

2010

Chicago I-355 NB OBSI Test Results

Preliminary Report

On May 23, 2010 the fourth OBSI measurement of the I-355 NB NGCS and CDG Test sections was conducted. Both sections tested at 100.7 dBA. It appears that after 31 months of traffic there is little change in either texture's noise levels.



Introduction

In October of 2007, a 1200 ft long, one lane wide test section of NGCS was constructed on I-355 NB between I-80 on the south and the Toll plaza approximately 2.5 miles north of I-80. This test section was added by the ACPA on an existing NCHRP 10-67 experiment which had already been constructed. The existing NCHRP test sections included approximately twelve other textures in the vicinity of this location including a CDG section. This test section was installed on a new PCCP that had not yet been open to traffic. This was the first NGCS section constructed full lane width and on an actual highway. It was also the first NGCS to be constructed on a new construction project. The project was open to traffic on November 7, 2007.

The project was constructed by Quality Saw and Seal and used grooves on $\frac{3}{4}$ inch centers. The $\frac{3}{4}$ in. c-c groove spacing was different than the Purdue research but was used to eliminate additional equipment changes since other locations on the project were using the $\frac{3}{4}$ " groove spacing. The flush grind texture was constructed with a 30 inch wide stack of blades. The NGCS section is located on a slight uphill grade and the CDG section on a level grade to the north of the NGCS section. Since the other test sections had already been constructed for the NCHRP project, there was not room available in the level area to construct the NGCS section.

May 23, 2010 OBSI Testing

The NGCS and CDG test sections were evaluated on 5-23-10 at approximately 3:30 PM and at a temperature of approximately 90° F. Only one pass was made as the testing was accomplished on the way to the airport. Two sequential five-second OBSI readings were obtained on the NGCS section as is commonly done, but only one five second reading was obtained for the CDG section. Typically the CDG section has one reading taken at the location and then a repeat made at the same location. No repeat was made during this test phase due to time constraints. The CDG section is located just prior to the Toll Plaza and only the first five seconds has been tested in the past to enable the test vehicle to shift over to the Toll Plaza Ramp for exiting to the Toll booth.

Figure 1 indicates the OBSI overall levels. As indicated, both surfaces tested at 100.7 dBA. Figure 2 indicates the one-third octave spectra for each of the surfaces. As indicated in Figure 2, the CDG exhibits slightly higher levels in the low frequencies and the NGCS higher levels in the frequencies above 2000 Hz.

2007 to 2010 OBSI Comparison

Prior to discussing the acoustic changes of the sections over time, it should be noted that two SRTT tires have been used in developing the data. In 2007 and 2008 the ACPA 2006 SRTT tire was used for testing. The 2009 and 2010 test results were obtained using the ACPA 2009 SRTT tire. In addition, the various data sets were collected at different temperatures as indicated in Table 1. The first three sets of data were collected under fairly similar temperature conditions. However, the 5-31-10 measurements were obtained under conditions 30° to 40° F warmer than the previous measurements

Figure 3 indicates the change in OBSI level over time since construction until May 23, 2010. I-355 was open to traffic on November 11, 2007 so the 11-4-07 measurement is prior to opening to traffic. As indicated in the Figure, both the CDG and NGCS textures have remained fairly stable over time. The variability in the data is probably more an artifact of the variability in speed, test location, and temperature differences. At this time it should be concluded that neither surface has changed

TABLE 1 Temperature Ranges and Traffic Levels During OBSI Testing

Date	Temperature Range (°F)	Months of Traffic
11-4-07	50 to 52	0
5-12-08	58	7
10-31-09	52-53	24
5-31-10	90	31

appreciably in 31 months. However, if the 5-23-10 values were ignored assuming some temperature effect, a slight increase in level of several tenths of a dBA could be assumed.

Figures 4 and 5 indicate the change in one third octave spectra for the NGCS and CDG surfaces over time. The 11-4-07 values represent the pre-construction levels and the remaining data points the levels at the respective test dates. In both Figures 4 and 5 the darkest color is the oldest test result and each subsequent test is lighter in shade. It should also be noted that the number of months of trafficking on the sections is indicated in the legends. Upon review of Figure 4 it does not appear that any consistent trends are evident, except that the level at the 1000 Hz center-band frequency has increased over the pre traffic condition.

