DARG, BOLGREAN, MENK, INC.
CONSULTING STRUCTURAL ENGINEERS

A Publication For Our Clients & Friends — Summer 1999

DBM Peer Review

In an effort to maintain the highest level of Structural Engineering standards, Darg, Bolgrean, Menk, Inc. has completed its second peer review in four years.

An outside principal engineer from a similar practice in another state spent an entire day reviewing several of our past projects including drawings, specifications, calculations, etc. Although a bit disruptive to the office for a day, it is an invaluable experience for the firm.

Needless to say, we were a bit touched when our reviewer, who has reviewed firms nationwide, ranked our drawings right up there near the top.

Our E-mail Address

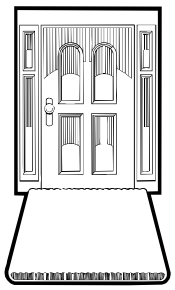
darg@att.net

Web Site Coming Soon

Watch for DBM's new home page scheduled to be completed sometime this summer.

Frost Heave and Exterior Door Stoops

Typically, most soils have some water that is trapped in the air voids between the soil particles. When water freezes and goes from the liquid to the solid state, it expands about 10 percent. In a saturated soil (0.7 void ratio), this means there would be a four percent increase in the volume of soil or only about one inch heave in a soil frozen to a depth of 25 inches. This condition would represent a normal or typical "swell" of frozen ground and would not cause any problems for most exterior doors that swing outboard; presuming the stoop slab was down at least a few inches from the door sill.



However, there is another far more severe frost heave phenomenon caused by the formation of (capillary tension induced) ice layers or "lenses" in the frozen soil zone under certain conditions. The observed heave for this situation can be as much as 4 or 5 inches even in finer grained sand. This is the kind of frost heave that can obstruct the swing of exterior doors.

Minimum frost depth for most of the Twin Cities is 5 feet for unheated areas.

It should be noted that severely heaved areas frequently turn into muck in the early spring, causing more problems for a soil supported stoop slab. This is why all critical exterior door stoops should be designed as reinforced structural slabs with 6 inch air void space below and supported around the perimeter on a foundation wall with frost footings. Minimum frost depth for most of the Twin Cities is 5 feet for unheated areas.

Phone Directory

To use our direct dial option, dial (612) 544-8457 and then enter the extension.

Name	Extension #
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DBM Projects

These are some projects that are in design or under construction:

- Resort/Hotel in northeast Minnesota
- Metro college dormitory
- Hospital addition in southwest Wisconsin
- Retail stores and additions in Kentucky, Illinois, Michigan and Minnesota
- West metro office building

ANNOUNCING

DBM Adds Staff Member

We are very proud to announce the addition of CAD draftsman Vladimir Moroz. Vladimir is a 1984 engineering graduate of LVIV Polytechnical Institute, Lviv, Ukraine and a 1994 graduate of the Minneapolis Drafting School. He has over four years of structural CAD experience.

CAD Corner

By Dale Urevig, CAD Operator

The Pack 'n Go (new in AutoCAD R14) utility copies all files associated with a drawing to a specified location. This allows packaging of all appropriate xref, font, shape, and related files. These can then be copied to a disk or compressed into a zip file and submitted to others. For fast and easy e-mail, use Pack 'n Go.

Control Joints in Concrete Block Masonry

As the concrete block and mortar in a masonry wall dry out, the wall wants to shrink. If not accounted for, unsightly cracks can develop to relieve these shrinkage related tensile stresses. One of the best ways of controlling shrinkage movement, besides using type I (moisture controlled) block, is by specifying control (or shrinkage) joints at intervals close enough to reduce or eliminate random shrinkage cracks.

Although there are numerous types and styles, control joints are some form of weakened vertical joint that panelizes the wall. Longitudinal shrinkage can then occur within the panels. For type I units with horizontal joint reinforcement, control joints should be no more than 40 feet on center and:

- At one or both sides of wall openings.
- Changes in wall height and thickness.
- A reasonable distance from corners.
- At sections of reduced cross section such as chases and recesses for pipe, steel columns, etc.

For type II units, the control joist spacing should be cut in half. Lintels over openings, roof and floor bond beam reinforcing steel, and grout can be continuous through the joint.

Allow for Structural Deflection

All horizontal framing members such as beams, joists or slabs have some flexibility and sag or "deflect" under loads. Based on UBC 1608, the maximum allowable deflection of horizontal framing members is L/240 for total load and L/360 for live load where L is the length in inches. For a thirty foot span, that corresponds to a one and a half (1½) inch total load and one inch live load deflection. For structural members supporting masonry or glass, deflections should be limited to L/600 or five-eighths (5/8) inch for a 30 foot span.

All architectural and mechanical elements, including door and window headers, partitions, and piping should have the necessary provision for structural deflection. Interior non-load bearing partitions built tight to the bottom of structure can buckle when the member deflects under loading; consequently, there should be a "slip" connection at the top track.