OSU STATISTICAL CONSULTING SERVICE
MEMORANDUM REPORT

To: **The Ohio State Highway Patrol**

From: **Christopher Holloman**

Subject: **Predictive Model Results for New Year's Weekend, District 1**

Date: **December 18, 2006**

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1. Overview

Over the past several months, the Ohio State Highway Patrol (OSHP) and the Statistical Consulting Service (SCS) at The Ohio State University have worked together to produce a probabilistic model for forecasting the likely locations of fatal and injury crashes. The model that was developed predicts the likelihood of crashes on interstates, US routes, and State routes throughout Ohio.

This report presents the model's OVI forecasts for the 2006-2007 New Year's weekend (Friday, December 29 through Monday, January 1). These results can be used to allocate troopers to different roadways throughout the day allowing OSHP to make the best use of available resources in preventing alcohol-related crashes. Crash forecasts are provided for all interstates, US routes, and state routes in District 1 except for the US and State routes in Fulton, Henry, and Putnam counties.

Although the New Year's weekend covers four days, there are only three types of days that need to be analyzed. The first type of day is the last workday before the long weekend: Friday, December 29. The second type of day to be analyzed is the weekend preceding the holiday: Saturday, December 30, and Sunday, December 31. The third type of day to be analyzed is the actual holiday, Monday, January 1, 2007. Section 2 of this report gives OVI forecasts for each of these types of days separately.

The forecasts provided in this report can be applied to the immediately preceding weekend as well – the weekend of Christmas, 2006. The forecasts for Friday, December 29 through Sunday, December 31 are identical to what would be predicted for Friday, December 22 through Sunday, December 24, and the forecasts for December 25, 2006 would only vary slightly from what is presented for January 1, 2007.

2. Forecasts

The forecasts are broken down by the three types of days that occur over the New Year's weekend.

2.1. Friday, December 29, 2006

Friday, December 29 is the last working day before the long weekend, so the crash patterns are predicted to be different from the crash patterns on the other days of the holiday. Figure 1 shows the OVI crash rates for fatal and injury crashes expected throughout the day. These are the crash rates across all interstates, US routes, and state routes in the analysis. The black line in this figure shows the crash rates predicted by the model, and a smooth red curve has been superimposed to show the overall pattern. In addition, a smooth green line has been added to the plot showing the crash rates expected on an ordinary Friday in December, one not preceding a holiday weekend. It appears that on December 29 the highest risk will be in the early morning hours, but it will not be as large as on a usual Friday. The risk declines in the middle of the day, and increases again at the end of the day, although the increase is not larger than what is normally observed on a Friday evening.

