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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 4**  
**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 4.

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.

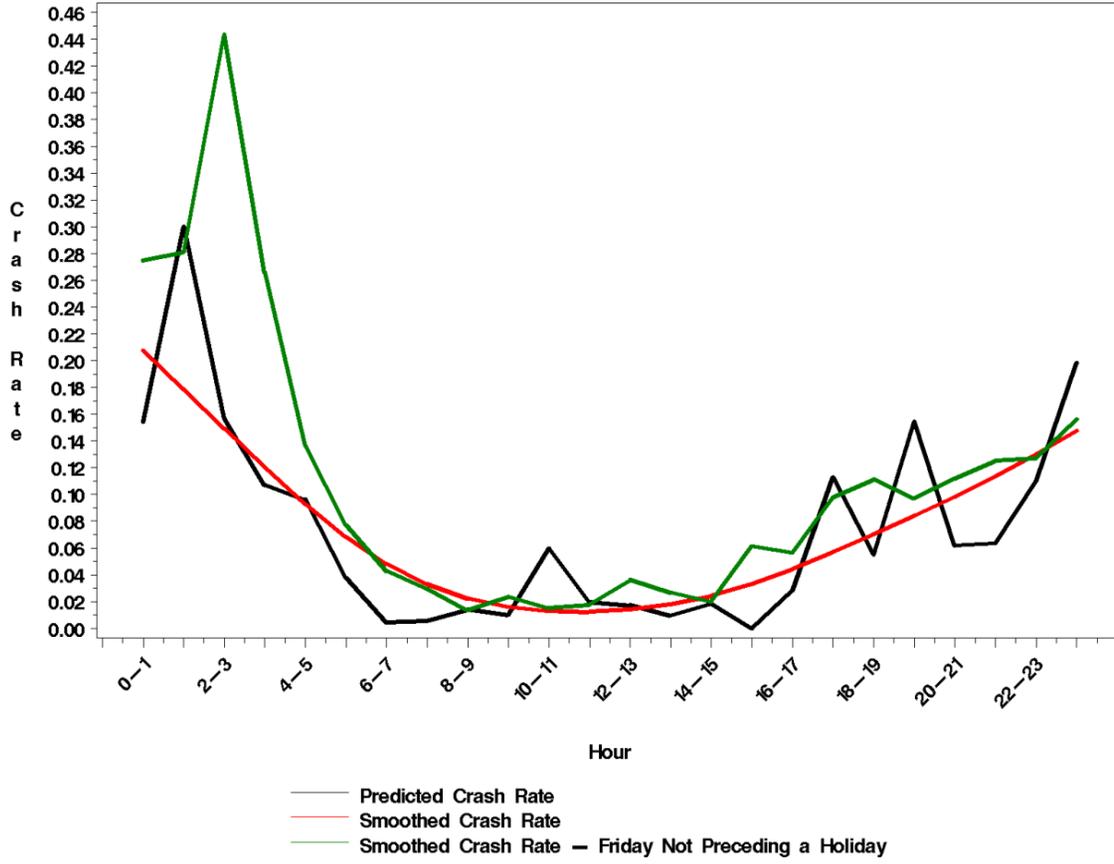


Figure 1. Forecasted OVI Fatal and Injury Crash Rates on December 29, 2006, by Hour.

