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**OSU STATISTICAL CONSULTING SERVICE  
MEMORANDUM REPORT**

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**To:           The Ohio State Highway Patrol**

**From:        Christopher Holloman**

**Subject:     Predictive Model Results for New Year's Weekend, District 7**

**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 7 except for the US and State routes in Coshocton County.

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.

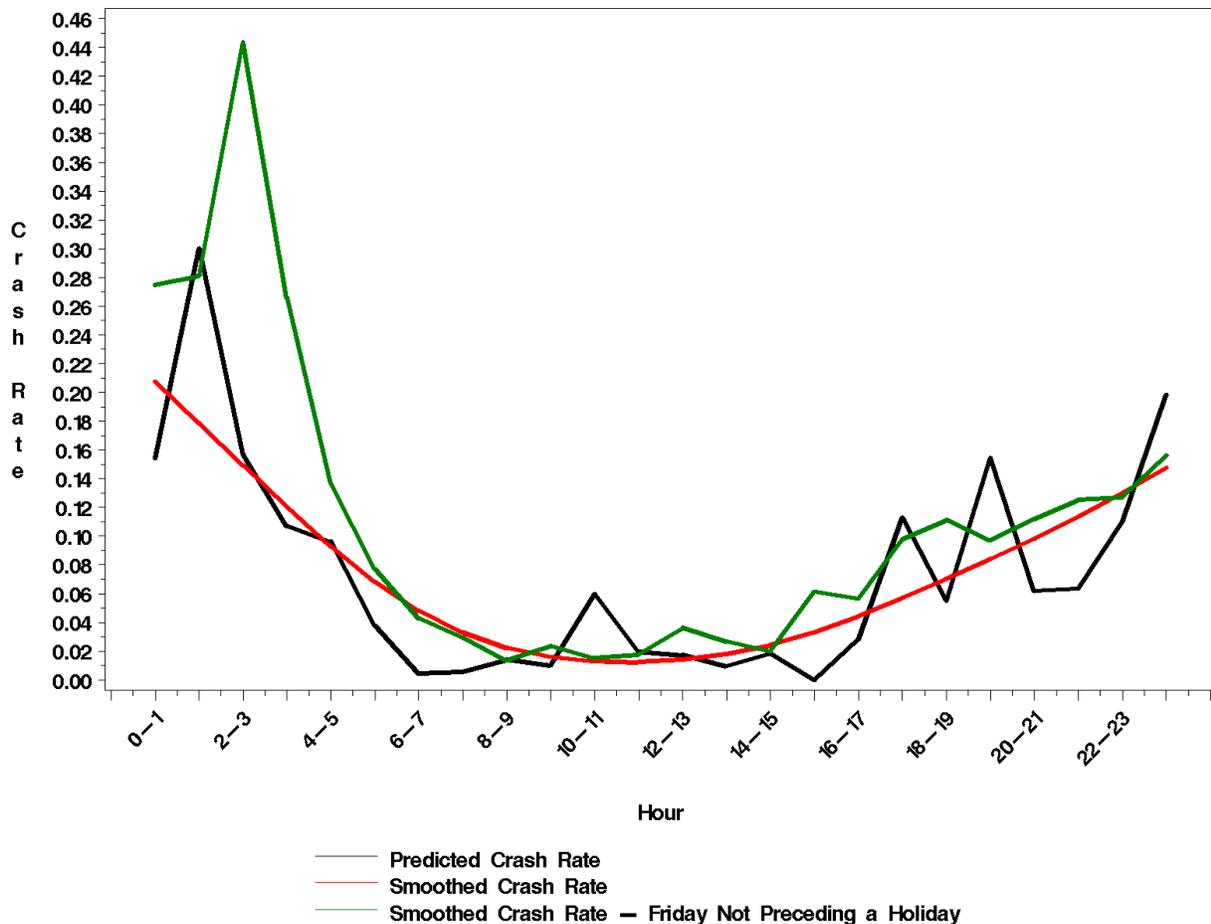


Figure 1. Forecasted OVI Fatal and Injury Crash Rates on December 29, 2006, by Hour.

