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SAFETY AND TRAFFIC ANALYSIS

FOR

Proposed Freestanding Billboard Sign
IAAT Services
Block 1405 Lot 4
Borough of River Edge
Bergen County, New Jersey
June 5, 2025
Our File No. 25-101

PREPARED BY: _____

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TABLE OF CONTENTS

INTRODUCTION

SIMOFF ENGINEERING ASSOCIATES, INC. (SEA) has prepared this Traffic Safety analysis for a proposed Outdoor Advertising Sign located on property known as Block 1405 Lot 4 in the Borough of River Edge, Bergen County, New Jersey. Figure 1 provides a plotting of the location on a road map.

The location is at milepost 5.21± of Route 4. Figure 2 depicts the location on the New Jersey Department of Transportation straight line diagram.

FIGURE 1

NJ 4 (West to East) **Mile Posts: 5.000 - 8.000**

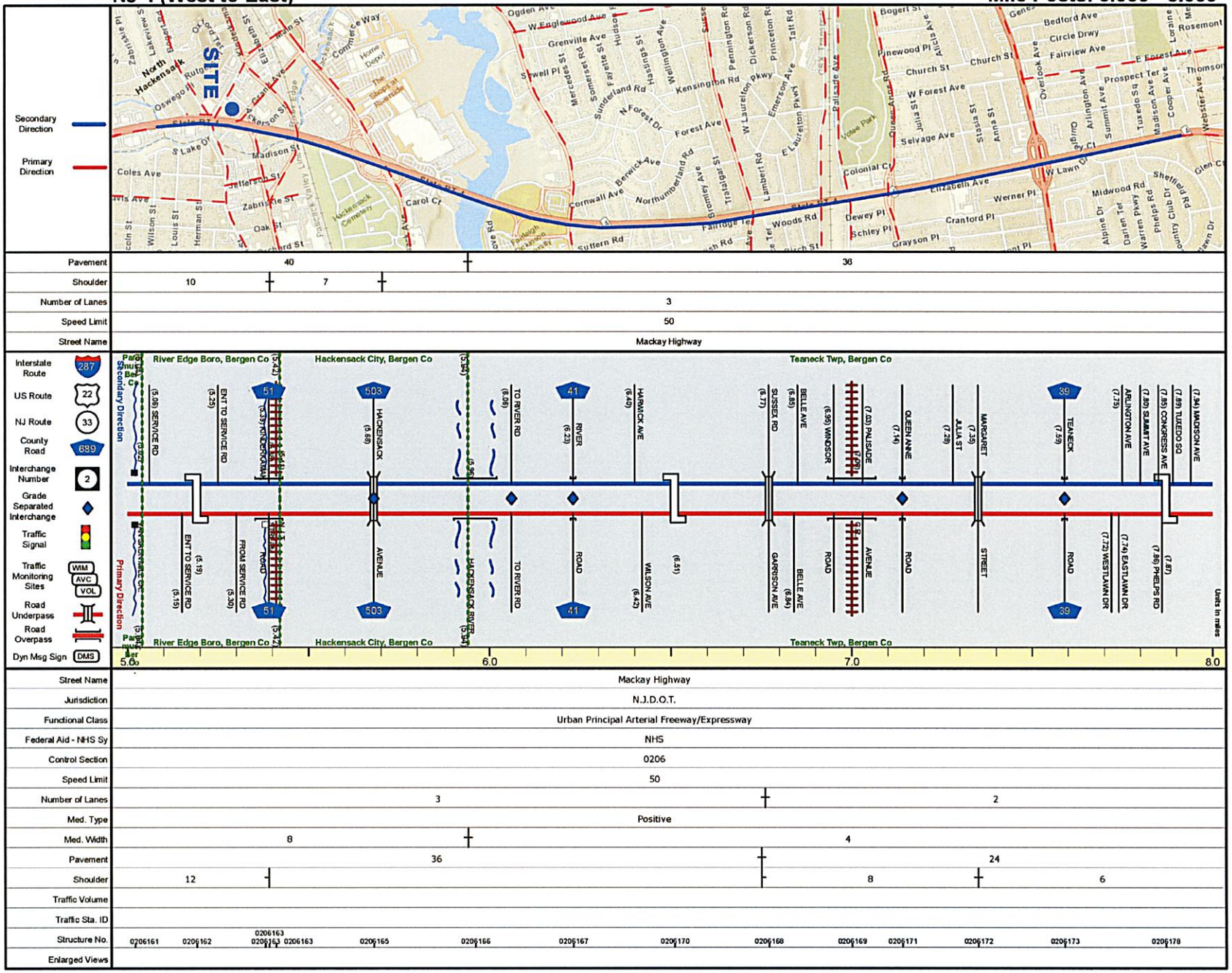

FIGURE 2

Proposed Sign dimensions are as follows:

Overall Height:	60'
Sign Width:	48'
Sign Height:	14'

The sign is proposed to be a double face static sign facing westbound and eastbound traffic on Route 4.

The purpose of this analysis is to evaluate the traffic safety and visual impacts associated with the proposed sign. Accordingly, this analysis includes the following:

- A review of the Site Plan and Details prepared by L2A Land Design, entitled "Proposed Outdoor Advertising Sign, 41 Grand Avenue, Borough of River Edge, Bergen County, New Jersey" Dated 3/19/2025
- A review of existing roadways and traffic conditions in the vicinity of the site.
- Perform a safety impact analysis of the proposed location on Route 4 in the area of the proposed outdoor advertising sign.
- Conclusions of this study.

Our findings indicate that the proposed sign will not have any detrimental effects on safety and traffic flow along Route 4. There is adequate time to observe the proposed sign without creating any distractions from the driving task.

ANALYSIS

The basic alignment of Route 4 in the vicinity of the proposed Outdoor Advertising Signs is relatively straight and level. As mentioned previously, the proposed sign will be located at milepost 5.21 ± of Route 4.

The goal for the placement of the proposed sign is to provide a safe time for optimum visibility to maximize the time that the driver will be able to view the billboard. The