Figure 5 indicates that no distinctive trends are evident in the CDG spectra except that the levels are increasing at the 1000 Hz center band frequency as with the NGCS surface. In addition, the 2009 SRTT tires appear to exhibit a lower level in frequencies below 1000 Hz. If the 2010 test results were ignored however, this statement would not necessarily be true, so the temperature effect cannot be discounted at this time.

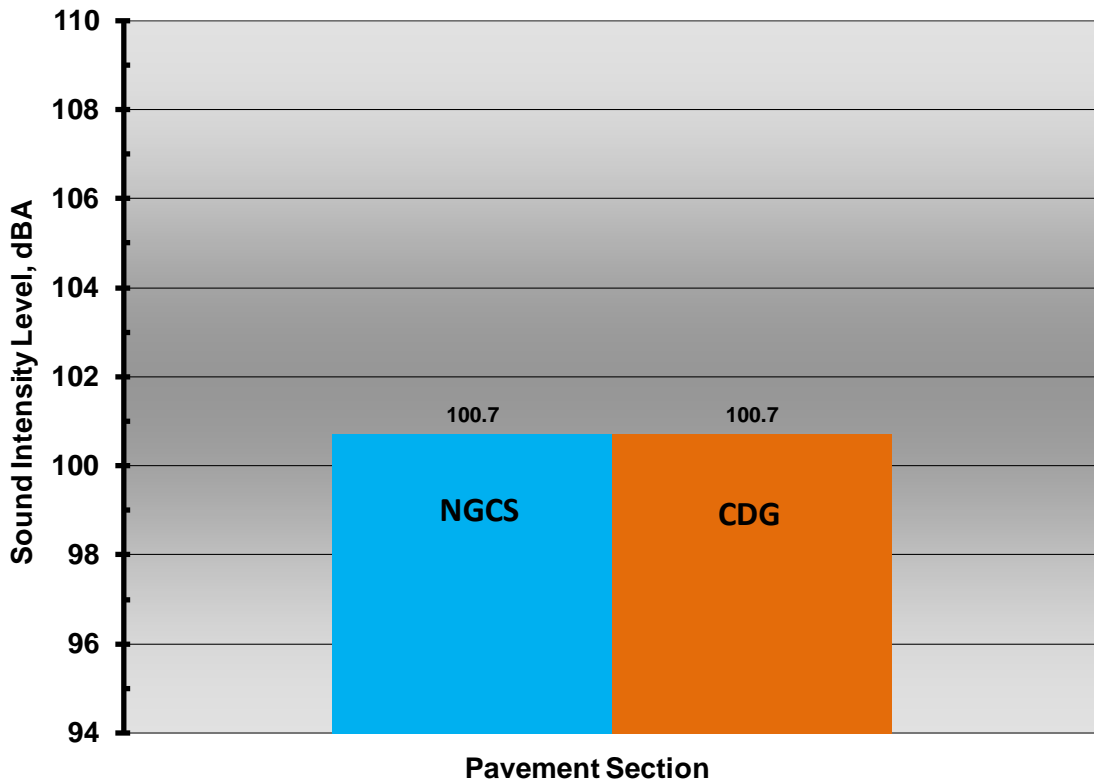


Figure 1 Chicago I-355 NB OBSI Levels for May 23, 2010 Testing

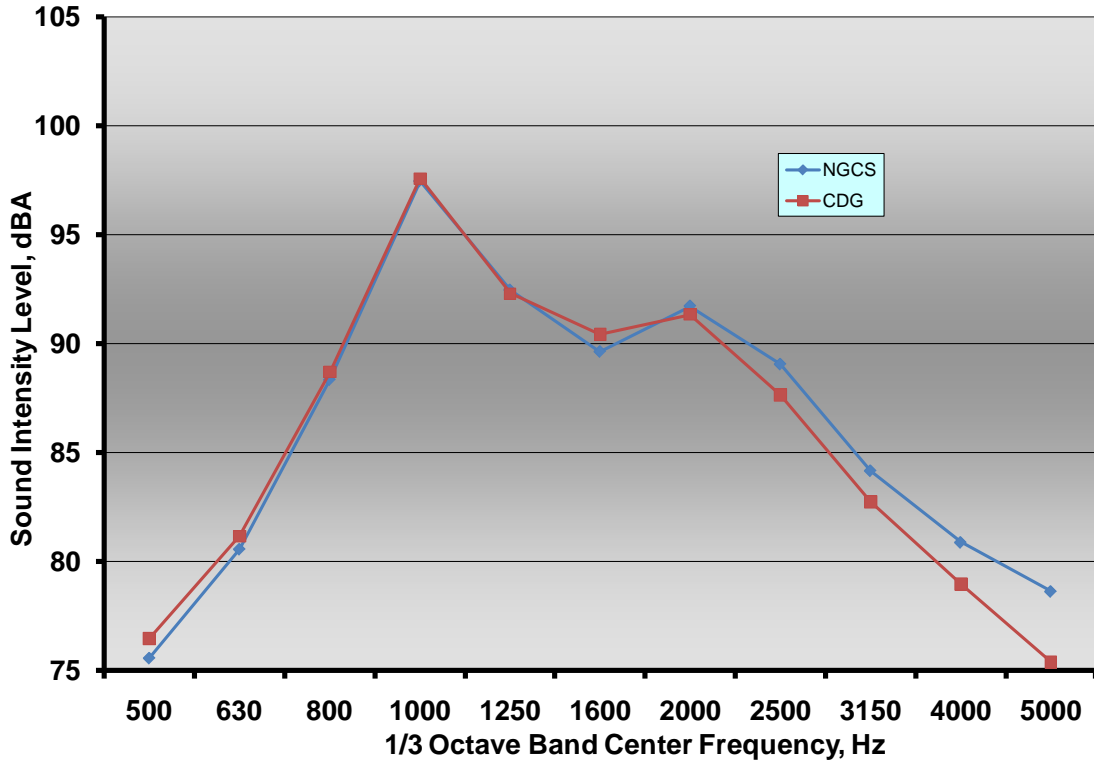


Figure 2 One Third Octave Spectra for May 23, 2010 OBSI Evaluation

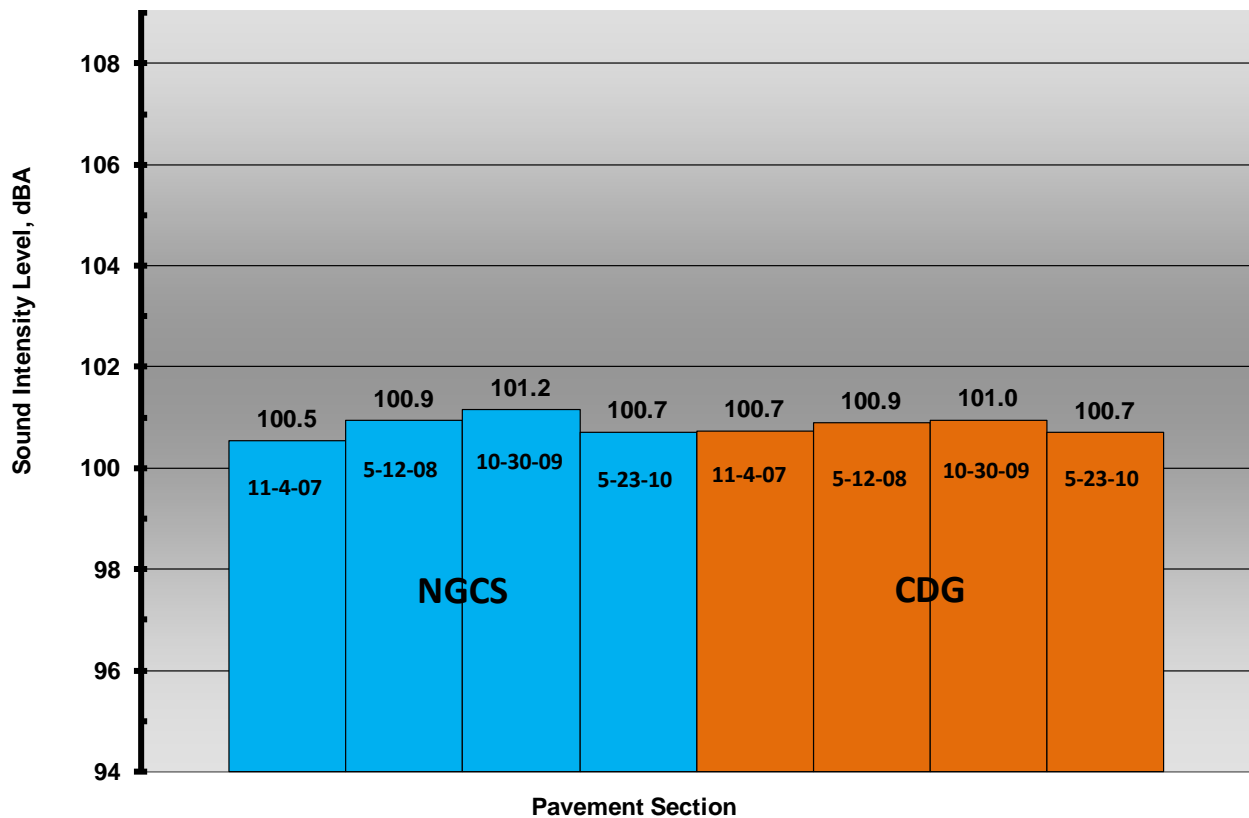


Figure 3 Comparison of OBSI Overall Level from Construction in 2007 to May 2010 for NGCS and CDG Surfaces