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. IR 70 from milepost 215 in BEL to milepost 217 in BEL.
2. IR 77 from milepost 0 in WAS to milepost 3 in WAS.
3. IR 77 from milepost 92 in TUS to milepost 93 in TUS.
4. IR 77 from milepost 44 in GUE to milepost 45 in GUE.
5. IR 77 from milepost 49 in GUE to milepost 50 in GUE.
6. IR 70 from milepost 219 in BEL to milepost 220 in BEL.
7. IR 70 from milepost 205 in BEL to milepost 207 in BEL.
8. IR 70 from milepost 168 in MUS to milepost 169 in MUS.
9. IR 70 from milepost 151 in MUS to milepost 152 in MUS.
10. IR 70 from milepost 153 in MUS to milepost 154 in MUS.
11. SR 416 near milepost 15 in TUS.
12. IR 470 from milepost 5 in BEL to milepost 7 in BEL.
13. IR 470 from milepost 0 in BEL to milepost 1 in BEL.
14. IR 470 from milepost 2 in BEL to milepost 3 in BEL.
15. IR 77 from milepost 29 in NOB to milepost 30 in NOB.
16. IR 77 from milepost 21 in NOB to milepost 22 in NOB.
17. IR 77 from milepost 11 in WAS to milepost 13 in WAS.
18. IR 77 from milepost 82 in TUS to milepost 83 in TUS.
19. IR 77 from milepost 80 in TUS to milepost 81 in TUS.
20. IR 77 from milepost 85 in TUS to milepost 89 in TUS.
21. IR 77 from milepost 74 in TUS to milepost 75 in TUS.
22. IR 77 from milepost 69 in TUS to milepost 70 in TUS.
23. IR 77 from milepost 42 in GUE to milepost 43 in GUE.
24. IR 70 from milepost 222 in BEL to milepost 223 in BEL.
25. IR 70 from milepost 210 in BEL to milepost 211 in BEL.
26. IR 70 from milepost 171 in GUE to milepost 172 in GUE.
27. IR 70 from milepost 182 in GUE to milepost 183 in GUE.
28. IR 70 from milepost 144 in MUS to milepost 145 in MUS.
29. IR 70 from milepost 156 in MUS to milepost 157 in MUS.
30. SR 26 from milepost 30 in MOE to milepost 31 in MOE.
31. SR 516 from milepost 5 in TUS to milepost 8 in TUS.
32. SR 555 near milepost 11 in MUS.
33. SR 800 from milepost 5 in TUS to milepost 10 in TUS.
34. SR 800 from milepost 10 in HAS to milepost 13 in HAS.
35. SR 212 from milepost 0 in HAS to milepost 1 in HAS.
36. SR 151 from milepost 15 in JEF to milepost 16 in JEF.
37. US 250 from milepost 5 in BEL to milepost 10 in BEL.
38. SR 379 from milepost 5 in BEL to milepost 7 in BEL.
39. SR 821 from milepost 0 in WAS to milepost 10 in WAS.
40. SR 574 from milepost 0 in GUE to milepost 1 in GUE.
41. SR 647 from milepost 0 in JEF to milepost 2 in JEF.
42. SR 9 from milepost 15 in BEL to milepost 20 in BEL.
43. SR 7 from milepost 20 in BEL to milepost 25 in BEL.
44. SR 800 from milepost 20 in TUS to milepost 25 in TUS.
45. SR 21 from milepost 0 in TUS to milepost 1 in TUS.
46. SR 39 from milepost 10 in TUS to milepost 20 in TUS.

