

Long-Run Expansion Joint

New Excellent Technology (NET) Certified New Excellent Product (NEP) Certified Excellent Product Certified MAS(Multiple Award Schedule) Certified



Innovation for sustainability

Expansion Joint System is a main object installed in bridge construction for smooth movement of bridge deck from temperature change, drying shrinkage, live load, etc. It is frequently damaged by increase of traffic volume, inattention on installation and maintenance, and that causes secondary damage on durability issues of the bridge construction.

The Long-run Expansion Joint System that we developed as an innovative maintenance method is designed to solve the inefficiency of the existing expansion joint system based on our experiences as a professional facility maintenance and safety inspection company on Bridge Expansion Joint System. Currently, the expansion joint is considered as a consumable material and Long-run Expansion Joint has changed the concept into a permanent component of the bridges. We have registered 26 patents and utility models on this system and acquired New Excellent Technology Certification, Installation Method of the Finger Type-Expansion Joint Device having the separable top and bottom plates within the bird's mouth structure from Ministry of Land, Infrastructure and Transport in Korea.

Further, we have developed an Earthquake-Resistant expansion joint system that movable to three axes of X, Y, Z during seismic reaction to minimize the damage on bridge. It is reusable after the seismic reaction stops if it is applied with a damper and bearing. Saving cost is additional attraction of the joint.

A preventive maintenance product for asphalt pavement is another recent development. As deterioration of the pavement occurs, removing the pavement generates construction wastes and re-paving increases CO₂ Emission. However, an Eco-friendly technology has been developed and applied which is to coat bitumen on the deteriorated pavement using polymer to extend the life of pavement from 5 to 8 years

We will do our best with our original intention, Innovation for sustainability



History

1999.03	Established Ilwontech Co.,Ltd.	20
1999. 04	Registered certificate for advanced construction business (facility	
	maintenance work)	20
2001. 04	Obtained ISO 9001	20
2003. 03	Registered for professional safety examination institute (bridge and	20
	tunnel)	20
2005. 05	Selected for Excellent Invention Support Enterprise (Korea Invention	
	Promotion Association)	20
2005. 06	A study on Movement Analysis and Stability Evaluation of expansion	
	joint (Korea Institute of Civil Engineering and Building Technology)	20
2005. 08	Selected for excellent invention tech, innovation development project	20
	support enterprise (Small and Medium Business Administration)	20
2006. 04	Served fatigue performance test and analysis of earthquake-resistant	20
	expansion joint (Large Scale Structural Lab of STRESS in Hanyang Univ.)	20
	/2006 feasibility assessment for new tech idea commercialization	20
	by SMBAFinger type structure of ERJ using hinge(Korea Institute of	
	Science and Technology Information)	20
2006. 11	Selected for "2006 top 100 excellent patent products grand prize"	
	and won Korean Intellectual Property Office prize	20
2007 01	Cortified affiliated lab octablishment (Korea Industrial Technology	

2007. 01 Certified affiliated lab establishment (Korea Industrial Technology Association)

- 2007. 05 Finalized registry of venture business (SMBA)
- 2007. 10 Certified for clean place of business (Korea Occupational Safety & Health Agency)

2008. 04	Certified for professional parts business (Ministry of Knowledge Economy
2008. 08	Passed test construction deliberation of Korea Expressway Corp
2008.10	Obtained ISO14001
2009. 10	Certified for INNOBIZ (SMBA)
2011.07	NET Certification # 627 (Ministry of Land, Infrastructure and Transport)
2012 11	NEP Certificate # NEP-MKE-2012-032 (Ministry of Knowledge
2012. 11	Economy)
2013. 03	Excellent Performance Certificate # 23-104 (SMBA)
2013. 06	Certificate of Designation of Excellent Product No. 2013087 (PPS)
2013, 11	Third Party Unit Price Contract with Public Procurement Service
2015. 05	Selected as small hidden champion by Bucheon City
2016.03	Extended Excellent Performance Certificate # 23-104 (SMBA)
2016.07	Extended NET Certification # 627 (Ministry of Land, Infrastructure and Transport)
2017.12	Received the award of the export tower of 1 million dollar and
	Presidential Award
2018.05	Registered to the technology market of Korea Expressway
	Corporation Reg. No. 2018-0174)
2018.06	Extended the certification for PPS Designated Excellent Product
	(Certification No. 2013087)
2019. 08	MAS(Multiple Award Schedule) certified



Long-Run Bridge Expansion Joint

A Study on the Improvement of Inspection Efficiency through Bridge Survey Analysis -Korea Expressway Corporation 2013 **Distribution Rate of Damages of Bridge Expansion Joints**

Result of Analysis: It shows main causes of damage of main body are Deposition of debris (31.7%), Rubber Seal (18.4%) and Leakage (17.8%), and main causes of damage of post-placing concrete are Crack (52.8%), Breakage (25.1%) and Misalignment (11.5%)



<Rate of damage based on the type of damages of expansion joint>

<Main causes of damage of main body>

Major Damages of Expansion Joint

Breakage of rubber seal





Damage of main body



Damage of steel fingers



Secondary Damage due to Expansion Joints' Leakage

Concrete Deterioration





Bridge Bearing Rust





Deposition of Debris



Main Technology of Long-run Expansion Joint System

A construction method to reduce bolt releasing and rupture by distributing the stress of the bolt to the cogged joint by engaging separable top and bottom plates of EJ with having cogged joint structure on the edge of the product

An economical and workable construction method to reduce the time required for repair to 10 min,/M from 60min,/M because a rubber seal and top plate are replaceable without damaging a post-placing concrete with a separable structure







Main Advantages of Long-run Expansion Joint System



- Reducing maintenance cost by replacing only rubber seal which is main damaged parts · Preventing fatigue increase on the end of slab and girder due to frequent removal of postplacing concrete
- Preventing damages of post-placing concrete because it does not come into contact with post-placing concrete for disassembling top plate
- It reduces civil complaints on traffic control by reducing repair time
- · Eco-friendly method corresponding to low carbon & green growth for minimizing construction waste

02. The bolt does not loosen



· Concentrated load on the bolt is distributed to the cogged joint with cantilever structure · Reducing bolt releasing and rupture

- · Using a special washer to prevent bolt releasing
- · Structure that prevents leaving of top plate even if some bolts fall

03. No joint on rubber seal



Applicable continuously up to 100M : cut rubber seal freely as the width of a bridge and construct Solve leakage problem by installing a continuous rubber seal

· Saving maintenance cost by reducing secondary damage of the structure due to leakage

04. It allows transverse movement



- Accepting transverse behavior of bridge bearing
- Preventing damages to concrete and bolts due to finger interference
- Preventing damages to bridge by allowing transverse behavior during earthquake
- · Advantageous for longitudinal, transverse behavior of skew bridge or curved bridge