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 90 from milepost 186 in LAK to milepost 189 in LAK.
2. IR 80 from milepost 220 in MAH to milepost 224 in MAH.
3. IR 680 from milepost 0 in MAH to milepost 3 in MAH.
4. IR 680 from milepost 4 in MAH to milepost 5 in MAH.
5. IR 80 from milepost 206 in TRU to milepost 230 in TRU.
6. IR 90 from milepost 199 in LAK to milepost 201 in LAK.
7. IR 76 from milepost 31 in POR to milepost 32 in POR.
8. IR 680 from milepost 9 in MAH to milepost 10 in MAH.
9. SR 46 from milepost 10 in MAH to milepost 17 in MAH.
10. SR 2 from milepost 0 in LAK to milepost 10 in LAK.
11. SR 625 from milepost 5 in MAH to milepost 7 in MAH.
12. IR 76 from milepost 36 in POR to milepost 37 in POR.
13. IR 271 from milepost 38 in LAK to milepost 39 in LAK.
14. SR 44 from milepost 0 in LAK to milepost 5 in LAK.
15. IR 680 from milepost 12 in MAH to milepost 14 in MAH.
16. SR 193 from milepost 0 in TRU to milepost 5 in TRU.
17. IR 80 from milepost 187 in POR to milepost 188 in POR.
18. IR 90 from milepost 236 in ATB to milepost 237 in ATB.
19. IR 90 from milepost 209 in LAK to milepost 210 in LAK.
20. IR 90 from milepost 196 in LAK to milepost 197 in LAK.
21. IR 90 from milepost 205 in LAK to milepost 206 in LAK.
22. US 6 from milepost 15 in GEA to milepost 16 in GEA.
23. SR 46 from milepost 15 in ATB to milepost 20 in ATB.
24. SR 5 from milepost 5 in TRU to milepost 10 in TRU.
25. US 62 from milepost 0 in TRU to milepost 5 in TRU.
26. US 20 from milepost 10 in ATB to milepost 15 in ATB.
27. SR 558 from milepost 10 in COL to milepost 13 in COL.
28. SR 11 from milepost 10 in MAH to milepost 15 in MAH.

## 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.

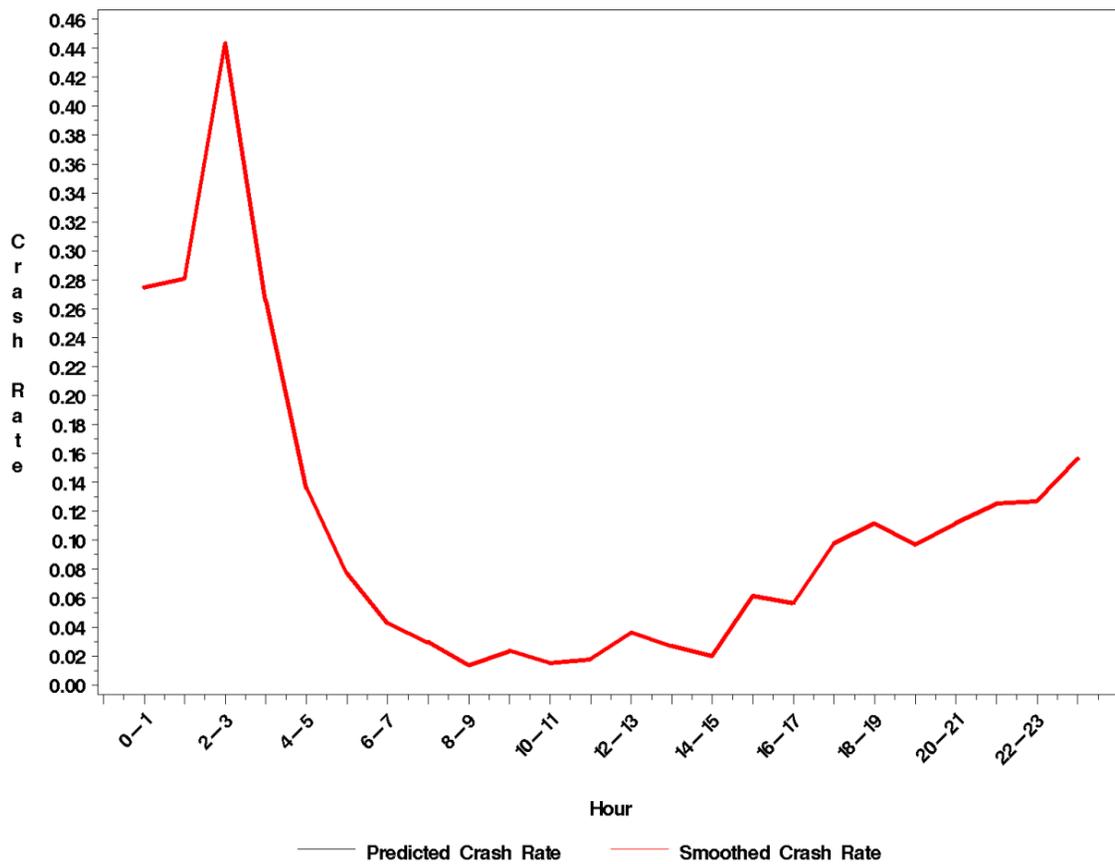


Figure 2. Forecasted OVI Fatal and Injury Crash Rates on December 30-31, 2006, by Hour.

