Appendix-1

Inventory Sheet Forms

OYO INTERNATIONAL CORPORATIO	
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A1-2

	(RCD: Road C	losure Disaster, FRCDa: Ac	tual Frequency of RCD	, FRCDp: Potential Frequency	of RCD, FRCDpwc: P	otential Frequency of RCD wit	h countermeasure)										
						Preliminary invento	y survey										
				-	Sheet 1										S	heet 2	
	Region Name	Engineering District	Road ID	Road Name	Road Section ID	Road Classification	Side of Survey			ation		Survey	Disaster	FRCDa	Disturbance	FRCDp	Necessity of
Survey ID							Right side of road, Left side of road	Start (km)	Start (m)	End (km)	End (m)	Length (m)	Туре	(nos. /year)	Situation	(nos. /year)	detailed inventory survey
																	-
																+	+
	L	1			1 1		- I		1	1	1	1	1.	1	1	1	1

Integration Table of Risk Management for Road Slope Disasters (1/4)

The Study on Risk Management for Sediment-Related Disaster on Selected National Highways in the Republic of the Philippines

							Detaile	d inventory su	irvey					
							8	Sheet 5 (1)						
	Potential Disa	ster Magnitude	No. of predicted	AADT Annual		Potential	annual loss				Countermeasur	e alternative I		
Survey ID	Accumulation volume on the road per RCD	LRC: Length of Road	closure days of the whole width	Average Daily Traffic on the survey site (vehicles/day)	cost per RCD		Annual detour cost (pesos/year)			ratio in RCD due to countermeasure	Decrease in annual loss due to countermeasure (pesos)	BCR : Benefit/Cost Ratio at 15% discount rate (ratio)	ENFV Economic Net Present Value at 15% discount rate (pesos)	EIRR: Economic Internal Rate of Return (%)
								0						
					======							i		
									-			1		
			±					-					-	-
							2		-					
			2											
		-			-	-								

Integration Table of Risk Management for Road Slope Disasters (2/4)

	1					De	etailed Inventor	y Survey					
	Sheet 5						-	-					
				itermeasure alterna	Sectore a sector a se						ure alternative II.		
Survey ID	Cost of countermeasur e with 20 years maintenance (pesos)	due to countermeasur	Decrease in annual loss due to countermeasure (pesos)	countermeasure	BCR Benefit/Cost Ratio at 15% discount rate (ratio)	at 15%	EIRR: Economic Internal Rate of Return (%)	Cost of countermeasur e with 20 years maintenance (pesos)	ratio in RCD due to countermeasure	to	BCR: Benefit/Cost Ratio at 15% discount rate (ratio)	ENPV Economic Net Present Value at 15% discount rate (pesos)	EIRR :Econom Internal Rate o Return (%)
_													
						12			÷				
			Ì									1	
	ő		-		-	12						7	4.
										-			
_	-												
_				_		1				-			
	1												
	-				-	2			x2				

Integration Table of Risk Management for Road Slope Disasters (3/4)

	Countermeasure	progress ma			
Survey ID	Selected countermeasure plan	Budget (pesos)	Proposed implementatio nyear	Situation of countermeasure implementation, planned, ongoing, completed	FRCDpwc: FRCDp with selected countermeasure pla (pesos/year)
	-				

Integration Table of Risk Management for Road Slope Disasters (3/4)

Side of survey Left		ntory survey,		Responsit km Survey date	Road Section		Autivey side in Month	Year
Side of survey Left Disaster type SC: S Vame of surveyor for pro- heet 1, 2 Vame of surveyor Photographs General View	side of road Soil Slope Colli eliminary inver	lapse ntory survey;						Year
side of survey Left Disaster type SC: S Name of surveyor for pro- heet 1, 2 Name of surveyor Photographs General View	side of road Soil Slope Colli eliminary inver	lapse ntory survey;						Year
Disaster type SC: S lame of surveyor for pro- heet 1, 2 lame of surveyor thotographs General View	Soil Slope Colli eliminary inver	ntory survey,		Survey date		Date	Month	Year
lame of surveyor for pro heet 1, 2 lame of surveyor thotographs General View	eliminary inver	ntory survey,		Survey date		Date	Month	Year
lame of surveyor hotographs ieneral View	n should be par	aid		Survey date				104
Photographs General View	n should be par	aid						
General View	n should be par	aid						
Note	Numari	cal value or terms	should be income	tod				
	I SALIDING ST		should be input natically inputte					
Checking and appro		cal value is autom		<u></u>	<u> </u>			

Inventory Sheet 1 General Information

nventory Sheet 2-1 toad Name	Selection of detail				_	
tation from		Ø	, m	Û.		
	Lett side of road					
. Evaluation by actual frequency		Disaster (RCD) at 10 years should be im	unted However in cas	e countern easures we	re done w	ithin last
RCDa: Actual frequency of RCD	10 years, Numbers of 1	RCDs after countermeas or 10 years as period of	nres should be inputted			
Ia: Number of RCDs			nos.			
a: Period of disaster record			year	> FRCDa >	0.1	Yes
FRCDa Na/Ya			пов. рег уса			Yes
RCDbc: Actual frequency of road clo						
ibc: Number of RCDs before counterme (bc: Period of available disaster record b			nos. year			
RCDbc=Nbc/Ybc	erore countermeasures		nos per year			
. Evaluation by disturbance situ	ation				_	-
(d: Visible disturbance is present	uon	Yd V	isible disturbance is pr	escut		
. Evaluation by potential frequen	ev of RCD (FRCI	Ini		Yes	(
and the second	Sale Class A. Cola			_	400-00	
actor items for FRCDy	Factor categories for	FRCDp				ncy score RCDp
	· · · ·				IOF EL	RCDP
		Geometry				
ength of survey site: L	L > 300 m	300m > L >= 200 m	200m > L >= 100 m	$100m \ge L$		
requency score for FECEs	0.16	0.041	-0.005	-0.028	а	(0.028
e orten a secon dell'a centra della del	11	0	1000 x 11 x x 20 m	20	-	-
leight of mountain side slope: 11 requency score for FRCDp	H >= 90 m 0.019	90m >H >= 60 m 0.019	60m >H >= 30 m 0.01	30m ≥ H 0.01	b	0.000
requery source of PRCEP	0.019	0.019	0.01	0.01		
Fradient of slope: G	G > 60°	$60^{\circ} > G > 40^{\circ}$	40° > G > 20°	$20^\circ > G$	- I.	
requency more for FRUEp	0.092	-0.019	-0.019	-0.054	C	0.000
	0	0	- 0	0	-	
Distance from road to toe of	1 m > D	3m >= D > 1m	5m >= D > 3m	D > 5 m.		
n onn tain sid e slop e : D requency soore for FRCDp	0.089	0.007	-0.043	-0.043	d	0.000
	Ô.	0	9	0		
ilope shape requency store for FRCEp	Valley type 0.028	Straight type 0.028	Ridge type 0.002	Combined type 0.002		0.000
regione, ion - in course	0.020	0	.0	0.002		1012 1000
		Surface situation				
		14	142	Surface protection	-	
fominant vegetation/ surface covering	Bure	Grasses	Trees	(without vegetation)	6	0.000
squency serve for PECIDp	0.051	0.007	0.007	0		0025775
	0.	0	0	0	-	-
Commant materials of slope surface	Sift, Clay	Sand	Gravels, Cobbles, or	Surface protection		
and the second		entra Valet	Boulders	(without vegetation)	g.	0.000
requency score for PRCDp	-0.014	-0.005	-0.005	0		
area ratio of bedrock exposure: AR	AR >40%	40% >= AR > 20%	$20\% >= \Lambda R > 0\%$	AR = 0%		C a Maria
requency score for EB (TDp	0.046	0.017	0.003	0.003	h	0.000
faterials of Bedrock	Fractured rock	Weathered rock	Soft fresh rock	Hard fresh rock	-	-
requestly more for FR/7Dp	0.058	0.014	0.014			
MANUCALIZZ TRANSFORM	0	0	.0	0	t t	0.000
requency serve for FRCDp.	Unknown -0.01					
requerter and receipt	0					
pring/ Surface water	Present	None			1.	0.000
requency score for FR.GDp.	0.297	-0.023			1	0.000
		Disturbance				
rosion on the slope	Erosion	Piping hole				
requency prore for FR/CDp	0.072	0.654			k	0:000
eformation/Collapse	Collapse/Shmp	Cracks, Crevices	(/allen/ inclined trees	Depression/		-
	March March			Upheaval	£ .	0.000
requency more for ERCITIP	0,051	0.229	0.12	0.062		
FRCDp	without existing co	ountermeasure ino	s per year).		m=SUM (s	0 0.000
		Countermeasure				
xisting countermeasure	Guard fence	Catch wall	Slope drainage	Shotcrete	i i	
cefficient of effectiveness of countermeasure	0.2	0.2	0.1	0.2		
A COLOR DO DO DO	Retaining wall	Vegetation	Other	Eperity countermeasure	a	1.000
ouffiment of effectiveness of countermospare	0.1	0.4	0.9			
	ERCTR of com	olupie (nos. per vec	0		0°m*n	0.001
	the phonental	table that per ver	49	12-	0.11.1	0.000
Comprehensive evaluation			1	FRCDp > 0.1	>Yni	Selec
1				~	1.14	inve
iote	I should be inputted	to selected category's ce	-n.			
lote	1 should be inputted	when corresponding to			_	arts
ote	1 should be inputted Numerical value is an	when corresponding to utomatically inputted.	situation	Commentantice	a lugar	
ote CD: Ruad closure disaster; 11 include	1 should be inputted Numerical value is an Numerical value or to	when corresponding to utomatically inputted. erms should be inputted	situation	Comprehensive F Necessity of Deta		

Load Name	0					
tation from ide of Survey		0	m	0		
I. Evaluation by actual frequence		Maaster (RCD) t 10 years should be imp	nted. However, in case	counterm easures were	done within	i last 10
RCDa: Actual frequency of RCD	years, Numbers of RCE	os after countermeasures	should be inputted. An			
sa: Number of KCDs after countermeas	should be substituted to ures have been	r 10 years as period of d	isaster record. nos			
installed Ya: Period of available disaster record			vear 🔽	+ FRCDa >	0.1	>
FRCDa =Na/Ya			nos. per year	Tacha	0.1	Yes
FRCDbc: Actual frequency of road cl	osure disaster before co	ountermeasure				1
Nbc: Number of RCDs before counterm Ybc: Period of available disaster record	easure have been installe		nos. year			
RCDbc =Nbc/Ybc			nos. per year			
2. Evaluation by disturbance situ	uation			_	_	
Yd: Visible disturbance is present	-	Yd Yd	isible disturbance is pr	esent		
3. Evaluation by potential freque	ency of RCD (FRCD	(q(Yes		
Factor items for FRCDp	Factor categories for I	FRCDp			Frequency FRC	
		Geometry				
Length of survey site: L	L >= 300 m	300m > L >= 200 m	200m >L >= 100 m	100m > L		
Frequency score for FRCDp	0.195	0.024	0.014	-0.017	8	(0.017
	0		0			
Height of mountain side slope: H	H >= 90 m	90m >H >= 60 m	60m > H >= 30 m	$30 \mathrm{m} > \mathrm{H}$	22	araac
Frequency score for FRCDp	0.067	0.067	-0.013	-0.013	b.	0.000
	0	0	0	0		-
Gradient of slope: G	$G \ge 60^{\alpha}$	$60^{\alpha} > ~G > -40^{\alpha}$	$40^{\sigma} \ge G >= 20^{\sigma}$	$20^{\circ} \ge G$	c	0.000
Frequency score for FRCDp	0.019	0.019	0.019	-0.235		0.000
Distance from road to toe of	0 1 m > D	0 3m >= D > 1m	5m >= D > 3m	D > 5m		-
mountainside slope : D	13012 0-255	Telen com Addes Arthin	Concept of the second second		đ	0.000
Frequency score for FRCDp	0.029	0.029	-0.058	-0.058		
Slope shape	Valley type	Straight type	Ridge type	Combined type		1
Frequency score for FRCEp	0.018	0.018	0.011	0.011		0.000
	0	Surface situation	¥	0	<u> </u>	1
Dominant vegetation/ surface	57		022	Surface protection		r
covering	Bare	Grasses	Trees	(without vegetation)	f	0.000
Frequency store for FRCDp	0.041	0.041	-0.068	0	(A)	ESTAR
Dominant Materials of slope surface	Fractured rock	Weathered rock	Soft fresh rock	Hard fresh rock		1
Frequency score for FRCDp	0.031	0.031	0.031	-0.143	g	0:000
Spring/ Surface water	0 Present	0 None	0	0		-
Frequency some for FRCDp	0.25	-0.013			h	0.000
	.0				<u> </u>	
Deformation/ Collapse on the slope	r	Disturbance Open crack below an			-	-
service and the sub-	Fall, collapse	overhang	Topp	ing		
Frequency score for FRCDp	0.074	0.044	0.1			
	0	.0		0	×.	0.000
	Cross open cracks to c	ause wedge shape slide	Sliding direction	n open cracks		
	0.1	121	0.0			
Frequency score for FRCDp	-0.1	0	0.0	0		
FRCB	p without existing o	ountermeasure (no	s, per year)		pestim (an)	0.000
	r	Countermeasure			_	_
Existing countermeasure	Guard fence	Catch wall	Shotcrete	Rock shed		
Coefficient of effectiveness of countermeasure	0.3	0.1	0.2	0.01	10	(TWO)
	Other	0	0 pecify countermeasure	0	k	1.000
Coefficient of effectiveness of countermeasure	0.6		e and a second second			
	0	1			1.00	0.000
t Commentanting and without	erec.up of survey	stope (nos. per yes	10.	×	⊨j*k	0.000
4 Comprehensive evaluation Note			سيسا المستعمد ومستعد ومستعد	FRCDp = 0.1		Select
		o selected category's cel		<	- 86	invent
	1 should be inputted v Numerical value is au	when corresponding to site	tuation	~		
		mus should be inputted.		Comprehensive E	valuation	1
			and the second state of th			yes =1,
CD: Road closure disaster: It includ Disturbance: deformation and collapse	es not only the whole rot	ad closure but also partia	D and are called	Necessity of Detail	led	no =0