05. Allowing movement in skew angle direction



· Customizing is available depending on skew angle

Long-Run Bridge Expansion Joint System

Comparison of Construction Method



Korea's first bridge expansion joint accredited for 4 major certifications



Background of Development of Long-run Expansion Joint

Guidelines of Management of Expansion Joints

(Korea Expressway Corporation, 2009)

Audit findings

- ⇒ Concerned over bolt rupture due to excessive stress to support bolts
- Analysis of Causes of Damage
- \Rightarrow Bolt rupture & releasing occur (57%)
 - Occurrence of excessive and continuous repair cost

Cases of EJ repair and reinforcement (Korea Infrastructure Safety Corporation, 2009)

Great concern over big traffic accident due to EJ bolt releasing





Bolt rupture (41%)

Bolt releasing (16%)





Finger EJ View

State of bolt releasing & rupture

Structural Safety of Long-run Expansion Joint

Cycle test for bolt loosening (KICT, 2006 / KTR, 2007)

Fatigue Test (KSF 4425) results ► decline 16.4% of bolt loosing



General Type Cogged Joint Type

Structure Review & Analysis of bridge EJ structure on bolt part (Industrial Univ. Collaboration from Dongguk Univ., 2008)

Safety analysis by vehicle load



Safety Analysis of Finger plate part Max. value 184.5 <Allowable value 279 ► O.K Safety analysis of Bolt part Max. value 341.1 <Allowable value 900 ► O.K Safety Analysis of Side Plate part Max. value 45 <Allowable value 279 ► O.K

CARGO CON Long-Run **Bridge Expansion Joint System**

Strength of Long-run Expansion Joint

Structural safety



2. Concrete damages since top plate contacts with postplacing concrete



1. Cogged joint releases stress concentration on bolt part 2. No concrete breakage since top plate opens with side plate. 3. No concrete damage since top plate opens on the side plate

Structural Safety when the bolt released



Condition1: 1 wrench bolt released

Stress St

Tensile 700 600

500

400

300

200

100

0

No stress increase of neighboring bolts occurs with Long-run EJ - structurally safe

Condition2: 2 wrench bolts released



Condition3: 1 medium bolt and 2 wrench bolts released



FEM Analysis

Eco-

friendliness



※ Distributing concentrated load on bolt part equally to prevent stress concentration

Existing Expansion Joint

It generates CO₂ and construction wastes from removing concrete

A1

A2

Before bolt released

Released 1 wrench bolt

Released 2 wrench bolts

A3



EJ with cogged joint structure

13.6 times of reducing CO₂ emission and construction wastes for only replacing rubber or top plate



Economic Feasibility(Monocell Type) in Korea

Classification	Existing Products	Our Products
Replacement Cost	Cost for replace construction : KRW950,000/m	Cost for replace construction : KRW950,000/m Cost per rubber seal replacement : RW170,000/m
Maintenance Cost (Base 10 years)	# of repair 10 yrs/ 3.3yrs=3times Repair cost for 10years KRW950,000/m x 3 times = KRW2,850,000/m	# of repair 10 yrs/ 3.3yrs=3times Repair cost for 10years KRW170,000 x 3 times = KRW510,000/m
Economic feasibility	Expensive maintenance Driver's complaints & fuel inefficiency due to overall traffic control	Inexpensive maintenance Minimize drivers' complaints with partial traffic control (10 minutes / m)

* LMJ maintenance cost with 10-year base is KRW 510,000/m.

It is about 6 times cheaper than the general Monocell joint maintenance cost of KRW2,850,000/m

Construction Procedures



Block-out

Mounting

Welding



Installing rubber seal & placing top plate







Completion of Construction

Condition check after construction (4 yrs later)



Bottom of top plate after dismantlement **>** Good

Thread of a bolt ► Good

Condition of the side ► Good

Long-Run Finger Expansion Joint

Use : Transverse EJ Movement range : 50mm ~ 500mm Applicability : Suitable for large movement, less noise





LFJ Specification

Model	Max.Allowable	Produc	ct Data	Block	<-out	La	aying gap((E)	POLT	oor M)	Amt. of Reinforcement	Concrete
Model	Movement	А	В	C	D	Min	Avg	Max	BOLI		(Kg)	(Per M)m'
LFJ-50	50	124	99	200	300	20	45	70	M16*45,10EA		19.60	0.12
LFJ-60	60	129	99	200	300	20	50	80	M16*4	5,10EA	19.60	0.12
LFJ-80	80	139	99	200	300	20	60	100	M16*4	5,10EA	19.60	0.12
LFJ-100	100	175	125	200	300	20	70	120	M16*4	5,10EA	19.60	0.12
LFJ-130	130	190	125	200	300	20	85	150	M16*4	5,10EA	19.60	0.12
LFJ-150	150	232	134	200	350	20	95	170	M18*45,10EA	M14*40,6EA	20.50	0.17
LFJ-160	160	232	134	250	350	20	100	180	M18*45,10EA	M14*40,6EA	20.50	0.17
LFJ-200	200	282	186	250	400	20	120	220	M22*50,10EA	M18*45,6EA	20.90	0.20
LFJ-230	230	307	186	250	450	20	135	250	M22*50,10EA	M18*45,6EA	20.90	0.20
LFJ-250	250	346	226	250	450	20	145	270	M22*50,10EA	M18*45,6EA	20.90	0.20
LFJ-300	300	371	226	250	500	20	170	320	M22*50,10EA	M18*45,6EA	21.00	0.25
LFJ-350	350	430	250	250	550	40	215	390	M24*60,10EA	M20*50,6EA	21.00	0.27
LFJ-400	400	500	299	250	600	40	240	440	M24*60,10EA	M20*50,6EA	21.20	0.30
LFJ-450	450	550	330	300	600	40	265	490	M24*60,10EA	M20*50,6EA	21.80	0.36
LFJ-500	500	615	364	300	600	40	290	540	M24*60,10EA	M20*50,6EA	21.80	0.36

% The product specifications are standard and subjected to change with the specifications and characteristics of a bridge % The above product specification has an error range of \pm 1~5mm depending on the specifications and characteristics % Movement range from 400 to 500mm is produced with steel

Footpath Finishing



X Additional costs incurred

Treatment of longitudinal and transverse EJ



Site : Hyunam Bridge (in Daejeon City, Korea)

LFJ-E Long-Run Finger Expansion Joint Type E

Use : Transverse EJ

Movement range : 60mm ~ 500mm **Applicability** : Applicable for deep block-out or steel girder. Suitable for large movement, less noise

