——低影响开发雨水系统构建

（试行）

住房城乡建设部

2014 年 10 月

.....1
.....2
.....4
.....8
.....8
.....9
.....13
.....18
.....23
.....23
.....23
.....24
.....26
.....28
.....29
.....31
.....48
.....54
.....54
.....54
.....55
.....55
.....56
.....57
.....57
.....57
.....61
1 63
2 64
3 66
4 67
5 85

2013 23

2013 36

—

1

2

3

1

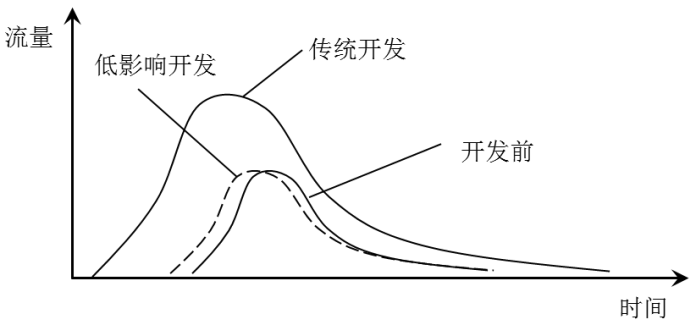
2014 2020

2

Low Impact Development LID

Low Impact Design LID Low Impact Urban Design and Development LIUDD

2-1



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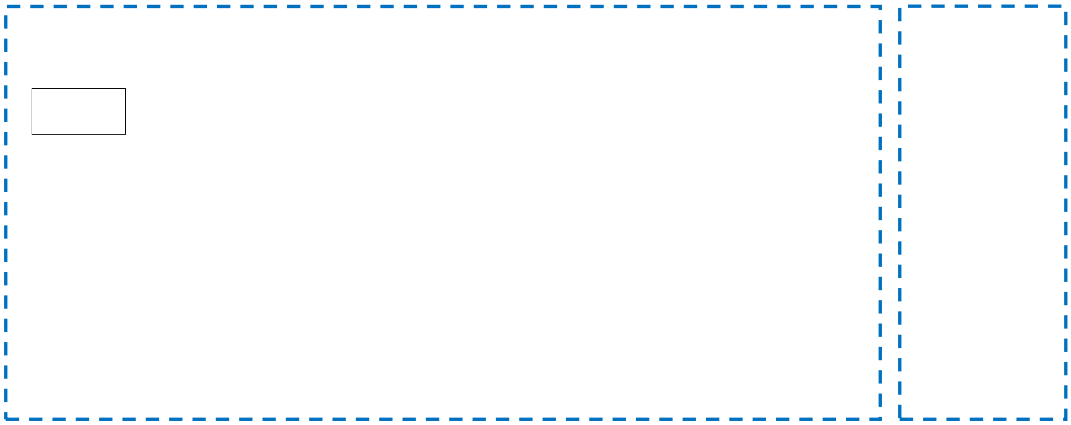
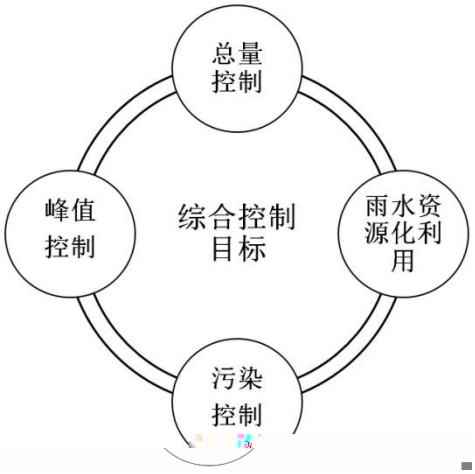
3

