

2014 12

1	.....	1
2	.....	2
3	.....	5
3.1	.....	5
3.2	.....	6
3.3	.....	8
4	.....	18
4.1	.....	18
4.2	.....	20
4.3	.....	23
4.4	.....	24
4.5	.....	27
5	.....	53
5.1	.....	53
5.2	.....	54
6	.....	56
6.1	.....	56
6.2	.....	56
6.3	.....	59
A	.....	61
B	.....	63
C	.....	64

D	.....	77
	.....	78
1	.....	78
3	.....	80
4	.....	92
5	.....	108

1

1.0.1
")

("

1.0.2

1.0.3

1.0.4

1.0.5

2

2.0.1 Cutting High-slope

20m

30m

2.0.2 Accident

2.0.3 Risk

2.0.4 Safety

2.0.5 Hazard or Danger

2.0.6 Risk Factors

2.0.7 General Risk Factors

2.0.8 High Risk Factors

2.0.9 Risk Identification

2.0.10 Risk Analysis

2.0.11 Risk Estimation

2.0.12
Safety

Risk Assessment in Construction

2.0.13

General Risk Assessment

2.0.14

Specific Risk Assessment

W=1

W=0

W=0 1

1

3-1

3-1

1		R_1	W	1
2		R_2	W	$D = W \times R$ W $i = 1 \dots 5$
3		R_3	W	R $1 \dots 4$ W
4		R_4	W	D
5		R_5	W	2 $D = 3.5$ $3.5 \ D = 2.5$ $2.5 \ D = 1.5$ $D = 1.5$

3.2.4

Dr

Dr

Dr 3.5

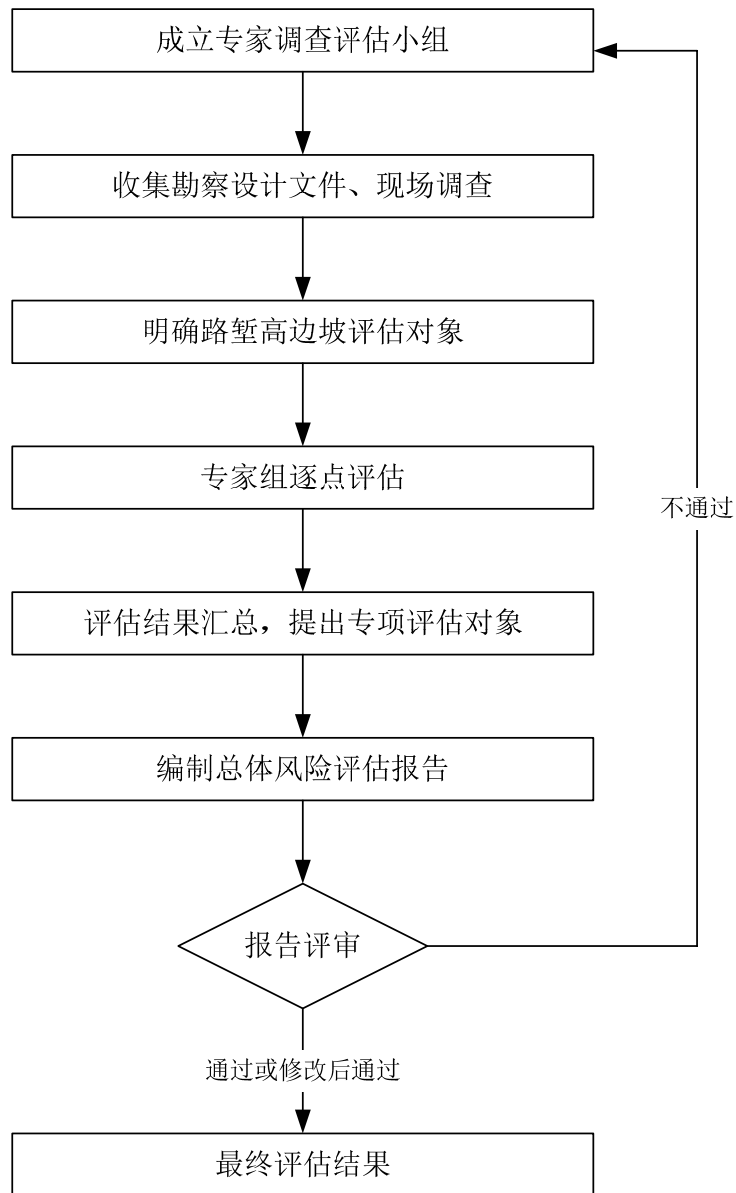
3.5 Dr 2.5

2.5 Dr 1.5

Dr 1.5

3.2.5

3-1



3-1

3.3

3.3.1

3.3.2

"

"

