Abstract:

tion as r

cooled slag by applying light crushing. The bene fts

where regular material was used, and Districts B, C, and D where slag was mixed in. The change in value shortly after construction was relatively small, i.e., approximately 1–3 mm, and was far below the figure of 30–40 mm requiring maintenance and repair.

Sliding resistance value BPN (BPN: British Pendulum Number, which is recommended to be 40 or higher at a flat surface road) was 68 to 72 shortly after construction and gradually decreased to approximately 60 after 15 months. There were no differences in BPN between the construction districts with regular recycled dense asphalt concrete and that with 15% mixture of air-cooled slag.

After 37 months, there were no cracks or hairline-crack generation in any of the districts.

A follow-up study was conducted until 38 months after construction in District II, and cross-sectional shape, sliding resistance and crack propagation showed no effects from using the slag mixture.

3.1.4 Reuse test

Characteristics as reuse roadbed material were studied by digging up roadbed material from part of the test construction district. Constructed material was dug up 12 months after the construction at District I and 13 months after the construction at District II.

A compounding test on the dug-up roadbed material was conducted without size adjustment or mixture with the other materials, to simulate the future reuse.

Table 4 shows the results of the compounding test for RM-40 mixed with 50% slag of the dug-up material at Construction District II and RC-40 also mixed with 50% slag. The results are nearly the same as those for the compounding test at the initial construction period and they satisfy the standard values both in corrected CBR and plasticity index. Therefore, it was concluded that the material is suitable for reuse. The results of the reuse test at Construction District I were also the same.

Based on the above, it was confirmed that roadbed material using air-cooled slag could be used for application equivalent to regular material as roadbed material or asphalt mixture material.

3.1.5 Actual application of roadbed material in Yokohama City[4)]

Citizens, business owners and the municipal government of Yokohama have been working together to recycle and reduce the volume of waste, as well as pursuing resource-saving and recycling-based urban development following the “General Waste Processing Plan.” An ash melting furnace was introduced at the Kanazawa Plant of the Environmental Division (currently Resource-Recycle Division) of Yokohama City as and rounded by a rotary-type slag-forming machine, then supplied as product.

Characteristics of slag produced by this process satisfy JIS for crusher-run stone 40–0 mm (C-40) by adjusting crushing/forming/granular size as shown in **Table 5**.

This slag has a larger diameter, higher corrected CBR value and relatively high strength due to the application of the air-cooled process.

3.2 Application as Aggregate for Secondary Concrete Products[5)]

3.2.1 Aggregate for interlocking blocks

Permeable interlocking block used for walkways and widely commercialized as landscaping material was content of 50% or higher.

3.2.2 Aggregate for hollow concrete blocks

Hollow concrete blocks were produced as a trial run by utilizing air-cooled slag obtained by crushing and adjusting granular size mixed to the given proportion shown in **Table 8** as aggregate. The blocks contain 23.8% slag consisting of 13.6% sand slag (equivalent to No. 7 crushing stones (5-2.5)) and 10.2% powder slag (equivalent to crushing sand (2.5-0)). This indicates that the equivalent of 26.9% aggregate except cement has been converted.

The prototype hollow blocks satisfed the required compressive strength, as shown in **Table 9**.

3.3 Application as Base M). RA0PAP3R(S)ag s9Base

because the slag is not easily pushed around under the pipes compared to water granulation slag from a blast furnace.

The above results confirm that eco-slag using waste material can be satisfactorily used as base material for sewage water pipes.

4. Conclusion

Various slags produced from melting systems developed by JFE Engineering satisfy the quality standards set forth by JIS for the safety of slag products as introduced in this paper and also satisfy the standards for physical properties for the uses described here. This indicates that the slag can be fully and effectively used.

It is possible to minimize the final volume generated from waste material processing by fully utilizing the salg, by using the technology for recycling metal form the melting systems and by reducing the volume of molten fly ash from the waste melting process with non-ferrous smelting. Therefore, this technology can greatly help recycle resources in society. The technology for utilizing slag produced from the melting systems of JFE is expected to become widely used in the near future.

JFE Engineering express its gratitude to all parties involved from the municipalities and to those who used