Hill Air Force Base (HAFB) currently has two aging Munition Storage Magazines (MSMs) and is planning to replace these with modern MSMs. HAFB’s new project will implement five new MSMs to increase their capacity, see Fig 1. HHI Corporation, the client, has acquired the project and has decided to include QM² Engineering as a subcontractor. QM² Engineering has worked on the site layout of the five MSMs, foundation design, retention pond, and access road. Portions of the MSMs are pre-designed by the US Army Corps of Engineers, but require a site specific foundation, see Fig 2. QM² Engineering has incorporated the MSMs’ designs and has designed a site specific foundation. Alternatives were developed, and the most suitable option was chosen.

**INTRODUCTION**

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**DESIGN CRITERIA**

- Site specific foundation
  - Cost efficiency
  - Ease of installation
  - Client preference
  - Availability of contractor
- Access road
  - Suitable for heavy equipment
- Retention pond
  - Storage capacity for 95th percentile storm
  - Provide fill needed for MSM cover

Three alternative footings were driven piles, shallow footings, and drilled shafts. See figures 3 - 5 for a brief description of each alternative. The criteria for the foundation were compared using a Pugh Matrix, see table 1. Each alternative was ranked for each criteria. The highest scoring option was the drilled shafts.

**ALTERNATIVES**

- Driven Piles – generally steel H - sections, or pipes pounded into the soil.
- Shallow Footing – called for in the standard drawings. Very common cast in place concrete footing.
- Drilled Shafts – soil is removed with an auger and filled with concrete and reinforcing steel.

**PREFERRED ALTERNATIVE**

The preferred alternative is drilled shafts, see Fig 6. The type of drilled shaft is a continuous flight auger (CFA). A CFA is installed using an auger that drills into the soil. Concrete is pumped through the auger as it is drawn out. Once the auger is removed and the hole filled, reinforcing steel is placed in the hole.

**REFERENCES**

