Grok Mini Sub: Step-by-step build

Concept assembly guide derived from the staged build plan. Not a certified engineering drawing. Prices are estimates (Oct 2026); nothing here is a purchase.

Stage 1

1	**Cut and glue the PVC frame.** Part M8: PVC pipe, fittings, pool noodle, dive weights x1 (~$25) Buy: Amazon search
2	**Strap pool-noodle floats on top and dive weights below.** Part M8: PVC pipe, fittings, pool noodle, dive weights x1 (~$25) Buy: Amazon search
3	**Mount two horizontal thrusters on the rear.** Part M1: cheeyoo 12 V brushed underwater thruster x3 ($92.34) Buy: Amazon B0D5JN1Z5R
4	**Mount one vertical thruster in the center.** Part M1: cheeyoo 12 V brushed underwater thruster x3 ($92.34) Buy: Amazon B0D5JN1Z5R
5	**Solder thruster leads to three pairs of the 8-conductor cable.** Part M4: 50 ft 18 AWG 8-conductor cable x1 (~$35) Buy: Amazon search
6	**Seal every splice with marine heat shrink and liquid tape.** Part M9: Marine heat shrink, liquid tape, silicone x1 (~$12) Buy: Amazon search
7	**Tie the braided pull line to the frame (carries the load, not the wires).** Part M5: Braided pull line 1/8 in x1 (~$8) Buy: Amazon search
8	**Zip-tie the endoscope camera to the frame front.** Part M2: USB endoscope camera, 15 m waterproof cable, LEDs x1 (~$30) Buy: Amazon search
9	**Build the fused 12 V battery box topside.** Part M6: 12 V 6 Ah LiFePO4 battery + 10 A fuse x1 (~$36) Buy: Amazon search
10	**Mount three BTS7960 drivers inside the battery box.** Part M3: BTS7960 H-bridge motor driver x3 (~$27) Buy: Amazon search
11	**Feed the Pi 4 from the 12V-to-5V buck.** Part M7: 12 V to 5 V 5 A buck for Pi x1 (~$10) Buy: Amazon search
12	**Plug the camera into the Pi 4; confirm /dev/video0.** Part M2: USB endoscope camera, 15 m waterproof cable, LEDs x1 (~$30) Buy: Amazon search
13	**Test each thruster in a bucket before going in the pool.** Part M1: cheeyoo 12 V brushed underwater thruster x3 ($92.34) Buy: Amazon B0D5JN1Z5R

Stage 2

14	**Assemble the Blue Robotics enclosure.** Part M10: Blue Robotics 3-inch watertight enclosure, aluminum cap x1 (~$110) Buy: Blue Robotics search
15	**Install the five WetLink penetrators in the end cap.** Part M11: WetLink penetrators x5 (~$75) Buy: Blue Robotics search
16	**Mount the Bar02 depth sensor in one penetrator.** Part M12: Bar02 depth sensor x1 ($80) Buy: Blue Robotics search

17	**Mount the ESP32-S3 inside the enclosure.** Part M13: ESP32-S3 board x1 (~$15) Buy: Amazon search
18	**Wire the BNO085 to the ESP32 I2C.** Part M14: BNO085 IMU x1 (~$25) Buy: Amazon search
19	**Link ESP32 to topside over RS-485 on the spare tether pair.** Part M15: RS-485 transceivers x2 (~$8) Buy: Amazon search
20	**Add the 4th thruster as a second vertical.** Part M16: 4th thruster (second vertical) x1 ($30.78) Buy: Amazon B0D5JN1Z5R
21	**Mount the two dive lights.** Part M17: Self-contained dive lights x2 (~$40) Buy: Amazon search
22	**Place the leak probe at the enclosure bottom.** Part M19: DIY leak probe x1 (~$5) Buy: Amazon search
23	**Vacuum-test the sealed enclosure with the plug and pump.** Part M18: Vacuum plug + hand pump x1 (~$45) Buy: Blue Robotics search