

2011

Duluth I-35 NGCS Open House OBSI Testing

On September 22, 2010 the IGGA conducted an NGCS Open House in Duluth, Minnesota to commemorate the first large production NGCS project. The project, constructed on I-35 in Duluth Minnesota by Interstate Improvement, was approximately 125,764 sq yds. of NGCS diamond grinding.

Prior to the Open House, OBSI testing of the NGCS section was conducted to present the results to the group. The SB and NB I-35 roadways tested at 100.2 and 100.5 dBA, respectively.

Just prior to the open house Interstate Improvement constructed a 2000 ft long, one lane wide, NGCS LITE test section on I-35 NB using Husqvarna blades. The NGCS LITE texture tested at 99.6 dBA prior to installing the grooves.



Duluth Minnesota



Introduction

The Minnesota Department of Transportation let a Next Generation Concrete Surface (NGCS) project on I-35 through downtown Duluth. The project consisted of diamond grinding 125,764 sq. yds. of the existing transverse texture with the NGCS texture. Interstate Improvement was the contractor on the project and constructed the largest NGCS project to date.

To commemorate this event, the IGGA hosted an open house on September 22, 2010 to showcase the event. Speakers provided overviews of the project and the development of the NGCS surface.

On September 17, 2010 the ACPA conducted OBSI testing of the NB and SB NGCS surfaces and the existing transverse tining that still existed at a few locations. This testing was accomplished to provide the results at the open house.

The day before the open house, Interstate Improvement constructed a one-lane wide by 2000 ft long flush grind texture using Husqvarena's newly developed blades for construction of the NGCS LITE texture. This test section, located on NB I-35 begins just north of exit 250 on a long down grade. The test section was constructed on September 21st, 2010. The ACPA attempted to conduct OBSI testing on the 21st but the results were sporadic due to speed control issues and external noise produced by the grinding equipment in the adjacent lane.

Duluth I-35 NGCS Construction

The I-35 roadway consists of two as-built projects, one approximately 45 years old on the south end and one approximately 20 years old on the north end. For the OBSI testing it was decided to test the northern as-built project to provide a better representation of the texture as it was felt there were fewer slab repairs on the newer project.

OBSI testing was conducted on September 17th, 2010 just north of the tunnel sections as indicated in Figure 1. Testing was conducted using the ACPA 2009 SRTT tire and in general conformance to the AASHTO TP 76 specifications with the exception that the frequency range was 500 to 5000 Hz. The temperature was 55° Fahrenheit during testing. It had rained that night and testing was conducted about 10 AM after the pavement had dried.



SB I-35 OBSI Test Location



NB I-35 OBSI Test Location

Figure 1 Location of OBSI Testing

Figure 2 indicates a close up photo of the NGCS texture. The 1/8 inch wide grooves were spaced on approximately 5/8" centers. This texture was constructed by first profile grinding the surface using a

conventional diamond grinding process. Once the profile grinding was completed, a single pass NGCS surface was then constructed. The existing sealed joints (hot pour) remained and were not resealed.



Figure 2 Duluth I-35 NGCS Texture

NGCS OBSI Results

Figures 3 and 4 indicate the OBSI results for the NGCS surface. As indicated in Figure 3, the NGCS surface was almost 7 dBA quieter than the existing transverse tined texture that still existed at a couple locations on the north end of the project. The results of the NB and SB roadways for the NGCS surface were similar.

Figure 4 indicates the spectra results for the three surfaces. As indicated, the transverse tined surface has higher levels at all frequency bands. The NB NGCS produced slightly higher results above 1600 Hz.

NGCS LITE Texture

On September 21st, Interstate Improvement constructed a 2000 ft. long, one lane wide, NGCS LITE test section on I-35 NB just after exit 250. Recently developed Husqvarna blades were used to construct the NGCS LITE texture. Testing was conducted prior to groove construction so it represents only the flush grind condition. Figure 5 indicates the NGCS LITE texture by itself without grooves. Figure 6 indicates the NGCS LITE texture (without grooves) alongside a conventional diamond grind (CDG) texture.

The ACPA attempted OBSI testing of this surface on September 21st but the results were highly variable. This was assumed to be the result of speed control issues and a diamond grinding machine operating in the adjacent lane. Four passes were conducted on the 21st, two uphill and two downhill. The results were not used due to the variability.

