

# Appendices

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# **Appendix FEIR-1**

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Draft EIR Comment Letters



**DEPARTMENT OF TRANSPORTATION**

DISTRICT 7  
100 S. MAIN STREET, MS 16  
LOS ANGELES, CA 90012  
PHONE (213) 269-1124  
FAX (213) 897-1337  
TTY 711  
www.dot.ca.gov



*Making Conservation  
a California Way of Life*

October 5, 2022

Shine Ling  
Development Review Team  
LA Metro  
One Gateway Plaza, Mail Stop 22-9  
Los Angeles, CA 90012

RE: Transportation Communication Network  
(TCN)  
SCH # 2022040363  
Vic. LA-Los Angeles Citywide  
GTS # LA-2022-04059-DEIR

Dear Shine Ling:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above-referenced NOP. Metro proposes to implement the TCN Program, which would provide a network of TCN Structures that would incorporate intelligent technology components to promote roadway efficiency, improve public safety, increase communication, and provide for outdoor advertising that would be used to fund new and expanded transportation programs consistent with the goals of the Metro Vision 2028 Plan. The TCN Program also includes the removal of existing static signage throughout the City of Los Angeles. Implementation of the Project would include the installation of up to 34 Freeway-Facing (FF) TCN Structures and 22 Non-Freeway-Facing (NFF) TCN Structures, all on Metro-owned property.

Caltrans regulates the placement of outdoor advertising displays visible from California highways. The project would require Outdoor Advertising (ODA) License. For questions, inquiries, and any other questions you may have, please call (916) 654-6473 or reference to the following website for additional information.

<https://dot.ca.gov/programs/traffic-operations/oda>

Each of the proposed FF TCN Structures would be compliant with all Caltrans requirements, as detailed above. All of the locations would be located at least 500 feet away from any freeway designated as a Scenic Highway and their locations would be outside of the freeway right of way. All locations would be at least 500 feet away from a landscaped freeway, consistent with Caltrans guidelines. Further, at Project completion,

none of the TCN Structures would be located within 500 feet of an existing sign or within 1,000 feet of an existing digital billboard on the same side of the freeway.

Additionally, all TCN Structures would be located on Metro-owned property and would be equipped with Metro's Regional Integration of Intelligent Transportation Systems (RIITS), which provides comprehensive, timely, and real-time information among freeway, traffic, transit, and emergency systems across various agencies including local and regional transit agencies, to improve traffic and transportation systems, and to disseminate information regarding roadway improvements, and during emergency events. Thus, the Project would be consistent with Caltrans guidelines for digital signage locations near freeways.

In accordance with SB 743 and updates to the CEQA Guidelines, the focus of transportation analysis has shifted from driver delay to vehicle miles traveled (VMT). The operation of the Project would not result in new uses that would generate vehicle miles traveled on a daily basis. Any vehicle trips and associated VMT resulting from maintenance activities would be infrequent. Additionally, in accordance with LADOT's TAG, construction worker trips are not evaluated under CEQA. As such, the Project would not result in significant traffic impacts with regard to VMT. Therefore, Caltrans concurs that no traffic impact would occur, and mitigation is not required at this time.

If any temporary lane closures on the State facility are necessary, the remaining travel lanes would be maintained in accordance with standard construction management plans that would be implemented to ensure adequate circulation and emergency access. Caltrans would need to review and approve the construction management plans prior to the start of the construction. Any transportation of heavy construction equipment and/or materials that requires the use of oversized-transport vehicles on State highways will need a Caltrans transportation permit. We recommend that large-size truck trips be limited to off-peak commute periods.

Please be reminded that any work performed within the State Right-of-way will require an Encroachment Permit from Caltrans. Any modifications to State facilities must meet all mandatory design standards and specifications.

If you have any questions, please feel free to contact Mr. Alan Lin the project coordinator at (213) 269-1124 and refer to GTS # LA-2022-04059AL-DEIR.

Sincerely,



MIYA EDMONSON  
LDR/CEQA Branch Chief

email: State Clearinghouse

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**From:** Evelyn Aguilar [eaguilar@aqmd.gov]  
**Sent:** 9/21/2022, 11:54 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Cc:** [swang1@aqmd.gov](mailto:swang1@aqmd.gov)  
**Subject:** Technical Data Request: Proposed Metro's Transportation Communication Network Project

Dear Shine Ling,

South Coast AQMD staff received the Draft Environmental Impact Report (Draft EIR) for the Proposed Metro's Transportation Communication Network Project (South Coast AQMD Control Number: LAC220913-03). Staff is currently in the process of reviewing the Draft EIR. The public commenting period is from 9/9/2022 – 10/24/2022.

Upon review of the files provided as part of the public review period, I was able to access the Draft EIR and appendices on Metro's [website](#).

Please provide an electronic copy of any live modeling and emission calculation files (complete files, not summaries) that were used to quantify the air quality impacts from construction and/or operation of the Proposed Project as applicable, including the following:

1. CalEEMod Input Files (.csv files);
1. Live EMFAC output files;
1. Any emission calculation file(s) (live version of excel file(s); no PDF) used to calculate the Project's emission sources.

You may send the above-mentioned files via a Dropbox link in which they may be accessed and downloaded by South Coast AQMD staff by **09/28/22**. Without all files and supporting documentation, South Coast AQMD staff will be unable to complete a review of the air quality analyses in a timely manner. Any delays in providing all supporting documentation will require additional time for review beyond the end of the comment period.

If you have any questions regarding this request, please contact me.

Thank you,

*Evelyn Aguilar  
Air Quality Specialist, CEQA-IGR  
Planning, Rule Development & Implementation  
South Coast Air Quality Management District  
21865 Copley Drive, Diamond Bar, CA 91765  
Phone: 909-396-3148  
E-mail: [eaguilar@aqmd.gov](mailto:eaguilar@aqmd.gov)*

**Hours of operation:  
Tuesday - Friday 7:00 AM to 5:30 PM**



**South Coast  
AQMD**

***Cleaning the air that we breathe.....™***

Committees:

**Chair**

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and Animal Welfare

**Vice Chair**

Transportation

**Member**

Energy, Climate Change,  
Environmental Justice  
and River

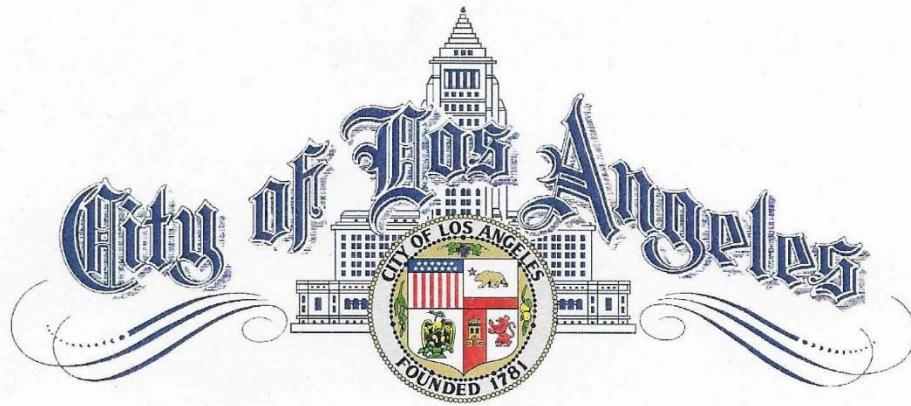
Public Works

Ad Hoc Committee

on 2028 Olympics  
and Paralympics Games

Website: <http://cd5.lacity.org>

Email: [Paul.Koretz@lacity.org](mailto:Paul.Koretz@lacity.org)



**PAUL KORETZ**  
Councilmember, Fifth District

**City Hall Office:**

200 N. Spring Street  
Room 440  
Los Angeles, CA 90012  
(213) 473-7005  
(213) 978-2250 Fax

**Valley Office:**

15760 Ventura Blvd.  
Suite 600  
Encino, CA 91436  
(818) 971-3088  
(818) 788-9210 Fax

**West L.A. Office:**

6380 Wishire Blvd.  
Suite 800  
Los Angeles, CA 90048  
(323) 866-1828  
(323) 852-1129 Fax

October 28, 2022

Metro Board of Directors  
One Gateway Plaza  
Mail Stop 22-9  
Los Angeles, CA 90012

Attention: Shine Ling, Development Review Team

Dear Honorable Board Directors:

**REGARDING METRO'S TRANSPORTATION COMMUNICATION NETWORK**

I have extreme concerns about the proposed Transportation Communication Network (TCN) Program. The last thing the City of Los Angeles needs is additional digital signs. All advertising signs distract drivers, create visual blight, and lead to injuries and fatalities. There are three proposed TCN Structures (NFF-07, FF-26, FF-28) in Council District Five. While I do believe that Metro should scrap the entire program, I echo the calls of my constituents when I say that, at a minimum, Metro should remove all three proposed TCN Structures from my district.

While the City has allowed digital signage in some instances in exchange for clear and tangible public benefits or streetscape improvements, the proposed TCN program includes no discernible public benefits and I assert will instead degrade the public realm. The City of Los Angeles is not for sale, and extreme exceptions to the City's current sign restrictions should not be granted to allow these advertising displays.

Instead of pursuing this dead-on-arrival proposal, Metro should explore alternatives to meet its project objectives. Such alternatives could include providing Metro's Regional Integration of Intelligent Transportation Systems (RIITS) information to boost roadway efficiency, in addition to other project components, on more traditional signs which do not sell advertising space. Additionally, alternatives should better explore increased buffering from residential uses, reduced brightness, and other mitigation measures as it appears that the proposed locations will have direct impacts on adjacent residential units and other potentially sensitive users.



While the Environmental Impact Report (EIR) brings to light certain impacts of the project on the environment, the simple fact is that the negative impacts of this project go far and well beyond the scope of an EIR and California Environmental Quality Act review. The EIR lays out the potential for significant and unavoidable impacts related to Aesthetics, Cultural Resources, and Land Use and Planning. Additionally, the EIR relies on unproven mitigation measures to potentially address significant impacts related to Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, Noise, and Tribal Cultural Resources. There is no way that the undefined potential benefits of this program would possibly outweigh the clear and obvious negative environmental and societal impacts associated with increased digital advertising and increased traffic dangers. I urge you to halt this program as soon as possible.

Thank you for the opportunity to provide comments on this project today.

Sincerely,

A handwritten signature in black ink that reads "Paul Koretz". The signature is written in a cursive, slightly slanted style.

**PAUL KORETZ**  
Councilmember, Fifth District

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**From:** Garcia, Perla [perla.garcia@fire.lacounty.gov]  
**Sent:** 9/22/2022, 1:02 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Metro Los Angeles - Electronic Submittal Required

**The Los Angeles County Fire Department is no longer accepting Environmental Impact Report (EIR) - City Requests applications by mail. Please register and submit your Environmental Review application through the EPIC-LA website at:**

<https://epicla.lacounty.gov>

1. Please see attached and follow the steps on the EPIC-LA User Guide - Fire - Environmental (EIR) - City Requests.
2. The requirements for the submittal is to upload all electronic (PDF format) **City Transmittal letters** and **other review documents** on EPIC-LA.

The Los Angeles County Fire Department **review period** for an EIR is **30 days**. We will upload the comments in the **Files/Attachments tab** on or before the deadline.

For any questions or concerns regarding the Environmental Review application or process, please contact Secretary III, Perla Garcia at (323) 890-4330 or [Perla.Garcia@fire.lacounty.gov](mailto:Perla.Garcia@fire.lacounty.gov)

**PERLA GARCIA**

**LACO FIRE DEPARTMENT**

**FORESTRY DIVISION**

**323-890-4330**







**COUNTY OF LOS ANGELES FIRE DEPARTMENT  
FIRE PREVENTION DIVISION**

Land Development Unit  
5823 Rickenbacker Road  
Commerce, CA 90040  
Telephone (323) 890-4293, Fax (323) 890-9783

EPIC-LA NUMBER:	FFER2022010844	PROJECT NUMBER:	
CITY/COMMUNITY:	City of Los Angeles	STATUS:	Cleared
PROJECT ADDRESS:	785 N Vignes Street Los Angeles, CA 90012	DATE:	10/04/2022

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**CONDITIONS**

1. This project is located entirely in the jurisdiction of the City of Los Angeles; therefore, the City of Los Angeles Fire Department has jurisdiction concerning this project and will be reviewing the Final Map Submittal. This project is located in close proximity to the jurisdictional area of the County of Los Angeles Fire Department; however, this project is unlikely to have an impact that necessitates a comment concerning general requirements from the County of Los Angeles Fire Department Fire Prevention Division Land Development Unit.

For any questions regarding the report, please contact Nancy Rodeheffer at (323) 890-4243 or [Nancy.Rodeheffer@fire.lacounty.gov](mailto:Nancy.Rodeheffer@fire.lacounty.gov).



# COUNTY OF LOS ANGELES FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE  
LOS ANGELES, CALIFORNIA 90063-3294  
(323) 881-2401  
www.fire.lacounty.gov

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INTERIM FIRE CHIEF  
FORESTER & FIRE WARDEN

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FIFTH DISTRICT

October 28, 2022

Ashley Wright  
2121 Rosecrans Avenue Ste. 3355  
El Segundo, CA 92045

Dear Ms. Wright:

**THE METRO VISION 2028 PLAN, PROPOSES TO IMPLEMENT THE INSTALLATION OF UP TO 34 FREEWAY FACING TRANSPORTATION COMMUNICATION NETWORK (TCN) STRUCTURES AND 22 NON-FREEWAY FACING TCN STRUCTURES, ALL ON METRO-OWNED PROPERTY, CITY OF LOS ANGELES, FFER202210844**

The Metro Vision 2028 Plan reviewed by the Planning Division, Land Development Unit, Forestry Division, and Health Hazardous Materials Division of the County of Los Angeles Fire Department.

The following are their comments:

### PLANNING DIVISION:

The subject property is entirely within the City of Los Angeles, which is not a part of the emergency response area of the Los Angeles County Fire Department (also known as the Consolidated Fire Protection District of Los Angeles County). Therefore, this project does not appear to have any impact on the emergency responsibilities of this Department.

For any questions regarding this response, please contact Ed Lamas, Planning Analyst, at (323) 881-2404 or [Eduardo.Lamas@fire.lacounty.gov](mailto:Eduardo.Lamas@fire.lacounty.gov)

### LAND DEVELOPMENT UNIT:

This project is located entirely in the jurisdiction of the City of Los Angeles; therefore, the City of Los Angeles Fire Department has jurisdiction concerning this project and will be reviewing the Final Map Submittal.

#### SERVING THE UNINCORPORATED AREAS OF LOS ANGELES COUNTY AND THE CITIES OF:

AGOURA HILLS  
ARTESIA  
AZUSA  
BALDWIN PARK  
BELL  
BELL GARDENS  
BELLFLOWER  
BRADBURY  
CALABASAS

CARSON  
CERRITOS  
CLAREMONT  
COMMERCE  
COVINA  
CUDAHY  
DIAMOND BAR  
DUARTE

EL MONTE  
GARDENA  
GLEN DORA  
HAWAIIAN GARDENS  
HAWTHORNE  
HERMOSA BEACH  
HIDDEN HILLS  
HUNTINGTON PARK  
INDUSTRY

INGLEWOOD  
IRWINDALE  
LA CANADA-FLINTRIDGE  
LA HABRA  
LA MIRADA  
LA PUENTE  
LAKEWOOD  
LANCASTER

LAWDALE  
LOMITA  
LYNWOOD  
MALIBU  
MAYWOOD  
NORWALK  
PALMDALE  
PALOS VERDES ESTATES  
PARAMOUNT

PICO RIVERA  
POMONA  
RANCHO PALOS VERDES  
ROLLING HILLS  
ROLLING HILLS ESTATES  
ROSEMEAD  
SAN DIMAS  
SANTA CLARITA

SIGNAL HILL  
SOUTH EL MONTE  
SOUTH GATE  
TEMPLE CITY  
VERNON  
WALNUT  
WEST HOLLYWOOD  
WESTLAKE VILLAGE  
WHITTIER

Ashley Wright  
October 28, 2022  
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This project is located in close proximity to the jurisdictional area of the County of Los Angeles Fire Department; however, this project is unlikely to have an impact that necessitates a comment concerning general requirements from the County of Los Angeles Fire Department Fire Prevention Division Land Development Unit.

For any questions regarding the report, please contact Nancy Rodeheffer at (323) 890-4244, or at [nancy.rodeheffer@fire.lacounty.gov](mailto:nancy.rodeheffer@fire.lacounty.gov)

**FORESTRY DIVISION – OTHER ENVIRONMENTAL CONCERNS:**

The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, brush clearance, vegetation management, fuel modification for Fire Hazard Severity Zones, archeological and cultural resources, and the County Oak Tree Ordinance.

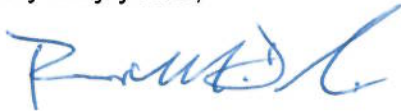
For any questions regarding this response, please contact Forestry Assistant, Nicholas Alegria at (818) 890-5719.

**HEALTH HAZARDOUS MATERIALS DIVISION:**

The Health Hazardous Materials Division (HHMD) of the Los Angeles County Fire Department does have some environmental regulatory jurisdiction within the City of Los Angeles. However, HHMD has no comments or requirements for the Metro TCN project at this time.

Please contact HHMD Hazardous Materials Specialist III, Jennifer Levenson at (323) 890-4114 or [Jennifer.Levenson@fire.lacounty.gov](mailto:Jennifer.Levenson@fire.lacounty.gov) if you have any questions.

Very truly yours,



RONALD M. DURBIN, CHIEF, FORESTRY DIVISION  
PREVENTION SERVICES BUREAU

RMD:pg

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**From:** Campomanes, Rochelle E. [recampom@lasd.org]  
**Sent:** 9/12/2022, 8:04 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Transportation Communication Network Project

Hello,

I received an email regarding the Notice of Availability of a Draft EIR on Metro's Transportation Communication Network project. I could not open the links. I went to Metro's website, but it is being blocked due to security purposes. Please send NOA and Draft EIR to my email for our review.

Thank you,

**Rochelle Campomanes, LEED AP**  
**Departmental Facilities Planner II**  
**Facilities Planning Bureau**  
**Tel: 323-526-5614**



**CONFIDENTIALITY NOTICE:** This email message, including any attachments, from the Los Angeles County Sheriff's Department is intended for the official and confidential use of the recipients to whom it is addressed. It contains information that may be confidential, privileged, attorney work product, or otherwise exempted from disclosure under applicable law. If you have received this message in error, be advised that any review, disclosure, use, dissemination, distribution, or reproduction of this message or its contents is strictly prohibited. Please notify the sender of this email immediately by reply email that you have received this message in error, and immediately destroy this message, including any attachments. Thank you in advance for your cooperation.

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From: [[pooja.bhagat@delreync.org](mailto:pooja.bhagat@delreync.org)]  
Sent: 10/21/2022, 10:00 AM  
To: [mwersinger@me.com](mailto:mwersinger@me.com); [tcn@metro.net](mailto:tcn@metro.net); [brideaug@metro.net](mailto:brideaug@metro.net); [eric.bruins@lacity.org](mailto:eric.bruins@lacity.org);  
[heather.bleemers@lacity.org](mailto:heather.bleemers@lacity.org)  
Subject: Response to Draft EIR for Metro's TNC project

Oct 21, 2022

To: Los Angeles County Metro Transportation Authority  
Re: Response to Transportation Communication Network plan's Draft Environmental Impact Report

The Del Rey Neighborhood Council (DRNC) opposes Metro's TCN project digital bill boards for many reasons listed below. We would prefer Alternate 1 where no environmental impact occurs. However, as Metro is proposing to take down more than 200 static Bill boards, we support Alternate 3 where-in digital bill board are not proposed at site locations FF29 and FF-30 in addition to other multiple locations. Attached is DRNC's letter to Metro.

Please note that on October 13th, the DRNC Board passed the following motion:

Del Rey Neighborhood Council has passed the following motion and requests Los Angeles City Council support Metro Transportation Communication Network's Draft EIR Alternate 3 to protects our coastal wetlands. As a condition of our support, we request FF29 & FF30 be eliminated completely, and we require that Metro confirm taking down existing static billboards at all locations along Culver Blvd from the 405 to 90 Fwy and along the wetlands.

Please see attached letter. Request to please inform us of next steps related to the EIR for the TCN project.

Regards

Pooja Bhagat - Land-use Officer DRNC  
Matt Wersinger - President DRNC



**NEIGHBORHOOD COUNCIL**

Oct 21, 2022

To: Los Angeles County Metro Transportation Authority  
Re: Response to Transportation Communication Network plan's [Draft Environmental Impact Report](#)

**PRESIDENT**

Matt Wersinger

**VICE-PRESIDENT**

Ravi Sankaran

**TREASURER**

Daniel Perez

**SECRETARY**

Brent Goshen

**COMMUNICATIONS OFFICER**

Alejandro Arroyo

**LAND USE OFFICER**

Pooja Bhagat

**OUTREACH OFFICER**

Jillian Hegedusl

**AREA DIRECTORS**

A: Theresa Gamache

B: Anne Kaplan

C: Kristine Rezny

D: Adriana De La Cruz

E: Peter Kunkle

F: Monica Franklin

G: Maria del Carmen

H: Greg Turquand

**Del Rey**

**Neighborhood Council**

[board@delreync.org](mailto:board@delreync.org)

[www.delreync.org](http://www.delreync.org)

[empowerla.org/drenc](http://empowerla.org/drenc)

The Del Rey Neighborhood Council opposes Metro's TCN project digital bill boards for many reasons listed below. We would prefer Alternate 1 where no environmental impact occurs. However, as Metro is proposing to take down more than 200 static Bill boards, we support Alternate 3 where-in digital bill board are not proposed at site locations FF29 and FF-30 in addition to other multiple locations. Listed below are some background and reasons for our position:

- A. Digital Billboards in Del Rey along the 90 Fwy at the proposed FF29 and FF30 locations will create significant irreversible and unavoidable long-term damage to the Ballona creek coastal wetland that consists of both permanent and migratory population of fauna and flora in this sensitive habitat. Even though mitigation measures have been proposed, there is no study or evidence shared of the long-term impact and consequences of radiation and other impacts from light and sound waves that will impact the migratory and permanent populations that this sensitive habitat supports.
- B. As Metro is proposing taking down over 200 static billboards, we are supporting Alternate 3 on the condition that all static billboards along the 90 FWY and along Culver Blvd be taken down as a condition of our support. If this entails that METRO work with other public and private authorities to take down the existing static billboards, we request them to do so immediately. The median along Culver Blvd has a wide green zone with soft and hard landscaping, a walking trail and is perceived and used as a park by the community. Members of the Del-Rey community have expressed Culver median be designated as a park in the future. The static bill boards are incongruous to the use of the space as a park due to its graphic content and overbearing scale specifically as the community uses Culver Blvd and it's median to cross over to multiple elementary schools to the south such as Braddock Elementary, Stoner Elementary, Marina Del Rey middle school, Vista mar charter to name a few.
- C. In general some community members have expressed a general dislike for digital bill boards as a source of revenue generation, cause of light pollution and as a source of distraction that could potentially lead to accidents.

