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This document outlines the major design specifications for a BOXR 10 yard Hydro-excavation Unit.

Equipment Scope of Supply:

1. Vacuum Process
  - a. Vacuum Tubes
    - i. One (1) 8" aluminum dig tube with crown
    - ii. One (1) 8" aluminum extension tube
    - iii. Customer to specify connection style. Anfor ends are standard. Bauer, Ring-Joint, and others are available as an option.
  - b. 6-way boom w/ vacuum breaking plunger (flap)
  - c. 10 yard debris tank
    - i. Internal exhauster plumbing
    - ii. 12" centralized HDPE float-ball for shutoff
    - iii. Full opening Rear door w/ 4 level sight eyes
  - d. 2<sup>nd</sup> stage cyclonic filtration w/ collection chamber
  - e. 3<sup>rd</sup> stage element filtration, removable for service
  - f. Three (3) 'Kunkle' 3" vacuum relief valves, Set to 16 inHG
  - g. One (1) Roots 827 RCS rotary lobe positive displacement blower
  - h. One (1) Stoddard Blower Silencer
  - i. Tank-cyclone rubber connector to be Fernco coupling
  - j. Vacuum piping and components to be 11 gauge mild steel
  - k. Piping connections to be Fernco couplers
  - l. Gaskets at blower to be neoprene full face type
  - m. Curbside panel mounted vacuum gauge
2. High Pressure Water Process
  - a. Four (4) saddle mounted 250 gallon HDPE water tanks (1000 gallon total)
  - b. Replaceable polyethylene bulkhead fittings
  - c. Two (2) 1" level tubes at rear
  - d. 2" fill w/ spring check top-mounted at front of curbside tanks
  - e. 2" crossover line between opposing water tanks
  - f. 6" Fernco couplers to join water tanks on same side
  - g. Crossover between rearmost tanks to have central drop to feed water pump
  - h. Loop under frame to have low point drain cap
  - i. One (1) 1.5" ball valve to isolate tanks from remainder of system
  - j. One (1) 1.5" Inline y-strainer, 80 mesh
  - k. Flange style disconnect at strainer inlet



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- l. One (1) Cat 3560 water pump
  - m. One (1) Baird relief valve with discharge to front driver side water tank
  - n. Recirculating restrictor and coupler plumbed into relief line
  - o. 1/2" high pressure ball valve at pump discharge
  - p. High pressure hosing to be hydraulic style hose, 5000psi min
  - q. Hydraulic fittings for high pressure plumbing
  - r. 660,000 BTU 12VDC diesel fired water boiler w/ flow switch, thermostat, temperature gauge, 6' whip hose at outlet
  - s. One (1) 50' 1/2" wash hose
  - t. 7' and 14' 1/2" wands w/ high pressure ball valves
3. Hydraulic System
- a. Closed Loop Blower Circuit
    - i. Sauer Danfoss H1 165cc closed loop pump
    - ii. External charge filtration easily accessible
    - iii. Sauer Danfoss H1 160cc bent axis motor
    - iv. Loop flush valve integral to motor
  - b. Closed Loop Water Pump Circuit
    - i. Sauer Danfoss H1 53.8cc closed loop pump
    - ii. External charge filtration easily accessible
    - iii. Sauer Danfoss 90 series 75cc fixed motor
    - iv. Loop flush valve integral to motor
  - c. Open Loop Auxiliary Circuit
    - i. Sauer Danfoss Series 45 L-Frame 30cc pump
    - ii. High Pressure filter
    - iii. One (1) Sauer Danfoss PVG32 one section valve
      - 1. Tank Raise/Lower
        - a. Mailhot CS130 double-acting telescopic hoist cylinder
        - b. Counter Balance Valve at inlet of cylinder
      - 2. Open Center design to induce continuous low pressure cooling flow
    - iv. One (1) Sauer Danfoss PVG32 three section valve
      - 1. Spare
      - 2. Door Lock/Unlock
        - a. Four 2"x4" cylinders w/ square lock wedges
      - 3. Door Open/Close
        - a. Two 3"x 20" cylinders mounted inside tank
        - b. Extra-high-pressure hosing and fittings to tank pass-throughs
        - c. Counter balance valve mounted on external side of tank pass-throughs
    - v. Load Sense Shuttle valve



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- vi. One (1) Sauer Danfoss PVG32 three section valve
    - 1. Boom Up/Down
      - a. Counter Balance Valves at best point w/ extra high pressure hosing
    - 2. Boom Left/Right
    - 3. Boom In/Out
    - 4. Pilot pressure from PVG32 to feed 2-position solenoid valve for vacuum break plunger
  - d. Boom valve feed/return to have spring and loop length to allow for boom rotation
  - e. One (1) AKG 12VDC electric hydraulic oil cooler, set to come on at 120°F
  - f. In-Tank return filter
  - g. One (1) 33 usg (nominal) reservoir
    - i. Filler/breather
    - ii. Sight/temperature gauge
    - iii. Single baffle
    - iv. Suction ports to be raised off bottom and have isolation valves
    - v. Removable lid
    - vi. Drain Valve
    - vii. Constructed and cleaned to industry standards
4. Pneumatic System
- a. Isolation ball valve and tractor protection valve
  - b. One (1) Parker Electric over air valve manifold
    - i. Shift transfer case
    - ii. Three (3) spare sections for future use
5. Electrical System
- a. In cab controls
    - i. Shift Transfer Case
    - ii. Enable remote throttle
    - iii. To be located in available dash space depending on cab/chassis
  - b. Curbside controls/junction box
    - i. Control all unit functions
      - 1. Boom functions
      - 2. Tank functions
      - 3. Engine control w/ digital RPM readout
    - ii. Houses all terminal blocks, breakers, relays, etc.
    - iii. Clear labelling
    - iv. Weather resistant
  - c. Optional wireless remote for boom functions
  - d. Chassis lighting all LED
6. Fuel System
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- a. Tie-in to fuel tank for boiler feed/return preferably in factory supplied ports or unused sender flange. To be confirmed with desired cab/chassis.
7. Driveline
- a. One (1) Fabco Splitshaft pump drive to be utilized
  - b. Transfer case able to engage pumps while in road-mode for circulation purposes
8. Cab/Chassis
- a. 300 hp minimum
  - b. 204" useable frame required
    - i. Recommend CA of 153" for proper weight distribution
  - c. Unit designed to be mountable on variety of chassis
  - d. Customer to specify requested chassis so BOXR can confirm fitment and required equipment