The ACPA retested the site on September 22st and made four passes as before. Since the test section is constructed on a downgrade it presents speed control issues to maintain the test speed of 60 mph. The speed variability was somewhat of an issue on the second attempt also.

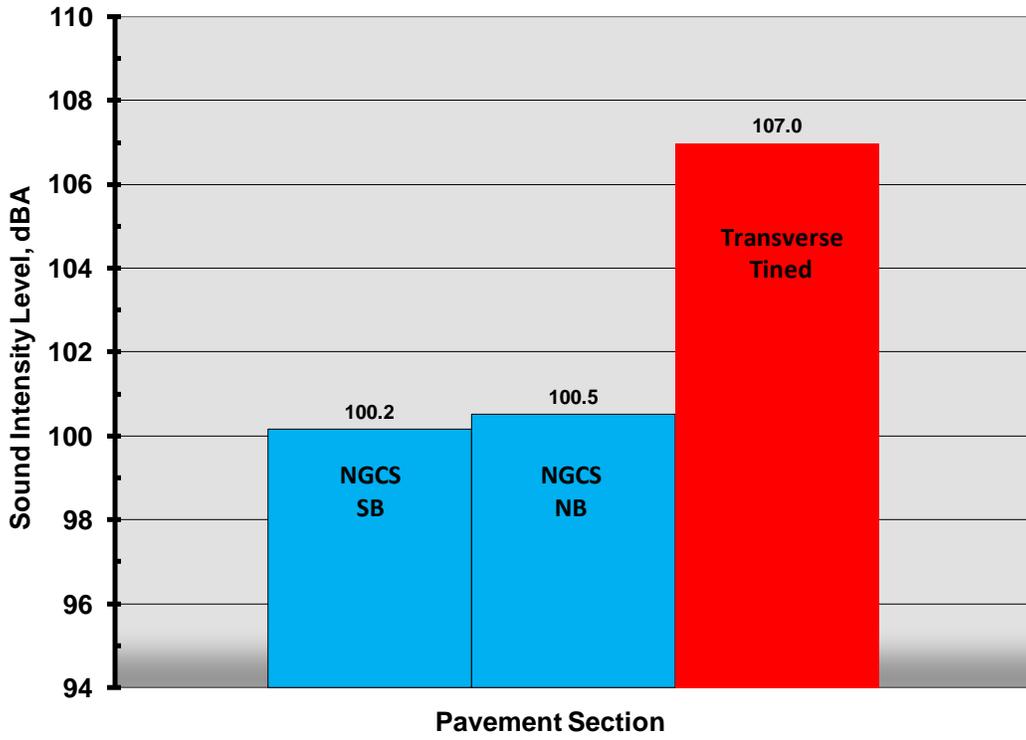


Figure 3 OBSI Level of the Duluth NGCS Surface and Existing Transverse Tined Surface

