PVC capacitor (primary DC accumulator, 500,000 volt) main tubes

Side view (print all pages as Landscape)
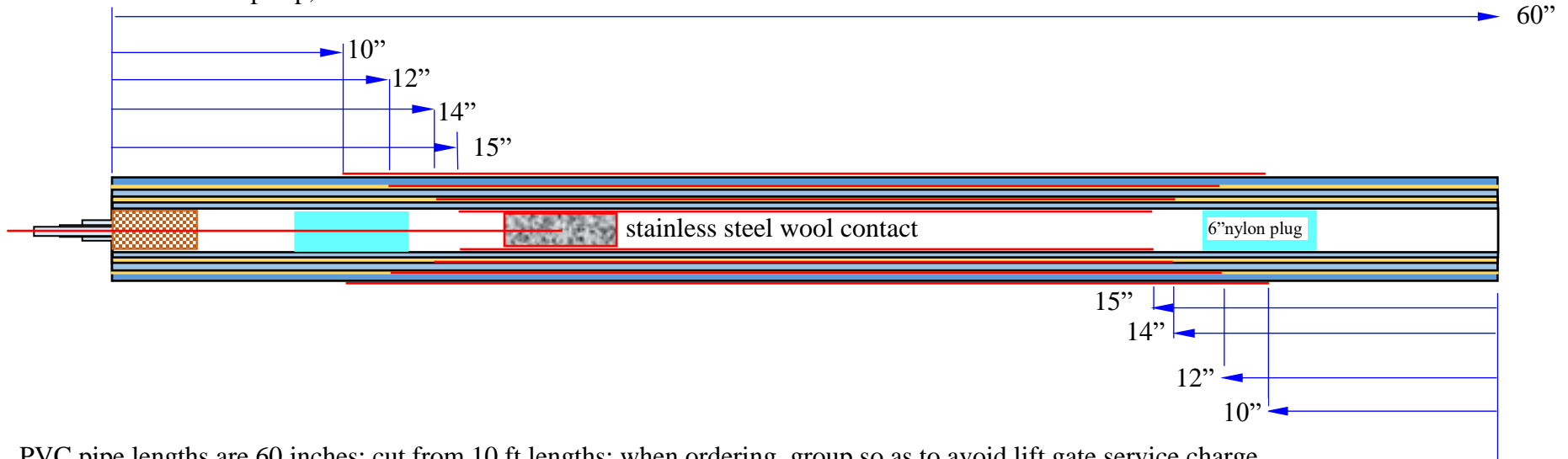## Scale: 1:7

Schedule 80 PVC specs: dielectric strength of PVC pipe is about 14-20kV/mm; 500 kV / (15kV/mm) = 33.3 millimeters minimum thickness required

