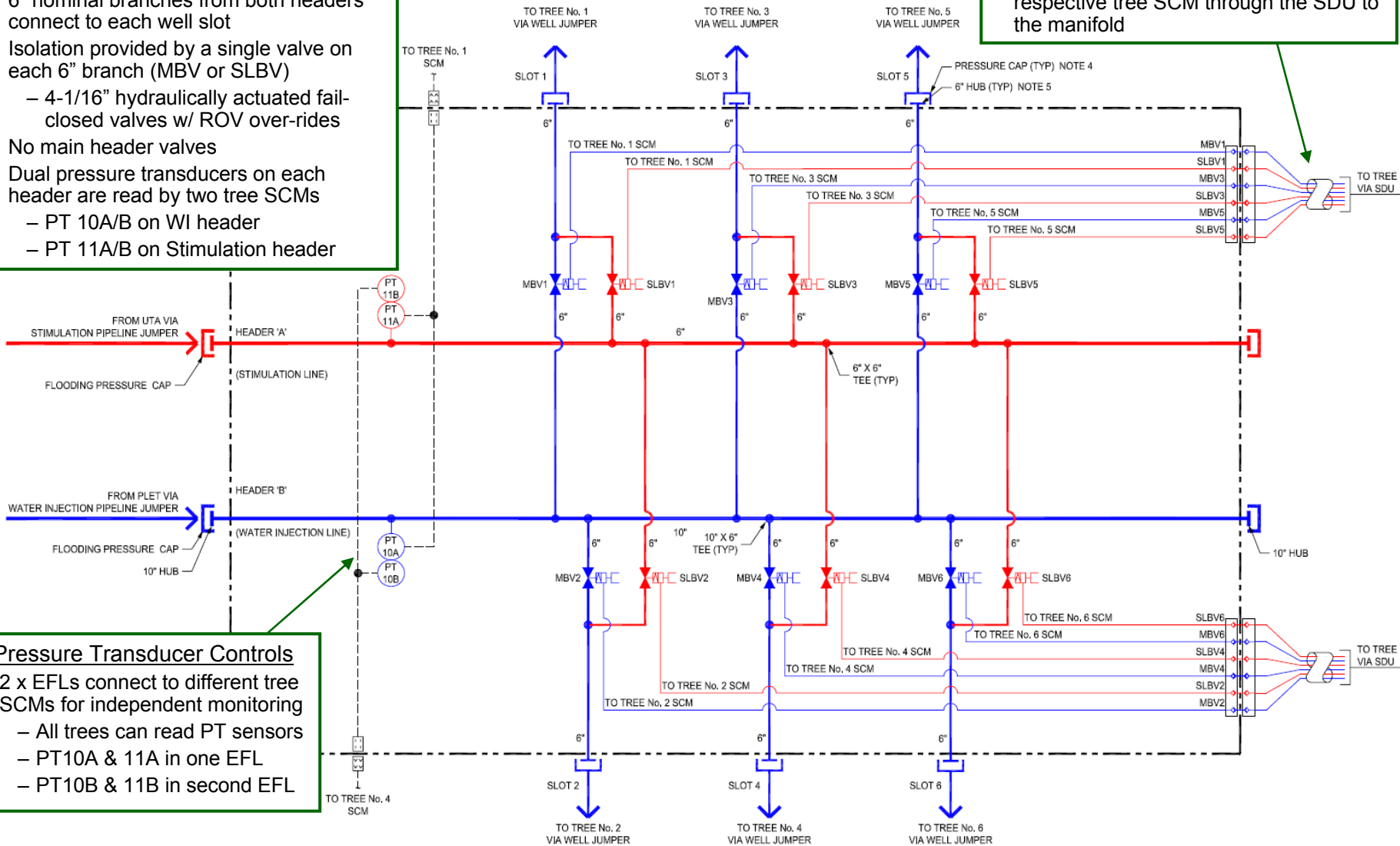


Water Injection Manifold Design – P&ID

- WI manifold rated to API 10,000 psi
- 2 x flow-through headers w/ 6 x well slots
 - 10" nominal water injection header
 - 6" nominal HP stimulation header
- 6" nominal branches from both headers connect to each well slot
- Isolation provided by a single valve on each 6" branch (MBV or SLBV)
 - 4-1/16" hydraulically actuated fail-closed valves w/ ROV over-rides
- No main header valves
- Dual pressure transducers on each header are read by two tree SCMs
 - PT 10A/B on WI header
 - PT 11A/B on Stimulation header

- ### Valve Controls
- Branch valves hydraulically controlled by the tree connected to that well slot
 - Controls routed through HFLs from respective tree SCM through the SDU to the manifold