3-1

$$\gamma = \frac{2n - 2m + 1}{n^2}$$

3-1

—

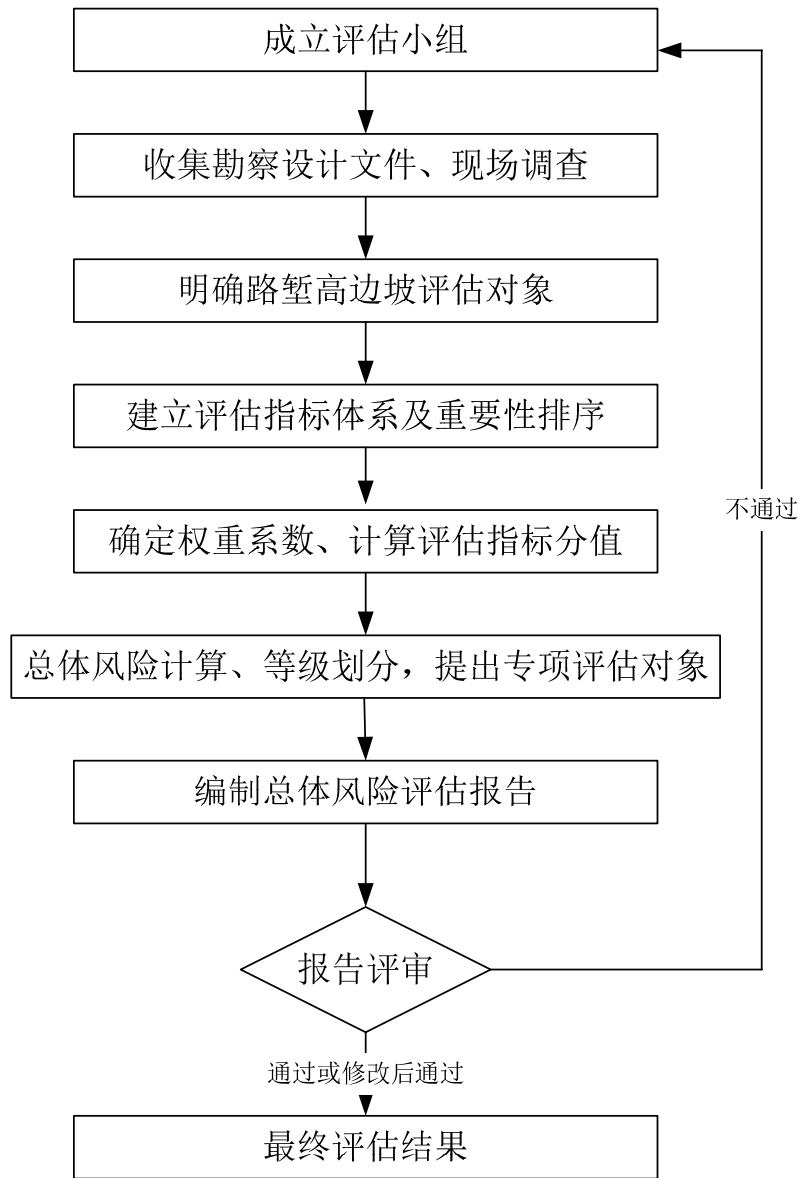
n—

m—

m n

3.3.3

3-2



3-2

3.3.4

5

3-2

3-2 11

3-2

			R _j		(i _j)	X _j			
X _i	X ₁₁	H 40m H 60m	75	100	R ₁₁	11	X ₁₁ = R ₁₁ × 11	1 H 60m H 80m 100	
		30m H<40m 40m H<60m	50	74				2	
		20m H<30m 30m H<40m	25	49				h 12m h 15m	
		H<20m H<30m	0	24				h 6m h 8m h=8m h=10m	
	X ₁₂			75	100	R ₁₂	12	X ₁₂ = R ₁₂ × 12	3
		15°							
		10° <15°	50	74	25° 100				
		5° <10°	25	49					
	<5°		0	24					

			R _j		(i _j)	X _j		
X ₂₃		0.25H	75	100	R ₂₃	23	X ₂₃ = R ₂₃ × 23	
		0.25 0.5 H	50	74				
		0.75 H	25	49				
		1.0 H	0	24				
X ₃₁		5	75	100	R ₃₁	31	X ₃₁ = R ₃₁ × 31	5 1000mm 100
		800mm						
		5	50	74				
X ₃		600-800mm						

			R _j		(i _j)	X _j		
		5 300- 600mm	25	49				
		5 300mm	0	24				
X ₃₂			75	100	R ₃₂	32	X ₃₂ = R ₃₂ × 32	
			50	74				
			25	49				
			0	24				
X ₄₁			75	100	R ₄₁	41	X ₄₁ = R ₄₁ × 41	
			50	74				
			25	49				
			0	24				
X ₄	X ₄₂	0.5H 1.0H	75	100	R ₄₂	42	X ₄₂ = R ₄₂ × 42	

			R_j		(i_j)	X_j	
		1. OH 1. 5H	50	74			
		1. 5H 2. OH	25	49			
			0	24			
X_5	X_{51}	1	75	100			
		2	50	74	R_{51}	$X_{51} =$ $R_{51} \times$	100

			R_j		(i_j)	X_j	
		3	25	49			
		3	0	24			
X_{52}			75	100	R_{52}	$_{52}$	$X_{52} =$ $R_{52} \times$ $_{52}$
			50	74			
			25	49			
			0	24			

			R _j		(i _j)	X _j	

3. 3. 5

3-2 3-3

$$F = \sum_{j=1}^n X_j \quad 3-2$$

$$X_j = R_j - \sum_{i=1}^j X_i \quad 3-3$$

$$\begin{array}{cccccccc}
 X_j & - & & & & & & & \\
 n & n & i & & & & i=1 & 2 & 3 & 4 & 5 & j=1 & 2 & \dots
 \end{array}$$

