

2000. 12

한국건설산업연구원

I.	.....	1
II	.....	2
1.	.....	2
2.	.....	5
III	.....	7
1.	.....	7
2.	.....	9
IV	.....	13
1.	.....	13
2.	.....	15
3. FIDIC	.....	16
4.	.....	18
5.	.....	19
.V	.....	20
1.	.....	20
2.	.....	21
IV.	.....	24
< >	.....	26
	.....	30

▪

< II-1>	.....	4
< II-2>	(' 96 2000)	5
< II-3>	.....	5
< III-1>	.....	8
< III-2>	.....	9
< IV-1>	(CAT Project)	15
< IV-2>	가	18
< V-1>	.....	22

↓

—

(risk)¹⁾가

- Thompson & Perry(1992)
(World Bank)

, 1974 1988
1,778 64%가

- 90%가
13% 106% (FTA, 1994)

—

Standard)

(Contingency) 」

(Global

가

—

-
-
- FIDIC
-

1) (risk) , (FTA, 1994) , “
가 (potential for monetary loss resulting from uncertainty about the project) ” .

1

1

—

가 , ,
 2가 , ,
 「 가 가 」
 (= 가)

(1)

가

—

「 」
 가 ,
 • , 1 1,831m²
 72 5,000 /m² 가 85 7,747
 5,000

• 가 가 ,
 (, 1997: 33).

—

가 가 가 , 가 가
 , 가 가 () ±2% 15
 , 가 , 가

2

4 가 .

- 가 ±2% (가)
가

— 가 「 가 」 ,
가

$$\begin{aligned}
 & 가 \quad 가 \\
 & = () \times 가 (가) \\
 & = () \times 가 (가) \\
 & = \times 가 (가) \\
 & = (+ +) \times (5.6\%) \\
 & = (+ +) \times (15\%)
 \end{aligned}$$

— 가 가 , 「 가」
「 」 가 ,
.

(2) (=)

— 1999 9 .

- 가 가 . 가

— , 가 가 (< II-1>)
(85 95)
가 ²⁾ (, 2000).

2)

< II - 1 >

			(200.5)		가 가	()
1,000	73%	85	72.995%	85	2 5%	75 78% (+2 5%)
1,000 300			77.995% (+5)	90	2 4.5%	80 83% (+7 9.5%)
300 100			82.995% (+10)	95	1 3%	84 86% (+11 13%)
100 50	80.5%	85	85.495% (+5)	95	0.3 1%	85.8 86% (+5.3 6%)
50 10 (3 , , 1 ,)	83%	85	86.745% (+3.8)	95	-	86.75% (+3.8%)
10 (3 , , 1 ,)	85%	85	87.745% (+2.8)	95	-	87.75% (+2.8%)

: (2000.6).

- 가 , 가

가 , 가 「 가
가 」 가

- 가 가
가 「 (全知全能) 」³⁾
(estimating error)
가 「 」

3) 가 「 (全知全能性) 」 가 , 가 「 (金本良嗣, 1999).

2

— (, 1999) 1994 (: 500 , : 200) (, 2000).

— < II-2> , 가 , 2000
2 3 .

• , < II-3> , 가
4 5,505
86.5% , 가 13.5% .

< II - 2> (' 96 2000)

	96	97	98	99	2000
	51	70	104	194	110
()	6.6 (38.8%)	5.2 (20.2%)	19.1 (28.0%)	15.4 (19.3%)	5.3 (9.5%)
(가)	2.4 (13.2%)	2.6 (10.0%)	8.5 (12.5%)	6.9 (8.6%)	2.3 (4.1%)

: (2000.7.24).

< II - 3>

			가					
				10%	10 30%	30 50%	50 100%	100%
(%)	52,629 (100.0)	45,505 (86.5)	7,124 (13.5)	4,668 (8.9)	14,390 (27.3)	10,699 (20.3)	111,882 (22.6)	10,990 (20.9)
(%)	106 (100.0)	103	23	62 (58.5)	22 (20.8)	11 (10.4)	7 (6.6)	4 (3.8)

: (2000.4.21).