47. SR 800 from milepost 0 in BEL to milepost 5 in BEL.

## 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.

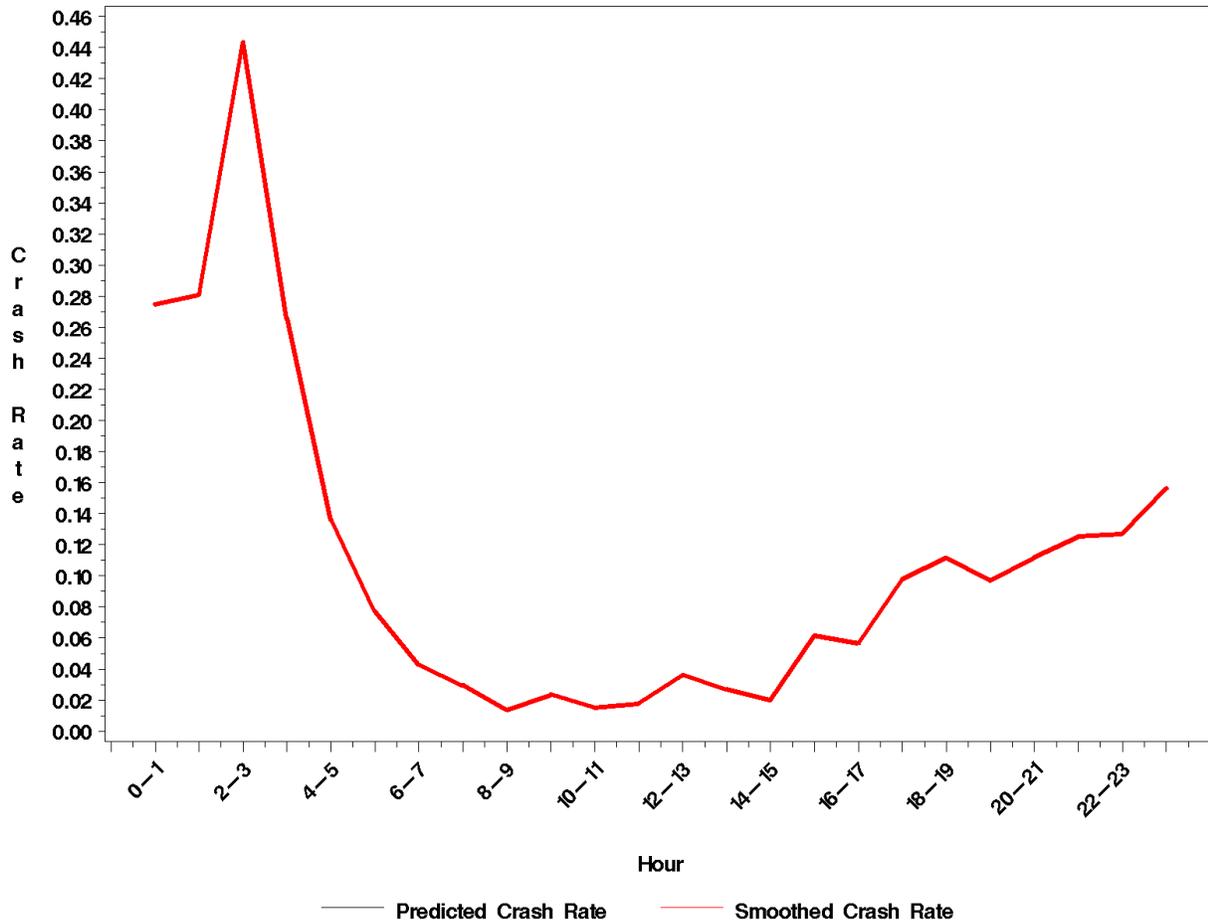


Figure 2. Forecasted OVI Fatal and Injury Crash Rates on December 30-31, 2006, by Hour.

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 416 near milepost 15 in TUS.
2. IR 70 from milepost 215 in BEL to milepost 217 in BEL.
3. SR 26 from milepost 30 in MOE to milepost 31 in MOE.
4. IR 70 from milepost 168 in MUS to milepost 169 in MUS.

