SSC-BRIDGE GUARDRAIL

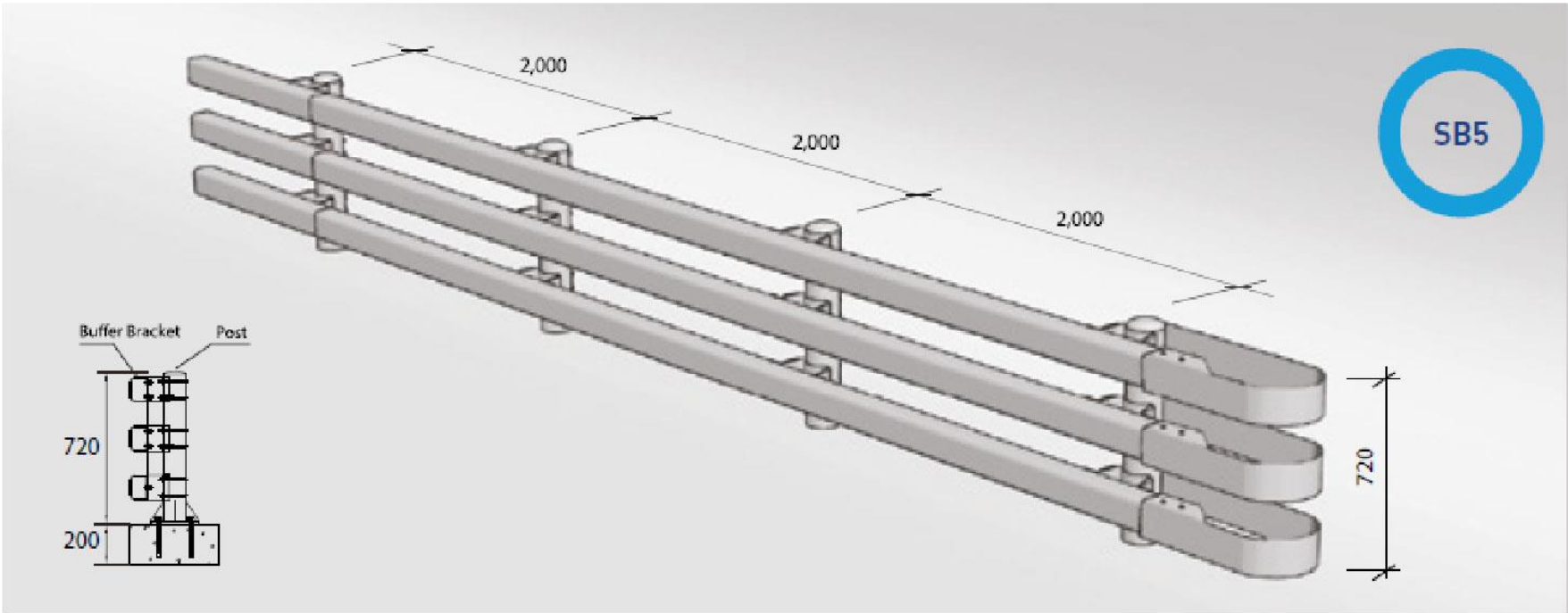
CONTAINMANET LEVEL SB5 (TL 4)
CRASH TESTED PERFORMANCE

ENGINEERED BY SHINSUNG CONTROL

CAHAYA AULIA SDN.BHD
(Co.No.1162368-X)

1- INTRODUCTION

SSC-SB5 Bridge Guardrail



Rail 1:
110×150×3.9t ×5.995

Rail 2:
110×150×3.2t ×5.995

Rail 3:
110×150×3.9t ×5.995

CHARACTERISTICS

- Height above conrete base: 920mm
- Depth of anchor penetration: 200mm
- Post spacing: C/C 2,000mm

COMPONENTS

- Bolt with nut and washer
  Beam:M16*180 / Post:M19*220 / Concrete anchor:M24*250
- Rail:middle 3.2T, top and bottom 3.9T
- Circular post:4.4T, diameter 165.2mm

Installation Case

안골대교-Angol Bridge-Busan, South Korea

2 - STANDARD COMPARISON (AAHSTO vs KS)