and the second se	D.	1	Ő.		_
km Right side of road	u	m	0.		
of Road Closure	Disaster (RCD)				
Number of RCDs in la years, Numbers of RCI	st 10 years should be in Ds after countermeasure	es should be inputted. An			
should be substituted h ires have been	the second				
			FRCDa	0.1	>
•	0.000.	nos, per year		-	Yes
ation					
	Yd: Visi	ble disturbance is preser			-
ncy of road closure	e disaster (FRCDp)	\sim	Yes	_	_
Faster esteration for	EDCDa			Frequen	y Score
Factor categories for	РКСОр			for FF	CDp
	Geometry				_
L >= 300 m	$300m \ge L \ge 200 m$	200m > L >= 100 m	100m > L		0.010
0.04	0.03	0.02	0.01		0.010
G>=60°	$60^{\circ} > G > 40^{\circ}$	$40^\circ > G > = 20^\circ$	20° > G		
0.04	0.01	0.005	0.001	b	0.000
0 Malley type	0 Straight type	0 Ridee tune	Combined type		-
0.05			0.01	¢	0.006
0	9 Surface situation	[0] F	0		
Bare			Surface protection	1.1	1
2002		1.		d	0.000
0	0	0	0		
Silt_Clay	Sand	Boulders	(without vegetation)		
0.02	0.01	0.005	0.001		0.000
Fractured rock	Weathered rock	Soft fresh rock	Hard fresh rock		Achiever
0.01	0,01	0.01	0.001		
Present	None			ø	0.000
0.05	0.001			<u></u>	10.000
	Disturbance				
-Erosion -0.03				g	0.000
0	0		Depression/		
CONTRACTOR CONTRACTOR OF A CARACTERISTICS	CELESCONDUCTIONS CONTR.	Province of the Letter Section 471 (2021)	Uphcaval	h	0.000
0	0	0	0.05		
e without existing				istra the second	0.010
Slope/P and drainage		Cutwork of landslide	Embankment of	_	1
1 N	*	head	landslide toe		
0		20023	0	- Y	1.000
Catch wall	Other	Specify cou	ntermeasure		1.000
9.5	0.3				
0	0			1	1 A FR
T KC UP OF XIII VO	antice (nov her a	une.	×	K-17]	0.010
and the second			FRCDp > 0.1		Select
			\smallsetminus	YES	detailed
		situation	\sim		-
	erms should be inputted		Company to a loss have	and the second	
is not only the whole ro			Comprehensive Ex Necessity of Details		yes=1.
	Right side of road y of Road Closure Number of RCDs in la years, Numbers of RC should be substituted f res have been fore countermeasure astron res for categories for L >= 300 m 0.04 0 G >= 60° 0.04 0 G >= 60° 0.04 0 G >= 60° 0.04 0 G >= 60° 0.04 0 G >= 60° 0.04 0 G >= 60° 0.04 0 G >= 60° 0 0 Silt_Clay 0.02 0 Fractured rock 0.01 0 Fractured rock 0.01 0 Fractured rock 0.01 0 Fractured rock 0.01 0 Silt_Clay 0 Collapse/ Shump 0.03 0 Collapse/ Shump 0.03 0 Collapse/ Shump 0.03 0 Collapse/ Shump 0.03 0 Collapse/ Shump 0.03 0 Collapse/ Shump 0.03 0 Collapse/ Shump 0.05 0 1 should be inputted 1 should be inputted 1 should be inputted 1 should be inputted 1 should be inputted	Right side of road y of Road Closure Disaster (RCD) Number of RCDs in last 10 years should be in last 10 years seperiod of reshue been Image: should be substituted for 10 years as period of reshue been 0 Image: should be substituted for 10 years as period of near seperiod near seperiod of near seperiod near	Right side of road y of Road Closure Disaster (RCD) Number of RCDs in last 10 years should be inputted. However, in case years, Nambers of RCDs after countermeasures should be substituted for 10 years as period of disaster record. ashould be substituted for 10 years as period of disaster record. res have been 0 nos. 10 year 0.000 nos. per year offere countermeasure 0.000 nos. per year asure 0 nos. 10 jear 0.000 nos. per year eation Yd. Visible disturbance is presentery record closure disaster (FRCDp) Factor categories for FRCDp Factor categories for FRCDp G = 60° 60° > G = 40° 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Right side of road y of Road Closure Disaster (RCD) Number of RCDs has to genes should be inputted. However, in case countermeasures wore years, Numbers of RCDs after countermeasures should be inputted. And the years after the con- should be abaterized for 10 years as period of disaster record. The should be inputted for 10 years as period of disaster record. The countermeasure asarc 0 years 0,000 nos per year asarc 0 years 0,000 nos per year asarc 0 years 0,000 nos per year asarc 0 years 10 year 10 year	Right and of road v of Road Closure Disaster (RCD) Number of RCDs flat to years specified of disaster regard. res line been 0 nos. 0 nos.

NIPPON KOEI CO., LTD. OYO INTERNATIONAL CORPORATION

Road Name	0	0	1051	6		
Station from Side of Survey	0 km	2	m			
1. Evaluation by actual frequency of F						
FRCDa: Actual frequency of RCD	Number of RCDs in last years, Numbers of RCD be substituted for 10 year	s after countermeasures a	hould be inputted. And			
Na: Number of RCDs after countermeasures ha			nos			-
Ya: Period of available disaster record			year	FRCDab	- 0.1	\geq
FRCDa=Na/Ya		0.000	nos, per year		-	Yes
FRCDbc: Actual frequency of RCD before c	ounterm easure		1 bet 7		1	
Nbc: Number of RCDs before countermeasure Ybc: Period of available disaster record FRCDbc =Nbc/Ybc	3	10	nos. year nos. per year			
2. Evaluation by disturbance situation	e	0.000	nos pri 2xa		4	
Yd: Visible disturbance is present			sible disturbance is pres	ent		
3. Evaluation by potential frequency o	f road closura disasi	or		Yes		
Factor items for FRCDp	Factor categories fo	· station			Frequency	
	1.1				for FRCD	A
	F 200 m	Geometry	200	100 1		
Length of survey site: L Frequency score for FRCDp	L >= 300 m 0.199	300m ≥ L >= 200 m 0.059	200m > L >= 100 m 0.022	100m > I. -0.00	a	(0.007)
	0	1	Ū	0.00		
Height of Valley side slope: H	H ≥ 90 m	$90\mathrm{m} > \mathrm{H} >= 60\mathrm{m}$	60m > H >= 30 m	30m ≥ H	100	0.000
Frequency score for FRCDp	0.115	0.021	0.004	-0.025	b	0.000
Gradient of valley side slope	G >= 60°	$60^{\circ} > G >= 40^{\circ}$	$40^{\circ} > G >= 20^{\circ}$	20 ⁿ ≻ G	1/2	
Frequency score for FRCDp	0.032	0.015	-0.032	-0.032	e	0.000
	0	0	.0	0	1	
Distance from road to head of valley side slope	1 m > D	3m >= D > 1m	5m >= D > 3m	D > 5m	2	7.00000
Frequency score for FRCDp	0.048	0.027	-0.045	-0.045	d	0.000
9	0 Valley by c	0	Didas trus	Combined type)	
Stope shape Fraguency score for FR-CDp	Valley type 0.029	Straight type 0.029	Ridge type 0.029	Combined type -0.014		0:000
Mendary and a second second	0	0	0		1	
	r	Surface situation			9	_
Dominant vegetation/ surface covering	Bare	Grasses	Trees	Surface protection (without vegetation)		
Frequency score for FRCDp	0.104	0.016	-0.014	(without vegetation) -0.07	E	0.000
A more and a second k	0.101	0.010	-0.014	-0.07		
Slope type	Embankment slope	Combined or unknown	Natural slope			
Frequency score for FRCDp	0.102	9.013	-0.026		8	0.000
	0	0	0 Gravels, Cobbles, or		-	
Dominant materials of slope surface	Silt, Clay	Sand	Boulders			
Frequency score for FRCDp	0.015	0.015	-0.036		141	
	0 Fractured rock	0 Weathered rock	0 Soft fresh rock	Hard fresh rock	, n	0.000
Frequency score for FRCDp	-0.063	weathered rock -0.063	-0.063	-0.063		
	0	0	0		1	
Spring/ Surface water Frequency score for FRCDp	Present 0.049	None 0.003			E.	0.000
	0	0				THE REAL
Rain water flows from road to valley side Frequency score for FRCDp	Yes 0.021	No -0.038			. j	0:000
and and shirt of earlier	0.021	-0.038				and an
		Disturbance				
Erosion in valley side slope Frequency score for FRCDp	Erosion is present 0.017	Piping hole is present 0.017			k	0.000
	0	0.017			-	
Deformation/Collapse on the slope	Cracks/Crevices on road	Depression on road	Fall, Shump in valley side slope			
Prequency score for FR/CDp	road 0.044	0.046	side stope 0.061		E.	0:000
	. 0	0	0			-
FRCDp	without existing con		REALER FOR THE PARTY OF THE PAR		m=SUM (s'l)	0.000
		Countermeasure		Page 1	4	
Existing countermeasure	Road drainage	Retaining wall	Other	Specify countermeasure	1.000	110 0000
Coefficient of effectiveness of countermeasure	0.05	0.05	0.5	A CONTRACTOR DECKAR	п	1.000
	ERI Do of survey s	0 tope (nos. per year)	0		o≕m*u	0.000
	and particular subjects	(and a second second second		*	9-m-n	0.000
4 Comprehensive evaluation				FROD		Select fo
Note	1 Marcana Providence		<	FRCDp >= 0.1	Yes	> invento
		selected category's cell. hen corresponding to sit	uation	\sim	4.66	ł
	Numerical value is aut Numerical value or ter			Comprehensive Ex		

Ľ.

