

This method is effective in cost reduction and contributes to developing a recycle-based society.

ISM (in situ mixing) method





ISM method

The gravels on site are not disposed. They will be used for foundations and structures by mixing with cement milk. It is an efficient way of construction which is based on a new concept.

Effectiveness of the method

It was common to dispose of the excavated materials when a structure was built on gravel ground. This way, the volume of disposal of excavated material is drastically decreased by turning it into the aggregate. This method achieves a reduction in the burdens placed on to the environment. This method also improves safety as well as cost reduction through the use of the high mechanized construction.

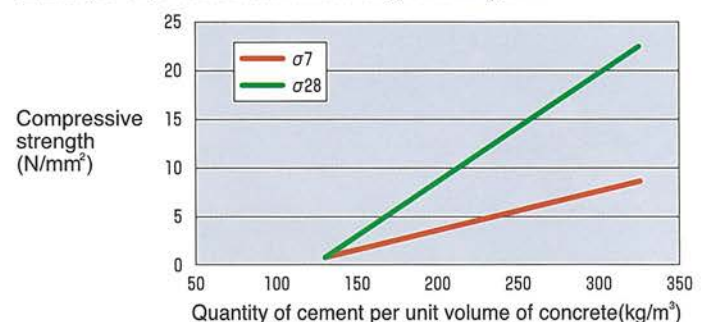
Applicable soil

- Applicable ground: Composed of cobble stone and gravel which have necessary strength
- Applicable gravel size: diameter of less than 300mm (Big size material is removed by using skelton bucket.)

Quantity of cement per unit volume of concrete and compression strength

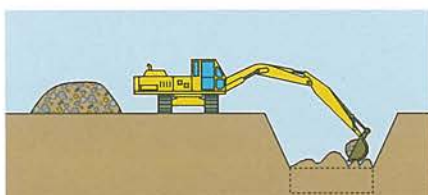
- Quantity of cement per unit volume of concrete: decided by trial mix

■ Example of portland blast furnace slag cement type B



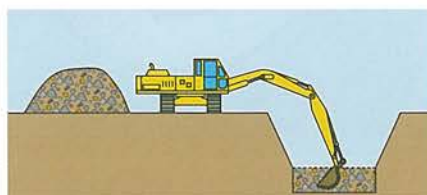
Outline of standard work execution of ISM method (single-layer construction)

① Excavation, temporary placement, large stone removal



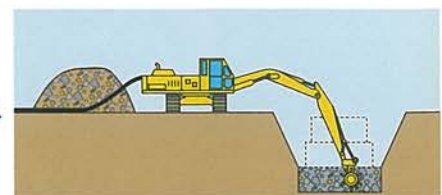
With the lowermost layer (first layer) left, soil of the upper layer is excavated and temporarily placed by backhoe and 300mm or greater particle sizes are removed.

② Loosening treatment and large stone removal



The lowermost layer (first layer) is loosened by backhoe. Or particle sizes greater than 300mm are removed.

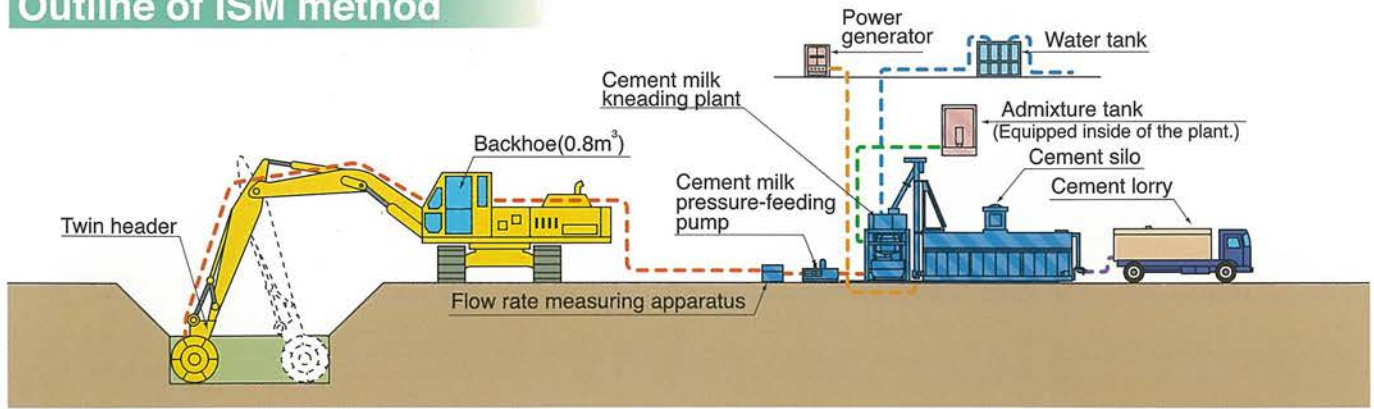
③ Agitation and mixing and plant operation



