EXECUTIVE SUMMARY

Title: “Efecte de la incorporació de cautxú de NFU’s sobre l’estabilitat i la cohesió d’una mescla per a capa base

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Every year, we dispose of millions of tyres around the world. These unwanted tyres are polluting the environment, they can possibly affect public health and they are a constant threat of fuelling fires because they are highly flammable. Further more, these tyres present a huge dilemma at their final stage of disposal as they are considered solid waste and therefore need to, either, be stored underground, need to be kept in storerooms or need to be burnt with the unfortunate and awful consequence of gas emissions directly into our atmosphere.

The answer to the necessity is to recover some of the materials from the unwanted tyres and disregard the poisonous components, designing a bituminous bonding mixing it with crumb rubber emerging from the mechanical destruction of these tyres for a asphalt mixture, this way we achieve the objective and we provide a solution to a very specific problem.

This thesis will focus on the usage of the crumb rubber as a bond modifier and as a better option for asphalt mixture for the usage in construction of flexible and semirigid pavements.

The purpose of this study is analyse the effect of the addition of crumb rubber emerging from the grinding of the unwanted tyres in the stability and resistance of this asphalt mixture for a base layer.

That is the reason why a fixed mix G-20 is produced using four kinds of bonds: bitumen of B-60/70 penetration as a reference, a bitumen modified by crumb rubber introduced through humid process, the previous bitumen but with 1% of crumb rubber added through a dry process and the same bitumen but with 2% of crumb rubber through dry process. These mixes are tested through Marshall and indirect tensile strength.

In this way, we have carried out 72 tests, half of them tested through the Marshall-like, and the remaining through indirect tensile strength. After that, we have added to the mixes produced 3, 4 and 5% of bitumen in order to observe their evolution, depending on the amount of bitumen.

The results obtained from these tests, show a reduction in density and porosity of the mix, the more amount of crumb rubber you add through dry process. Moreover, the more amount of bitumen inside the agreed interval, higher are the deformation values, although lower the stability values but always within the limits of Spanish law for this kind of tests.

Finally, we determine the optimum mixture content of bitumen for each of the mixtures considered in this research project and the effect of crumb rubber along the evolution of stability properties and cohesion through a base layer.