CLAIMS

What is claimed is:

1. An integrated jacking pipe comprising a concrete jacking envelope integrally-formed with and encircling a metal pipe, wherein said metal pipe comprises a spigot protruding from said concrete jacking envelope and a bell defined by a sigmoid-curved bend, gradually opening in the opposite direction from a main segment of said pipe and extending in a parallel manner with respect to said main segment, said diameter being larger than a diameter of said spigot, wherein the diameter of said bell is larger than the diameter of said spigot by more than twice a wall thickness of said metal pipe,

wherein said concrete jacking envelope comprises a first end portion with a circumferential seal and a second end portion with a circumferential metal collar.

2. The integrated jacking pipe according to claim 1, wherein:

said concrete jacking envelope is made of reinforced concrete; and

said metal pipe is made of steel.

3. The integrated jacking pipe according to claim 1, further comprising a lubrication nozzle formed in both of said concrete jacking envelope and said metal pipe.

4. The integrated jacking pipe according to claim 1, further comprising a load distributor disposed on a side rim of said concrete jacking envelope.

5. The integrated jacking pipe according to claim 4, wherein said load distributor comprises a plywood pad.

6. A method for pipe jacking, comprising:

jack-pushing a drilling head into the ground;

serially jack-pushing multiple integrated jacking pipes into the ground, wherein each of said multiple integrated jacking pipes comprises a concrete jacking envelope integrally-formed with and encircling a metal pipe, wherein said metal pipe comprises a spigot protruding from said concrete jacking envelope and a bell defined by a sigmoid-curved bend, gradually opening in the opposite direction from a main segment of said pipe and extending in a parallel manner with respect to said main segment , said diameter being larger than a diameter of said spigot, wherein the diameter of said bell is larger than the diameter of said spigot by more than twice a wall thickness of said metal pipe; and

welding said metal pipes of said multiple integrated jacking pipes, to form a sealed conduit.

7. The method according to claim 6, further comprising jack-pushing an intermediate jacking station between two adjacent ones of said multiple integrated jacking pipes, and operating said intermediate jacking station to repeatedly contract and expand.

8. The method according to claim 6, wherein said welding is a direct welding between said metal pipes.

9. The method according to claim 6, wherein:

said concrete jacking envelope is made of reinforced concrete; and

said metal pipe is made of steel.

10. The method according to claim 6, wherein said concrete jacking envelope comprises a first end portion with a circumferential seal and a second end portion with a circumferential metal collar.

11. The method according to claim 6, wherein at least some of said multiple integrated jacking pipes further comprise:

a lubrication nozzle formed in both of said concrete jacking envelope and said metal pipe; or

a load distributor disposed on a side rim of said concrete jacking envelope, wherein said load distributor comprises a plywood pad.

12. A tunnel comprising a series of integrated jacking pipes each comprising:

a concrete jacking envelope integrally-formed with and encircling a metal pipe, wherein said metal pipe comprises a spigot protruding from said concrete jacking envelope and a bell defined by a sigmoid-curved bend, gradually opening in the opposite direction from a main segment of said pipe and extending in a parallel manner with respect to said main segment, said diameter being larger than a diameter of said spigot, and wherein the diameter of said bell is larger than the diameter of said spigot by more than twice a wall thickness of said metal pipe;

wherein every adjacent pair of said series of integrated jacking pipes comprises the spigot of one metal pipe welded to the bell of the other metal pipe; and

wherein said metal pipes form together a sealed, pressure-resistant, elongated conduit.

13. The tunnel according to claim 12, wherein:

said concrete jacking envelope is made of reinforced concrete; and

said metal pipe is made of steel.

14. The tunnel according to claim 12, wherein said concrete jacking envelope comprises a first end portion with a circumferential seal and a second end portion with a circumferential metal collar.

15. The tunnel according to claim 12, wherein at least some integrated jacking pipes of said series of integrated jacking pipes further comprises a lubrication nozzle formed in both of said concrete jacking envelope and said metal pipe.

16. The tunnel according to claim 13, wherein at least some integrated jacking pipes of said series of integrated jacking pipes further comprise a load distributor disposed on a side rim of said concrete jacking envelope, wherein said load distributor comprises a plywood pad.