Hence, Del Rey Neighborhood Council has passed the following motion and requests City Council support Metro Transportation Communication Network's Draft EIR Alternate 3 to protects our coastal wetlands. As a condition of our support, we request FF29 & FF30 be eliminated completely, and we require that Metro confirm taking down existing static billboards at all locations along Culver Blvd from the 405 to 90 Fwy and along the wetlands.



Signed,

Matt Wersinger – President, Del Rey Neighborhood Council

Pooja Bhagat- Land Use Officer, Del Rey Neighborhood Council

---

From: Advisor DRRA [[advisor@delreyresidentsassn.org](mailto:advisor@delreyresidentsassn.org)]  
Sent: 10/24/2022, 10:30 AM  
To: [tcn@metro.net](mailto:tcn@metro.net)  
Cc: [andrew.pennington@lacity.org](mailto:andrew.pennington@lacity.org); [councilmember.bonin@lacity.org](mailto:councilmember.bonin@lacity.org); [board@delreync.org](mailto:board@delreync.org);  
[hagu.solomon-cary@lacity.org](mailto:hagu.solomon-cary@lacity.org); [wraclupe@gmail.com](mailto:wraclupe@gmail.com); [terri.osborne@lacity.org](mailto:terri.osborne@lacity.org); [clerk@lacity.org](mailto:clerk@lacity.org)  
Subject: Comments on TCN Draft EIR; CF 22-0392

Here is the comment letter:





October 24, 2022

ONE GATEWAY PLAZA  
Mail Stop 22-9  
Los Angeles, CA 90012

Attn: Shine Ling, Development Review Team

Re: Transportation Communications Network (“TCN”) Draft Environmental Impact Report (DEIR), comments due October 24, 2022

Two decades ago, the City of Los Angeles imposed a ban on digital off-site signs, Ordinance 174547. Now, Metro and the City of Los Angeles have entered into a Memorandum of Agreement (C-139852) that would allow digital billboards to be erected on property that is co-owned by Metro and the City. For the reasons outlined more fully below, the Del Rey Residents Association (“DRRA”) is opposed to the Metro Transportation Communications Network (“TCN”) program. The following comments on the DEIR are not exhaustive of all our concerns but are those that are feasible for non-experts to address.

### Aesthetics

The public has spoken and has been opposed to digital advertising for decades. Please see the dozens of communications from the public and community impact statements from Neighborhood Councils in Council Files 11-1705 and 22-0392. The DEIR has no discussion of the cumulative effects of visual clutter on the general public and drivers alike.

In Del Rey, we are most concerned about the billboards FF29 and FF30 proposed for the intersection of the Marina (90) Freeway and Culver Boulevard. That is next to the Ballona Wetlands Ecological Reserve, and we take issue with the DEIR conclusion that the potential impacts to views of the Ballona Wetlands would be less than significant (DEIR, IV.A.3.d. Threshold (a)(1)). We also disagree with the statement “Furthermore,

Transportation Communication Network

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Council File: CF 22-0392

based on the Site Location of the proposed TCN Structure next to a freeway or major roadway, their size and height, and the existing urban setting of the Site Locations and surroundings, the TCN Structures would not substantially contrast with the existing aesthetics features, such as trees, landscaping , and open space areas” (DEIR, IV.A.3.d, Threshold (c)). The signs would attract attention and detract from the benefits the open space of the Wetlands provide for drivers. Our comments on the TCN Initial Study<sup>1</sup> (attached) noted that a digital sign on a business at 5450 Lincoln Boulevard (in Del Rey) is clearly visible from the other side of the Ballona Wetlands (about 1.5 miles away). We would like Metro to respond to each of the concerns raised by us in that letter.

Despite our particular interest in ensuring that no digital billboards are erected near the Ballona Wetlands Ecological Reserve, and our desire to have all static billboards removed from Metro property along the Culver Blvd. Bike Path that runs through Del Rey (from the 405 freeway to McConnell Avenue, about 1.5 miles), we support Alternative One – the no project alternative. In our opinion, there is no take down ratio that would be sufficient to overcome the negative effects of digital billboards in Los Angeles.

The DRRA fully supports the removal of all static display billboards from Metro-owned property. Complete removal would improve the quality of life in our neighborhoods by reducing cyclist, driver and pedestrian distractions, reducing the commercialization of our lives and eradicating the unsightly structures that hold up the billboards. We should not have to allow digital billboards as the price for having the static billboards removed.

### **Biological Resources**

According to the DEIR, the Project will have “less than significant” impact from “Substantial Light or Glare.” In fact, the DEIR fails to address the effect of light and noise from billboards on humans and wildlife. A recent article in The Atlantic<sup>2</sup> raises this issue, as does the story of the migrating goose that disrupted the October 12, 2022 Dodgers-Padres playoff game.<sup>3</sup> The best way to mitigate the light pollution from the digital billboards is to choose Alternative 1, i.e. No Project.

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<sup>1</sup> DRRA letter of August 1, 2022, attached.

<sup>2</sup> <https://www.theatlantic.com/magazine/archive/2022/07/light-noise-pollution-animal-sensory-impact/638446/>

<sup>3</sup> “Where Has Goose Gone?” from Los Angeles Times, published in Yahoo News, October 13, 2022.

### **Energy consumption – Section IV.E**

We disagree with the conclusion that the cumulative impacts related to energy use and conflicts with plans will have a less than significant impact.

According to the DEIR, the Project will result in a net increase in energy demand of 2,288,690 kWh per year. DEIR, Section IV.E. Per the U.S. Energy Information Administration, in 2020 the “average annual electricity consumption for a U.S. residential utility customer was 10,715 kWh.” Thus, the net increased use from the TCN will be equivalent to the energy consumption of 213 homes per year.

The DEIR analysis places too much reliance on the increase in energy usage as a percentage of the total sales (0.1%) of the Department of Water and Power (DWP). This is a specious argument given the size of DWP. We are in an era of climate change when the mandate is to reduce energy use, not rationalize ways to increase it. According to the DEIR, this Project is not contemplated to reach 100 percent renewable energy until 2035. Section IV.E.3.c.

Gov. Newsom has proposed clean electricity targets of 90% by 2035 and 95% by 2040. <https://www.gov.ca.gov/2022/08/12/governor-newsoms-ambitious-climate-proposals-presented-to-legislature/> (8/12/22).

Increasing consumption will make these targets harder to reach. Even if renewable energy were the answer to climate change, increases in consumption mean more renewable energy will need to be produced. Until 100% renewable energy is available for all, those using such energy force others to continue using dirty energy.

The energy consumption of the digital billboards should be re-analyzed with an emphasis on the effects of the increase in energy use. We suggest that a redirected analysis will find that the demand during operation will cause wasteful, inefficient, and unnecessary use of energy and impacts will be significant.

### **Land Use and Planning, Section I.**

The DEIR acknowledges that the Project Impact on Land Use and Planning would be “Significant and Unavoidable.”

The DEIR Section IV (Other CEQA Considerations) is required to discuss the significant and unavoidable impacts that would result from the Project,

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and the reasons why the Project is being proposed notwithstanding the significant and unavoidable impacts. Our Councilmember Mike Bonin summed it up clearly<sup>4</sup>: “[T]he scope and intent of the project is clear: install large digital billboards at highly visible Metro-owned locations for revenue generation purposes.” Other than the generation of revenue to be allocated in a manner yet to be specified, what benefit will result from Metro being allowed to ignore a ban on digital billboards that has been in place for two decades? A piecemeal dismantling of the ban will make it increasingly difficult to stop digital pollution of our environment. Why should Metro be allowed to erect digital billboards when private companies cannot?

### **Zoning**

The Project will require an amendment to the Zoning Code that has not yet been written or approved, although the City Council has instructed the Department of City Planning to draft the amendment (CF 22-0392). After years of study, the City of Los Angeles has developed a new Zoning Code that is currently going through the adoption process with the Downtown Community Plan Update. The Zoning Ordinance enabling the implementation of the TCN Program would apply solely to the 56 proposed Site Locations for the TCN Structures and any locations for associated sign takedowns. (Executive Summary, page I-6). The DEIR does not explain why Metro needs a Zoning Code that is different from the one that the City Planning Commission recommended for approval on September 23, 2021.

Zoning near each of the 56 TCN Project sites and any potential takedown sites is a critical issue that has not been adequately considered.

1. The executive summary states that industrial zoning “is generally buffered by commercial uses to provide separation from residential uses.” Del Rey has several neighborhoods that are zoned Industrial, and yet apartment complexes and schools have been built in those areas, e.g. the area covered by the Glencoe Maxella Specific Plan and the area between Ballona Creek and Jefferson Boulevard. How will Metro ensure that the digital billboards are not built on Metro property that is next to areas that are de facto residential?
2. The State of California is hoping to make housing more affordable by allowing construction of housing in buildings that were previously zoned for commercial use.<sup>5</sup> The DRRA has been asked to consider a number of such projects, particularly in the Glencoe-Maxella Specific Plan area. However, current land use planning does not

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<sup>4</sup> Letter of June 1, 2022 from Mike Bonin re Metro’s TCN Notice of Preparation (attached)

<sup>5</sup> “2 laws expand options for new housing,” L.A. Times, September 29, 2022, page 1, regarding Senate Bill 6 and Assembly Bill 2011, which take effect January 1, 2023.

provide any certainty as to where those developments will occur. The DEIR should show how Metro is going to ensure that the TCN Project complies with the Community Plans that are being updated citywide. At a minimum, this should include a review of the draft plans that are in circulation and a letter from the Department of City Planning confirming that they agree or disagree with the statements in the DEIR.

The Palms Mar Vista Del Rey Community Plan was adopted in 1997 and has been going through updating since 2019. Del Rey is transected by Centinela Avenue and bounded by Lincoln, Washington, Sepulveda and Jefferson Boulevards. The State of California has changed the law to promote housing construction within half a mile of any of these streets. The analysis in the DEIR must ensure compatibility with planned and reasonably foreseeable residential use, not just with areas specifically zoned residential. For all project sites, adequate mitigation measures must include siting, orientation, buffering, and screening from all residential dwellings.

3. Alternative 3 assumes that the Project would “eliminate or relocate FF-29 and FF30 outside of the coastal area of the Palms-Mar Vista-Del Rey Community Plan.” The DEIR does not clearly define what is meant by the “coastal area of the Palms-Mar Vista – Del Rey Community Plan area” and should include a map showing where relocation might be considered. Except for the areas within the Glencoe-Maxella and Playa Vista Specific Plans, the rest of Del Rey falls within the Coastal Transportation Specific Plan. Parts of Del Rey also are within the jurisdiction of the California Coastal Commission. As stated above, we are opposed to FF-29 *and FF-30 at any location.*

### **Community Benefits**

If digital billboards are permitted, who will decide what community benefits must be provided in exchange? Who will determine which community gets those benefits? How will the revenue sharing from the billboards be allocated within the City? Any system of allocation must provide for notice to the community, an opportunity for the community to be heard, consideration of the environmental impacts and findings.

Metro needs to analyze each potential TCN Project site separately and to provide data showing what was analyzed and what methodology was used. Each structure erected or taken down will have a unique environmental impact, depending on its location.

### **Take-downs**

The DEIR states that in exchange for being allowed to erect 56 TCN structures (98 digital ad faces, according to Scenic LA), static billboards with twice the square footage of the digital billboards (DEIR page I-7) would be removed. This take-down ratio is far too low.

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Because one digital billboard can feature ads from multiple advertisers, a digital billboard can generate far more revenue than a static billboard. At a minimum, the environmental impact of each digital billboard should be offset by taking down the number of static billboards that generate the same amount of revenue as the digital billboard. This is likely to be closer to a take-down ratio of 10 to one.

The DEIR does not explain how it would be decided which static billboards would be taken down and when that would occur. How would Metro ensure that those decisions are made fairly and equitably so that the static billboards are removed from the same neighborhood that is being burdened with a digital billboard?

**Transportation:** Section IV.K and Appendix K

Gibson relied on three studies to analyze whether the TCN structures present potentially significant traffic safety concerns. Two of the three studies were conducted by the Foundation for Out of Home Advertising Research & Education (“FOARE”). DEIR Section IV.K.3.b. The FOARE research projects “help ensure OOH [out of home] advertising is competitive and a preferred means for marketing and promotion.” The Board of Directors of the Foundation are all from advertising companies.

The use of studies conducted by a foundation created to further the interests of the business that will benefit from the Project is an egregious conflict of interest. Moreover, studies that demonstrate safety concerns have been ignored. The Transportation analysis must be redone using unbiased research and without the use of the FOARE studies.

We note the oft-referenced study by the National Center for Transportation Systems Productivity and Management that “revealed that the presence of digital billboards increased the overall crash rates in areas of [digital] billboard influence compared to control areas downstream of the digital billboard locations.” Digital Advertising Billboards and Driver Distraction (April 1, 2015)(Contract #DTRT12GUTC12 with USDOT Office of the Assistant Secretary for Research and Technology, Section 7.1.1.)

Furthermore, the Transportation analysis uses the expected benefits of the TCN program to rationalize digital billboards. The purpose of the CEQA process is not to weigh the benefits of a project against the detrimental impact on the environment. CEQA requires the environmental effects of adding offsite digital advertising billboards to Metro property to be analyzed independent of the benefits other aspects of the Project may deliver. For example, see Section IV.K.3.d.1(a)(1). “For example, the

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TCN Program would aim to improve the bus passengers' experience by helping to facilitate transit signal priority and bus wi-fi and efficiently relay bus arrival time information to riders. Therefore, the Project would not conflict with the applicable goals and initiatives set forth in the Vision Plan.”

The DEIR does not explain why Metro cannot use intelligent technology components to promote roadway efficiency, improve public safety and augment Metro's communication capacity without using digital billboards.

According to the Department of City Planning, the City and Metro entered into a Memorandum of Agreement (C-139852) to share revenue generated from the off-site advertising on these signs for 20 years. It is unclear who will pay the costs to erect the TCN, or who will decide who will build the TCN, who may advertise on the TCN and what may be advertised on the TCN. In short, the DEIR is seeking to assess the environmental impacts of a Project that is not yet ready to be evaluated.

### **Appendix B: Metro TCN Lighting Study**

In Del Rey, we are most concerned about the billboards FF29 and FF30 proposed for the intersection of the Marina (90) Freeway and Culver Blvd. because of the proposed location next to the Ballona Wetlands Ecological Reserve. However, light pollution from the digital billboards must be addressed citywide. What will be done to prevent “sky glow” from the billboards? (See “A switch's flip side” from Los Angeles, Times, September 22, 2022, page 1<sup>6</sup>, and “The Sky Needs Its ‘Silent Spring’ Moment”<sup>7</sup> from Scientific American).

The whole point of a digital billboard is for the advertising to be seen, preferably over as wide an area as possible. If there is no “potential visibility” of the sign, its advertising is not effective.

Appendix B, Part A. Summary, states that “the proposed Project will not introduce a new source of light trespass and or glare at residential properties or other sensitive use properties within the City of Los Angeles.” Then the DEIR states that it also monitored “potential for visibility of the Signs” from residential properties nearby. However, if the digital billboard is visible from residential property or sensitive use property, it will be disruptive, particularly if the display changes every eight seconds, 24 hours a day.

To prepare the Lighting Study, not all of the proposed Project Sites were monitored to determine if there was a “potential for visibility” from

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<sup>6</sup> See attached pdf copy.

<sup>7</sup> Doi:10.1038/scientificamerican1022-46, article by Joshua Sokol, originally published with the title “Saving the Night Sky” in Scientific American 327,4, 46-55 (October 2022).

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residential properties nearby. Further, the DEIR does not explain where the monitoring sites were located. The Project Sites needed to be monitored from the residential properties or other sensitive use properties where the billboards would be visible.

The Initial Study in April 2022 states on page 9 that the “digital display faces would be set to refresh every eight seconds and would transition instantly with no motion, moving parts, flashing, or scrolling messages.” Does that mean that there will be no videos like the ones shown on the digital billboard at Manchester Avenue and the 405 in Inglewood, which announces upcoming entertainment offerings? Where is that regulated? Who decides on the content of the advertising on the billboards?

Earlier this year, the City Council agreed to the Sidewalk and Transit Amenities Program (STAP) (CF 20-1536 and 20-1536-2) which would allow digital advertising on transit furniture in the public right-of-way. The STAP program will have digital elements in Transit Shelters, Digital Kiosks, Interactive Kiosks, Digital Urban Panels. STAP raises the same issues as the TCN program – energy consumption, light pollution, effects on traffic – and like TCN, it is seen as a revenue source for the City. We believe that the revenues from these digital signage programs do not outweigh the damage caused by the signs.

Best regards,

DEL REY RESIDENTS ASSOCIATION

DocuSigned by:  


CC5A2DDF768E4E3...  
By Elizabeth Campos Layne, President

#### Attachments

1. Del Rey Residents Association Comment Letter of August 1, 2022
2. “How Light and Noise Pollution Confound Animals’ Senses”, The Atlantic, July 2022
3. “Where has goose gone?” Los Angeles Times, as posted on Yahoo News, October 13, 2022
4. Mike Bonin’s comment letter of June 1, 2022
5. Article about new housing laws, Los Angeles Times, page 1, September 29, 2022
6. “A switch’s flip side,” Los Angeles Times, page 1, September 20, 2022
7. “Saving the Night Sky,” Scientific American (October 2022)

Cc: (via e-mail)

Shine Ling, [tcn@metro.net](mailto:tcn@metro.net)



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Councilmember Mike Bonin (C.D. 11), [councilmember.bonin@lacity.org](mailto:councilmember.bonin@lacity.org)

Del Rey Neighborhood Council, [board@delreync.org](mailto:board@delreync.org)

Westside Regional Alliance of Councils, Land Use and Planning Committee,

[wraclupc@gmail.com](mailto:wraclupc@gmail.com)

City Clerk – [clerk@lacity.org](mailto:clerk@lacity.org) re CF 22-0392

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August 1, 2022

Los Angeles City Council  
Nury Martinez, President  
200 N. Spring Street  
Los Angeles, CA

Re: Metro Transit Communication Network Program Proposal to Allow Digital Billboards

Dear Council Members,

The Del Rey Residents Association (“DRRA”) is **opposed** to the Metro Transit Communication Network Program (TCN Program) proposal to allow digital billboards on joint LA City/Metro property and urges the Council to **reject the proposal**.

The DRRA fully **supports the removal of all commercially-oriented static display billboards from Metro-owned property**. Complete removal would improve the quality of life in our neighborhoods by reducing cyclist, driver and pedestrian distractions, reducing the commercialization of our lives and eradicating the unsightly sign structures that hold up the billboards. However, **removal of existing static display billboards must not come at the cost of introducing digital billboards**.

Residents of Los Angeles have long expressed their disdain for digital billboards. **The TCN Program is an affront to the interests of individuals, neighborhood organizations and Neighborhood Councils who have nearly unanimously fought against digital billboards in our city** and supported only the strictest standards for placement of digital billboards.<sup>1</sup>

Moreover, if the City allows digital billboards on Metro property, its ability to limit off-site digital billboards on private property may be hampered. This issue should be fully analyzed by the City Attorney.

The Del Rey Residents Association is particularly concerned about the impact of digital billboards proposed for two locations at the intersection of the Marina Freeway and Culver Boulevard in Del Rey. This intersection is **adjacent to the Ballona Wetlands, a unique natural landscape in Los Angeles**. The Wetlands provide habitat for migratory birds, waterfowl and land wildlife and provide a visual respite for drivers, bicyclists and

pedestrians. **The large, high-light emitting digital billboards will interfere with “sensitive habitats”** that the City should be doing its best to protect.<sup>2</sup>

#### **Road Safety Concerns:**

Electronic billboards will cause **more of a distraction** compared to static billboards by encouraging drivers to switch mental tasks and look at the changing images more often - instead of looking at the road.<sup>3</sup>

We refer you to an oft-referenced study by the National Center for Transportation Systems Productivity and Management. The study “revealed that the presence of digital billboards increased the overall crash rates in areas of [digital] billboard influence compared to control areas downstream of the digital billboard locations.”<sup>4 5 6</sup>

#### **Light Impact:**

In addition to **constantly changing advertising** content contributing to driver distraction, **excessive light** emitting from billboards also poses a **safety hazard**.

In the abstract of a study “aimed at developing guidelines ... concerning the reduction of advertisements located in the vicinity of roads”, researchers concluded, “. . . excessive or incorrect distribution of media luminance in the driver’s field of vision, especially at night, may have a significant effect on the disturbance of the visual process. The driver’s night vision is generally adapted to low ambient luminance values, illuminated by vehicle and road lighting.”<sup>7</sup>

Digital billboards typically emit more light directly towards drivers than other light sources. This is particularly relevant to proposal to place digital billboards at the **90 Freeway/Culver Boulevard intersection** adjacent to the low-lit Ballona Wetlands, where the light-dark contrast will be greater than in highly lit locations.

Digital billboards at that intersection will also be visible to many **nearby residences**. The digital sign on the commercial property at 5450 Lincoln Boulevard can be seen from the other side of the Ballona Wetlands (about 1.5 miles away). It may be effective advertising for the sign owner but artificial night light is known to disrupt the behavior of humans, insects and animals.<sup>8</sup>

#### **Increased Energy Usage in the time of Climate Change:**

Digital billboards use more power than static billboards and drastically more power than having no billboards. Digital billboards use energy 24 hours a day compared to only nighttime use for static billboards and use more energy during the day than static billboards. Based on energy usage from one digital billboard company, a double-sided digital billboard uses approximately the same energy as 15 to 23 single family homes.<sup>9</sup>


**Electricity usage must be reduced, not increased.** Climate change-induced heat waves are putting a strain on the electric power grid. Consumer and business consumption is increasing for many reasons. Los Angeles is nowhere near 100% “clean” energy. And contrary to its name, “clean” energy still has negative environmental impacts. As stewards of the environment for future generations, we must scrutinize how every decision will impact energy usage.

Putting the relatively small revenue that would come from the proposed TCN Program ahead of safety, the environment, and human and animal well-being is short-sighted and dangerous.