2-2



2-2

3-1



3-1

2.1

1

2 2

3-2

15%-20% 0.15-0.20

80%-85%

80% 85% 27.3 mm 33.6 mm F2-1

0.5 1 1

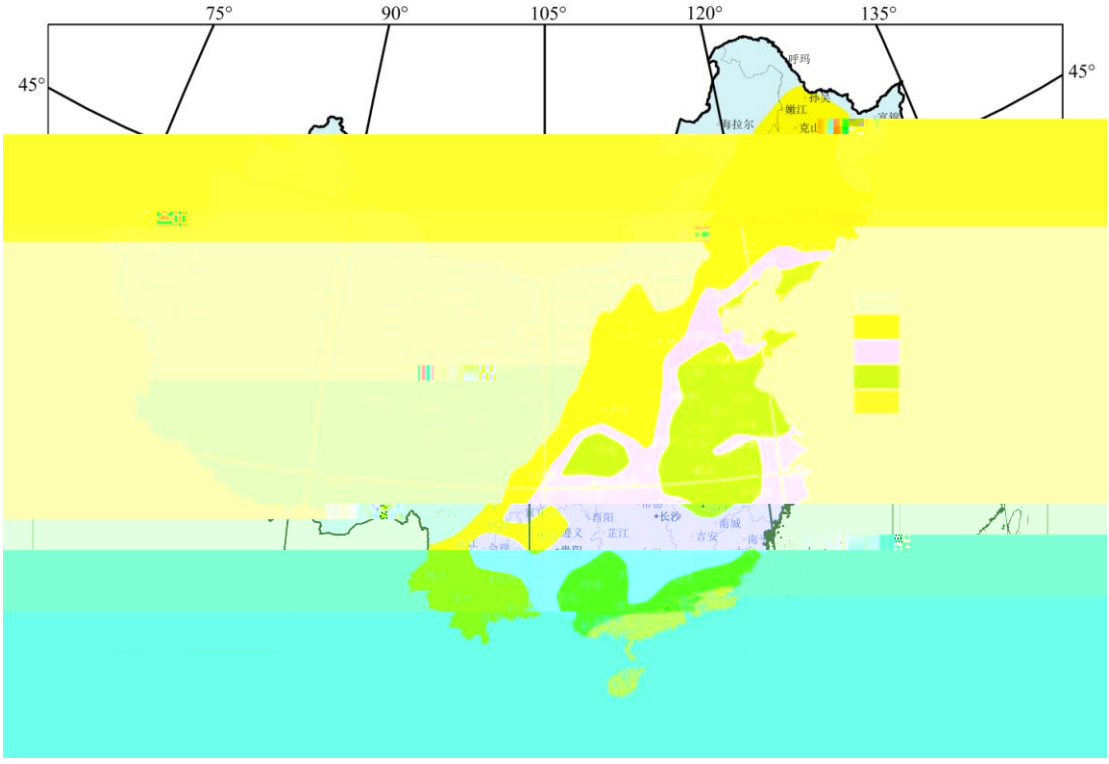
200

1983-2012

I 85% 90%

II 80% 85% III 75% 85% IV 70% 85% V

60% 85% 3-3



3-3

3

2.4

1

2

3

SS

4

5

GB50014

6

1

1

2

3

2

1

2

3

4

5

3

3.1

1

2

3

3.2

1

2

3

4

5

6

3.3

GB50318

GB50014

1

2

SS

3

4

GB50318 GB50014

5

3.4

1

/

2

3

4

1

R A

B M W S U

G

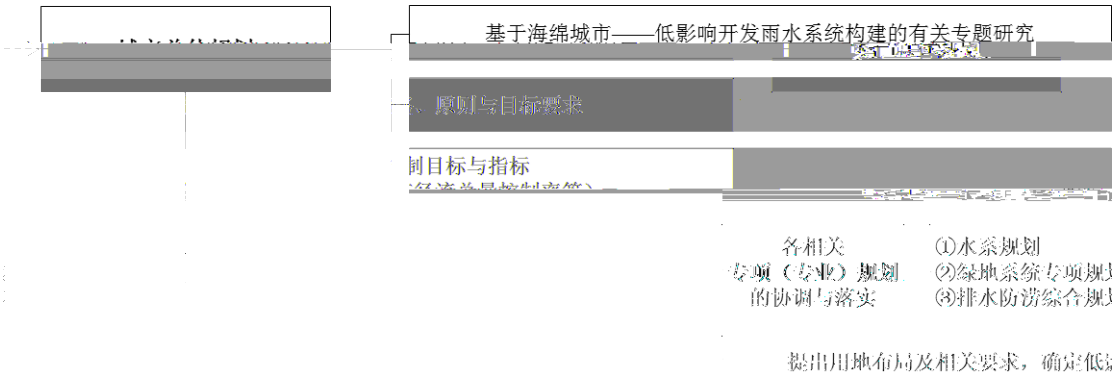
2

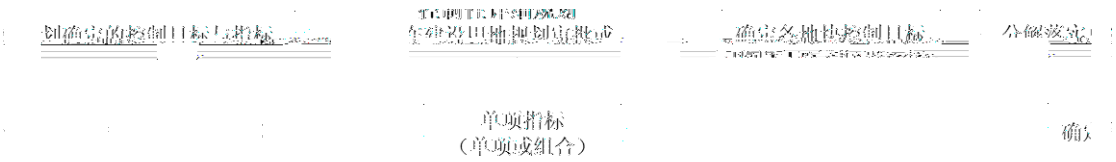
3

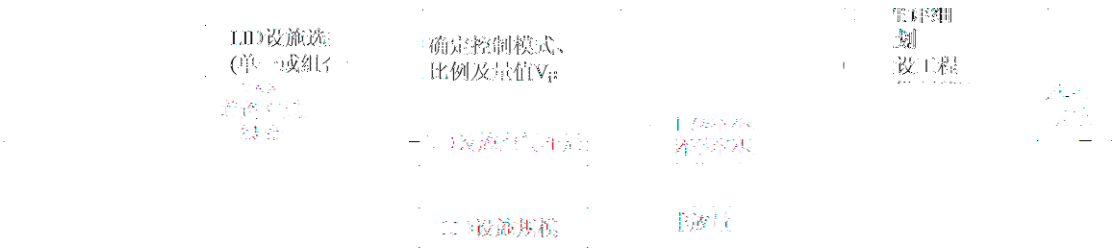
5

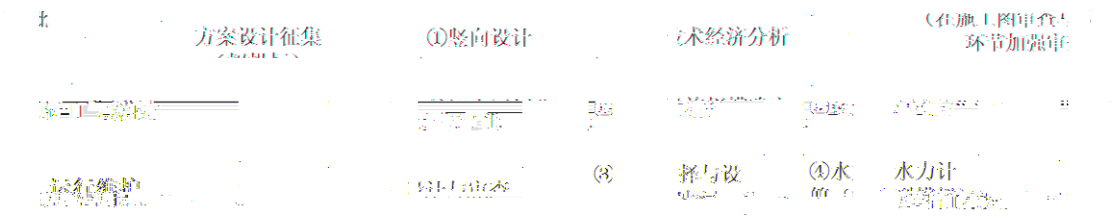
1

3-4


基于海绵城市——低影响开发雨水系统构建的有关专题研究
原则与目标要求
制目标与指标
各相关
专项（专业）规划
的协调与落实
①水系规划
②绿地系统专项规划
③排水防涝综合规划
提出用地布局及相关要求，确定低