— 가 86.5%가 「 」 가
· , 가
,

I

1

— (Contingency) < III-1> 가
 4) 가
 .
 ,
 가
 (risk analysis) (sum of
 money or amounts of time)
 (uncertainty)
 가 (estimator's
 allowance for the cost of unknowns)
 가 (escalation)
 , escalation (fit)
 (separate item)
 , “ 가 10% ”가
 가
 , (estimating error)
 (confidence)

4) (AAACE : American Association of Cost Engineers)
 (Contingency)
 “ (Contingency) () 가
 가 (AAACE, 1990: 19) ” 가

(Definition)	(Source)
<ul style="list-style-type: none"> - specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur. If an allowance for escalation is included in the contingency it should be a separate item, determined to fit expected escalation conditions for the project 	PMK87
<ul style="list-style-type: none"> - Specific provisions to mitigate random or unknown project risks from causing project failure or frequent baseline changes 	26
<ul style="list-style-type: none"> - A Contingency is the planned allotment of time and cost for unforeseeable elements with a project. Including contingencies will increase the confidence of the overall project 	WST
<ul style="list-style-type: none"> - An amount of design margin, time, or money inserted into the corresponding plan as a safety factor to accommodate unexpected and presently unknown occurrences that judgement suggests will occur during the project 	SPM 304-9
<ul style="list-style-type: none"> - Incidental expense 	NPMT
<ul style="list-style-type: none"> - A component of the authorized appropriation or estimated cost at completion for the project scope of work or a particular cost class. Contingency is an estimator's allowance for the cost of unknowns, changes to make things work or estimating error. The anticipated award price of a cost class may also contain allowance for escalation. However, a reserve for scope changes is not a contingency in the same sense. A Scope Change Reserve is an allowance from which transfers can be made into specific cost classes when the scope of work in the class is amended by the owner. The appropriation for that class should be amended accordingly following the transfer 	OCCP
<ul style="list-style-type: none"> - Time, effort or money added to the project plan to compensate for uncertainty 	PMMJ97
<ul style="list-style-type: none"> - As a result of risk analysis sum of money or amounts of time may be set aside as contingency which may be used in the event of risks occurring. <i>Editor's note: Contingency should be shown in the plan as a separate item and not hidden in activities as 'an extra 10%' on duration or cost</i> 	PNG

:(<http://www.pmforum.org/library/glossary/PMG-C05.htm>).

2

(1)

— CII(1997) 37 350 (Design-Build),
 (CM at Risk), / 3가 ,
 . . 3가 가(Performance Evaluation)
 , < III-2> .
 • 가 ,
 (risk) 가

< III - 2 >

/		.	CM at Risk	
(%)	가	4.8	3.37	2.17
	가	2 11	0 9	0 5
(%)	가	4.4	0	0
	가	0 18	-2 4	-1 6
(m ² /)		477	761	846
	+	302	438	636
(10)	()	7.0	8.1	7.9
	()	5.2	6.3	6.1

:CII(1997). Project Delivery Systems : CM at Risk, Design-Build, Design-Bid-Build.

— 가 , 가 .

(2)

— ,

가 가 ,

— 가 ,

가 .

• 「 (' 99.3) 」

(3) .

— 가 ,

가 .

• 1989 1994 175
20%
50% 2
15%
(, 1995).

• ,

가 .

— , 가 .

(4)

— () 가
가 .

— 가 ()

• 31 1 , 63% 가 '98 19 '99

— 가

(5)

— 가 가
가 ,

— ,

• 「 (2000.9) 」

(6)

— 가 , . . .
—
가 , 가
가 , 가

(7) (Global standard)

— IV , .
(Global Standard) .

• 가 가 ,

M.

1

(1) 「 (FAR) 」

— 「 (FAR: Federal Acquisition Regulations) 」
(Cost for Contingencies) (FAR 31.205-7).