Inventory Sheet 2-5	Selection of detaile	d inventory survey	sites for DF			
Road Name	0			8		
Station from Side of Survey	Right side of road	1	m	0		
1. Evaluation by Actual Freq FRCDa: Actual Frequency of RC	Number of RCDs in las [last 10 years, the Numb	t 10 years should be inpu er of RCDs after the pro	vision of countermeas	ure should be inputt		
Na: Number of KCDs after counter	neasures have been	0.1	IOS.	FRCDa =	= 0.1	-
nstalled fa: Period of available disaster reco FRCDa =Na/Ya	ord	10 3	ruser.	- TRCDa	- 0.1	Yes
RCDbc: Actual Frequency of Ro	ad Closure Disaster be					
vbc. Number of RCDs before Coun	termeasure	0 r				
Ybc: Period of Available Disaster R RCDbc=Nbc/Ybc	ecord	10 1	ear los. per year			
and the state of the second	CTA	0,000 1	ios. per year			
 Evaluation by Disturbance d: Visible disturbance is present 	Situation		listurbance is present	>		
. Evaluation by Potential Fr	equency of Road Cl	osure Disaster		Yes		
actor Items for FRCDp	Factor Categories for		1.1		Frequenc for FR	
		Geometry			2	
Width of channel: W	3>=W	5>=W>3	10 >= W > 5	W>10		
requency score for FRCDp	0.06	0.06	-0.004	-0.004	a	0.060
the second s		0	0	0		-
Area of drainage basin : A	A >= 0.5 km ²	0.5 km ² ≥A ⇒	J 1960 - 1190	$0.15 \mathrm{km^3} > \mathrm{A}$	b	0.000
requency score for FRCDp	0.074	0.07	4	-0.007 0		
leight from channel bottom to oad: H	1 m >= H	2 m > = H > 1 m	$5 \mathrm{m} >= \mathrm{H} > 2 \mathrm{m}$	H>5m	ĕ	0.000
requency score for FRCDp	0.032	0.032	-0.013	-0.013		0.000
	0	0 Surface situation	0	.0		
Oominant vegetation of drainage	Bare	Grasses	Trees	Unknown	F	T
Fea requency score for FRCDp	0.11	0.016	0.001	0	d	0.000
70 G 12	0	Ó	Ö	Û		-
Dominant materials of river sediment	Cobbles, Boulders	Gravel	Sand, silt, clay	bedrock	e	0.000
requency score for FRCDp	0.141	0.066	-0.012	-9.016	0	0.000
	01	Disturbance	. 0			
Slope failure situation in	More than 5 slope	2-4 slope collapses	1 slope collapse	No slope collapse		
ir ainage area Frequency score for FRCDp	collapses 0.358	0.07	-0.015	or Unknown +0.015	ß	0.000
	.0	0	0	0		
Frace of debris on or beside the out	Present	None			1.221	0.000
requency score for FRCDp	0.133	-0.054			g	0.000
FRCD	p without existing o	ountermeasure (no	s per year)		h=SUM(alp	0.060
		Countermeasure				
Existing countermeasure	Small check dam (less	Sabo dam (equal to more than 10 m	Other	Specify		
	than 10 m height)	height)		countermeasure	i.	1.000
coefficient of «Ifectivenent) of countermeasure	0.05	0.01	0.1			
	FRCDp of survey	slope (nos. per yea			j=h+i	0.060
Comprehensive evaluation				×	-	1.2.2
inte	1 tokontal ba baanne te	o colorial colorial in the		FRCDp >= 0.1	>	 Selection detail
	1 should be inputted v	o selected category's cell when corresponding to si		~	Yes	Lawran
	Numerical value is au	tomatically inputted.		Comprehensive	8	
RCD: Road closure disaster; It In	cludes not only the whol	e road but also partial ro	ad closures	Evaluation		yes=1
Disturbance: Deformation and coll	apses that do not result to	the road closure is not	considered RCD but	Necessity of Del		no =0
nly called 'disturbance'				Inventory Survi		

Station from	0 km	0	m	0		
Side of Survey	0	-			_	
1. Evaluation by actual freque			united Theorem in the series		and discourses	ittein Lone
FRCDa: Actual frequency of RCD			suffed. However, in case			nnin las
N 10.62 P. D. S. N. W. S.	countermeasures should		ears as period of disaste		die,	
Na: Number of KCDS after counterme ostalled	asures nave ocen	0	nos.		-	
Ya: Period of available disaster record	1		year	+ FRCDa >	=0.1	Yes
FRCDa =Na/Ya		0.000	nos, per year	\sim	-	
RCDbe: Actual frequency of RCD be				5		
Nbc: Number of RCDs before counter Vbc: Period of available disaster record			nos. year			
RCDbc=Nbc/Ybc	M		nos, per year			
2. Evaluation by disturbance s	ituation					
Yd. Visible disturbance is present	+	Yd: Vis	ble disturbance is	<u> </u>		
3. Evaluation by potential freq	uency of road close	and the second second second		Yes		
. Evaluation of potential free	dency of road close	ne unsaster (rite)	P)	1		
Factor items for FRCDp	Factor categories for	FRCDn			Frequency	
ractor neurstor PRCDp	Factor categories for	ricop			for FR	CDp
		Constant				
Length of survey site: L	L >= 300 m	Geometry 300m > L >= 200 m	200m>L>=100 m	100m>L		-
requency score for FRCDp	0.141	0.141	0.009	0.009	a	0:009
		0	Û	1.		
Distance from low water to road: D	0.5 m > = D	$1 \text{ m} \ge D \ge 0.5 \text{ m}$	2 m > = D > 1 m	D >2 m	b	0.000
requency score for FRCDp	0.057	0	-0.034	-0.034		23996669
Width of river stream at low			v.			
water discharge : W	W >= 10 m	10 m > W >= 5 m	$5 \mathrm{m} > \mathrm{W} >= 3 \mathrm{m}$	3 m > W	с	0.000
requency score for FRCDp	0.045	0.009	0.009	0		
	0	0	0	0		<u> </u>
leight from high water to road	0 m>=H	1 m > H >= 0 m	2 m > H >= 1 m	H≫2 m		
surface or head of revetment; H	1381-11-12 - 555	058994 SPE3 - 802.5.1	38904 9945 - 3536C	2 1998 - 2 1997 J	d	0.000
requency score for FR CDp	0.322	0.322	0.013	-0.056		
		Surface situation				
Dominant materials of river bank	Cobbles, Boulders	Gravel	Sand	Silt, Clay		
requency score for FRCDp	0.051	+0.009	-0.009	+0.009		
	0	0	0	0	12	10000
	Bedrock	Artificial structure			e	0.000
requency score for FRCDp	-0.009	(without vegetation) 0				
requency score for PKCDp	-0.009	0				
Dominant materials of river bed	Cobbles, Boulders	Gravel	Sand	Silt, Clay		
requency score for FRCDp	0.043	0.043	-0.069	-0.069		11 TV advertise
	0 bedrock	0	0	.0	f	0.000
requency score for FRCDp	-0.069					
	0	Distant				
Deformation/ Collance / Fractor	(a.) a ()	Disturbance		· · · · · · · · · · · · · · · · · · ·		-
Deformation/ Collapse / Erosion	Cracks, Crevices on road	Depression on road	Fall, Slump, Erosion in river side slope			101000
requency score for FR CDp	0.071	0.071	0.071		g	0,000
	0	0	0			
ERCIDp w	ifhout existing cour	ntermeasure effect	(nos. per year)		h = SUM(x g)	0.009
		Countermeasure		8		
Existing countermeasure	Revetment	Groin/ spur dike	Other	Specify Countermeasure		
Coefficient of effectiveness of countermeasure	0.05	0.05	_0.1	Sourcemeasure	1	1.000
	0	0	0		10.14	
	FRCDp of survey	slope (nos. per-ye	ari		j=h *i	0.009
Comprehensive evaluation				~		
	****			FRCDp	\rightarrow	Select
Note	1 should be imputted	to selected category's co	a	=0.10	Yes	inve
		when corresponding to		~	11122	-
	Numerical value is a	itomatically inputted.		Comprehensive		
RCD: Road closure disaster; It incl Sisturbance: deformation and collap	Numerical value is a Numerical value or to ides not only the whole	atomatically inputted, arms should be inputted road closure but also p	artial road closures	Comprehensive Evaluation		yes=1

NIPPON KOEI CO., LTD. OYO INTERNATIONAL CORPORATION 2

Selection of detailed inventory survey sites for CE **Inventory Sheet 2-7** ad Name m 0 tation from km 0 Right side of road ide of Surv 1. Evaluation by actual frequency of Road Closure Disaster (RCD) Read Closine Disaction (RCD) Number of RCDs in last 10 years should be inputted. However, in case countermeasures were done within FRCDa: Actual frequency of RCD last 10 years, Numbers of RCDs after countermeasures should be inputted. And the years after the Na: Number or KCDs atter countermeasures have been installed Ya: Period of available disaster record FRCDa=Na/Ya FRCDa >= 0.1 10 year 0.000 nos. per year Yes FRCDbc; Actual frequency of RCD before countermeasure Nbc: Number of RCDs before countermeasure (if 0 nos. countermeasure is installed) Ybc: Period of available disaster record 10 year FRCDbc=Nbc/Ybc 0.000 nos. per year 2. Evaluation by disturbance situation Yd: Visible disturbance is present Yd: Visible disturbance is present Yes 3. Evaluation by potential frequency of road closure disaster Frequency Score for FRCDp Factor items for FRCDp Factor categories for FRCDp Geometry Length of survey site: L L >= 300 m 300m > L >= 200 m $200 \mathrm{m} \ge \mathrm{L} >= 100 \mathrm{m}$ 100m>L (0.024 a requency score for FRCDp 0.14 0.0; 0.05 -0.03 Distance from high water coastal 0.5 m >= D $1 \text{ m} \ge = D \ge 0.5 \text{ m}$ 2 m > = D > 1 mD > 2 mline to road : D b 0.000 frequency score for FR CDp 0.027 0.02 0.019 0.01 Height from high water to road 0 m >= 111 m > H >= 0 m $2 \mathrm{m} > \mathrm{H} >= 1 \mathrm{m}$ 11>=2 m formation or head of revetment : H c 0.000 Frequency score for FR.CDp 0.04 -0.14. -0.14 Surface situation Dominant materials of coastal Cobbles, Boulders Silt, Clay Gravel Sand hank Frequency score for FRCDp 0.053 0.05. 0.046 0.004 đ 0.000 Artificial structure bedrock. without vegetation -0.12 0.004 Frequency score for FRCDp Dominant materials of coast Cobbles, Boulders Gravel Sand Silt, Clay equency cove for FRCDp 0.17 0.012 -0.005 -0.00 0.000 c Bedrock Frequency score for FR CDp -0.00 Disturbance Erosion of coastal side slope Erosion of revetment Erosion of costal side slope or revetmer Collapse of revetment foot back fill 0.000 f requency score for FR CDp 0.030 0.03 0.03 Deformation/ Collapse Cracks, Crevices on Depression on road road 0.000 8 Frequency score for FRCDp 0.230 0.10 h=SUM(arg) 0.000 without existin countermeasure (no Vear Countermeasure Existing countermeasure Revetment without Revelment with foot Wave-absorbing foot foundation foundation works 0.05 0.0 oefficient of effectiveness of con i 1.000 Other Specify countermeasure Coefficient of effectiveness of counterment i=h*i 0.000 FRUDp of survey slope (nos, per year) 4 Comprehensive evaluation Select for detailed FRCDp = 0.10 Note inventory section 1 should be inputted to selected category's cell. Yes 1 should be inputted when corresponding to situation Numerical value is automatically inputted. omprehensive Numerical value or terms should be inputted. RCD: Road closure disaster; It includes not only the whole road closure but also partial road closures Disturbance: deformation and collapses that do not close the road is not included in RCD and are called valuation ycs=1. 0 vecessity of Detailed no =0

NIPPON KOEI CO., LTD. OYO INTERNATIONAL CORPORATION

'disturbance'

Inventory Survey

Road Name Station from	0 km 0	m 0	Side of survey	Left	side of	road
	ordinator for detailed inventory			1		
arvey; sheet 3, 4, 5			ey date (d/m/y)	Date	Month	Yea
vame of surveyor						
3-1 Front view sketche	8			scale:		
				scare.		
-2 Cross section skete	hes					
				scale:		
Note						
151e	Numerical value or terms shou Numerical value is automatica					

NIPPON KOEI CO., LTD. OYO INTERNATIONAL CORPORATION

oad Name	3						
tation from	km		m	0 Side of surv	ey Left sic	le of road	
1 Plan of counterme 2 Section of counter							
	with 20 years ma	intenance Work		Unit	Quantity	Unit price (pesos)	-
).	vith 20 years ma			Unit	Quantity	Unit price (pesos)	9
	with 20 years ma			Unit	Quantity	Unit price (pesos))
1	with 20 years ma			Unit	Quantity	Unit price (pesos)	
2 3	vith 20 years ma			Unit	Quantity	Unit price (pesos)	Amount (pesos)
5. 1 2 3 4 5	with 20 years ma			Unit	Quantity	Unit price (pesos)	
2 3	with 20 years ma			Unit	Quantity	Unit price (pesos)	
6. 1 2 3 4 5 6	vith 20 years ma		Total Co		Quantity	Unit price (pesos)	
3 4 5 6 7	vith 20 years ma		Total Co		Quantity	Unit price (pesos)	
5. 1 2 3 4 5 6		Work			Quantity	Unit price (pesos)	

	3							
tation from	km	0	m	0 Side of sur	vey	Left sid	e of road	
1 Plan of counterm	éasures (plan layou	t and descr	iptions)					
2 Section of counts	rmeasures							
	with 20 years maint							
		enance Work		Uni	t	Quantity	Unit price (pesos)	Amounit (pesos)
				Uni	t	Quantity	Unit price (pesos)	Amount (pesos)
				Uni	t	Quantity	Unit price (pesos)	-
).:]				Uni	t	Quantity	Unit price (pesos)	-
), 1 2					t :	Quantity	Unit price (pesos)	
0. 1 2 3					t	Quantity	Unit price (pesos)	
5. 1 2 3 4 5					t :	Quantity	Unit price (pesos)	
5. 1 2 3 4 5 6					t :	Quantity	Unit price (pesos)	
5. 1 2 3 4 5			Total Cox		t :	Quantity	Unit price (pesos)	
5. 1 2 3 4 5 6 7			Total Cos		t ::	Quantity	Unit price (pesos)	
x. 1 2 3 4 5 6		Work		sl	t	Quantity	Unit price (pesos)	
1 2 3 4 5 6 7	Numerica	Work	terms shoul		t	Quantity	Unit price (pesos)	