3-3

	F
	F < 60
	45 < F < 60
	30 < F < 45
	F < 30

3-2

4

4.1

4.1.1

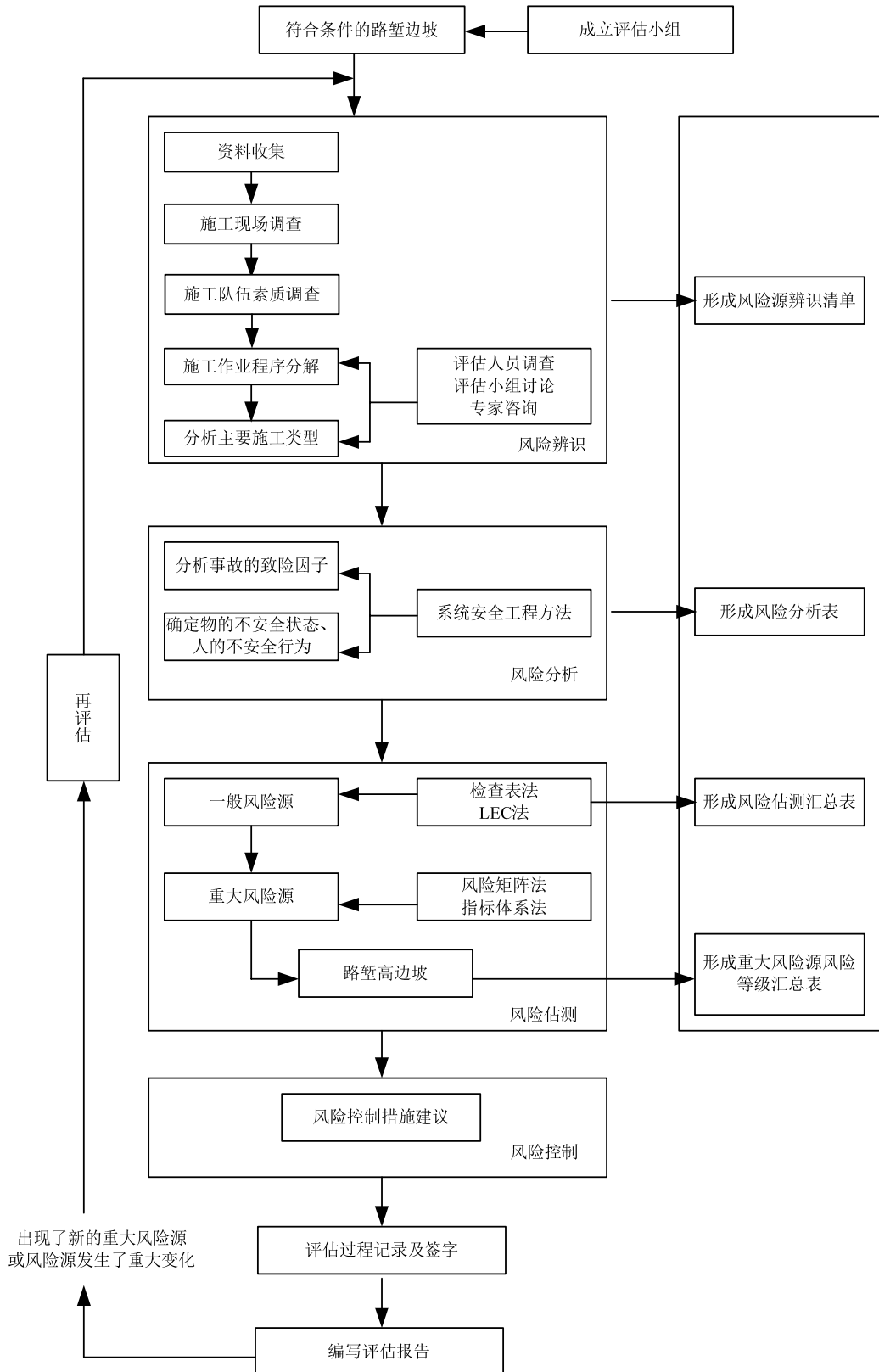
4.1.2

1

2

4.1.3

4-1



4-1

4. 1. 4

4. 1. 5

1

2

4. 2

4. 2 1

4. 2 2

1

2

3

4

5

4. 2 3

1

2

3

4. 2 4

1

2

3

4.2 5

4.2 6

A

4.2 7

4-1

4-1

1	1	
2	2	
...	...	
N	N	

4.2 8

B

4. 3

4. 3. 1

4. 3. 2

4. 3. 3

4. 3. 4

4. 3. 5

4-2

4-2

		1	2	3	4			
1								
2								
.....								
N								

4. 4

4. 4. 1 = ×

" × "

4. 4. 2

1

2

4. 4. 3

4-3

4. 4. 4

4-4

4-3

0.3	1		4
0.03 0.3	0.1		3
0.003 0.03	0.01		2
0.003	0.001		1

1

2

4-4

			4
			3
			2
			1

4-1

$$L=(1 \ 4)H$$

4-1

H—

m

L—

m

4. 4. 5

4-5

4. 4. 6

4-6

4-5

1	1						
2	2						
...	...						
N	N						

4-6

		1	2	3	4
4		Orange	Orange	Red	Red
3		Yellow	Orange	Orange	Red
2		Yellow	Yellow	Orange	Orange
1		Blue	Yellow	Yellow	Orange

4.5

4.5.1

4.5.2

4-4

4.5.3

4.5.4

1

2

3

4

5

6

4. 5. 5

4. 5. 6

4-7

4. 5. 7

4-8

D₀

4-7

			R _j		(i _j)	X _j			
X ₁	X ₁₁	H 40m H 60m	75	100	R ₁₁	11	X ₁₁ = R ₁₁ × 11	1 H 60m H 80m 100	
		30m H<40m 40m H<60m	50	74				2	
		20m H<30m 30m H<40m	25	49				h 12m h 15m h 6m h 8m h=8m h=10m	
		H<20m H<30m	0	24				3	
	X ₁₂		15°	75	100	R ₁₂	12	X ₁₂ = R ₁₂ × 12	
		10° <15°	50	74	25°				
		5° <10°	25	49	100				
		<5°	0	24					
				75	100	R ₂₁	21	X ₂₁ = R ₂₁ × 21	
			50	74					

X ₂	X ₂₁		R _j		(i j)	X _{ij}	
		25 49					
		0 24					
X ₂	X ₂₂		75 100	R ₂₂	22	X ₂₂ = R ₂₂ × 22	
			50 74				
			25 49				
			0 24				
X ₃	X ₃₁		75 100	R ₃₁	31	X ₃₁ = R ₃₁ × 31	
		2	50 74				
		1	25 49				
			0 24				

