BEBO®
Precast Concrete Arch Systems

BEBO® Arch Solution

STRATA Geosystems (India) Pvt Ltd

BEBO® Precast Concrete Arch Systems

Overfilled arches for a wide range of applications

Strata India is an exclusive licensee of BEBO® *Precast Arch System*

The BEBO® system is a patented precast concrete arch structural technique for the design and construction of soil backfilled and overfilled bridges, culverts and underpasses. It is a fully pre-engineered system that features the world's largest span precast concrete arches. The spans range from 3.6m to 25.6m, and more. BEBO® precast concrete arch systems have been constructed since 1966 and are to date in excellent condition. Full scale tests have also been conducted on these structures in Germany, Australia and USA which have confirmed the validity of the analyses and designs, and the large load carrying capacities.

The fully pre-engineered system stands apart from other products through extensive technical support by Strata India and the BEBO® Design Centre in Zurich, Switzerland.

Applications

Bridges

- **Spans from 3.6m to 31m and more** – for highways, railways, pathways, bicycle tracks, landscaping, etc
- **Standardised designs** – as per Indian BIS and IRC standards and codes
- **Heavy live loads with high overfills** – capable of supporting heavy freighter aircraft and mining haulers
- **Smooth approaches** - from earth embankments due to soil overfill; does not require any approach slab
- **Low life cycle costs** – traffic runs on overfill and not over an exposed bridge deck
- **Aesthetic structures** – the true arch form is accentuated

Multi-span bridge over Bhima canal on NH-9, Pune - Solapur

Culverts

- **Rapid construction** – minimum obstruction to traffic during construction
- **Drainages under airport aprons/ runways** – can carry heavy loading and large overfills
- **Drainages under stack yards** – can carry heavy bulk loading

Arch over live gas pipeline on NH-30

Underpasses

- **Cut-and-cover tunnels** – with overfills as much as 30m
- **Multi-span viaducts** – for all forms of traffic grade separation
- **Pedestrian, bicycle and animal crossings** – under busy expressways

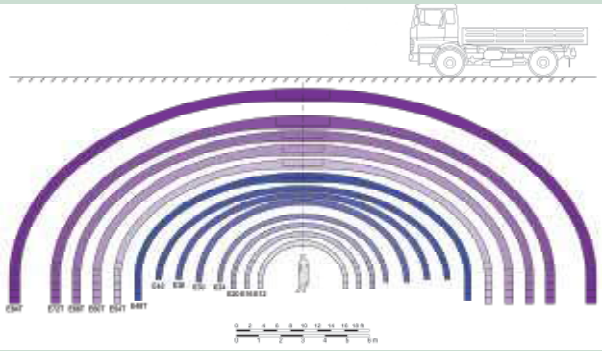
Bridge over Tembhurni bypass on NH-9

BEBO® Arch Types

Depending on the size and profile, arches are cast either as a single unit or as double leaf to be connected together at site at the crown.

Elliptical Arch Shapes

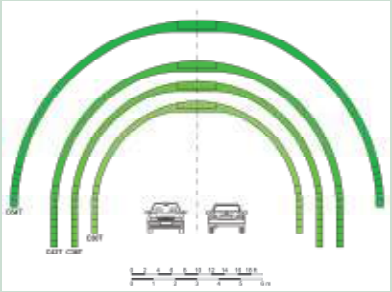
- Spans from 3.6m to 12.8m are cast as a single unit
- Spans from 14.6m to 25.6m are cast as twin leaves
- Thickness of concrete element is uniform over the development. In case of twin leaf spans, the patent crown joint area is thicker to allow for in situ casting for the monolith connection without formwork
- The minimum overfill height required is 500mm and the uniform design holds up to 5000mm overfill. Non-standard applications requiring higher overfills and/ or unconventional loadings are designed on project-to-project basis by BEBO® Switzerland



E-Series

Circular Arch Sections

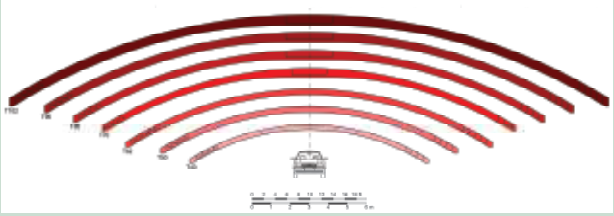
- Spans range from 9.1m to 16.4m and are cast as twin leaves only to facilitate transportation from precast yard to site in regular trailers
- Thickness of concrete element is uniform over the development except at the crown, where the patent crown joint area is thicker to allow for in situ casting for the monolith connection without formwork
- The minimum overfill height required is 500mm and the uniform design holds up to 5000mm overfill. Non-standard applications requiring higher overfills and/ or unconventional loadings are designed on project-to-project basis by BEBO® Switzerland



C-Series

Flat (Truncated Ellipse) Arch Sections

- Spans range from 12.2m to 30m and more, and are cast as single units or twin leaves, depending on the span
- Overfills may range from minimum requirement of 500mm to a maximum of 1000mm
- Since the tangent at the supports is inclined, there are heavy horizontal forces to be supported by the foundations. Foundations are designed on a project-to-project basis with site specific geotechnical data



T-Series

Benefits

Economy

- Arch sections are slender in design. Concrete savings can be as much as 50% as compared to the traditional framed structure
- The arch profile is generally in compression and flexes into the soil backfill to invoke soil-structure interaction. As a result, the reinforcement steel requirement is low as compared to conventional bridge structures
- The type of soil required for backfill and overfill is similar to that required for reinforced soil structures. The spandrel itself may be designed as a reinforced soil structure
- The entire construction process is cost effective. Generally the overall cost savings can be of the order of 10% to 30%

Speed

- Arches are pre-designed to various Indian design codes. Hence complete structural designs are available virtually at call. Turnaround time for designs with non-standard live loads is a matter of hours
- Sub-structure designs are on the basis of tabulated loads at the supports
- Arch elements can be erected as per BEBO® guidelines in the foundation pedestals on either side within days
- Backfill and compaction can be done with standard earthwork equipment as per BEBO® guidelines and standard earthwork quality control
- Construction equipment can traverse the arch once the minimum overfill height of 500mm is achieved

Quality

- BEBO® arch structures are designed using validated state-of-the-art finite element analysis software
- It is essential to observe safety by compliance with BEBO® safety guidelines developed over decades of experience and over a thousand applications globally
- Overfilled precast concrete arch bridges are durable and require virtually no maintenance over the life of the structure
- There are no exposed bridge decks, no joints, approach slabs and bearings that otherwise require frequent maintenance
- The profile is aesthetically pleasing and offers scope for architectural embellishments

About us

Established
2004

Manufacturing Facility
StrataGrid™ geogrid, StrataWeb® geocells at Daman, India

Joint Venture
Strata Systems Inc. USA
(Division of Glen Raven Group)

Project Track Record
Timely & infallible installation

Global Presence
USA, Brazil & Ireland

Certification
CE TÜV

Strata India offers a comprehensive range of high-quality geosynthetic and geotechnical solutions to India's civil engineering and construction industry.

Strata India provides turnkey solutions for various applications like reinforced soil structures, slope protection and stabilization, erosion control, precast arch bridges, foundation improvement for structures and embankments, steep slope embankments, strengthening of paved/ unpaved roads, storage/ container yards etc.

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