posted speed limit on Route 4 at the location is 50 mph (73 feet/second). The visibility of the sign as depicted on Exhibit A is as follows:

4 WB – 875 feet (12 seconds)
4 EB – 740 feet (10 seconds)

The US Department of Transportation, Federal Highway Administration published a study entitled **DRIVER VISUAL BEHAVIOR IN THE PRESENCE OF COMMERCIAL ELECTRONIC VARIABLE MESSAGE SIGNS (CEVMS)** – see exhibit G for the executive summary of the study. While the analysis was conducted to evaluate the impacts of electronic billboards, the information for static billboards was developed as a comparison between the two types of signs. The study conducted driver's eye-tracking in the presence of billboards to determine if glances at billboards took the driver's eye off the forward view and there was a determination of the time that the motorist viewed the digital and static billboards. The study found that motorists' average fixation duration of static billboards was .335 seconds (approximately 1/3 of a second). This study performed by the US Department of Transportation has shown that driver's glances at both static and digital outdoor advertising signs average less than .4 seconds. The visibility that was measured in this location allows the available visibility of the proposed sign 12 seconds in the westbound direction and 10 seconds eastbound compared to the US DOT average viewing of .335 seconds. The placement and height of the sign allow motorists the time to observe the sign without being distracted from the driving task.

The sign will have no impact on the existing operation of the roadway. There is more than adequate time for the motorist to view the sign based on the geometry of the roadway.

CONCLUSION

Based on our analysis of published research, the following summarized comments can be concluded:

- The geometric alignment of Route 4 in the vicinity of the proposed sign provides motorists with proper viewing timing. Therefore, it will not present any distractions or safety hazards. The roadway geometry affords adequate forward visibility of the motorist's view.
- In a review of site-specific conditions, the proposed sign will be visible the 12 seconds traveling westbound and 10 seconds eastbound compared to the FHWA research that determined an average viewing time of .335 seconds. The placement of the sign is in accordance with the research criteria to afford adequate time to observe the sign in a safe manner.