单项指标
（单项或组合）


确定控制模式、
比例及量值Vs


方案设计征集
①竖向设计
水力计

3-4

1

2

2

3

4

5

6

2

1

2

3

4 4-3

3 4-1

5

2

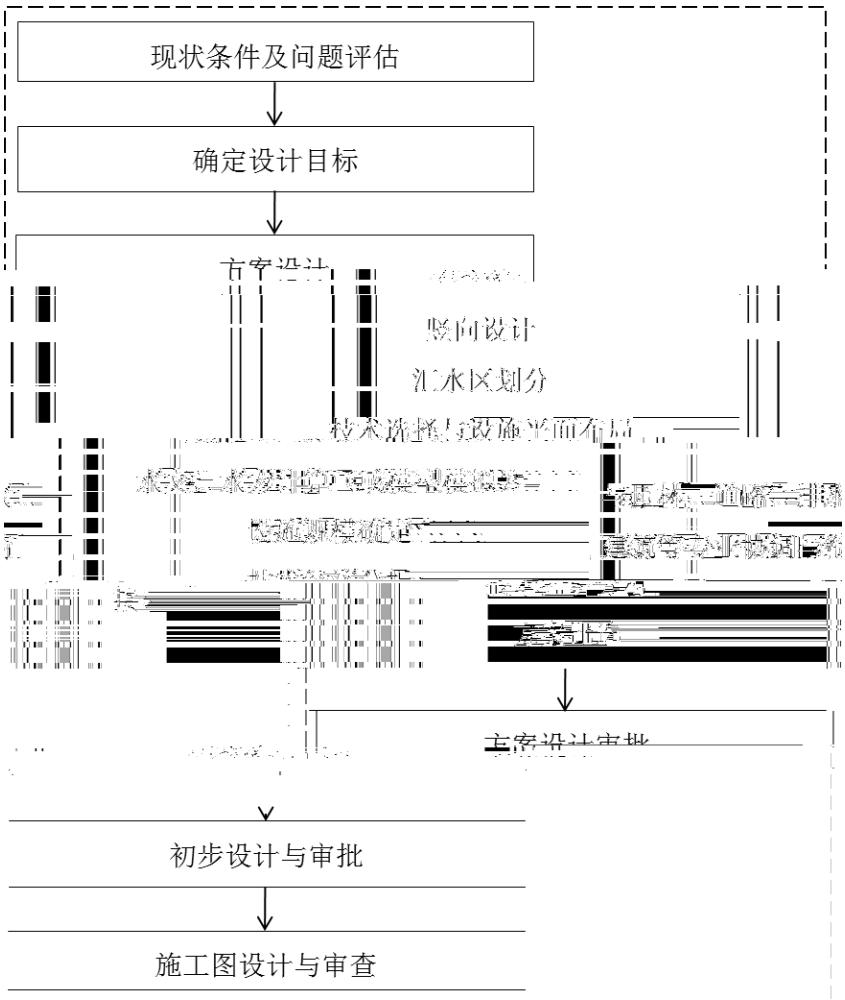
6

7 2 - 6

4-1

8

4-1



4-1

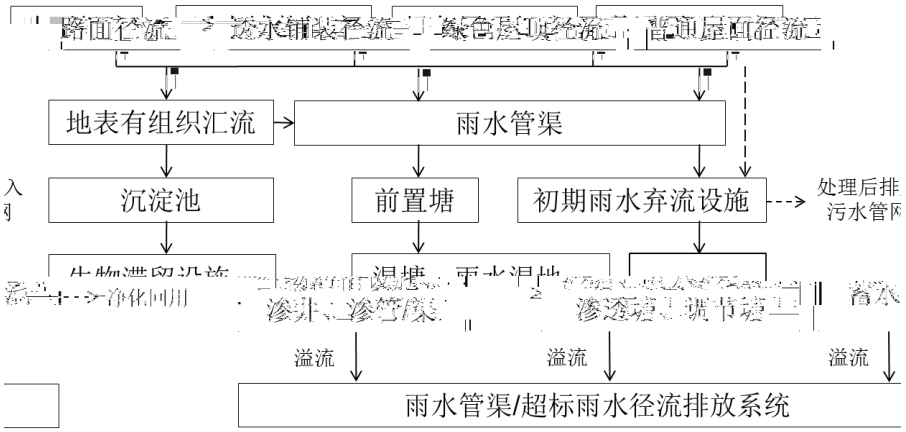
1

2

3

4

4-2


地表有组织汇流
雨水管渠
沉淀池
前置塘
初期雨水弃流设施
处理后排
污水管网
溢流
溢流
溢流
雨水管渠/超标雨水径流排放系统

4-2

1

1

2

3

4

GB/T50378

5

6

2

1

GB50345

2

3

4

5

3

1

2

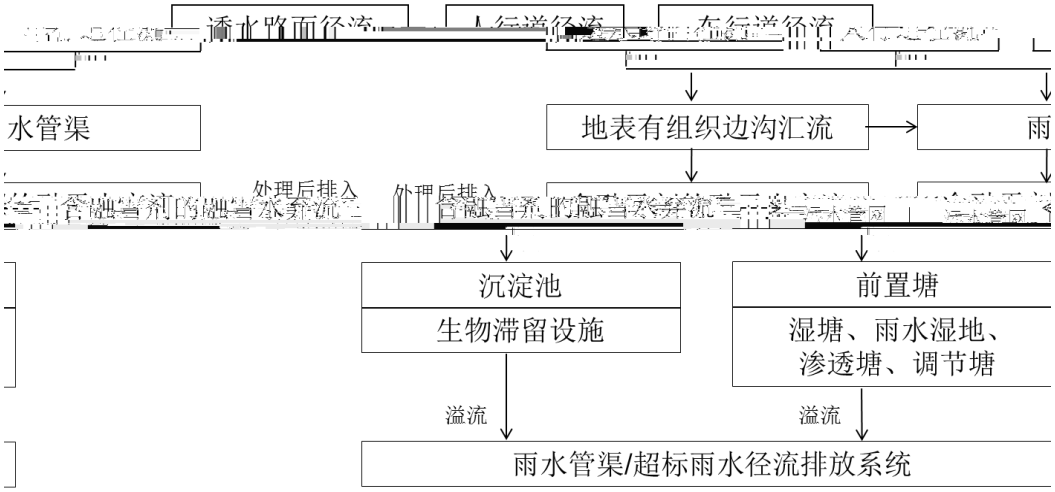
3

4

1

2

3



4-3

1

GB50014

2

3

4

5

6

7

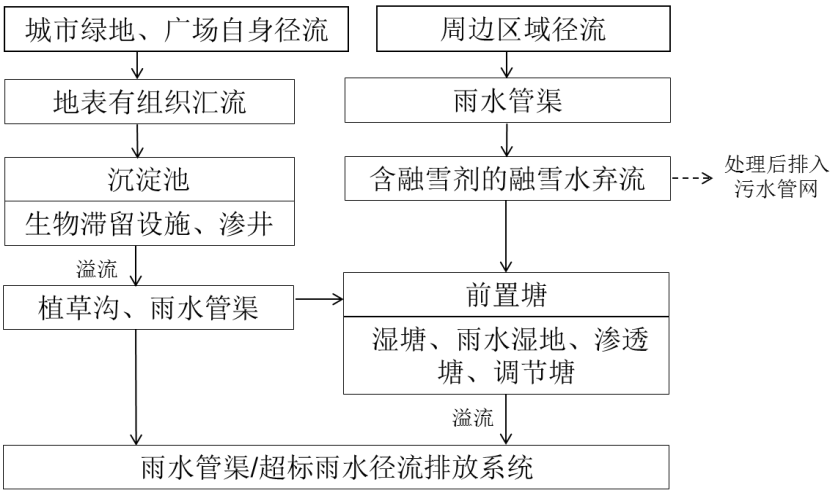
8

9

10

CJJ37

4-4



4-4

1

10

GB/T50805

1

2

/

2.1

CJJ/T188

CJJ/T190 CJJ/T135

1

2

3 600 mm

4-6

4-6

1

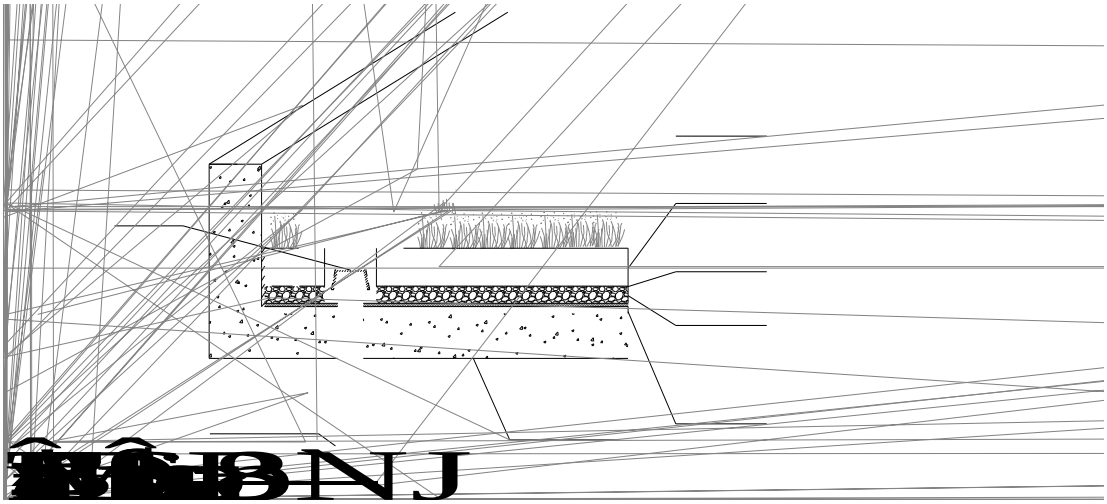
2

2.2