	3							
tation from	km	0	m	0 Side of	survey	Left sid	e of road	
1 Plan of counterm	easures (plan layout	and descrip	ptions)					
Section of counte	measures							
3 Cost actimation	vith 20 vaars mainta	1 2026						
	vith 20 years mainte				ffeit	Quantity	Unit mice (merce)	Amount (assa)
		nance Vork			Unit	Quantity	Unit price (pesos)	Amount (pesos)
).					Unit	Quantity	Unit price (pesos)	Amount (pesos)
1					Unit	Quantity	Unit price (pesos)	Amount (pesos)
0. 1 2 3					Unit	Quantity	Unit price (pesos)	Amount (pesos)
0. 1 2 3 4					Unit	Quantity	Unit price (pesos)	Amount (pesos)
0. 1 2 3					Unit	Quantity	Unit price (pesos)	Amount (pesos)
0. 1 2 3 4					Unit	Quantity 2	Unit price (pesos)	Amount (pesos)
5. 1 2 3 4 5					Unit	Quantity 2 3 4 4 5 4 5 5 5 7 5 7 7 7 7 7 7 7 7 7 7 7	Unit price (pesos)	
5. 1 2 3 4 5 6		Work	Total Cos		Unit	Quantity 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 4 5	Unit price (pesos)	Amount (pesos)
5. 1 2 3 4 5 6 7		Work	Total Cos		Unit	Quantity 2 2 3 4 4 4 4 4 4 4 5 4 5 4 5 7 5 7 7 7 7 7 7	Unit price (pesos)	
5. 1 2 3 4 5 6	1	Work	<u> </u>	t t t t t t	Unit	Quantity 2	Unit price (pesos)	
5. 1 2 3 4 5 6 7	Numerical	Vork	erms shoul	<u></u>	Unit	Quantity	Unit price (pesos)	

	0				
Km station from	F 0 11	km	0	m	
Side of Survey	Left side o	of road		_	_
Items	symbol	equation	Unit	Quantity	Remarks
(1) D	isaster F	Frequency and Magniti	ıde	_	
1–1) Potential frequency of road closure disasters	FRCDp		nos. per year	0.000	evaluated in sheet 2
1-2-1) Coefficient for volume estimation (method of dimension setting for collapsible material)	6			_	1-2-1) When dimmasons of collapsible roaterials cannot
1-2-2) Length of collapsible materials	b		m		predicted, "no input" should estected. And "Volume of
1-2-3) Width of collapsible materials	e.		m	-	coll apable material' is estim by Figure 3.15 m the Outle
1-2-4) Depth of collapsible materials	d		m		is directly inputted in the yel cell below
1-2-5) Volume of collapsible materials per RCD	c	e≈a*b*c*d	m ² per RCD	0	
1+2-6) Ratio of accumulation to collapsible materials	e.	c-a b c d	ratio		
1+2-0) Kallo of accumulation to conspilore materials	7,6 >		rauo	17	1-2-6) Evaluated by t
1-2) Accumulation volume on the road per RCD	<u>R</u>	g=e*í	m ³ per RCD	.9	Figure 3.16 of the Gu
(2) Ann	ual Los	ses without Counterme	asure		
2-1-1) Reopening cost per accumulation volume of road closure site	ħ		pesos per m ³		
(excluding fixed cost) Fixed cost for reopening per RCD			http://www.www.c.com		refer 3.4.2.2-1-1) of the Gu
A CONTRACT CONTRACT OF A CONTRACT		1.25×30×35310.2	pesos per RCD	10	
2-1) Annual reopening cost	1	J=FRCDp*(0*g+i)	pesos per year).0	refer 3.4 5.2-3) of the Gu
2-2-1) Average number of human deaths per RCD	k	k=0.008	ave. deaths per RCD	0.006	nde 342(7)23-1) of the Gu
2-2-2) Unit value of human life lost (death)	1		pesos per human life	2,300,000	mfer 3.4,7 (7) 7-2-7) of the Gu
2-2) Annual value of human lives lost	m	m=FRCDp*k*l	pesos per year		refer: 3.4.2 (2) 2-2) of the Gu
2-3-1) Length of survey road (from entry to exit point of detour road to	n		km		tefer 3.4.2 (2) 2-5-6) of the Go
avoid road closure site on survey road) Length of defour road (from entry to exit point of survey road to	0		km		refer 3.4.2 (2) 2-3-2) of the Gu
avoid road dosure site on survey road) 2-3-2) AADT: Annual Average Daily Traffic on the survey site	p		vehicles per day		refer 3.4.2 (2) 2-3-3) of the Ou
2-3-3) Nos. of predicted closure days of the whole width of the road on	q		days		mfer 34.2(2) 2-3-4) of the Ou
the survey site per RCD			pesos per		1008 2 4 2 (W) 2 5 4 0 40 100 100
2-3-4) Average Vehicle Operating Cost per km on survey road	- T		vehi cle*km		refer 3.4.2 (2) 2.3.5) of the Ou
Average Vehicle Operating Cost per km on detour road	. 8		pesos per vehi cle*km		
2-3) Annual detonr cost	Т.	t=FRCDp*p*q*(o*s-n*r)	pesos per year	0	m for 342 (2) 2-3) of the Ou
Total Annual Loss	u	u=j+m+t	pesos per year	Ö	pefer 3.4.2 (2) of the Ou
(3) Feas	ibility Ir	dicators of Counterme	asures		
		rmeasure alternative I			
3-1) Cost of countermeasure with 20 years maintenance	v I		pesos	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	wI		ratio		refer 3 4 2 (3) 3-8) of the Gu
3-3) Decrease in annual loss due to countermeasure	xI	x I≈u* wI	pesos per year	0	refer 3.4.2 (1) 3.3) of the Gu
Potential frequency of road closure disaster with countermeasure	FRCDpwc 1	FRCDpwc1=FRCDp*(1-wI)	ratio	0.000	
Benefit/cost ratio at 15% discount rate	BCRI		ratio	#DIV/0	mfar 3.4.2 (3) 3-4) of the Oc
Economic net present value at 15% discount rate	ENPV1		pesos	0	al menun disert danse er
Economic internal rate of return	EIRRI		percent	#NUM	
3-1) Cost of countermeasure with 20 years maintenance		measure alternative II			evaluated in sheet 4
	vII TR		ratio		A STREET BOLLET HILL STREET
3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure	wП xП	х II = u* wII	pesos per year	0	refer 3.4.2 (3) 3-2) of the Ou refer 3.4.2 (1) 3-3) of the Ou
Potential frequency of road closure disaster with countermeasure	FRCDpwc I		nos. per year	0.000	rister a si a fal a al at mis ca
Benefit/cost ratio at 15% discount rate	BCRII	instruction that is a second second	ratio	#DIV/0	
Economic net present value at 15% discount rate	ENPV II		pesos	0	refer 3.4.2 (3) 3.4) of the G
Economic internal rate of return	EIRR II		percent	#NUM	
		measure alternative III	10		
3-1) Cost of countermeasure with 20 years maintenance	vm		pesos	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	w III		ratio		refer 3.4.3 (3) 3-2) of the Ou
3-3) Decrease in annual loss due to countermeasure	хШ	x III = u * w III	pesos per year	¢.	refer 3.4.2 (3) 3-33 of the Gu
	FRCDpwc II	FRCDpwc III= FRCDp*(1- wIII)	nos, per year	0.000	
Benefit/cost ratio at 15% discount rate	BCRIII		ratio	#DIV/0	refer 3.4.2 (3) 3-4) of the O
Economic net present value at 15% discount rate	ENPV III		pesos	0	
Economic internal rate of return	EIRR III		percent	#NUM	1
			Numerical value or te	rtus should be int	nitted
	0		a contract of the second second second	and the set	

Road Name	0				
Km station from	-	km	0	m	(
Side of Survey	0				
Ttems	symbol	equation	Unit	Quantity	Remarks
(1) Di	saster Fr	equency and Magnitu	de		
1-1) Potential frequency of road closure disasters	FRCDp		nos, per year	0.000	evaluated in sheet 2
-2-1) Coefficient for volume estimation (method of dimension setting for collapsible material)					i-I-1) When dimensions of collopsible materials sumoth predicted, 'no upput' should b
-2-2) Length of collapsible materials	b		щ		relected. And 'Volume of
-2-3) Width of collapsible materials	c		щ		collapsible material" is estimately Vigure 3.15 m the Gaule o
-2-4) Depth of collapsible materials	đ		m		is directly inputted in the yell cell below
-2-5) Volume of collapsible materials per RCD	c	e=a*b*c*d	m ³ per RCD	0	
-2-6) Ratio of accumulation to collapsible materials	- ii		ratio	_	Taskin a state of
		g-e*f	V constanting	0	1-2-6) Evaluated by I Figure 3.16 of the Gui
1-2) Accumulation volume on the roud per RCD	8		m ³ per RCD	2	
	ual Losse	es without Counterme	isure	_	
2-1-1) Reopening cost per accumulation volume of road closure site excluding fixed cost)	h		pesos per m ³		refer 34.2.2.1.1) of the Gu
Fixed cost for reopening per RCD	- St		pesos per RCD		CONTRACTOR OF STREET, S
2-1) Annual reopening cost	ų.	j=FRCDp*(h*g+i)	pesos per year	ō	refer 3.4.3 2-1) of the Gu
2-2-1) Average number of human deaths per RCD	k	k=0.005	ave. death per RCD	0.006	refer 3.4.2 (2) 2-2-4) of the Gu
2-2-2) Unit value of human life lost (death)	24		pesos per human life	2,300,000	refet 3.4.2 (2) 2-2-2) of the Gu
2-2) Annual value of human lives lost	m	m≠FRCDp*k*i	pesos per year	0	refer 3.4 2 (2) 2-2) of the Gu
2-3-1) Length of survey road (from entry to exit point of detour road to word road closure site on survey road)	n .		kan		refer 34 2 (2) 2-3-1) of the Gu
Length of detour road (from entry to exit point of survey road to word road closure site on survey road)	0		km		mfm 3.f.2 (2) 2-3-2) of line (1)
1-3-2) AADT: Annual Average Daily Traffic on the survey site	p		vehicles per day		refer $1 \neq 1(2) \ge 3(3)$ of the Gu
2-3-3) Nos. of predicted closure days of the whole width of the road on he survey site per RCD	q		days		refer 3.4.7 (2) 2-3-4) of the Gu
2-3-4) Average Vehicle Operating Cost per km on survey road	r.		pesos per		
Average Vehicle Operating Cost per km on detour road	5		pesos per vehicle*km		nfer 34.2(2)2-3-5) of the Gu
2-3) Annual detour cost	jt.	t=FRCDp*p*q*(o*s-n*t)	pesos per year	0	refer 3.4.2 (2) 2-3) of the Gu
Total Annual Loss	u.	u=j+m+t	pesos per year	0	refer 3.4.2 (2) of the Gu
		licators of Counterme			Larde N.H.W. (eff., 50, 616, 510)
(3) F eas		neasure alternative I	asures		_
3-1) Cost of countermeasure with 20 years maintenance	v1	leasure alernaive 1	pesos	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	wI		ratio	_	refer 3.4.2 (3) 3-2) of the Gu
3-3) Decrease in annual loss due to countermeasure	xI	x I = u* w1	pesos per year	0	refer 3 4 2 (3) 3-3) of the Gu
Potential frequency of road closure disaster with countermeasure	FRCDpwc1	FRCDpwc I = FRCDp*(1-wI)	ntio	0.000	refer 3 4 2 (3) 5-4) of the Gu
Benefit/cost ratio at 15% discount rate	BCR1		nilio	#DIV/0!	
Economic net present value at 15% discount rate	ENPV1		pesos	0	refer 3.4 2 (3) of the Gu
Economic internal rate of return	EIRRI	heasure alternative II	percent	#NUMI	
3-1) Cost of countermeasure with 20 years maintenance	v II	leusure auernauve 11	pesos	0	evaluated in sheet 4
-2) Risk reduction ratio in RCD due to countermeasure	wll		ratio		refer 3 4 2 (3) 3-2) of the Gu
3-3) Decrease in annual loss due to countermeasure	хП	х II = u* wП	pesos per year	0	refer 3.4.2 (3) 3-3) of the Gu
Potential frequency of road closure disaster with countermeasure			ratio	0.000	
Benefit/cost ratio at 15% discount rate	BCR II		ratio	#DIV/0	refer 3:4 2 (3) 3:4) af the G
Economic net present value at 15% discount rate	ENPV II		pesos	0	**************************************
Economic internal rate of return	EIRRII	and the second second	percent	≇NUMI	
3-1) Cost of countermeasure with 20 years maintenance	Counterm	easure alternative III	misori	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	w III		ratio	0	refer 3.4.2 (3) 3-2) of the Gu
3-3) Decrease in annual loss due to countermeasure	x III	x III = u * w III	pesos per year	0	refer 3 4 2 (3) 3-3) of the Gu
Potential frequency of road closure disaster with countermeasure		FRCDpwc III= FRCDp*(1- wIII)	rutio	0.000	
Benefit/cost ratio at 15% discount rate	BCRIII		ratio	#DIV/0!	refer 3 4 2 (3) of the Gu
Denejne tost rand at 15 /g assedant rate			1212202	10	1 crut 2 + 5 (2) of m6 (30
Economic net present value at 15% discount rate	ENPV III		pesos	19	