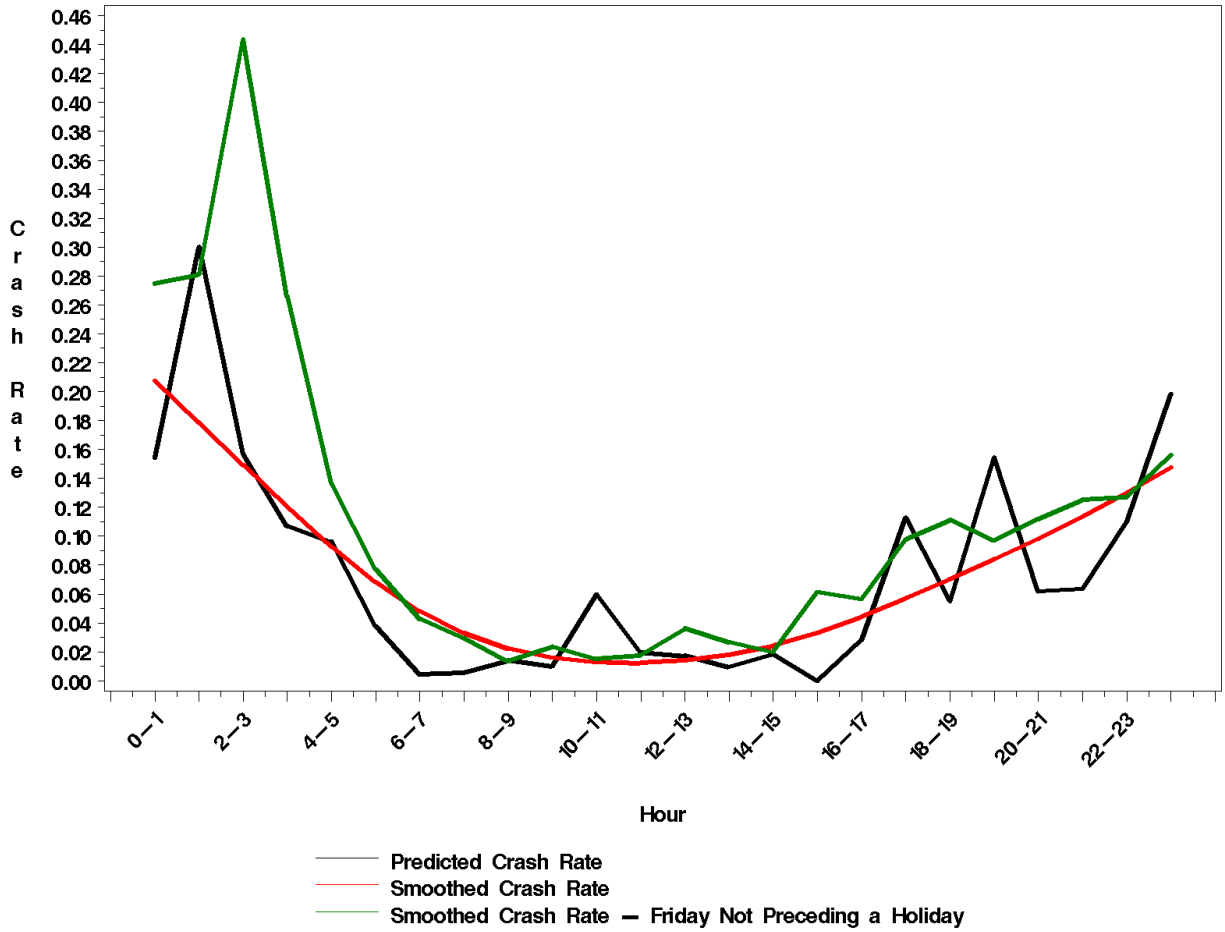

Figure 1. Forecasted OVI Fatal and Injury Crash Rates on December 29, 2006, by Hour.

Having determined the best allocation of resources throughout the day, the next question to answer is where those resources should be allocated. The top 20% of roadways that should be patrolled to prevent alcohol-related crashes on December 29, 2006, are in the following list.

1. SR 309 near milepost 25 in ALL.
2. SR 51 from milepost 0 in WOO to milepost 5 in WOO.
3. SR 184 from milepost 0 in LUC to milepost 10 in LUC.
4. SR 111 from milepost 5 in DEF to milepost 7 in DEF.
5. SR 64 from milepost 5 in LUC to milepost 10 in LUC.
6. SR 2 from milepost 5 in LUC to milepost 15 in LUC.
7. SR 246 from milepost 0 in LUC to milepost 5 in LUC.
8. SR 420 from milepost 0 in WOO to milepost 2 in WOO.
9. US 20 from milepost 15 in LUC to milepost 5 in WOO.
10. SR 66 from milepost 0 in WIL to milepost 1 in WIL.
11. SR 295 from milepost 5 in LUC to milepost 10 in LUC.
12. US 20 from milepost 0 in LUC to milepost 5 in LUC.
13. SR 309 from milepost 15 in ALL to milepost 20 in ALL.
14. US 127 from milepost 15 in WIL to milepost 20 in WIL.
15. SR 107 from milepost 10 in WIL to milepost 11 in WIL.
16. SR 51 from milepost 0 in LUC to milepost 2 in LUC.
17. SR 51 from milepost 3 in LUC to milepost 5 in LUC.
18. SR 2 from milepost 20 in LUC to milepost 25 in LUC.
19. US 30 from milepost 0 in PAU to milepost 1 in PAU.