150 mm

600 mm

JGJ155 4-7



4-7

15 °

2.3

200 mm

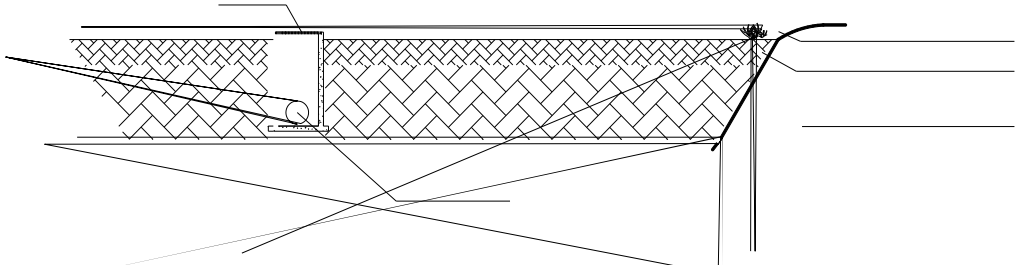
1

100-200 mm

2

50-100 mm

4-8



4-8

1 m

3 m

2.4

1

2

3 1%

/

4

100 mm

5

5%-10%

6

7

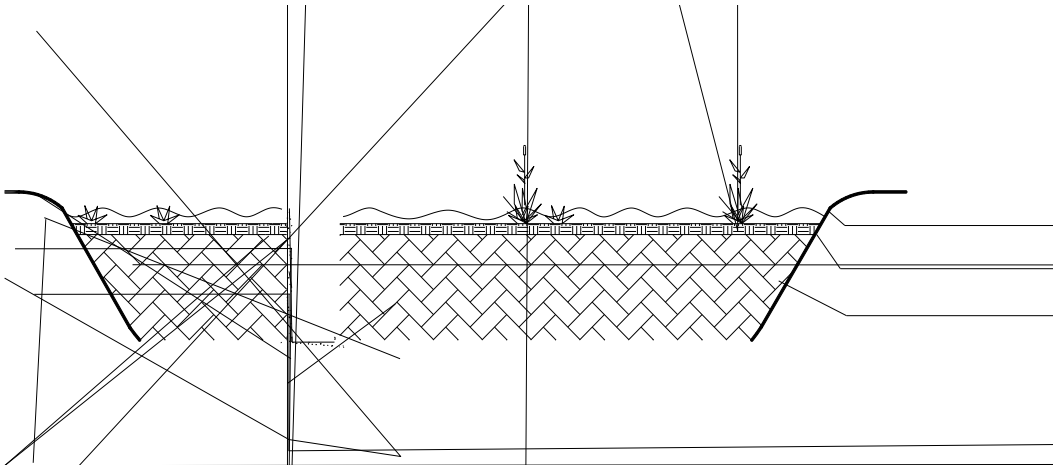
200-300 mm 100 mm

100

mm 250-300 mm

100-150 mm

4-9 4-10



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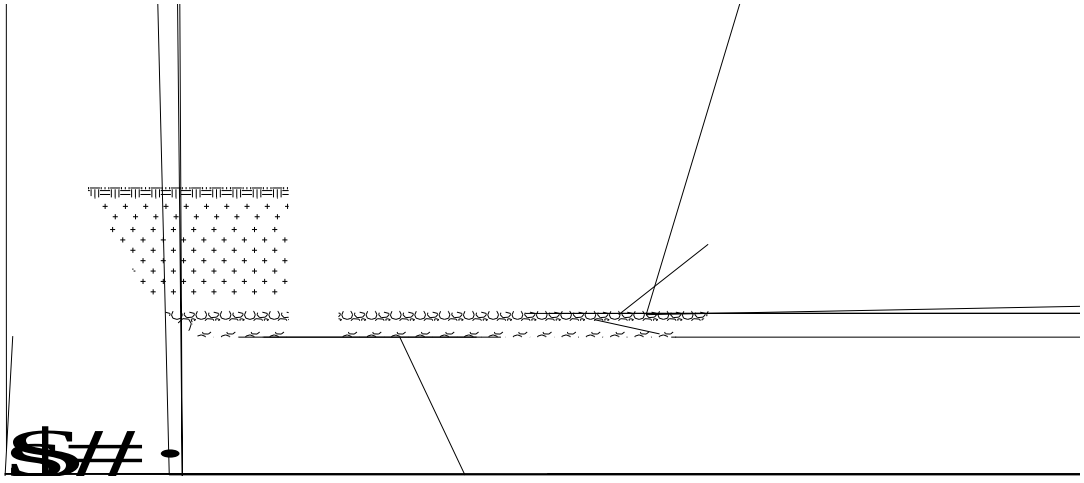


4-10

1 m 3 m

2.5

1

2 1:3

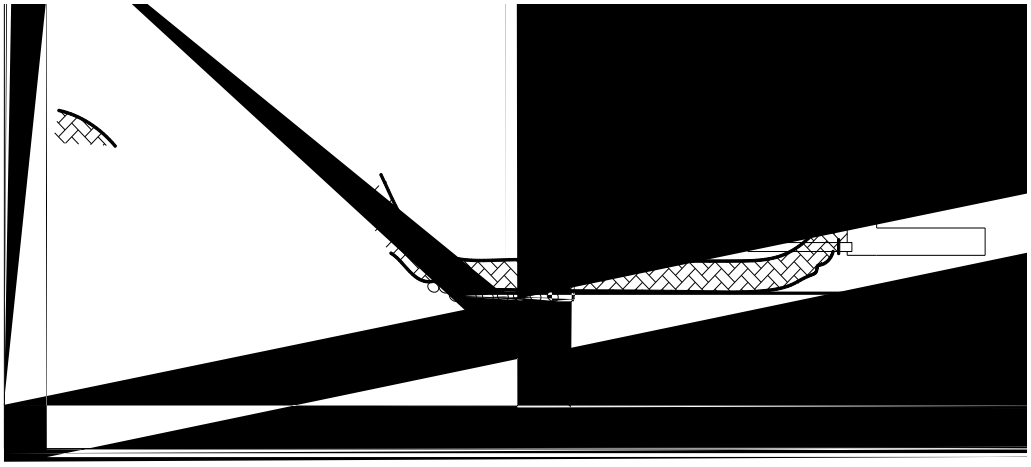
0.6 m

3 200-300 mm 300-500 mm

4 24 h

5

4-11



4-11

1 hm^2

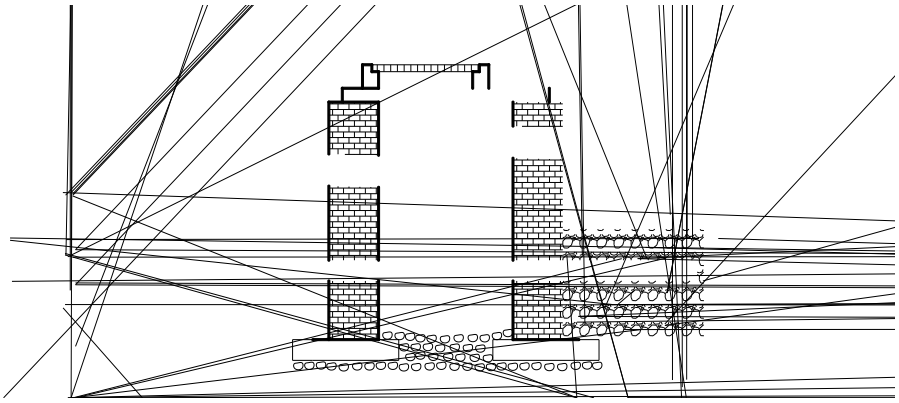
1 m 3 m

2.6

1

2

4-12



4-12

1 m

3 m

2.7

1

2

1:2-1:8

SS

3

0.8-2.5 m

24-48 h

1:6

4

5

4-13

.