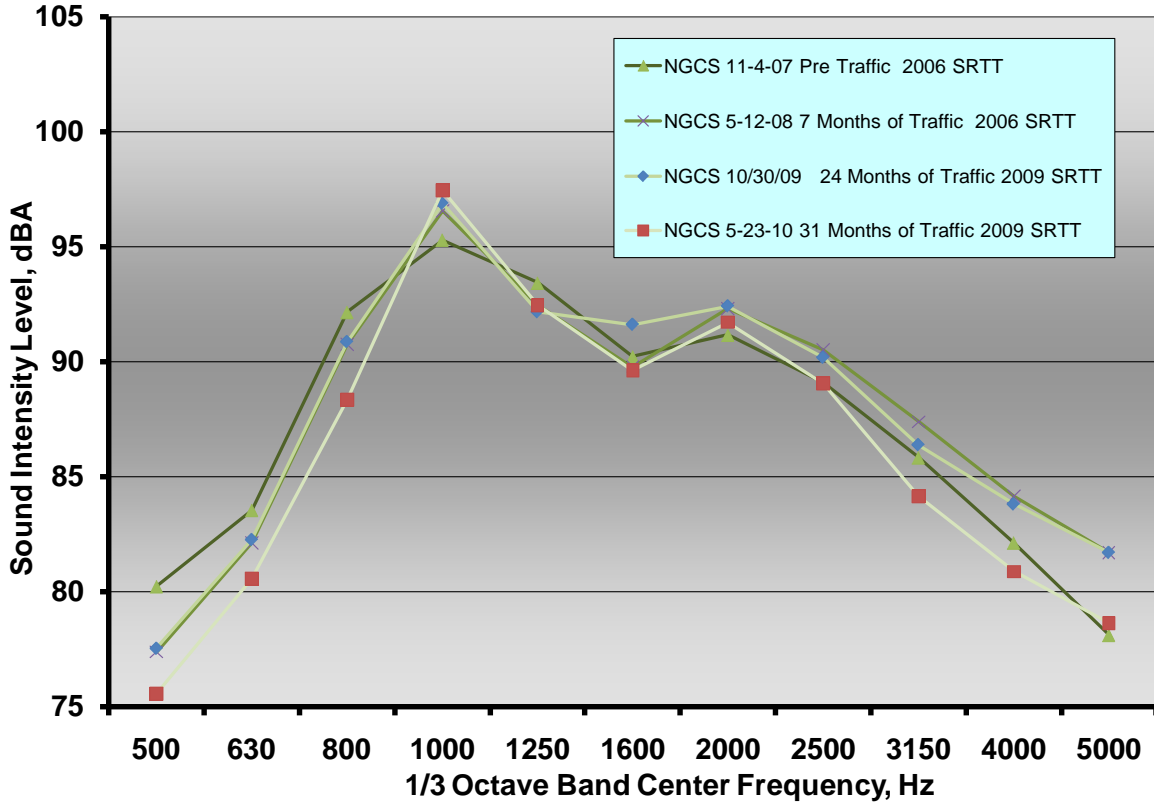


Figure 4 Changes in OBSI Spectra Over Time for the I-355 NB NGCS Test Section

