



NATIONAL SLAG ASSOCIATION

Steel Furnace Slag SMA Mix Proves to be “The World’s Strongest Intersection”*

Steel Slag’s toughness, stability and durability provided the answer to a problem no other material was able to provide.

Challenge:

Thornton, IL is the home to one of the world’s largest limestone quarries and during the construction season ships 50,000 tons per day. The only way in or out is through the intersection of Margaret and Williams Streets. Thornton quarry provides the majority of the mineral aggregates used throughout South Chicago and Northwest Indiana. The vast majority of this aggregate travels by truck through the intersection of Margaret and Williams Streets on it way to the marketplace. The intersection must be able to sustain the stresses of high load braking, stopping and turning as it endures around-the-clock pounding of thousands of fully loaded semi-trailers hauling stone and hot mix asphalt to construction sites and to other construction material producers.

Solution:

An SMA surface treatment consisting of steel furnace slag was recommended as the solution to this nagging problem after all other attempts to repair the road failed after only a short period of time and usually less than one year.

One constraint was time to repair and replace the existing pavement. No one wanted the intersection closed even for a day and the repair had to be complete in a 24-hour period; so concrete was not a viable solution. But the asphalt previously used to pave the intersection failed usually after only a few months.

On several previous occasions, the intersection has been paved, repaved, and even re-worked to the sub-base. Until recently, regardless of the effort or dollars expended, the performance of the pavement surface continually fell short of

Illinois DOT (IDOT) expectations. Typically, it required maintenance or rehabilitation even before one year passed. Several of the intersection's distresses have occurred because the pavement never fully relaxes. Over 1200 heavy trucks per day enter the intersection, most of them stopping at the traffic light or making turns in the 11-foot wide lanes.

After extensive analysis and through a collaborative effort between IDOT, Asphalt Institute engineers, hot mix producers and Asphalt Institute member companies, a steel slag SMA was specified for the surface course to provide a high-friction surface and the stone-on-stone contact needed to handle the 750,000 equivalent axle loads (ESAL's) per year. The SMA mix has been down and in use on Margaret and Williams Streets for more than 5 years and has outperformed any previously laid down material.

IDOT was so confident in the steel slag SMA mix's ability to perform that in the summer of 1998 they let a major resurfacing job on I-94 in Chicago using a similar steel slag mix. This was the largest steel slag SMA project built to date in the region.

Steel Slag SMA is now being used in other high load, high traffic situations where a rut-resistant mix is essential. **At the Margaret and William's intersection, asphalt technologists are showing how hot mix asphalt remains capable of producing the world's strongest intersection.**

SMA Mix Specifications

IDOT Mix Design

GADATION	CM 11 Steel Slag	CM 13 Steel Slag	FA 20 Dolomite	Mineral Filler	FIBER Slag	BLEND	SPECIFICATION
1"	100	100	100	100	100	100	100
3/4"	100	100	100	100	100	100	100
1/2"	39	100	100	100	100	84.8	85 – 100
3/8"	9.0	78.4	100	100	100	64.1	26 -78
#4	4.0	21.0	99.5	100	100	27.7	20 -28
#8	3.0	6.9	84.0	100	100	17.8	16 -24
#16	3.0	7.8	52.4	100	100	14.5	
#30	3.0	4.4	29.2	100	100	12.7	12 – 18
#50	3.0	4.1	15.7	100	100	11.7	12 -15
#100	3.0	3.4	10.0	99	100	10.8	
#200	1.5	3.0	7.1	83.9	100	8.9	8 – 12

* Asphalt Institute