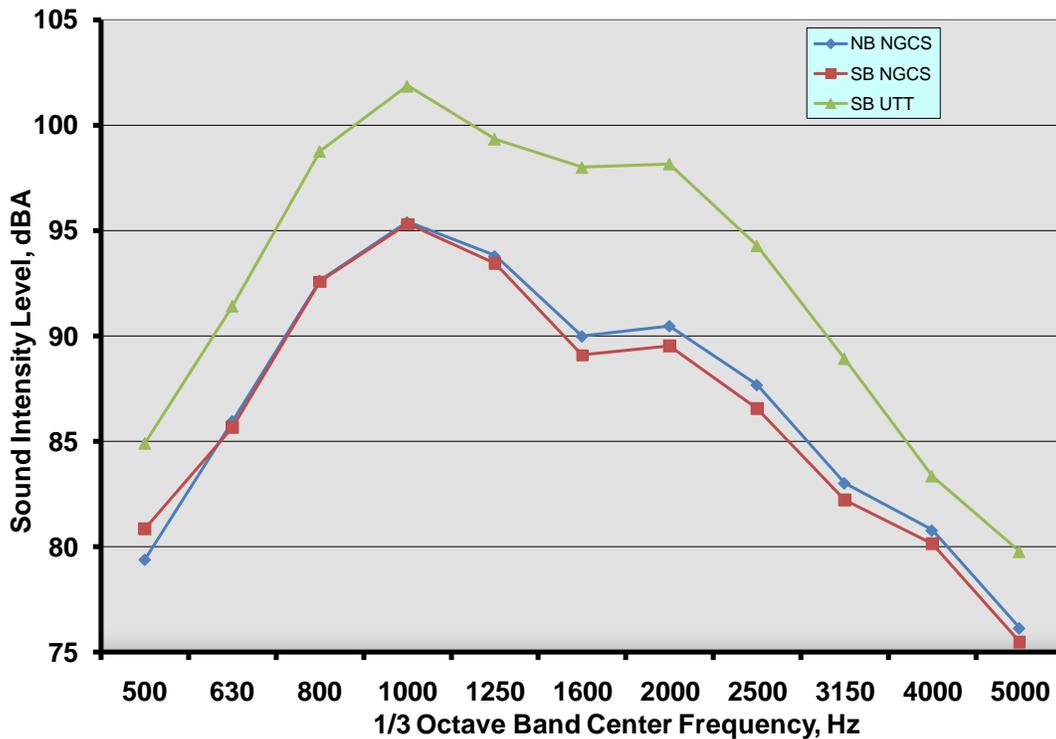


Figure 4 OBSI One-Third Octave A-Weighted Spectra Results for the NGCS Texture



Figure 5 Close Up Photo of NGCS LITE Texture before Grooving



Figure 6 NGCS LITE Texture (Left) Alongside CDG Texture (Right)

The results of the OBSI testing are indicated in Figures 7 and 8. As indicated in Figure 7, three of the four passes provided consistent results but one pass was slightly higher.

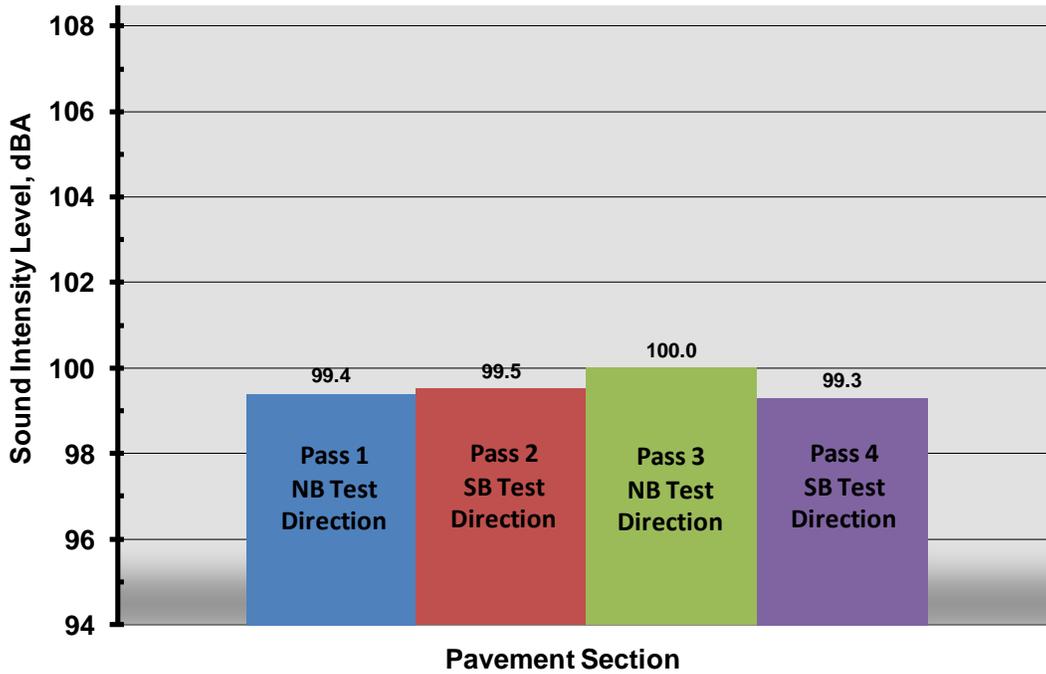


Figure 7 OBSI Levels for Each of the Four Passes Conducted for the NGCS LITE Texture (without Grooves)- NB is downhill Direction