Vehicles travelling at 50 Miles per Hour, i.e., 73 feet per second will have more than adequate time to digest the copy of the outdoor advertising sign without being distracted from the driving task. Grant of the variance relief will not create adverse impacts from a traffic engineering point of view.

In conclusion, the findings of this analysis indicate that the proposed sign will not adversely impact driver safety and will also not be a detriment to the health, safety, and welfare of the community.

EXHIBITS A, B, C, D, E & F

① INDICATES LOCATION AND DIRECTION PHOTO WAS TAKEN

0 200 400

SCALE: 1" = 200'

NORTH

PHOTO KEY MAP

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PROPOSED OUTDOOR ADVERTISING SIGN
41 GRAND AVENUE
BLOCK 1405, LOT 4
BOROUGH OF RIVER EDGE, BERGEN COUNTY, NEW JERSEY

FILE No: 25-101

EXHIBIT "A"

0 200 400

SCALE: 1" = 200'

NORTH

VIEWING STUDY

SEA Simoff Engineering Associates
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FILE No: 25-101

EXHIBIT "B"

PHOTO #1. NJSH 4 EB. APPROXIMATELY 400 FEET WEST OF PROPOSED SIGN

PROPOSED BILLBOARD SIMULATION

SEA Simoff Engineering Associates
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PROPOSED OUTDOOR
ADVERTISING SIGN
41 GRAND AVENUE
BLOCK 1405, LOT 4
BOROUGH OF RIVER EDGE, BERGEN COUNTY, NEW JERSEY

FILE No: 25-101

EXHIBIT "C"

PHOTO #3. NJSH 4 EB. APPROXIMATELY 800 FEET WEST OF PROPOSED SIGN

PROPOSED BILLBOARD SIMULATION

SEA
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PROPOSED OUTDOOR
ADVERTISING SIGN
41 GRAND AVENUE
BLOCK 1405, LOT 4
BOROUGH OF RIVER EDGE, BERGEN COUNTY, NEW JERSEY

FILE No: 25-101

EXHIBIT "D"

PHOTO #5. NJSH 4 WB. APPROXIMATELY 200 FEET EAST OF PROPOSED SIGN

PROPOSED BILLBOARD SIMULATION

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PROPOSED OUTDOOR
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FILE No: 25-101

EXHIBIT "E"

PHOTO #7. NJSH 4 WB. APPROXIMATELY 600 FEET EAST OF PROPOSED SIGN

PROPOSED BILLBOARD SIMULATION

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FILE No: 25-101

EXHIBIT "F

EXHIBIT G

EXECUTIVE SUMMARY OF

FHWA REPORT

DRIVER VISUAL BEHAVIOR IN THE PRESENCE OF COMMERCIAL ELECTRONIC VARIABLE MESSAGE SIGNS (CEVMS)

SEPTEMBER 2012

U.S. Department of Transportation
Federal Highway Administration

FHWA-HEP-

EXECUTIVE SUMMARY

This study examines where drivers look when driving past commercial electronic variable message signs (CEVMS), standard billboards, or no off-premise advertising. The results and conclusions are presented in response to the three research questions listed below:

1. Do CEVMS attract drivers' attention away from the forward roadway and other driving-relevant stimuli?

2. Do glances to CEVMS occur that would suggest a decrease in safety?

3. Do drivers look at CEVMS more than at standard billboards?

This study follows a Federal Highway Administration (FHWA) review of the literature on the possible distracting and safety effects of off-premise advertising and CEVMS in particular. The review considered laboratory studies, driving simulator studies, field research vehicle studies, and crash studies. The published literature indicated that there was no consistent evidence showing a safety or distraction effect due to off-premise advertising. However, the review also enumerated potential limitations in the previous research that may have resulted in the finding of no distraction effects for off-premise advertising. The study team recommended that additional research be conducted using instrumented vehicle research methods with eye tracking technology.

