Mitigating Inadvertent Returns

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What are inadvertent returns?

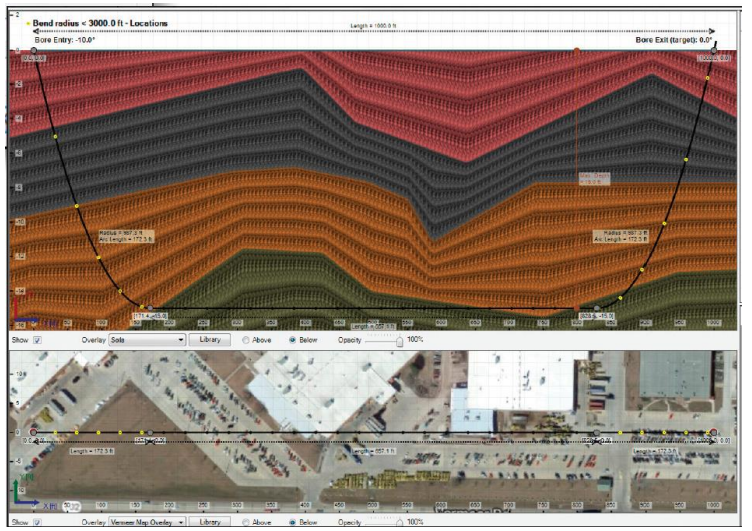
- Drilling fluid that takes an unintended path to the surface
- Fluid return to unintended areas
- Drilling fluid that cannot be accounted for

Potential causes for inadvertent returns

- Excess fluid flow
- High fluid pressure
- Improper drilling fluid mixture
- Poor fluid quality
- Improper rate of penetration
- Unstable geological formations
- Annular space obstruction

Avoidance practices

- Proper drilling fluid
- Pressure monitoring
- Pressure reduction
- Proper bore design



Proper drilling fluid

- Correct additives
  - Bentonite
  - Polymer
  - Ash
- Proper mixing
  - Clean water
  - Continuous testing
  - Equipment maintenance
  - Bore hole stability

Pressure monitoring

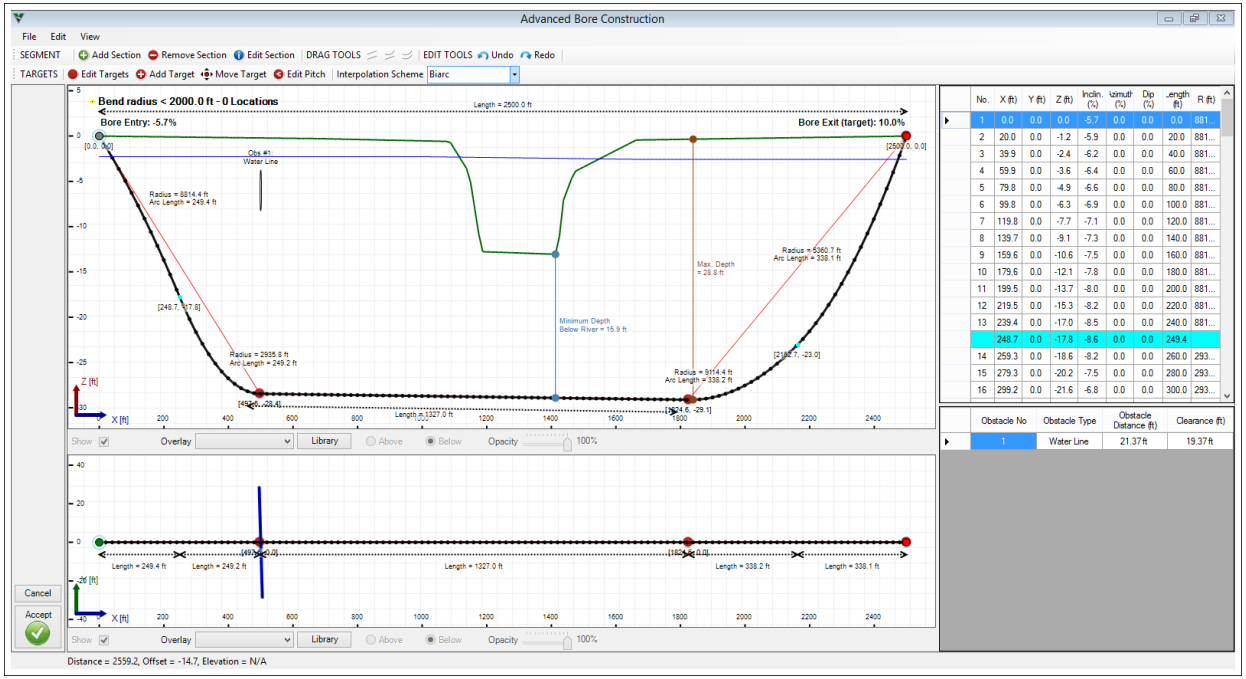
- Downhole monitoring
  - -Live feedback
  - -Adjust flow-to conditions
- On-rig monitoring
  - -Long-term records
  - -Review multiple machine parameters
  - -Use historical data to help predict future conditions