•“ (Contingency) ”
가 ,

•“ (Costs for contingencies) ” (historical
costing purposes) ,

• “ (Contingency) ” 2가

가 , 가

(:) (cost estimates)

(2) (FTA)

— (U.S. Department of Transportation)
(FTA : Federal Transit Administration) Fixed Guideway
Transit System , 가

(FTA, 1994).

— FTA

2가

/ (design/construction risks) :

(financial risk) : , ,

— (risk management) 3 .

1 :

2 : ,

3 :

— 가 , (overall

contingency rate) 10 15%가 .

- Pickrell(1990) ,
가 5 15% ,

—

- , (,
가)

- Check list

- (Central Artery/Third Harbor Tunnel Project) , < IV-1> , 7 가 5% 30% 가 (, (Change Order) 12%), 가 가 가

< IV - 1> (CAT Project)

		가	(×)
1. (Design difficulty)	25%	0.05	1.25%
2. (Geological conditions)	30%	0.12	3.6%
3. (Joining occupancy of site)	15%	0.06	0.9%
4. (Schedule constraints)	15%	0.12	1.8%
5. (Project duration)	5%	0.04	0.2%
6. 가 (Escalation)	5%	0.06	0.3%
7. (Urban environment)	5%	0.06	0.3%
	100%		8.35%

: FTA(1994). Risk Assessment in Fixed Guideway Transit System Construction.

2

— (HM Treasury) 「 (Government Construction Procurement Guidance, No 6 Financial Aspects of Projects) 」 「 (base estimation) + (risk allowance) 」

- (risk allowance) (formal risk analysis) (identified) , (contingency)

- 가

— “ ICE Conditions of Contracts 58 ”
(Provisional Sum)

(Allan Ashworth, 1998: 233 234)⁵⁾

3. FIDIC

— FIDIC 58 (Provisional Sums)

(Definition of “ Provisional Sum ”)

•“
 , , , (contingencies)
(BOQ) , 가
 ,
(contingencies)
가 가 .
 , 1
 .”

(Use of Provisional Sums)
Vouchers)

(Production of

•“
 ,
 .
(a) 13.3 가
(b) (nominated subcontractors)

5)

FIDIC

- 가:
- (i) 가
 - (ii)

가

6)

— FIDIC

(contingency)

, FIDIC

Guide to the use of FIDIC

3가 (, 1997).

“ ,

가 가

가

— FIDIC 「 (Conditions of Contract for Design-Build and Turnkey, 1995)」 14 5

“

- (a) 가 ()
- 14 3 ,

6) 1999 “ New FIDIC ”

(b) 가 , ,
 (i) 가 ()
 (ii) , 가 ,
 () 가
 , , ,
 .”

4

— () · LG ·
 (< >), 가
 (Provisinal Sums) (Contingencies)

— , 가
 < IV-2> .

< IV - 2 > 가

		(%)	
LG ()	4	10.1%	
()	4	10%	
()	15	6.70%	
()	4	1.80%	
()	4	2.6%	
()	4	17.5%	
()	2	5.28%	
()	8	9.61%	
	45	7.95%	()

: (2000).

5

— 가 (가 , 가)
,
(Global Standard) .

- FIDIC (nominated sub-contract)
「 (Provisional Sums) 」

— 10 15% .