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. IR 90 from milepost 186 in LAK to milepost 189 in LAK.
2. IR 80 from milepost 220 in MAH to milepost 224 in MAH.
3. IR 680 from milepost 0 in MAH to milepost 3 in MAH.
4. IR 76 from milepost 31 in POR to milepost 32 in POR.
5. IR 680 from milepost 9 in MAH to milepost 10 in MAH.
6. IR 90 from milepost 199 in LAK to milepost 201 in LAK.
7. IR 680 from milepost 4 in MAH to milepost 6 in MAH.
8. SR 625 from milepost 5 in MAH to milepost 7 in MAH.
9. IR 76 from milepost 36 in POR to milepost 37 in POR.
10. IR 80 from milepost 206 in TRU to milepost 230 in TRU.
11. SR 46 from milepost 15 in MAH to milepost 17 in MAH.
12. SR 2 from milepost 0 in LAK to milepost 10 in LAK.
13. SR 82 from milepost 15 in TRU to milepost 20 in TRU.
14. SR 282 near milepost 0 in GEA.

15. IR 90 from milepost 211 in LAK to milepost 212 in LAK.
16. US 6 from milepost 15 in GEA to milepost 16 in GEA.
17. SR 193 from milepost 0 in TRU to milepost 5 in TRU.
18. IR 680 from milepost 7 in MAH to milepost 8 in MAH.
19. IR 680 from milepost 11 in MAH to milepost 14 in MAH.
20. IR 90 from milepost 228 in ATB to milepost 229 in ATB.
21. SR 86 from milepost 5 in LAK to milepost 10 in LAK.
22. US 20 from milepost 10 in ATB to milepost 15 in ATB.
23. SR 44 from milepost 0 in LAK to milepost 5 in LAK.
24. IR 271 from milepost 38 in LAK to milepost 39 in LAK.
25. IR 80 from milepost 187 in POR to milepost 188 in POR.
26. IR 90 from milepost 236 in ATB to milepost 237 in ATB.
27. IR 90 from milepost 209 in LAK to milepost 210 in LAK.
28. IR 90 from milepost 196 in LAK to milepost 197 in LAK.
29. IR 90 from milepost 205 in LAK to milepost 206 in LAK.
30. SR 46 from milepost 5 in TRU to milepost 10 in TRU.
31. SR 5 from milepost 5 in TRU to milepost 10 in TRU.
32. SR 7 from milepost 10 in MAH to milepost 12 in MAH.

