CLAIMS:

1. A directional soil drilling, soil coring and soil sampling apparatus comprises:

a steerable drill head, which is connectable at an end of a drill pipe, with the steerable drill head and the drill pipe being rotatable by a pipe drilling machine to form a pilot drill-path according a predetermined profile; and

a forward reamer, which is connectable to an end of a distal drill pipe, and the forward reamer is rotatable to enlarge the pilot drill-path to form a bored path of a predetermined bore diameter;

wherein the drill pipe is made of an aluminium tube of a predetermined length and outside diameter, and the drill pipe is extendable in series with a plurality of drill pipes, with one end of each of the drill pipe being formed with a pin screw connection (PSC) and an opposite end being formed with a matching box screw connection (BSC).

2. The apparatus according to claim 1, wherein the forward reamer comprises 3 regions, namely, a stem region, a conical region and a guide region, with the guide region being located at a forward location and formed with a diameter substantially matching that of the pilot drill path.

3. The apparatus according to claim 2, wherein the guide region is configured in an oblong cylindrical shape, with a front tip thereof being deposited with an abrasive material.

4. The apparatus according to claim 3, wherein the guide region comprises two parts that are joined by a pin screw connection (PSC) and a matching box screw connection (BSC) of a predetermined size, so that the PSC and BSC allow the front tip to be removeably replaced when the abrasive material is worn out.

5. The apparatus according to any one of claims 2 to 4, wherein the conical region comprises a front conical region, a centre cylindrical region and a rear conical region.

6. The apparatus according to claim 5, wherein the front conical region subtends a conical angle that is smaller than a conical angle subtended by the rear conical region.

7. The apparatus according to claim 5 or 6, wherein a conical surface of the front conical region is formed with a plurality of spiral bands of abrasive material.

8. The apparatus according to claim 7, wherein the forward reamer further comprises an internal, longitudinal bore which leads to outlets formed on both the front and the rear conical regions, with the outlets on the front conical region located between the spiral bands of the abrasive materials.

9. The apparatus according to any one of claims 5 to 8, wherein a cylindrical surface of the centre cylindrical region is formed with a cylindrical band of abrasive material or a hard-facing material.

10. The apparatus according to claim 1, further comprises:

a coring head joined to a soil extractor subassembly, with the soil extractor subassembly being threadedly connectable to the drill pipe.

11. The apparatus according to claim 10, wherein the soil extractor comprises a split mould to contain a soil sample, with the split mould being threadedly connectable to the coring head.

12. The apparatus according to claim 10, wherein the soil extractor comprises an integral mould and a longitudinal sleeve disposed inside the integral mould to contain a soil sample.

13. The apparatus according to claim 11 or 12, wherein the soil extractor further comprises a sleeve sub and a stabilizer threadedly connectable to the sleeve sub.

14. The apparatus according to claim 13, wherein the sleeve sub has each of two ends being formed with a box screw connection (BSC).

15. The apparatus according to claim 13 or 14, wherein the stabilizer is configured substantially as a cylindrical shell having two spaced apart cylindrical bands of abrasive material of a predetermined extended diameter D1.

16. The apparatus according to claim 1, further comprises:

a series of connected outer tubes to line the bored path, with a coring head attached to a terminal end of the outer tube; and

a wireline soil extractor is receivable inside the series connected outer tubes, with a lower end of the wireline soil extractor configured with a coring tube for receiving a soil sample.

17. The apparatus according to claim 16, wherein the coring tube further comprises a longitudinal split sleeve for receiving the soil sample.

18. The apparatus according to any one of claims 10 to 17, wherein the coring head is configured substantially as a sleeve, and an annular edge of the sleeve is formed with a ring of cutting edge comprised of an abrasive material.

19. The apparatus according to claim 18, wherein the ring of the abrasive material is arranged in a plurality of sectors.

20. The apparatus according to claim 18 or 19, wherein the abrasive material is formed by coating, depositing, impregnating, welding or brazing the abrasive material onto the coring head.

21. A method for conducting soil coring and soil sampling comprising:

determining an underground location for soil sampling;

plotting a drill profile from an entrance pit to reach the underground location for soil sampling;

conducting pilot drilling along the drill profile with a steerable drill head attached to an end of a drill pipe, with the drill pipe is being extended during drilling;

after conducting the pilot drilling, retrieving the drill pipes and the drill head to the entrance pit, replacing the drill head with a forward reamer and driving the drill pipes to enlarge the pilot drill path to form a bored path;

retrieving the drill pipes and the forward reamer to the entrance pit, replacing the forward reamer with a coring head and a soil extractor, and driving the coring head and the soil extractor with the drill pipes into the bored path to obtain a soil sample; and

retrieving the drill pipes, coring head, the soil extractor and the soil sample from the underground location.

22. A method for conducting soil coring and soil sampling comprising:

determining an underground location for soil sampling;

plotting a drill profile from an entrance pit to reach the underground location for soil sampling;

conducting pilot drilling along the drill profile with a steerable drill head attached to an end of a drill pipe, with the drill pipe is being extended during drilling;

after conducting the pilot drilling, retrieving the drill pipes and the drill head to the entrance pit, replacing the drill head with a forward reamer and driving the drill pipes to enlarge the pilot drill path to form a bored path;

driving an outer tube with an end having a coring head and extending the outer tube so that the coring head reaches an end of the bored path; and

sending a wireline soil extractor down into an interior bore of the series connected outer tubes, rotating the outer tubes to conduct soil coring, and after a soil sample is received inside a coring tube connected to the soil extractor, retrieving the wireline soil extractor and the soil sample from the underground location.