Containment Levels

Korean Standard

Test Level (SB)	Type Of Vehicle Type	Impact Conditions		
		Vehicle weight (Kg)	Impact Angle (º)	Nominal Speed (Km/h)
SB 1	Passenger Car	1,300	20	60
	Truck	8,000	15	55
SB 2	Passenger Car	1,300	20	80
	Truck	8,000	15	65
SB 3	Passenger Car	1,300	20	100
	Truck	8,000	15	80
SB 4	Passenger Car	1,300	20	80
	Truck	14,000	15	65
SB5	Passenger Car	1,300	20	100
	Truck	14,000	15	80
SB 6	Passenger Car	1,300	20	100
	Truck	25,000	15	80
SB 7	Passenger Car	1,300	20	100
	Truck	36,000	15	80

NCHRP 350

Test Level (TL)	Type Of Vehicle Type	Impact Conditions		
		Vehicle weight (Kg)	Impact Angle (º)	Nominal Speed (Km/h)
TL 1	Passenger Car	1,100	25	50
	Pick Up Truck	2,270		
TL 2	Passenger Car	1,100		70
	Pick Up Truck	2,270		
TL 3	Passenger Car	1,100		100
	Pick Up Truck	2,270		
TL 4	Passenger Car	1,100		100
	Pick Up Truck	2,270		
	Single Unit Truck	10,000	15	90
TL 5	Passenger Car	1,100	25	100
	Pick Up Truck	2,270		
	Tractor Van Trailer	36,000	15	80
TL 6	Passenger Car	1,100	25	100
	Pick Up Truck	2,270		
	Tractor Tank Trailer	36,000	15	80

2
STANDARD COMPARISON (AAHSTO vs KS)

Compliancy

Korean Standard

Test Level (SB)	Type Of Vehicle Type	Impact Conditions			
		Vehicle weight (Kg)	Impact Angle (º)	Nominal Speed (Km/h)	Impact energy (KJ)
SB 5	Passenger Car	 1,300	20	100	59
	Single Unit Truck	 14,000	15	80	232

NCHRP 350

Test Level (TL)	Type Of Vehicle Type	Impact Conditions			
		Vehicle weight (Kg)	Impact Angle (º)	Nominal Speed (Km/h)	Impact energy (KJ)
TL 4	Passenger Car	 820	25	100	76
	Pick Up Truck	 2,000			156
	Single Unit Truck	 8,000	15	90	209

4 - STRUCTURAL CALCULATIONS

STRUCTURAL CALCULATIONS-01

I. Design conditions & properties - TL4

■ Full scale crash tests conditions

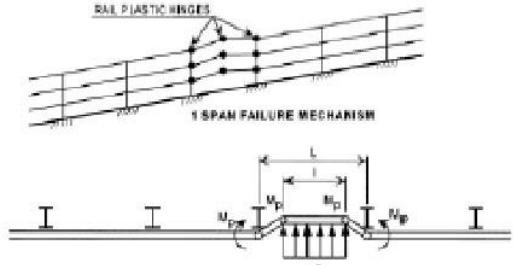
Vehicle characteristics	Single-Unit Truck
W (kg)	8000
Crash angle	15
Test speed (km/hr)	80

Rail effective height	900	mm	(H)	
Height of load working	900	mm	(LT & LL)	
Steel yield strength	2400	kg/cm^2	(SS400, SM400)	
	2800	kg/cm^2	(SS490)	
Vehicle mass	8	ton	(TL4)	
Impact velocity	80	km/h	22.2222	m/sec (TL4)
Impact angle	15	degree	(TL4)	
Gravity acceleration	9.81	m/sec^2		
	SIN(15) =	0.258819045	COS(15) =	0.96592583

Distance from vehicle front to the center(A)	3500 mm
Vehicle width (B)	2400 mm
Horizontal displacement of railing (D)	0.2 m
Post spacing	2.0 m

V. Review of Bridge Railing Strength

5.1. 1 Span Failuer Mechanism



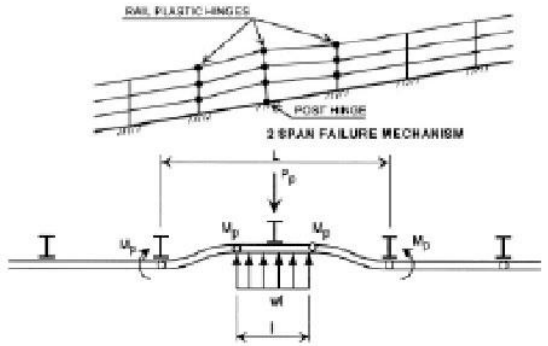
(A) 1-Span Failure Modes

l = 1 m

Review of railing

1 span	POST	Rail 1 (110+150+3.9)	Rail 1 (110+150+3.2)	Rail 1 (110+150+3.9)	Total
	0	8.48	7.06	8.48	24.05

