~~[CLAIMS]~~

WHAT IS CLAIMED IS:

~~[Claim 1]~~

1. An excavation system using a water jet, comprising:

~~a moving unit movable over an area that is to be blasted;~~

~~an articulated robot arm disposed on the moving unit;~~

a robot arm;

a water jet nozzle mounted on a leading end of the robot arm; and

~~a supply unit which supplies high pressure water to the water jet nozzle; and~~

a control unit which controls ~~the moving unit,~~ the robot arm, so that a continuous free surface having a predetermined depth can be formed, using the water jet ejected from ~~and~~ the water jet nozzle, around a surface to be excavated in a direction in which the tunnel is to be excavated,

wherein the water jet nozzle comprises a depth sensor part that measures a depth of the free surface, formed on the surface to be excavated, that is crushed,

the control unit controls the robot arm and a supply unit based on the depth that is crushed.

2. The excavation system according to claim 1, further comprising the supply unit, which supplies high pressure water to the

water jet nozzle.

~~[Claim 2]~~

3. The excavation system according to claim ~~1~~ 2, wherein the supply unit supplies an abrasive along with high-pressure water.

~~[Claim 3]~~

4. The excavation system according to claim 1, further comprising: a ~~line~~ recognizing means for recognizing a ~~predetermined color line which is pained~~ pattern to be crushed formed on ~~a~~ the surface to be excavated,

wherein the control unit controls the robot arm so as to follow the ~~line~~ pattern to be crushed that is recognized by the ~~line~~ recognizing means.

~~[Claim 4]~~

5. The excavation system according to claim ~~3~~ 4, wherein the ~~line comprises a~~ pattern to be crushed is a line that is painted, and

the control unit controls the robot arm so as to follow the line that is recognized by the recognizing means and is painted.

6. The excavation system according to claim 4, wherein the recognizing means recognizes position information of a plurality of locating terminals installed on the surface to be excavated, and the control unit controls the robot arm so as to follow the position information that is recognized.

7. The excavation system according to claim 4, wherein the pattern to be crushed is a guideline based on a laser that is

irradiated from a rear of the robot arm and is displayed on the surface to be excavated, and

the control unit controls the robot arm so as to follow the guideline that is recognized by the recognizing means.

~~[Claim 5]~~

8. The excavation system according to claim ~~1~~ 4, wherein the pattern to be crushed ~~of the surface to be excavated that is formed by the water jet nozzle~~ comprises an arch-shaped pattern.

~~[Claim 6]~~

9. The excavation system according to claim ~~5~~ 4 or 8, wherein the pattern to be crushed basically comprises the arch-shaped pattern to which a zigzag pattern is combined.

~~[Claim 7]~~

10. The excavation system according to claim 1, wherein

the water jet nozzle comprises a ~~depth~~ width sensor part ~~which~~ that measures a depth of the free surface, formed on the surface to be excavated, that is crushed ~~by the high-pressure water~~, and

the control unit controls the robot arm and the supply unit based on the depth that is crushed.

~~[Claim 8]~~

~~The excavation system according to claim 7, wherein~~

~~the water jet nozzle comprises a width sensor part which measures a width of the free surface that is crushed by the high-pressure water, and~~

~~the control unit controls the robot arm and the supply unit based on the width that is crushed.~~

~~[Claim 9]~~

11. The excavation system according to claim ~~7~~ 1, wherein the depth sensor part is based on a laser.

~~[Claim 10]~~

12. The excavation system according to claim ~~8~~ 10, wherein the width sensor part is based on a laser.

~~[Claim 11]~~

13. The excavation system according to claim 1, wherein the water jet nozzle is stretchably mounted on a plurality of the robot arms ~~such that the water jet nozzle crushes a surface to be excavated~~.

~~[Claim 12]~~

~~An excavation system comprising:~~

~~an arch-shaped frame which is movable back and forth with respect to an area to be blasted for tunnel excavation;~~

~~a moving means movably meshed with the arch-shaped frame;~~

~~a water jet nozzle which is fixed to and supported on the moving means, and ejects high-pressure water to the area to be blasted; and~~

~~a control unit which controls the moving means and the water jet nozzle.~~

~~[Claim 13]~~

~~The excavation system according to claim 12, wherein the moving means is meshed with a rail which is provided on the arch-shaped frame.~~

~~[Claim 14]~~

~~The excavation system according to claim 13, wherein the moving means includes the rail, wherein the rail comprises a first rail which enables the frame to move back and forth and a second rail which enables the water jet nozzle to move.~~

~~[Claim 15]~~

~~An excavation method comprising a first process of forming a free surface having a predetermined depth in a surface to be excavated using a water jet.~~

~~[Claim 16]~~

~~The excavation method according to claim 15, further comprising a second process of forming charge holes in an area inside the free surface using the water jet.~~

~~[Claim 17]~~

~~The excavation method according to claim 16, further comprising a third process of charging the charge holes with explosives and blasting the explosives.~~