With an agitator and mixer mounted to the backhoe, gravels and cement milk are agitated and mixed

g) method

Outline of ISM method



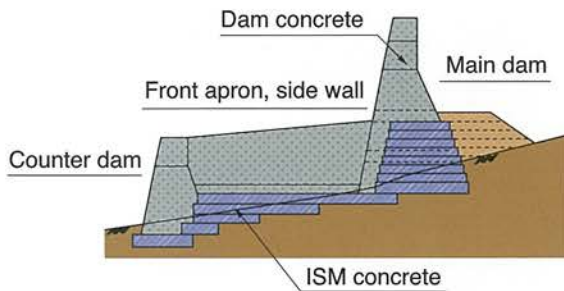
The equipment for this method, composed of the plant for production and transport of cement milk made of cement, water and admixtures, and twinheader attached to the backhoe mixes the gravels and cement milk. Gravels with diameter of less than 300mm, (excavated in advance) and cement milk produced in the plant are mixed. In using it for foundations and structures, the required strength will be achieved.



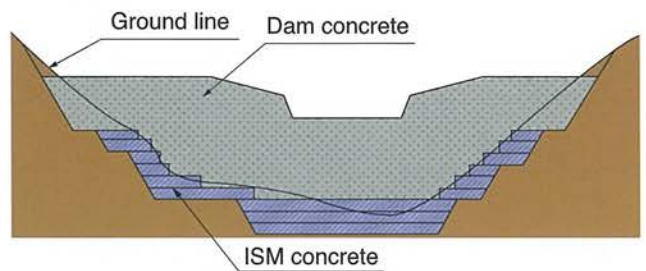
■ Twin header attached to the backhoe

Application of ISM method

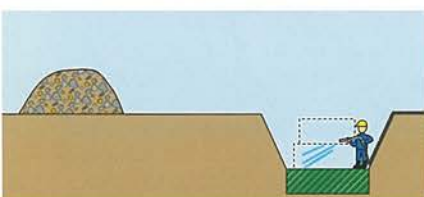
Foundation of Sabo dam, groundsill, riverbed girdle, front apron, etc.
(Construction of artificial bedrock)



Wing of Sabo dam, groundsill, etc.
(Retain wing slope face quickly.)

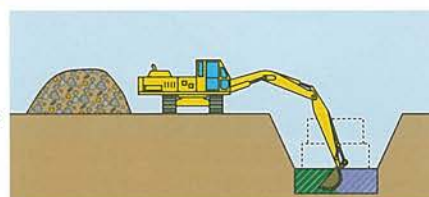


④ Horizontal construction joint treatment



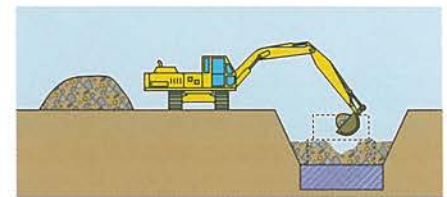
Laitance on the surface is removed.

⑤ Vertical construction joint treatment



Loose rocks, etc. are removed by backhoe bucket.

