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PROMOTION SPOTLIGHT | 2014

New Technique for Strengthening Road Subgrades Utilized for Eugene, Oregon

1 Street prior to construction

2 Initial Pulverization

3 Discharge of cement/sand slurry

The City of Eugene Oregon specified an innovative technique for strengthening their subgrade on the urbanized, residential streets of North Shasta Loop and Firland Blvd. Eugene utilized in place cement treated base (ICTB) with cement slurry as the soil stabilizer. ICTB has been in practice for decades as a cost effective way to strengthen the subgrade by utilizing existing materials rather than conventional removal and replacement of the existing base. This method includes pulverizing the existing AC and utilizing it as an aggregate source for the new base. Since the profile of the residential streets included curbs and sidewalks, 7" of this pulverized material was removed via dump trucks in order for the final AC surface to match existing grade. Then a total of 9200 square yards of existing road base were mixed in place with the sand/ cement slurry for the new base. By using this new ICTB method, the environmental and financial savings included 270 truck delivery trips and 3500 tons of virgin aggregate.

Prior to 2014, Eugene specified cement powder for their ICTB projects. Considering the potential for residential impacts due to airborne cement dust, the City developed a mix design that used a cement and sand slurry paste. A cement/ sand paste slurry application was chosen over a cement and water slurry to minimize movement of the stabilizer material due to the steep grades of the roadways. The City worked with the Lane County geotechnical lab to test soils cylinders in order to determine the exact amount of cement to add to the slurry. The target strength was 300 – 500 psi.

During the bidding process, it became evident to the City that this would be a new technique for all potential bidding contractors, and the key concern during the bid period was how the slurry was to be placed. The winning bidder was Best Grinding (now known as West Coast Soil Solutions), of Portland, Oregon. They proposed using an asphalt paver to spread the cement and sand paste. Best Grinding worked with the General Contractor and the City to construct a few test sections, and the equipment performed well, and was accepted.

To hit the target cement percentage and thickness during placement, only the height of the paving screed needed to be adjusted. The cement and sand slurry was discharged from a typical ready mix truck into the front of the asphalt paver. The 'pull distances' were precalcuated and monitored to assure that the right quantities were applied.

In summary, the cement and sand ICTB slurry eliminated potential impacts of the cement dust. This process looked more similar to an asphalt paving operation than a soil modification process, and fit the urban environment well. Quality control was easily achieved by adjusting the height of screed, and if soft spots were encountered, the 'paving train' could be reversed and additional slurry applied where needed. The City of Eugene delivered a newly constructed and paved 1300 foot street in 5 days, to very appreciative residents. The City will continue to utilize this process for future projects.

4 Discharge of cement/sand slurry

5 Remixing materials

6 Compaction

7 Testing

Typical Construction Sequence of new technique for strengthening subgrades

1. Monday morning, existing HMA street prior to start of work
2. Initial pulverizing. The existing AC was mixed into the base as a new aggregate source for the constructed base.
3. Concrete ready mix concrete truck discharging cement and sand slurry into asphalt paver
4. Discharge of cement and sand slurry into the front end of the asphalt paver. Note the consistency of the slurry is similar to 'chocolate mousse'.
5. Pulverizer mixing the cement and sand slurry with the new base aggregate material
6. Sheep's foot rolling and compacting the ICTB
7. Nuclear density gauge was used to insure that the moisture content and compaction was appropriate to achieve the design strength.

Project Team

Owner:	City of Eugene, Oregon
Engineer:	City of Eugene, Oregon
Geotechnical Lab:	Lane County, Oregon
FDR Contractor:	West Coast Soil Solutions
Cement Slurry Producer:	Knife River

For more information, contact:
Diane Warner, PE
Pavement Engineer
Portland Cement Association Northwest Region
Phone: (503) 780-9505
Email: dwarner@cement.org