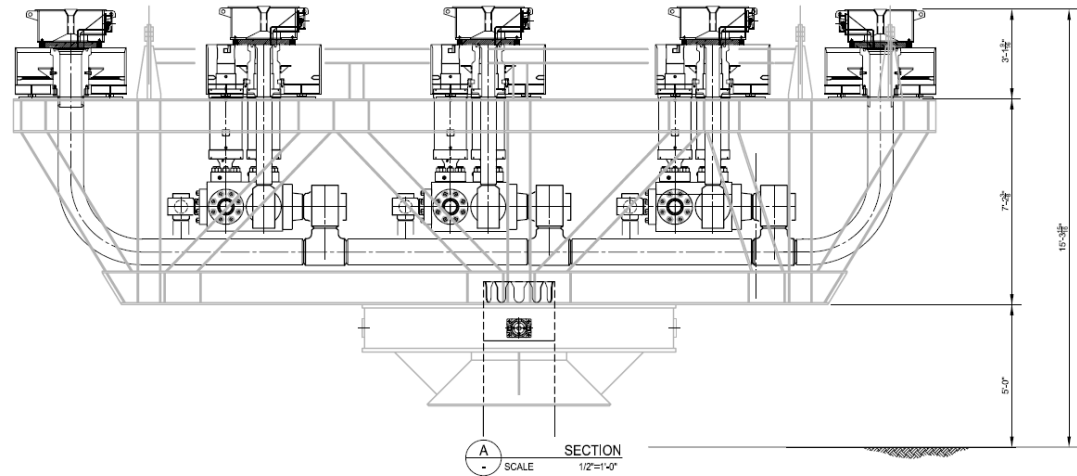
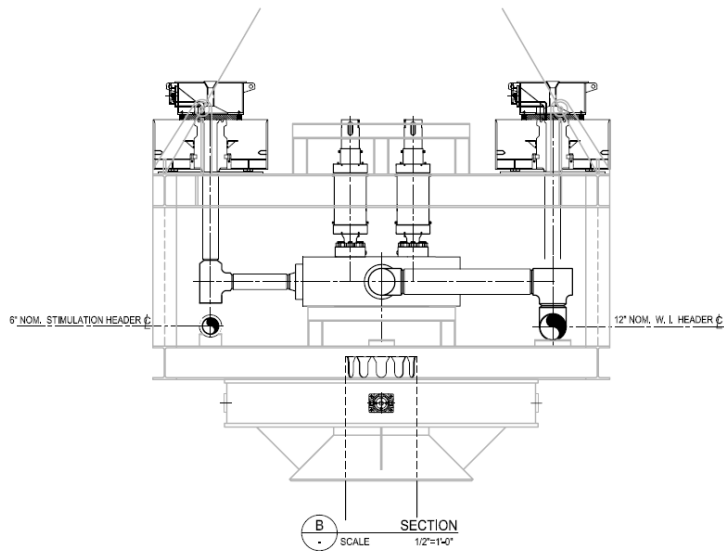
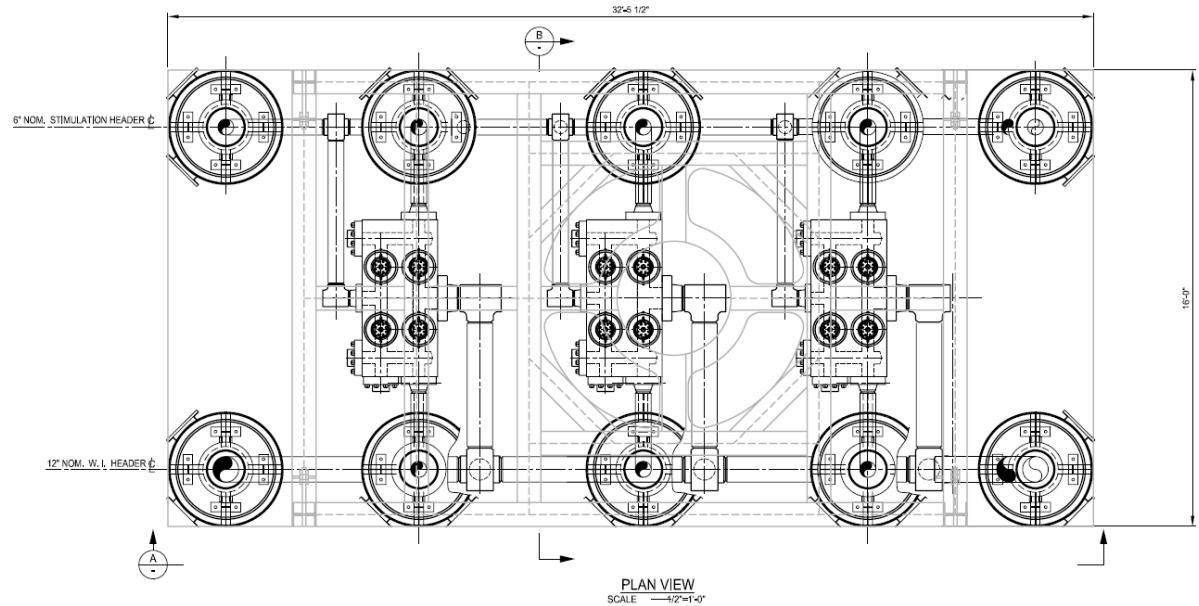