4-13

2.8

1

2

3

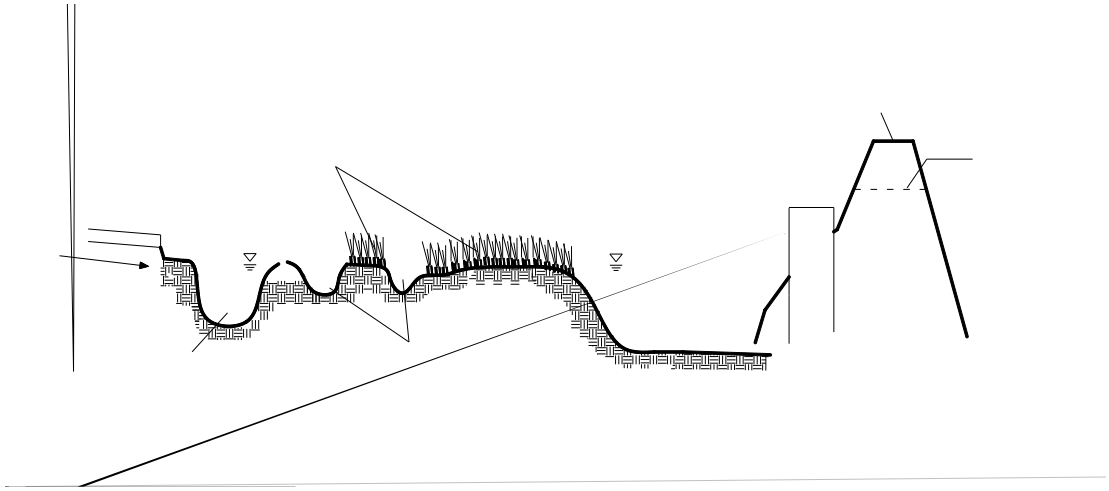
0-0.3 m 0.3-0.5 m

4 24h

5

0.8-1.2 m 10%

4-14



4-14

2.9

10SS705

2.10

2.11

1

2

3 0.6-3 m

1 m 3 m

4

24 h

5

4-15

—

4-15

2.12

5

2.13

1

2

2.14 /

/ /

/

/

1 /

2 / 1%-3%

20%

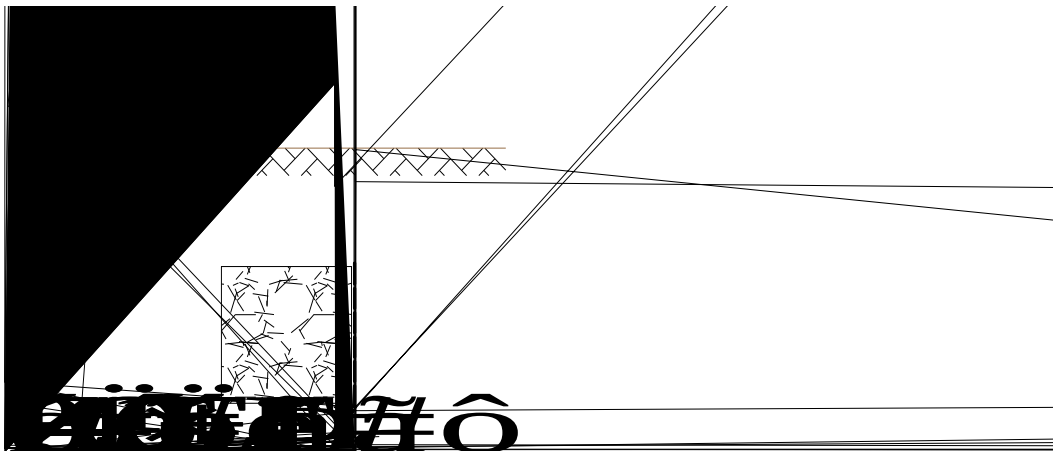
3 /

4 /

200 mm

5 / 700 mm

/ 4-17



4-17 /

/

/

2.15

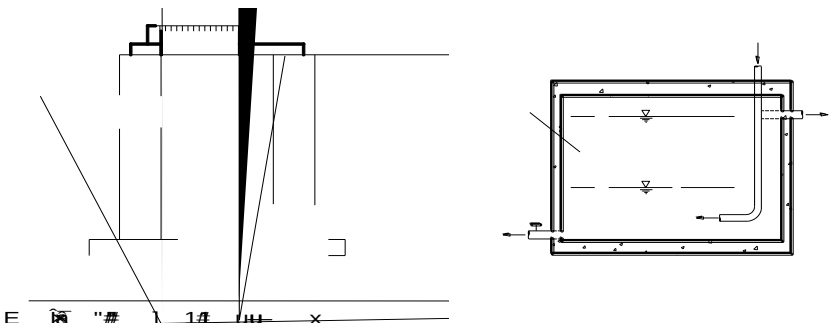
2%-6% 2 m 4-18

4-18

6%

2.16

4-19



4-19

2.17

3

4-1

4-1

													SS %	
													80-90	
													80-90	
													80-90	
													70-80	
													70-95	
													70-80	
													50-80	
													50-80	
													80-90	
													80-90	
													35-90	
													35-90	
													35-70	
													50-75	
													40-60	
													75-95	

2 SS Center For Watershed Protection CWP

4-2

4-2

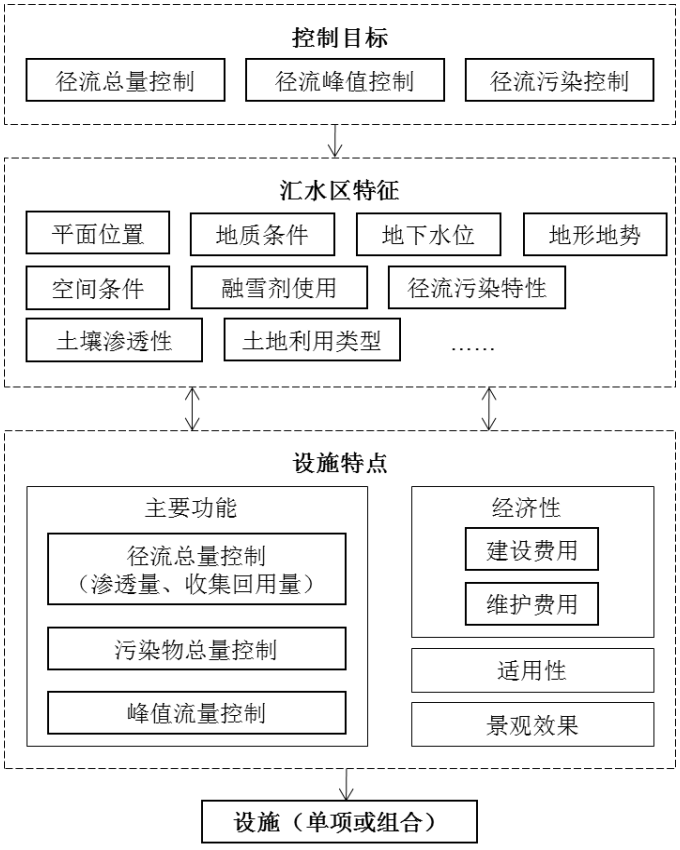
4

1

2

3

4-20


控制目标
径流总量控制
径流峰值控制
径流污染控制
汇水区特征
平面位置
地质条件
地下水位
地形地势
空间条件
融雪剂使用
径流污染特性
土壤渗透性
土地利用类型
……
设施特点
主要功能
径流总量控制
（渗透量、收集回用量）
污染物总量控制
峰值流量控制
经济性
建设费用
维护费用
适用性
景观效果
设施（单项或组合）

4-20

1

1

F hm^2

GB50014

4-3

	φ	ψ
mm	0.30-0.40	0.40
	0.80-0.90	0.85-0.95
	0.60-0.70	0.80
	0.80-0.90	0.85-0.95
	0.50-0.60	0.55-0.65
	0.45-0.55	0.55-0.65
	0.40	0.40-0.50
	0.40	0.35-0.40
	0.30	0.25-0.35
	0.15	0.10-0.20
	1.00	1.00
mm	0.15	0.25
500 mm	0.30-0.40	0.40
	0.08-0.45	0.08-0.45
50		0.85-1.00

2.1

4-4

4-4

	m^3/	m^3/	m^3/	m^3/	m^3/	m^3/	m	m	m^3/	m^3/
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
1										
2										
11										
12										