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NIPPON KOEI CO., LTD. OYO INTERNATIONAL CORPORATION

Kin statistic form km 0 m Side of anywey Right side of road Unit Quantity Regulation Unit Quantity Regulation Unit Quantity Remark. 1-1) Distant F Frequency: and Magnitude Init Quantity Remark. Init Quantity Remark. 1-2) Length of road closure disaster FRCDp nos per year 0.010 alset 2.41.2 2-1.2) Responding cost per length of road closure disaster I.RC m m of es 2.41.12 2-1.1) Responding cost per length of road closure dis (sechuling fixed h perso per year 0.000 def 2.42.12 2-1.1) Average number of human thealte per RCD k k=0.066 are any et RCD def 2.42.01 2-2.1) Average number of human thealte per RCD k k=0.066 are any et RCD def 2.42.02 2-2.2) Unit value of human thealte per RCD k k=0.066 are any et RCD def 2.42.02 2-2.2) Unit value of funna mity to extip tot of survey road to m m=PRCDp*k=1 perso per year def 2.42.02 2-2.2) ADT: Annual Average Daily Traffic on the survey road to n m=PRCDp*k=4 def 2.42.02	Road Name	0		ssment for			
Side of survey Right side of road tense symbol equation Unit Qumity Remark. (1) Discrete Frequency and Magnitude int Qumity Remark. (1-1) Potential frequency of road closure disater FRCD no. per yer 0.010 discret 2 (1-2) Length of road closure site I.RC no. per yer 0.010 discret 2 (1-1) Respending cot per length of read cloare site (excluding fixed h persos per rom offer 14.2.2.1 (2-1) Average number of human ideals per RCD k be-0.066 are and yer RCD offer 14.2.2.0. (2-2) Juit value of human ideals per RCD k be-0.066 are and yer RCD offer 14.2.2.0. (2-2.2) Unit value of human ideals per RCD k be-0.066 are and yer RCD km distribution in the start 2.0. (2-2.2) Unit value of human ideals per RCD k be-0.066 are and yer RCD km distribution in the start 2.0. (2-2.2) Auto Transma Value of human ideals per RCD in m m=FRCDp ⁴ s ⁴ perso per yer (1300 distribution in the start 2.0. (2-2.3) Auto Transma Value of human ideals per RCD in km distribut	course and a second s	<u> </u>	km	0	m	0	
(1) Disaster Frequency and Magnitude (1) Disaster Frequency and Magnitude (1) Potential frequency of road closure disaster FRCDp (a) on spry or (a) one pry or <td></td> <td>Right side</td> <td>ofroad</td> <td></td> <td></td> <td></td>		Right side	ofroad				
(1) Disaster Frequency and Magnitude (1) Disaster Frequency and Magnitude (1) Potential frequency of road closure disaster FRCDp (a) on spry or (a) one pry or <td>Liferra di la companya di la companya</td> <td>in the second</td> <td>200-6400r</td> <td>1997 (M</td> <td>de la tra</td> <td>Distance of</td>	Liferra di la companya	in the second	200-6400r	1997 (M	de la tra	Distance of	
L1) Potential frequency of road closure disaster FRCDp no. pry year 0.010 dict 2 L-2) Length of road closure site LRC m refer 34.21-2 C2) Annual Losses Without Countermeasure m refer 34.21-2 St-11) Reopening cost per length of road closure site (secluling fixed http://process.com/process.c	and set of the set of			i titavi.	Quantity	Remark	
Constraint of space of grant construction Construction Construction Construction (2) Annual Losses Without Countermeasure (2) Annual Losses Without Countermeasure m	(1) Disaste	r Freque	ency and Magnitude				
(2) Annual Losses Without Countermeasure (2) Annual Losses Without Countermeasure (2) Annual cost of or reogening per RCD (a) person per rector (a) person per rector (a) person per rector (a) Annual reogening cost (a) person per rector (b) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) person per rector (c) per rector per rector per rector (c) per rector per rector per rector (c) per rector (c) per rector per rector per rector p	1-1) Potential frequency of road closure disaster	FRCDp		nos, per year	0.010	sheet 2	
2-10) Responding cost per length of road closure sine (excluding fixed prior) person per m person per m refer 34.2.2.3. Fixed cost for responing per RCD i person per m person per m refer 34.2.2.3. 2-1) Aurnual responing cost j p=RECDp*(b*LRC*0) person per m 0.000 or hir 34.2.2.3. 2-1) Average number of human deaths per RCD k k=0.066 are stant per RCD 0.000 or hir 34.2.0.3. 2-2.2) Unit value of human life lost (death) 1 person per ver 1.38 of def 34.2.0.3. 2-2.2) Unit value of human life lost (death) 1 person per ver 1.38 of def 34.2.0.3. 2-3.1) Length of survey road (from entry to exit point of detour road to are on survey road (from entry to exit point of survey road to over road (road closure are dow sof the whole width of the road on Q km entra 44.2.0.3. 2-3.3) No. of predicted closure do s of the whole width of the road on Average Vehicle Operating Cost per km on survey road r r person per ver 1.38 of def 34.2.0.3. 2-3.4) Average Vehicle Operating Cost per km on survey road r r reshiele km rdm 74.4.2.0.3.4. 2-3.4) No.and detour road s person per ver 1.38 of def 3.4.2.0.3. 2-3.4) Average Vehicle Operating Cost per km on survey road <	1-2) Length of road closure site	LRC		m		refer 3.4.2 1-2) of the Guid	
B person per NCD i person per NCD person per NCD 213 Annual reopening cost j i=PECDP*(0*1.RC*i) pesson per year 0 offs/242.01.22 223 Annual reopening cost j i=PECDP*(0*1.RC*i) pesson per year 0.000 offs/242.01.22 224 Unit value of human life lost (death) 1 pesson per year 0.800 offs/242.01.22 223 Annual value of human life lost (death) 1 pesson per year 138 offs/242.01.22 223 Annual value of human life lost (death) n km offs/242.01.22 223 Annual value of human life lost (death) n km offs/242.01.22 223 Annual value of human life lost (death) n km offs/242.01.22 233 Annual value of human life lost (death) n km offs/242.01.22 233 Annual value of human life lost (death) n km offs/242.01.21 233 Annual value of human life lost (death) n km offs/242.01.21 233 Annual value go main value	(2) Annual L	osses Wi	thout Countermeasu	ıre			
Fixed cost for responing per RCD i person per RCD 21) Annual responing cost j i=PECDp*(b*LRC*i) pess per year 0 order x23.32.32.32.32.32.32.32.32.32.32.32.32.3		ĥ		pesos per m			
2-1) Annual reopening cost j p=RCDp*0p*1RC+0j pessa per year 0 refer 3433-21 22-1) Average number of human life lost (death) 1 pessa per human life 0.006 def 342 (0.52 22-2) Unit value of human life lost (death) 1 pessa per human life 0.006 def 342 (0.52 22-2) Unit value of human life lost (death) 1 pessa per year 138 def 342 (0.52 23-3) Length of dearroy of the entry to exit point of survey road to numerity to exit point of survey road to 0 n km def 342 (0.52 23-3) Annual closure size on survey read p vehicles per dag def 342 (0.52 23-3) Average Vehicle Operating Cost per km on survey road r pessa per year 0 def 342 (0.52 23-4) Average Vehicle Operating Cost per km on survey road r vehicle/thm def 342 (0.52 Average Vehicle Operating Cost per km on detour road s pessa per year 0 def 342 (0.52 23-1) Average Vehicle Operating Cost per km on detour road s vehicle/thm def 342 (0.52 23-10 Average Vehicle Operating Cost per km on detour road s vehicle/thm def 342 (0.52 23-10 Average Vehicle Operating Cost per km on detour road		i		pesos per RCD		reter 3.4.2.2-1-1) of the Gui	
22-1) Average number of human ideatin-per RCD k k=0.006 mr = statistic CD 0.000 mf = 542 (2) (2) (2) (2) (2) (2) (2) (2) (2) (2		E.	i=FRCDp*/h*LRC+i)		0	refer 3.4.3 2-1) of the Guid	
22-20. Unit value of human life lost (death) 1 perceptimum if 2,200,000 ref 34.20732 22-20. Unit value of human life lost (death) 1 perceptimum if 2,200,000 ref 34.20732 23-30. Longh of deary road (bran entry to exit point of detour road to not chain road to not chain read to not chain road to not show road road chain read to not not chain road to not show road road chain read to not not show road road chain read to not not show road road chain road to not show road road road road road road road road	- i) Annua i copening cost	-	i mool w moon	peass per year		1000 2.10 2.1 7 01 00 000	
2.2) Annual value of human lives lost m m=FRCDp*k*1 pesos per year 138 def 34.2(0).2 2.3-1) Length of survey road n km def 34.2(0).2 Length of defor road (from entry to exit point of survey road to wold road cloaure site on survey road) 0 km def 34.2(0).2 2.3-2) AADT: Annual Average Daily Traffic on the survey site p vehicles per dag def 34.2(0).2 2.3-3) AADT: Annual Average Daily Traffic on the survey road q days def 34.2(0).2 2.3-4) Average Vehicle Operating Cost per km on survey road r vehicles per dag def 34.2(0).2 2.3-4) Average Vehicle Operating Cost per km on detour road s pesos per vehicle*km def 34.2(0).2 2.3-3) Annual detour cost t t=PRCDp*g*q*(o*s-a*r) pesos per vear 0 def 34.2(0).2 2.3-3 Annual close cost t u=j+m+t pesos per vear 0 def 34.2(0).2 3.4 for facultarmeasure w1 pesos per vear 0 def 34.2(0).2 4.1 pesos per vear 0 def 34.2(0).2 def 34.2(0).2 5.3 Annual Loss u u=j+m+t pesos per vear 0 def	2-2-1) Average number of human deaths per RCD	k	k⇔0.006	aus death per RCD	0.006	refer 3.4.2 (2) 2-2-1) of the Gia	
23-1) Length of survey road (from entry to exit point of detour road to noder condense site on survey road) n km state 34.2(2).33 Length of detour cod (from entry to exit point of survey road) 0 km entro 34.7(2).34 23-2) ADD:: Annual Average Daily Traffic on the survey site p vehicles per day entro 34.7(2).34 23-3) ADD:: Annual Average Daily Traffic on the survey site p vehicles per day entro 34.7(2).34 23-3) ADD:: of predicted closure days of the whole width of the road on earney site p vehicle/m. entro 34.7(2).34 23-4) Average Vehicle Operating Cost per km on survey road r vehicle/m. entro 34.7(2).34 Average Vehicle Operating Cost per km on detour road s pesos per vest 0 entro 34.2(2).35 12 O Annual detour cost t t=PRCDp*p*q*(o*s-n*r) pesos per year 0 entro 34.2(2).35 12 O Cost of countermeasure with 20 years maintenance v 1 u u=j*tm+t pesos for of the solution sol	2-2-2) Unit value of human life lost (death)	1		pesar per human life	2,300,000	refer 3 4.2 (3) 2-2-2) of the Gu	
nord cloure site or survey read) n km metrod (2000) Length of detour road (from entry to exit point of survey road to over read) o km metrod 2000) 23-2) AADT: Annual Average Daily Traffic on the survey site p vehicles per day metrod 2000) 23-3) ANDT: Annual Average Daily Traffic on the survey site p vehicles per day metrod 2000) 23-3) ANDT: Annual Average Daily Traffic on the survey site p vehicle from on the survey site per RCD days metrod 2000) 23-4) Average Vehicle Operating Cost per km on survey road r vehicle*km vehicle*km metrod 2000) 2-3) Annual detour cost t t==RCDp*p*q*(o*sn*r) pesos per year 0 effe 34.2 (2) 2 Countermeasure alternative I Countermeasure alternative I For subility Indicators of Countermeasures Countermeasure alternative I For subility Indicators of Countermeasures For subility Indicators of Countermeasure alternative I <td col<="" td=""><td>2) Annual value of Imman lives lost</td><td>m</td><td>m=FRCDp*k*l</td><td>pésos per year</td><td>138</td><td>refer 3.4.2 (2) 2-2) of the Gm</td></td>	<td>2) Annual value of Imman lives lost</td> <td>m</td> <td>m=FRCDp*k*l</td> <td>pésos per year</td> <td>138</td> <td>refer 3.4.2 (2) 2-2) of the Gm</td>	2) Annual value of Imman lives lost	m	m=FRCDp*k*l	pésos per year	138	refer 3.4.2 (2) 2-2) of the Gm
Void road closure site on survey road 0 0 km shi 34.2()33 2-3-2) AADT: Annual Average Daily Traffic on the survey site p vehicles per day shi 34.2()33 2-3-3) Nos. of predicted closure days of the whole width of the road on q days shi 34.2()33 2-3-3) Nos. of predicted closure days of the whole width of the road on q days shi 34.2()33 2-3-4) Average Vehicle Operating Cost per km on survey road r vehicle*km shi 34.2()33 Average Vehicle Operating Cost per km on detour road s pessos per vehicle*km shi 34.2()33 Average Vehicle Operating Cost per km on detour road s pessos per year o refr 34.2()33 B-3-3) Junual detour cost t t=FRCDp*p*q*(o*s-n*p) pessos per year o refr 34.2()33 Contermeasure alternative I u u=j+m+t pessos per year o refr 34.2()33 Contermeasure alternative I st = u* wil pessos per year o refr 34.2()33 L) Cost of countermeasure w1 refr 34.2()33 refr 34.2()33 L) Cost of countermeasure w1 ratio refr 34.2()34 L) D Cost of countermeasure w1 pessos o refr 34.2()34 <		n		km		zefier 3.4.2 (2) 2-3-15 of the Gus	
avoid road cloare site on survey road) 0 km mint 34 (2) 23 23-2) AADT: Annual Average Daily Traffic on the survey site p vehicles per day mint 34 (2) 23 23-3) Nos. of predicted cloare days of the whole width of the road on he survey site predict q days mint 34 (2) 23 23-3) Nos. of predicted cloare days of the whole width of the road on he survey site predict q days mint 34 (2) 23 23-4) Average Vehicle Operating Cost per km on survey road r .vehicle*km mint 34 (2) 23 Average Vehicle Operating Cost per km on detour road s pesco per year 0 mint 34 (2) 23 2.3) Annual detour cost t t=FRCDp*p*q*(o*s-n*r) pesco per year 0 mint 34 (2) 23 7 Contrermeasure alternative I pesco per year 0 mint 34 (2) 23 8 u u=j=tm+t pesco per year 0 mint 34 (2) 23 7 Contrermeasure alternative I pesco per year 0 mint 34 (2) 23 8 pesco per year 0 mint 34 (2) 23 pesco per year 0 mint 34 (2) 23 8 pesco per year 0 mint 34 (2) 23 pesco per year <				1.1112			
23-3) Nos. of predicted closure days of the whole width of the road on he survey site per RCD q days refer 34.2(2) 23 25-1) Average Vehicle Operating Cost per km on survey road r pesse per vehicle*km refer 34.2(2) 23 Average Vehicle Operating Cost per km on detour road s pesse per vehicle*km refer 34.2(2) 23 Average Vehicle Operating Cost per km on detour road s pesse per vehicle*km refer 34.2(2) 23 2-3) Annual detour cost t t=FRCDp*p*q*(o*s-n*r) pesse per vear 0 refer 34.2(2) 24 (3) Feasibility Indicators of Countermeasures u u=j+m+t pesso per year 0 refer 34.2(2) 24 (1) Cost of countermeasure with 20 years maintenance v I pesso per year 0 refer 34.2(2) 24 (2) Cost of countermeasure w I rafio refer 34.2(2) 24 (3) Feasibility Indicators of Countermeasure annual loss due to countermeasure w I rafio refer 34.2(2) 25 (2) Cost of countermeasure with 20 years maintenance v I x I = u* wit pesso per year 0 refer 34.2(3) (2) Cost of countermeasure with countermeasure FRCDvc I FRCDp*(I = wI) nos, per year 0 0.010 refer 34.2(3)	이 같은 것 같은	0		km		refer 3.4 2 (2) 3-3-2) of the Gu	
q duys metrod 4 (0) 2 23-6) Average Vehicle Operating Cost per km on survey road r vehicle*km Average Vehicle Operating Cost per km on detour road s pesse per vehicle*km Average Vehicle Operating Cost per km on detour road s pesse per vehicle*km 8-3) Aunual detour cost t t=FRCDp*p*q*(o*s-n*r) pesse per ven d nfm 342 (2) 2 <i>Ital Annual Loss</i> u u=j+m+t pesse per ven d nfm 342 (2) 2 <i>Ital Annual Loss</i> u u=j+m+t pesse per ven d nfm 342 (2) 2 <i>Ital Annual Loss</i> u u=j+m+t pesse per ven d nfm 342 (2) 2 <i>Ital Annual Loss</i> u u=j+m+t pesse per ven d nfm 342 (2) 2 <i>Ital Annual Loss</i> u u=j+m+t pesse per ven d nfm 342 (2) 2 <i>Ital Annual Loss</i> u u=j+m+t pesse per ven d nfm 342 (2) 2 <i>Ital Annual Loss</i> vii 1 natio nfm 342 (2) 2 <i>Ital Annual Loss</i> vii 1 natio nfm 342 (2) 2 <i>Ital Annual Loss</i> vii 1 natio nfm 342 (2) 2 <i>Benditi Ost Taio al 15% discount rate</i>	2-3-2) AADT: Annual Average Daily Traffic on the survey site	р		vehicles per day		refer 3.4.2 (2) 3-3-3) of the Gia	
23-3) Average Vehicle Operating Cost per km on detour road r vehicle*km pessos per vehicle*km refm 74.2 (2) 2-0 Average Vehicle Operating Cost per km on detour road s pessos per veat 0 refm 74.2 (2) 2-0 2.3) Annual detour cost t t=FRCDp*g*q*(o*s-n*r) pessos per year 0 refm 74.2 (2) 2-0 (3) Feasibility Indicators of Countermeasures Countermeasure alternative 1 State of countermeasure with 20 years maintenance v1 pessos per year 0 refm 74.2 (2) 2-0 Countermeasure alternative 1 State of countermeasure x1 x1 = u* wit pessos per year 0 refm 74.2 (2) 2-0 State of countermeasure w1 pessos per year 0 refm 74.2 (2) 2-0 State of countermeasure w1 pessos per year 0 refm 74.2 (2) 2-0 State of countermeasure w1 pessos 0 refm 74.2 (2) 2-0 State reduction ratio in RCD due to countermeasure x1 x1 = u* wit pessos 0 refm 74.2 (2) 2-0		ĝ		days		refer 3 4 5 (3) 2-3-4) of the Gia	
Average Vehicle Operating Cost per km on detour road s pesos per vehicle*km eff: 34.2 (2) - 2 2.3) Annual detour cost t t=FRCDp*p*q*(0*s-n*r) pesos per year 0 nfr: 34.2 (2) - 2 2.3) Annual Loss u u=j+m+t pesos per year 138 fefr: 34.2 (2) - 2 Countermeasures Countermeasure alternative 1 ***********************************	2-3-4) Average Vehicle Operating Cost per km on survey road	r					
L 3) Annual detour cost t t =FRCDp*p*q*(o*s-n*r) pesos per year 0 ofter 34.2 (2) 2 Cotal Annual Loss u u =j+m+t pesos per year 138 refer 34.2 (2) 2 (3) Feasibility Indicators of Countermeasures Countermeasure alternative I pesos per year 138 refer 34.2 (2) 2 (4) Cost of countermeasure with 20 years maintenance v I pesos 0 evaluated in 5-2) Risk reduction ratio in RCD due to countermeasure x I x I = u* wI pesos per year 0 refer 34.2 (3) 2 Benefit/cost ratio at 15% discount rate BCR I ratio #DIV/0 pesos 0 evaluated in 5-2) Risk reduction ratio in RCD due to countermeasure V I pesos 0 order 34.2 (3) 2 Benefit/cost ratio at 15% discount rate BCR I ratio #DIV/0 percent #NUMI 5-2) Risk reduction ratio in RCD due to countermeasure V II pesos 0 evaluated in 5-2) Risk reduction ratio in RCD due to countermeasure V II pesos 0 evaluated in 6-2) Risk reduction ratio in RCD due to countermeasure V II pesos 0 evaluated in <td>Average Vehicle Operating Cost per km on detour road</td> <td>8</td> <td></td> <td>pesos per</td> <td></td> <td>refer 3.4.2 (2) 2-3-5) of the Ou</td>	Average Vehicle Operating Cost per km on detour road	8		pesos per		refer 3.4.2 (2) 2-3-5) of the Ou	
(3) Feasibility Indicators of Countermeasures Countermeasure alternative 1 Source Countermeasure alternative 1 3-1) Cost of countermeasure with 20 years maintenance v.1 pesos 0 evaluated in 3-2) Risk reduction ratio in RCD due to countermeasure x.1 x.1 = u* wil pesos per year 0 rdfr 542 (3) 5 3-3) Decrease in annual loss due to countermeasure x.1 x.1 = u* wil pesos per year 0.010 rdfr 542 (3) 5 Potential frequency of road closure disaster with countermeasure BCR I ratio #DIV/01 refer 3.42 (3) 5 Benefit cost ratio at 15% discount rate ENPV I pesos 0 evaluated in Economic internal rate of return EIRR I percent #NUMI refer 3.42 (3) 5 5-3) Decrease in annual loss due to countermeasure w.II x.II = u* wII pesos 0 evaluated in 3-2) Risk reduction ratio in RCD due to countermeasure w.II x.II = u* wII pesos 0 evaluated in 3-3) Decrease in annual loss due to countermeasure x.II x.II = u* wII pesos 0 evaluated in 62.0 Risk reduction ratio at 15% discoun	2-3) Annual detour cost	t	t=FRCDp*p*q*(o*s-n*r)		0	refer 3.4.2 (2) 2-3) of the Gui	
(3) Feasibility Indicators of Countermeasures Countermeasure alternative 1 Sourcease in annual loss due to countermeasure vi pesos per vear 0 evaluated in Sourcease in annual loss due to countermeasure xi xi = u* wi pesos per vear 0 evaluated in sourcease in annual loss due to countermeasure xi = xi = u* wi pesos per vear 0 evaluated in sourcease in annual loss due to countermeasure xi = xi = u* wi pesos per vear 0 evaluated in FRCDwc I FRCDp*(I-wII) nos, per vear 0 evaluated in Benefit/cost ratio at 15% discount rate ENPV I pesos per vear 0 evaluated in Gountermeasure alternative II percent #WI ratio #WI ratio #WI ratio evaluated in 6 O							