### 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.

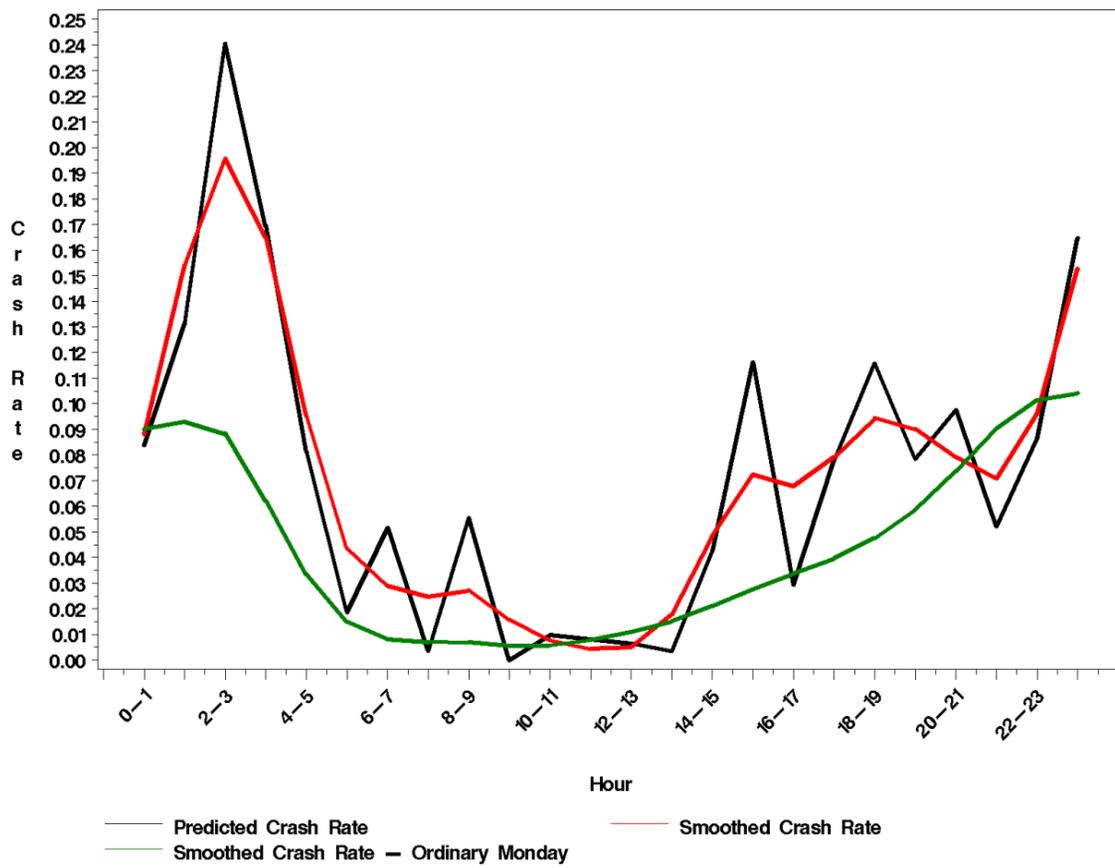


Figure 3. Forecasted OVI Fatal and Injury Crash Rates on January 1, 2007, by Hour.

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. IR 80 from milepost 220 in MAH to milepost 224 in MAH.
2. IR 90 from milepost 186 in LAK to milepost 189 in LAK.
3. US 322 from milepost 5 in GEA to milepost 10 in GEA.
4. IR 90 from milepost 199 in LAK to milepost 201 in LAK.
5. IR 680 from milepost 0 in MAH to milepost 3 in MAH.
6. SR 625 from milepost 5 in MAH to milepost 7 in MAH.
7. IR 680 from milepost 4 in MAH to milepost 5 in MAH.
8. SR 46 from milepost 10 in MAH to milepost 17 in MAH.
9. SR 2 from milepost 0 in LAK to milepost 10 in LAK.
10. SR 193 from milepost 0 in TRU to milepost 5 in TRU.
11. IR 76 from milepost 31 in POR to milepost 32 in POR.
12. IR 680 from milepost 9 in MAH to milepost 10 in MAH.
13. SR 82 from milepost 15 in TRU to milepost 20 in TRU.
14. IR 80 from milepost 207 in TRU to milepost 227 in TRU.

15. SR 44 from milepost 0 in LAK to milepost 5 in LAK.
16. US 6 from milepost 15 in GEA to milepost 16 in GEA.
17. IR 76 from milepost 36 in POR to milepost 37 in POR.
18. SR 11 from milepost 10 in MAH to milepost 15 in MAH.
19. SR 46 from milepost 5 in TRU to milepost 15 in TRU.
20. US 20 from milepost 10 in ATB to milepost 15 in ATB.
21. US 62 from milepost 0 in TRU to milepost 5 in TRU.
22. IR 271 from milepost 38 in LAK to milepost 39 in LAK.
23. SR 46 from milepost 15 in ATB to milepost 20 in ATB.