LFJ-E Sectional Diagram





LFJ-E Specification

											(Unit : mm)
Model	Max.Allowable	Produc	ct Data	Bloc	k-out	Li	aying gap(E)	POLT(por M)	Amt. of Reinforcement	Concrete
MOUEI	Movement	А	В	C	D	Min	Avg	Max	BOLT(per W)	(Kg)	(Per M)m'
LFJ-E60	60	126	90	200	300	20	50	80	M18*120H*200L, 10EA	18.70	0.12
LFJ-E80	80	136	90	200	300	20	60	100	M18*120H*200L, 10EA	18.70	0.12
LFJ-E100	100	164	109	200	300	20	70	120	M18*150H*200L, 10EA	18.70	0.12
LFJ-E110	110	164	109	200	300	20	75	130	M18*150H*200L, 10EA	18.70	0.12
LFJ-E130	130	169	109	200	300	20	85	150	M18*150H*200L, 10EA	18.70	0.12
LFJ-E160	160	210	132	250	400	20	100	180	M22*150H*250L, 10EA	19.98	0.20
LFJ-E200	200	248	150	250	400	20	120	220	M22*150H*250L, 10EA	19.98	0.20
LFJ-E230	230	292	183	250	400	20	135	250	M22*150H*250L, 10EA	19.98	0.20
LFJ-E250	250	312	183	250	400	20	145	270	M24*150H*250L, 10EA	19.98	0.20
LFJ-E300	300	389	255	250	500	20	170	320	M24*150H*250L, 10EA	20.08	0.25
LFJ-E350	350	454	297	250	500	20	185	370	M24*150H*250L, 10EA	20.08	0.25
LFJ-E400	400	490	345	250	600	40	240	440	M24*150H*250L, 10EA	21.20	0.30
LFJ-E500	500	590	365	300	600	40	290	540	M24*150H*250L, 10EA	21.80	0.36

% The product specifications are standard and subjected to change with the specifications and characteristics of a bridge
 % The above product specification has an error range of ±1~5mm depending on the specifications and characteristics

Foothpath Finishing



X Additional costs incurred

Installation Photo



Site : Anyang Bridge (Seoul)

LCFJ Long-Run Change Finger Joint

Use : Construction method to replace EJ by installing an independent bracket on the existing anchor of rail type EJ

Movement range : 160mm ~ 480mm

Applicability : Replace damaged existing rail type EJ to LCFJ

LCFJ Sectional Diagram





LCFJ Specification

(Unit : mm)

Model	Max Allowable	Produc	ct Data	Post-p concret	lacing e filling	Post-p concrete	e removal
	Movement	А	В	С	D	E	F
LCFJ-160	160	246	152	100	80	150	80
LCFJ-240	240	307	192	100	80	200	80
LCFJ-320	406	406	232	100	80	200	80
LCFJ-400	486	486	272	100	80	200	80
LCFJ-480	570	570	500	100	80	200	80

% The product specifications are standard and subjected to change with the specifications and characteristics of a bridge

* The above product specification has an error range of ± 1~5mm depending on the specifications and characteristics

Sectional Diagram of Bracket



- 1. Minimize time of replacement and traffic control
- 2. No structural damage due to no concrete breakage
- 3. Smooth driving with less noise
- 4. Secure structural safety from dual structure of base plate and finger

5. Easy maintenance

6. Minimize social and economic loss by solving traffic jam



Rail type EJ (before replacement)



Plan of Independent Bracket



X Dimension and space of bracket specification can be changed due to site condition

3D view of Independent Bracket



Installation Procedure











Regular welding EJ bracket



Installing LCFJ (adjusting laying gap)



Rear welding of LCFJ



Connecting rubber seal



Completion of LCFJ installation



Placing top plate of LCFJ and locking bolts



Placing elastic concrete



Big Finger Expansion Joint

Use : Long span behavior, Transverse EJ Movement range : 300mm ~ 1500mm (transverse movement available) Applicability : Suitable for long span bridges with large movement

BFJ Sectional Diagram





(Unit : mm)

BFJ Specification

		Max.Allowable	Produc	ct Data	Block	-out	La	ying gap((E)	DOLT(Amt. of	Concrete
Ν	lodel	Movement range	А	В	С	D	Min	Avg	Max	BOLT(per w)		(Kg)	(Per M)m'
	BFJ-300	300	820	455	250	655	30	180	330	M22*60,12EA	M14*45,6EA	74.63	0.33
	BFJ-350	350	870	505	250	705	30	205	380	M22*60,12EA	M14*45,6EA	75.53	0.35
	BFJ-400	400	920	555	250	755	30	230	430	M22*60,12EA	M14*45,6EA	92.23	0.38
CTEEL	BFJ-450	450	970	605	250	805	30	255	480	M22*60,12EA	M14*45,6EA	105.91	0.40
SIEEL	BFJ-500	500	1020	655	250	905	30	280	530	M22*60,12EA	M14*45,6EA	107.48	0.45
	BFJ-600	600	1120	755	250	1005	30	330	630	M22*60,12EA	M14*45,6EA	114.70	0.50
	BFJ-700	700	1220	855	250	1105	30	380	730	M22*60,12EA	M14*45,6EA	125.72	0.55
	BFJ-800	800	1320	955	250	1205	30	430	830	M22*60,12EA	M14*45,6EA	130.49	0.60

1. Amt, of steel reinforcement and standards of anchor can be differed by condition of the site

The above figures are subjected to change with specifications and characteristics of a bridge (Customize for products not listed on the specification)
 Customize after 800



LE-DPS Long-Run Expansion Joint Debris Prevention Seal

Use : Debris prevention on EJ



[Debris Deposition on EJ]

[Application of LE-DPS on EJ]

Problems of the Existing EJ

For the existing EJ, regular cleaning is required for smooth expansion. It is very difficult to clean if debris piled up on rubber seal, they are solidified and harden as time passes. A long metal bar is needed to remove them and that damages weak rubber seal and leads to leakage and secondary structural damage to bridge.

Installation Diagram



Strength of Debris Prevention Seal

· Easy to clean debris · Minimize leakage with dual structure · Increase the service life of rubber seal

ERJ Earthquake-resistant Expansion Joint

Use : Earthquake-resistant EJ, long-span behavior, transverse EJ Movement range : 160mm ~ 1000mm Applicability : Suitable for a bridge requiring earthquake-

resistance or tri-axial movements

Selected for "2006 Top 100 Excellent Patent Products Grand Prize" and won Korean Intellectual Property Office prize

ERJ Sectional Diagram





(Unit : mm)