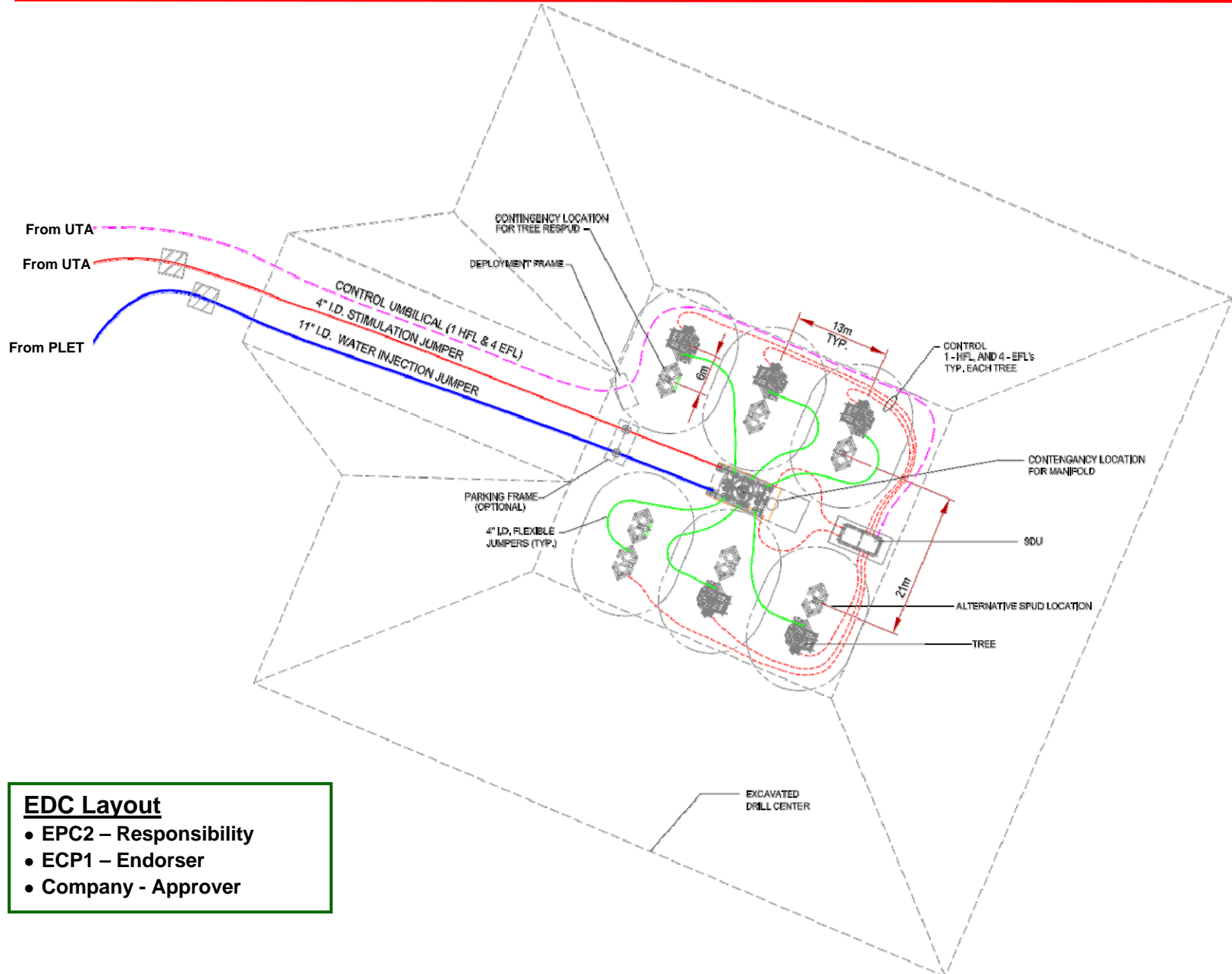
- ### Pressure Transducer Controls
- 2 x EFLs connect to different tree SCMs for independent monitoring
 - All trees can read PT sensors
 - PT10A & 11A in one EFL
 - PT10B & 11B in second EFL

Water Injection Manifold Design – GA (Notional)

Water Injection Manifold

- Mono-pile foundation able to meet leveling and orientation requirements
- Diverless installation and operation
- Well slots have 6" upward facing hubs
- Blind pressure caps on end of each header
- Branch valves controlled by associated tree
 - No SCM on manifold
- Does not require pigging capability
- Not insulated
- Header and branch pipe materials appropriate for water injection service
- Valve trim: API EE
- Approximate weight: 150 Tons (US)





EDC Layout

- EPC2 – Responsibility
- ECP1 – Endorser
- Company - Approver