		R_j		(ij)	X_{ij}	
X_{32}		75	100	R_{32}	$_{32}$	$X_{32} =$ $R_{32} \times$ $_{32}$
		50	74			
		25	49			
		0	24			
X_{33}		75	100	R_{33}	$_{33}$	$X_{33} =$ $R_{33} \times$ $_{33}$
		50	74			
		25	49			
		0	24			

			R _j		(i _j)	X _{i_j}		
X ₄	X ₄₁	5 800mm	75	100	R ₄₁	41	X ₄₁ = R ₄₁ × 41	100 5 5 1000mm
		5 600-800mm	50	74				
		5 300-600mm	25	49				
		5 300mm	0	24				
X ₄₂			75	100	R ₄₂	42	X ₄₂ = R ₄₂ × 42	
			50	74				
			25	49				
			0	24				

			R_j		$(\quad ij)$	X_{ij}	
X_5	X_{51}	0.5H 1.0H	75	100	R_{51}	$_{51}$	$X_{51} =$ $R_{51} \times \quad_{51}$
		1.0H 1.5H	50	74			
		1.5H 2.0H	25	49			
			0	24			

4-8

		D _b			
			1.3 D _b <1.5	D _b	0.8 1.2 1.3
			1.2 D _b <1.3		
			1.1 D _b <1.2		
			1.0 D _b <1.1		

4.5.8

4-9

4-9

			R _j		(i j)	X _j		
X ₁	X ₁₁	H 16m	75	100	R ₁₁	11	X ₁₁ = R ₁₁ × 11	H 20m 100
		12m H 16m	50	74				
		8m H 12m	25	49				
		H 8m	0	24				
	X ₁₂	60°	75	100	R ₁₂	12	X ₁₂ = R ₁₂ × 12	70° 100
		45° H 60°	50	74				
		30° H 45°	25	49				
		H 30°	0	24				
	X ₁₃	L 40m	75	100	R ₁₃	13	X ₁₃ = R ₁₃ × 13	60m 100 L
		30m L 40m	50	74				
		20m L 30m	25	49				
		L 20m	0	24				
X ₂	X ₂₁	a	75	100	R ₂₁	21	X ₂₁ = R ₂₁ × 21	a b
		b	50	74				
		c	25	49				
			0	24				
	X ₂₂		75	100	R ₂₂	22	X ₂₂ = R ₂₂ × 22	
			50	74				
			25	49				
			0	24				

			R_j		(ij)	X_j				
X_3	X_{31}		75	100	R_{31}	${}_{31}$	$X_{31} =$ $R_{31} \times {}_{31}$			
			50	74						
			25	49						
			0	24						
	X_{32}		$2/3$	75	100	R_{32}	${}_{32}$	$X_{32} =$ $R_{32} \times {}_{32}$	$4/5$ 100	
			$1/3$	50	74					
			$1/10$	$1/3$	25					49
			$1/10$	0	24					
X_4	X_{41}		75	100	R_{41}	${}_{41}$	$X_{41} =$ $R_{41} \times {}_{41}$			
			2	2					50	74
			1	1					25	49
				0					24	

			R _j		(i j)	X _j		
X ₄₂			75	100	R ₄₂	42	X ₄₂ = R ₄₂ × ₄₂	
			50	74				
			25	49				
			0	24				
X ₄₃		h>24m	75	100	R ₄₃	43	X ₄₃ = R ₄₃ × ₄₃	h 30m 100
		16m<h 24m	50	74				
		8m<h 16m	25	49				
		h 8m	0	24				
X ₅₁			75	100	R ₅₁	51	X ₅₁ = R ₅₁ × ₅₁	GB50021-2001
			50	74				
			25	49				
			0	24				
X ₅			75	100	R ₅₂	52	X ₅₂ = R ₅₂ × ₅₂	

	X_{52}		R_j		(ij)	X_j		
			50	74				
			25	49				
		0	24					
	X_{53}		75	100	R_{53}	$_{53}$		$X_{53} =$ $R_{53} \times$ $_{53}$
			50	74				
		25	49					
		0	24					

4. 5. 9

4-10

4-10

			(R _j)		(i j)	(X _j)		
X ₁	X ₁₁	L 35m	75	100	R ₁₁	11	X ₁₁ = R ₁₁ × 11	L 45m 100
		25m L 35m	50	74				
		15m L 25m	25	49				
		L 15m	0	24				
	X ₁₂	h	75	100	R ₁₂	12	X ₁₂ = R ₁₂ × 12	
			50	74				
			25	49				
			0	24				
X ₂	X ₂₁		75	100	R ₂₁	21	X ₂₁ = R ₂₁ × 21	
			50	74				
			25	49				
			0	24				
	X ₂₂	30°	75	100	R ₂₂	22	X ₂₂ = R ₂₂ × 22	40° 100
		20° 30°	50	74				
		10° 20°	25	49				
		10°	0	24				

			(R _j)		(i _j)	(X _j)		
X ₂₃			75	100	R ₂₃	23	X ₂₃ = R ₂₃ × 23	
			50	74				
			25	49				
			0	24				
X ₃₁			75	100	R ₃₁	31	X ₃₁ = R ₃₁ × 31	0.5 1.0m
			50	74				
			25	49				
			0	24				
X ₃₂			75	100	R ₃₂	32	X ₃₂ = R ₃₂ × 32	
			50	74				
			25	49				
			0	24				
X ₄₁			75	100	R ₄₁	41	X ₄₁ = R ₄₁ × 41	
			50	74				
			25	49				
			0	24				

		(R _j)		(i, j)	(X _j)		
X ₄₂		75	100	R ₄₂	42	X ₄₂ = R ₄₂ × 42	10m
		50	74				
		25	49				
		0	24				
X ₄₃		75	100	R ₄₃	43	X ₄₃ = R ₄₃ × 43	
		50	74				
		25	49				
		0	24				