Pressure reduction

- Drilling procedure
  - Carrying cuttings from bore hole
  - Multiple bore passes - “swabbing”
  - Proper fluid flow
- Mechanical reduction
  - Vent holes
  - Fluid removal
  - Return pits

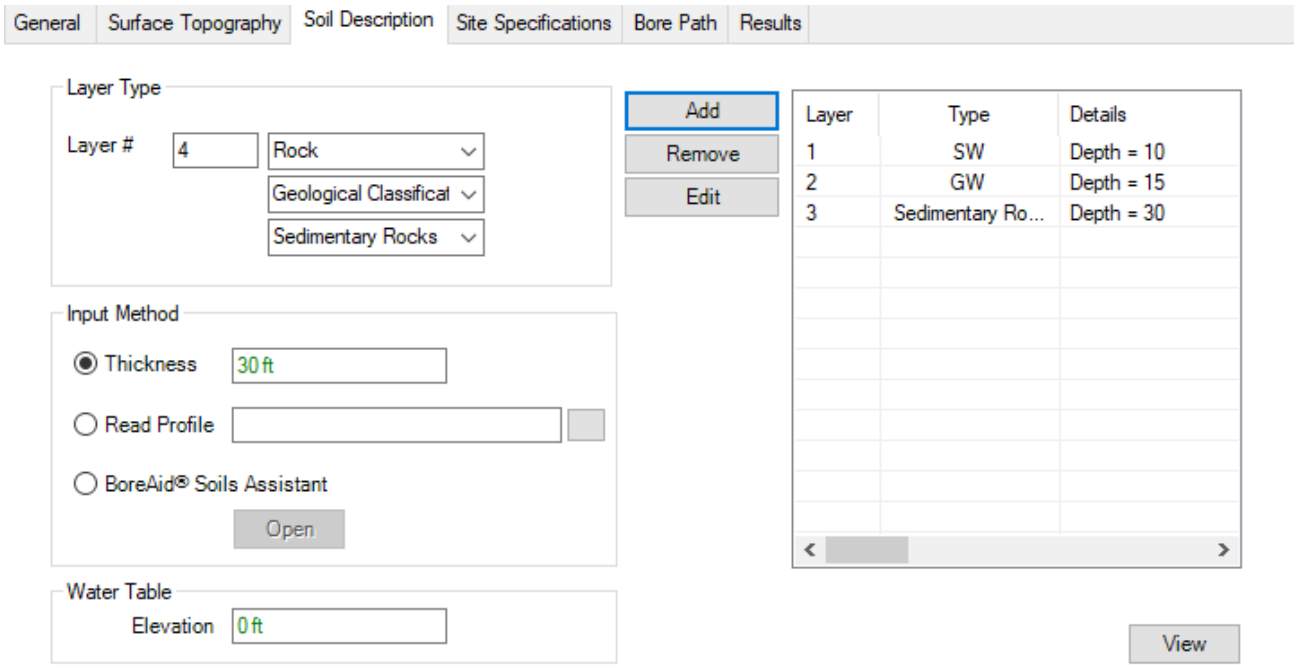
Bore planning

- Bore profile
  - Proper minimum distance from below-grade features
  - Proper geometry to help reduce drag during pullback



