Preconstruction Meeting with Landowner/Contractor

- Make sure landowner/producer understands the fundamentals of the design.
- Make sure the person doing the actual work understands the fundamental elements of the design.
- Review required elements
- Review minimum standards
- Review areas of possible variation
- Discuss schedule and timetable
- Make sure person doing the work has the design
- Discuss potential problems
- Discuss dealing with unanticipated problems
Pipeline Installation

Items to Review

- Specification: **VA745 PLASTIC PIPE**
- Types of pipe: PE, PVC, Galvanized Steel, etc.
- Depth of pipe: Protect pipe from freezing and traffic
- Sleevings of pipe: Protect pipe from abrasion
- Fittings and connections
- Valves and valve box locations
- Preparation for trough installation: Pipe has to go in first.
- Gravity or pressure system: Is positive grade necessary?
- Trench Safety
- Pressure check
Sleeving Situations

- Pipe trench through rocky rough ground
- Pipeline running under a high traffic area
Leaks

This leak is easy to find.

But not all are, especially with smaller pipes buried two feet or more in the ground.

Pipelines must be pressure tested before backfilling to check for leaks.
A Plumbing Short Course

- Some plumbing materials
  1. Copper
  2. Black Steel (Gas Pipe)
  3. Galvanized steel
  4. PVC
  5. CPVC
  6. Polyethylene (PE)
  7. Pex

- Everyone wants to use something different and about half of it is suitable.

- Specifications.....VA745 Pipelines
Valves

Take a quick walk through the plumbing section of your local hardware store sometime. The selection of valves is staggering. Valves can be purchased by...

- Material
- Action
- Method of installation
- Connection
- Size
- Application
Ball Valve
Gate Valve
Valves – Types and Location

Left… Glued PVC ball valve for trough

Right …Brass threaded ball valve

Left…Brass gate valve

Right…Long pipeline run with trough branch and shutoff every 600 ft
Fittings

- If you thought valves were confusing…….
- There are many more fitting types than there are valves
- But sorted along the same principles
Fittings Basics

- Material should be consistent with pipe material for the most part.
- Materials can be interchanged and upgraded.
- Fittings come in both male and female connections.
- Basics
  - PVC pipe uses glue PVC fittings, but can use galv. steel fittings.
  - Black plastic pipe uses mostly insert fittings and clamps.
  - Galvanized pipe uses galvanized fittings and brass fittings.
  - Copper pipe uses copper and brass.

I don’t intend for you to know how to plumb from this discussion. I do intend for you to know what you are seeing in the field. A few minutes in a hardware store looking at plumbing materials could be very helpful.
Air Locks

- One of the major considerations in pipelines, especially gravity pipelines, is air-locking, or a partial or complete blockage of water flow by air pockets trapped at high points along the pipeline. Air can enter pipelines in a number of ways:
  - Initial filling of the line in the spring - the line will be full of air and the air will have to be expelled before the system can operate
  - "Gulping" at the inlet - if the inlet is not far enough below the surface of the water, a vortex can form allowing air to enter the pipe
  - Dissolved air released from the water - at high points along the pipeline the pressure may be reduced enough that air dissolved in the water bubbles out of solution - this is of concern especially with siphons
  - Entry to the line at a stock tank that is installed as a flow-through trough

- Air locks can be partial or total; that is, they can either completely block flow, or they can partially block the flow, reducing the desired flow rate. The following sketches illustrate total and partial air locks:
Total Air Lock

- Water Source
- Ground
- Pipeline
- Total Airlock
- Ground
- Pipeline
- Water Facility
Partial Air Locks
Dealing with Air Locks

- The occurrence of air-binding in pipelines can be prevented in a number of ways:
- Insure that air does not enter the pipeline - while this is obvious, in a practical sense, it is probably not possible to completely prevent air from entering a pipeline.
- Install the pipe on a continuous grade without undulations or high points - the topography may make such an installation impractical.
- Periodically remove air from high points with stand-pipes or air-release valves - this will work on most systems except siphons.
- Insure that the flow velocity is sufficient to flush any air out of the line.
- Adding a water trough at the high spot is a possible solution

This is an advanced topic. If the possibility exists, solicit assistance. You are not expected to be able to cure an airlock. You do need to be able to recognize the potential for the problem and what causes it. Prevention is the best cure here. Airlocks should be discussed with the landowner and the contractor BEFORE the pipeline is installed.
Venting To Prevent An Air Lock
Watering Facility Installation
Items to Review

- Specification  **VA772 Watering Facility, Trough or Tank**
- Type of water system  Pressure or Gravity
- Types of trough  Precast Concrete, Frost-free, HETT, etc.
- Water level control  Float valve, stand pipe, other
- Fittings and connections
- Valves and valve box locations
- Preparation for trough installation
- Trench Safety
- Pressure check
Trough Installations

How a trough is installed depends on what kind you are going to install.