2.2. Saturday, December 30, and Sunday, December 31, 2006

Saturday, December 30, and Sunday, December 31, are both considered ordinary weekend days in the crash model, so their predicted crash patterns are the same. Figure 2 shows the OVI crash rates for fatal and injury crashes expected throughout the day. These are the OVI crash rates across all interstates, US routes, and state routes in the analysis. The figure contains only one curve, a red curve, since the smoothed crash pattern lies directly on top of the raw (black) crash pattern.

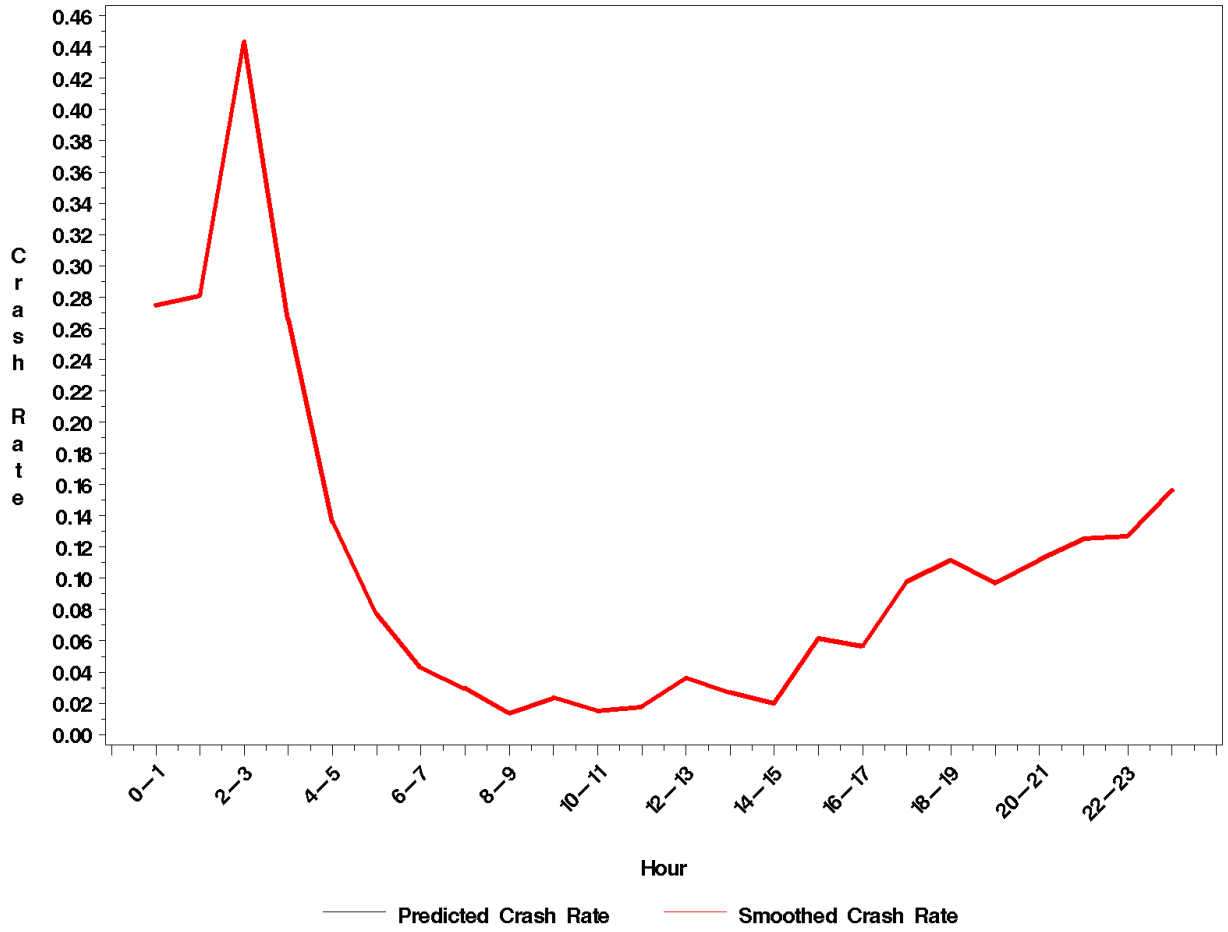

Figure 2. Forecasted OVI Fatal and Injury Crash Rates on December 30-31, 2006, by Hour.

Having determined the best allocation of resources throughout the day, the next question to answer is where those resources should be allocated. The top 20% of roadways that should be patrolled to prevent alcohol-related crashes on December 30-31, 2006, are in the following list.

1. SR 309 near milepost 25 in ALL.
2. IR 475 from milepost 8 in LUC to milepost 9 in LUC.
3. IR 475 from milepost 13 in LUC to milepost 15 in LUC.
4. IR 75 from milepost 161 in HAN to milepost 162 in HAN.
5. IR 75 from milepost 204 in LUC to milepost 205 in LUC.
6. IR 75 from milepost 123 in ALL to milepost 124 in ALL.
7. IR 75 from milepost 191 in WOO to milepost 192 in WOO.
8. IR 75 from milepost 196 in WOO to milepost 197 in WOO.
9. IR 75 from milepost 168 in WOO to milepost 169 in WOO.
10. IR 75 from milepost 202 in LUC to milepost 203 in LUC.
11. IR 280 from milepost 7 in LUC to milepost 8 in LUC.
12. IR 75 from milepost 126 in ALL to milepost 127 in ALL.
