Bridge Expansion with Light FRP Bridge Decks (Restoring Traffic Lanes by Creating Exclusive Bike Lanes)





EJtech Co., Ltd.

10, Migeum-ro, 33beon-gil, Bundang-gu, Sungnam-si, Gyeonggi-do, 13625, Korea T: +82.31.711.4880 E: ejtech@ejtech.net

1. Project Background

- Autobikes and bikes are major transportation means for citizens in developing countries including Vietnam, Cambodia, Laos, Philippines and Taiwan.
- Due to greatly lacking transportation infra such as bridges in these countries, autobikes and bikes are occupying most of lanes of the bridges, consequently traffic vehicles are hardly afford to share.
- Accordingly, a lot of problems such as heavy traffic congestion, rising logistic transporting costs and causing public inconveniences are ever-present.
- Such problems are effectively resolved by expanding bridges with light weight composite(FRP) deck without strengthening the substructures of existing bridge, consequently providing exclusive lanes for autobikes and bikes in the expanded portions, while original lanes in the bridge are restored for traffic vehicles.
- By smoothing the traffic flow for vehicles as well as autobikes and bikes, it rapidly and cost-effectively resolves the problems of traffic congestion and logistic transportation at a single stroke, and maximizes effectiveness in contrast to construction costs.

2. Autobike Mixed Traffics and Demands for Bridge Expansion



- Bridge expansions with light FRP deck resolve problems of autobike's traffic lane occupation
 Restoring traffic lanes as well as providing exclusive autobike lanes without strengthening
- > Bridge expansion with FRP deck is most economical and rapid solution

3. Benefits and Applications of FRP Bridge Deck

Light Weight

Less than 20% of concrete deck Reduce self-weight Slender girder and substructure Enhance earthquake resistance

High Strength

10 times of conc. strength 1.5 times of steel strength Enhance structural safety

High Durability

Low Life Cycle Cost(LCC) Reduce maintenance cost Longer service life



Rapid Installation

Reduce construction time and cost Minimize traffic interference

Bolt+Snap-Fit Connection

Easy connection for deck-to-girder and deck-to-deck Complete integration between decks Enhance constructability (all assembly works at upper side)

Efficient Bridge Expansion

No extra strengthening needed Most economical and rapid solution for walkway/bikeway expansion

Applications of FRP Bridge Deck

1) Bridge Expansion (Economically provide walkway/bikeway without strengthening substructures underneath)

- 2) Walkway of New Bridge (Light weight walkway mostly no need complements to girder section of traffic bridge)
- 3) New Footbridge (Bridge in mid-city for minimum congestion. Bridge in corrosion environments and mountains)
- 4) Temporary Bridges (Restoration or temporary bridge for disaster, construction and military use)

4. Assembly Details of ISF(Integral Snap-Fit) Deck

- Snap-fit deck of ISF(Integral Snap-Fit) type integrally connects side-by-side decks with snapfit and bolts in robust way.
- > Integrally connected ISF decks behave as plate-like 2-way decks, increasing structural safety.
- Increase constructability since all assembly works are rapidly done at upper side of bridge, thereby saving construction costs.
- > The decks can be easily disassembled in reverse way for reuse or maintenance.



5. Construction Records

1) Walkway/Bikeway Expansion of Hangang Bridge(Arch) (L=840m, both side. W=4.5m. 2008)



2) Walkway/Bikeway Expansion of Hangang Bridge(Plate Girder) (L=840m, both side. W=4.5m. 2008)



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3) Gyulhyun Bridge, Walkway/Bikeway under Concrete Box Girder (L=293m, W=4m, 2011)



4) Gyulhyun Bridge, Walkway/Bikeway above Concrete Box Girder (L=292m, W=4m, 2011)



5) Sejong Haknarae Bridge, Walkway/Bikeway under the Cable Stayed Bridge (L=700m, W=9m, 2011)



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6) Walkway/Bikeway Expansion of Onchun-chun Bridge above FRP Bracket (L=144m, W=3m, 2009)



7) Julyoung-ro Exp.(500m, 2010), Geumchun Exp.(198m, 2009), Saewul Exp.(77m, 2009), Maduk Exp.(30m, 2010)



8) Records for Traffic Bridges; Gaejung Bridge(25m, 2004), Bongsan Bridge(36m, 2007), Malmoo Bridge(120m, 2012)



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