Caveat Emptor

Let the buyer beware!
The Need For Inspection During Construction

All Photographs MDE or C Wallis
Unless Noted
I Need To Build A Dam

I am:

- A private owner
- A developer who will transfer ownership to a:
  - Homeowner’s Association
  - Local Government
- A Government Agency
- A Business/Commercial Entity
Contracts

• To build my dam I will enter into contracts with:
  • An engineer to design, prepare contract documents (plans, specs, special provisions(contract between owner and builder), obtain permits, administer bidding, manage and inspect the construction, prepare As-Builts, and certify the construction to the owner and permitting agencies.
  • A contractor to obtain materials and perform the work.

• My needs include:
  • Schedule
  • Control of Costs
  • Control of Quality
  • Management of liability
  • Management of risk
Contract Items

• Lump Sum
• Line Items
• Contingency Items
• Change Orders
• Shop Drawings
• Force Account (Time and Materials)
• Permit Compliance
Project Schedule – Contractor

• Mobilization
• Submission of:
  • Material Sources
  • Shop Drawings
• Install E&S Controls (Likely Sediment Basin)
• Clear and Grub Site
• Earthwork
• Installation of Utilities and Drainage System
• Build any Structures or Paved Areas
• Stabilize Site (and Convert Sediment Basin to SWM Facility)
Inspection – The Hardest Job

• Must know the plans and specs, often including national or proprietary specs that may be reference in the contract documents
• Must know permit conditions
• Must understand the contractor’s methods and means
• Be prepared for the contractor to work in a different area then previously discussed the day (or hour) before
• Must speak up immediately if work is inadequate, unacceptable, or failing
• Must not supervise the contractor, can only accept or reject
  • You can not inspect work you supervise, Inspection is QA/QC
• Must not slow the contractor down
Conflicts in Contract Documents

- Priority order of documents should be listed in Special Provisions
- Access to engineer for resolution
- Hidden obstacles
- Contingency Items
Conflict Between Plan Sheets

• Two objects can not occupy the same place at the same time
  Example Sediment trap in the location of a bridge abutment
• Specialization of disciplines – overlap of areas – can’t do both at the same time
• Constructability (this is contractor’s area of expertise):
  • On subdivisions, the number of lots is the driver
  • Utility excavations/relocations can involve deep excavations
  • Substructures, foundations
  • Size of trench narrower than standard equipment
  • Access of equipment
  • Groundwater (construct in the dry)
Before Work Begins

• Walk the site

• Take Photographs:
  • Of the project site
  • Looking offsite

• Have a Pre-Construction Meeting
Stakeout

1. Bales shall be placed at the toe of a slope or on the contour and in a row with ends tightly knitted to the adjacent bales.
2. Each bale shall be embedded in the soil, a minimum of 48 inches, and placed so the bindings are horizontal.
3. Bales shall be securely anchored in place by either the stakes or rebar driven through the bale. The first stake in each bale shall be driven toward the previously placed bale at an angle to force the bales together. Stakes shall be driven flush with the bale.
4. Inspection shall be frequent and repair or replacement shall be made promptly as needed.
5. Bales shall be removed when they have served their usefulness so as not to block off debris, storm flow or drainage.
What You See Is What You Get
Earthwork
Excavation – Construction Subgrade

• Undercutting
• Stability
• Pumping – Proof rolling
Proctors & Compaction

• Standard & Modified
• Curves
• Moisture Content
• Lift thickness
• Compaction Effort
• Compaction Testing
  • Sand Cones
  • Nuclear Density Gauges
Keying In When Excavating In Existing Dam
Shoring and Bracing
Cofferdams
Inside the cofferdam

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Spillways

• Principal ASTM C-361 Concrete Pipe
  • Concrete Cradle
  • Placed on natural ground
  • Riser controlled inlet
  • Weir Walls

• Emergency Natural Ground, Flat Level Section

• Typically Constructed Off Line, In the dry

• Drainage then directed carefully thru new spillway

• Remainder of Dam constructed
Concrete

• **Ingredients**
  • Cement
  • Water
  • Coarse Aggregate
  • Fine Aggregate
  • Air Entrainment
  • Admixtures
Hydraulic Cement

• Pozzolans/Flyash
• Portland
  • Type I  Normal Use
  • Type II  Moderate Sulfate Resistance
  • Type III  High Early Strength
  • Type IV  Low Heat of Hydration
  • Type V  High Sulfate Resistance
Mixing / Batching

• Plant
• Time stamp
• Adding water once mixed
• Admixtures
Testing

• Slump
• Air Entrainment
  • Roll-a-meter
  • Pressure
• Temperature
• Unit Weight
• Cylinders
  • 7 Day
  • 28 Day
Curing & Cold/Hot Weather Measures
Placement

• Vibration
Segregation
Cracks, Spalling, Honeycombs, Cold Joints
Waterstops
Filter Diaphragms, Toe Drains, & Seepage
There Are NO Springs in Dams!

• Signs of Seepage
  • Flowing water thru the embankment
  • Soft Spots
  • Areas of exceptional vegetative growth

• Downstream Boils

• First Filling

• Whirlpools in the impounded reservoir

• Original Stream (Diverted to new spillway) will have slightly different geology then adjacent land and likely contribute to seepage after dam is built over it
Emergency Spillways
Landscaping
Dam Removal
Connecting Pre-Cast Sections (Not Desirable)
Jack and Bore
Political Considerations
Constructability
Final Thoughts

- Don’t Assume People Read the Permit
- Don’t Assume the Contractor Will Follow the Plans
- We Are All Creatures of Habit
  - Contractor Will Say “I’ve Done It This Way For Years, Now You’re Telling Me I’m Doing It Wrong”
- If Something Is Critical, Unique; It Must Be **BOLD** On The Plans
- Test and operate any valves and gates
- Substantial Completion
- Punch Lists
- As-Builts
Questions?