⑥ Backfilling



Backfill temporarily stored soil on the finished layer.

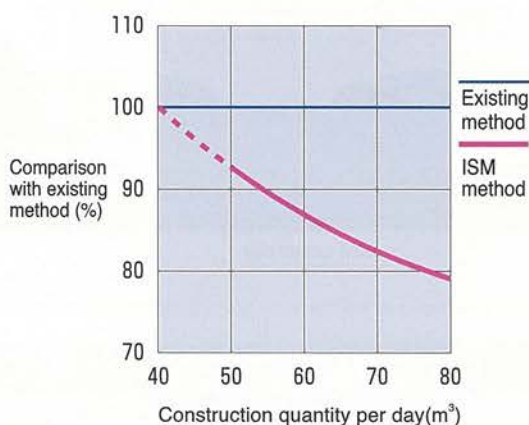
Repeat processes ③ through ⑥ from the second layer.

Merit of the method

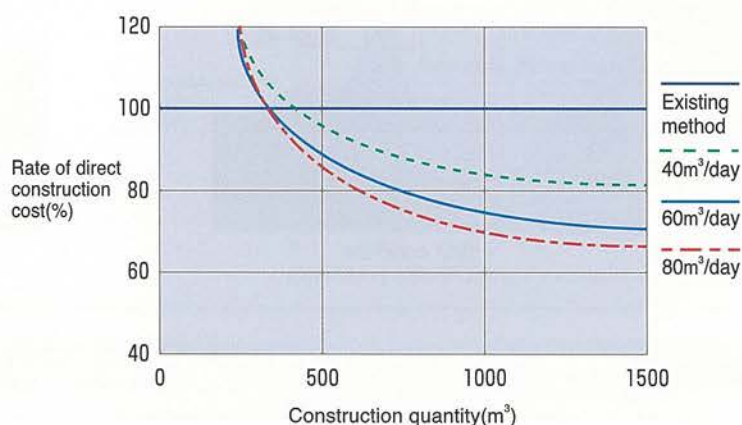
This method is a peculiar method of construction based on a new idea. There are many merits for it in comparison with the existing methods. They are as follows:

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|---|---|
| <p>1 Manpower saving in work execution</p> | <p>The excavation quantity is reduced, heavy manpower labor such as assembly and dismantling of formworks and scaffolding, concrete placement, etc. are eliminated, and work can be executed by a small number of workers using general-purpose machinery and equipment.</p> |
| <p>2 Reduction of construction by-products</p> | <p>Because the ISM mixture is manufactured with site-generated gravels (including excavated soil) used as material, construction surplus soil decreases.</p> |
| <p>3 Reduction of environmental load</p> | <p>Not only the quantity of construction surplus soil transported and concrete carried into the site is reduced, but also there is no need to newly construct the surplus soil disposal site, and the load exerted to the surrounding environment can be reduced.</p> |
| <p>4 Improved safety</p> | <p>Manpower work at a narrow space on the excavated surface or on scaffolding, and dangerous work such as moving formworks by crane, concrete placement work, etc. are reduced and the safety is improved because the standing period of the excavated slope face can be shortened by rapid work execution.</p> |
| <p>5 Shortened contract period</p> | <p>The contract period can be shortened by rapid work execution achieved by simplification and mechanization of the work contents.</p> |
| <p>6 Cutting of construction cost</p> | <p>The construction cost can be cut by manpower saving in work execution, a shortened contract period, and a reduction of construction by-products.</p> |

Comparison of construction period



Comparison of cost



ACTEC(Advanced Construction Technology Center)

2-15-6 Ootuka, Bunkyo-ku, Tokyo, 112-0012, Japan
Phone +81-3-3942-3990 Facsimile +81-3-3942-0424

ISM method Association Office

2-4-1 Kamiochiai, Chuo-ku, Saitama City, Saitama, 338-0001, Japan
Phone +81-48-851-5513 Facsimile +81-48-851-5514