3

1 **4-3**

$V_s=V-W_p$ 4-3

V_s

m^3

V m^3 2.1

W_p m^3

2 **4-4**

$W_p=KJA_st_s$ 4-4

W_p m^3

K m/s

J J=1

A_s m^2

t_s s 2h

A_s

1

2 1/2

3 1/2

4

4

2.1 2.3

5

4-5

$$V = Max\left[\int_0^T (Q_{in} - Q_{out})dt\right] \qquad 4\text{-}5$$

V m^3

Q_{in} m^3/s

Q_{out} m^3/s

t s

T s

6

7

1

2 GB50014

2.2 *Q*

3

2.1

1

2

3

4

5

6

7

1

2

3

4

5

1

2

3

CJJ194

4

5

6

CJJ1

1

2

/

3

4

5

GB/T50563 CJJ82

1

2

GB50773

3

4

5

6

1

2

3

4

5

6

1

1

2

3

3

1

2

3

4

5

6

7

8 36 h

9

4 /

1

2

3 36 h

5

1

2

3 / 50%

4

5

6

7

6

1

2

3

4

5

7

1

2

3

4

8

1

2

9

1

2

3

10

1

2

3

4

5

6

11

1

2

12

1

2

3

13

6-1

6-1

	2 /	
	2-3 /	1 1 0 1

5

6

7

1

2 /

1

LID low impact development

volume capture ratio of annual rainfall

design rainfall depth

mm

volume of LID facilities for catchment runoff control

stormwater detention, retention/ storage

stormwater retention or storage

stormwater detention

stormwater infiltration

disconnection

2

30

2 mm

F2-1

1983-2012

F2-1

	(mm)				
	60%	**70%**	**75%**	**80%**	**85%**
	4.1	5.4	6.3	7.4	8.9
	6.2	8.1	9.2	10.6	12.3
	6.1	8.0	9.2	10.7	12.7
	5.8	7.8	9.1	10.8	13.0
	7.5	10.3	12.1	14.4	17.7
	9.5	13.0	15.2	18.2	22.0
	9.1	12.7	15.1	18.2	22.2
	9.7	13.5	16.1	19.4	23.6
	10.6	14.9	17.8	21.4	26.6
	11.5	15.7	18.5	22.0	26.8
	11.7	16.0	18.8	22.3	27.0
	12.3	17.1	20.3	24.1	28.9
	12.8	17.5	20.8	25.0	30.3
	13.1	17.8	21.0	24.9	30.3
	13.1	18.0	21.3	25.6	31.3
	13.7	18.5	21.8	26.0	31.6
	12.2	17.4	20.9	25.5	31.9
	13.2	18.4	21.9	26.3	32.0
	13.4	18.7	22.2	26.7	33.0
	14.0	19.4	22.8	27.3	33.6
	14.0	19.5	23.1	27.8	34.3
	14.8	20.4	24.1	28.9	35.7
	14.7	20.5	24.6	29.7	36.6
	12.9	19.0	23.4	29.1	36.7
	14.9	20.9	25.0	30.4	37.8
	16.7	22.8	26.8	32.0	38.9
	17.0	23.5	27.9	33.4	40.4
	16.7	23.2	27.7	33.5	41.3
	17.6	24.5	29.2	35.2	43.3
	18.4	25.2	29.7	35.5	43.4
	23.5	33.1	40.0	49.5	63.4

3

F3-1

F3-1

	60-200 /m^2
	100-300 /m^2
	40-50 /m^2
	150-800 /m^2
	400-600 /m^2
	500-700 /m^2
	800-1200 /m^3
	200-400 /m^3
	30-200 /m
	800-1200 /m^2

4

22

30-50 hm^2

F4-1

F4-1

1		= ————————
2		= ————————
3		= ————————————————

2

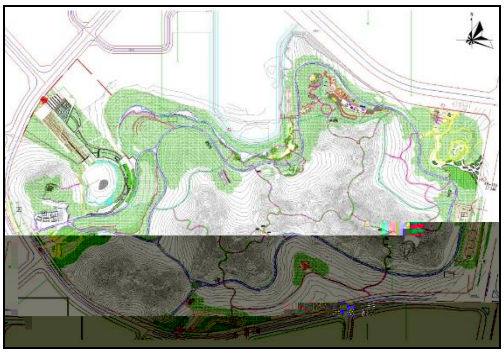
F4-2

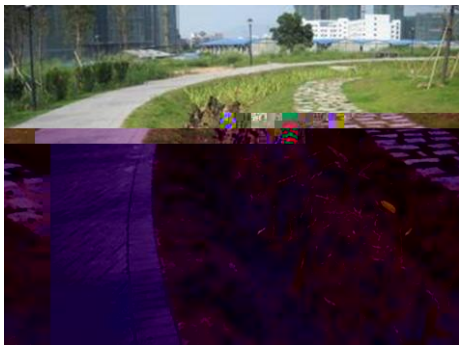
F4-2

	22			
	60%	60%		
	20%-50%	20%-30%		
			80%	

1

23 17 km

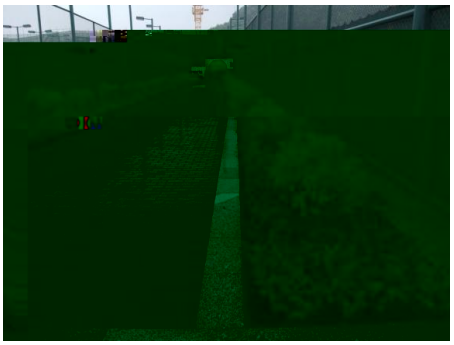




F4-4

3

F4-5



F4-5

1

16.85 hm^2

2010

LEED-ND Leadership in Energy and Environmental Design for Neighborhood Development