4. 5. 10

4-11

4-11

			(R _j)		(i _j)	(X _j)			
X ₁	X ₁₁	H 12m	75	100	R ₁₁	11	X ₁₁ = R ₁₁ × 11	16m H 100	
		10m H 12m	50	74					
		8m H 10m	25	49					
		H 8m	0	24					
	X ₁₂			75	100	R ₁₂	12	X ₁₂ = R ₁₂ × 12	
				50	74				
				25	49				
				0	24				
	X ₁₃		h ₀ 4m	75	100	R ₁₃	13	X ₁₃ = R ₁₃ × 13	5m h ₀ 100
			2.5m h ₀ 4m	50	74				
			1.5m h ₀ 2.5m	25	49				
			h ₀ 1.5m	0	24				
	X ₂	X ₂₁		75	100	R ₂₁	21	X ₂₁ = R ₂₁ × 21	
			50	74					
			25	49					
			0	24					

			(R _j)		(i _j)	(X _j)			
X ₂₂			75	100	R ₂₂	22	X ₂₂ =	30% 30% 50%	
			50	74					
			25	49					
			0	24					
X ₂₃		4m	75	100	R ₂₃	23	X ₂₃ =	50% 70% 70%	
		2 4m	50	74					
		0 2m	25	49					
			0	24					
X ₃	X ₃₁	L>12m	75	100	R ₃₁	31	X ₃₁ =		
		10m L 12m	50	74					
		8m L 10m	25	49					
		L 8m	0	24					
	X ₃₂		h>16m	75	100	R ₃₂	32	X ₃₂ =	h 20m
			10m×h 16m	50	74				
			6m×h 10m	25	49				
			h 6m	0	24				
						R ₃₂ × ₃₂	100		

			(R _j)		(i _j)	(X _j)		
X ₄	X ₄₁		75	100	R ₄₁	41	X ₄₁ = R ₄₁ × 41	10m
			50	74				
			25	49				
			0	24				

4. 5. 11

4-12

4-12

			(R _j)		(i _j)	(X _j)		
X ₁	X ₁₁	R 3.0m	75	100	R ₁₁	11	X ₁₁ = R ₁₁ × 11	R 3.6m 100
		2.0m R 3.0m	50	74				
		1.5m R 2.0m	25	49				
		R 1.5m	0	24				
	X ₂₁		75	100	R ₂₁	21	X ₂₁ = R ₂₁ × 21	
			50	74				
			25	49				
			0	24				

			(R _j)		(i j)	(X _j)		
X ₂	X ₂₂		75	100	R ₂₂	22	X ₂₂ = R ₂₂ × 22	30% 30% 50% 50% 70% 70%
			50	74				
			25	49				
			0	24				
	X ₂₃		75	100	R ₂₃	23	X ₂₃ = R ₂₃ × 23	
			50	74				
			25	49				
			0	24				
X ₃	X ₃₁	S 2m	75	100	R ₃₁	31	X ₃₁ = R ₃₁ × 31	S 3m 100
		1m S 2m	50	74				
		0 S 1m	25	49				
		S=0	0	24				
	X ₃₂	>1.5m	75	100	R ₃₂	32	X ₃₂ = R ₃₂ × 32	S 2.5m 100
		1 S 1.5m	50	74				
		0.5 S 1m	25	49				
		S 0.5m	0	24				
	X ₃₃		75	100	R ₃₃	33	X ₃₃ = R ₃₃ × 33	
			50	74				
			25	49				
			0	24				

			(R _j)		(i, j)	(X _j)		
X ₄	X ₄₁		75	100	R ₄₁	41	X ₄₁ = R ₄₁ × 41	10m
			50	74				
			25	49				
			0	24				

4. 5. 12

4-13

4-13

			(R _j)		(i, j)	(X _j)		
X ₁	X ₁₁	R 30cm	75	100	R ₁₁	11	X ₁₁ = R ₁₁ × 11	R 36cm 100
		20cm R 30cm	50	74				
		10cm R 20cm	25	49				
		R 10cm	0	24				

			(R _j)		(i _j)	(X _j)			
X ₂	X ₂₁		75	100	R ₂₁	21	X ₂₁ = R ₂₁ × 21		
			50	74					
			25	49					
			0	24					
	X ₂₂		75	100	R ₂₂	22	X ₂₂ = R ₂₂ × 22		
			50	74					
			25	49					
			0	24					
X ₃	X ₃₁		75	100	R ₃₁	31	X ₃₁ = R ₃₁ × 31		
			50	74					
			25	49					
			0	24					
	X ₃₂		P 5.0 MPa	75	100	R ₃₂	32	X ₃₂ = R ₃₂ × 32	P 5.5 MPa 100
			3.0 MPa P 5.0 MPa	50	74				
			1.0 MPa P 3.0 MPa	25	49				
			P 1.0 MPa	0	24				
X ₄₁			75	100	R ₄₁	41	X ₄₁ = R ₄₁ × 41		
			50	74					

X_4			(R_j)		(i_j)	(X_j)	
		25 49					
		0 24					
X_{42}		75 100	R_{42}	$_{42}$	$X_{42} =$	$R_{42} \times$	$_{42}$
		50 74					
		25 49					
		0 24					
							10m

4. 5. 13

4- 14

~~M~~A+B+C+D+E+F+G+H+I +J

4- 15

4-14

A		2	
		1	
		0	
B		2	
		0	
C		2	
		0	
D		2	
		1	
		0	
E		2	3 1 2
		1	
		0	
F		2	" A C "
		1	
		0	
G		2	
		1	
		0	
		2	
		1	

