

THE DELTA ADVANTAGE

Design Topics for Precasters

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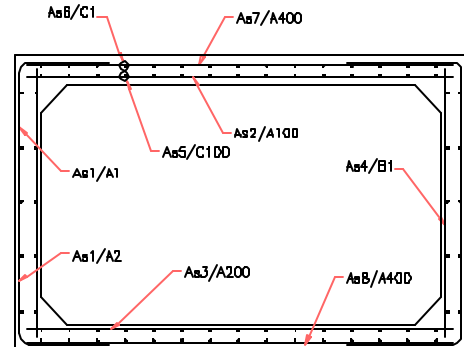
Box Culvert Programs

A comparative analysis

The following is a brief comparison of just a few of the box culvert design and analysis programs that we have available:

- BOXCAR V1.0** – Developed by Simpson Gumpertz & Heger, Inc. in cooperation with FHWA and ACPA, this DOS program has not had a single update since its inception in 1988. It is a relatively easy to use, menu driven program that provides a design output for box culverts under any AASHTO HS loading as well as railroad loadings according to AREA standards. Other loads may be specified for design by magnitude and footprint. The design is limited to 4-sided single cell culverts with spans of 14' or less and uses only load factor for its design method.
- CULVERT V2.1** – This program, originally developed by the North Carolina DOT in 1978, was modified by NYSDOT Structures Division in 1995 and subsequently formatted for PC use by the Precast Concrete Association of NY in 1996. A windows version of this program has recently been developed by PCANY. The DOS version of this program provides a design output file under the standard AASHTO H and HS loadings. A special one-axle live load of any magnitude (up to 99000lbs) may also be defined. The program works with either service load or load factor and will analyze both 3-sided and 4-sided culverts with up to four cells.
- PSTDSB55 V2.43** – This is the Florida DOT version of the NCDOT program and was developed by the FDOT Structures Design Office in 1993. Because of its common roots, it functions very similar to the NYSDOT Culvert program. However, the card reader format for the input file makes data entry more difficult. This program also includes wing wall designs in the output (even if you don't want them) and it can be run in both English and metric units.

Figure 1 shows how the results of a typical box culvert compare using the three programs described above. The culvert depicted has a 12' span and 6' rise with less than 2' of earth fill. The culvert has a 12" top slab, 10" bottom slab and 8" walls and is designed for AASHTO HS20 loading. Although results vary somewhat, any of the designs may be considered valid and the choice of which program to use depends solely on the application. ■



Design Location:	As1/A1	As1/A2	As2/A100	As3/A200	As4/B1
Program	Area-of-steel Required (in.sq./ft)				
Culvert V2.1	0.340	0.340	0.740	0.530	0.200
Boxcar V1.0	0.327	0.327	0.621	0.430	0.192
PSTDSN55 V2.43	0.400	0.420	0.740	0.610	0.330
	Design Moment (kip-ft/ft)				
Culvert V2.1	7.8	9.7	32.3	18.1	-1.0
Boxcar V1.0	5.8	7.0	31.9	18.2	2.4
PSTDSN55 V2.43	9.1	11.9	30.6	21.4	-0.9
	Shear (kips/ft)				
Culvert V2.1	1.20	3.20			
Boxcar V1.0	0.97	0.79			
PSTDSN55 V2.43	1.00	2.90			

Figure 1

Delta Plans Open House

Delta Engineers, P.C. is proud to be hosting an open house on Friday September 29, 2000 from 3:00 – 6:00PM. Refreshments and hors d'oeuvres will be served at our offices in Binghamton, New York giving current and prospective clients the opportunity to meet with our professional staff and to tour our recent 2500sf office expansion. Formal invitations will be going out soon. We hope to see you there. ■

Employee News

Greg Shirhall has recently joined our staff as an Engineering Technician and will be working primarily on precast projects. Ron Thornton passed the PE licensing exam and has received his professional registration in New York State. ■

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Delta Engineers, P.C. provides specialized services to the precast/prestressed concrete industry including:

- *Structural design and analysis*
 - *Erection plans*
 - *Detailed shop drawings*
 - *Plant automation consulting*
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Featured Project

Berkshire County Jail & House of Correction
Pittsfield, Massachusetts
Produced by: Oldcastle Precast Modular Group
Structural Design and Shop Drawings: Delta Engineers, P.C.

This project included 146 double precast cell modules for this two-tier, 292 cell medium security jail. Cell modules were produced at the Oldcastle Plant in Rehoboth, MA. and were delivered to the jobsite completely wired, plumbed, furnished and painted. ■



Cell module being erected in one of the 5 housing pods.

Please send us your project photos to be featured here

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