LEED-ND

90% 3

90%

-
- 72 h
-

2

2.1

7.13 hm^2 929 m^3

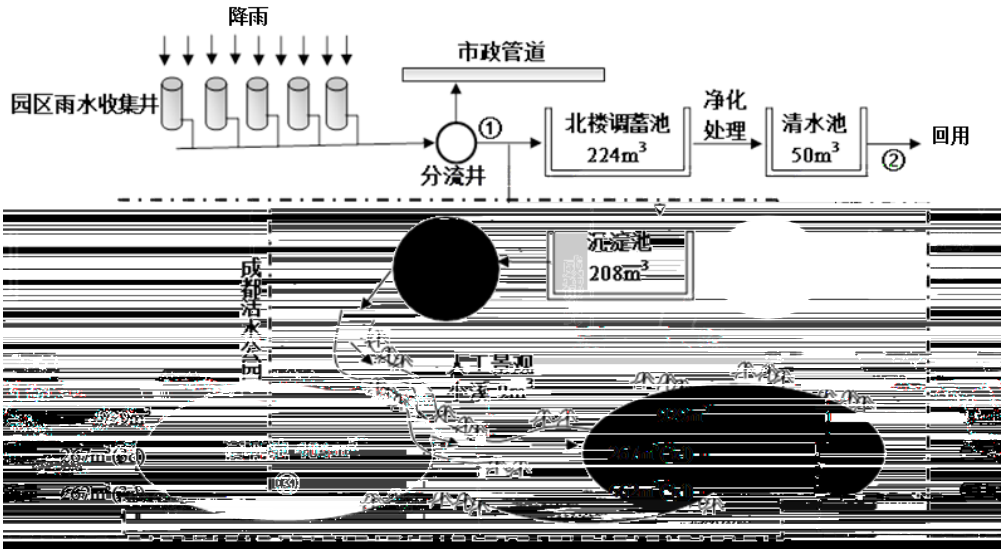
89 m^3/d 3

267 m^3 662 m^3 3

2010

3

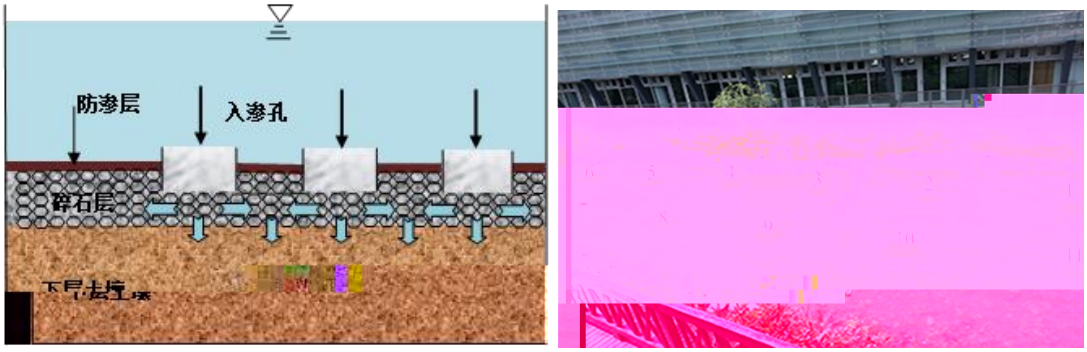
F4-6



F4-6

2.3×10^{-5} m/s

F4-7



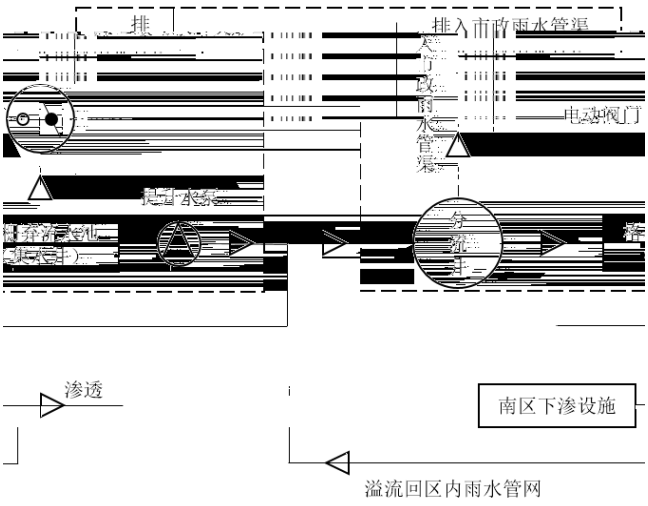
F4-7

2.2

9.72 hm^2 1375 m^3

3#

F4-8

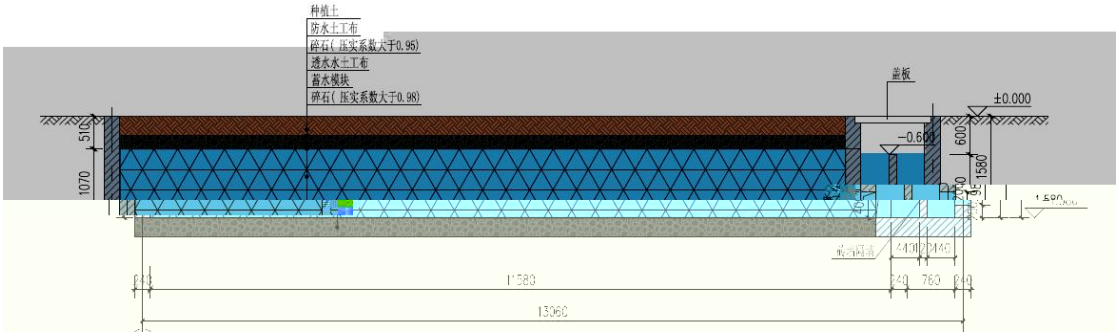


F4-8

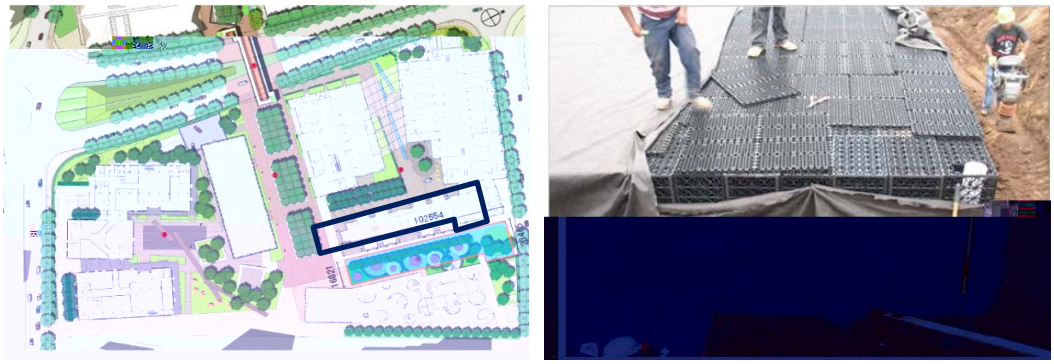
6.48×10^{-6} m/s　　1845 m^2

F4-9　　F4-10

100%　　PP



F4-9



F4-10

3

1 LEED-ND

2 90%

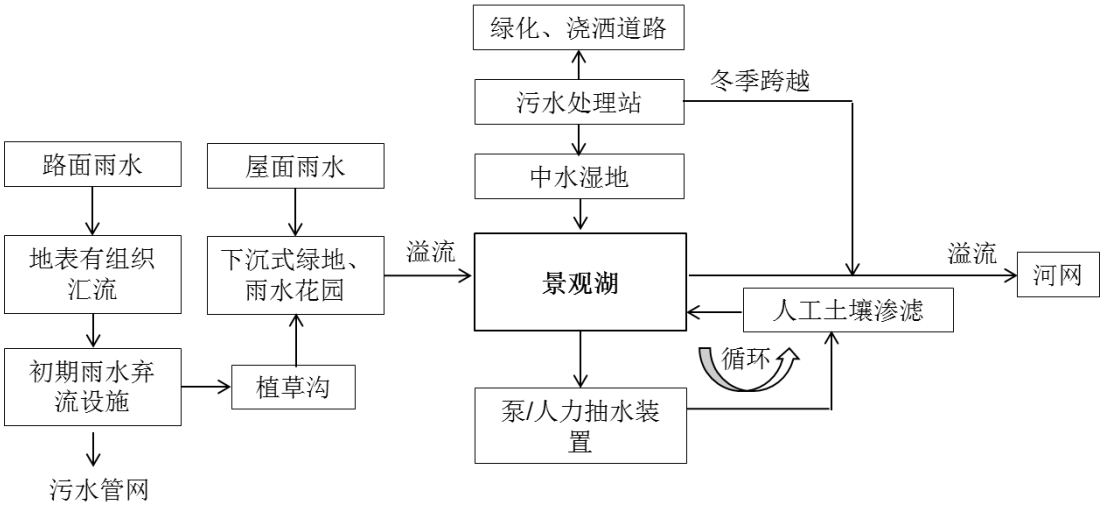
1

234 hm^2

18 hm^2 70 hm^2

2

F4-11



F4-11

2011 6.23 2012 7.21

F4-12

F4-12

3

1

2 70 m^3 85%

3

4

1

1.7 km

34 m

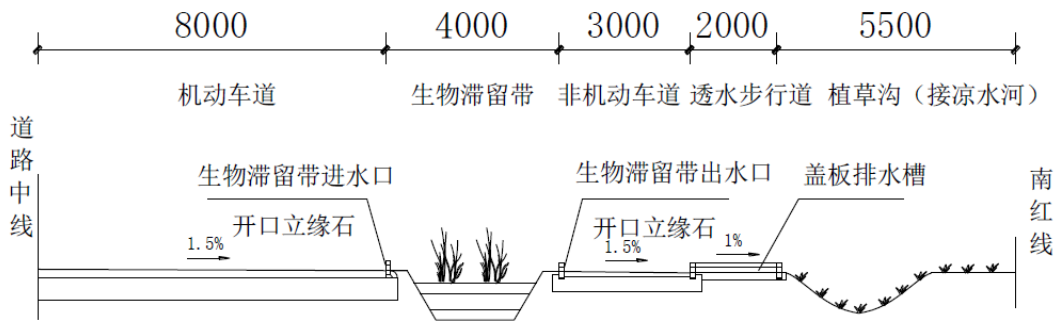
2

85% 33.6 mm

3

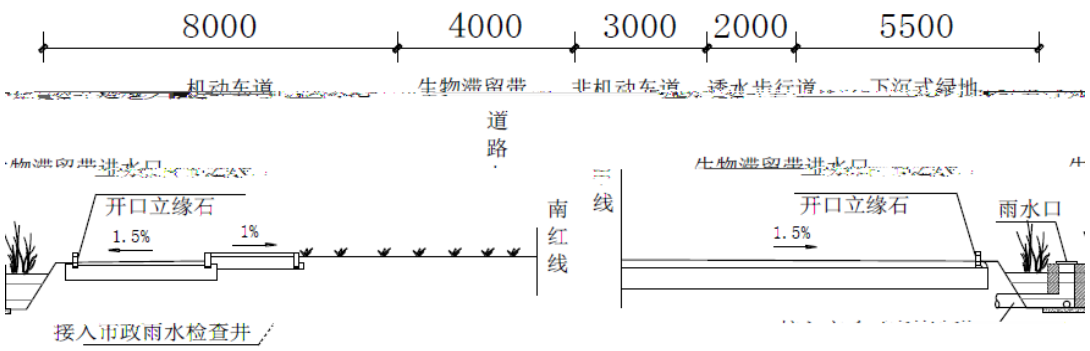
3

F4-13



F4-13

F4-14



F4-14

85% F2-1

H=33.6 mm 4-3

F + F + F / F +F +F =

0.15 1700 0.9 1700 1700 / 1700 1700 1700

=0.66

4-1

V