ERJ Specification

N 11	Max.Allowable	Produ	Product Data		Block-out		L	aying gap(E)		Amt. of	Concrete
Model	Movement	А	В	С	D2	D1	Min	Avg	Max	BOLI (per M)	(Kg)	(Per M)m'
ERJ-160	160	260	472	300	650	500	90	170	250	M16*55, 6EA	17.90	0
ERJ-250	250	310	522	300	700	500	90	215	340	M16*55, 6EA	17.90	0
ERJ-300	300	360	572	300	750	500	90	240	390	M18*55, 6EA	17.90	0
ERJ-400	400	460	672	300	850	500	90	290	490	M20*55, 6EA	17.90	0
ERJ-500	500	560	772	300	950	500	90	340	590	M20*55, 6EA	17.90	0
ERJ-600	600	660	872	300	1050	500	90	390	690	M24*55, 6EA	17.90	0
ERJ-700	700	760	972	300	1150	500	90	440	790	M24*55, 6EA	17.90	0
ERJ-800	800	860	1072	300	1250	500	90	490	890	M24*55, 6EA	17.90	0

- ※ Above product specification and block out are standard and subjected to change with the specifications and characteristics of a bridge.
- 1. Amt, of steel reinforcement and standards of anchor can be differed by condition of the site
- 2. Above figures are subjected to change with specifications and characteristics of a bridge (Customize for products not listed on the specification)
- 3. Customize after 800







3-axis behavior test

Earthquake-Resistant System on Bridge



Need of Earthquake Resistant System

Earthquake is an energy phenomenon and earthquake energy inflows intensively and damages rigid axle structure.

Applicability of Earthquake-Resistant EJ

Applied ER design of new bridge
 Reinforced ER design of existing bridge
 Skew bridge
 Long-span bridge
 Curved bridge(if internal and external movements are different)

Comparison to Others

Other earthquake-resistant EJ ERJ Other earthquake-resistant EJ(Rail Type) (Biaxial behavior finger type) Structure · Complicated · Simple Complicated Summary · Movement range : 160~1,000mm Movement range : 80~1,000mm Movement range : 80~1,000mm · Material : Aluminum Alloy + Steel · Material : Steel Material : Steel · Structure : Separable steel and rubber · Structure : Support beam format · Structure : Rotary type finger format seal, hinge type finger plate format Behavioral · Enough behavior allowance in axes of Behavior allowance in axes of X. and Y but · Accept axes of X and Y behavior but Characteristics X. Y and Z behavioral limit of 7 uncertain of accepting displacement for vertical behavior. Individual finger rotates and partial damage may occur. Reparability · Easy partial repair with unit structure. · Partial repair is hard due to integral design Easy partial repair with unit structure but to the width of a bridge. non-shrink material damages · No damages on ERJ structure members Framework member falls at the limit of Z Finger damage due to vertical behavior during earthquake axis during earthquake during earthquake \cdot Allow traffic immediately after the seismic force is extinguished Recoverable by reinstallation with material Finger departure occurs due to bolt replacement after earthquake release with finger of cantilever structure. · Recover to the original state without repair after earthquake Generates public complaints due to traffic Reinstallation is required when finger control for rubber seal replacement(overall damage occurs after earthquake · No traffic control nor public complaints for traffic control) Generates public complaints due to traffic rubber seal replacement Difficult to do partial replacement for steel control for rubber seal replacement(overall traffic control) damages. **Constructability** · Simple construction with simple structure · Required heavy equipment for installation Simple construction with simple structure due to integral structure. Precise construction is required Driving · Comfortable driving with finger type Loud noise and less comfortable driving Comfortable driving with finger type comfort structure due to discontinuity of structure structure · Good Economic · Poor Average aspect

Displacement of top plate



Application of Earthquake Resistant System

Exhausts energy and blocks earthquake. Small energy inflows to structure and min. Mitigates the remaining energy effectively.



Long-Run Rail LR Expansion Joint

Use : Longitudinal, Transverse EJ Movement range : 20mm ~ 100mm Applicability

: Applicable for transverse EJ with small movement (20 ~ 100mm). Suitable for longitudinal EJ due to no longitudinal behavior limitation

LRJ Sectional Diagram



LRJ Speci	fication										(Unit : mm)
Madal	Max.Allowable	Produ	ct Data	Block	<-out	l	aying gap(E	E)		Amt. of	Concrete
wodei	Movement	А	В	С	D	Min	Vin Avg Max		BOLI (per M)	(Kg)	(Per M)m'
LRJ-20	20	57	63	200	300	10	20	30	M14*45,10EA		0.12
LRJ-40	40	57	63	200	300	10	30	50	M14*45,10EA		0.12
LRJ-60	60	57	63	200	300	10	40	70	M14*45,10EA	19.60	0.12
LRJ-80	80	57	63	200	300	10	50	90	M14*45,10EA		0.12
LRJ-100	100	57	63	200	300	10	60	110	M14*45,10EA		0.12

% The product specifications are standard and subjected to change with the specifications and characteristics of a bridge







Use : Transverse EJ Movement range : 20mm ~ 100mm Applicability : Suitable for small movement (20~100mm), less noise, improved durability

LMJ Sectional Diagram Slab Concre Slåb C E D

LMJ Specification

LMJ Spec	ification										(Unit : mm)
Madal	Max.Allowable	Product Data Blo		Block	<-out	L	aying gap(E	POLT(par M)	Amt. of	Concrete	
Model	Movement	А	В	С	D	Min	Avg	Max	BOLT(per M)	Keinforcement (Kg)	(Per M)m
LMJ-20	20	67	63	200	300	20	30	40	M14*45,10EA		0.12
LMJ-40	40	67	63	200	300	20	40	60	M14*45,10EA		0.12
LMJ-50	50	67	63	200	300	20	45	70	M14*45,10EA	10.60	0.12
LMJ-60	60	67	63	200	300	20	50	80	M14*45,10EA	19.60	0.12
LMJ-80	80	67	63	200	300	20	60	100	M14*45,10EA		0.12
LMJ-100	100	82	73	200	300	20	70	120	M14*45,10EA		0.12

(Unit : mm)



LCRJ Long-Run Compact Rail Expansion Joint

Use : Longitudinal, Transverse EJ

Movement range : 20mm ~ 100mm Applicability

: Applicable for transverse EJ with small amount of movement (20 ~ 100mm), economical.