13. IR 75 from milepost 193 in WOO to milepost 195 in WOO.
14. IR 475 from milepost 17 in LUC to milepost 19 in LUC.

15. SR 51 from milepost 0 in WOO to milepost 5 in WOO.
16. IR 75 from milepost 180 in WOO to milepost 181 in WOO.
17. IR 75 from milepost 199 in WOO to milepost 200 in WOO.
18. IR 75 from milepost 211 in LUC to milepost 212 in LUC.
19. IR 475 from milepost 4 in LUC to milepost 5 in LUC.
20. IR 475 from milepost 1 in WOO to milepost 2 in WOO.
21. IR 280 from milepost 2 in WOO to milepost 3 in WOO.
22. IR 80 from milepost 63 in WOO to milepost 65 in WOO.
23. IR 75 from milepost 134 in ALL to milepost 135 in ALL.
24. IR 75 from milepost 144 in HAN to milepost 145 in HAN.
25. IR 75 from milepost 159 in HAN to milepost 160 in HAN.
26. IR 280 from milepost 10 in LUC to milepost 11 in LUC.
27. IR 75 from milepost 174 in WOO to milepost 175 in WOO.
28. SR 184 from milepost 0 in LUC to milepost 5 in LUC.
29. SR 111 from milepost 5 in DEF to milepost 7 in DEF.
30. IR 75 from milepost 206 in LUC to milepost 207 in LUC.
31. SR 64 from milepost 5 in LUC to milepost 10 in LUC.
32. US 68 from milepost 15 in HAN to milepost 16 in HAN.
33. SR 2 from milepost 5 in LUC to milepost 10 in LUC.
34. SR 246 from milepost 0 in LUC to milepost 5 in LUC.
35. SR 420 from milepost 0 in WOO to milepost 2 in WOO.
36. US 20 from milepost 15 in LUC to milepost 19 in LUC.
37. SR 66 from milepost 0 in WIL to milepost 1 in WIL.
38. SR 295 from milepost 5 in LUC to milepost 10 in LUC.
39. SR 15 from milepost 10 in DEF to milepost 15 in DEF.
40. SR 309 from milepost 15 in ALL to milepost 20 in ALL.

