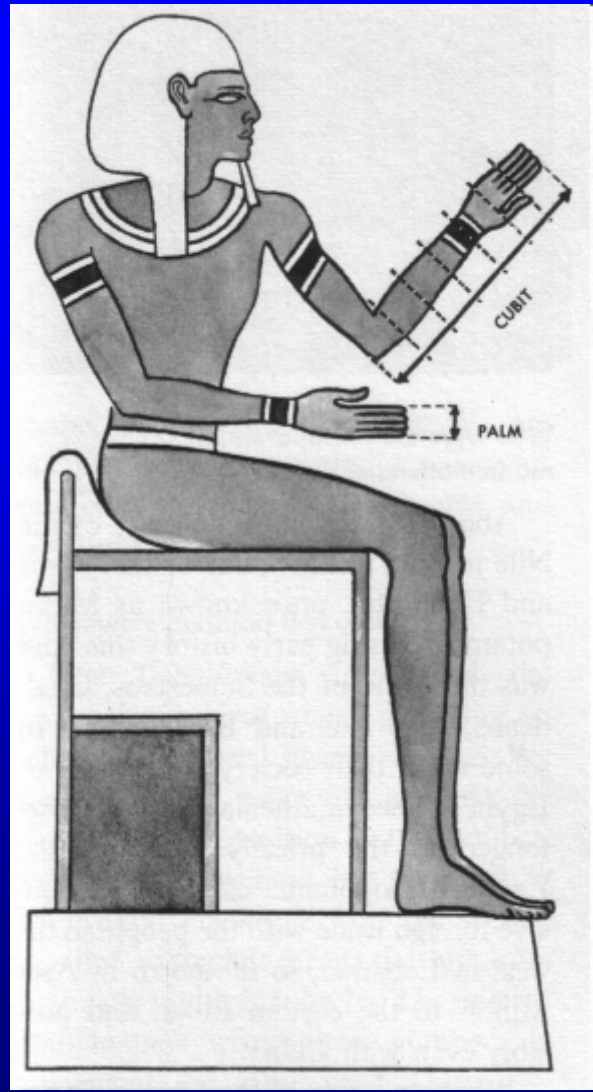
Douglas Townes, P.E.
FHWA Resource Center
Douglas.townes@fhwa.dot.gov

Photo courtesy of McAninch Corporation

How much is a cubit?

The ancient Egyptians were the first known civilization to develop a standard measurement for length. This was called the cubit. The cubit was determined by the pharaoh and failure to achieve accuracy was punishable by death.



Why do we have a "**National Institute of Standards and Technology (NIST)** "

- **The National Institute of Standards and Technology (NIST)** is a measurement standards laboratory which is a non-regulatory agency of the United States Department of Commerce. The institute's official mission is:

  To promote U.S. innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve quality of life.