Suitable for longitudinal EJ due to no longitudinal behavior limitation

LCRJ Sectional Diagram





LCRJ Specification

Madal	Max.Allowable	Product Data	Bloc	k-out		Laying gap(E)		Concrete
Model	Movement	А	С	D	Min	Avg	Max	(Per M)m'
LCRJ-20	20	34	200	250	10	20	30	0.10
LCRJ-30	30	34	200	250	10	25	40	0.10
LCRJ-40	40	34	200	250	10	30	50	0.10
LCRJ-50	50	34	200	250	10	35	60	0.10
LCRJ-60	60	34	200	250	10	40	70	0.10
LCRJ-80	80	34	200	250	10	50	90	0.10
LCRI-100	100	34	200	250	10	60	110	0.10

* The product specifications are standard and subjected to change with the specifications and characteristics of a bridge

Foothpath Finishing



X Additional costs incurred

Installation Photo



Site : DA NANG-QUANG NGAI EXPRESSWAY(IN VIETNAM)



LHAJ Long-Run Height Adjustment Joint

Use : EJ for height adjustment Movement range : 20~80mm Applicability

: Suitable for expanded bridge, bridge with different sag, bridge that is concerned about occurring height difference

LHAJ Sectional Diagram





LHAJ Specification

		_										
Model	Max.Allowable Movement		Produ	ct Data	Bloc	k-out	L	Laying gap(E)		BOLT(per M)	Amt. of r M) Reinforcement	Concrete
	Horizontal	Vertical	Α	В	C	D	Min	Avg	Max		(Kg)	(Per M)m
LHAJ-20	20	20	64	68	200	300	40	50	60	M14*45,10EA	19.10	0.12
LHAJ-40	20	40	64	68	200	300	40	50	60	M14*45,10EA	19.10	0.12
LHAJ-60	20	60	64	68	200	300	40	50	60	M14*45,10EA	19.10	0.12
LHAJ-80	20	80	64	68	200	300	40	50	60	M14*45,10EA	19.10	0.12

1. Amt. of steel reinforcement and standards of anchor can be differed by condition of the site

- 2. Above product is a standard product below 80mm
- 3. Customization is available by difference of height and specification of A and B values
- 4. To determine the movement, it has to consider the transverse behavior, longitudinal behavior, vertical behavior, and margin (10mm)



Embracing effect after intalling LHAJ

LHAJ Plan





Comparison of Wheel Inclination



%Problems when applying general EJ for height difference

1. Comparing the wheel inclination of CASE-2, 3 and 4 showed that about 2 times steep incline occur with the general EJ and that causes anxiety to a driver. 2. In case of rain or sudden stop, slip of a vehicle is concerned due to small thread of tiers with height difference.

3. Damage on the side of tire is concerned when entering height difference section

LCJ Long-Run Culvert Expansion Joint

Use : Transverse & longitudinal EJ, EJ for culvert Movement range : 20mm ~ 100mm Applicability : Suitable for small movement of transverse EJ, longitudinal EJ, culvert EJ that requires waterproofness.

LCJ Sectional Diagram





(Unit : mm)

LCJ Specification

Madal	Max.Allowable	Produ	ct Data	Block	-out	La	aying gap((E)	Amt. of	Concrete
woder	Movement	А	В	С	D	Min	Avg	Max	(Kg)	(Per M)m'
LCJ-20	20	90	87.5	180	250	20	30	40	14.80	0.09
LCJ-40	40	90	87.5	180	250	20	40	60	14.80	0.09
LCJ-60	60	90	87.5	180	250	20	50	80	14.80	0.09
LCJ-80	80	90	87.5	180	250	20	60	100	14.80	0.09
LCJ-100	100	90	87.5	180	250	20	70	120	14.80	0.09

* Above product specification are standard and subjected to change with the specifications and characteristics of a bridge1. Standards of amt. of steel reinforcement and anchor can be differed by condition of the site

2. Above figures are subjected to change with specifications and characteristics of a bridge (Customize for products not listed on the specification)

RWJ Railway Expansion Joint

Use : EJ for railway

Movement range : 20mm ~ 100mm

Applicability : Suitable for easy replaceable railway EJ with integral structure requiring waterproofness. Maintenance costs can be reduced by using replaceable rubber seal or stainless steel.

%The width of EJ is subjected to change to accommodate additional behavior



RWJ1 Specification (Unit : mn									
Model	Max.Allowable	Produ	ct Data	Laying gap(E)					
Iviodei	Movement	А	В	Min	Avg	Max			
RWJ1-20	20	90	87.5	20	30	40			
RWJ1-40	40	90	87.5	20	40	60			
RWJ1-60	60	90	87.5	20	50	80			
RWJ1-80	80	90	87.5	20	60	100			
RWJ1-100	100	90	87.5	20	70	120			

RWJ 3 (TYPE-3)



RWJ3 Specification (Unit : mm)										
	Max	Laying gap(E)			Product Data					
wodei	Expansion Length	Min	Avg	Max	А	В	С	D		
RWJ3-50	50	25	50	75	275	61	11.5	5.5		
RWJ3-100	50	75	100	125	325	61	11.5	5.5		
RWJ3-150	50	125	150	175	390	61	16.0	5.5		
RWJ3-200	50	175	200	225	440	61	20.5	5.5		



RWJ2 Specification (Unit : mm) Max.Allowable Product Data Laying gap(E) Model Movement А В С Min Avg Max RWJ2-20 RWJ2-40 RWJ2-50 RWJ2-60 RWJ2-80 RWJ2-100 RWJ2-120 RWJ2-135 87.5 RWJ2-150

RWJ4 Specification

Model	Max.Allowable	Produ	ct Data	Laying gap(E)		
Woder	Movement	А	В	Min	Avg	Max
RWJ4-20	20	47	60	20	30	40
RWJ4-40	40	47	60	20	40	60
RWJ4-60	60	47	60	20	50	80
RWJ4-80	80	47	60	20	60	100
RWJ4-100	100	47	60	20	70	120

LAWJ

Long-Run Agricultural Waterway Joint

Use : EJ for agricultural waterway

Movement range : 20mm ~ 100mm

Applicability : Suitable for where rubber seal requires bending for angle grade of hunch inclination. Easy installation

LAWJ Sectional Diagram

LAWJ Specification

(Unit :	: mm)
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Madal	Max.Allowable	Pr	oduct Da	ata	Laying gap(E)		
woder	Movement	В	D	С	Min	Avg	Max
LAWJ-20	20	50	200	75	20	30	40
LAWJ-40	40	50	200	75	40	60	80
LAWJ-60	60	50	200	75	50	80	110
LAWJ-80	80	50	200	75	60	100	140
LAWJ-100	100	50	200	75	70	130	170

% The width of EJ is subject to change to accommodate additional behavior% Above figures are subjected to change with specifications and

characteristics of agricultural waterway(Customize for products not listed on the above table)

