Claims

1. A method for reconstructing a shield tunnel for mining construction, comprising following steps of:

S1, carrying out construction preparation, wherein when construction of a shield tunnel (12) is in place, reinforcement and waterproof treatment are conducted on rock formations surrounding a shield tunneling machine as per following processes of:

S101, filling a shield tail by the shield tunneling machine with grease to protect shield tail brushes;

S102, sealing and grouting last ten pipe rings (4) of shield tunneling after construction of the shield tunnel (12), wherein a double-liquid slurry is used for grouting construction and injected symmetrically from bottom to top through secondary grouting holes reserved in pipe segments, at a grouting pressure of 0.3 bar ~ 0.4 bar, and in the process of grouting, monitoring the grouting pressure and the pipe segments to prevent cracking and dislocation of the pipe segments;

S103, tensioning the last ten pipe rings (4) of shield tunneling through tensioning steel plates (5), wherein a total of 6~8 tensioning steel plates (5) are provided in a longitudinal direction of the last ten pipe rings (4) of shield tunneling to prevent loosening of the pipe segments after penetration;

S104, arranging embedded steel plates and arc steel plates on a last pipe ring (4) of shield tunneling, and welding and sealing the same to a tail of a shield shell (2), then by virtue of sealing reinforcement ribs (6), welding the embedded steel plates and the arc steel plates in the last pipe ring (4) of shield tunneling to the tail of the shield shell (2), and injecting micro-expanding cement through grouting holes in the pipe segments to fill gaps between

the pipe segments and the tail of the shield shell (2);

S105, arranging sealing steel plates (3) at a head of the shield shell (2), sealing gaps between the head of the shield shell (2) and surrounding rocks, injecting and filing micro-expanding cement through radial grouting holes at an intermediate part of the shield, and sealing formation water around shield shell; and

S106, installing one or more smoke exhaust fans in front of a tunnel excavating face to form convection currents with an original air supply fan in the tunnel, so as to accelerate air circulation on the working face and ensure a prompt discharge of smoke and dust in the tunnel;

S2, abandoning the shield shell and disassembling the shield tunneling machine, wherein according to a dismantling sequence of rear supporting trolleys, erectors, walking beams, H frames, motors, man cabins, propulsion cylinders, stone crushers, cutter heads and main bearings, shell abandoning and machine dismantling are carried out in the tunnel; the rear supporting trolleys are disconnected and pulled out of the tunnel directly, all parts of the erectors, the walking beams, the H frames, the motors, the man cabins, the propulsion cylinders, the stone crushers, the cutter heads and the main bearings are disassembled, cut off and transported out of the tunnel in pieces; and the discarded shield shell (2) is remained in situ;

S3, carrying out horizontal road construction, wherein model-building concrete (7) is firstly laid on the pipe rings (4) of the shield tunnel (12), the model-building concrete (7) is at a maximum thickness of 500mm ~ 700mm, in the model-building concrete (7) are embedded single-layer steel bar meshes and connecting steel bars (8); on the model-building concrete (7) is laid a concrete cover (9) for protecting the single-layer steel bar meshes, the connecting steel bars (8) are arranged erect, and a track bed (10) is poured;

S4, carrying out protection on the shield tunnel (12), and excavating a transitional section of a mining tunnel (11), wherein the transitional section of mining tunnel (11) is excavated by blasting, before blasting and excavating the transitional section of mining tunnel (11), on an end face of the last pipe ring (4) of shield tunneling are installed a plurality of hanger bolts (15) for hanging a protective door curtain (14), the hanger bolts (15) penetrate into bolt holes on sides of the last pipe ring (4) of shield tunneling, the hanger bolts (15) are used as door curtain hanging points, and the protective door curtain (14) is made of wire rope meshes;

then, on last three to five pipe rings (4) of shield tunneling are covered a pipe segment cover (16), the pipe segment cover (16) includes a wooden board underlying layer and a cotton protective cover laid on the wooden board underlying layer;

in the construction process of the transitional section of the mining tunnel (11), transport vehicles reverse from a shield tunneling starting station (13) to enter the excavating face and depart along a direction of traffic, the tunneling starting station (13) is used as a vehicle U-turn and temporary equipment storage area to output residues generated during the construction of transitional section of the mining tunnel (11); and

the transition section of mining tunnel (11) has a length of 30m ~ 50m;

S5, forming the transitional section of the mining tunnel (11) as per following processes of:

S501, arranging one or more ring beams (17) at an end of the last pipe ring (4) of shield tunneling near the mining tunnel (11), wherein the ring beams (17) are of a reinforced concrete structure, steel bars in the ring beams (17) are fixedly connected with embedded steel plates (20) and sealing reinforcement ribs (6) in the last pipe ring (4) of shield tunneling; one end of the ring beams (17) extends outside the pipe rings (4) and is fixedly connected to the shield shell (2), and another end of the ring beams (17) extends 10cm

into the pipe rings (4);

S502, roughening construction joints between the ring beams (17) and the last pipe ring (4) of shield tunneling, and providing the same with water-expandable water-stop strips and grouting pipes; and

S503, performing a secondary lining construction on the transitional section of the mining tunnel (11), wherein a secondary lining (19) of the transitional section of the mining method tunnel (11) is done by pouring concrete for both the ring beams (17) and the secondary lining (19) simultaneously, and extending and lining one side of the ring beams (17) far from the transitional section of mining tunnel (11) to build an extended lining (18) of transitional section of the mining tunnel (11), the extended lining (18) extends into the last three to five pipe rings (4) of shield tunneling, further, gaps between the shell of the shield tunneling machine (2) and the pipe rings (4) are filled by shield tail grouting, so that the secondary lining (19), the ring beams (17), the extended lining (18), the pipe rings (4) and the shell of the shield tunneling machine (2) are cast to be an integral structure; and

S6, constructing the mining tunnel (11), wherein the mining tunnel (11) is excavated by blasting, in the process of constructing the mining tunnel (11), transport vehicles use the mining tunnel (11) as a vehicle U-turn and temporary equipment storage area to output residues newly generated during the construction of the mining tunnel (11).

2. The method for reconstructing a shield tunnel for mining construction according to claim 1, wherein the embedded steel plates mentioned in the S501 are arranged in the last pipe ring (4) via anchor ribs.

3. The method for reconstructing a shield tunnel for mining construction according to claim 1, wherein pipelines are adjusted accordingly to meet requirements of the mining tunnel construction while carrying out horizontal road construction mentioned in the S3; the

mentioned pipelines include ventilation pipes, water supply pipes, sewage pipes, high voltage cables, lighting lines, communication lines, walkway board pipelines and transformer pipelines; and the transformer pipelines removed from the shield tunneling machine are installed onto side walls of the pipe segments through bolts.

4. The method for reconstructing a shield tunnel for mining construction according to claim 1, wherein a diameter of each mesh of wire rope meshes mentioned in the S4 is 100mm~200mm.

5. The method for reconstructing a shield tunnel for mining construction according to claim 1, wherein the amount of hanger bolts (15) is 8~ 10 and the 8~10 hanger bolts (15) are evenly arranged on the end face of the last pipe ring (4) of shield tunneling.

6. The method for reconstructing a shield tunnel for mining construction according to claim 1, wherein the micro-expanding cement mentioned in the S104 is alunite expansive cement.