Thank you very much for considering our concerns.

Sincerely,

DEL REY RESIDENTS’ ASSOCIATION

DocuSigned by:  
  
B30E294C3FC64EB  
Elizabeth Campos Layne  
President

<sup>1</sup> See, for example, the dozens of communications from the public and community impact statements from Neighborhood Councils in Council Files 11-1705 and 22-0392.

<sup>2</sup> See the Initial Study for the Transportation Communication Network Program, section IV Biological Resources findings that the project will have a potentially significant impact on the Ballona Wetlands.

<sup>3</sup> Drivers so exposed “tailgate more, drift more across lanes, are more inclined to cross intersections unsafely, have more variability in their driving speed and have a more distracted gaze.” Guest Commentary. “Digital billboards downtown: a bad idea for Baltimore.” *The Baltimore Sun*, October 18, 2021 (linking to various academic studies).

<sup>4</sup> Digital Advertising Billboards and Driver Distraction, National Center for Transportation Systems Productivity and Management (April 1, 2015) (Contract #DTRT12GUTC12 with USDOT Office of the Assistant Secretary for Research and Technology, Section 7.1.1

<sup>5</sup> In another example, study authors found that “[r]esults show a significant shift in the number and length of glances toward the billboards and an increased percentage of time glancing off road.

A Field Study on the effects of digital billboards on glance behavior during highway driving, *Accident: Analysis and prevention* 88:88-96 (published March 2016)

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<sup>6</sup> We compare the safety of digital billboards to static billboards because the static billboards already exist. However, the consensus is that any billboards are a distraction (which is their intended purpose) and driver distraction leads to decreased safety.

<sup>7</sup> *The Journal of the Illuminating Engineering Society, Procedure for Measuring the Luminance of Roadway Billboards and Preliminary Results* (Published online 16 Oct 2020) <https://www.tandfonline.com/doi/full/10.1080/15502724.2020.1803752>

<sup>8</sup> Our night sheds a bad light on wildlife, European Wilderness Society, 2021 <https://wilderness-society.org/our-artificial-night-sheds-a-bad-light-on-wildlife/>

<sup>9</sup> City of South San Francisco Initial Study and Mitigated Negative Declaration, Nov. 2019, pg. 50. Also see San Diego Gas & Electricity Company's study, "Digital Billboard Energy Use in California": "DBB are comprised of LEDs, power supplies, cooling systems, lighting controls, and a computer, with LEDs being the largest contributor to a DBB's power draw." In summary: "Given the large power requirements and constant usage, DBBs consume a significant amount of energy. [https://www.etcc-ca.com/sites/default/files/reports/et14sdg8011\\_digitalbillboardreport\\_2014-7.pdf](https://www.etcc-ca.com/sites/default/files/reports/et14sdg8011_digitalbillboardreport_2014-7.pdf) Study for San Diego Gas and Electric Company, July 2014

cc: Mayor Eric Garcetti  
Council Member Mike Bonin, Council District 11  
City Attorney Mike Feuer  
Shine Ling, [tcn@metro.net](mailto:tcn@metro.net)  
Ginny Brideau, Community Relations Manager, Metro Westside/Central  
([servicecouncils@metro.net](mailto:servicecouncils@metro.net))  
LA City Clerk's Office, Council File 22-0392



Shayan Asgharnia for The Atlantic

SCIENCE

# HOW ANIMALS PERCEIVE THE WORLD

Every creature lives within its own sensory bubble, but only humans have the capacity to appreciate the experiences of other species. What we've learned is astounding.

By Ed Yong  
Photographs by Shayan Asgharnia

JUNE 13, 2022, 6 AM ET

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**W**ITHIN THE 310,000 ACRES of Wyoming's Grand Teton National Park, one of the largest parking lots is in the village of Colter Bay. Beyond the lot's far edge, nestled among some trees, is a foul-smelling sewage-pumping station that Jesse Barber, a sensory ecologist at Boise State University, calls the Shiterator. On this particular night, sitting quietly within a crevice beneath the building's metal awning and illuminated by Barber's flashlight, is a little brown bat. A white device the size of a rice grain is attached to the bat's back. "That's the radio tag," Barber tells me. He'd previously affixed it to the bat so that he could track its movements, and tonight he has returned to tag a few more.

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From inside the Shiterator, I can hear the chirps of other roosting bats. As the sun sets, they start to emerge. A few become entangled in the large net Barber has strung between two trees. He frees a bat, and Hunter Cole, one of his students, carefully examines it to check that it's healthy and heavy enough to carry a tag. Once satisfied, Cole daubs a spot of surgical cement between its shoulder blades and attaches the tiny device. "It's a little bit of an art project, the tagging of a bat," Barber tells me. After a few minutes, Cole places the bat on the trunk of the nearest tree. It crawls upward and takes off, carrying \$175 worth of radio equipment into the woods.

I watch as the team examines another bat, which opens its mouth and exposes its surprisingly long teeth. This isn't an aggressive display; it only looks like one. The bat is unleashing a stream of short, ultrasonic pulses from its mouth,

which are too high-pitched for me to hear. Bats, however, can hear ultrasound, and by listening for the returning echoes, they can detect and locate objects around them.

Echolocation is the primary means through which most bats navigate and hunt. Only two animal groups are known to have perfected the ability: toothed whales (such as dolphins, orcas, and sperm whales) and bats. Echolocation differs from human senses because it involves putting energy into the environment. Eyes scan, noses sniff, and fingers press, but these sense organs are always picking up stimuli that already exist in the wider world. By contrast, an echolocating bat creates the stimulus that it later detects. Echolocation is a way of tricking your surroundings into revealing themselves. A bat says “Marco,” and its surroundings can’t help but say “Polo.”

[Join us: Ed Yong and Clint Smith in conversation at Sixth and I](#)

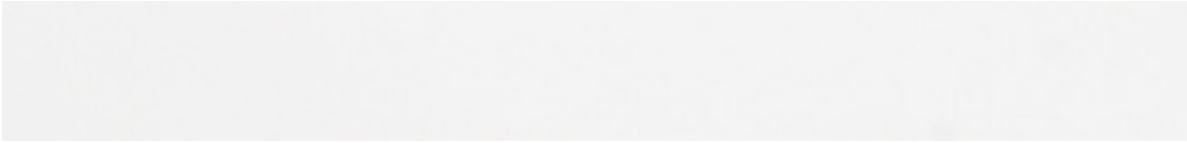
The basic process seems straightforward, but its details are extraordinary. High-pitched sounds quickly lose energy in air, so bats must scream to make calls that are strong enough to return audible echoes. To avoid deafening themselves, bats contract the muscles in their ears in time with their calls, desensitizing their hearing with every shout and restoring it in time for the echo. Each echo provides a snapshot in time, so bats must update their calls quickly to track fast-moving insects; fortunately, their vocal muscles are the fastest known muscles in any mammal, releasing up to 200 pulses a second. A bat’s nervous system is so sensitive that it can detect differences in echo delay of just one- or two-millionths of a second, which translates to a physical distance of less than a millimeter. A bat thus gauges the distance to an insect with far more precision than humans can.

Echolocation’s main weakness is its short range: Some bats can detect small



moths from about six to nine yards away. But they can do so in darkness so total that vision simply doesn't work. Even in pitch-blackness, bats can skirt around branches and pluck minuscule insects from the sky. Of course, bats are not the only animals that hunt nocturnally. In the Tetons, as I watch Barber tagging bats, mosquitoes bite me through my shirt, attracted by the smell of the carbon dioxide on my breath. While I itch, an owl flies overhead, tracking its prey using a radar dish of stiff facial feathers that funnel sound toward its ears. These creatures have all evolved senses that allow them to thrive in the dark. But the dark is disappearing.





A big brown bat's ability to echolocate allows it to thrive in the dark.  
(Shayan Asgharnia for *The Atlantic*)

Barber is one of a growing number of sensory biologists who fear that humans are polluting the world with too much light, to the detriment of other species. Even here, in the middle of a national park, light from human technology intrudes upon the darkness. It spews forth from the headlights of passing vehicles, from the fluorescent bulbs of the visitor center, and from the lampposts encircling the parked cars. “The parking lot is lit up like a Walmart because no one thought about the implications for wildlife,” Barber says.

Many flying insects are fatally attracted to streetlights, mistaking them for celestial lights and hovering below them until they succumb to exhaustion. Some bats exploit their confusion, feasting on the disoriented swarms. Other, slower-moving species, including the little brown bats that Barber tagged, stay clear of the light, perhaps because it makes them easier prey for owls. Lights reshape animal communities, drawing some in and pushing others away, with consequences that are hard to predict.

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Every animal is enclosed within its own sensory  
bubble, perceiving but a tiny sliver of an  
immense world.

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To determine the effect of light on the bats of Grand Teton, Barber persuaded the National Park Service to let him try an unusual experiment. In 2019, he refitted all 32 streetlights in the Colter Bay parking lot with special bulbs that can change color. They can produce either white light, which strongly affects the behavior of insects and bats, or red light, which doesn't seem to. Every few days during my visit, Barber's team flips their color. Funnel-shaped traps hanging below the lamps collect the gathering insects, while radio transponders pick up the signals from the tagged bats. These data should reveal how normal white lights affect the local animals, and whether red lights can help rewild the night sky.

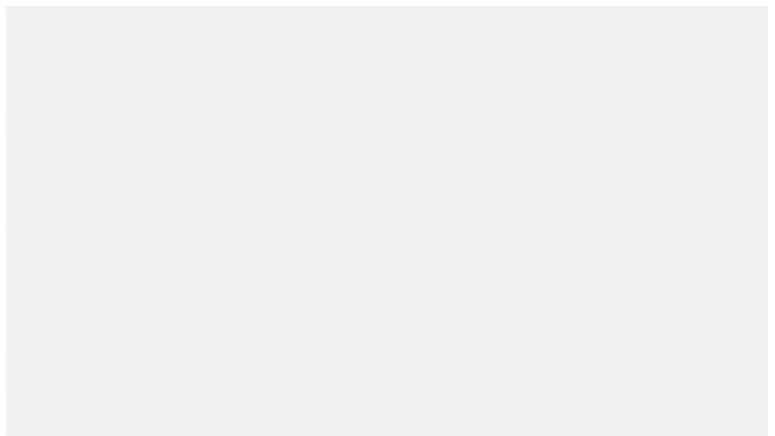
Cole gives me a little demonstration by flipping the lights to red. At first, the parking lot looks disquietingly infernal, as if we have stepped into a horror movie. But as my eyes adjust, the red hues feel less dramatic and become almost pleasant. It is amazing how much we can still see. The cars and the surrounding foliage are all visible. I look up and notice that fewer insects seem to be gathered beneath the lamps. I look up even farther and see the stripe of the Milky Way cutting across the sky. It's an achingly beautiful sight, one I have never seen before in the Northern Hemisphere.

**E**VERY ANIMAL IS enclosed within its own sensory bubble, perceiving but a tiny sliver of an immense world. There is a wonderful word for this sensory bubble—*Umwelt*. It was defined and popularized by the Baltic German zoologist Jakob von Uexküll in 1909. *Umwelt* comes from the German word for “environment,” but Uexküll didn't use it to refer to an animal's surroundings. Instead, an *Umwelt* is specifically the part of those surroundings that an animal can sense and experience—its perceptual world. A tick, questing for mammalian blood, cares about body heat, the touch of hair, and the odor of butyric acid that emanates from skin. It doesn't care about other stimuli, and probably doesn't know that they exist. Every *Umwelt*

is limited; it just doesn't feel that way. Each one feels all-encompassing to those who experience it. Our Umwelt is all we know, and so we easily mistake it for all there is to know. This is an illusion that every creature shares.

[Read: An ingenious injection can create infrared vision](#)

Humans, however, possess the unique capacity to appreciate the Umwelten of other species, and through centuries of effort, we have learned much about those sensory worlds. But in the time it took us to accumulate that knowledge, we have radically remolded those worlds. Much of the devastation that we have wrought is by now familiar. We have changed the climate and acidified the oceans. We have shuffled wildlife across continents, replacing indigenous species with invasive ones. We have instigated what some scientists have called an era of “biological annihilation,” comparable to the five great mass-extinction events of prehistory. But we have also filled the silence with noise and the night with light. This often ignored phenomenon is called sensory pollution—human-made stimuli that interfere with the senses of other species. By barraging different animals with stimuli of our own making, we have forced them to live in our Umwelt. We have distracted them from what they actually need to sense, drowned out the cues they depend upon, and lured them into sensory traps. All of this is capable of doing catastrophic damage.





A sea turtle's hatchlings can be diverted away from the sea by artificial lights. For mice, human-made noise can mask the sounds of predators. (Shayan Asgharnia for *The Atlantic*)

In 2001, the astronomer Pierantonio Cinzano and his colleagues created the first global atlas of light pollution. They calculated that two-thirds of the world's population lived in light-polluted areas, where the nights were at least 10 percent brighter than natural darkness. About 40 percent of humankind is permanently bathed in the equivalent of perpetual moonlight, and about 25 percent constantly experiences an artificial twilight that exceeds the illumination of a full moon. "Night" never really comes for them," the researchers wrote. In 2016, when the team updated the atlas, it found that the problem had become even worse. By then, about 83 percent of people—including more than 99 percent of Americans and Europeans—were under light-polluted skies. More than a third of humanity, and almost 80 percent of North Americans, can no longer see the Milky Way. "The thought of light traveling billions of years from distant galaxies only to be washed out in the last billionth of a second by the glow from the nearest strip mall depresses me to no end," the visual ecologist Sönke Johnsen once wrote.

At Colter Bay, Cole flips the lights from red back to white and I wince. The extra illumination feels harsh and unpleasant. The stars seem fainter now.

Sensory pollution is the pollution of disconnection. It detaches us from the cosmos. It drowns out the stimuli that link animals to their surroundings and to one another. In making the planet brighter and louder, we have endangered sensory environments for countless species in ways that are less viscerally galling than clear-cut rain forests and bleached coral reefs but no less tragic. That must now change. We can still save the quiet and preserve the dark.

**E**VERY YEAR ON September 11, the sky above New York City is pierced by two columns of intense blue light. This annual art installation, known as *Tribute in Light*, commemorates the terrorist attacks of 2001, with the ascending beams standing in for the fallen Twin Towers. Each is produced by 44 xenon bulbs with 7,000-watt intensities. Their light can be seen from 60 miles away. From closer up, onlookers often notice small flecks, dancing amid the beams like gentle flurries of snow. Those flecks are birds. Thousands of them.

This annual ritual unfortunately occurs during the autumn migratory season, when billions of small songbirds undertake long flights through North American skies. Navigating under cover of darkness, they fly in such large numbers that they show up on radar. By analyzing meteorological radar images, Benjamin Van Doren showed that *Tribute in Light*, across seven nights of operation, waylaid about 1.1 million birds. The beams reach so high that even at altitudes of several miles, passing birds are drawn into them. Warblers and other small species congregate within the light at up to 150 times their normal density levels. They circle slowly, as if trapped in an incorporeal cage. They call frequently and intensely. They occasionally crash into nearby buildings.

Migrations are grueling affairs that push small birds to their physiological limit. Even a night-long detour can sap their energy reserves to fatal effect. So

whenever 1,000 or more birds are caught within *Tribute in Light*, the bulbs are turned off for 20 minutes to let the birds regain their bearing. But that's just one source of light among many, and though intense and vertical, it shines only once a year. At other times, light pours out of sports stadiums and tourist attractions, oil rigs and office buildings. It pushes back the dark and pulls in migrating birds.

In 1886, shortly after Thomas Edison commercialized the electric light bulb, about 1,000 birds died after colliding with illuminated towers in Decatur, Illinois. More than a century later, the environmental scientist Travis Longcore and his colleagues calculated that almost 7 million birds die each year in the United States and Canada after flying into communication towers. The lights of those towers are meant to warn aircraft pilots, but they also disrupt the orientation of nocturnal avian fliers, which then veer into wires or each other. Many of these deaths could be avoided simply by replacing steady lights with blinking ones.

“We too quickly forget that we don't perceive the world in the same way as other species, and consequently, we ignore impacts that we shouldn't,” Longcore tells me in his Los Angeles office. Our eyes are among the sharpest in the animal kingdom, but their high resolution comes with the cost of low sensitivity. Unlike most other mammals, our vision fails us at night, so we crave more nocturnal illumination, not less.

[Read: The dark side of light](#)

The idea of light as a pollutant is jarring to us, but it becomes one when it creeps into places where it doesn't belong. Widespread light at night is a uniquely anthropogenic force. The daily and seasonal rhythms of bright and dark remained largely inviolate throughout all of evolutionary time—a 4-

billion-year streak that began to falter in the 19th century.

When sea-turtle hatchlings emerge from their nests, they crawl away from the dark shapes of dune vegetation toward the brighter oceanic horizon. But lit roads and beach resorts can steer them in the wrong direction, where they are easily picked off by predators or squashed by vehicles. In Florida alone, artificial lights kill baby turtles in the thousands every year. They've wandered into a baseball game and, more horrifying, abandoned beach fires. The caretaker of one property in Melbourne Beach found hundreds of dead hatchlings piled beneath a single mercury-vapor lamp.



Female crickets struggle to find the best mates when noise pollution masks the males' songs. (Shayan Asgharnia for *The Atlantic*)



Artificial lights can also fatally attract insects, contributing to their alarming global declines. A single streetlamp can lure moths from 25 yards away, and a well-lit road might as well be a prison. Many of the insects that gather around streetlamps will likely be eaten or dead from exhaustion by sunrise. Those that zoom toward vehicle headlights will probably be gone even sooner. The consequences of these losses can ripple across ecosystems. In 2014, as part of an experiment, the ecologist Eva Knop installed streetlamps in seven Swiss meadows. After sunset, she prowled these fields with night-vision goggles, peering into flowers to search for moths and other pollinators. By comparing these sites to others that had been kept dark, Knop showed that the illuminated flowers received 62 percent fewer visits from pollinating insects. One plant produced 13 percent less fruit even though it was visited by a day shift of bees and butterflies.

The presence of light isn't the only factor that matters; so does its nature. Insects with aquatic larvae, such as mayflies and dragonflies, will fruitlessly lay their eggs on wet roads, windows, and car roofs, because these reflect horizontally polarized light in the same way bodies of water do. Rapidly flickering light bulbs can cause headaches and other neurological problems in humans, even though our eyes are usually too slow to detect these changes; what, then, do they do to animals with faster vision, like insects and small birds?

Colors matter, too. Red is better for bats and insects but can waylay migrating birds. Yellow doesn't bother turtles or most insects but can disrupt salamanders. No wavelength is perfect, Longcore says, but blue and white are worst of all. Blue light interferes with body

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clocks and strongly attracts insects. It is also easily scattered, increasing the spread of light pollution. It is, however, cheap and efficient to produce. The new generation of energy-efficient white LEDs contain a lot of blue light, and the world might switch to them from traditional yellow-orange sodium lights. In energy terms, that would be an environmental win. But it would also increase the amount of global light pollution by two or three times.

From the April 2020 issue: [Ed Yong on how we can save giraffes from extinction](#)

After talking with Longcore, I head home to Washington, D.C., on a red-eye flight. As the plane takes off, I peer out the window at Los Angeles. The twinkling grid of lights stirs the same primordial awe that comes from watching a starry sky or a moonlit sea. But as the illuminated city recedes beneath my window, that amazement is tinged with unease. Light pollution is no longer just an urban problem. Light travels, encroaching even into places that are otherwise untouched by human influence. The light from Los Angeles reaches Death Valley, one of the largest national parks in the United States, more than 150 miles away. True darkness is hard to find.

**S** O IS TRUE SILENCE.

It's a sunny April morning in Boulder, Colorado, and I've hiked up to a rocky hillside, about 6,000 feet above sea level. The world feels wider here, not just because of the panoramic view over conifer forests but also because it is blissfully quiet. Away from urban ruckus, quieter sounds become audible over greater distances. On the hillside, a chipmunk is rustling. Grasshoppers snap their wings together as they fly. A woodpecker pounds its beak against a nearby trunk. Wind rushes past. The longer I sit, the more I seem to hear.

Two men puncture the tranquility. I can't see them, but they're somewhere on

the trail below, intent on broadcasting their opinions to all of Colorado. Then I realize I can also hear faraway vehicles zooming along a highway beyond the trees. Denver hums in the distance, an ambient backdrop that I had all but blocked out. I notice the roaring engines of a plane flying overhead. After my hike, I meet up with Kurt Fristrup, who says he's been backpacking since the mid-1960s. In that time, aircraft emissions have increased nearly sevenfold. "One of my favorite parlor tricks when friends visit is to ask, at the end of the hike, if they heard any aircraft," he tells me. "People will say they remember one or two. And I'll say there were 23 jets and two helicopters."

Before he retired, Fristrup was a scientist at the National Park Service's Natural Sounds and Night Skies Division, a group that works to safeguard (among other things) the United States' natural soundscapes. To protect them, the team first had to map them, and sound, unlike light, can't be detected by satellites. Fristrup and his colleagues spent years lugging recording equipment to almost 500 sites around the country, capturing nearly 1.5 million audio samples. They found that human activity doubles the background-noise levels in 63 percent of protected spaces like national parks, and increases them tenfold in 21 percent. In the latter places, "if you could have heard something 100 feet away, now you can only hear it 10 feet away," Rachel Buxton, a former National Park Service research fellow, told me. Aircraft and roads are the main culprits, but so are industries like oil and gas extraction, mining, and forestry, which fill the air with drilling, explosions, engine noises, and the thud of heavy tires. Even the most heavily protected areas are under acoustic siege.





Busy roads may drown out the alarm calls of songbirds like the tufted titmouse. (Shayan Asgharnia for *The Atlantic*)

In towns and cities, the problem is worse, and not just in the United States. In 2005, two-thirds of Europeans were immersed in ambient noise equivalent to perpetual rainfall. Such conditions are difficult for the many animals that communicate through calls and songs. Scientists have found that noisy neighborhoods in Leiden, in the Netherlands, compel great tits to sing at higher frequencies so that their notes don't get masked by the city's low-pitched hubbub. Nightingales in Berlin are forced to belt out their tunes more

loudly to be heard over the surrounding din. Urban and industrial noise can also change the timing of birds' songs, suppress the complexity of their calls, and prevent them from finding mates. Noise pollution masks not only the sounds that animals deliberately make but also the "web of unintended sounds that ties communities together," Fristrup says. He means the gentle rustles that tell owls where their prey is, or the faint flaps that warn mice about impending doom.