H		0	
I		2	
		1	
		0	
J		2	
	2	1	
	3	0	

4-15

M	
M 15	1.2
12 M 15	1.1
9 M 12	1
6 M 9	0.9
M 6	0.8

4.5.14

4-2

4-3

$$P = \cdot D_0 X_j \quad 4-2$$

$$X_{ij} = R_{ij} \quad 4-3$$

$$X_{ij} \quad i=1 \ 2 \ \dots \ m \quad j=1 \ 2 \ \dots \ n$$

$n \ m \quad n \quad i$

$D_0 =$

4-8

$D_0 = 1$

—

P

P

4-16

4.5.15

4-6

4-16

		P
	4	P 60
	3	45 < P 60
	2	30 < P 45
	1	P 30

4.5.16

4-17

4-17

1						
.....						
N						

5

5.1

5.1.1

5-1

5-1

5.1.2

5-2

5-2

5. 2

5. 2 1

5. 2 2

5. 2 3

5. 2 4

5. 2 5

1

2

5. 2 6

1

2

3

5. 2 7

1

2

5. 2 8

C

6

6.1

6.1.1

6.1.2

6.1.3

6.2

6.2.1

1

1

2

3

4

5

2

1

2

3

3

4

5

6

1

2

3

4

7

6.2.2

1

1

2

3

4

5

6

2

3

4

5

6

1

2

3

4

7

6.2.3

1

2

3

4

5

6

6.2.4

1

2

3

6.3

6.3.1

6.3.2

6.3.3

6.3.4

A

A-1

1			
2			
3			
4			
5			
6		5	4

7			
8			
9			
10			
11			
12			

B

B-1

1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												

C

C-1

	1	1	1
		2	2
	1	2	3
		3	4
			5
			6
	2	1	1
		2	2
			3
	3	1	1

		2	2
	4	1 2 3	1 2
	5	1 2 3	1 2 3m
	6	1 2	1 5m 2 15

C-2

	1	1 2 3	1 2 3 4
	2	1 2	1 2 3 4
	3	1 2 3	1 2 3
	4		1

		1	2
		2	10 15m 10m 45° 1 1 4 6
			3
			4
	5	1	1
		2	2
			3

C-3

	1	1 2 3	1 " " 2 3 4 5 6
	2	1 2	1 2 3 4 5 0.5m
	3	1	1 2 1.2m

		2	3 4 5
	4	1 2	1 2 10m 2 3m ³ 10 20min 3
	5	1 2 3	1 36V 2 3
	6	1	1

		2	2

C-4

	1	1 2	1 2 3 4 5
	2	1 2	1 2 3
	3	1 2	1 2 3

C-5

	1	1 2 3	1 2 0.5m 1.0m 3 1.5× 1.5m 2.5× 2.5m 4 5
	2	1 2	1 2 10m 2 3m ² 10 20 3 4 5 6
	3	1	1

		2	2 3 4 5 6 " "
	4	1 2 3	1 36V 2 3

C-6

	1	1	1 2 3 1 4 " 5 6
	2	1 2	1 2 3 4
3	1		1

		2	2
		3	3
4	1	2	1
	2		2
	3		3
			1
5	1		2
	2		3
			4
6	1		1

36V

10 15m

4 6

10m

45° 1 1

		2	2
			3
	7	1	1
		2	2
			3
			4
			5
			0.5m
	8	1	1
			2
			10m
			2 3m ³
			10
		2	20min
			3
	9	1	1
		2	2

D

1

" "

" "

2

" "

" " " "

3

" "

" "

" "

1

1.0.2

1.0.3

1-1

A 1-1

1. Q. 4

3

3.1

3.1.2

20m

30m

500

20m

30m

3.1.3

3. 1. 4

3. 2

3. 2 1

3. 2 2

1

2 :

3

4

5

"

"

3. 2 3

5

4

D

3. 2 4

D

D

3. 2 5

3. 3

3. 3. 1

3.3.2

"

"

A.3-1

A.3-1

		1	2	3	4	5	6	7	8	9	10	11	12	
		1.00	—	—	—	—	—	—	—	—	—	—	—	=1
		0.75	0.25	—	—	—	—	—	—	—	—	—	—	=1
		0.56	0.33	0.11	—	—	—	—	—	—	—	—	—	=1
		0.44	0.31	0.19	0.06	—	—	—	—	—	—	—	—	=1
		0.36	0.28	0.20	0.11	0.05	—	—	—	—	—	—	—	=1
		0.31	0.25	0.19	0.14	0.08	0.03	—	—	—	—	—	—	=1
		0.27	0.22	0.18	0.14	0.10	0.06	0.03	—	—	—	—	—	=1
		0.23	0.20	0.17	0.14	0.11	0.08	0.05	0.02	—	—	—	—	=1
		0.21	0.19	0.16	0.14	0.11	0.09	0.06	0.03	0.01	—	—	—	=1
		0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	—	—	=1
		0.17	0.16	0.14	0.12	0.11	0.09	0.07	0.06	0.04	0.03	0.01	—	=1
		0.16	0.15	0.13	0.12	0.10	0.09	0.08	0.06	0.05	0.03	0.02	0.01	=1

"

"

1

1

2

3

4

x_1, x_2, \dots, x_n

A 3-2

A 3-2

	x_1	x_2	...	x_n
x_1				
x_2				
...				
x_n				

T. L. Saaty

1-9

A. 3-3

A 3-3

1	
3	
5	
7	
9	
2, 4, 6, 8	
	$i \quad j \quad b_{ij} \quad j \quad i \quad b_{ji}=1/b_{ij}$

max

CR CR < 0.1

$$CR = \frac{CI}{RI}$$

CI

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

n

RI

A. 3-4

A 3-4

RI

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.89	1.12	1.26	1.36	1.41	1.46	1.49

$$C_j = \frac{2(G_{jm2} - G_{j1} - G_{j2})(G_{j2} - G_{j1})}{(G_{jm2} - G_{jm1})}$$