Road Name	0				
Km station from	0	km	0	m	
Side of survey	U				
Items	symbol	equation	Unit	Quantity	Remark
(1) Disast	er Frequ	ency and Magnitude			
1-1) Potential frequency of road closure disaster	FRCDp		nos. per year	0.000	sheet 2
1-2) Length of road closure site	LRC		ш	-	refer 3 4 2 1-2) of the Gui
		ithout Countermeasu			
2-1-1) Reopening cost per length of road closure site (excluding fixed	T	anoui Countermeusi	and the second second		F
cost)	h		pesos per m		refer 3.4.22-1-1) of the Gu
Fixed cost for reopening per RCD	Ĩ		pesos per RCD		
2-1) Annual reopening cost	i i	j=FRCDp*(h*LRC+i)	pesos per year	0	refer 3 4 3 2-1) of the Gu
2-2-1) Average number of human deaths per RCD	k	k=0.006	ave. death per RCD	0.006	refer 3.4.2 (2) 2.2-1) of the Gi
2-2-2) Unit value of human life lost (death)	I		pecas per human life	2,300,000	refer 3.4.2 (2) 2-2-2) of the G1
2-2) Annual value of human lives lost	m	m=FRCDp*k*l	pesos per year	0	refer 3.4.2 (7) 2-2) of the Go
2-3-1) Length of survey road (from entry to exit point of detour road to avoid road closure site on survey road)	n		km		refer 3.4.2 (2) 2.3-1) of the Ga
Length of detour road (from entry to exit point of survey road to avoid road closure site on survey road)	0		km		refer 3.4.2 (2) 2.3-2) of the Gr
2-3-2) AADT: Annual Average Daily Traffic on the survey site	p		vehicles per day		refer 3.4.2 (2) 2-3-3) of the Ga
2-3-3) Nos. of predicted closure days of the whole width of the road on the survey site per RCD	q		days		refe: 3.4 1 (2) 2-3-4) of the Gr
2-3-4) Average Vehicle Operating Cost per km on survey road	r		pesos per vehicle*km		
Average Vehicle Operating Cost per km on detour road	8		pesos per vehicle*km		refer 3.4.7 (2) 2-3-5) of the G
2-3) Annual detour cost	î.	t=FRCDp*p*q*(o*s-n*r)	pesos per year	0	refer 3.4.2 (2) 2-3) of the Gi
Total Annual Loss	n	u=j+m+t	pesos per year	0	refer 342 (2) of the Gu
	v Indicat	ors of Countermeasi			
		ure alternative I			
3-1) Cost of countermeasure with 20 years maintenance	v1		pesos.	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	wI		ratio		refer 2.4.2 (3) 3-2) of the G
3-3) Decrease in annual loss due to countermeasure	x1	$x I = u^* wI$	pesos per year	0	refer 3.4.2 (3) 3-3) of the G
Potential frequency of road closure disaster with countermeasure	FRCDwc I	FRCDpwc I = FRCDp*(1-wI)	uos, per year	0.000	
Benefit/cost ratio at 15% discount rate	BCR I		ratio	#DIV/01	
Economic net present value at 15% discount rate	ENPV I		pesos	0	refer 3.4.2 (3) of the Ch
Economic internal rate of return	EIRR I		percent	#NUM!	
		ire alternative II			
3-1) Cost of countermeasure with 20 years maintenance	vII		pesos	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	wΠ		ratio	_	mfer 3.4.2 (3) 3.2) of the Gi
3-3) Decrease in annual loss due to countermeasure	хII	$x \Pi = u^n w \Pi$	pesos per year	0	refer 3.4.2 (3) 3-3) of the G
Potential frequency of road closure disaster with countermeasure	FRCDpwc I	FRCDpwc II = FRCDp*(1- wII)	nos, per year	0.000	
Benefit/cost ratio at 15% discount rate	BCRII		ratio	#DIV/0!	
Economic net present value at 15% discount rate	ENPV II		pesos	0	refer 3.4.2 (3) of the Gu
	EIRRI		percent	#NUM!	
Economic internal rate of return	ntermeasu	re alternative III			
Cou			pesos	0	evaluated in sheet 4
3-1) Cost of countermeasure with 20 years maintenance	v III	1	i mate a		refer 3.4.2 (3) 3-2) of the Gu
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure	vⅢ wⅢ		ratio	141	A
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure	vШ wШ xШ	x III = u * w III	pesos per year	0	refer 3.4.2 (3) 3.5) of the G
Court 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure	v III w III x III FRCDpwe II	x III = u * w III FRCDpwc III = FRCDp*(1- will)	pesos per year nos. per year	0.000	refer 3 4 2 (3) 3-3) of the G
Courses Courses and Course and Course and Course and Course and Courses and Co	v III w III x III FRCDpwe II BCR III	and the state of the second state of the secon	pesos per year nos. per year ratio	0.000 #DIV/0!	
Com 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate	v III w III x III FRCDpwe II BCR III ENPV III	and the state of the second state of the secon	pesos per year nos. per year	0.000 #DIV/0! 0	
Courses Courses and Course and Course and Course and Course and Courses and Co	v III w III FRCDpwe II BCR III ENPV III EIRR III	and the state of the second state of the secon	pesos per year nos. per year ratio	0.000 #DIV/0!	refer 3 4 2 (3) 3 3) of the Gu pefer 3,4 2 (3) of the Ch
Com 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate	v III w III x III FRCDpwe II BCR III ENPV III	and the state of the second state of the secon	pesos per year nos. per year ratio pesos percent	0.000 #DIV/0! 0 #NUM!	