In 2012, Jesse Barber and his colleagues Heidi Ware Carlisle and Christopher McClure built a phantom road. On a ridge in Idaho that acts as a stopover for migrating birds, the team set up a half-mile corridor of speakers that played looped recordings of passing cars. A third of the usual birds stayed away. Many of those that didn't paid a price for persisting. With tires and horns drowning out the sounds of predators, the birds spent more time looking for danger and less time looking for food. They put on less weight and were weaker during their arduous migrations. The phantom-road experiment was pivotal in showing that wildlife could be deterred by noise and noise alone, detached from the sight of vehicles or the stench of exhaust. Hundreds of studies have come to similar conclusions. In noisy conditions, prairie dogs spend more time underground. Owls flub their attacks. Parasitic *Ormia* flies struggle to find their cricket hosts.

Sounds can travel over long distances, at all times of day, and through solid obstacles. These qualities make them excellent stimuli for animals but also pollutants par excellence. Noise can degrade habitats that look idyllic and make otherwise livable places unlivable. And where will animals go? In 2003, 83 percent of the contiguous United States lay within about a kilometer of a road.

Even the seas can't offer silence. Although Jacques Cousteau once described

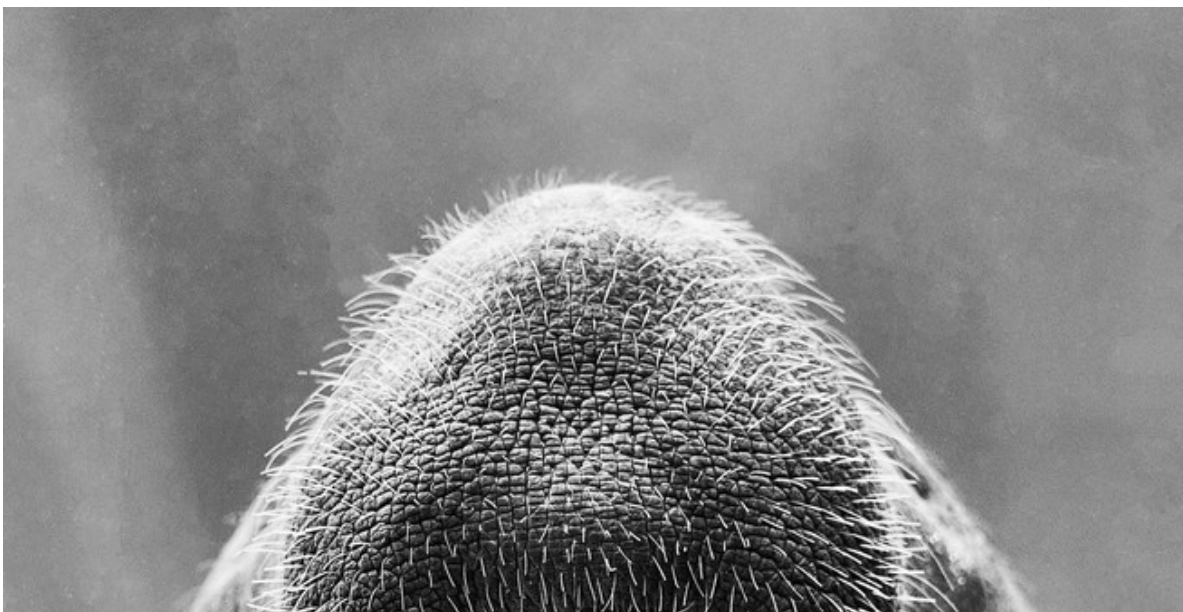
the ocean as a silent world, it is anything but. It teems with the sounds of breaking waves and blowing winds, bubbling hydrothermal vents and calving icebergs, all of which carry farther and travel faster underwater than in air. Marine animals are noisy, too. Whales sing, toadfish hum, cod grunt, and bearded seals trill. Thousands of snapping shrimp, which stun passing fish with the shock waves produced by their large claws, fill coral reefs with sounds similar to sizzling bacon or Rice Krispies popping in milk. Some of this soundscape has been muted as humans have netted, hooked, and harpooned the oceans' residents. Other natural noises have been drowned out by the ones we added: the scrapes of nets that trawl the seafloor; the staccato beats of seismic charges used to scout for oil and gas; the pings of military sonar; and, as a ubiquitous backing track for all this commotion, the sounds of ships.

Read: These animals are feasting on the ruins of an extinct world

“Think about where your shoes come from,” the marine-mammal expert John Hildebrand tells me. I look; unsurprisingly, the answer is China. Some tanker carried my shoes across the Pacific, leaving behind a wake of sound that radiated for miles. From 1945 to 2008, the global shipping fleet more than tripled, and began moving 10 times more cargo at higher speeds. And in the past 50 years, shipping vessels have multiplied the levels of low-frequency noise in the oceans 32-fold—a 15-decibel increase over levels that Hildebrand suspects were already 10 to 15 decibels louder than in pre-propeller seas. Because giant whales can live for a century or more, there are likely whales alive today that have personally experienced this growing underwater racket and now can hear only a small fraction of their former range. As ships pass in the night, humpback whales stop singing, orcas stop foraging, and right whales become stressed. Crabs stop feeding, cuttlefish change colors, damselfish are more easily caught. “If I said that I’m going to increase the noise level in your office by 30 decibels, OSHA would come in and say you’d

need to wear earplugs,” Hildebrand tells me. “We’re conducting an experiment on marine animals by exposing them to these high levels of noise, and it’s not an experiment we’d allow to be conducted on ourselves.”

**B**ECAUSE OF THE way we have upended the worlds of other animals, senses that have served their owners well for millions of years are now liabilities. Smooth vertical surfaces, which don’t exist in nature, return echoes that sound like open air; perhaps that’s why bats so often crash into windows. Dimethyl sulfide, the seaweedy-smelling chemical that once reliably guided seabirds to food, now also guides them to the millions of tons of plastic waste that humans have dumped into the oceans; perhaps that’s one reason an estimated 90 percent of seabirds eventually swallow plastic. Manatees can detect the currents produced by objects moving in the water with whiskerlike hairs found all over their body, but not with enough notice to avoid a loud, fast-moving speedboat; boat collisions are responsible for at least a fifth of deaths among Florida’s manatees. Odorants in river water can guide salmon back to their stream of birth, but not if pesticides in that same water blunt their sense of smell. Weak electric fields at the bottom of the sea can guide sharks to buried prey, but also to high-voltage cables.





Manatee whiskers can detect currents in the water, but not quickly enough to dodge loud, fast boats. (Shayan Asgharnia for *The Atlantic*)

Some animals have come to tolerate the sights and sounds of modernity. Others even flourish among them. Some urban moths have evolved to become less attracted to light. Some urban spiders have gone in the opposite direction, spinning webs beneath streetlights and feasting on the attracted insects. In some Panama towns, nighttime lights drive frog-eating bats away, allowing male túngara frogs to load their songs with sexy flourishes that would normally attract predators as well as mates. Animals can adapt, by changing their behavior over an individual lifetime and by evolving new behaviors over many generations.

Read: Why some moths are evolving to avoid artificial light

But adaptation is not always possible. Species that mature and breed slowly



can't evolve quickly enough to keep pace with levels of light and noise pollution that double every few decades. Creatures that have already been confined to narrow corners of shrinking habitats can't just up and leave. Those that rely on specialized senses can't just retune their entire Umwelt.

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## With every creature that vanishes, we lose a way of interpreting the world.

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Our influence is not inherently destructive, but it is often homogenizing. In pushing out species that cannot abide our sensory onslaughts, we leave behind smaller and less diverse communities. And beyond polluting the world with unwanted sensory stimuli, we're also removing natural stimuli that animals have come to depend on, flattening the undulating sensescapes that have generated the wondrous variety of animal Umwelten.

Consider Lake Victoria, in East Africa. It is home to more than 500 species of cichlid fish that are found nowhere else. That extraordinary diversity arose partly because of light. In deeper parts of the lake, light tends to be yellow or orange, while blue is more plentiful in shallower waters. These differences affected the eyes of the local cichlids and, in turn, their mating choices. The evolutionary biologist Ole Seehausen found that female cichlids from deeper waters prefer redder males, while those in the shallows are drawn to bluer ones. These diverging penchants acted like physical barriers, splitting the

cichlids into differently colored forms. Diversity in light helped create diversity in vision, in color, and in species. But over the past century, runoff from farms, mines, and sewage filled the lake with nutrients that spurred the growth of clouding, choking algae. The old light gradients flattened in some places, the cichlids' colors and visual proclivities no longer mattered, and the number of species collapsed. By turning off the light in the lake, humans also switched off the sensory engine of diversity, contributing to what Seehausen has called "the fastest large-scale extinction event ever observed."

As those species go extinct, so too do their Umwelten. With every creature that vanishes, we lose a way of interpreting the world. Our sensory bubbles shield us from the knowledge of those losses. But they don't protect us from the consequences. In the woodlands of New Mexico, the ecologists Clinton Francis and Catherine Ortega found that the Woodhouse's scrub-jay avoids the noise of compressors used in extracting natural gas. The scrub-jay spreads the seeds of piñon pine trees, and a single bird can bury thousands of pine seeds a year. They are so important to the forests that, in quiet areas where they still thrive, pine seedlings are four times more common than in noisy areas they have abandoned, Francis and colleagues found in a later study.





*Left:* As babies, clown fish use sounds to find their way to the safety of a coral reef. *Right:* To avoid excessive noise, prairie dogs spend more time underground. (Shayan Asgharnia for *The Atlantic*)

Piñon pines are the foundation of the ecosystem around them—a single species that provides food and shelter for hundreds of others, including Indigenous Americans. To lose three-quarters of them would be disastrous. And because they grow slowly, “noise might have hundred-plus-year consequences for the entire ecosystem,” Francis tells me.

A better understanding of other creatures’ senses can show us how we’re defiling the natural world—and can also point to ways of saving it. In 2016, the marine biologist Tim Lamont (formerly Tim Gordon) traveled to Australia’s Great Barrier Reef to begin work for his doctorate. Lamont should have spent months swimming amid the corals’ vivid splendor. Instead, a heat wave had forced the corals to expel the symbiotic algae that give them nutrients and colors. Without these partners, the corals starved and whitened in the worst bleaching event on record, and the first of several to come. Snorkeling through the rubble, Lamont found that the reefs had been not only bleached but also silenced. Snapping shrimp no longer snapped. Parrotfish no longer crunched. Those sounds normally help guide baby fish back to the reef after their first vulnerable months out at sea. Soundless reefs were much less attractive.

Lamont feared that if fish avoided the degraded reefs, the seaweed they

normally eat would run amok, overgrowing the bleached corals and preventing them from rebounding. He and his colleagues set up loudspeakers that continuously played recordings of healthy reefs over patches of coral rubble. The team would dive every few days to survey the local animals. After 40 days, he ran the numbers and saw that the acoustically enriched reefs had twice as many young fish as silent ones and 50 percent more species. They had not only been attracted by the sounds but stayed and formed a community. “It was a lovely experiment to do,” Lamont says. It showed what conservationists can accomplish by “seeing the world through the perceptions of the animals you’re trying to protect.”

From the July 2019 issue: The last of its kind

Lamont’s experiment was possible only because the team managed to record the sounds of the healthy reefs before they were bleached. Natural sensescapes still exist. There is still time to preserve and restore them before the last echo of the last reef fades into memory. And in most cases, the work ahead of us is considerably simpler. Instead of adding stimuli that we have removed, we can simply remove those that we added. Radioactive waste can take millennia to degrade. Persistent chemicals like the pesticide DDT can thread through the bodies of animals long after they are banned. Plastics will continue to despoil the oceans even if all plastic production halts tomorrow. But light pollution ceases as soon as lights are turned off. Noise pollution abates once engines and propellers wind down. Sensory pollution is an ecological gimme—a rare example of a planetary problem that can be immediately and effectively addressed. And in the spring of 2020, the world did unknowingly address it.



The body clock of the barred tiger salamander is disrupted by artificial light at night. (Shayan Asgharnia for *The Atlantic*)

**A**S THE CORONAVIRUS spread, public spaces closed. Flights were grounded. Cars stayed parked. Cruise ships stayed docked. About 4.5 billion people—almost three-fifths of the world's population—were told or encouraged to stay home. As a result, many places became substantially darker and quieter. With fewer planes and cars on the move, the night skies around Berlin were half as bright as normal. Alaska's Glacier Bay, a

sanctuary for humpback whales, was half as loud as the previous year, as were cities and rural areas throughout California, New York, Florida, and Texas. Sounds that would normally be muffled became clearer. City dwellers around the world suddenly noticed singing birds.

Read: Artificial lights tell the story of the pandemic

In a multitude of ways, the pandemic showed that sensory pollution can be reduced if people are sufficiently motivated—and such reductions are possible without the debilitating consequences of a global lockdown. In the summer of 2007, Kurt Fristrup and his National Park Service colleagues did a simple experiment at Muir Woods National Monument, in California. On a random schedule, they stuck up signs that declared one of the most popular parts of the park a quiet zone and encouraged visitors to silence their phones and lower their voices. These simple steps, with no accompanying enforcement, reduced the noise levels in the park by three decibels, equivalent to 1,200 fewer visitors.

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find splendor in familiarity, and the sacred in the  
mundane.

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To truly make a dent in sensory pollution, bigger steps are needed. Lights can

be dimmed or switched off when buildings and streets are not in use. They can be shielded so that they stop shining above the horizon. LEDs can be changed from blue or white to red. Quiet pavements with porous surfaces can absorb the noise from passing vehicles. Sound-absorbing barriers, including berms on land and air-bubble curtains in the water, can soften the din of traffic and industry. Vehicles can be diverted from important areas of wilderness, or they can be forced to slow down: In 2007, when commercial



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vessels can also be fitted with quieter hulls and propellers, which are already used to muffle military ships (and would make commercial ones more fuel-efficient).

We could regulate industries causing sensory pollution, but there's not enough societal will. "Plastic pollution in the sea looks hideous and everyone is worried, but noise pollution in the sea is something we don't experience so directly, so no one's up in arms about it," Lamont says. And as we desecrate sensory environments, we grow accustomed to the results. Our blinding, blaring world becomes normal, and pristine wilderness feels more distant.

But the majesty of nature is not restricted to canyons and mountains. It can be found in the wilds of perception—the sensory spaces that lie outside our Umwelt and within those of other animals. To perceive the world through others' senses is to find splendor in familiarity, and the sacred in the mundane. Wonders exist in a backyard garden, where bees take the measure of a flower's electric fields, leafhoppers send vibrational melodies through the stems of plants, and birds behold the hidden palettes of ultraviolet colors on their flock-mates' feathers. Wilderness is not distant. We are continually immersed in it. It is there for us to imagine, to savor, and to protect.



Barn owls track prey using stiff facial feathers that funnel sound toward their ears. (Shayan Asgharnia for *The Atlantic*)

In 1934, after considering the senses of ticks, dogs, jackdaws, and wasps, Jakob von Uexküll wrote about the Umwelt of the astronomer. “Through gigantic optical aids,” he wrote, this unique creature has eyes that “are capable



of penetrating outer space as far as the most distant stars. In its Umwelt, suns and planets circle at a solemn pace.” The tools of astronomy can capture stimuli that no animal can naturally sense—X-rays, radio waves, gravitational waves from colliding black holes. They extend the human Umwelt across the universe and back to its very beginning. The tools of biologists are more modest in scale, but they, too, offer a glimpse into the infinite. Scientists have used night-vision goggles to show that nocturnal bees can see in extreme darkness, clip-on microphones to eavesdrop on the vibrational songs of leafhoppers, and electrodes to listen in on the pulses of electric fish. With microscopes, cameras, speakers, satellites, and recorders, people have explored other sensory worlds. We have used technology to make the invisible visible and the inaudible audible.



No creature could possibly sense everything, and no creature needs to. Evolving according to their owner's needs, the senses sort through an infinity of stimuli, allowing through only what is relevant. To learn about the rest is a choice. The ability to dip into other Umwelten is our greatest sensory skill. A moth will never know what a zebra finch hears in its song, a zebra finch will never feel the electric buzz of a black ghost knifefish, a knifefish will never see through the eyes of a mantis shrimp, a mantis shrimp will never smell the way a dog can, and a dog will never understand what it is like to be a bat. We will never fully do any of these things either, but we are the only animal that can try. Through patient observation, through the technologies at our disposal, through the scientific method, and, above all else, through our curiosity and imagination, we can try to step into perspectives outside our own. This is a profound gift, which comes with a heavy responsibility. As the only species that can come close to understanding other Umwelten, but also the species most responsible for destroying those sensory realms, it falls on us to marshal all of our empathy and ingenuity to protect other creatures, and their unique ways of experiencing our shared world.

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*This article has been adapted from Ed Yong's latest book, [An Immense World: How Animal Senses Reveal the Hidden Realms Around Us](#). It appears in the July/August 2022 print edition with the headline "Our Blinding, Blaring World."*

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Ed Yong is a staff writer at *The Atlantic*. He won the Pulitzer Prize for Explanatory Reporting for his coverage of the COVID-19 pandemic.

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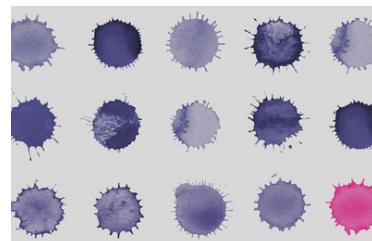
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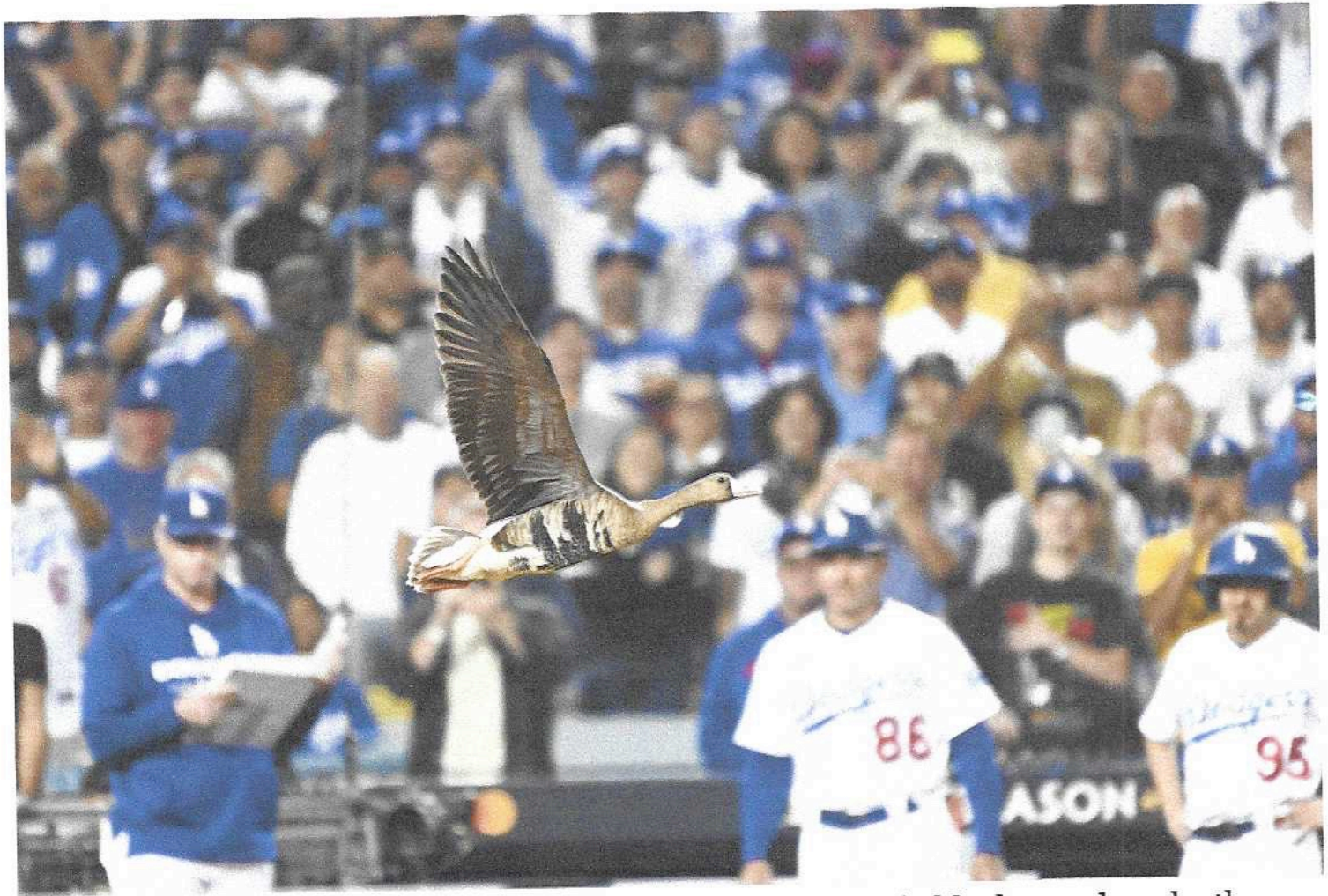
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# Where has goose gone?



A GOOSE flies inside Dodger Stadium on Wednesday — probably drawn there by the lights, an expert says. (Wally Skali Los Angeles Times) 10/12/22

More than 50,000 fans at Dodger Stadium hardly noticed at first when a goose made a rough landing in shallow right field during the eighth inning of Wednesday's National League Division Series game between the Dodgers and Padres.

But then camera operators spotted the bird and blasted its image onto the stadium's giant screen, drawing hoots, laughter and cheers from the crowd.

Fox Sports TV broadcasts zoomed in on the disoriented goose, its head swiveling side to side as it sat in the outfield, as one play-by-play announcer commented, "Ducks are very

aggressive. I don't know if you know that. They're very aggressive."

Another commentator asked, "Is that a duck?"

After something like a wild-goose chase, the grounds crew wrapped the big bird in a towel, placed it in a plastic recycling bin and retreated back into the Dodgers dugout. The crowd cheekily booed, lamenting the end of a break to an otherwise dismal inning for the Dodgers, who trailed by two runs.

"Can confirm that the goose was safely released," Nicole Singer, vice president of public relations for the Dodgers, wrote in an email. She did not respond to questions about how and where it was set free.

Video of the goose was widely circulated on social media, the latest addition to the entertaining sports subgenre of [wild animals](#) interrupting competition. Yet laughter aside, many users took to Twitter to ask, [is the bird OK?](#) And why did the bird land on the field in the first place?

Travis Longcore, president of the Los Angeles Audubon Society and an adjunct professor at UCLA, identified the wild bird as a [greater](#) white-fronted goose. He said the species is an uncommon sight throughout most of the year in urban Los Angeles.