The eyes are constantly moving and they fixate (focus on a specific object or area), perform saccades (eye movements to change the point of fixation), and engage in pursuit movements (track moving objects). It is during fixations that we take in detailed information about the environment. Eye tracking allows one to determine to what degree off-premise advertising may divert attention away from the forward roadway. A finding that areas containing CEVMS result in significantly more gazes to the billboards at a cost of not gazing toward the forward roadway would suggest a potential safety risk. In addition to measuring the degree to which CEVMS may distract from the forward roadway, an eye tracking device would allow an examination of the duration of fixations and dwell times (multiple sequential fixations) to CEVMS and standard billboards. Previous research conducted by the National Highway Traffic Safety Administration (NHTSA) led to the conclusion that taking your eyes off the road for 2 seconds or more presents a safety risk. Measuring fixations and dwell times to CEVMS and standard billboards would also allow a determination as to the degree to which these advertising signs lead to potentially unsafe gaze behavior.

Most of the literature concerning eye gaze behavior in dynamic environments suggests that task demands tend to override visual salience (an object that stands out because of its physical properties) in determining attention allocation. When extended to driving, it would be expected that visual attention will be directed toward task-relevant areas and objects (e.g., the roadway, other vehicles, speed limit signs) and that other salient objects, such as billboards, would not necessarily capture attention. However, driving is a somewhat automatic process and conditions generally do not require constant, undivided attention. As a result, salient stimuli, such as CEVMS, might capture driver attention and produce an unwanted increase in driver distraction. The present study addresses this concern.

This study used an instrumented vehicle with an eye tracking system to measure where drivers were looking when driving past CEVMS and standard billboards. The CEVMS and standard billboards were measured with respect to luminance, location, size, and other relevant variables to characterize these visual stimuli extensively. Unlike previous studies on digital billboards, the present study examined CEVMS as deployed in two United States cities. These billboards did not contain dynamic video or other dynamic elements, but changed content approximately every 8 to 10 seconds. The eye tracking system had nearly a 2-degree level of resolution that provided significantly more accuracy in determining what objects the drivers were looking at compared to an earlier naturalistic driving study. This study assessed two data collection efforts that employed the same methodology in two cities.

In each city, the study examined eye glance behavior to four CEVMS, two on arterials and two on freeways. There were an equal number of signs on the left and right side of the road for arterials and freeways. The standard billboards were selected for comparison with CEVMS such that one standard billboard environment matched as closely as possible that of each of the CEVMS. Two control locations were selected that did not contain off-premise advertising, one on an arterial and the other on a freeway. This resulted in 10 data collection zones in each city that were approximately 1,000 feet in length (the distance from the start of the data collection zone to the point that the CEVMS or standard billboard disappeared from the data collection video).

In Reading, Pennsylvania, 14 participants drove at night and 17 drove during the day. In Richmond, Virginia, 10 participants drove at night and 14 drove during the day. Calibration of the eye tracking system, practice drive, and the data collection drive took approximately 2 hours per participant to accomplish.

The following is a summary of the study results and conclusions presented in reference to the three research questions the study aimed to address.

Do CEVMS attract drivers' attention away from the forward roadway and other driving relevant stimuli?

- On average, the drivers in this study devoted between 73 and 85 percent of their visual attention to the road ahead for both CEVMS and standard billboards. This range is consistent with earlier field research studies. In the present study, the presence of CEVMS did not appear to be related to a decrease in looking toward the road ahead.

Do glances to CEVMS occur that would suggest a decrease in safety?

- The average fixation duration to CEVMS was 379 ms and to standard billboards it was 335 ms across the two cities. The average fixation durations to CEVMS and standard billboards were similar to the average fixation duration to the road ahead.

- The longest fixation to a CEVMS was 1,335 ms and to a standard billboard it was 1,284 ms. The current widely accepted threshold for durations of glances away from the road ahead that result in higher crash risk is 2,000 ms. This value comes from a NHTSA

naturalistic driving study that showed a significant increase in crash odds when glances away from the road ahead were 2,000 ms or longer.