Road Name	0				
Km station from		km	0	m	}
Side of survey	Right side	ofroad			
ltems	symbol	equation	Unit	Quantity	Remark
		ency and Magnitude		58.125.0100E	
	1.0000000	I	1	0.060	sheet 2
1-1) Potential frequency of road closure disaster	FRCDp		nos. per year	0.060	1.
1-2) Length of road closure site	LRC		m		refer 3.4.2.1.2) of the Guid
	osses W	ithout Countermeasi	ire		
2-1-1) Reopening cost per length of road closure site (excluding fixed rost)	h		pesos per m		refer 3.4.2.2-1-1) of the Gui
Fixed cost for reopening per RCD	1		pesos per RCD		tere 544 9-1-1) of the Om
2-1) Annual reopening cost	. j	j=FRCDp*(h*LRC+i)	pesos per year		reler 3.4 3 2-1) of the Out
	· 4	2 - Contract, Mr. 2002 - M.	ENTYS, PRE 2007		
2-2-1) Average number of human deaths per RCD	k	k=0.006	ave death per RCD	0.006	infer $1 \in \mathcal{I}(\vec{x})$ (2.1-1) of the Gui
2-2-2) Unit value of human life lost (death)	ţ,		peror per laman life	2,300,000	refer 3.4.2 (2) 2-2-2) of the Gui
2-2) Annual value of human lives lost	m	m=FRCDp*k*I	pesos per year	828	refer 3.4.2 (2) 2-7) of the Guid
2-3-1) Length of survey road (from entry to exit point of detour road to avoid road closure site on survey road)	n		km		sefer 3.4.2.(2) 2.3-1) of the Gui
Length of detour road (from entry to exit point of survey road to avoid road closure site on survey road)	o		km		sefer 3.4.2 (2) 2-3-2) o fib# Oci
2-3-2) AADT: Annual Average Daily Traffic on the survey site	P		vehicles per day		refer 3 = 2 (2) 2-3-3) of the Oui
2-3-3) Nos. of predicted closure days of the whole width of the road on the survey site per RCD	q		days		refer 3 4 2 (2) 2-3-4) of the Ou
2-3-4) Average Vehicle Operating Cost per km on survey road	r,		pesos per vehicle*km		
Average Vehicle Operating Cost per km on detour road	8		pesos per vehicle*km		refer 3.4.2 (2) 2-3-5) of the Gai
2-3) Annual detour cost	t	t=FRCDp*p*q*(o*s-n*r)	pesos per year	0	refer] # 2 (2) 2-5) of the Gau
Total Annual Loss	u	u=j+m+t	pesos per year	828	refer 3.4.2 (2) of the Guid
(3) Feasibilit	Indica	ors of Countermeasi	tres		
		ure alternative I	2340401		
3-1) Cost of countermeasure with 20 years maintenance	¥1		pesos	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	w1		ratio		refer 3.4.2 (3) 3-2) of the Gui
3-3) Decrease in annual loss due to countermeasure	x1	$x I = u^{*} wI$	pesos per year		refer 3.4.2 (2) 2-3) of the Guo
Potential frequency of road closure disaster with countermeasure	FRCDwc 1	FRCDpwc1=FRCDp*(1-wl)	nos, per year	0.060	
Benefit/cost ratio at 15% discount rate	BCR1		ratio	#D1V/0	refer 3.4.2 (3) of the Gui
Economic net present value at 15% discount rate	ENPV1		pesos	0	
Economic internal rate of return	EIRR I		percent	#NUM!	
		ing alt muching II			
		tre alternative II			
3-1) Cost of countermeasure with 20 years maintenance	ntermeasi v田	ire allernalive 11	pesos	0	evaluated in sheet 4
		life allernalive 11	pesos ratio	0	
 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure 	νΠ	xII=u* wII			refer 3.4.2 (3) 1-2) of the Out
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure	v П w Ш x П		ratio		refer 3.4.2 (3) 1-2) of the Out
 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure 	v П w Ш x П	x II =u* wII	ratio pesos per year	0	refer 3.4 2 (3) 3-2) of the Guo refer 3.4 2 (3) 3-3) of the Guo
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Patential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate	vП wШ xП FRCDpwc1 BCRП	x II =u* wII	ratio pesos per year nos. per year ratio	0	refer 3.4.2 (3) 3-2) of the Gau refer 3.4.2 (3) 3-3) of the Gau refer 3.4.2 (3) of the Gau
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Patential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate	vП wII xII FRCDpwcI	x II =u* wII	ratio pesos per year nos. per year ratio pesos	0 0.060 #DIV/0	refer 3.4.2 (3) 3-2) of the Gau refer 3.4.2 (3) 3-3) of the Gau refer 3.4.2 (3) of the Gau
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Patential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate Economic internal rate of return	VII WII XII FRCDpwe I BCR II ENPV II EIRR II	x II =u* wII	ratio pesos per year nos. per year ratio	0 0.060 #DIV/0! 0	refer 3.4 2 (3) 3-2) of the Gui refer 3.4 2 (3) 3-3) of the Gui refer 3.4.2 (3) of the Gui
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Patential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate Economic internal rate of return	VII WII XII FRCDpwe I BCR II ENPV II EIRR II	x II = u* wII IFRCDpwc II = FRCDp*(1-wII)	ratio pesos per year nos. per year ratio pesos	0 0.060 #DIV/0 0 #NUM!	refer 3.4 2 (3) 3-2) of the Gui refer 3.4 2 (3) 3-3) of the Gui refer 3.4.2 (3) of the Gui
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate Economic internal rate of return Cou	VII WII XII FRCDpwc I BCR II ENPV II EIRR II HEFMEASU	x II = u* wII IFRCDpwc II = FRCDp*(1-wII)	ratio pesos per year nos. per year ratio pesos percent	0 0.060 #DIV/0 0 #NUM!	refer 3.4.2 (3) 3-2) of the Guid refer 2.4.2 (5) 3-3) of the Guid refer 3.4.2 (3) of the Guid
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate Economic internal rate of return Coun 3-1) Cost of countermeasure with 20 years maintenance	vII wII xII FRCDpwcI BCRII ENPVII EIRRII ttermeasu vIII	x II = u* wII IFRCDpwc II = FRCDp*(1-wII)	ratio pesos per year nos. per year ratio pesos percent pesos	0 0,060 #DIV/0 0 #NUM! 0	refer 3.4.2 (3) 1-2) of the Guo refer 3.4.2 (3) 3-3) of the Guo refer 3.4.2 (3) of the Guo evaluated in sheet 4
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate Economic internal rate of return Coun 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure	v II w II FRCDpwc I BCR II ENPV II EIRR II ttermeasu v III w III	х II = u* wII IFRCDpwc II = FRCDp*(1- wII) <i>re alternative III</i> х III = u * w III	ratio pesos per year nos. per year ratio pesos percent pesos ratio	0 0,060 #DIV/0 0 #NUM! 0	refer 3.4.2 (3) 3.2) of the Gau refer 3.4.2 (3) of the Gau refer 3.4.2 (3) of the Gau evaluated in sheet 4 refer 3.4.2 (3) 3.2) of the Gau
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic internal rate of return Cou 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure	v II w II x II FRCDpwc I BCR II ENPV II EIRR II ttermeasu v III w III x III	х II = u* wII IFRCDpwc II = FRCDp*(1- wII) <i>re alternative III</i> х III = u * w III	ratio pesos per year nos. per year ratio pesos percent pesos ratio pesos per year nos. per year	0 0.060 #DIV/0 0 #NUM! 0 0	refer 3.4.2 (3) 3.2) of the Guu refer 3.4.2 (3) of the Guu refer 3.4.2 (3) of the Gu evaluated in sheet 4 arter 3.4.2 (3) 3.2) of the Guu refer 3.4.2 (3) 3.2) of the Guu
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic internal rate of return 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate	v II w II FRCDpwc I BCR II ENPV II EIRR II termeasu v III w III FRCDpwc I BCR III	х II = u* wII IFRCDpwc II = FRCDp*(1- wII) <i>re alternative III</i> х III = u * w III	ratio pesos per year nos. per year ratio pesos percent pesos ratio pesos per year nos. per year ratio	0 0.060 #DIV/0 0 #NUM! 0 0 0.060	refer 3.4.2 (3) 3.2) of the Gau refer 3.4.2 (3) of the Gau refer 3.4.2 (3) of the Gau evaluated in sheet 4 refer 3.4.2 (3) 3.2) of the Gau
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic internal rate of return 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure Sol contermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic net present value at 15% discount rate	v II w II FRCDpwc I BCR II ENPV II EIRR II Itermeasu v III x III FRCDpwc I BCR III ENPV III	х II = u* wII IFRCDpwc II = FRCDp*(1- wII) <i>re alternative III</i> х III = u * w III	ratio pesos per year nos. per year ratio pesos percent pesos ratio pesos per year nos. per year ratio pesos	0 0.060 #DIV/0 0 #NUM 0 0 0 0.060 #DIV/0 0 0	refer 3.4.2 (3) 3.2) of the Guu refer 3.4.2 (3) of the Guu refer 3.4.2 (3) of the Gu evaluated in sheet 4 arter 3.4.2 (3) 3.2) of the Guu refer 3.4.2 (3) 3.2) of the Guu
3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate Economic internal rate of return 3-1) Cost of countermeasure with 20 years maintenance 3-2) Risk reduction ratio in RCD due to countermeasure 3-3) Decrease in annual loss due to countermeasure Potential frequency of road closure disaster with countermeasure Benefit/cost ratio at 15% discount rate	v II w II STI FRCDpwc I BCR II ENPV II EIRR II termeasu v III w III FRCDpwc I BCR III	х II = u* wII IFRCDpwc II = FRCDp*(1- wII) <i>re alternative III</i> х III = u * w III	ratio pesos per year nos. per year ratio pesos percent pesos ratio pesos per year nos. per year ratio	0 0.060 #DIV/0 0 #NUM! 0 0 0.060	refer 3.4.2 (3) 3.2) of the Guu refer 3.4.2 (3) of the Guu refer 3.4.2 (3) of the Gu evaluated in sheet 4 arter 3.4.2 (3) 3.2) of the Guu refer 3.4.2 (3) 3.2) of the Guu

