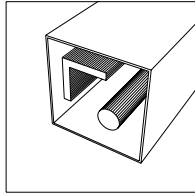
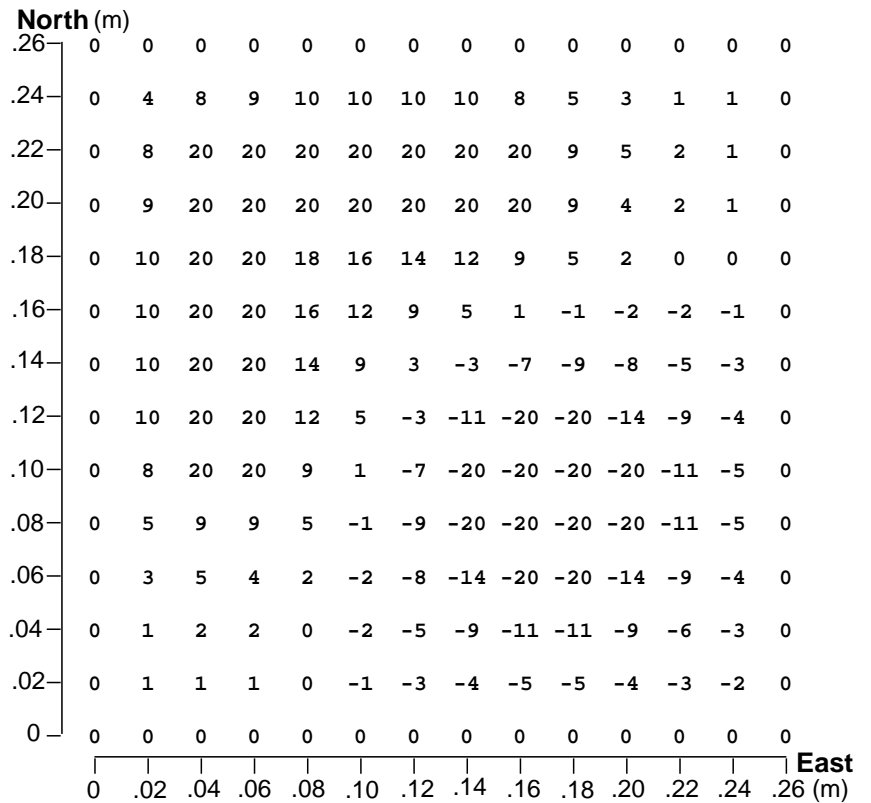


Consider a structure of a long L shaped metal electrical conductor and a long round metal pipe. They are in a square metal enclosure as shown below:



The enclosure is at ground potential (0 volts), the "L" is at +20,000 volts, and the cylinder is at -20,000 volts. The numbers in the pattern on the right represent the values of the **electrical potential**, i.e., the voltage at the various locations, in *kilovolts*. (1Volt = 1Joule/Coulomb).



- Use the left hand corner as (H,V)=(0,0); (H = horizontal), (V = vertical) , both in *cm*.
  - Mark an 'x' at (H,V)=( 5,19)
  - Mark an 'y' at (H,V)=( 17,9)
  - Mark an 'z' at (H,V)=( 21,5)
  - Mark an 'i' at (H,V)=( 3,16)
- The PE of a charge of  $1 \times 10^{-6} C$  located at 'x' is: .....
- The PE of a charge of  $-2 \times 10^{-6} C$  located at 'y' is: .....
- The PE of a charge of  $3 \times 10^{-6} C$  located at 'z' is: .....
- The work required to (slowly) move a charge of  $4 \times 10^{-6} C$  from y to z is .....
- The work required to (slowly) move a charge of  $5 \times 10^{-6} C$  from y to x is .....
- The work required to (slowly) move a charge of  $3 \times 10^{-6} C$  from i to x is .....
- Draw the equipotential contour(s) for potential= 0., +20 *kilovolts*, -20 *kV*, +10 *kV*, -10 *kV*.
- Electric Field** inside the enclosure:
  - locate a position where the electric field is very strong. Mark it **S**.
  - locate a position where the electric field is 0. Mark it **E=0**.
  - locate a position near the "L" where the Electric field is weak: Mark it **W**.
- The force on a charge of  $-1.6 \times 10^{-19} C$  located at x is .....  
It points in the N NE E SE S SW W NW direction.
- The force on a charge of  $+1.6 \times 10^{-19} C$  located at i is .....  
It points in the N NE E SE S SW W NW direction.
- The force on a charge of  $-3.2 \times 10^{-19} C$  located at z is .....  
It points in the N NE E SE S SW W NW direction.