Unlike other species such as Canada geese, which have made homes at parks throughout Los Angeles County, the greater white-fronted geese are seen only during migratory seasons.

They are known to migrate from the Arctic tundra in Alaska, where they breed in the summer, and fly south in the fall along the Pacific, settling in the wetlands in the Central Valley of California or even farther south into Mexico, a flight pattern the birds have carried out for thousands of years, Longcore said.

The bird on Wednesday was probably following this migration pattern when it became distracted by the stadium lights that tower above Chavez Ravine, a common obstacle for migrating birds, said Longcore, whose research includes the effects of light pollution on migratory birds.

Moments before the bird landed on the field, fans had spotted a flock of geese flying low near the stadium lights in a "V" formation.

About 80% of birds migrate at night, preferring the cool of darkness, Longcore said. However, lights from structures such as communication towers or skyscrapers can attract birds, causing them to either land within the brightness or circle it in flight.

Oftentimes, light pollution can cause birds to become disoriented and [crash](#) into structures, which contributes to the death of millions of migratory birds each year, according to a group of conservationists behind [World](#) Migratory Bird Day, which took place last week. The initiative calls on cities to reduce light pollution during peak migration periods in May and October.

“It’s like they get into this zone, and they just won’t go back into the darkness,” Longcore said.

He applauded the grounds crew’s use of a towel, which is key in preventing damage to the feathers.

And although the Dodgers didn’t disclose how and where they released the bird, Longcore hoped it was near a body of water.

Most white-fronted geese are spotted along bodies of water, such as lakes at MacArthur and Echo parks, at the L.A. River, or in the wetlands of Playa del Rey or the South Bay, Longcore said. The goose Wednesday would have been accustomed to landing in water, which would explain its hard landing on the field, he said.

Bird enthusiasts have been buzzing online in recent weeks about large flocks of greater white-fronted geese spotted throughout coastal Southern California, said Kimball Garrett, a researcher at the Natural History Museum of Los Angeles County.

Garrett had been watching the game from his L.A. home when the unwitting goose interrupted play.

Geese are known to fly together as families, yet even though the bird was separated from its group, Garrett said he isn’t worried about its survival.

He estimated the goose was a year old, an adult, given its white trim around its beak and black belly, which means it had made this migration south at least once before.

He assured that geese can survive alone, are strong fliers and are great at finding suitable habitats and food, as well as other geese.

“They’re really good at finding each other,” Garrett said, “And they can survive perfectly fine on their own.”

With October as a peak migration period throughout the world, both experts expect this won’t be the last clash of playoff baseball and migrating birds.

“I hope it reminds people that even here in Los Angeles, we are still part of the natural world,” Longcore said, “And we can do things to do our part in making it safer for them.”





# MIKE BONIN

City of Los Angeles  
Councilmember, Eleventh District

June 1, 2022

Shine Ling  
Metro  
One Gateway Plaza, MS 22-9  
Los Angeles, CA 90012

via email: [tcn@metro.net](mailto:tcn@metro.net)

**RE: Metro's Transportation Communication Network NOP Comments**

Dear Shine Ling,

I write with significant concerns about the breadth and potential impact of Metro's Transportation Communications Network (TCN) project. As described, the TCN would construct a number of digital displays in prominent locations throughout the Los Angeles region. While there are ancillary communication and intelligent transportation system (ITS) elements, the scope and intent of the project is clear: install large digital billboards at highly visible Metro-owned locations for revenue generation purposes.

As a matter of policy and principle, I do not support billboards—especially digital ones. In almost every instance, they are bright, unsightly, and are a blight on the urban environment. In many locations, they pose a distraction to drivers on already dangerous streets and freeways. Proof of their danger is self-evident: if they did not effectively pull drivers' eyes off the road ahead, they would not be valuable for advertising. These are significant impacts that must be analyzed both cumulatively and at individual proposed locations.

In addition to general objections, I have specific concerns about proposed locations of new digital billboards in my district. The locations in West Los Angeles (NFF-14, NFF-15, FF-27, and FF-26) along the Expo Line are either immediately adjacent to or in close proximity to residential dwellings. In fact, the City has worked collaboratively with Metro to plan for transit-oriented housing in these exact areas. While some of this land has underlying commercial zoning, the planned use is residential or mixed-use. Metro's assessment of residential proximity in these locations appears to not consider permitted and/or planned housing. Analysis in the EIR should ensure compatibility with planned and reasonably foreseeable residential use, not just zoning. Furthermore, adequate mitigation measures must include siting, orientation, buffering, and screening from all residential dwellings.

Metro also proposes locations in Del Rey (FF-29 and FF-30) that are immediately adjacent to and will be visible from the Ballona Wetlands Ecological Reserve, the only State Ecological Reserve in Los Angeles County. Metro should seek input from the Department of Fish and Wildlife and analyze the aesthetic and biological impacts to visitors and wildlife of having illuminated advertising in such close proximity to the Ecological Reserve. The Ballona Wetlands

Westchester Office  
7166 W. Manchester Boulevard  
Los Angeles, CA 90045  
(310) 568-8772  
(310) 410-3946 fax

City Hall  
200 N. Spring Street, Room 475  
Los Angeles, CA 90012  
(213) 473-7011  
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West Los Angeles Office  
1645 Corinth Avenue, Room 201  
Los Angeles, CA 90025  
(310) 575-8461  
(310) 575-8305 Fax



are also a critical coastal resource under the jurisdiction of the California Coastal Commission. Both the resources themselves and the views of those resources from public roads are protected.

Finally, Metro proposes two locations in Westchester with potentially significant aesthetic impacts. One is along Century Boulevard (NFF-17) within the Century Boulevard Streetscape Plan area, which conditions public agencies and private developers to construct improvements within the public right of way whenever a City permit is required. Los Angeles World Airports (LAWA) and commercial property owners have spent millions of dollars—and will spend millions more—to transform Century Boulevard into a gateway to Los Angeles for international visitors. It would not be fair or reasonable for this significant public and private investment in the corridor's aesthetics to be undermined by Metro. The EIR should analyze both the compatibility with and the applicability of the streetscape plan to this project, and propose specific mitigation measures or discontinue consideration of this location.

The second proposed Westchester location (NFF-18) is on the property of the Airport Metro Connector Station, a \$900 million marquee station in Metro's rail network designed by world-renowned architects. Metro would not consider placing a digital billboard in front of Union Station and likewise a digital billboard in this location should be out of the question.

Thank you for your consideration of these comments. If you have any questions, please contact my Transportation Director, Eric Bruins, at [eric.bruins@lacity.org](mailto:eric.bruins@lacity.org).

Regards,



**MIKE BONIN**  
*Councilmember, 11<sup>th</sup> District*

9/29/22

## 2 laws expand options for new housing

Gov. Gavin Newsom signs compromise bills to spur home building in commercial areas.

In a historic deal between affordable housing groups and labor unions, Gov. Gavin Newsom signed two major bills Wednesday to [convert underutilized and vacant commercial buildings into housing](#).

[Senate Bill 6](#) and [Assembly Bill 2011](#) incentivize housing projects in commercial corridors otherwise zoned for large retail and office buildings as a way to help California fill a multimillion-unit shortage in its housing supply. Both bills guarantee union-scale wages and promise an expedited construction process, while keeping development close to city centers to help the state meet its environmental goals and avoid sprawl.

Newsom said the two laws will help California address the state's "original sin" of housing affordability.

"It has been a stubborn issue. Decade after decade after decade, just fighting and talking about it and fighting each other in the process," Newsom said.

"I think what makes today a special day is this is a big moment as we begin ... to take responsibility, not to give the same speech and expect the same applause, but to begin to do something about it," Newsom said during a news conference in San Francisco to sign the two proposals and dozens of other measures. "This is a big package. These bills matter."

Gridlock among several opposing forces in the Capitol — where unions, developers and affordable housing groups [regularly stall legislation over disputed labor standards](#) — nearly capsized this year's historic deal. The powerful State Building and Construction Trades Council of California backed SB 6, along with builders and business groups, while the California Conference of Carpenters and the Service Employees International Union of California broke from other labor groups to support AB 2011.

"Every organization took a position that benefited them the best and decided which bill

they wanted to support. And part of the challenge there is that each coalition of people were ready to have the other bill die in order for their bill to be successful,” said state Sen. Anna Caballero (D-Salinas). “The problem was that you couldn’t get to that perfect middle with some of the groups. They just wouldn’t go there.”

The two bills offer developers options on projects intended to convert underutilized and vacant commercial spaces such as big-box stores, strip malls and office buildings into much-needed housing.

Despite the energy and effort required to pass the bills, both Caballero and Assemblymember Buffy Wicks, an Oakland Democrat who wrote AB 2011, said they’re willing to broker a future deal on similar legislation.

“Today we are taking a monumental step in our efforts to turn our housing crisis in a different direction,” Wicks said in a statement. “The governor’s signature on AB 2011 marks a turning point for California’s housing production needs — no longer will lack of land be an issue. No longer will there be a lack of incentive for workers to join the construction workforce. And, no longer will red tape and bureaucracy prohibit us from building housing in the right locations to address our climate crisis.”

Experts say the effect on California’s housing supply could be significant.

Caballero said SB 6 will help rural communities recover from a big chain store exodus that left behind a trail of vacant buildings and parking lots. She sees the new law as a way to produce housing for first-time buyers.

Housing advocates are particularly excited about AB 2011.

An August analysis by UrbanFootprint, a software platform that analyzes city data for urban planners and local governments, found that the new law could produce [1.6 million to 2.4 million new homes](#), depending on market conditions, including hundreds of thousands of affordable units.

“AB 2011 has tremendous potential to unlock ... a ton of land for development that was previously off-limits,” said David Garcia, policy director for UC Berkeley’s Turner Center for Housing Innovation. “It’s a huge deal.”

Garcia said he sees both bills as a sign that lawmakers in Sacramento are taking a stronger “pro-housing approach” and are willing to push for the kind of legislation that is notoriously difficult to pass amid interest group infighting.

Ray Pearl, executive director of the California Housing Consortium, one of the co-sponsors of AB 2011, called the measure a “game changer.”

“It’s really unprecedented that we brought together all of those different groups. As you look forward, nothing is ever easy in Sacramento, nor should it be,” Pearl said. “But there are a lot of folks that want similar outcomes. Hopefully, we are going to be able to use this coalition for future efforts.”

Erin Lehane, legislative director for the trades council, said SB 6 will provide valuable work to local residents. “These are opportunities for young people who really, really need the opportunity,” she said.

To finalize a deal, Caballero and Wicks worked together to craft two bills that promised each coalition a slice of the pie.

“As the clock started ticking down, we both agreed we would make some amendments that would give each one of us what we wanted,” Caballero said, even if that meant “everybody was a little bit unhappy” with the final product.

The Assembly bill includes a requirement for union-scale wages, along with stringent environmental standards and a mandate that a certain percentage of the units be affordable for low- and extremely low-income residents.

Some projects would be exempt from local governments’ discretionary approval process as well as the restrictive California Environmental Quality Act, which has been used as a legal weapon to slow down or even halt housing construction.

The labor requirement ensures that contractors provide healthcare benefits and union-level pay, so-called [prevailing wages](#), to all workers, even if some aren’t unionized. Contractors have argued that prevailing-wage requirements drive up costs and housing prices.

The Senate’s version was billed as a “middle-class” housing proposal, and requires the union-scale wages as a minimum labor standard while ensuring that a so-called skilled and trained workforce is used in most situations. The additional regulation guarantees most workers are unionized.

The cautious optimism about future legislative housing agreements could be short-lived, however.

Lehane said the trade unions remain concerned about most residential housing construction projects, especially those not using union workers, because those builders are “paying and treating workers unfairly.”

“I think that is not something that changes overnight,” she said. “As our responsibility, we need to remain ever vigilant to that.”

The new laws will go into effect July 1.

9/20/22

## A switch's flip side

Shift to efficient LEDs has an unintended result: Light pollution



A PANORAMA of stars behind silhouetted trees at Cedar Breaks National Monument in Utah. A growing number of people say the dark sky is an undervalued and underappreciated natural resource. (Sumeet Kulkarni Los Angeles Times)

In 2014, Los Angeles cut its annual carbon emissions by 43% and saved \$9 million in energy costs by replacing the bulbs in more than half of the city's streetlamps with light-emitting diodes.

That year, the Nobel Prize in physics went to three scientists whose work made those LEDs possible. “As about one fourth of world electricity consumption is used for lighting purposes, the LEDs contribute to saving the Earth’s resources,” the Nobel committee [explained](#) when it announced the award.

For more than a century, most sources of artificial light wasted energy in the form of heat. LEDs are much more efficient, requiring less than 25% of the energy consumed by an incandescent lamp. By 2020, LEDs accounted for [51% of global lighting sales](#), up from just 1% in 2010, according to the International Energy Agency, an intergovernmental organization that analyzes global energy data.

It sounds like a clear win for the environment. But that’s not how [Ruskin Hartley](#) sees it.

“The drive for efficient fixtures has come at the expense of a rapid increase in light pollution,” he said.

Hartley would know. He’s the executive director of the [International Dark-Sky Assn.](#), or IDA, and he’s one of a growing number of people who say the dark sky is an undervalued and underappreciated natural resource. Its loss has detrimental consequences for wildlife and human health.

And yet the public’s embrace of LEDs keeps rising, spilling way too much light into the sky where no one needs it.

“We’ve taken a lot of the energy savings and just lit additional places,” Hartley said. It’s a classic example of the [Jevons paradox](#), in which efficiency gains (such as better automobile gas mileage) are countered by an increase in consumption (people driving more often).

In essence, Hartley and others say, we’ve traded one kind of pollution for another.

That’s not the only problem. In addition to making more light, LEDs have altered its fundamental nature.

The light produced by incandescent bulbs had warmer amber or yellow colors, “more in tune with firelight, the only light aside from starlight we knew,” said Robert Meadows, a scientist with the Natural Sounds and Night Skies Division of the National Park Service. LEDs, in contrast, give off cooler bluish-white tones that exacerbate light pollution for the same reason that the sky is blue.

Sunlight contains the full spectrum of colors, and air molecules happen to be the right size to scatter the shorter blue wavelengths more effectively than any other. This causes blue light to spread more readily in the atmosphere, giving the daytime sky its familiar color.

After the sun goes down, the same thing happens with LED light that spills wastefully into the sky: It gets [diffused to a greater extent and increases “sky glow,”](#) the combined radiance of city lights.

[Travis Longcore](#), an urban ecologist at UCLA, estimates that artificial lighting causes the night sky in Los Angeles to shine 1½ times brighter than a night lit by a full moon. All creatures are affected by the brighter nightscapes, especially those who cannot close the blinds for a sound sleep.

“There are many, many species who don’t go out and forage during the full moon because it’s too bright and they know they’re going to be vulnerable to predators,” he said.

According to the National Audubon Society, 80% of North American migratory bird species fly at night, and they’re confounded by city lights.

Even species that stay put are forced to relocate their homes. A recent study led by Longcore found that [Western snowy plovers](#), a threatened species of shorebird, look for safe roost sites in darker areas of Santa Monica Bay when mostly empty parking lots are illuminated with floodlights all night long.

The survival of wild species depends on the variabilities of the natural world — day and night, seasons, the lunar cycle. Take them away, Longcore said, and you inevitably start alienating species from their natural habitats.

Snakes, for example, are most active and hunt prey during new moon nights. The disappearance of the California glossy snake and the long-nosed snake from Orange County has been attributed largely to the increase in ambient light.

Humans, too, are vulnerable to light pollution. Artificial light blocks the production of melatonin, a hormone that regulates sleep cycles, and disrupted sleep cycles have been linked to an array of health problems. The American Medical Assn. [warned](#) in 2016 that high-intensity, blue-rich LED lights were “associated with reduced sleep times, dissatisfaction with sleep quality, excessive sleepiness, impaired daytime functioning, and obesity.”

Longcore calls it “an accident of history” that the first LEDs to become readily available were blue-white in color. LEDs that produce warmer colors with similar levels of efficiency are now available, but the original remains popular with consumers who prefer the way it mimics daylight.

Because of sky glow, light pollution isn’t just a local phenomenon. Even areas hundreds of miles from urban centers cannot escape it.

“You can see Los Angeles from Death Valley at night,” Meadows said.

The reason light pollution is steadily getting worse, Hartley said, is that people aren’t even aware it’s a problem.

“I don’t think anyone intentionally sets out to pollute the night,” he said. But when it comes to lighting up our surroundings for the sake of safety, “there’s an assumption that because a little bit of light is good, more light must be better.”



The one good thing about light pollution is that, unlike pollution caused by chemicals or plastics, it's fully reversible. Simply [turn off enough lights](#) and the dark skies will be back in an instant.

"The solution doesn't mean plunging us into medieval darkness," Hartley said. It involves thinking carefully about the purpose of each lamp installed, making sure its light is restricted to its intended space, and turning it on only during the time it is needed.

Mexico, France and Croatia have enacted national light pollution laws. Since 2013, France has required all shops and offices to turn off their lights after 1 a.m.

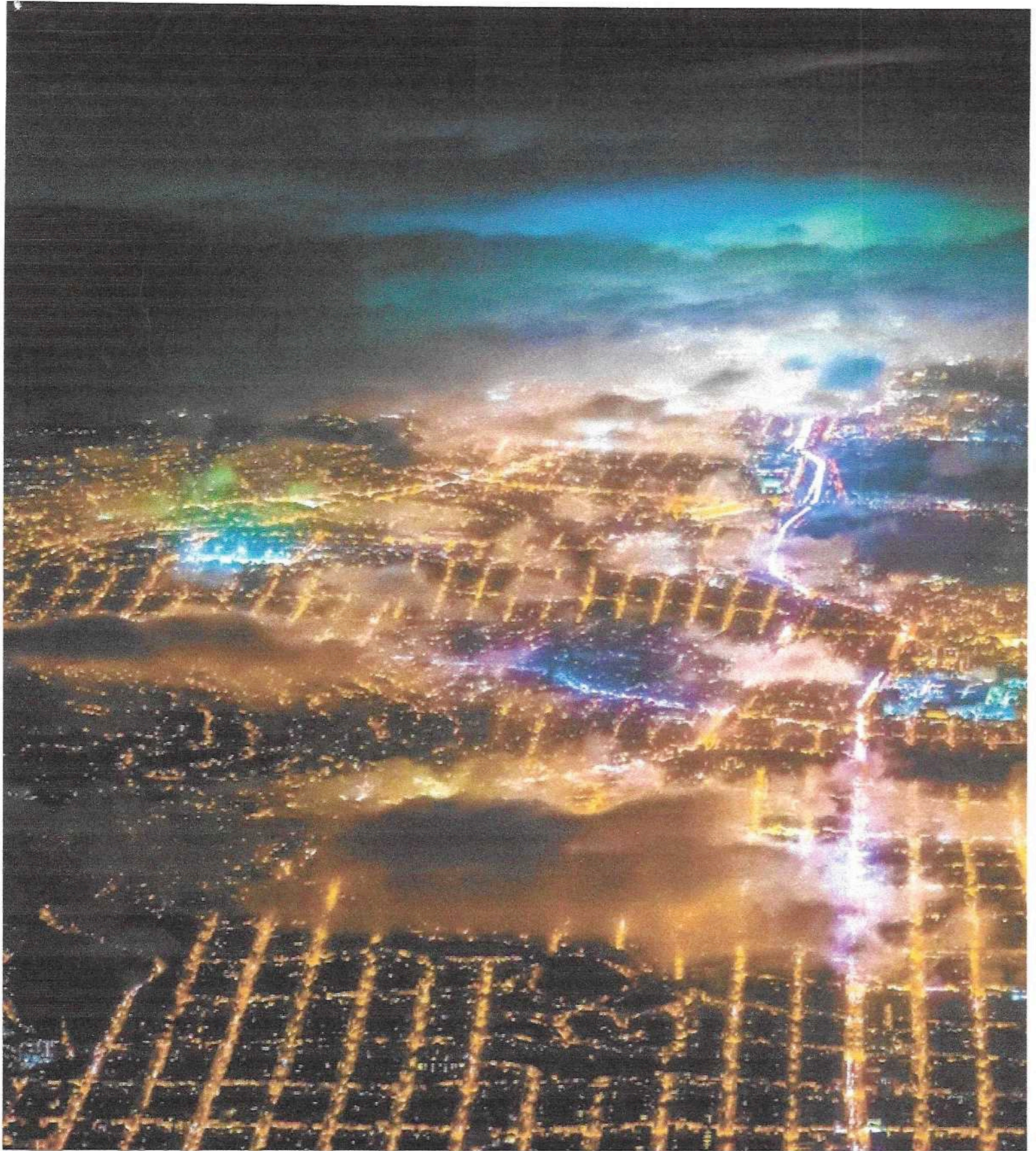
Nineteen states, the District of Columbia and Puerto Rico [have laws on the books to prevent light pollution](#). Arizona, home to several large telescopes, requires all exterior lights to be fitted with shields that prevent light from escaping skyward. Some coastal areas in Florida mandate low-power amber lights that won't draw sea turtle hatchlings away from the safety of the Gulf of Mexico.

No such laws exist in California, but Assemblyman Alex Lee (D-San Jose) introduced a [bill](#) that would require all outdoor lights on state government buildings to be shielded and have warmer color tones. They'd also need to be dimmed or shut off at night, though they could turn on if activated by a motion sensor.

The bill has [passed both houses of the Legislature](#), and it's now up to Gov. Gavin Newsom to decide whether to sign it.

Being limited to state property, the bill doesn't address the worst culprits of light pollution, which include stadium floodlights, industrial lights, residential lights and streetlights.

Still, Longcore sees it as "a first baby step that has to be taken." If the government leads by example, more people will recognize the importance of this issue, he said.



Aerial views of cities at night, such as this photograph of San Francisco, show both the allure of artificial light and the challenge of reducing it. Credit: Vincent Laforet

# The Sky Needs Its ‘Silent Spring’ Moment

A surge of new research underscores the growing global problem of light pollution—the urgent need for public awareness and action

By Joshua Sokol

## AUTHOR



**Joshua Sokol** is an award-winning

freelance science journalist whose work has appeared in *Science*, the *Atlantic*, the *New York Times*, and many other publications. He lives in Raleigh, N.C. His reporting on the environmental status of the night sky was supported by a 2021 fellowship from the Alicia Patterson Foundation.

Credit: Nick Higgins

**D**arkness was falling at Kitt Peak National Observatory outside Tucson, Ariz. At this hour Michelle Edwards, the observatory's associate director, would usually be inside prepping for a night on the telescope. But on this evening last December she stood alongside me in the twilight, watching two worlds collide. As the stars came out, electric lights dotting the landscape below turned on, too, leaving a diminished Milky Way arcing above the brighter civilization. “Holy crap,” Edwards said, taken aback by the enormous city glow.