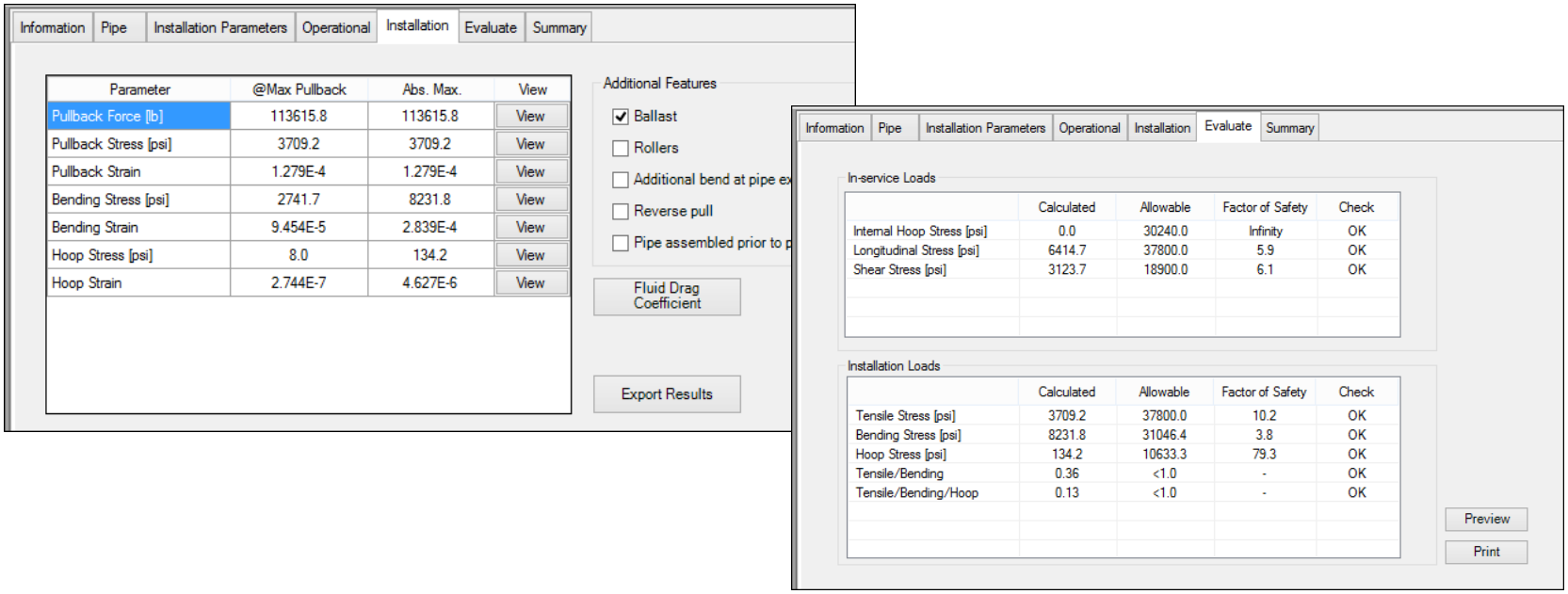
Bore planning

- Geotechnical data



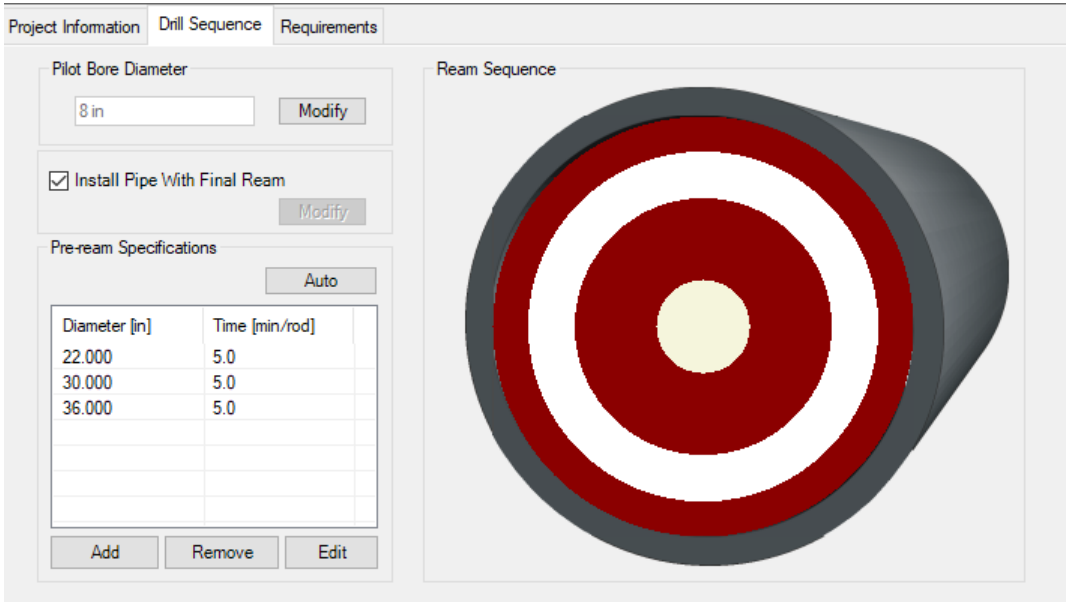
Bore planning

- Calculate installation and stress calculations



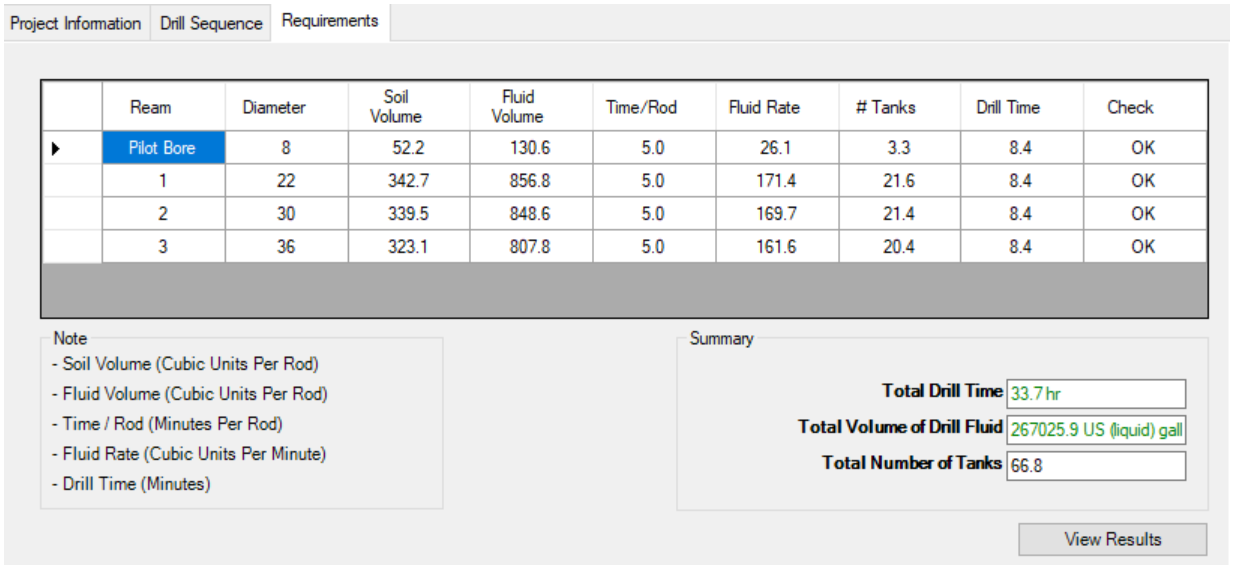
Bore planning