Road Name	0				
Km station from	0	km	0	m	<u>)</u>
Side of survey	U				
tems	symbol	equation	Unit	Quantity	Remark
(1) Disaste	r Freau	ency and Magnitude	0		
1-1) Potential frequency of road closure disaster	FRCDp		nos, per year	0.009	sheet 2
	LRC		m		refer 3.4.2.1-2) of the Guid
1-2) Length of road closure site	11.001-0			_	refer 5.4.2 1-2) of the Ould
(2) Annual L 2-1-1) Reopening cost per length of road closure site (excluding fixed	osses Wi	ithout Countermeasi	ire	_	_
cost)	h		pesos per m		refer 3.4.2.2-1-1) of the Gui
Fixed cost for reopening per RCD	1		pesos per RCD		CONTRACTORY & WARRANT PAR
2-1) Annual reopening cost	į	j=FRCDp*(h*LRC+i)	pesos per year	Q	refer 3.4.3 2-1) of the Guid
2-2-1) Average number of human deaths per RCD	k	k=0.006	ave death per RCD	0.006	refer 3.4.2 (2) 2-2-1) of the Guid
2-2-2) Unit value of human life lost (death)	. 1		yesos ger human liðs	2,300,000	irfe 341 (2)222) sfthe Gui
2-2) Annual value of human lives lost	m	m=FRCDp*k*l	pesos per year	124	refer 3.4.2 (2) 2.2) of the Gui
2-3-1) Length of survey road (from entry to exit point of detour road to woid road closure site on survey road)	ň		km		rrfir 3.4 7 (2) 2-3-1) of the Gui
Length of detour road (from entry to exit point of survey road to woid road closure site on survey road)	ø		km		refer 3.4.2 (2) 2.3 (2) of the Gai
2-3-2) AADT: Annual Average Daily Traffic on the survey site	р		vehicles per day	_	refer 3.4.2 (2) \lesssim 5.3) of the Oni
2-3-3) Nos. of predicted closure days of the whole width of the road on he survey site per RCD	q		days		refe 3.4.2 (2) 2-3-4) of the Gui
2-3-4) Average Vehicle Operating Cost per km on survey road	r		pesos per vehicle*km		
Average Vehicle Operating Cost per km on detour road	s		pesos per vehicle*km		rrfir 3,4 2 (2) 2-3-5) of the Gui
2-3) Annual detour cost	3	⊨FRCDp*p*q*(o*s-n*r)	pesos per year	0	refer 3.4.2 (2) 2-3) of the Gui
Total Annual Loss	u	u=j+m+t	pesos per year	124	refer 3.4.2 (2) of the Gui
	Indicat	ors of Countermeas			
		ure alternative I			
3-1) Cost of countermeasure with 20 years maintenance	v1		pesos	0	evaluated in sheet 4
-2) Risk reduction ratio in RCD due to countermeasure	wI		ratio		refer 3 4.2 (3) 3-2) of the Gui
i-3) Decrease in annual loss due to countermeasure	x1	$x l = u^* wl$	pesos per year	0	refer 3.4.2 (3) 3.3) of the fini
Potential frequency of road closure disaster with countermeasure	FRCDwcT	FRCDpwc I = FRCDp*(I+wI)	nos. per year	0.009	
Benefit/cost ratio at 15% discount rate	BCRI		ratio	#DIV/0	refer 3.4.2 (3) of the Gui
Economic net present value at 15% discount rate	ENPVI		pesos	9	
Economic internal rate of return	EIRR I		percent	#NUM	
	ntermeasu	ire alternative 11			
3-1) Cost of countermeasure with 20 years maintenance	V II		pesos	0	evaluated in sheet 4
8-2) Risk reduction ratio in RCD due to countermeasure	wп		ratio		refer 3.4.2 (3) 3-2) of the Gui
3-3) Decrease in annual loss due to countermeasure	хII	$x II = u^{\mu} w II$	pesos per year	0	refer 3 4 2 (3) 3 3) of the (init
Potential frequency of road closure disaster with countermeasure	FRCDpwc I	I FRCDpwc II = FRCDp*(1- wII)	nos. per year	0.009	
Benefit/cost ratio at 15% discount rate	BCR II		ratio	#DIV/0	
Economic net present value at 15% discount rate	ENPV II		pesos	Ó	refer 3.4.2 (3) of the Gui
Economic internal rate of return	EIRR II		percent	#NUM	
Coun	termeasu	re alternative III			
-1) Cost of countermeasure with 20 years maintenance	v III		pesos	0	evaluated in sheet 4
3-2) Risk reduction ratio in RCD due to countermeasure	w III		ratio		refer 3.4.2 (3) 3-2) of the Gui
5-5) Decrease in annual loss due to countermeasure	x III	x III = u * w III	pesos per year		refer 3.4.2 (3) 3-3) of the Gui
Potential frequency of road closure disaster with countermeasure	FRCDpwc II	FRCDpwc III = FRCDp*(I-wIII)	nos, per year	0.009	
Benefit/cost ratio at 15% discount rate	BCR III		ratio	#DIV/0	refer 2.4.2 (2) white course
Economic net present value at 15% discount rate	ENPV III		pesos	0	refer 3.4.2 (3) of the Gui
scononac net present value at 15% alscount rate			CONTRACTOR AND IN	and shares and	1
Economic internal rate of return	EIRR III		percent	#NUM	
Economic internal rate of return	EIRR III Note		percent	#NUM	

Road Name	0				
Km station from		km	0	m	
Side of survey	Right side	of road			
Items	symbol	equation	Unit	Quantity	Remark
	Constant of the	icy and Magnitude			
1-1) Potential frequency of road closure disaster	FRCDp		nos, per year	0.000	sheet 2
terrese and the second second	LRC			10000	refer 3421-2) of the Ga
1-2) Length of road closure site			m		refer 3.4.2 (-2) of the Gin
(2) Annual Lo 2-1-1) Reopening cost per length of road closure site (excluding fixed		out Countermeasu	re		
cost)	h		pesos per m		refer 34.2.2.1.1) of the Ou
Fixed cost for reopening per RCD	Ũ.		pesos per RCD		
2-1) Annual reopening cost	J	j=FRCDp*(h*LRC+i)	pesos per year	0	refer 3.4 3.2-1) of the Giz
2-2-1) Average number of human deaths per RCD	k	k=0.006	ave: death per RCD	0.006	refer 3.4.2 (i) 3-3-1) of the Ov
2-2-2) Unit value of human life lost (death)	1.		peaas per human life	2,300,000	noter 2.4.2 (3) 2-2-2) of the Ox
2-2) Annual value of human lives lost	m	m=FRCDp*k*l	pesos per year	0	refer 3.4.2 (2) 2-2) of the Gui
2-3-1) Length of survey road (from entry to exit point of detour road to avoid road closure site on survey road)	n		km		rafit 2.4.2 (7) 2.3-1) of the (1)
Length of detour road (from entry to exit point of survey road to avoid road closure site on survey road)	: 0		km		rafer. 3. 4. 2 (2) 3. 3- 2) of the (3+
2-3-2) AADT: Annual Average Daily Traffic on the survey site	р		vehicles per day		infer 3 4 2 (2) 2 3 3) of the O
2-3-3) Nos. of predicted closure days of the whole width of the road on the survey site per RCD	q		days		refer 3.4.2 (2) 2-3-4) of the Os
2-3-4) Average Vehicle Operating Cost per km on survey road	r.		pesos per vehicle*km		
Average Vehicle Operating Cost per km on detour road	5		pesos per vehicle*km		rafer 3.4.7 (2) 2-3-3) of the D
2-3) Annual detour cost		⊨FRCDp*p*q*(o*s-n*r)	pesos per year	0	refer 3.4.2 (2) 2-3) of the Gu
Total Annual Loss		u∹j+m+t	pesos per year	0	refer 3.4.2 (2) of the Gui
(3) Feasibility	Indicator	rs of Countermeasu	res		·
		e alternative I			
3-1) Cost of countermeasure with 20 years maintenance	v I		pesos	0	evaluated in sheet
3-2) Risk reduction ratio in RCD due to countermeasure	wI		ratio		refer $342(3)32$ of the Gu
3-3) Decrease in annual loss due to countermeasure	x1	$x I = u^{a} wI$	pesos per year	and the second se	refer 3 # 2 (3) 5-3) of the Ge
Potential frequency of road closure disaster with countermeasure	FRCDwc1	FRCDpwcI = FRCDp*(1 - wI)	nos, per year	0.000	
Benefit/cost ratio at 15% discount rate	BCR1	and the second second	ratio	#DIV/0!	refer 3.4.2 (3) of the Gu
Economic net present value at 15% discount rate	ENPV I		pesos	Ó	
Economic internal rate of return	EIRRI		percent	#NUM!	1
	-	e alternative 11			
3-1) Cost of countermeasure with 20 years maintenance	vП		pesos	0	evaluated in sheet
3-2) Risk reduction ratio in RCD due to countermeasure	wП		ratio		retier 3 ± 2 (3) 3-2) of the Ou
3-3) Decrease in annual loss due to countermeasure	x.II	x II = u* wII	pesos per year	0.000	refer 3.4.2 (3) 3-3) of the Gu
Potential frequency of road closure disaster with countermeasure	FRCDpwcL	FRCDpwcII = FRCDp*(1-wII)	nos. per year	100000000000000000000000000000000000000	
Benefit/cost ratio at 15% discount rate	BCR II		ratio	#DIV/01	refer 3.42 (3) of the Ge
Economic net present value at 15% discount rate	ENPV II		pesos	0 #NUM!	
Economic internal rate of return Count	EIRR II ermeasure	alternative III	percent	- WENCOWI	
3-1) Cost of countermeasure with 20 years maintenance	v III		pesos	0	evaluated in sheet
3-2) Risk reduction ratio in RCD due to countermeasure	w III		ratio		retter 3-4-2 (3) 3-2) of the Gu
3-3) Decrease in annual loss due to countermeasure	x III	x III = u * w III	pesos per year		refer 3 4 2 (3) 3-3) of the Gu
Potential frequency of road closure disaster with countermeasure	FRCDpwe II	FRCDpwc III = FRCDp*(1- wIII)	nos. per year	0.000	
Benefit/cost ratio at 15% discount rate	BCR III		ratio	#DIV/0!	refer 3.4.2 (3) of the Gu
	ENPV III		pesos	0	
Economic net present value at 15% discount rate	Carbon 251 (151)			#NUM!	
Economic net present value at 15% discount rate Economic internal rate of return	EIRR III	****	percent	- A CONTRACTOR	1
	EIRR III Note				ould be inputted.

Road Name	3			lau				_	
Station from	km	0 m	-0	Side of	survey Left	side of	road		
Name of inspector for disaster record, sheet 6	-		_		Survey date (d/m/s/	Date	Month	Year
lame of surveyor				1	Disaster D				
Disaster Occurrence Date, Hour	Hour	Date	Month	Year	(Select from dro list)				
ength of road closure site		Road clo	sure type (Full width/	At least one lane is	s secured)			
teopen Date, Hour at least one lane is secured	Hour	Date	Month	Year	Number of day width road closu				
Disaster station	from	km		m	until	km		m	
robable provoking cause of the disaster							_	_	
Collapsed materials		Tatalas		and Generally	Collapsed volum	ie (m')	-	Actual	
Accumulation volume on the road (m ²) Reopening method (Select from drop down list)	Soil/Rock-r	enioval by ma		ost (pesos)	Estimated			Actual	
sumber of dead persons due to disaster (nos.)				and the second se	ersons by the dist	aster (nos	a l		
					Station				
<u> </u>	from	km		m	until	km		m	
	from	km		m		km		m	
	from	km		m		km		m	
Countermeasure type	from	km	-	m		km		m	
RISS	from	km km	-	m		km km	_	m	
Rehabilitation plan (planned, not yet planned)			of the plan		- Millio	+011		14	_

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