

## ENGINEERING DIRECTIVES AND STANDARDS

Volume	Chapter	Section	Directive Number	Effective Date
II	3	1	5	6/10/2005

**SUBJECT: USE OF PRECAST REINFORCED CONCRETE 3 SIDED STRUCTURES, METALARCH STRUCTURES, AND STRUCTURAL PLATE STRUCTURES**

- 1. PURPOSE:** The purpose of this directive is to establish a policy for the use of precast reinforced concrete 3 sided structures, metal arch structures, or structural plate structures as alternate structures to a bridge, reinforced concrete box or pipe.
- 2. POLICY:** It will be the policy of the Louisiana Department of Transportation (DOTD) to allow alternate structures to bridges, reinforced concrete boxes and pipes on roads administered by DOTD. All such structures presented as alternates, including submittals by the value engineering process, must adhere to the following criteria:
  - A. Design criteria shall be in accordance with AASHTO LRFD Bridge Design Specifications, DOTD Bridge Design Manual, and DOTD Hydraulics Design Manual.
  - B. Alternate structures, qualifying as bridge structures in accordance with 23 CFR 650.403, (illustrated in DOTD Bridge Design Manual, Chapter 2), will not be allowed on National Highway System routes until performance monitoring and evaluation are concluded and approved by FHWA and DOTD.
  - C. Span lengths shall not exceed 32'. If a site situation mandates a span greater than 32', approval from the Chief Engineer is required.
  - D. The structure shall be supported on a base slab, pile and tie slab, or deep foundation based on site conditions and design requirements.
  - E. If a single unit in the structure exceeds an 8' span, foundation design calculations are required from the proprietor and will be reviewed by DOTD.
  - F. DOTD will obtain geotechnical data needed for design of the foundation if the structure is the only choice for the site.
  - G. If the structure is an alternate to a concrete box structure with any unit having a span larger than 8', consolidation data will be provided by DOTD. If the structure is an alternate to a pipe or concrete box structure consisting of units spanning 8' or less, no geotechnical data will be obtained by DOTD.
  - H. For a structure chosen as an alternate to a bridge, only deep boring data will be obtained by DOTD.
  - I. It is the responsibility of the proprietor to collect geotechnical data needed to determine pile lengths or bearing capacities for pile and tie slab, base slab, and deep foundation design if not obtained by DOTD as mentioned above.
  - J. "Beam on Elastic Foundation" is the method to be used for base slab design. The minimum depth of the toewalls is to be 2'-0" below the flow line.
  - K. Piles shall be designed using service loads determined from LRFD limit state Service I. Maximum allowable pile loads are listed on page 6(6) of DOTD Bridge Design Manual. Pile length and capacity shall be determined using FHWA program "DRIVEN". Minimum one pile shall be provided at the end of panels and at the joint between the panels for the pile and tie slab foundation system. The piles shall be designed to support vertical load, while the tie slab shall be designed to resist lateral forces. The minimum thickness of the tie slab shall be 9 inches. Deep foundation designs, resisting both vertical and lateral loads without a tie slab, may be used.
  - L. Wingwall design calculations shall include hydrostatic pressure, bearing capacity and stability.

- M. As a minimum, backfill material shall be in accordance with the “Louisiana Standard Specifications for Roads and Bridges”, Section 701.08(c)(1) c. Additional or varying requirements needed for design of the structure shall be provided by the manufacturer and made part of the project documents. Quantities for backfill material shall be provided by the manufacturer and shall be included in the cost of the structure.
- N. For all structures qualifying as a bridge, the design calculations from finite element analysis with assumptions and boundary conditions shall be submitted for review.
- O. All design calculations, boring logs and reports must be stamped and signed by an engineer licensed in the State of Louisiana. All calculations and drawings are to be submitted to DOTD for review.
- P. For plans in final design stage, alternate structures will only be considered on a case-by-case basis. Review and approval of the hydraulic, foundation, and structural design calculations and construction cost are required prior to incorporating into the final plans.
- Q. The structure will not be considered as an alternate if additional right-of-way above what is required for the pipe, concrete box or bridge is needed to construct the structure or its wingwalls.
- R. If the arch structure does not extend past the clear zone, rigid concrete barriers shall be used. Barrier attachments and supports are to be designed to translate the moment capacity of the barrier.

Alterations to this policy require approval from the Chief Engineer.

- 3. **OTHER ISSUANCES AFFECTED:** All directives, memoranda or instructions issued heretofore in conflict with this directive are hereby rescinded.
- 4. **EFFECTIVE DATE:** This policy will be immediately implemented on all projects with the exception of those where implementation would result in scheduling delays.

WILLIAM H. TEMPLE  
CHIEF ENGINEER