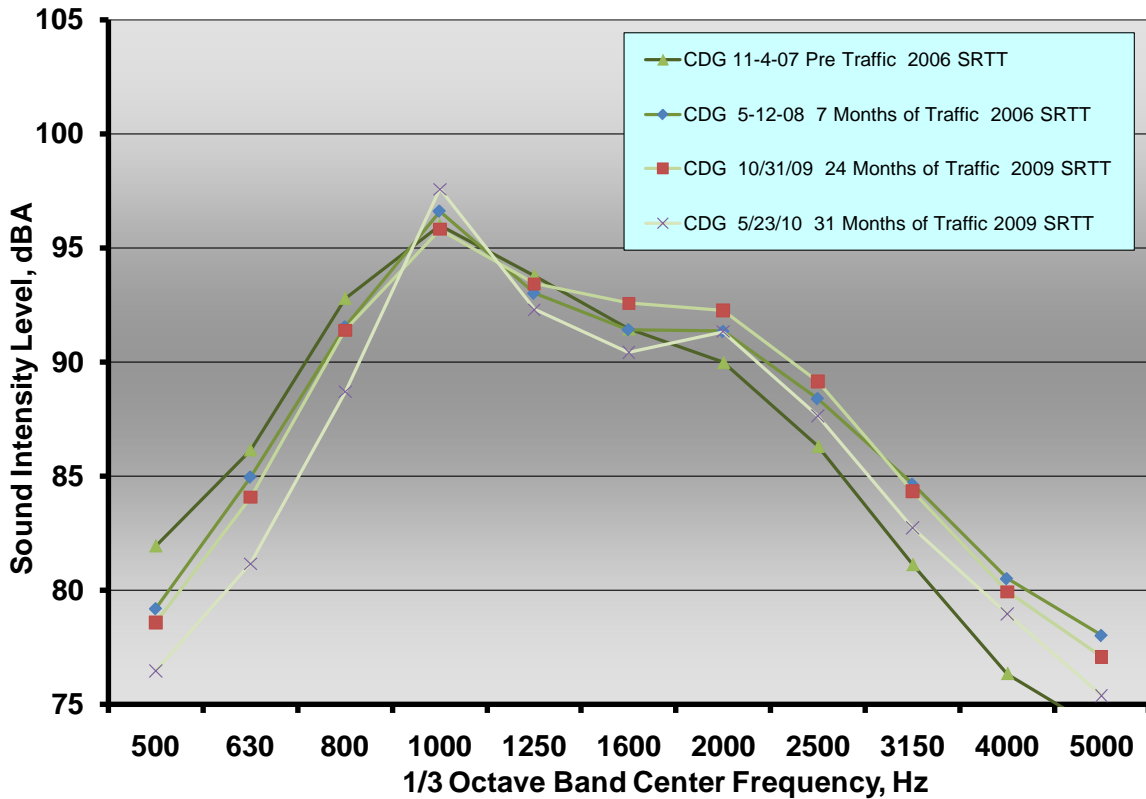


Figure 5 Changes in OBSI Spectra Over Time for the I-355 NB CDG Test Section