

Composite Arch Bridge System

An AASHTO-approved, rapidly deployable, lightweight, corrosion resistant bridge technology with 100 year lifespan.



The Composite Arch Bridge System, commonly known as Bridge-In-A-Backpack™, is a lightweight, corrosion resistant system for short to medium span bridge construction using FRP composite arch tubes that act as reinforcement and formwork for cast-in-place concrete. The arches are easily transportable, rapidly deployable and do not require the heavy equipment or large crews needed to handle the weight of traditional construction materials.

The patented FRP system has been tested with advanced structural characterization, predictive modeling, and fatigue testing, along with environmental durability tests for UV, fire, and abrasion resistance.

Our innovative composite bridge system is part of the American Association of State Highway and Transportation Officials (AASHTO) code, lowers construction costs, extends structural lifespan up to 100 years, and is a sustainable alternative to traditional construction methods. All designs are engineered to exceed AASHTO load standards for single span bridges from 35 ft. to more than 65 ft.

Advanced Infrastructure Technologies is a privately held company licensed by the University of Maine that has completed 21 domestic and international composite arch bridge projects.

Advantages of Composite Arch Bridge System Technology

- **Cost-effective** – We have the lowest life cycle cost in the industry. No bridge decks or approach slabs to maintain. No rusting of steel or spalling of concrete caused by freezing and thawing, unloading, thermal expansion and contraction, or salt deposition.
- **Sustainable** – Composites are manufactured with very low energy production. When properly designed and maintained our bridges have a design life of 100+ years so its totaled embodied energy is very low – the amount of energy needed to preserve the bridge.
- **Environmentally Friendly** – Natural Stream Bottom, low impact on surrounding environment during its life cycle and also during the construction phase. It provides a great habitat for our natural wildlife and provides a strong balance to our aquatic ecosystem.
- **Durable** – A fully composite bridge system.
- **Secure / Safe** – A high structural reserve capacity and redundancy well above the AASHTO standards. Failure of one component of the bridge will not create a major collapse – it is not a failure critical bridge system. Overfilled Arches are the most efficient shapes in the world.
- **Aesthetically Pleasing** – Headwalls and Wing walls can be designed to meet the aesthetics of the environment and improve the physical appearance of the structure.
- **Functional** – Pertains to the overall functional programming (spatial or structural needs) of the bridge over its life cycle.
- **Innovative** – New ideas that change our world for the better. The use of composites drives other innovations in the transportation market and can create Maine based manufacturing as a source for our components.

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ADVANCED INFRASTRUCTURE TECHNOLOGIES

The AIT Composite Arch Bridge System is a cost-effective solution to short-span bridges such as an underpass, overpass, tunnel or stream, wetland crossings, as well as other overfilled arch structures. The AIT Composite Arch Bridge System is a combination of composite tube arch elements, composite deck, spandrels, wing walls, and cast-in-place footings with spans from 35 to 65+ feet. We have over 100 size combinations available that include waterway areas exceeding 1,500 square feet.

The AIT Composite Arch Bridge System comes complete with FRP spandrels and wing walls or can be used in conjunction with other pre-engineered precast or dry-cast wall systems on the market today. Its versatility allows it to be adapted to skewed or square-end alignments that are challenging for current pre-fabricated bridge systems on the market. It can be used in both multi-span and curved alignments for wide crossings.

The AIT Composite Arch Bridge System can be used in both low and extremely high fill ranges. There are no exposed connections or concrete decks or approach slabs to maintain which reduces preservation costs and provides one of the lowest life cycle cost bridge systems on the market. The composite arch structure is extremely durable and maintenance free. In full-scale tests the composite arch carried loads greater than 20 times AASHTO HL-93 loading required for bridges in the U.S. by the Federal Department of Transportation.

The AIT Composite Arch Bridge System has been used successfully to span wetland areas with minimal disturbance to vegetation and the surrounding environment. The system provides an elegant solution and is easy to install. A small crew can complete most AIT Composite Arch Bridge System installations in a few days. There is no heavy equipment required to install any of the components of the bridge and the system can be installed with unskilled labor making it ideal for remote locations and owner-installed bridge applications.

The technology uses lightweight composite tubes. The tubes are a lightweight structural composite with many possible applications in infrastructure. They are shaped into an arch prior to infusion, and used as both reinforcing and stay-in-place framework for buried concrete arch bridges. They also provide concrete with protection from environmental degradation, particularly from salt and water. This technology is the key component of AIT's composite bridge systems.



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STATE HIGHWAY AND
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AASHTO
THE VOICE OF TRANSPORTATION

**Approved For Use In All
50 U.S. States**