4"   4.5"   OD   3.786" ID   (wall 0.714; annulus with next inner OD = 0.286)
3" -   3.5"   OD   2.864" ID   (wall 0.636; annulus with next inner OD = 0.489)
2" -   2.375" OD   1.913" ID   (wall 0.457)
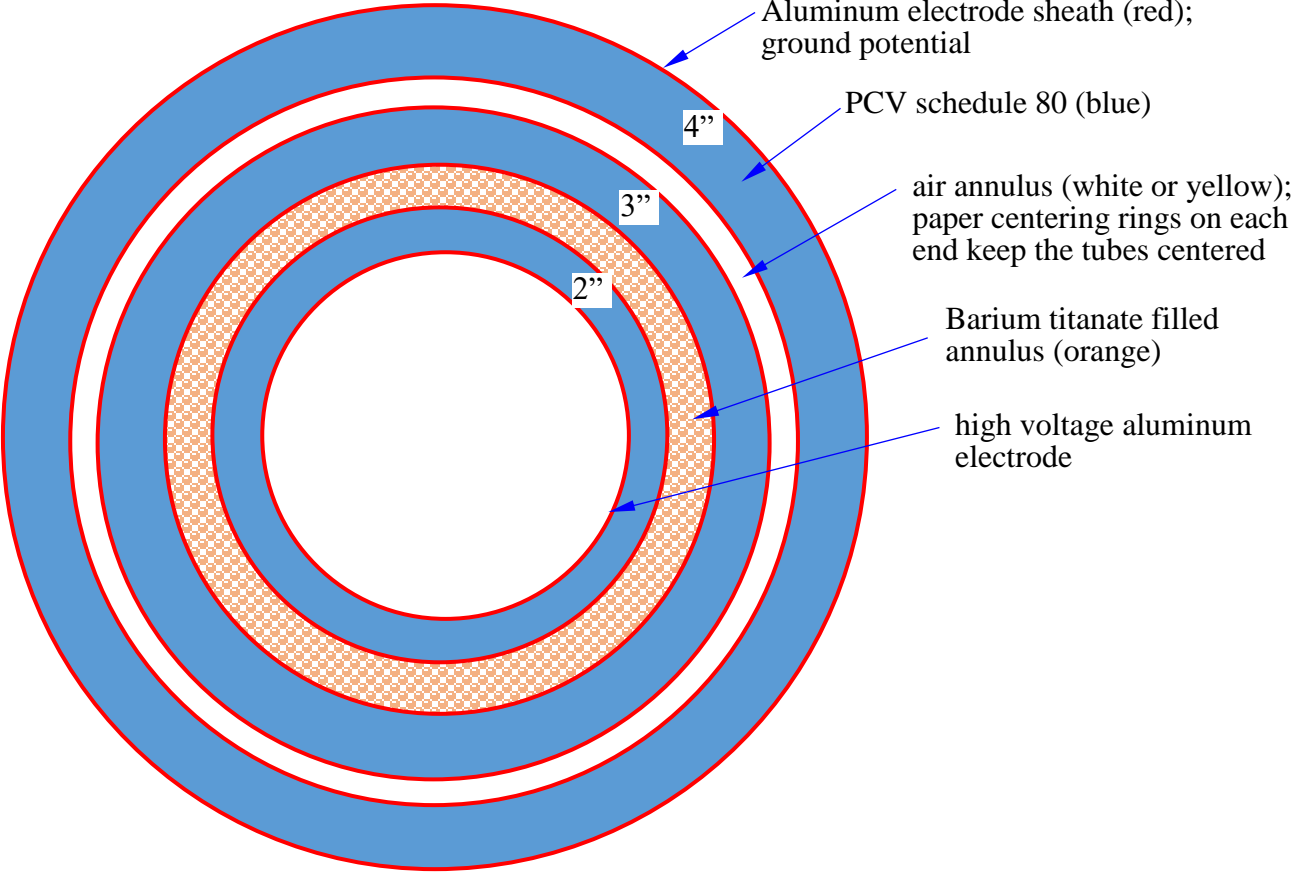**4"   PVC Sched 80 slip cap, 2 each**

- PVC pipe lengths are 60 inches; cut from 10 ft lengths; when ordering, group so as to avoid lift gate service charge
- Electrode lengths are 40, 36, 32, and 30 inches long. Width to be determined at assembly. Field at seams reduced with semiconductive paint.
- Annulus between 2" and 3" pipe has two electrode surfaces and an annular fill with tetragonal barium titanate powder to increase capacitance
- Ends are closed with PVC slip caps and dielectric grease. Both ends have a 6" nylon plug (with greased 'O' rings?) in the innermost pipe.
- Top end has a copper wire sheathed with 3 layers of concentric clear PVC tubing .
- Surface underlying electrode ends are treated with semi-conducting paint (MG Chemicals 838-340G) to even out the electric stress.
- Semiconductive resistive grading extends from an inner electrode edge to an inch beyond the next longer electrode edge.
- use aluminum flashing and resistive electrode grading; add Drierite to inner core; various wooden and plastic plugs, epoxy paper centering rings.