5.2. 2 Span Failuer Mechanism



(B) 2-Span Failure Mode

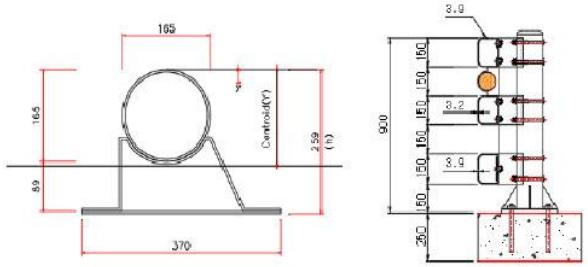
l = 1 m

Review of railing

2 span	POST	Rail 1 (110+150+3.9)	Rail 1 (110+150+3.2)	Rail 1 (110+150+3.9)	Total
	14.90	3.84	3.02	3.84	26.20

III. Post Plastic Modulus

3.1. Characteristics of Post section

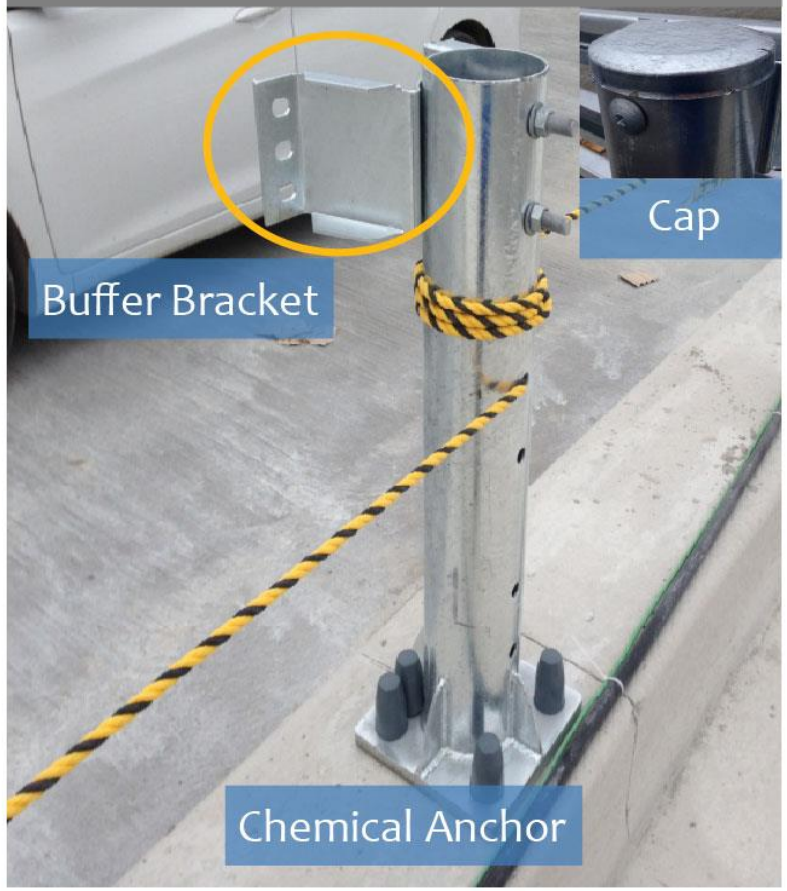


	Length	Thickness	Area	Moment of inertia
Height (h)	259			
Main post(a)	165.2	4.4	2222.74	7189451.55
Block out (b)	89	4.6	2942.74	6067252.60
Plate (c)	370	4.6	1776.00	3409.92