- Four dwell times (aggregate of consecutive fixations to the same object) greater than 2,000 ms were observed across the two studies. Three were to standard billboards and one was to a CEVMS. The long dwell time to the CEVMS occurred in the daytime to a billboard viewable from a freeway. Review of the video data for these four long dwell times showed that the signs were not far from the forward view while participant's gaze dwelled on them. Therefore, the drivers still had access to information about what was in front of them through peripheral vision.

- The results did not provide evidence indicating that CEVMS, as deployed and tested in the two selected cities, were associated with unacceptably long glances away from the road. When dwell times longer than the currently accepted threshold of 2,000 ms occurred, the road ahead was still in the driver's field of view. This was the case for both CEVMS and standard billboards.

Do drivers look at CEVMS more than at standard billboards?

- When comparing the probability of a gaze at a CEVMS versus a standard billboard, the drivers in this study were generally more likely to gaze at CEVMS than at standard billboards. However, some variability occurred between the two locations and between the types of roadway (arterial or freeway).

- In Reading, when considering the proportion of time spent looking at billboards, the participants looked more often at CEVMS than at standard billboards when on arterials (63 percent to CEVMS and 37 percent to a standard billboard), whereas they looked more often at standard billboards when on freeways (33 percent to CEVMS and 67 percent to a standard billboard). In Richmond, the drivers looked at CEVMS more than standard billboards no matter the type of road they were on, but as in Reading, the preference for gazing at CEVMS was greater on arterials (68 percent to CEVMS and 32 percent to standard billboards) than on freeways (55 percent to CEVMS and 45 percent to standard billboards). When a gaze was to an off-premise advertising sign, the drivers were generally more likely to gaze at a CEVMS than at a standard billboard.

- In Richmond, the drivers showed a preference for gazing at CEVMS versus standard billboards at night, but in Reading the time of day did not affect gaze behavior. In Richmond, drivers gazed at CEVMS 71 percent and at standard billboards 29 percent at night. On the other hand, in the day the drivers gazed at CEVMS 52 percent and at standard billboards 48 percent.

- In Reading, the average gaze dwell time for CEVMS was 981 ms and for standard billboards it was 1,386 ms. The difference in these average dwell times was not statistically significant. In contrast, the average dwell times to CEVMS and standard billboards were significantly different in Richmond (1,096 ms and 674 ms, respectively).

The present data suggest that the drivers in this study directed the majority of their visual attention to areas of the roadway that were relevant to the task at hand (e.g., the driving task). Furthermore, it is possible, and likely, that in the time that the drivers looked away from the forward roadway, they may have elected to glance at other objects in the surrounding environment (in the absence of billboards) that were not relevant to the driving task. When billboards were present, the drivers in this study sometimes looked at them, but not such that overall attention to the forward roadway decreased.

It also should be noted that, like other studies in the available literature, this study adds to the knowledge base on the issues examined, but does not present definitive answers to the research questions investigated.

SITE PHOTOS

PHOTO #1. NJSH 4 EB. APPROXIMATELY 400 FEET WEST OF PROPOSED SIGN

PHOTO #2. NJSH 4 EB. APPROXIMATELY 600 FEET WEST OF PROPOSED SIGN

PHOTO #3. NJSH 4 EB. APPROXIMATELY 800 FEET WEST OF PROPOSED SIGN

PHOTO #4. NJSH 4 EB. APPROXIMATELY 1000 FEET WEST OF PROPOSED SIGN

PHOTO #5. NJSH 4 WB. APPROXIMATELY 200 FEET EAST OF PROPOSED SIGN

PHOTO #6. NJSH 4 WB. APPROXIMATELY 400 FEET EAST OF PROPOSED SIGN

PHOTO #7. NJSH 4 WB. APPROXIMATELY 600 FEET EAST OF PROPOSED SIGN

PHOTO #8. NJSH 4 WB. APPROXIMATELY 800 FEET EAST OF PROPOSED SIGN

PHOTO #9. NJSH 4 WB. APPROXIMATELY 1000 FEET EAST OF PROPOSED SIGN