LAWJ Plan

Major Accomplishment

NO	Product	Project Name	Orderer	Year
1	LMJ 60 / LFJ 60	Yanghwa and Dobong bridges repair and reinforcement	Office of Infrastructure Management, Seoul Metropolitan Government	2006
2	LMJ 60 / LFJ 80	Nowon Bridge Renovation	Northern Roads & Bridges Maintenance Office, Seoul Metropolitan Government	2007
3	LFJ 100 / LFJ 120	Dongjak Bridge repair	Office of Infrastructure Management, Seoul Metropolitan Government	2007
4	LFJ 80 / LFJ 100	Sungdong Bridge(old bridge) Repair	Seongdong Roads & Bridges Maintenance Office, Seoul Metropolitan Government	2007
5	LMJ 40 / LFJ 80	Gakgae Bridge and 8 More Bridge Repair in National Highway #4	Boeun National Highway Maintenance Office	2007
6	LFJ 80	Jangsu elevated bridge and 5 more bridge(Yeonsu overpass) repair and reinforcement	Incheon Metropolitan City	2007
7	LMJ 60	Uigyo(Bridge) and 2 more bridge repair	Northern Roads & Bridges Maintenance Office, Seoul Metropolitan Government	2008
8	LRJ 40 / LFJ 80	Daegok Bridge renovation	Eastern Roads & Bridges Maintenance Office, Seoul Metropolitan Government	2008
9	LRJ 40 / LFJ 150	Gangchang Bridge in Daegu Expansion	Daegu Metropolitan City Government	2008
10	LMJ 40 / LFJ 80	The first sector expansion on highway #451 of the Okpo-Seongseo vicinity (Daemyeongcheon Bridge)	Korea Expressway Corporation Southern Agency	2009
11	LFJ 160	Gumidaegyo(Bridge) repair and reinforcement	Gumi City Government	2009
12	LFJ 160	Ramp way expansion in Han-nam Bridge	Seoul Urban Infrastructure Head Office	2009
13	LMJ 100 / LFJ 100	Banpo Bridge EJ replacement	Seoul Urban Infrastructure Head Office	2009
14	LMJ 40 / LFJ 60	EJ improvement on the Central Inland Highway in the jurisdiction of KEC Chungju Branch(Moonsung 1 and 8 more bridges)	Korea Expressway Corporation Chungju Branch	2009
15	LCFJ 240	EJ replacement of the Bucheon viaduct in the Beltway Around Seoul(P95-towards Ilsan)	Korea Expressway Corporation Incheon Branch	2010
16	LMJ 60 / LFJ 100	EJ repair of the Olympic Bridge and Jamsil Railroad bridge	Seoul Urban Infrastructure Head Office	2010
17	LMJ 100 / LFJ 130	EJ repair of Seongsan Bridge	Seoul Urban Infrastructure Head Office	2010
18	LMJ 60 / LFJ 100	Dorimcheon Boramae overpass EJ repair	Seoul Urban Infrastructure Head Office	2010
19	LMJ 60	Yeouigvo Bridge EJ repair	Seoul Urban Infrastructure Head Office	2010
20	LFJ 160	EJ installation of sea dike expansion project (1st stage) of Asan bay seawall	Korea Rural (Community) Corporation	2010
21	LMJ 60	EJ repair of the Cheonieon 2 Bridge of Kvungbu Highway	Korea Expressway Corporation Ulsan Branch	2010
22	LFJ 160	EJ repair of Manui 2 Bridge A2 of Beltway Around Seoul	Korea Expressway Corporation Incheon Branch	2010
23	LMJ 40 / LMJ 60	EJ replacement in the jurisdiction of KEC Sanchung Branch(Omi bridge and 3 other bridges)	Korea Expressway Corporation Sanchung Branch	2010
24	LFJ 240 / LFJ 160	EJ repair of the Daedong-Nakdong river bridge of Central Highway	Korea Expressway Corporation Yangsan Branch	2010
25	LCFJ 160 / LCFJ 240	EJ replacement of the Bucheon viaduct in the Beltway Around Seoul(p95, p104, p112)	Korea Expressway Corporation Gyeonggi Branch	2011
26	LCFJ 160	EJ replacement of the Gvulhveondaegvo(Bridge) in the Beltway Around Seoul(P3, P6)	Korea Expressway Corporation Incheon Branch	2011
27	LMJ 60	EJ repair for the Namhae Expresswav(Kumdang and 5 more Bridges)	Korea Expressway Corporation Jiniu Branch	2011
	L FL 160	EJ repair for the ramp way D sector of the Joongdong IC in the Beltway Around Seoul	Korea Expressway Corporation Incheon Branch	2011
29	LMJ 40 / LMJ 60	EJ improvement in Central Inland Highway Corporation Chungju Branch(Moonsung 1 and 8 more	Korea Expressway Corporation Chungju Branch	2011
30	LM160/LEL200/LEL240	F I renlacement of the Goniiam 2 pedestrian overpass and 4 places in the Central Expressway	Korea Expressway Corporation Gyeongan Branch	2011
31	LMJ 60 / LFJ 160	EJ replacement of the Gongneungcheon 3 and Wondangcheon(stream) bridge in the Beltway Around Spoul	Seoul Urban Expressway Corporation	2011
32	L EL 160	E I ranlarament of the Bongeun Bridge	Secul Linhan Infrastructure Head Office	2011
33	LFJ 160	E I renair for the Tancheon 1 Bridge	Seoul Ulthan Infrastructure Head Office	2011
3/	LMI60 / LEU160 / LEU200	Brad construction on the 1st sector of the Versu-Screncheon vicinity		2011
35	LEI 160	E I renair for the Rookhang overnass in Incheon	Incheon Metropolitan City	2011
36	LMJ 40	Repair to the booking or pass in increase Repair and reinforcement for overpass between the international-domestic flight in Gimpo International Airport	Korea Airports Corporation Seoul Head Office	2011
37		International Aliport Excility improvement for the existing overpass of Jaju Airport	Korea Airports Corporation Jaiu Branch	2011
		- Danair far lak laan awarnes	Inchean Matropolitan City	2011
	LEL120	E I renair for the Service 2 average	Incheon Matropolitan City	2012
		Dependion for the 6-bridger including the pedertrian evenance of Pupping IC in highway #22	Cuandiu Pagianal Construction Office	2012
	LEU160	Increase of Tonging IC In Relating the period Social F I replacement of Tonging IC In Relating Around Social	Secul Lirban Evoressuay Corporation	2012
41		E Leopar for the Lap Diver Bridge	Secul Urban Infrastructure Lload Office	2012
42 //2	LMI60/LEI120	E I renair for the Dongrak/dae Bridge		2012
43		La repair foi file Duligjande Diluge El realezament in Karea Expression Comparison Cambridge Pranch (Casha and Express Holdson)		2012
44		Europlacement in Korea Expressivaly Corporation Sanchung Branch (Seona and 5 more Dridges)		2012
45		EJ replacement in Korea Expressway Corporation Jinju Branch (Kuho and 2 more bridges)	Korea Expressway Corporation Jinju Branch	2012
40		E3 repracement in in Korea Expressively Corporation Usan Branch (CheonJeon Fand 3 more Dridges)	Consult Under Expressional Vice Consult Under Expressional Vice Consult Under Expression Vice Consult Under Expression Vice Consult Under Expression Vice Consult	2012
4/		EJ repail tot tille Dollgjak billage El construction in Karaa Expression Corporation, Jackson Depark (Kaumsoner, bidge)		2013
40	LCI J 100	Es construction in Norea Expressivaly Corporation Decreton Dianch (Neuriseong Diruge)	Norea Expressividy Corporation Jeureon Didner	2013