Tucson was a bright bubble eating the eastern sky and the shoulder of Orion. A snake of lesser lights—Interstate 10—wriggled out from the glow, winding 100 miles north toward the glare of Phoenix. To the south, across the Mexican border, loomed another luminous half-circle from the lights of Nogales.

All that light is an existential threat to high-grade stargazing on Kitt Peak. Over the decades astronomers have taken urgent steps to slow or even reverse its spread. For them, the boundary of each glowing dome was a battle line, expanding or shrinking with each skirmish won or lost; the imperfect darkness overhead was a testament to local policy and millions of collective actions—or collective shrugs and proliferations of gleaming billboards and streetlights.

Yet the glow keeps spreading. Under skies so filled with stray photons, it takes twice as long to resolve an astronomical target as it typically would, one Kitt Peak astronomer told me a few hours after sunset. Intense wildfires linked to

global warming (such as one that swept the summit half a year after my visit) may pose more obvious risks to the telescopes there, but the subtle, pernicious effects of ever brighter nights could eventually become an even bigger threat to astronomy.

Species spiraling into oblivion, a few extra parts per million of carbon dioxide in the air, sea life gobbling up microplastics—many of our era's ecological calamities are hard to see with unaided eyes. Not so with light pollution, even though astronomers looking through telescopes may have been the first to really notice it. Its impacts are not limited to astronomy, of course. Over the past decade biologists have discovered that wasteful nighttime lighting drastically disrupts animals, plants and the ecological relationships that knit the world together. These effects reach across entire regions of the globe, far outside of cities. “You need to think about it much more like we might think about plastic pollution or some of the climate change effects,” says Kevin Gaston, a prominent U.K.-based conservation biologist at the University of Exeter.

Researchers still maintain that we can reduce light pollution without much sacrifice. As new research reveals the scope of the problem, possible fixes become clearer as well. Light pollution is something we can understand and manage, like smokestack emissions or factory wastewater. The sooner we act, the better. Satellite measurements suggest that more than three in five Europeans and four in five North Americans live under skies too light-swamped to allow them to see the Milky Way. Other analyses show Earth's artificially lit surface area bloating outward by about 2 percent a year, transforming the remaining map of true night into Swiss cheese. And although recent LED technology has made lighting cheaper and more energy-efficient than ever, consumers don't seem to be pocketing those savings and reducing carbon emissions. Instead humanity seems to be switching on even more lights.

It doesn't have to be this way. Dark, star-filled skies can once again become the rule rather than the exception, easing the burden on already struggling ecosystems while restoring some celestial wonder into ordinary human lives. Legislation aiming to achieve as much is already being drafted on multiple

continents. Any solution, however, depends on questions more social than scientific: Can we sustain the necessary research to properly define and address light pollution? How much nighttime lighting do we really need? And most crucially, maddeningly—does anyone care?

To give scientists and the rest of us some credit, it has always been hard to assess the ecological implications of bathing the world in an eternal false twilight. To some creatures, a lamp is a siren call; to others, it's a repulsive force field. Light's timing, wavelength, direction and intensity, as well as the eyes of the beholder, all matter, and unlike mercury in tuna or DDT in bald eagles, photons don't leave behind a lasting measurable chemical trace. Taken together, though, studies on at least 160 species provide ample evidence that artificial lights send the natural world a bewildering array of ill-timed signals—Wake up! Hide! Hunt! Fly this way! Change your metabolism!

One morning in May of last year, I drove out to a cattle farm in rural North Carolina to meet Murry Burgess, a graduate student at North Carolina State University who had strung up little Christmas lights over swallow nests built in the rafters of a barn. She went up on a ladder, pulled out what looked like squirmy, stubble-feathered dinosaurs one by one, and subjected each chick to a battery of tests while clutching it gently in her warm palms. The parents didn't know to move their nests away from the lights, she said, and the light took a toll on their babies' bodies. Compared with neighboring chicks growing up under no lights, coming of age under just one tiny bulb had made these birds stunted and underweight. "It's crazy how light goes all the way in deep into their cells," Burgess told me.

What harms individual baby barn swallows also operates on the scale of entire species, even ecosystems. Offshore, artificial light can cause reef-building corals that grasp toward the surface to stop spawning all at once, turning what should be synchronized explosions of fresh life into useless, mistimed puffs of eggs and sperm. In the U.S. alone, somewhere between several hundred million and one billion birds die every year after thwacking into windows, many of them beckoned by interior lights.

Insects especially are facing dire consequences. Moths keep flapping into lightbulbs for reasons scientists still don't quite understand. Cricket calls are becoming decoupled from the rhythms of night and day. In the British countryside, research shows caterpillar populations plummeting in roadside hedgerows illuminated by LED streetlights. Light pollution is almost certainly hastening the so-called insect apocalypse, the planet's declining portfolio of bug biomass, although little research has focused on this grim end point.

Light pollution ripples through multiple domains of life. In one 2017 experiment, scientists with night-vision goggles watching cabbage thistle plants confirmed that ambient light deterred nocturnal pollinating insects from making their rounds. Daytime pollinators couldn't make up the deficit, so the plants bore less fruit, suggesting that the effects of brightening nights could eventually show up in supermarket aisles. And while nocturnal light can lead the insects we like to lose conviction, it can fill those we despise with passionate intensity: the mosquito *Aedes aegypti*, which causes a staggering 400-million-odd infections such as dengue and Zika a year, seems encouraged to bite more in the presence of artificial light, as does another mosquito species that spreads West Nile virus.

Such observations used to be documented one organism at a time in specialist journals, unconnected to a broader research program. But in the late 1990s a pair of grad students and self-described environmental “troublemakers” in Los Angeles began building up a dossier of these kinds of stories. Catherine Rich, a lawyer turned ecologist-in-training, got accepted to several Ph.D. programs, but when she went looking for an adviser who would let her study the effects of light pollution on wildlife, she found no takers. “I would hear things like ‘you might not get any results,’” she says. But Rich and her now husband Travis Longcore stuck with the issue and organized what would prove to be a seminal academic conference on the subject.

In their 2002 conference, a 2004 review paper and a subsequent book, Longcore and Rich steered clear of another, parallel field of research—the ongoing exploration of what living in a brighter outdoors and brighter-still indoor world does to human health. (We know light exposure at night is associated with myriad problems, ranging from the obvious, like sleep

disruption, to the more surprising, like higher breast cancer risk, but it isn't clear yet how much of this is from outdoor light pollution versus our glowing screens and indoor fixtures.) Even so, journalists and the public began to pick up on the idea that light pollution was real pollution, ecologically speaking. By 2011 high-powered European ecology laboratories such as Gaston's picked up the topic and began cranking out their own results and meta reviews of the literature. As of this year, Longcore and Rich's review paper has been cited more than 1,500 times.

Many of these results involve the easiest kind of light pollution to picture: a single, intense light source shining at you with the harsh glare of LED headlights on a new-model SUV. More recently, however, others have focused on the subtler, more encompassing light-bubble effect I saw from Kitt Peak. The latest, most painstaking ecological findings show that these levels of ambient light pollution have biological consequences, too, even with no specific light sources in sight.

A series of recent experiments, conducted in tanks and under domes bobbing in a German lake, showed that bright skies alone can cause sagging levels of melatonin—a hormonal messenger of darkness—and alter reproductive hormones in Eurasian perch. A separate paper last year showed that whiter nights disoriented dung beetles in South Africa, which look toward the Milky Way to guide themselves in the humble but essential task of burying poop in the savanna. Yet another 2021 study, led by Longcore, showed similarly low thresholds of light on stretches of California beach can prevent plovers from roosting and fish called grunion from throwing themselves ashore to spawn.

All this matters because domes of light from skyglow are visible for hundreds of miles across state and international borders, and studies show they lure migratory birds and insects at regional scales. Even in the rare corners of the planet these domes haven't yet reached, organisms already seem attuned to the faintest changes in lighting. Over winter in the Arctic Ocean, for example, plankton rise and fall each day despite the sun never breaching the horizon. Artificial light from fishing or mining could also scramble that system.

There is no real, organized “pro-skyglow” opposition on the other side of all this funneling money to politicians or pumping out contrarian studies. The problem, scientists assert, is that current lighting trends are driven by unquestioned development and millions on millions of oblivious human decisions. Setting aside regions left in the dark by poverty and neglect, precious few communities have managed to slow down light's advance.

Two weeks before my sojourn at Kitt Peak, I stood shivering in the late-night chill beneath the ponderosa pines around Lowell Observatory in Flagstaff, gazing up at a lunar eclipse. As Earth's shadow slid across the face of the moon, the black of bare sky deepened, and the stars popped brighter, as if a photo editor were fiddling with the vista's contrast levels.

The most memorable part of the whole experience, though, was the downward view overlooking Flagstaff. Almost no illumination besides individual stoplights shined back up. You could blink and convince yourself you were overlooking a sleepy coastal hamlet, not a mountain town of more than 75,000 hoping to snag tourists on their way to the Grand Canyon. It looked like a little corner of modernity had somehow taught itself to close its eyes and fall asleep.

To date, the most successful defenses of dark skies have been mounted in places where astronomers could rally around facilities with economic value. In 1958, around the same time Rachel Carson got the tip that spawned *Silent Spring* and modern environmentalism, astronomers at Lowell Observatory began to worry about spinning searchlights used in advertising spoiling their view of the sky. In response, Flagstaff put the world's first light-pollution ordinance on the books. Arizona—not exactly a place famous for collectivist, big-government policies—has been the heartland of the dark sky movement ever since.

Two years earlier, a few hundred miles to the south, astronomers and tribal guides from the surrounding Tohono O'odham nation had ridden on horseback to the top of Kitt Peak, exchanging Western and Indigenous star stories by a campfire at the summit. Soon the federal government leased the



land from the tribe in perpetuity, and bigger and better telescopes bloomed on the mountaintop.

As light pollution in nearby Tucson ballooned, Kitt Peak astronomers found allies such as Tim Hunter, a doctor who had grown up seeing the Milky Way through elms in the Chicago suburbs, then watched helplessly as artificial light dimmed the galaxy just like Dutch elm disease rotted the trees. Together Kitt Peak astronomer David Crawford and Hunter formed the International Dark Sky Association (IDA) in 1988, hoping to build a broader coalition that included their allies in Flagstaff.

Over the years, as advocates watched darkness retreat, the tools and techniques required to track it advanced. Light-pollution modeling progressed from pen-and-paper equations to computerized ray-tracing simulations. Sophisticated wide-angle cameras made it easier to measure skyglow from the ground, and satellite images started showing spidery webs of light spreading across the globe. The general trend was, and remains, dismal: the better researchers can study the problem, the worse it appears to be.

The IDA and its affiliated researchers reject the assumption that light pollution must intensify as cities grow. Usually crime prevention is the municipal excuse for banishing the night. But how well does this work? Perhaps the most definitive evidence that light suppresses crime comes from an experiment begun in 2016 in which criminologists lugged nearly 400 basketball hoop-sized lighting towers into public outdoor spaces in New York City housing developments. Powered by their own portable fuel generators, the blue-white fixtures were left on from sunset to sunrise—and outdoor crimes around the light towers at night dropped by about 45 percent.\*

But dark sky researchers point out that these towers were far brighter than mere streetlights. They also note the ethically dubious nature of any anticrime policy that relies on subjecting majority-minority communities to prison yard-esque floodlights all night long. Indeed, across the continental U.S., the burden of light at night, like other known pollutants, falls harder on less

powerful groups: according to a 2020 study from researchers at the University of Utah, Black, Hispanic and Asian American neighborhoods tend to be about twice as illuminated as white ones.



Miami's infrastructure forms a dazzling landscape of light. Credit: Vincent Laforet

Road safety is another common rationale for the proliferation of lights at night. But here, too, scientists argue that brightness standards are driven by convention, not science. In 2018 lighting researchers from England and the U.S. scanned regulations in Europe and North America. “There appears to be little, if any, credible empirical support for light levels recommended in much current road lighting guidance,” they concluded.

Other lighting choices come down to industries and individual people, many of whom remain unreached or unmoved by the issue. Spend any time in dark sky circles, and you'll hear talk of a curse: a moment of revelation, of veil lifting, when you suddenly see bad, wasteful lighting and then can't unsee it. (Mine came on a walk in my Raleigh, N.C., neighborhood, when I realized a richer, whiter “historic” stretch of blocks had dimmer amber streetlights, and the adjacent historically Black neighborhood had harsher white fixtures.)

Many activists have also taken that curse as a call to action. The day after watching the lunar eclipse in Flagstaff, I sat down with Chris Luginbuhl in the city's Dark Sky Brewing Company. Playing along, he ordered a "Circadian Rhythm." That on-the-nose brew had run out, though, so he settled for a brown ale.

Luginbuhl, a former astronomer at the nearby U.S. Naval Observatory who has worked to protect Flagstaff's skies for four decades, knows the field of dark sky science and its progress better than almost anyone. He and his coalition are "like the John Muir character," one colleague told me, "kind of nutty but superpassionate." Streetlights here are a dim orange because, as Luginbuhl explains, blue-tinged light is more disruptive to most animals at night (humans included), as well as to nearby astronomical observatories. That's because bluer, shorter-wavelength photons scatter more readily in the air, creating a localized fog of light.

Nursing his beer, Luginbuhl praised his town as a paragon, a proof of concept that other communities could emulate. In 2017 the U.S. National Park Service deployed an ultrasensitive panoramic camera outside both Flagstaff and the similarly sized city of Cheyenne, Wyo., which does not have comparable dark sky ordinances. Cheyenne was 14 times brighter than Flagstaff, and the bubble of trapped light around it was eight times bigger. Luginbuhl says his strategy has been simply to show people the stars and convince them that being able to see them is a matter of choice—that there is no zero-sum conflict pitting growth against wilderness. "Do I think that stars will win out over light? Almost every time," Luginbuhl says. "They're mind-bending, and everybody needs to have their minds bent."

In the spring of 1942 Nazi Germany sent U-boats slinking across the Atlantic to prey on American shipping lanes. Cargo sank by the ton, drowned bodies washed ashore, and it soon became clear that the submarine gunners were picking off ships at night by watching for their dark silhouettes against skyglow over the coast.

Elected officials and chambers of commerce in cities such as Miami were

pressured to dim lights and turn off glitzy outdoor displays. Clearly, this light pollution had literal life-or-death stakes. For three months, though, community leaders dragged their heels, subverting a collective response, citing economic concerns. The carnage offshore ultimately moved President Franklin D. Roosevelt to issue an executive order that compelled coastal blackouts, and U-boat attacks waned as defensive patrols were stepped up and communities for many miles inland restricted their use of nighttime lights, even taping over car headlights. All this is within living memory: my late grandmother, a teenager at the time, told stories about how serious it felt to keep the lights off that summer in Wrightsville Beach, N.C.

“It's like, oh, my God,” says Christopher Kyba, a physicist and dark skies advocate at the GFZ German Research Center for Geosciences in Potsdam. Even back then, “the U.S. government knew how to control skyglow! We're not waiting for some breakthrough technology.” Smarter, more data-driven guidance on unnecessary lighting can exist; presumably the collective will to act on it can, too.

Barring that, it's easy to imagine the planet's wealthier regions cranking out ever more wasted light powered by wasted carbon, evaporating the remnants of true night like water from a drying lake bed and subjecting life on Earth to an additional stressor in a world increasingly full of them. Or—and this is also eminently possible—we can come to notice wayward light as we would a neighbor's garden sprinkler accidentally set to water the street. With enough restraint, the Milky Way can shine once more above bustling human communities.

Pressure to dim the lights is building. Multiple U.S. states are reviewing proposed dark sky-friendly legislation. Campaigns to turn off lights during bird migration season are spreading all over the country; in Texas cities such as Dallas and Houston, for example, more than 100 downtown buildings dimmed their lights this past spring. And since 2001, when the IDA started recognizing places where dark skies are being preserved—Flagstaff, of course, was first on the list—nearly 200 such sites have been certified around the globe.

Even bolder policies are unfolding in Europe. In France, a law passed in 2019 bars businesses from leaving decorative lights and signs illuminated all night. In Germany, which has developed a legal action plan to reverse insect declines, controlling light pollution is considered to be a major goal. On the technology front, LED makers, sensing an unmet need, are adding dark sky-friendly, downward-pointing, long-wavelength fixtures to the market. And the Holker Lab in Berlin—the ones behind those fancy lake experiments on skyglow—have developed prototype lights that don't emit the wavelengths disruptive to most insects. “The crazy thing about this problem,” ecologist Jesse Barber of Boise State University told me, echoing a sentiment common throughout dark sky circles, “is it's so damn fixable.”

It's hard to care for what you've never seen. The Milky Way—a glitter bomb of awe that all our grandparents and all preceding humanity could witness whenever they wanted—is the biggest reward for limiting light pollution. But unlike residents of the American West, who can summon its appearance with modest reductions in light, people in the more densely populated, brighter eastern U.S. can't gain even a subpar view of our galaxy without hours-long drives to isolated pockets of darkness. There are other perspectives to consider, though.

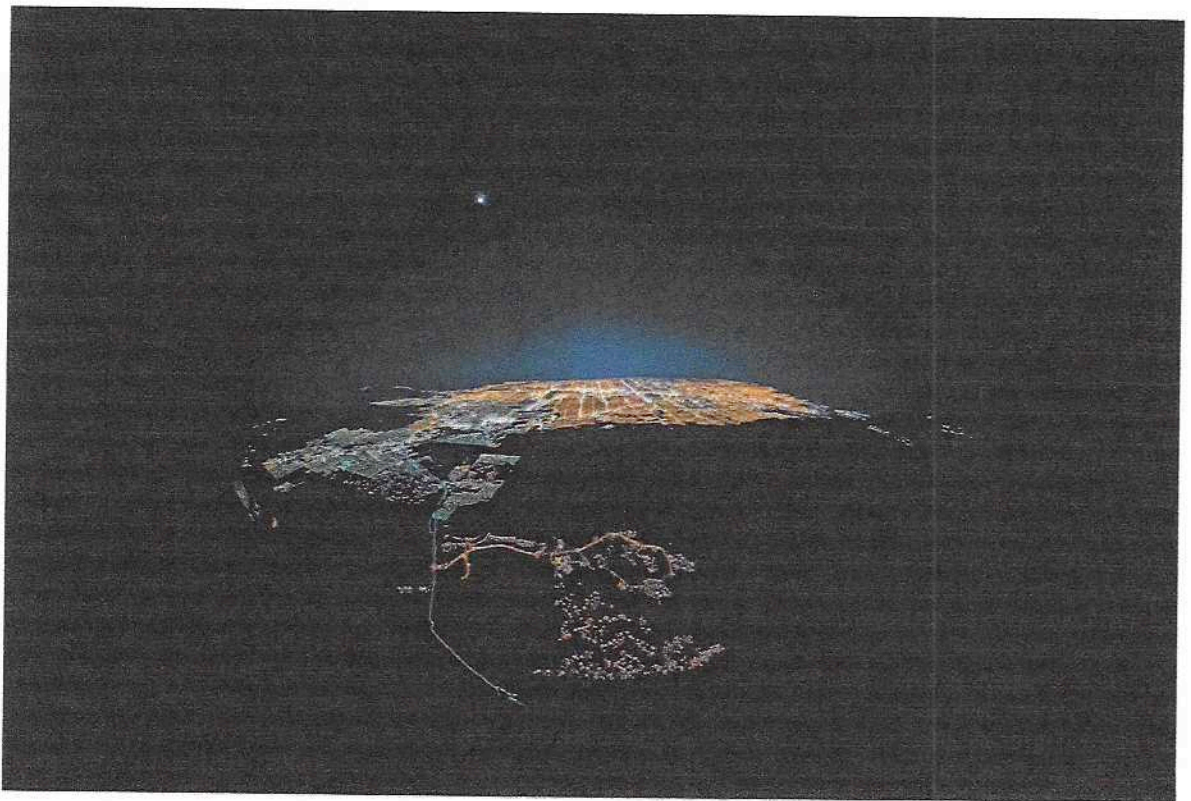
Recently I learned of a quiet little wonder left in my own world: a species of ghost firefly was discovered haunting old pine stands near my home in the Piedmont of central North Carolina. The males of this species keep their lights on for up to 30 seconds at a time, scrawling faint, floating messages, and the females sit still below, gleaming back up silent, greenish answers.

In 2021 citizen scientists spotted populations of this firefly in some of the state's most urbanized counties, where, of course, they had been all along. They easily could have been paved over to extinction before anyone noticed. The entomologist searching for the species, Clyde Sorenson of North Carolina State, even stumbled onto a population in his very own backyard. “I've been living there for 25 years,” he told me, sheepishly.

Desperate for a little reenchantment myself, I pulled up in his driveway one

evening this past spring. We set out into the adjoining woodlot, wearing headlamps and crunching through leaves as a bullfrog bellowed in the background. This being a new species, we didn't know the exact time of year to expect it or the right weather. We did know darkness was necessary.

Fireflies, obviously, are sensitive to levels of light, the medium in which they communicate. Studies show ambient light pollution obstructs firefly courtship to the extent that some species don't even bother to try. As we walked that night, errant rays—from our phones, streetlights through the trees, the neighbor's security floodlight—kept needling their way back in, illuminating all the fireflies' likely hiding spots.

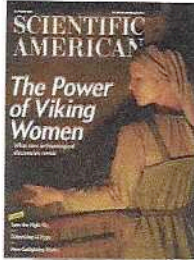


A typical starless sky over Las Vegas, one of the brightest nighttime cities on Earth.  
Credit: Vincent Laforet

But then we saw three huddled females scintillating like misplaced stars, glowing from a shadowy crevice of glare-blocking leaf litter. Their bodies were the size of grains of rice. I leaned in close, and each firefly's star divided into two emerald dots, two side-by-side light organs cranking out their own feeble wattage into the scattered remnants of the dark—a broadcast they continued for about half an hour, until that evening's shift ended, and they winked out.

*\*Editor's Note (9/29/22): This sentence was edited after posting to correct the description of when the blue-white fixtures were left on.*

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doi:10.1038/scientificamerican1022-46

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**From:** Sam Dunlap [tongvatcr@gmail.com]  
**Sent:** 10/13/2022, 11:43 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Cc:** [lcandelarial@gabrielinotribe.org](mailto:lcandelarial@gabrielinotribe.org)  
**Subject:** Tribal Consultation - Transportation Communication Network Project

LA Metro  
Attn: Shine Ling, Manager, Development Review Team  
One Gateway Plaza, Mail Stop 22-9  
Los Angeles, CA 90012-3745

Good Morning,

The Gabrielino Tongva Tribe requests continued consultation on the proposed Transportation Communication Network Project as the project area is within our traditional tribal territory and may impact our tribal cultural resources.