V=10 $=10\times33.6\times0.66\times1700\times34/10000=1165.3\ m^3$

V $=10H$ $=10\times33.6\times0.66=221.8\ m^3$

5.5m

0.2 m

2011 F4-15

F4-15

4

1

85%

33.6 mm 3

2 75%

SS

1

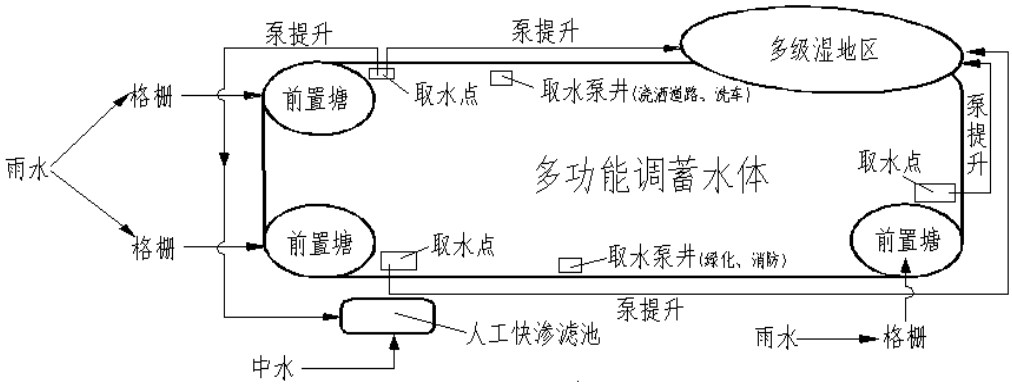
7.6 hm^2

2

110 hm^2 3.6 hm^2

31.4 m^3 50

F4-16



F4-16

2012 7.21

F4-17

F4-17

4

- 20 m

70

-
-

1

2007 2000 m^2

400 m^2 0.8 m

480 m^3

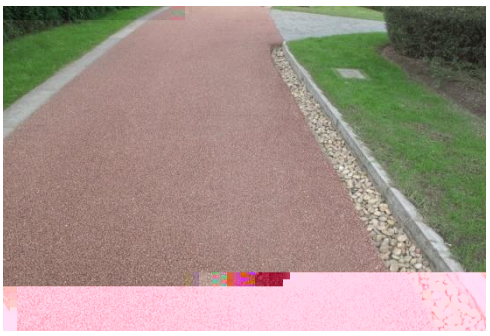
GB3838-2002 F4-18

F4-18

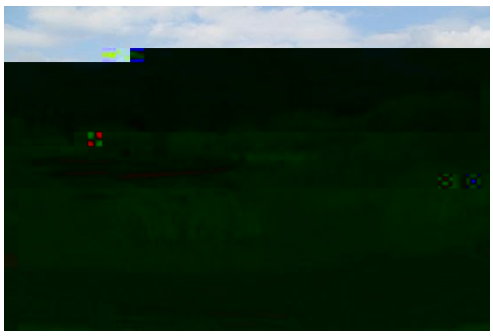
2

4 cm 20%

F4-19 F4-20



F4-19



F4-20

1

0.84 km 50 m 4 m +2 m 12 m

+2 m 5 m +2 m 6 m 2.8% 1.5%

1%

2

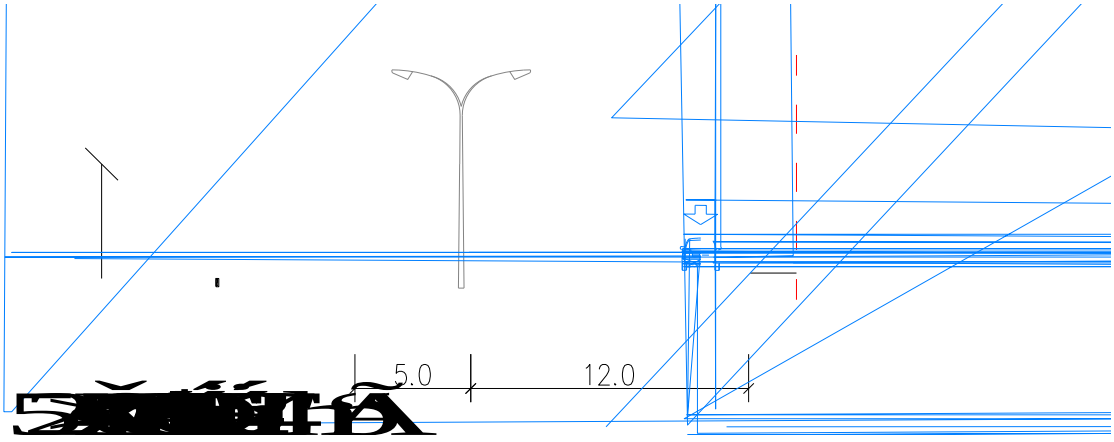
85% 13 mm 2

3

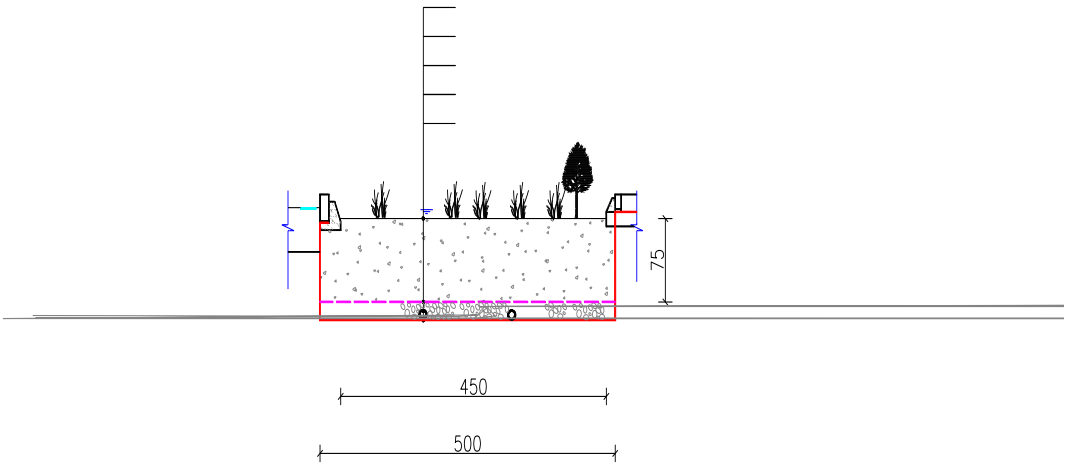
5 m 0.15 m

F4-21

F4-22



F4-21



F4

5

1 GB50014

2 GB50318

3 GB50400

4 GB/T50596

5 GB/T50378

6 GB50345

7 GB/T50563

8 GB50773

9 GB/T50805

10 CJJ37

11 CJJ48

12 CJJ/T135

13 CJJ/T190

14 CJJ/T188

15 CJJ194

16 CJJ1

17 CJJ82

18 JGJ155

19 DB11/685