G_j —

G_{m2} G_{m1} —

G_2 G_1 —

G_{m2} G_{m1}

G_2 G_1

$$W = \frac{1}{\Sigma} [C_1, C_2, C_3, C_4]$$

2

Checklist

" "

3.3.3

3-1

3-2

F

3-2

3.3.4

1

1

2

2

1

JTG C20 2011

1

2

3

2

JTG C20 2011

"

"

1: 500 1: 2000

1: 200 1: 1000

1: 200 1: 500

20m

3. 3. 5

4

4.1

4.1.2

5

11

11

1

1

2

3

4

5

4. 1. 5

4. 2

4. 2 1

4.2.7

B

4.3

4.3.1

1

2

3

4

5

6

4. 3. 2

1

2

3

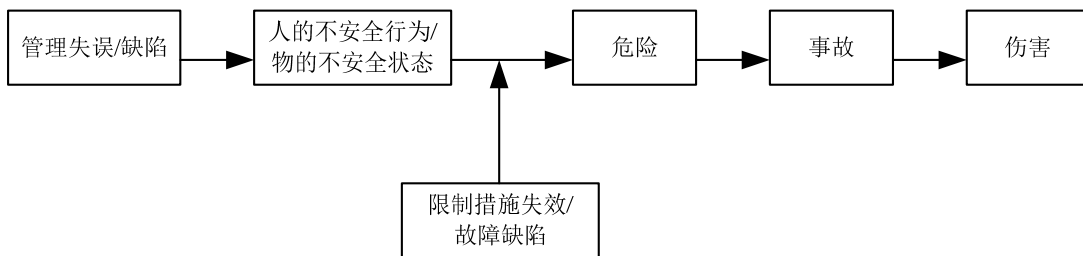
1

2

4.3.4

1

A.4-1



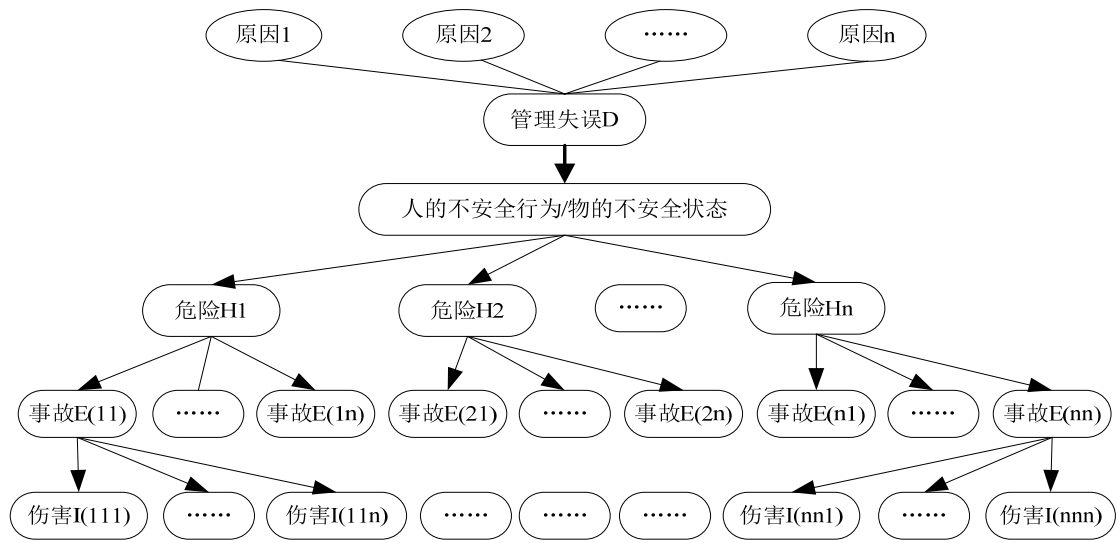
A.4-1

D

$H_1 H_2 \dots H_h$

$I_{111} I_{112} \dots I_{nnn}$

A.4-2

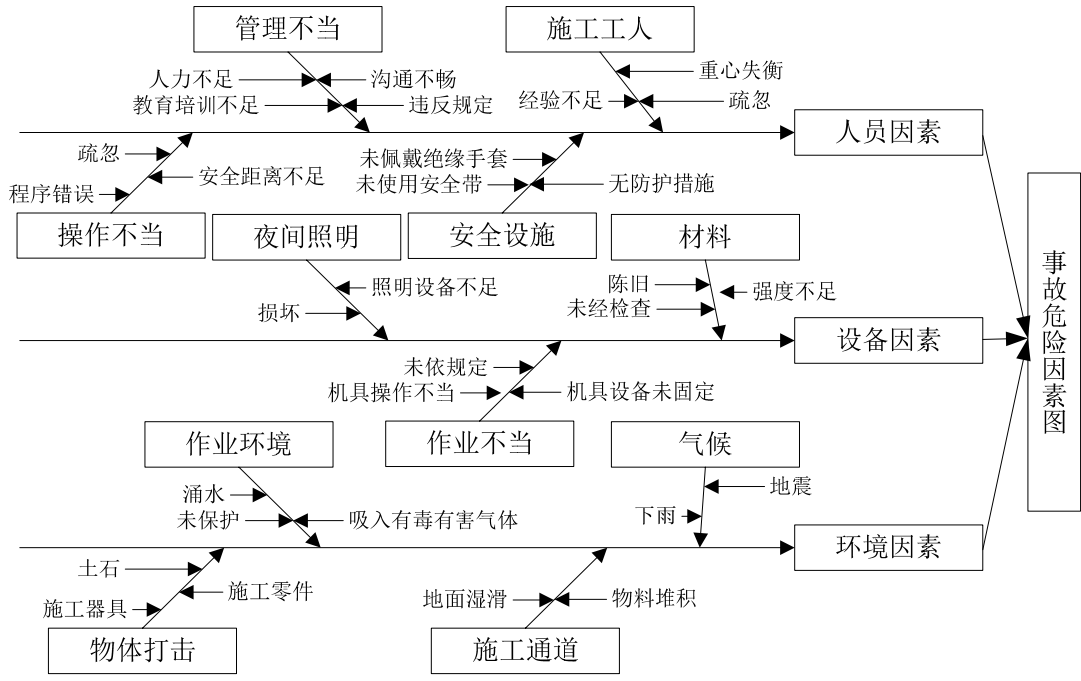


A 4-2

2

" "