Please contact me as soon as possible so our tribe may share our concerns.

Thank you,

Sam Dunlap  
Cultural Resource Director  
Gabrielino Tongva Tribe  
(909) 262-9351



# GLASSELL PARK

IMPROVEMENT ASSOCIATION

WORKING TO BETTER OUR COMMUNITY SINCE 1968

20 October 2022

Los Angeles City Planning  
c/o Terri Osborne ([terri.osborne@lacity.org](mailto:terri.osborne@lacity.org))  
Los Angeles Metropolitan Transportation Authority  
c/o tcn@metro.net

## Statement of Community Impact re Digital Billboards

### **The Glassell Park Improvement Association has taken the following position:**

The GPIA is **opposed** to the Los Angeles Metropolitan Transportation Authority (Metro) proposal to implement the Transportation Communication Network (TCN) Program of digital billboards above our City's freeways. We are strongly opposed to the two Freeway-Facing TCN structures proposed for placement above the 2 Freeway in Glassell Park.

We further **oppose** Los Angeles City Council motion CF-0392 that would amend the Zoning Code to permit digital signage such as the TCN structures in Metro's proposal.

Suggesting that these billboards would "promote roadway efficiency" and "improve public safety" is disingenuous at best. The fact is these are advertising billboards that will cause more roadway hazards and light blight than can possibly be offset by Metro's ability to use them for occasional communications.

Light pollution is a serious problem in our City, and locating these billboards in our neighborhood will affect the quality of life for residents. While Metro specifies that none of the locations where the billboards will be placed are "zoned for residential use", they don't mention that one of the Glassell Park sites (FF-13 SB 2) is directly across a narrow street from a neighborhood of older, small, single family homes. People who live in the area will have their quality of life greatly diminished. Additionally, the nature of digital billboards is that from elevation, they can be seen—if not actually read—for miles.

Furthermore, the site designated for FF-14 NB 2 is at the entrance to the new Bowtie State Park along the Los Angeles River. The river in this area is a haven for native and migrating birds and many varieties of wildlife that will be negatively impacted by this type of light pollution. The State is currently creating a passive recreational space where the community has already held night-time gatherings & nature walks.

For all of these reasons, digital billboards do not belong above the 2 Freeway in our neighborhoods or over our natural space.

The Glassell Park Improvement Association was founded in 1968, and is one of the oldest organizations of its kind in Los Angeles. Our founders described our mission as advocating for quality of life issues and working to improve conditions in Glassell Park. As such, our Board of Directors has voted and unanimously approved sending this statement on behalf of our members.

cc: Los Angeles City Council, Assemblymember Wendy Carrillo, County Supervisor Hilda Solis, City Attorney Mike Feuer, Friends of the Los Angeles River, Clockshop, California State Parks, Glassell Park Neighborhood Council

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**From:** patricia mcpherson <[patriciamcpherson1@verizon.net](mailto:patriciamcpherson1@verizon.net)>  
**Sent:** Wednesday, October 19, 2022 12:50 PM  
**To:** [terri.osborne@lacity.org](mailto:terri.osborne@lacity.org) <[terri.osborne@lacity.org](mailto:terri.osborne@lacity.org)>; [tcn@metro.net](mailto:tcn@metro.net) <[tcn@metro.net](mailto:tcn@metro.net)>  
**Subject:** Grassroots Coalition DEIR response comments to Metro; PlanCheckNCLA



## **METRO-**

Two signs are planned for SR 90 East and West (Freeway Facing FF 29 an FF 30) shown in the map of the project EIR.

Here is information about the comment due date: <https://plancheckncla.com/2022/10/05/metros-transportation-communication-network-digital-signage/>

### **RESPONSE:**

**DIGITAL SIGNS ARE UNECESSARY for the FREEWAY 90 SR 90 East and West (Freeway Facing FF 29 an FF 30,DEIR Map)**

**AND THEIR LIKELIHOOD OF CAUSING ENVIRONMENTAL HARM IN THIS AREA IS HIGH.**

**Please be responsive to the scientific studies included below per assessment of creating new lighted signage on SR 90 which is alongside and ending in areas that are sensitive biological, ecological areas.**

### **Bright city lights exacerbate air pollution**

<http://cires1.colorado.edu> › *science* › *spheres* › *lights*

Stark's measurements indicated the energy of the nighttime lights slowed down nighttime *cleansing* by up to 7 percent and also increased the starting chemicals ...

This area is an environmentally sensitive area that the public has paid over \$200 million for its acquisition and study. Further studies must also be done for full CEQA and federal EIS studies.

<https://travislongcore.net> › *research* › *light-pollution*

LIGHT POLLUTION , Travis Longcore, Catherine Rich

In 2002, the American researchers Travis Longcore and Catherine Rich organized the first conference on the ecological consequences of artificial *light* at night.

### **Ecological light pollution - Travis Longcore - Academia.edu**

<https://www.academia.edu> › *Ecological\_light\_pollution*

REVIEWS REVIEWS REVIEWS 191 *Ecological light pollution* Travis Longcore and Catherine Rich Ecologists have long studied the critical role of natural *light* in ...

## Ecological Consequences of Artificial Night Lighting

<https://www.researchgate.net> › publication › 40777410...

Jul 5, 2022 — Travis Longcore at University of California, Los Angeles ... Therefore, *light pollution* through its impact on internal clock time which ...

## Lighting's Impact on the Animal World with Travis Longcore

<https://www.youtube.com> › watch



Lighting for Safety and CPTED (Crime Prevention Through Environmental Design) with Art Hushen. International Dark-Sk...

YouTube · International Dark-Sky Association · Apr 22, 2020

## Study reveals which outdoor lighting minimizes harm to insects

<https://www.ioes.ucla.edu> › article › study-reveals-whic...

Mar 17, 2021 — UCLA–Smithsonian research confirms *certain LED colors cause less damage* than ... co-authors is UCLA conservation scientist Travis Longcore

Thank you for your time spent in review of this information and please preclude new illuminated signage in all areas that may be negatively impacted.

Patricia McPherson, Grassroots Coalition

---

**From:** Theresa Saso [theresa.saso@highlandparknc.com]  
**Sent:** 10/22/2022, 6:44 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Cc:** [john.collinson@highlandparknc.com](mailto:john.collinson@highlandparknc.com); [charles.blumsack@highlandparknc.com](mailto:charles.blumsack@highlandparknc.com);  
[claramsolis@earthlink.net](mailto:claramsolis@earthlink.net)  
**Subject:** Transportation Communication Network (State Clearinghouse No. 2022040363) – Draft EIR

Dear Shine Ling,

The Historic Highland Park Neighborhood Council (HHPNC) represents over 60,000 Los Angeles stakeholders who reside, own property, or conduct business in the neighborhoods of Highland Park and Garvanza. The HHPNC Board voted at its Board and Stakeholder meeting held on October 11, 2022, to submit this comment letter and CIS regarding the Transportation Communication Network (TCN) Draft Environmental Impact Report (DEIR). The HHPNC opposes the Building of the TCN and supports the NO BUILD ALTERNATIVE.

[PLEASE SEE THE TWO ATTACHED PDFS FOR FULL CIS AND SUPPORTING DOCUMENTS]

Please reply to acknowledge receipt of this email.

--

Kind Regards,  
Theresa Saso  
HHPNC Secretary  
HHPNC Homelessness Director  
Co-Chair Housing, Renters, and Homelessness Committee  
[theresa.saso@highlandparknc.com](mailto:theresa.saso@highlandparknc.com)

HISTORIC HIGHLAND PARK NEIGHBORHOOD COUNCIL  
Post Office Box 50791 Los Angeles, CA 90050  
<http://www.highlandparknc.com>  
Certified as NC #33 May 28, 2002

DEPARTMENT OF NEIGHBORHOOD EMPOWERMENT  
200 N. Spring St. Ste.2005 Los Angeles, CA 90012  
Telephone: (213) 978-1551

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Roger Mora

# HISTORIC HIGHLAND PARK NEIGHBORHOOD COUNCIL

## COMMUNITY IMPACT STATEMENT

### In Opposition to Building of Transportation Communication Network- TCN

**RE:** Transportation Communication Network (State Clearinghouse No. 2022040363)  
– Draft EIR

October 11, 2022

One Gateway Plaza, Mail Stop 22-9,  
Los Angeles, CA 90012,  
Attn:Shine Ling,  
Development Review Team  
[tcn@metro.net](mailto:tcn@metro.net)

Dear Shine Ling:

The Historic Highland Park Neighborhood Council (HHPNC) represents over 60,000 Los Angeles stakeholders who reside, own property or conduct business in the neighborhoods of Highland Park and Garvanza. The HHPNC Board voted at its Board and Stakeholder meeting held October 11, 2022 to submit this comment letter and CIS regarding the Transportation Communication Network (TNC) Draft Environmental Impact Report (DEIR). The HHPNC opposes the Building of the TCN and supports the NO BUILD ALTERNATIVE.

According to Metro, the purpose of the proposed project is to “provide a network of TCN Structures that would

incorporate intelligent technology components to promote roadway efficiency, improve public safety, increase communication, and provide for outdoor advertising that would be used to fund new and expanded transportation programs consistent with the goals of the Metro Vision 2028 Plan...The Metro TCN Program also includes the removal of existing static signage throughout the City. Implementation of the Project would include the installation of up to 34 Freeway-Facing (FF) TCN Structures and 22 Non-Freeway Facing (NFF) TCN Structures, all on Metro owned property.”

An EIR is an informational document that will inform public agency decision-makers and the public of the significant environmental effects of a project, identify possible ways to minimize any significant effects, and describe reasonable project alternatives.

After review of the DEIR, the HHPNC concludes that the DEIR does not provide sufficient evidence that this project is needed or that it will benefit residents of Los Angeles. Further, we are concerned that to the contrary, this project could present a danger to motorists and pedestrians, have a negative impact on our historical resources, and negatively impact the well-being of our residents and wildlife.

If Metro is seeking to raise funds a cost benefit analysis should be prepared analyzing this.

We are also concerned that the document as prepared is biased in favor of the project and inadequately addresses the significant impacts from it. For example, Appendix K, the Transportation and Traffic Safety Review cherry picks three studies to conclude that drivers overwhelmingly pay attention to the road ahead, regardless of the presence of CEVMS or billboards. Two of the studies included are industry sponsored. Additionally, for no clearly explained reasons, the preparer excludes studies done outside of the United States. In doing this, the preparer seems to disregard the widely used literature reviews prepared by Jerry Wachtel, CPE of the Veridian Group. Wachtel’s work is cited extensively by local and state government researchers.

Further, for the reasons stated within this letter we believe the EIR is deficient.

## **I. SAFETY**

The HHPNC is concerned for the safety of motorists and residents in the City of Los Angeles from the TCN. We share the concerns indicated below in Wachtel’s Literature Review.

A. Wachtel’s 2018 Updated Literature Review (See Attached) concludes:

1. Broadly summarized, the more recent studies have tended to find that outdoor advertising signs, particularly Commercial Electronic Variable Message Signs (CEVMS) Commercial Electronic Variable Message Signs, attract drivers' attention, and that more dramatic and salient signs attract longer and more frequent glances.
2. Several of the reported studies suggested that the distraction caused by outdoor advertising signs could be tolerated by experienced drivers

and when attentional or cognitive demands of the driving task were low, but that the risk increased when such signs competed for the driver's visual attention with more demanding road, traffic, and weather conditions, when travel speeds were higher, or when an unanticipated event or action ( such as a sudden lane change or hard braking by a lead vehicle) occurred to which the driver had to respond quickly and correctly.

3. In addition, the more recent research continues to show that the drivers most susceptible to unsafe levels of distraction from roadside billboards are the young (who are more prone to distraction and less adept at emergency vehicle response) and the elderly ( who have more difficulty with rapidly shifting attention, poorer night vision and glare susceptibility, and slower mental processing time). As will be seen in this Compendium, these concerns are heightened today, with our elderly driver population growing quickly, traffic increasingly dense, more roads under maintenance or repair ( construction and work zones create added risks), and larger, brighter digital and video roadside advertising signs competing for the driver's attention.
  4. Finally, the most recent epidemiological studies (dating from 2014 and 2015) have begun to demonstrate what has long been suspected but not proven - that roadside billboards are associated with increases in crash rates where such billboards are located.
- B. Appendix K, Transportation and Safety Review as previously indicated cherry picked two industry prepared studies in Ohio from 2007 and one 2012 Federal Highway Administration Study. These studies each have limitations and in our opinion are far from conclusive in determining that CEVMS are safe.
1. The 2012 study was conducted in two cities, one in Richmond, Virginia and the other in Reading, Ohio. In both cities, there was a small sample size, in Reading 31 participants and in Richmond 24 participants. The study author acknowledges that there were issues with the interpretation of the specific contributions made by billboards and the environment to the driver's behavior. The author also found that, "The drivers were generally more likely to gaze at CEVMS than at standard billboards," even though he concluded that drivers spent most of their time gazing at the task at hand. Additionally, the billboard refresh rate was 8-10 seconds. The Metro billboard refresh rate would be 8 seconds less than in the study. Shorter refresh rates could be more distracting.
  2. One of the 2007 studies, looked at driver fixation time with CEVMS and found it to be longer than for regular billboards it was less than 1 second, which they concluded was less than the 2.0 second fixation duration threshold that is considered dangerous by the NHTSA

3. The other 2007 study looked at traffic accidents. A 2009 FHA study, indicates the limitations of such studies, “crashes are rare multicausal events which are difficult to measure.”
- C. We are concerned that the studies conducted do not look at cities like Los Angeles.
  1. None of the studies cited have studied a large city such as Los Angeles where our traffic is legendary.
  2. Additionally, we have a large population whose primary language is not English. None of the studies referenced has looked at multi-lingual populations whose primary language is other than English.
- D. The DEIR failed to consider the totality of the circumstances that drivers today face including increasingly complex cars and cell phones. How does that one second distraction along with these other distractions impact drivers. See LATimes article 2022 July attached.  
<https://www.latimes.com/business/story/2022-07-06/we-are-killing-people-how-technology-has-made-your-car-a-candy-store-of-distraction>

## **II. Traffic:**

Our stakeholders have raised the question of what impact these signs will have on traffic. Residents have noticed that where these signs are located on a freeway such as the I-5 in Commerce near the Citadel, traffic slows.

Additionally, while the study authors may find that a one second fixation is not significant, in a city of millions and tens of thousands of drivers passing these signs, those seconds add up. We do not believe this issue was sufficiently addressed in the study.

## **III. Impacts to humans and wildlife**

- A. A recent article in the Los Angeles Times cites the impacts from light pollution on residents and wildlife. In the article, the journalists reflects that animals cannot pull down the blinds to light pollution. (see attached <https://www.latimes.com/science/story/2022-09-20/how-an-effort-to-reduce-fossil-fuel-use-led-to-another-environmental-problem-light-pollution> )
  1. UCLA Urban Ecologist, Travis Longcore, PhD states, “There are many, many species who don’t go out and forage during the full moon because it’s too bright and they know they’re going to be vulnerable to predators,”
  2. The articles states, “According to the National Audubon Society, 80% of North American migratory bird species fly at night, and they’re confounded by city lights.”
  3. Further there are impacts on humans as well, “Humans, too, are vulnerable to light pollution. Artificial light blocks the production of melatonin, a hormone that regulates sleep cycles, and disrupted sleep cycles have been linked to an array of health problems. The American Medical Assn. [warned](#) in 2016 that high-intensity, blue-rich LED lights were “associated with reduced sleep times, dissatisfaction with sleep



quality, excessive sleepiness, impaired daytime functioning, and obesity.”

- B. We are concerned that there are cumulative impacts from this project which have not been fully addressed including light pollution which will impact the poorest residents and our communities of color who often live closest to transportation corridors. There will also be cumulative impacts to wildlife including migratory wildlife. This project will add to light pollution as will the recently approved bus station LED's.
- C. The Biological report is inadequate in addressing the impacts to wildlife. It suggests there could be impacts near the Los Angeles River but fails to even visit the site to see what is there. Additionally, it appears there could be impacts to migratory wildlife that uses these bodies of water on their migrations. It does not study the impact to Hollenbeck Park in Boyle Heights which appears to be near FF-10 and FF-11. At this park, egrets and other water fowl use the park as a stopping ground. FF-06 and FF-07 is located in a particularly sensitive area, between Elysian park, Egret Park, an area of the Los Angeles River that indeed has vegetation near the Los Angeles River Greenway Trail, Confluence Park, below Los Angeles River Center and Gardens. We are concerned that impacts and mitigation to wildlife in these areas and throughout the city were not fully addressed including impacts to birds and bats.

#### **IV. Corruption**

- A. In the City of Los Angeles we have faced corruption amongst politicians and staff. Billboard companies and commercial digital billboards have also been a problem. We are concerned that this project presents more opportunity for corruption within our city. See the attached articles regarding this.
- B. According to the indictment of Huizar, the approvals of the sign district for The Reef (Council File 16-1058-S2) and of the redevelopment of the billboard-fronted Luxe Hotel (Council File 17-1009-S2) were allegedly tainted by illegal developer-funded kickbacks to Huizar as chair of the PLUM Committee. The alleged bribery took the form of free trips, concert tickets, nepotism, and campaign contributions.

#### **V. Impacts to Historical Resources**

- A. Visual Impacts to Fourth Street Bridge. We are concerned about the visual impacts to this historic bridge. A look at the location of the sign NFF-21 reveals no urgent need for signage except to obtain advertising dollars. This sign is not needed for safety. It is not replacing anything. It should be removed from consideration.
- B. NFF-13 and NFF-16 are likewise not replacing anything but will have visual impacts to historical resources, Little Tokyo Historic Village and Japanese Village Plaza. The 30 foot structures would have a significant impact on the communities and the large senior populations. They could also impact senior housing nearby.

C. NFF-2 will have significant visual impacts to the Spring Street bridge. Again, there is no need for signage at this location as none exists now. This is just another opportunity for revenue at the cost of a beautiful historic view that will be greatly diminished by a 30 foot sign.

**VI. Disproportionate Impacts to Communities of Color and Low Income Communities**

We are concerned that this project will have disproportionate impacts to lower income communities and communities of color. Metro properties, freeways and public transportation is more often in these communities. Therefore these communities will have more of these unsightly signs with their light pollution and traffic safety impacts. Additionally, there is housing located near to some of these signs. The residents living nearby will have their health impacted by increased pollution from traffic pausing to read the signs, the light pollution and increased traffic safety risks.

Thank you for the opportunity to comment.

Sincerely,

A handwritten signature in black ink, appearing to read 'Charles Blumsack', written in a cursive style.

Charles Blumsack

President

Historic Highland Park Neighborhood Council

# **Compendium of Recent Research Studies on Distraction from Commercial Electronic Variable Message Signs (CEVMS)**

**Prepared by  
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President, The Veridian Group, Inc.  
Berkeley, California**



**February 2018**

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## Background

This is the second in a series of brief updates based upon this author's 2009 report for AASHTO through NCHRP Project 20-7/256,<sup>1</sup> which was a comprehensive and critical review of research that had been undertaken, and guidelines that had been developed up to that time that addressed the potential consequences for driver distraction from Commercial Electronic Variable Message Signs (CEVMS) along the roadside.

We critically reviewed all of the research papers (more than 40) that had been published or presented within the prior 30 years. These papers represented the work of academic, industry, and government researchers in many countries (including, but not limited to: Sweden, Denmark, Israel, Canada, US, England, and Australia), and which followed many different research protocols. Whereas earlier studies (primarily those from the 1990s and prior) often suffered from limitations in equipment, methodology, or statistical rigor, leaving their conclusions open to question and controversy, those performed in the more recent past were generally more robust, and tended to reach similar conclusions to each other.

The previous update was done in June, 2013 and presented at a joint meeting of AASHTO's traffic engineering and highway safety subcommittees. The new material in this update includes nine studies in five countries.

Broadly summarized, the more recent studies have tended to find that outdoor advertising signs, particularly CEVMS, attract drivers' attention, and that more dramatic and salient signs attract longer and more frequent glances. This attention is often captured through a "bottom up" physiological process, in which the driver attends to the sign unintentionally and unconsciously, with the eyes captured involuntarily by the sign's changing imagery, brightness, conspicuity, and/or movement.

Several of the reported studies suggested that the distraction caused by outdoor advertising signs could be tolerated by experienced drivers and when attentional or cognitive demands of the driving task were low, but that the risk increased when such signs competed for the driver's visual attention with more demanding road, traffic, and weather conditions, when travel speeds were higher, or when an unanticipated event or action (such as a sudden lane change or hard braking by a lead vehicle) occurred to which the driver had to respond quickly and correctly.

In addition, the more recent research continues to show that the drivers most susceptible to unsafe levels of distraction from roadside billboards are the young (who are more prone to distraction and less adept at emergency vehicle response) and the elderly (who have more difficulty with rapidly shifting attention, poorer night vision and glare susceptibility, and slower mental processing time). As will be seen in this Compendium, these concerns are heightened today, with our elderly driver population growing quickly, traffic

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<sup>1</sup> Wachtel, J. (2009). "Safety Impacts of the Emerging Digital Display Technology for Outdoor Advertising Signs: Final Report. NCHRP Report 20-7/256. Available at: [http://rightofway.transportation.org/Documents/NCHRP%20Reports/20-7\(256\)%20digital%20outdoor%20advertising\\_aashto.pdf](http://rightofway.transportation.org/Documents/NCHRP%20Reports/20-7(256)%20digital%20outdoor%20advertising_aashto.pdf)

increasingly dense, more roads under maintenance or repair (construction and work zones create added risks), and larger, brighter digital and video roadside advertising signs competing for the driver's attention.

Finally, the most recent epidemiological studies (dating from 2014 and 2015) have begun to demonstrate what has long been suspected but not proven – that roadside billboards are associated with increases in crash rates where such billboards are located.

The research and guidelines reviewed in our 2009 report set the stage for the 21 research articles and guidelines that are reviewed and summarized in this compendium.