5. IR 77 from milepost 0 in WAS to milepost 3 in WAS.
6. IR 470 from milepost 5 in BEL to milepost 7 in BEL.
7. IR 470 from milepost 0 in BEL to milepost 1 in BEL.
8. SR 212 from milepost 0 in HAS to milepost 1 in HAS.
9. IR 77 from milepost 92 in TUS to milepost 93 in TUS.
10. SR 555 near milepost 11 in MUS.
11. IR 77 from milepost 44 in GUE to milepost 45 in GUE.
12. IR 77 from milepost 49 in GUE to milepost 50 in GUE.
13. SR 516 from milepost 5 in TUS to milepost 8 in TUS.
14. IR 70 from milepost 219 in BEL to milepost 220 in BEL.
15. IR 70 from milepost 205 in BEL to milepost 207 in BEL.
16. IR 70 from milepost 151 in MUS to milepost 152 in MUS.
17. IR 70 from milepost 153 in MUS to milepost 154 in MUS.
18. IR 77 from milepost 80 in TUS to milepost 81 in TUS.
19. SR 800 from milepost 5 in TUS to milepost 10 in TUS.
20. SR 800 from milepost 10 in HAS to milepost 13 in HAS.
21. SR 574 from milepost 0 in GUE to milepost 1 in GUE.
22. SR 151 from milepost 15 in JEF to milepost 16 in JEF.
23. SR 7 from milepost 20 in BEL to milepost 25 in BEL.
24. SR 800 from milepost 20 in TUS to milepost 25 in TUS.
25. SR 821 from milepost 0 in WAS to milepost 10 in WAS.
26. SR 21 from milepost 0 in TUS to milepost 1 in TUS.
27. US 250 from milepost 5 in BEL to milepost 10 in BEL.
28. SR 9 from milepost 15 in BEL to milepost 20 in BEL.
29. SR 39 from milepost 10 in TUS to milepost 20 in TUS.
30. SR 379 from milepost 5 in BEL to milepost 7 in BEL.
31. US 22 from milepost 10 in JEF to milepost 16 in JEF.
32. IR 70 from milepost 221 in BEL to milepost 223 in BEL.
33. SR 647 from milepost 0 in JEF to milepost 2 in JEF.
34. IR 470 from milepost 2 in BEL to milepost 3 in BEL.
35. IR 77 from milepost 29 in NOB to milepost 30 in NOB.
36. IR 77 from milepost 21 in NOB to milepost 22 in NOB.
37. IR 77 from milepost 11 in WAS to milepost 13 in WAS.
38. IR 77 from milepost 82 in TUS to milepost 83 in TUS.
39. IR 77 from milepost 85 in TUS to milepost 89 in TUS.
40. IR 77 from milepost 74 in TUS to milepost 75 in TUS.
41. IR 77 from milepost 69 in TUS to milepost 70 in TUS.
42. SR 821 from milepost 15 in NOB to milepost 20 in NOB.