Major Accomplishment

NO	Product	Project Name	Orderer	Year
• 49	L EL 100 / L EL 160	Pakistan linnah Bridge	Rainbow Enterprises	2010
				~2014
50	LCFJ 240	and 3 more bridges)	Branch	2013
• 51	LFJ 60 / LFJ 100	Vietnam Truong Phat investment trading joint stock company	Truong Phat company	2013
52	LCFJ 320	EJ replacement in Korea Expressway Corporation Wonju Branch (Seomgam bridges)	Korea Expressway Corporation Wonju Branch	2013
53	LFJ 130 / LFJ 160	EJ repair for the Gimcheon bridge and Gampo Bridge	Gimcheon city in Gyeongsangbuk-do	2013
54	LFJ 160 / L.M.J 60	EJ repair for the section built with private capital in Beltway Around Seoul 2013	Seoul Urban Expressway Corporation	2013
55	LMJ 60	EJ replacement in Korea Expressway Corporation Nonsan Branch	Korea Expressway Corporation Nonsan Branch	2013
56	LFJ 160	EJ repair for the Wang-gil overpass in Incheon	Incheon Engineering & Construction Head Office	2013
57	LMJ 40	Naju Nampyeong bridge renovation in the National highway #1	Gwangju Regional Construction Office	2013
58	LFJ 160	Youngju Elevated Bridge Renovation	Busan Metropolitan City	2014
59	LMJ 20 / LMJ 40 / LMJ60	Ayang Bridge Renocation	Dae-gu Infrastructure Management System	2014
60	LRJ 20	Kyeongin Highway	Incheon Metropolitan City	2014
61	LCJ 20	Keumkagn Amenity Urban Construction	Buyeo District Office	2014
62	LFJ 80 / LFJ 100	Ssangcheun Bridge, National Highway 7th and 4 More Bridges	Wonju City Hall	2014
63	LMJ 60 / LFJ 150	Seoul Highway EJ Replacement	Seoul Belway Corp	2014
64	LMJ 50 / LMJ 100	Hwasung-Dongtan Urban Gateway Construction	Korea Land & Housing Corp.	2014
• 65	LFJ 60	Costa Rica Bridge	MECO	2014
66	LFJ 200	Uman overpass, EJ replacement work	Paldal-gu, Suwon City	2015
67	LFJ 100 / LFJ 160 / LMJ 60	National highway No. 1, Honggyeongyo bridge and 2 other bridges, EJ repair work	Yesan National Land Management Office	2015
68	LFJ 100	Gyebaek bridge repair work	Nonsan City, Chungcheongnam-do	2015
69	LFJ 80 / LFJ 160	Busan East-West overpass and 5 other places, maintenance works	Busan Construction Safety Testing Office	2015
70	LMJ 60 / LFJ 80	National Route 1,Sabong bridge and 1 other place, EJ repair work	Nonsan Land Management Office	2015
71	LFJ 60 / LFJ 100	Hancheon bridge repair work	Nowon-gu Office	2015
72	LFJ 100 / LFJ 130 / LFJ 160	Seoul Expressway ,EJ repair work in 2015	Seoul Belway Corp	2015
73	LFJ 60 / LFJ 80	Bangseo bridge repair & reinforcement work	Cheongju City, Chungcheongbuk-do	2015
74	LFJ 60 / LRJ 60	Yeongju bridge and one other bridge repair work in 2015	Yeongju City, Gyeongsangbuk-do	2015
75	LFJ 100 / LMJ 20	Daebong bridge EJ replacement work	Daegu City Facility Safety Management Office	2015
76	LFJ 100	Eunwol district road maintenance work	Goseong County, Gyeongsangnam-do	2015
77	LFJ 60 / LFJ 80	Route 45, Songchon bridge and 4 other places EJ maintenance work	Uijeongbu Land Management Office	2015
78	LFJ 50 / LRJ 50	National highway No. 3 road maintenance, Pungggye bridge	Suwon National Highway Maintenance & Construction Office	2015
79	LHAJ 60	Yongbi Bridge ~ Haengdang Middle Road, road construction work	Seoul Urban Infrastructure Head Office	2015
80	ERJ 160 / ERJ 250	Eungbong bridge construction	Seoul Urban Infrastructure Head Office	2015
• 81	LFJ 60 / LFJ 100 / LCRJ 50	Vietnam Truong Phat investment trading joint stock company (export)	Truong Phat company	2016
82	LFJ 80	Daejeon and Tongyeong Expressway, Baekcheon 2nd Bridge repair work	Korea Expressway Corporation Sancheong Branch	2016
83	LM160	National Road No 21 Connecting Road Construction (1st)	Cheonan City, Chungcheongnam-do	2017
84	LEL80 / LEL100	National Road No 21 Connecting Road Construction (1st)	Seoul Urban Infrastructure Head Office	2017
	LM160	Goseongcheon Hometown River Develonment Project (2nd)	Goseong County, Gyeongsangnam-do	2017
86		Hanhat hridge renair work (2nd)	Deeleon Metropolitan City	2017
87	15180	Taenvung bridge renair & reinforcement work (2nd)	Daejeon Metropolitan City	2017
	LEI 80 / LEI 100	Samona 3rd bridge, expansion inint renlacement work		2017
		Binong hridge renair work	Seiong Special Self-Governing City	2017
			Incheon Excilities Corporation	2017
 		Ungchon Overnass and other 2 bridges repair & reinforcement work	Daeleon Metropolitan City	2017
	LEI 120	Jungchon Overpass and other 2 bruges repair & reinforcement work	Daejeon Metropolitan City	2017
92	LRJ 20 / LFJ 80 / LFJ 100 /		Design Metropolitan City	2017
93	LFJ 60	Jungcion prioge and other 2 places repair & reinforcement Work	Daejeon Metropolitan Lity	2017
		Daekje proge iongitudinal Eurepäir Work	Buyeo county, Chungcheongham-do	2017
95	ΓMJ 00	ruseong bridge repair and intersection improvement works	Yuseong-gu, Daejeon	2017
96		Uaepyeong bridge and I other place repair & reinforcement work	Daejeon Metropolitan City	2017
9/	LKJ 40	Uriental Anti-aging General Industrial Complex, Entry bridge extension & paving work	Sancheong County, Gyeongsangnam-do	2017
98	LFJ 100	kia dridge and 1 other place, seismic performance improvement work	Seoul Southern Road Office	2017