- Concrete (precast and cast in place)
- HETT (Heavy Equipment Tire Trough)
- Frost-free
- Heated
- Animal powered
Precast Concrete Trough
Typical Installation

Concrete Trough Installation - Side View

- Gravel Pad
  - 10’ on all sides
- Strip and remove sod before placing gravel pad.
- 2” Schedule 40 PVC Inlet Pipe
- 2” Schedule 40 PVC Female Thread Adapter
- 2” Galvanized Steel Pipe - 4 feet length
- 2” Galvanized Steel 90 degree Elbow
- 2” Schedule 40 PVC Overflow Pipe
- 2” Schedule 40 PVC Female Thread Adapter
- 2” Galvanized Steel Pipe - 4 feet length
- 24” cover over pipe (min)
Cast in Place Concrete Trough in Rockbridge Co.
Cast in Place Concrete Trough In WV
HETT

Heavy Equipment Tire Trough
Algae Guard for Concrete and HETT Troughs
Typical Installation

Apply silicone sealant to concrete/tire joint to ensure watertight seal.

2” Galvanized steel pipe
2” Galvanized elbow

Flow

2” collar
4”–8” Concrete plug

Strip and remove sod before placing gravel pad.

Cut top 6” off with a bandsaw.

Geotextile

Flow

2” Galvanized steel pipe
2” Galvanized elbow

SIDE VIEW
Not to scale
Frost-Free Troughs
Unheated and Heated

1

2

3

4
Frost-free Fountain Installation — Side View

- Geotextile fabric
- Concrete Pad: 3500 psi, 5” thick
- 6” stone
- 10’
- 18”
- Install heat well per manufacturer’s specifications
- Fountain
Earth Tube

A ground tube is three to four feet long and 10” to 12” in diameter. The tube allows the heat stored naturally in the earth to trough.

Above: Earth tube four feet in ground with water line into tube. Pad not yet poured. Line not insulated yet. Used for frost-free Richie trough.

Below: Earth tube in concrete with insulated pipe and electric wire for auxiliary heat. This site is for a Nelson Bowl trough.
Portable Troughs

A 300 gallon Rubbermaid Brute trough

A 60 gallon trough with built in valve used with portable electric fence

Portable troughs go well with quick connect valves and couplers.
Portable Water System in Washington Co.
Animal Powered
Nose pump in Iowa
Nose Pump from Pond
Frost-Free Nose Pump

Hey ....
Even a horse can do it

System operating in Alberta, Canada

The author is looking for someone brave enough to try one in Virginia.
Concrete Pad Installation

- **Size**: Concrete has a high upfront cost. Pad size is a factor to consider.

- **Specifications**
  - VA-731. UNREINFORCED CONCRETE CONSTRUCTION
  - VA-732. REINFORCED CONCRETE CONSTRUCTION

- **Location**: How much grading will be necessary.

- **Finish**: Concrete needs to be rough... non slip.
Concrete Pads
Concrete Pad for Cattle
12 ft X 12 ft Pad
Grading and Site Preparation
Concrete thickness
Was this really the best possible location?

- Site should be in a high or level location.
- Site should be well drained.
- Site should not be in natural drainage ways.

If none of these are present ARMOR, ARMOR, ARMOR with stone and gravel.
CONSTRUCTION SPECIFICATIONS
For
(Insert Project Name and/or Landowner Name)
(Insert County Name) County, Virginia

List of Specifications

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Learn ‘em and love ‘em………..If in doubt read ‘em
Safety
Miss Utility of Virginia: For **ALL** excavation work **ANYWHERE** in Virginia! Call 1-800-552-7001

- Miss Utility is the free "one call" Virginia communications center for excavators, contractors, property owners, and those planning any kind of excavation or digging. The Miss Utility center notifies participating utilities of the upcoming excavation work so they can locate and mark their underground facilities in advance to prevent possible damage to underground utility lines, injury, property damage and service outages.

- The "Miss Utility Law" (Virginia Underground Utility Damage Prevention Act) requires that Miss Utility be called at least 3 **working days** in advance of the planned work to allow time for marking, that the marks be respected and protected, and that excavation be completed carefully. References to "working day" means every day, except Saturdays, Sundays, and legal state and national holidays.
Safety

Above
Backhoe Tip over
One fatality

Bucket came loose
One fatality

When you find yourself in a hole...the first thing to do is stop digging
The End