- 가 (FTA) 10 15%

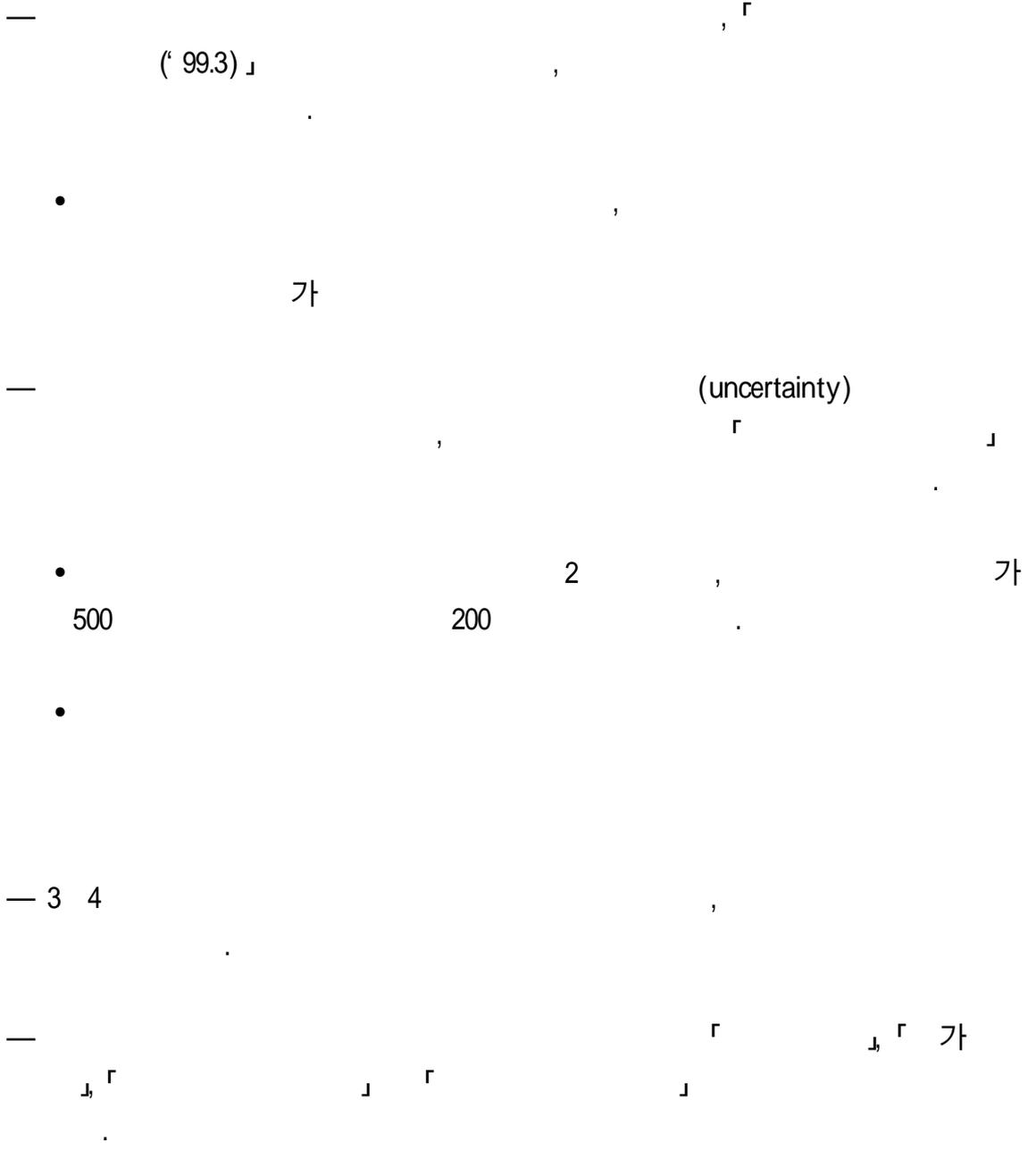
— 가 (engineer)
, , 가
(uncertainty)

- (Provisional Sums)
“ (included in the contract) ” FIDIC
, “
(effective contract price)⁷⁾ ” (,
1997 : 330).

