

Base and Subbase Applications



NEEDS A CAPTION!

Introduction

In a pavement structure, the granular base and subbase are compacted aggregate layers between the asphalt concrete or the Portland cement concrete pavement layers and the underlying subgrade material. The base is the load bearing layer directly immediately below the pavement layers, and serves to provide strength and support to the overlying pavement. The subbase is below the base and serves as the foundation for the overall pavement structure, transmitting traffic loads to the subgrade while providing drainage and frost protection. These layers are formed by spreading the aggregate in thin layers and then compacting it with heavy equipment until the material forms a dense layer of interlocking aggregate. To perform well, base and subbase aggregates must be strong and durable, and must meet very specific gradation requirements.

IRC Materials in Flowable Fill

Traditionally, aggregates for base and subbase applications were composed of sand, gravel, crushed rock, quarry stone and other natural mineral materials that provided the necessary strength and durability. Natural aggregates are still the primary materials used in base and subbase applications, though many states are now also using IRC materials in these applications because they can achieve comparable performance at a competitive price. In fact, a number of states consider air cooled blast furnace slag to be equivalent to natural materials and it has been used very successfully as fine aggregate. Similarly, foundry sands are essentially high quality natural sands, so they have also been used very successfully as fine aggregate in base and subbase applications. Construction of these unbound pavement layer are also one of the major uses for coal bottom ash, more so than coal fly ash, though Class C coal fly ash has been allowed to hydrate and been crushed to form a coarse aggregate material. Crushed concrete makes both coarse and fine aggregate suitable for base material, and has been used for subbase applications as well. One benefit of recycling concrete is that it keeps high quality natural aggregates in use. In addition, Portland cement concrete pavements can be recycled on site, which reduces project costs by eliminating the transportation costs associated with removing the old concrete. Lastly, while not normally considered a hard aggregate, tire chips have also been used in base and subbase applications, usually mixed with other aggregate materials. The major driver for using tire chips is that they provide good drainage while reducing the weight of the aggregate layer.

Benefits

The use of IRC materials in high volume applications like base and subbase layers reduces the need for mining virgin aggregate and the associated use of water, fuel and reduces carbon dioxide emissions, while also saving valuable landfill space. At the same time, the performance of these materials is as good or better than natural materials, which provides added value to the project because of the reduced costs.



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