Major Accomplishment

NO	Product	Project Name	Orderer	Year
99	LFJ 160	Route 37, Uam bridge and facility repair work	Uijeongbu Land Management Office	2017
100	LMJ 30 / LMJ 50	LMJ 30 / LMJ 50 Busan Shigye ~ Woongsan 1 National Road Construction	Busan Regional Construction Management Administration	2017
101	LFJ 50 / LFJ 80 / LFJ 100 / LMJ 30	National Route 37 Changok bridge and 3 other places facilities repair work	Uijeongbu Land Management Office	2017
102	LCFJ 400	Jeongneungcheon overpass and 1 other place in 2017 repair work	Seoul Facilities Corporation	2017
103	LHAJ 30	Shingal Detour Road Construction (Gugal bridge)	Seoul Regional Construction & Management Administration	2017
104	LFJ 80 / LFJ 130	Mannyeongyo bridge and 2 other bridges repair and reinforcement work	Daejeon Metropolitan City	2018
105	LFJ 120	Chungju Megapolis Access Road (Shinyang bridge)	Chungju City	2018
106	LFJ 160 / LFJ 100 / LMJ 30	Tianbyeon Expressway ramp repair work	Cheonbyeon Expressway	2018
107	LFJ 80 / LFJ 100	2018 Dongjak bridge repair work	Seoul City	2018
108	LMJ 60	Goseongcheon hometown river development project 2nd& 3rd	Goseong County Office	2018
109	LFJ 160	Hyundo bridge & reinforcement work	Daejeon Metropolitan City	2018
110	LRJ 40	Oriental Herbal Anti-Aging General Industrial Complex, Entry bridge	Sancheong County Office	2018
111	LMJ 40	Noryang overpass repair work	Korea Expressway Corporation Jinju Branch	2018
112	LFJ 130	Gongneungcheon bridge and 1 other place repair work	Seoul Expressway	2018
113	LFJ 50 / LFJ 80 / LMJ 30 / LMJ 50 / LRJ 50	Busan Shigye ~ Woongsan 1 National Road Construction	Busan Regional Construction Management Administration	2018
114	LFJ 100	Kia Bridge and 1 other place seismic performance improvement work	Seoul City	2018
115	LFJ 200	Hyomok overpass bridge repair work	Daegu City	2018
116	LMJ 40 / LMJ 80	National Route 46 Palmi 2nd bridge repair work	Hongcheon Land Management Office	2018
117	LFJ-60 / LFJ-80 / LFJ-160	Route 46, Geumnam IC RAMP-C bridge, etc. facility repair work	Uijeongbu Land Management Office	2018
118	LRJ 20 / LFJ 60 / LFJ 80	Gapcheon Bridge repair & reinforcement work	Daejeon Metropolitan City	2018
119	LMJ 60 / LFJ 80 / LFJ 100 / LFJ 130 / LRJ 20	Jungchon overpass, 2nd repair work	Daejeon Metropolitan City	2018
120	LFJ 80	Yongin ~ Seoul Expressway Heonreung IC, EJ replacement work	Gyeongsu Expressway	2018
121	LFJ 60 / LFJ 80 / LFJ 160	Route 46, Geumnam IC RAMP-C Bridge, etc. facility repair work	Uijeongbu Land Management Office	2018
122	LRJ 20 / LFJ 60 / LFJ 80	Gapcheon bridge repair & reinforcement work	Daejeon Metropolitan City	2018
123	LMJ 60 / LFJ 80 / LFJ 100 / LFJ 130 / LRJ 20	Jungchon overpass, 2nd repair work	Daejeon Metropolitan City	2018
124	LMJ 40	Guam Bridge Reinforcement Work	Daejeon Metropolitan City	2019
125	LFJ 80	Geumcheon Bridge Reinforcement Work	Seoul City	2019
126	LMJ 40	National Route 19, Naenamsong 2nd Bridge, EJ Work	Daejeon Metropolitan City	2019
127	LFJ 80	National Route 47, Dopyeong 1st Bridge, Facility repair work	Uijeongbu Land Management Office	2019
128	LMJ 20 / LMJ 40	Heunghae Seonggok 1st Bridge, Restoration Work	Pohang City Buk-gu Office	2019
129	LFJ 100	Heunghae Namsong IC Bridge, Restoration Work	Pohang City Buk-gu Office	2019
130	LFJ 60 / LFJ 80 / LFJ 100 / LMJ 30	Gwangbok Bridge & Anyang Bridge, Road Expansion Construction	Seoul Metropolitan Government	2019
131	LHAJ 40/ LFJ 90	Okcheon 1st Bridge, Bridge extension work	Yangpyeong	2019
132	LFJ 160	Incheon Airport Entrance JCT RAMP-A Repair work	Incheon Airport Corporation	2019
133	LHAJ 60	Jangji Underpass-Dongbu Expressway, connection road installation work	Seoul Metropolitan Government	2019
134	LCFJ 240	Joongdong IC Bridge, Repair Work	Korea Expressway Corporation Incheon Branch	2019
135	LFJ 80	Yongin ~ Seoul Expressway Heonreung IC, EJ replacement work	Gyeongsu Expressway	2019
136	LRJ 20 / LFJ 100 / LFJ 60	Hyunam Bridge, repair & reinforcement work	Daejeon Metropolitan City	2019
137	LFJ 160 / LFJ 80	National Route 37 New Cheongpyeong Bridge, etc. Facility repair work	Uijeongbu Land Management Office	2019
138	LFJ 80	Beodeunae Bridge, repair & reinforcement work	Daejeon Metropolitan City	2019
139	LFJ 100	Daejeon Tongyeong Line Baekcheon 2 Bridge Repair	Korea Expressway Corporation Sancheong Branch	2019
140	LFJ 100 / LCJ 100	Namchang 1st Bridge, Namak New Town Oryong District Housing Site Development Project	Jeonnam Development Corporation	2019
141	LFJ-80 / LCJ 80	Namchang 4th Bridge, Namak New Town Oryong District Housing Site Development Project	Jeonnam Development Corporation	2019
142	LFJ 80	Toegyewon Bridge, Repair Work	Guri City	2019
143	LFJ 50 / LFJ 70	National Route 42, Songmun 2nd Bridge and 1 other place Repair work	Suwon Land Management Office	2019
144	LMJ 40	Hakbong ~ Gongam Road Construction (Kumo-dong Bridge)	Daejeon Regional Construction & Management Administration	2019
145	LFJ 80 / LFJ 160	Renovation of facilities including Pyeongdaegyo Bridge, National Route 37	Uijeongbu Land Management Office	2019

ilwontech co., ltd.

[HQ]

Rm.505, Hyun-hae Plaza,105 Sang-dong Rd, Wonmi-gu, Bucheon City, Gyeonggi-do, Korea TEL. +82-32-225-1010 FAX. +82-32-215-1010

[1st Factory] 171 Wolseongan-gil, Jincheon-gun Chungcheongbuk-do, Korea

[2nd Factory] 522 Jiseok-ri, Eungbong-myeon, Yesan-gun, Chungcheongnam-do, Korea