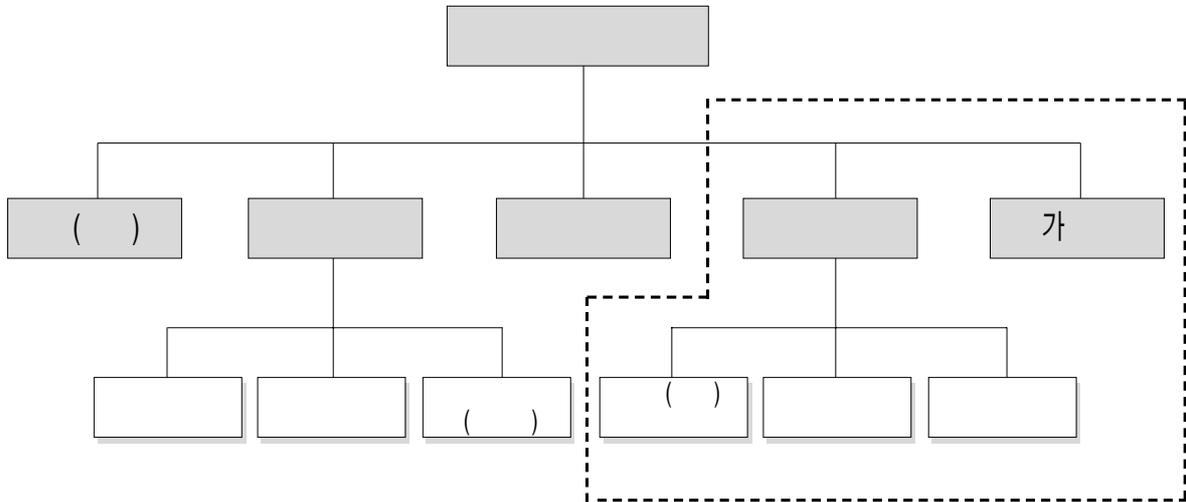
7)“ 52)” , “ (daywork) (contract price) (FIDIC ,
(FIDIC
1)” . , (daywork) (, 1997 : 301).

2

(1)



< V - 1 >



(2)

— 가 < V-1 > 가 .

• () .
 , < V-1 >

• 가 ,
 가
 가 가 , 가 가
 가

• 가 , 가

가 ()

- ()

(3)

— 10 15%

- (risk analysis)
10%

— , .

- 10%
- 가
- 가
- ,

Ⅴ

—

가 가 ,

•

가 ,

—

가 ,
(Global Standard)

—

, 「
(: 500 , : 200)

•

10%

(risk analysis)

•

, (),

가

•

—

가 .

- 5 15%
, , 5%
(, 2000 : 164 165),
- 가
- .
- (risk analysis)

(:U. S. dollar)

			(A)	(B)	(B/A) (%)
	Highway No.1 Rehabilitation Project Doxxay-Vinh (IDA II)	,96.1	24,069,633	4,813,927	20.00
	Ham Thum-Dami Hydro power project	,97.2	103,824,972	10,382,497	10.00
	Third Road Improvement Project ADB 3-1	,99.10	16,247,662	3,249,532	20.00
	Third Road Improvement Project ADB 3-3	,99.10	19,478,965	3,895,793	20.00
	1 Great Man-Made River Project Phase 1	,83.11.6	3,296,975,000	171,985,000	5.22
	2 Great Man-Made River Project Phase 2	,96.4.4	4,632,390,000	247,008,000	5.33

			(A)	(B)	(B/A) (%)
()		97.10.22	26,515,000	803,000	3.00
	가 A-K	98.10.14	18,840,000	495,000	2.63
		99.06.06	55,749,000	571,000	1.02
		99.06.18	88,600,000	482,000	0.54
()	Davao-Bukidnon road, Buda-Maramag (Camporact Uno) Section, Contract PackageNo.09B-2	99.4.22	18,383,410	750,000	4.08
	National Highway No.1 Rehabilitation, Nha Trang to Ho Chi Minn City	95.12.11	36,684,824	6,114,135	16.67
	Construction of Boeng Trabek Drainage System	00.3.10	5,429,338	493,576	9.09
	Malaysia R-Story Office/Commercial Commercial Complex	83.10.5	18,956,852	1,900,000	10.02
	Singapore Capital Pjt.	97.1.31	223,936,620	1,938,680	0.90
	Singapore Ssangyong Cement Silo Pit.	99.57	6,728,000	334,050	5.00
	Malaysia Suasana Condominium Pjt.	99.8.11	34,095,342	1,485,000	4.40
	U. A. E Dubai Grand Hyatt Hotel Pjt.	99.9.19	172,006,682	102,110	0.10

