

USING RAW CHAT IN HOT MIX ASPHALT FOR PAVEMENT APPLICATIONS¹

N. M. Wasiuddin, W. B. Hamid, M. M. Zaman, R. Nairn and T. Landers²

Abstract. Over 35 million cubic meters of chat, a waste material of lead and zinc mining, are presently stockpiled at the Tar Creek Superfund Site. Currently, Oklahoma Department of Transportation (ODOT) uses up to 20% washed chat in hot mix asphalt (HMA). This paper presents the results of an experimental study to maximize raw chat in HMA, designed in accordance with the Superpave mix design methodology. Raw chat was combined with locally available limestone aggregates. Bench scale laboratory tests pertaining to engineering properties were conducted on aggregates. Trial blends were prepared by varying percentages of raw chat, and volumetric analyses were carried out for each blend so as to achieve a 4% air void content. The Superpave volumetric requirements, namely voids in mineral aggregates (VMA) and voids filled with asphalt (VFA) at 4% air void, were achieved satisfactorily in all the mix designs attempted. Chat-asphalt mixes also did well in performance tests, namely moisture susceptibility and APA rut. All specimens exhibited a much higher tensile strength ratio (above 0.9) than that required (minimum of 0.8) in moisture sensitivity tests. These mixes also performed well (<2 mm (0.08 in)) in APA rut tests (maximum of 4 mm (0.16 in) is allowed).

Additional Key Words: Superpave, voids in mineral aggregates, voids filled with asphalt

¹Paper was presented at the 2005 National Meeting of the American Society of Mining and Reclamation, June 19-23, 2005. Published by ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

²Nazimuddin M. Wasiuddin, Doctoral Student, Wamiq B. Hamid, Former Graduate Student, Musharraf M. Zaman, Professor, Robert Nairn, Associate Professor, School of Civil Engineering and Environmental Science, and Thomas Landers, Associate Dean for Research, College of Engineering, University of Oklahoma, Norman, Oklahoma 73019.