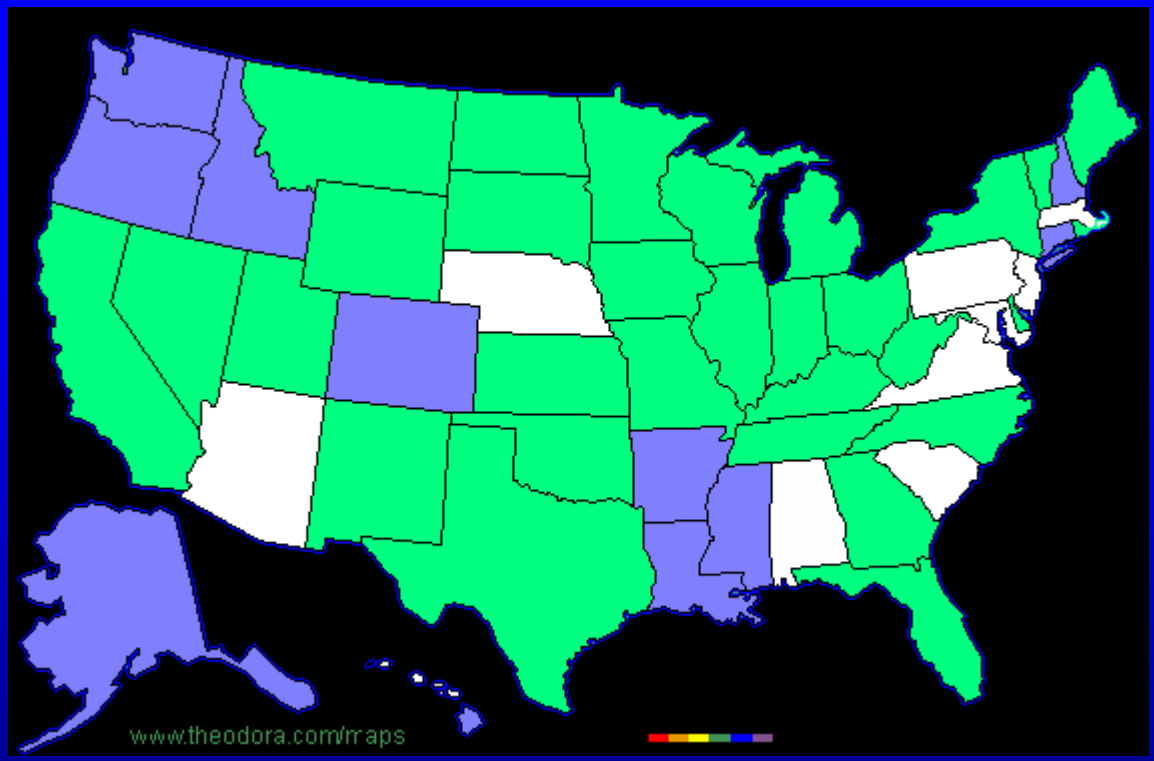
Quality Assurance with Stakes

Quality Assurance without Stakes

What is happening in DOT Construction Today?

- According to the AASHTO subcommittee's Technology Implementation Group's (TIG) 2002 survey:
  - Only 9 of 36 States reported contractors were using GPS controlled machinery
- 6 of 17 reported GPS use in Construction in the SOC "Technologies Used in Construction" 2004 survey

2006 States use of GPS Technology in Construction



Using GPS in Construction

Not using GPS in Construction

No Response

Revised November, 2006

So why isn't GPS Technology being used in more State transportation construction projects?

- State DOTs are reluctant to give electronic survey data with contract documents
  - Fear of misuse or misapplication
  - Procedure for QC does not exist for stakeless grading
  - Current plans are 2 dimensional and leave a paper trail

How are the "implementation challenges being overcome?

- Through the American Association of Highway Transportation Officials (AASHTO)
  - Technology Implementation Group (TIG) formed 2007
- Through the Transportation Research Board (TRB)
  - National Cooperative Highway Research Program (NCHRP) Synthesis 372 (Emerging Technologies for Construction Delivery, 2007)
  - NCHRP panel (Developing Guidelines for GPS Controlled Construction Machine Guidance and Required CADD Software 2010)
- Through IHEEP and Area HEEP conferences

The use of GPS Technology in Construction may also provide:

- Training challenges for DOT Staff
- GPS survey equipment challenges
  - STA can choose to purchase one “rover” (to be used with total station) approximately $17,000
  - Contractor can furnish but State needs to control
- Greater coordination between various offices within the STA

Help Needed With GPS Machine Control

- Conduct “Contractor workshops” to facilitate electronic data exchange
- Revise standard specifications to allow Automated Machine Guidance (AMG) grading
- Review specifications to see how many stakes are truly required for quality control/assurance
- Provide 3-D electronic data along with 2-D paper plans during the bid process and at contract award
- Provide training of the entire Team involved with the project (certification by Level of Training)
- Have Contractor return paper and electronic “asbuilt” files when Project is complete

How can the Federal Highway assist?

- **Continue to facilitate all State Transportation Agencies (STA)'s use of GPS Technology from initial survey through plans development to construction and back to the STAs**

- **Continue to explore new and innovative uses of this technology that will benefit the transportation construction industry.**

Questions?