A. 4-3



A 4-3

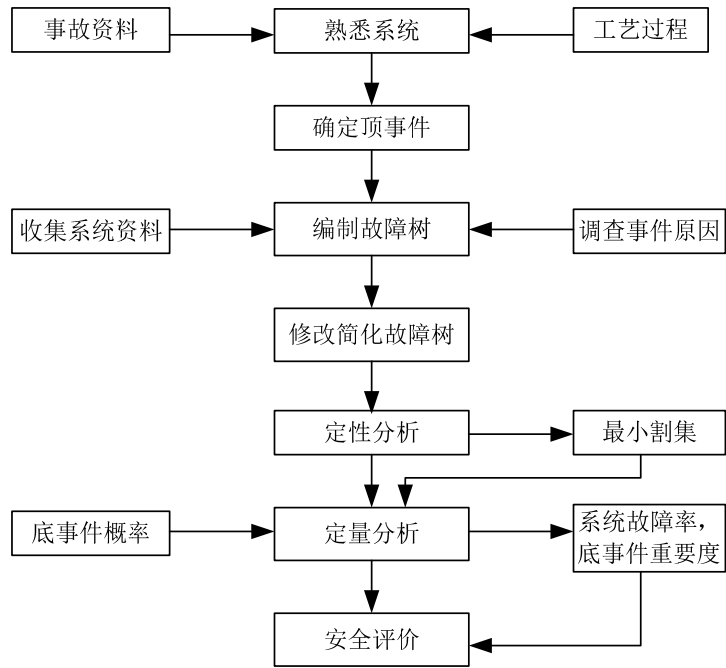
1

2

- -

3

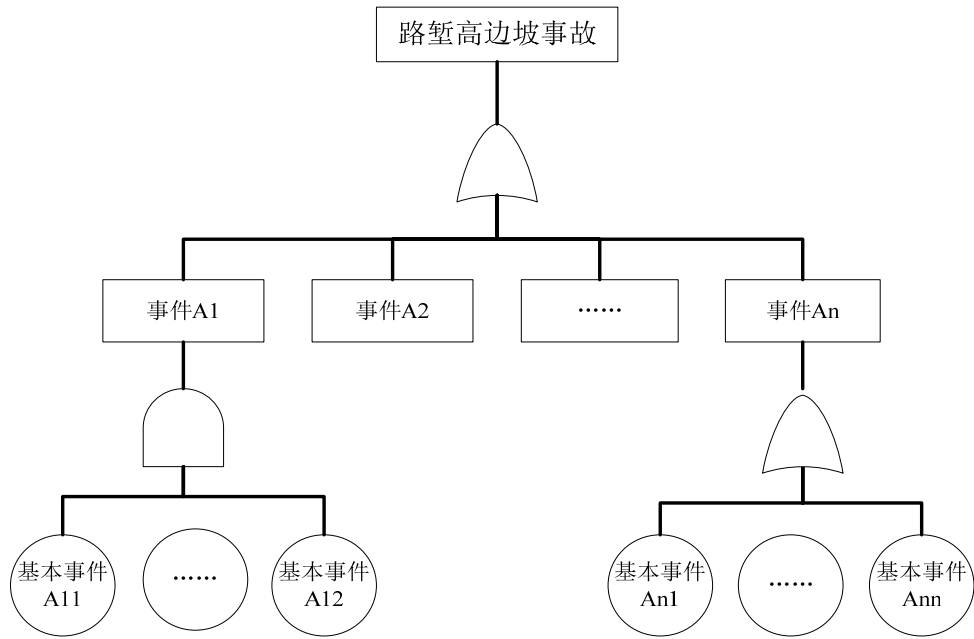
A. 4-4



A 4-4

A 4-5

$A_1 \quad A_2 \dots A_n \quad B_1$
 $A_{11} \quad A_{12} \dots A_{nn}$
 $B_2 \dots B_n$
 $B_{11} \quad B_{12} \dots B_{nn}$



A 4-5

GB/T4888-2009

4. 4

4. 4. 2

LEC

LEC

1

2

L—

E—

C—

3

L E C

L E C

D

$$D=L \times E \times C$$

L—

A. 4-1

E—

A. 4-2

C—

A. 4-3

D—

A. 4-4

A 4-1

L

	10	6	3	1	0.5	0.2	0.1

A 4-2

E

	10	6	3	2	1	0.5

A 4-3

C

	100	40	15	7	3	1
	10	3 9	1			

A 4-4

D	320	160 320	70 160	20 70	20
	5	4	3	2	1

1 2

3

5

4. 4. 4

A. 4-5

A. 4-6

1

A. 4-5

A 4-5

	1	2	3	4
	1 <2 1 <9	3 <9 10 <49	10 <29 50 <99	30 100

2

A. 4-6

A 4-6

	1	2	3	4
	100 Z 1000	1000 Z 5000	5000 Z 10000	Z 10000

4. 5

4. 5. 3

6

6

4. 5. 6

5 10

2

3

10

10

4. 5. 7

4. 5. 8

4. 5. 9

4. 5. 10

4. 5. 11

"

"

4. 5. 12

4. 5. 13

10

5

5.1

5.1.1

5.1.2