5
COMPONENTS AND INSTALLATION

Basic Components

POST



RAILS

Finishing Touches

POST CAP-WELD-GRIND

BOLT COVERS

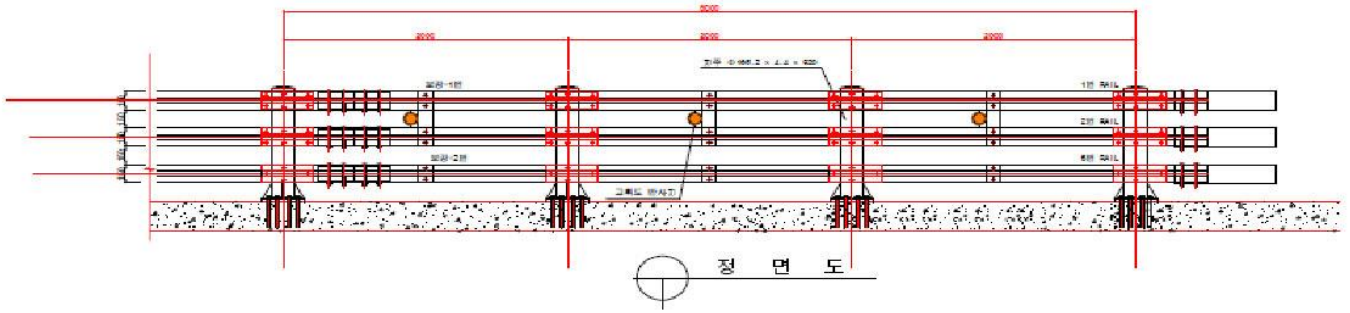
6
REFERENCE

Component List

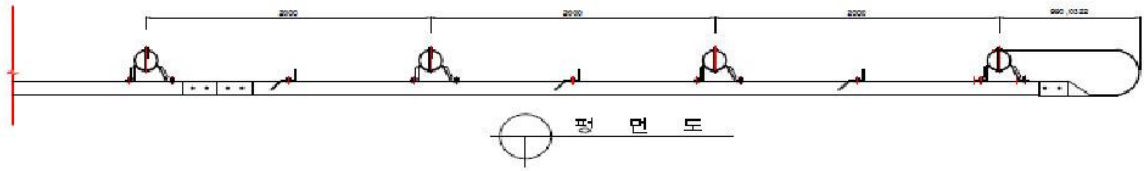
COMPONENT	SPECIFICATION	QUANTITY	UNIT	NOTE
Standard Interval				
Post	ϕ165.2×4.4t×920	3	EA	STK400
Post Cap	ϕ165.2	3	EA	
Rail	110×150×3.2t×5.995	1	EA	SS400
Rail	110×150×3.9t×5.995	2	EA	SS400
Rail Connector	137×97×500×4.0t	3	EA	SS400
Base Plate	300×300×21t	3	EA	SS400
Back up Plate	65×120×6t	12	EA	SS400
Blockout	370×150×4.8t	9	EA	SS400
Bolt (attachment and rail connection)	M19×180L (220L)	12	EA	HDG
Bolt (attachment and support connection)	M19×220L	9	EA	HDG
Bolt (rail fixing)	M16×33L	36	EA	HDG
Chemical Anchor	M24×250L	18	EA	
End Rail	408×3.2t×2400	3	EA	SS400
Rail Connecting Bolt	M19×180L	6	EA	HDG

Drawing

SSC - SB6 Class: Flexible Guard Safety Bridgerail



정 면 도



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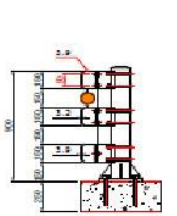
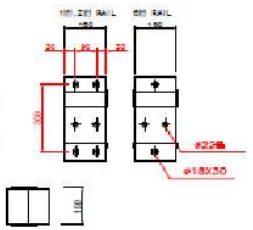


측 면 도



블럭아웃 상세도

MATERIAL LIST

(3경간당=6m)

품 명	규 격	수 량	단 위	비 고
POST	ø165.2x4.4Tx920	3	EA	STK400
POST CAP	ø165.2	3	EA	
RAIL	110x150x3.2Tx5995	1	EA	SS400
RAIL	110x150x3.9Tx5995	2	EA	SS400
RAIL/RAIL BOLT	M19x180L	12	EA	용융아연도금
POST/RAIL BOLT	M19x220L	18	EA	용융아연도금
BRACKET BOLT	M16x33L	48	EA	용융아연도금
CHEMICAL ANCHOR	M24x250L	18	EA	

Shinsung Control

설 계 변 경 DESCRIPTION OF REVISION

REV. | 설계 | 검토 | 심사 | 승인

축 척: S = NONE

설계년도:

도면파일명: DSF-SB5 교량난간(외측)120521_수정

도면명 SUBJECT TITLE: SB5 AC(H:900W:2000)

DATE : | 관련번호 : | SHEET NO. 1 / 2