The Barn Raiser

Mid-South Engineering Company

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Drawings? What Drawings

When we are called into a facility to assist with a project, modification or solution to a problem we first meet with the appropriate people to determine the nature of the job. The next thing we need is factual information of the existing conditions.

The most straight forward and cost effective way to accomplish this is to have an accurate set of current drawings, preferably in AutoCAD format. We can simply bring these into AutoCAD and begin the modifications as required. The least cost effective way to accomplish this is for us to make field measurements and create, from scratch, the existing drawings needed. In either case we must know the existing situation, in drawing file format, in order to determine the changes required to accomplish the project.

Real world scenario no. 1; We realize an accurate, current set of drawings is virtually impossible to have or to maintain. The reason for this is that after "as built" drawings are produced following the last construction or modification project, these drawings must be continuously updated to reflect changes made by maintenance or changes performed by in-house personnel. This would be a perfect world and there are very few entities in our industries who maintain drawing information in this way.

Real world scenario no. 2; One all too common statement we get when asking for existing drawing information is "we don't have any drawings". Unfortunately this is a completely accurate statement in many cases and is at least partially accurate in virtually all projects. We are told this at the beginning of many projects; however after some questioning many times we find there are some drawings in the supplies room, maintenance shop, electrical maintenance shop, truck shop, or the plant engineer's office.

Since, in most instances, we deal with "real world scenario no. 2" in some form or fashion, any information we can't get from current accurate drawings we must obtain from field measurements, In some cases this is not too big a chore; however in 24 hour operations or even multi shift operations this can be rather demanding.

One thing we can not get from field measurements is existing foundation information, so if this information is lost, any new construction will require the removal of the existing foundations and replacement with a known foundation.

Foundation information is highly valuable, we can't measure what is under ground. Also along with the demanding nature of field measuring, the required features is the risk of inaccuracy, personnel injury, potential plant down time requirement, time of plant personnel away from their normal duties, and many other possible scenarios. These are not complaints, they are simply potential problems and increased costs.

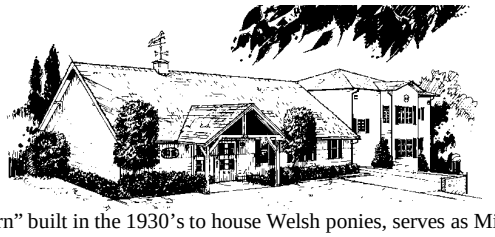
As a compromise solution, a way to maintain the most recent drawing information is to save the AutoCAD drawings electronically, in their native ".dwg" format. This will eliminate physical storage room requirements, and with a "set" of AutoCAD electronic files, any drawing can be called up and used when required. When future projects come along these drawings can be the beginning of the new work. Paper copies could be plotted when needed and simply tossed when the job is finished. Paper drawings which pre-date AutoCAD can be scanned and produce a ".tif" or ".pdf" file and still be maintained electronically.

Mid-South has been in business for over 35 years and can retrieve any drawing we have ever produced. Since 1998 these drawings are in their native ".dwg" format. All the jobs we produced prior to that time have been scanned and now occupies approximately 35 cu ft of storage space, previously this occupied several rooms of our barn.

Because we do this and on more than a few projects when we've gone into mills and were told "we don't have any drawings", Mid-South has at least some drawings in that facility from work we performed previously.

In closing, at the completion of your next project spend a few hours to get your drawings in good shape. Both in paper form and electronically, it will pay dividends on future projects.

Submitted By: David Lamb, Design/Drafting Manager



"The Barn" built in the 1930's to house Welsh ponies, serves as Mid-South's offices.

Soils Testing;
Why Is It Smart to Conduct these Test

In August of 1173 Italian architect Bonanno Pisano began overseeing the construction of the cathedral tower in the town of Pisa, Italy. At the height of about 30 feet the tower began to lean severely and construction was halted. Over the next several hundreds of years, the construction on the tower was restarted multiple times, only to be discontinued as the tower continued to lean when the soils on one side of the tower settled more than 15 inches relative to the soils on the opposite side of the tower. This structure, also known as the " Leaning tower of Pisa ", is one of the best known and spectacular examples of foundation failures due to a lack of understanding of the soils on which it was constructed.

I imagine that Pisano spent the rest of his life bemoaning the fact that he did not have a more complete understanding of the soils under the tower. I also imagine that he gathered as much information on the soils underlying the tower as he could prior to the start of construction. However in 1173 the science of soils mechanics was very primitive; personal experience and rules of thumb being all that were available to the builders of the time.

Today we have it a lot better than did our friend Bonanno Pisano. Modern soils mechanics has the potential to provide a great deal of information about the soil on which a structure is to be built. Ironically, even today, soils mechanics is sometimes underutilized or not employed at all on many construction projects. Just as it was in 1173, the soil near the surface of the earth is one of the most frequently encountered and used building materials. All structures including buildings, dams, roads, runways, etc. are supported on soil.

The soil on which structures are routinely built is very complicated in both its makeup and behavior. Soil varies in color, composition, texture and sensitivity to moisture. There are soils that are compressible when loaded, soils that swell and shrink when in the presence of moisture and soils that lose all ability to support structure loads when subjected to seismic loads. As if this does not complicate the situation enough, soils exhibiting different characteristics can exist in the same area at different depths below the surface. A lack of understanding of the characteristics of the soil on which a structure is built can result in a multitude of potential problems including differential settlement, cracking of concrete and masonry and bearing failure of the soil.

The degree of severity of the problems can range from nothing noticeable, to cosmetic cracks in masonry veneer, hard to operate doors and windows and possibly to structural problems that may require either major repair or result in a structure that is not capable of being utilized in the manner originally intended.

Today soils mechanics provides us with the ability to determine many of the properties of the soils on which we intend to build. From soils surveys and soils borings, the modern geotechnical engineer can conduct tests on the soils both at the surface and at great depths below the surface. Triaxial shear strength tests, Atterberg Limits tests, Proctor tests and other tests can provide a great deal of information on the soils in a given area. In turn, this information can be used by the geotechnical engineer to formulate foundation design recommendations. These recommendations are then used by the foundation designer to provide a foundation system which will adequately support the structure at the least amount of cost.

Like most things in the construction process, soils testing is not free. It is up to owners, with input and advice from their architects, engineers and constructors, to determine an acceptable risk to benefits ratio for a given project prior to deciding if the cost of a soils investigation and the associated tests is warranted. It is my opinion that the cost of the soils survey and soils testing is a small fraction of the overall cost of most projects. Many times the money that is saved due to the efficient design of a foundation system that is made possible by the information obtained from soils testing more than compensates for the cost of the soils testing. Also, the costs of repairs that are not required to be performed later in the structure's life due to a foundation design performed based on the results of the soils testing can result in substantial cost savings to the owner. I am reasonably sure that if Bonanno Pisano were available to comment today he would agree that the cost of a soils investigation and soils testing is more than worth it.

Submitted By: Steve Martin, P.E., Civil Engineer

Nuclear Density Meter

The nuclear density meter device deploys a radioactive isotope to determine the density of road payment layers, including earthworks, granular materials, bituminous materials and road pavement concrete.

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