2.3. Monday, January 1, 2007

Monday, January 1 is treated as a holiday in the crash model. Figure 3 shows the OVI crash rates for fatal and injury crashes expected throughout the day. These are the crash rates across all interstates, US routes, and state routes in the analysis. The black line in this figure shows the crash rates predicted by the model, and a smooth red curve has been superimposed to show the overall pattern. In addition, a smooth green line has been added to the plot showing the crash rates expected on an ordinary Monday in January. This figure shows that crash risk from alcohol will be higher during most of the day than it is on an ordinary Monday with the highest risk during the early morning hours and mid-afternoon.

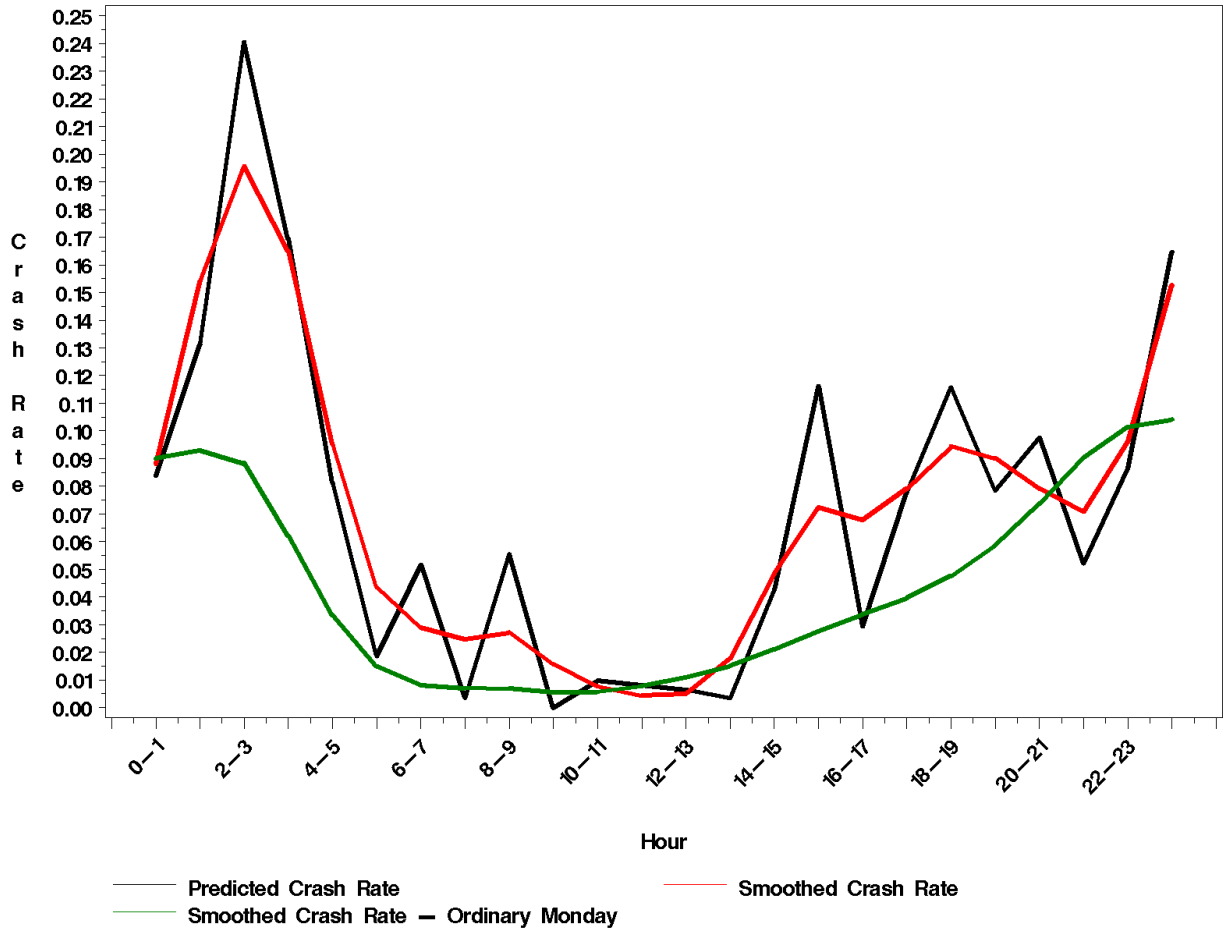

Figure 3. Forecasted OVI Fatal and Injury Crash Rates on January 1, 2007, by Hour.

Having determined the best allocation of resources throughout the day, the next question to answer is where those resources should be allocated. The top 20% of roadways that should be patrolled to prevent alcohol-related crashes on January 1, 2007, are in the following list.

1. SR 309 near milepost 25 in ALL.
2. IR 475 from milepost 12 in LUC to milepost 15 in LUC.
3. IR 75 from milepost 199 in WOO to milepost 200 in WOO.
4. IR 280 from milepost 10 in LUC to milepost 11 in LUC.
5. IR 75 from milepost 161 in HAN to milepost 162 in HAN.
6. IR 280 from milepost 7 in LUC to milepost 8 in LUC.
7. IR 75 from milepost 126 in ALL to milepost 127 in ALL.
8. IR 75 from milepost 121 in ALL to milepost 125 in ALL.
9. IR 75 from milepost 194 in WOO to milepost 196 in WOO.