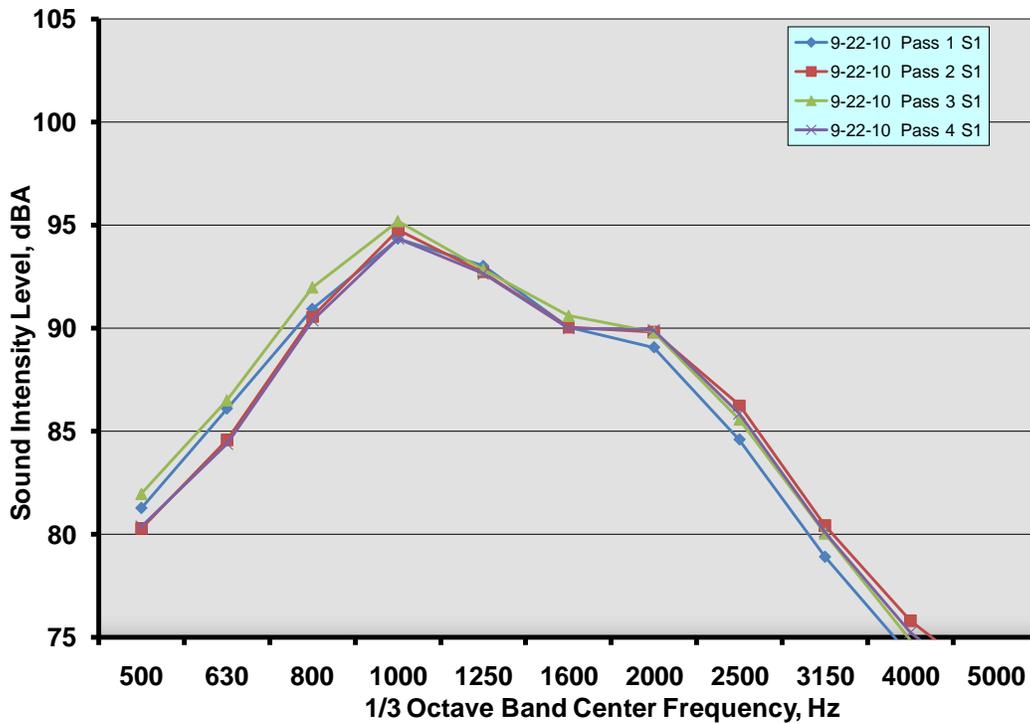


Figure 8 OBSI One-third Octave Spectra for Each of the Four Passes Conducted on the NGCS LITE Texture (without Grooves)

Appendix 1 Duluth NGCS



Figure 1-1 Duluth I-35 NGCS Texture



Figure 1-2 Location of NB I-35 NGCS OBSI Test Location

Appendix 1 Duluth NGCS Texture



Figure 1-3 Location of Duluth I-35 SB NGCS OBSI Testing



Figure 1-4 Location of Duluth I-35 NGCS OBSI Testing (Cont)

Appendix 1 Duluth NGCS Texture



Figure 1-5 Existing Duluth I-35 Transverse Tining

Appendix 2 Duluth NGCS LITE Texture



Figure 2-1 NGCS LITE Texture (without Grooves)



Figure 2-2 Close Up of Duluth I-35 NGCS LITE Texture (without Grooves)

Appendix 2 Duluth NGCS LITE Texture



Figure 2-3 Ground View of Duluth I-35 NGCS LITE Texture (without Grooves)



Figure 2-4 View of Duluth I-35 NB NGCS LITE Texture Alongside CDG

Appendix 2 Duluth NGCS LITE Texture



Figure 2-5 Duluth I-35 NGCS LITE Texture—Ridge at Shoulder



Figure 2-6 Duluth I-35 NB NGCS LITE Texture—Depth of Cut on One Slab

Appendix 2 Duluth NGCS LITE Texture



Figure 2-7 NGCS LITE Texture Alongside CDG



Figure 2-8 Interstate Improvement Diamond Grinding Equipment

Appendix 2 Duluth NGCS LITE Texture



Figure 2-9 Field Review of NGCS LITE Texture During Duluth NGCS Open House