### 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.

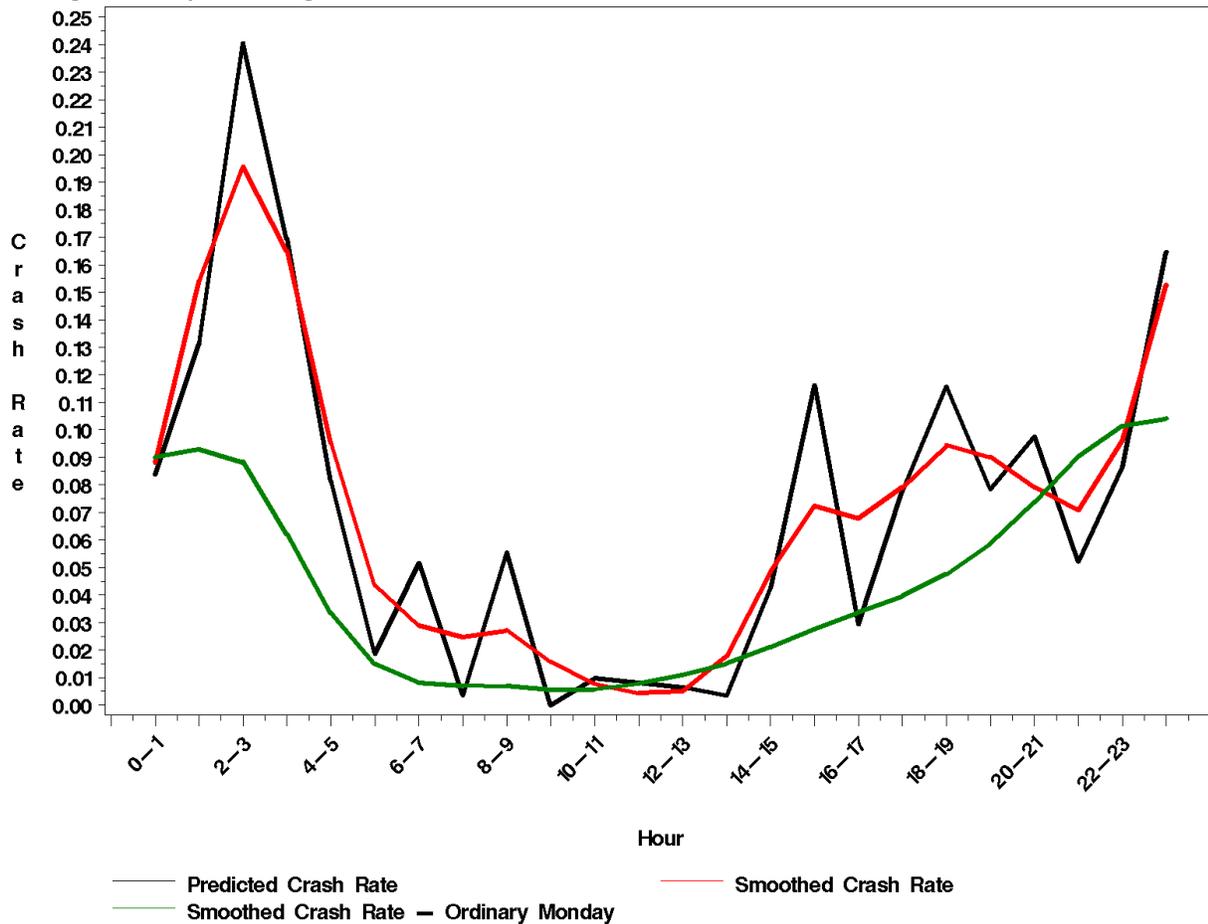


Figure 3. Forecasted OVI Fatal and Injury Crash Rates on January 1, 2007, by Hour.

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 416 near milepost 15 in TUS.
2. SR 516 from milepost 5 in TUS to milepost 8 in TUS.
3. SR 26 from milepost 30 in MOE to milepost 31 in MOE.
4. SR 555 near milepost 11 in MUS.
5. SR 212 from milepost 0 in HAS to milepost 1 in HAS.
6. SR 800 from milepost 5 in TUS to milepost 10 in TUS.
7. SR 574 from milepost 0 in GUE to milepost 1 in GUE.
8. SR 39 from milepost 10 in TUS to milepost 15 in TUS.
9. SR 21 from milepost 0 in TUS to milepost 1 in TUS.
10. SR 213 from milepost 0 in JEF to milepost 5 in JEF.
11. SR 7 from milepost 20 in BEL to milepost 25 in BEL.

12. SR 800 from milepost 20 in TUS to milepost 25 in TUS.
13. SR 9 from milepost 15 in BEL to milepost 20 in BEL.
14. SR 800 from milepost 10 in HAS to milepost 13 in HAS.
15. SR 821 from milepost 0 in WAS to milepost 5 in WAS.
16. US 22 from milepost 15 in JEF to milepost 16 in JEF.
17. SR 151 from milepost 15 in JEF to milepost 16 in JEF.
18. SR 821 from milepost 15 in NOB to milepost 20 in NOB.
19. SR 542 from milepost 10 in CAR to milepost 15 in CAR.
20. SR 212 from milepost 0 in TUS to milepost 5 in TUS.
21. SR 800 from milepost 5 in BEL to milepost 10 in BEL.
22. SR 93 from milepost 15 in MUS to milepost 20 in MUS.
23. SR 564 from milepost 0 in NOB to milepost 5 in NOB.
24. US 250 from milepost 0 in TUS to milepost 5 in TUS.
25. US 250 from milepost 5 in BEL to milepost 10 in BEL.
26. SR 26 from milepost 0 in WAS to milepost 5 in WAS.
27. SR 149 from milepost 20 in BEL to milepost 25 in BEL.
28. US 250 from milepost 25 in HAS to milepost 30 in HAS.