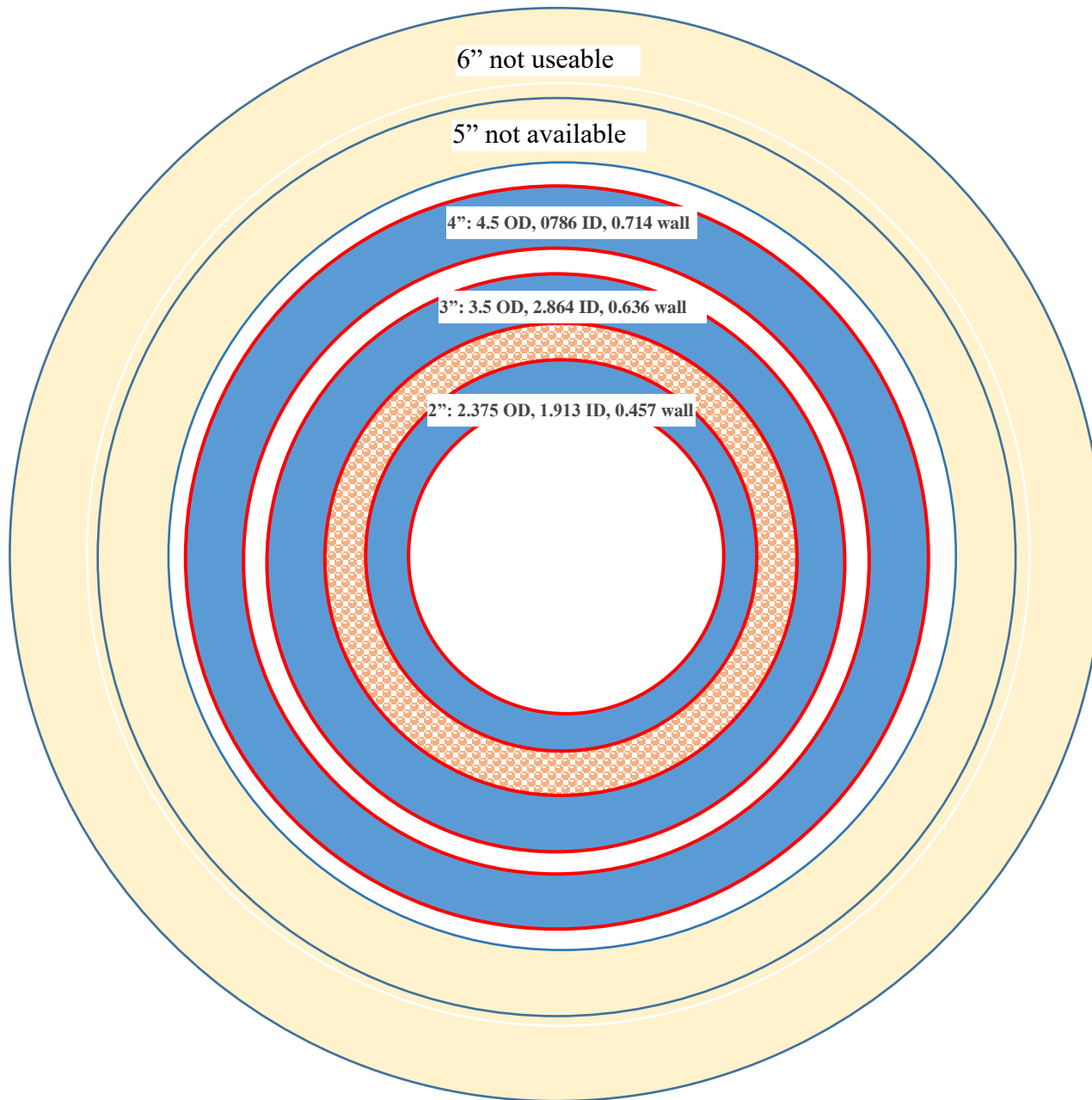|				
1	Nylon rod, 2" OD, 1 ft.	MSC 510-1596	must be cut down to fit ID of 1.913"; add ¼-20 x 1" threaded socket	
10 ft	PVC pipe, sch 80, 4" OD	Zoro Pipe, PVC, 4 In, Schedule 80, 10 Feet G3064871		
10 ft	PVC pipe, sch 80, 3" OD	(local)		
10 ft	PVC pipe, sch 80, 2" OD	(local)		

PVC capacitor, 500,000 volt
End view
Scale: actual size

Aluminum electrode sheath (red);
ground potential

PCV schedule 80 (blue)

4"

air annulus (white or yellow);
paper centering rings on each
end keep the tubes centered

3"

2"

Barium titanate filled
annulus (orange)

high voltage aluminum
electrode

Total PVC wall: 0.714 + 0.636 + 0.457 = 1.8 inches = **45.9 mm**

Scale: actual size (PVC Schedule 80)

6" not useable

5" not available

4": 4.5 OD, 0786 ID, 0.714 wall

3": 3.5 OD, 2.864 ID, 0.636 wall

2": 2.375 OD, 1.913 ID, 0.457 wall

Annulus for tetragonal barium titanate powder: $V = 30 \pi (r^2_2 - r^1_1) = (30)(3.14)(1.432^2 - 1.1875^2) = (30)(3.14)(0.640) = 60.3 \text{ in}^3 = 984 \text{ ml}$