- Plan bore tooling sequence



Bore planning

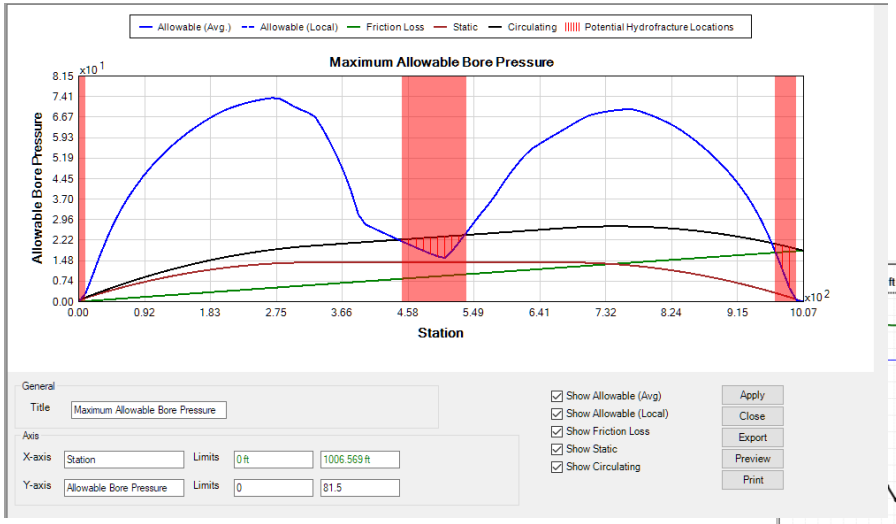
- Drilling fluid usage

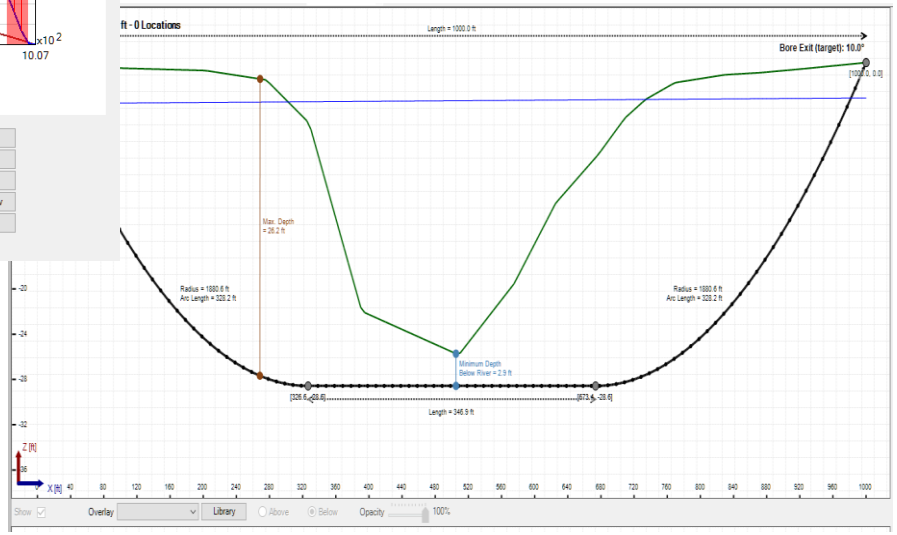


	Ream	Diameter	Soil Volume	Fluid Volume	Time/Rod	Fluid Rate	# Tanks	Drill Time	Check
▶	Pilot Bore	8	52.2	130.6	5.0	26.1	3.3	8.4	OK
	1	22	342.7	856.8	5.0	171.4	21.6	8.4	OK
	2	30	339.5	848.6	5.0	169.7	21.4	8.4	OK
	3	36	323.1	807.8	5.0	161.6	20.4	8.4	OK

Bore planning

- Bore pressure calculations





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