			(A)	(B)	(B/A) (%)
LG	Thien Tan Water Supply	99.12.07	25,680,000	273,000	1.06
	Quy Cao Bridge	00.2.18	7,411,000	1,603,000	21.63
	NODCO	99.1.4	686,359,00	58,190	8.48
	GOD	00.4.8	93,964,00	8,651	9.21
	Jamuna Multipurpose Bridge Project Contract No.3 East Road Approach	94.10.15	29,727,549	2,229,592	7.50
	Jamuna Multipurpose Bridge Project Contract No.4 East Road Approach	94.10.15	27,151,779	2,351,344	8.66
	Champassak Road Improvement Project contract 3	96.06.01	12,111,767	185,520	1.53
	Periodic Maintenance of Ulaambaatar-Darchan-Altanbulag Road and Reconstruction of Orhon and Buraltai Bridge	96.11.26	23,343,605	1,913,779	8.20
	Bangladesh Bridge Railway Link Project	97.12.4	117,705,010	6,700,170	5.72
	Second Highway Rehabilitation Project Contract No.1	98.8.11	20,823,624	3,470,604	16.67
	Second Highway Rehallitation Project Contract No.2	98.8.11	22,182,657	3,697,109	16.67
	National Highway No.18Improvement Project Package No.2	00.3.31	13,543,473	1,614,680	11.92

			(A)	(B)	(B/A) (%)
	가 711	97.9	94,848,786	18,720,000	19.34
	가 706	97.6	250,040,952	22,545,714	9.02
	가	97.5	223,570,000	29,937,143	13.39
		00.9	54,129,000	2,580,000	4.77
	NEW OIL PIER	00.9	324,210,000	17,371,000	5.36
	MACAU ENTERTAINMENT CENTER	99.1	24,497,000	1,806,450	7.37
	TUNG CHUNG STATION DEV. PKG-2	99.8	278,429,000	12,800,000	4.60
	QUEEN STREET DEV. SITE B	9.8	67,354,000	2,580,600	3.83
	TUEN MUN RESIDENTIAL	99.4.22	67,354,000	782,000	2.92
	KCRC SERVICE APARTMENT	99.8	26,817,000	2,564,103	5.60
	HUME PARK 4 CONDO	99.8	45,806,000	7,692,000	11.31
	HUME PARK 4 CONDO	96.10	89,599,000	1,078,000	1.20
	HUME PARK 5 CONDO	99.10	52,417,000	1,796,000	3.43
	COSTA DEL SOL CONDO	99.11	114,848,000	5,089,000	4.43
	30 STORY HOTEL	99.11	37,705,000	1,497,000	3.94

: (Provisional Sums), (Contingencies) .
: (2000).

(1999.3), 「
(2000.9), 「
(2000.1), 「 2000
(1997), 「
(1997), 「
(1995), 「
(2000), 「 가
(2000), “ SOC , ” 「 SOC
III-I

金本良嗣(1999), 「日本の建設産業」, 日本経済新聞社.

AACE(1990), Cost Engineer's Notebook Vol. I & II, American
Association of Cost Engineers(AACE).

Ashworth, Allan(1998), Civil Engineering Contractual Procedures.
Longman.

CII(1997), Project Delivery Systems : CM at Risk, Design-Build, Design-Bid-Build.

FIDIC(1995), Conditions of Contract for Works of Civil Engineering
Construction.

FIDIC(1995), Conditions of Contract for Design-Build and Turnkey.

FTA(1994), Risk Assessment in Fixed Guideway Transit System Construction.

OMB(1997), Capital Programming Guide.

Pickrell, Don H.(1990), Urban Rail Transit Projects-forecast Versus Actual Ridership and
Cost, Transportation Systems Center. U.S.DOT. Cambridge, MA.

Thompson, P., and J. Perry(1992), Engineering Construction Risks, Thomas Telford.
London. UK.

GSA(<http://www.gsa.gov>) Federal Acquisition Regulations.

HM Treasury(<http://www.hm-treasury.gov.uk>), Government Construction
Procurement Guidance.

PMI(http://www.pmforum.org/library/glossary/PMG_C05.htm).