10. IR 475 from milepost 18 in LUC to milepost 19 in LUC.
11. US 68 from milepost 15 in HAN to milepost 16 in HAN.
12. IR 475 from milepost 7 in LUC to milepost 11 in LUC.
13. SR 186 from milepost 0 in HAN to milepost 4 in HAN.
14. SR 51 from milepost 0 in WOO to milepost 5 in WOO.

15. IR 75 from milepost 207 in LUC to milepost 208 in LUC.
16. IR 75 from milepost 204 in LUC to milepost 205 in LUC.
17. SR 64 from milepost 5 in LUC to milepost 10 in LUC.
18. IR 75 from milepost 179 in WOO to milepost 181 in WOO.
19. IR 75 from milepost 211 in LUC to milepost 212 in LUC.
20. SR 195 from milepost 5 in HAR to milepost 9 in HAR.
21. SR 184 from milepost 0 in LUC to milepost 5 in LUC.
22. IR 475 from milepost 0 in WOO to milepost 1 in WOO.
23. IR 80 from milepost 25 in FUL to milepost 26 in FUL.
24. IR 80 from milepost 52 in LUC to milepost 53 in LUC.
25. IR 80 from milepost 54 in LUC to milepost 55 in LUC.
26. IR 80 from milepost 56 in LUC to milepost 57 in LUC.
27. SR 37 from milepost 0 in HAN to milepost 5 in HAN.
28. IR 75 from milepost 129 in ALL to milepost 130 in ALL.
29. SR 111 from milepost 5 in DEF to milepost 7 in DEF.
30. IR 75 from milepost 148 in HAN to milepost 149 in HAN.
31. IR 75 from milepost 153 in HAN to milepost 154 in HAN.
32. SR 2 from milepost 5 in LUC to milepost 10 in LUC.
33. IR 75 from milepost 197 in WOO to milepost 198 in WOO.
34. IR 75 from milepost 176 in WOO to milepost 177 in WOO.
35. IR 75 from milepost 170 in WOO to milepost 171 in WOO.
36. IR 75 from milepost 172 in WOO to milepost 173 in WOO.
37. SR 420 from milepost 0 in WOO to milepost 2 in WOO.
38. SR 309 from milepost 15 in ALL to milepost 20 in ALL.