**While employing a broad array of approaches and methodologies, the common theme clearly indicates that the more that commercial digital signs succeed in attracting the attention of motorists that render them a worthwhile investment for owners and advertisers, the more they represent a threat to safety along our busiest streets and highways, where these signs tend to be located.**

The long awaited study by the Federal Highway Administration (FHWA), announced on the agency's website on December 30, 2014, is an outlier in this group of recent studies (except for those sponsored by the outdoor advertising industry<sup>2</sup>), in that it found no relationship

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<sup>2</sup> In 2007, two studies sponsored by the outdoor advertising industry (the Outdoor Advertising Association of America [OAAA] and its research arm, the Foundation for Outdoor Advertising Research and Education [FOARE]) were submitted through the peer review process to the Transportation Research Board of The National Academies. Both reports, one a human factors study by the Virginia Tech Transportation Institute (VTTI), and the other an epidemiological study by Tantala and Tantala, received overall negative reviews from peer reviewers, and were therefore rejected by TRB both for presentation and publication. Although Virginia Tech has not performed subsequent work in this field, Tantala and Tantala have continued to perform research under the sponsorship of OAAA/FOARE. However, for whatever reasons, FOARE and OAAA have not made the subsequent studies available to the public, so they could not be addressed in this Compendium of research.

The Tantala and Tantala 2007 study was an epidemiological analyses of crash rates, but the authors established data collection parameters that led them to exclude from examination the very driver cohorts (older drivers) and road locations (interchange areas) known to be at greatest risk for distraction. Subsequent comments from the senior author of these studies, to the effect that their subsequent studies follow the same basic methodology as the one performed in 2007 (with the exception of a more robust statistical technique to analyze the data), remains a cause for concern because of these methodological biases. The other industry study released by FOARE in 2007, the human factors analysis performed by VTTI, actually found that digital signs were associated with more long-duration glances away from the forward roadway than other types of signs, and further found that the problem was considerably worse at night. However, the authors edited their final report to make it seem as if these adverse consequences did not exist, and their industry sponsors terminated the nighttime research after the pilot data had been collected and reviewed. At that time, many experts considered an "eyes-off-road" duration of two seconds or longer to be the threshold for a substantially higher level of crash risk, and the Virginia Tech team actually found a number of instances in which digital signs caused participating drivers to take their eyes off the road for two and three seconds or longer, whereas the other test conditions (areas with traditional billboards and roadway sections devoid of billboards) did not produce this result to the same extent.

between digital billboards and adverse driver scanning behavior. The FHWA study, however, has been severely criticized for faulty methods and analyses in a peer-reviewed critique by the present author<sup>3</sup>. The FHWA study remains available on the agency's website, but has never been formally published.

It has been shown that road environments cluttered with driving-irrelevant material (often called visual complexity) make it difficult to extract critical information necessary for safe driving in a timely manner, a particular problem for older drivers. In addition, with the growing proliferation of CEVMS, ever-newer technology that renders them more compelling, the expansion of on-premise signs using this technology, and several States considering the use of such signs within the right-of-way, it was deemed appropriate to provide an up-to-date review of the most recent research and guidelines.

The next section of this report provides a brief summary of each of the studies. The following section, the Compendium itself, provides further details about each study, including its sponsorship, research protocol, strengths and weaknesses, and source identification. This document concludes with a complete list of references as cited.

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<sup>3</sup> Wachtel, Jerry (2015). "A Peer-Reviewed Critique of the Federal Highway Administration (FHWA) Report Titled: "Driver Visual Behavior in the Presence of Commercial Electronic Variable Message Signs (CEVMS)."  
Available at:  
<http://nebula.wsimg.com/722c5bb9d76d4b10b6d7add54d962329?AccessKeyId=388DC3CA49BF0BEF098B&disposition=0&alloworigin=1>

## Summary of Findings

This section summarizes the major findings of each of the 22 studies discussed in the Compendium. Key conclusions are highlighted in **bold**. The subsequent section of this report, the Compendium itself, provides additional detail about each study, and information about how to access the study, where available.

The studies are cited here, and in the Compendium, in generally chronological order.

### ***Chan, et al., 2008 – USA, Amherst, MA***

The researchers compared susceptibility to distraction from sources inside the vehicle (e.g. phone dialing, map reading) to those outside the vehicle (e.g. billboards) for both young novice drivers and experienced drivers. As predicted, for the in-vehicle distractors, the young drivers looked away from the roadway for extended periods (2 seconds or longer) more than twice as often as the experienced drivers. Surprisingly, however, results showed that: (a) external distractors were even more distracting, and (b) the experienced drivers were just as distracted as the newly-licensed drivers on this critical measure of distraction when they performed the outside-the-vehicle tasks. The authors had assumed that experienced drivers would exercise the same degree of caution with the external distractors as they did with the internal ones. Instead, “the experienced drivers showed little concern for the effect that diverting their attention to the side of the roadway might have had on their ability to perceive potential risks immediately in front.” In some 81% of the external tasks, older drivers glanced for longer than 2s away from the forward roadway. The authors concluded by saying: **“...we think that our drivers engaged in the external search task were truly distracted with potentially serious consequences.”**

### ***Young, et al., 2009 - England***

In this driving simulator study, participants drove rural, urban, and highway routes in the presence and absence of roadside billboards, while their driving performance was measured. Billboards had a detrimental effect on lateral control, and appeared to increase crash risk. Longitudinal control was not affected. The most striking effects were found for driver attention. Driver mental workload (using the NASA developed TLX scale) significantly increased in the presence of billboards. On rural roads and motorways, results showed that billboards were consciously attended to at the cost of more relevant road signs. The authors reached a **“persuasive overall conclusion that advertising has adverse effects on driving performance and driver attention.** Whilst there are sometimes conflicts of interest at Local Authority level when authorizing billboards (since Councils often take a share of the profit from roadside advertising), these data could and should be used to redress the balance in favour of road safety.”

### ***Backer-Grøndahl, & Sagberg, 2009 - Norway***

The authors asked drivers who had actually been involved in a crash to identify, from a list, what they believed were the causes of distraction for that crash. (Cell phone use was excluded). The most frequently reported sources of distraction were: (1)



conversations with passengers, and (2) attending to children in the back seat. However, **when the researchers applied the statistical method known as quasi-induced exposure, they found that distractions with the “highest relative risk” were: (1) billboards outside the vehicle, and, (2) searching for addresses. The authors note that both of the highest risk distractors were *visual* distractions, rather than physical, auditory, or cognitive ones.**

### ***Chattington, et al., 2009 - England***

The researchers found “significant effects on both drivers’ visual behavior and driving performance” in the presence of both static and video billboards. As expected, the video signs were seen as more potent distractors than similarly placed static signs. The authors state that their results “support and extend (the findings of) other studies of driver distraction by advertising,” citing studies by Crundall, et al, and of Young and Mahfoud (both of which were extensively reviewed in the Wachtel 2009 report for AASHTO). The study showed that **several aspects of driving performance were adversely affected by both video and static billboards, with the video signs generally more harmful to such performance than the static signs. The authors list these effects as: speed control, braking, and lane position maintenance.**

### ***Horberry, et al., 2009 - Australia***

Road authorities may be justified in using the best research information available, even if incomplete, coupled with engineering judgment, for the development of billboard guidelines. **The authors recommend that their client (Queensland, Australia) adopt advertising restrictions at known areas of high driver workload, including “locations with high accident rates, lane merges, curves/bends, hills and road/works/abnormal traffic flows.”** (They state that) “this is broadly in line with Wachtel who recommended a restriction of advertisements at times when driver decision, action points and cognitive demand are greatest – such as at freeway exits/entrances, lane reductions, merges and curves. Although useful for all road users, such restrictions would be of specific benefit to older drivers.”

### ***Gitelman, et al., 2010 - Israel***

The authors studied crashes at two highway locations along the same heavily traveled freeway – a “treatment” section in which previously visible billboards were covered as part of a trial period, and a “control” section in which the billboards remained visible. At the control sites, crashes remained essentially the same throughout the 3-year study period; at the treatment sites, crashes declined dramatically after the billboards were covered. The results were similar for injury and fatal crashes. After adjusting for traffic volume, **crashes were reduced at the treatment sites (where billboards had been covered) by the following percentages: all crashes by 60%; injury/fatal crashes by 39%; property damage crashes by 72%.**

### ***Bendak & Al-Saleh, 2010 - Saudi Arabia***

The authors used a driving simulator in which test subjects drove on two similar roads, one with advertising signs and one without. Twelve male volunteers, ages 23-28,

participated in the study. Driver opinions about billboards were also sought using a simple questionnaire distributed to male drivers at random in the city of Riyadh, Saudi Arabia. 160 questionnaires were returned. Results of the simulator study showed that **the driving speed of participants was not affected by the presence of advertising signs. However, two of the five indicators were statistically significant. Both “drifting unnecessarily from (the) lane” and “recklessly crossing dangerous intersections” were significantly more prevalent in the presence of billboards.** Although not reaching statistical significance, each of the other three measures, tailgating, speeding, and failure to signal, were all worse in the presence of billboards. Half of the respondents to the questionnaire indicated that they had been distracted by a billboard, and 22% indicated that they had been put in a dangerous situation due to distraction from billboards.

### ***Milloy & Caird, 2011 - Canada***

This was a driving simulator study that looked at distraction effects of a video billboard and a wind turbine. **The results demonstrated a *causal* (italics original) relationship between the presence of a video billboard and collisions with, and delays in responding to, the lead vehicle.**

### ***Edquist, et al., 2011 - Australia***

**“The finding that the presence of billboards increases time to detect changes is an important one.” Billboards can automatically attract attention when drivers are engaged in other tasks, delaying their responses to other aspects in the environment. The effect of billboards was particularly strong in scenes where response times are already lengthened by high levels of visual clutter.** This is of particular concern because roads with high levels of clutter are the very kind of busy, commercial, high traffic environments where billboards are most often erected.”

The results are consistent with growing evidence suggesting that billboards impair aspects of driving performance such as visual search and the detection of hazards, and therefore should be more precisely regulated.

### ***Dukic, et al., 2012 - Sweden***

In this on-road, instrumented vehicle study, **drivers had a significantly longer dwell time (time looking at the billboards), a greater number of fixations, and a longer maximum fixation duration when driving past digital billboards compared to other signs along the same road sections.**

### ***Perez, et al., 2012 – USA, Washington, DC***

The authors of this Federal Highway Administration (FHWA) sponsored study used an instrumented vehicle that recorded volunteer drivers’ eye glances as they drove along pre-determined routes in Reading, Pennsylvania and Richmond, Virginia. The routes included digital as well as static billboards, undefined on-premise signs, and areas free of commercial signage. The routes were driven during daylight and at night, and the report found that **digital billboards “were not associated with ‘unacceptably long glances away from the road’.”** As noted above, however, the draft report of this

study was strongly criticized by the agency's selected peer reviewers, particularly with regard to the efficacy of the obtained eye glance data. Indeed, the participants in the study did gaze more often to digital billboards than to other signs, in some cases more than twice as much. (For example 71% vs. 29% at night in Richmond). As a result of the critical peer reviews, the authors took 33 months to revise the study, which, although dated September 2012, was released on the agency's website on December 30, 2013. This revised report, in turn, was reviewed by the present author, whose critical report was reviewed and agreed-to by 14 independent expert peer reviewers. To our knowledge, the revised FHWA report was not subjected to peer review by the agency prior to its issuance on the agency website, and it has never been given an official agency report number, putting it in a state of uncertainty with regard to its publication.

### ***Divekar, et al., 2013 – USA, Amherst, MA***

Experienced drivers are far less likely to be distracted by inside-the-vehicle tasks (e.g. cell phone, map display, entertainment system) than novice drivers. However, the researchers were surprised to find that **experienced and novice drivers are at an equal and elevated risk of getting into a crash when they are performing a secondary task outside the vehicle such as looking at billboards**

### ***Roberts, et al., 2013 - Australia***

**The appearance of movement or changes in luminance can involuntarily capture attention, and engaging information can capture attention to the detriment of driving performance, particularly in inexperienced drivers. Where this happens in a driving situation that is also cognitively demanding, the consequences for driving performance are likely to be significant.** Further, if this results in a situation where a driver's eyes are off the forward roadway for 2 seconds or longer, this will further reduce safety. Additionally, road environments cluttered with driving-irrelevant material may make it difficult to extract information that is necessary for safe driving, particularly for older drivers. The studies that have been conducted show convincingly that roadside advertising is distracting and that it may lead to poorer vehicle control.

### ***Herrstedt, et al., 2013 - Denmark***

The authors studied drivers using an instrumented car equipped with an eye-tracking system, a GPS system for registering the vehicle's speed, and a laser scanner for measurement of following distances to other road users. The overall findings of the studies demonstrate that **"advertising signs do affect driver attention to the extent that road safety is compromised."** In 69% of all drives past advertising signs, the driver glanced at least once at the sign; in almost half of all drives, the driver glanced twice or more at the same sign. For 22% of all drives, the total glance duration of successive glances was two (2) seconds or longer. In 18% of all drives, glance durations of one (1) second or longer was recorded. In approximately 25% of all glances, the safety buffer to the vehicle ahead was less than two (2) seconds, and in 20% of the glances, the safety buffer was less than 1.5 seconds. This study has been praised in independent peer review by Dr. Richard Pain, Transportation Research Board Senior Program Officer, retired. Dr. Pain considered this study to be the best designed and

conducted on-road study in this field, the conclusions of which, he believes, were far more valid and robust than those of the FHWA study (discussed above).

### ***Hawkins, et al., 2014 – USA, College Station, TX***

This study, sponsored by the on-premise signage industry, was a statistical (epidemiological) analysis of crash rates in the vicinity of on-premise digital signs that had been first installed in 2006-07. On premise signs differ from billboards in several ways. Per the common meaning of the term, on-premise signs must advertise only a business or service that is available on the property on which the sign is located. Because of that, on-premise signs typically function to identify the business and, as such, they may have little text or imagery other than that required for such identification. On the other hand, they are often closer to the road than billboards are permitted to be, and it is often possible for them to be larger than billboards and to feature motion or the appearance of motion. This study employed an analysis methodology known as *empirical Bayes* (or EB) to look at before-and-after crash data in four states. A total of 135 sign locations and 1,301 control sites were used, and the researchers found **“no evidence the installation of on-premise signs at these locations led to an automatic increase in the number of crashes.”**

### ***Schieber, et al., 2014 – USA, Vermillion, SD***

In this simulator study the authors varied message length (4, 8, or 12 words) on digital billboards that participants drove past at either 25 or 50 MPH. Although there was no decrement in lane keeping or billboard reading performance at the lower speed on straight roads, **“clear evidence of impaired performance became apparent at the higher (50 MPH) driving speed.”** The analysis revealed that, rather than weaving in and out of lane while reading the billboards with longer messages, participants tended to slowly drift away from the lane center and then execute a large amplitude corrective steering input about eight (8) seconds *after* passing the billboard. Eye gaze analysis showed that information processing overload began to emerge with a message length of eight (8) words, and was clearly present with twelve (12) word messages under the 50 MPH condition.

### ***Gitelman, et al., 2014 - Israel***

In 2014, these authors had the opportunity to add an additional data set to that in their 2010 study (discussed above), and to reanalyze the data from the original study. This was because the road authorities issued a decision to reauthorize the display of billboards that they had previously had ordered covered. In other words, the authors had the opportunity to study traffic crashes on a single roadway when billboards were: (a) visible, then (b) covered, then (c) visible again. The 2010 study examined conditions (a) and (b), and the 2014 supplement added condition (c) and a reanalysis of (a) and (b). They found that: **“The results support and strengthen the previous findings.”** **Removal/covering of the billboards from the highway (condition [b]) was associated with a 30-40% reduction in injury crashes from condition (a) according to two different databases, whereas the reintroduction/uncovering of the billboards (condition [c]) was associated with a 40-50% or 18-45% increase in such crashes, depending on the database cited. The trends were similar and**

consistent across damage-only, injury, and total accidents as well as nighttime vs. daytime injury accidents.

### ***Sisiopiku, et al., 2015 – USA, AL, FL***

The authors analyzed crashes from eight (8) digital billboard locations in Alabama and ten (10) in Florida. All sites were on high speed, limited access highways. A total of 377 crashes in Florida and 77 in Alabama were used in the analysis. Actual traffic collision reports were used since the authors discovered numerous errors in coding in the summary crash databases that they initially examined. Although the data set was too small to employ statistical analyses, the authors found that **“the presence of digital billboards increased the overall crash rates in areas of billboard influence compared to control areas downstream of the digital billboard locations. The increase was 25% in Florida and 29% in Alabama.”** The predominant crash types that were overrepresented at billboard locations were rear-end and sideswipe collisions, both typical of driver distraction.

### ***Rempel, et al., 2015 - Canada***

These authors, working on behalf of the Transport Association of Canada, developed a set of guidelines for the control of digital and projected advertising signs. The resultant guidelines are based on a comprehensive literature review, a survey of Canadian governmental jurisdictions, a review of existing sign regulations, interviews with international Governmental agencies, discussions with sign industry representatives, and the application of human factors and traffic engineering principles. **The key principle documented in the Guidelines is that they “provide recommendations designed to control (digital billboards) such that they emulate static advertising signs (italics added), and therefore result in a similar distracting and road safety effect as static advertisements.”**

### ***Samsa & Phillips, 2015 - Australia***

These authors, working on behalf of the Outdoor Media Association of Australia, studied 29 participants, ages 25-54 in an instrumented vehicle. The participants were fitted with “eye tracking glasses” and their eye fixations and driving performance was assessed as they drove a 14.6 km route in Brisbane, Queensland. **The route took them past a “number” of advertising signs, including static, digital, and on-premise signs. The results showed that fixation durations “were well below” 0.75 seconds, and that there were no significant differences in vehicle headways between the three types of signage. One statistically significant finding was that lateral deviation was poorer when billboards were present.** (Note that, at present, only an Abstract of this industry-sponsored study is available).

### ***Belyusar, et al., 2016 – USA, Cambridge, MA***

In this on-road study, data was collected from 123 subjects, nearly equally divided between males (63) and females (60) and between young (age 20-29, N = 63) and older (age 60-69, N = 60). These volunteers drove an instrumented vehicle under normal driving conditions (with no specific tasks to perform) past a digital billboard on a

posted 65 MPH roadway with four travel lanes in each direction. Data was collected during late morning and early afternoon to avoid commuter traffic. The authors state: **“In contrast to the recent FHWA report (Perez, et al., 2012), the findings revealed statistically significant changes in total number of glances and, depending upon the direction of travel, moderate-to-long duration glances in the direction of the billboard.”** Older drivers were thought to be particularly affected. The authors also found that: **“Drivers glanced more at the time of a switch to a new advertisement display than during a comparable section of roadway when the billboard was simply visible and stable.”** Given typical billboard dwell (cycle) times of six (6) or eight (8) seconds, these findings add to the argument the dwell times for such signs should be considerably longer.

### ***Mollu, 2018 - Belgium***

Per a 2015 European Commission report, distraction accounts for 10-30% of all European road accidents. Although there is no consistent definition of distraction, most definitions describe a *diversion* of attention away from the driving task, and *toward a competing activity* inside or outside the vehicle. This diversion of attention may be visual and/or cognitive. The author and his colleagues sought to study whether the glance behavior of road users was influenced by advertising signs, whether such signs lead to changes in driving behavior and whether there were notable effects on road safety as a result. Thirty-five test subjects (age range 20-69; 54% male) completed the protocol and drove a simulator past LED billboards with 3, 6, and 15-second dwell times, and at 41 and 65-meter distances from pedestrian crossings. The signs were placed in a road segment with a retail zone and in one transitioning to a built-up area. All other characteristics of the sign (size, placement, illumination, etc., were held constant. At the shortest display times and the closest distance to the pedestrian crossing the study showed significantly higher mental demands and lower performance. The longer the message display time, the fewer glances were made to the sign. The signs also contributed to higher approach speeds to pedestrian crossings and delayed slowing upon approach to the crossing. There was also an indication, although not statistically significant, of increased swerving behavior (change in lateral position) in the presence of the billboards.

## ***Compendium of Recent Research Studies on Commercial Electronic Variable Message Signs (CEVMS)***

### **Key to Codes Used in Tables:**

#### **\*Type of Study:**

- N = on-road, naturalistic
- Q = on-road, quasi-naturalistic
- C = on-road, controlled
- S = lab, simulator
- L = lab, other
- E = epidemiological, crash data
- R = review of other work
- CR = critical review of other work
- D = discussion /consultation with experts
- G = guidelines or regulations development
- QI = questionnaires, interviews, surveys, focus groups, etc.

#### **\*\*Type of Signs Studied:**

- O = On-premise
- C = Conventional billboard
- D = Digital billboard
- V = Sign contains video or animation
- H = Official highway sign
- U = Unknown

Date 1 <sup>st</sup> published/presented	2008
Location	U.S. (Massachusetts)
Author(s)	Chan, E., Pradhan, AK, Knodler, MA, Jr., Pollatsek, A. & Fisher, DL
Title	Empirical Evaluation on a Driving Simulator of the Effect of Distractions Inside and Outside the Vehicle on Drivers' Eye Behaviors
Affiliation	
Forum	TRB - presentation and CD ROM
Peer Reviewed?	Yes
Sponsor/funding source	National Science Foundation; National Highway Traffic Safety Administration (NHTSA)
Type of Study*	S
Type of Signs Studied**	C (simulated)
Brief Description of Method	Young, novice drivers (age 16-17) are at greatly elevated risk of crashing, and it is believed that distraction plays a large role in such crashes. More experienced, older teen drivers (age 18-19) have also been shown to look away from the forward roadway for extended periods of time. This simulator study compared such extended, off-roadway glance durations of newly licensed drivers to those of older, experienced drivers, using eye movement recordings as participants drove along a simulated roadway and engaged in distracting tasks both inside and outside the vehicle.
Summary of Findings	The researchers compared the average maximum duration of an <i>episode</i> , (the maximum time that drivers spent continuously looking away from the forward roadway). For the in-vehicle distractors, the average was 1.63s for the experienced drivers, and 2.76s for the younger drivers. Another measure, the percentage of scenarios in which the maximum duration of an episode was greater than 2s, yielded similar findings. The results were statistically significant between the two groups. As predicted for in-vehicle distractors, the young drivers looked away from the roadway for extended periods (2s or longer) more than twice as often as the experienced drivers while engaged in inside-the-vehicle distractors (such as phone dialing, map reading, and CD searching). Surprisingly, however, results showed that: (a) external distractors were even more distracting, and (b) there was no difference between newly-licensed and experienced drivers on this critical measure of distraction when the drivers performed outside-the-vehicle tasks, specifically, searching for a target letter in a 5x5 grid representative of a billboard. The authors had assumed that experienced drivers would exercise the same degree of caution with the external distractors as they did with the internal ones. Instead, "the experienced drivers showed little concern for the effect that diverting their attention to the side of the roadway might have had on their ability to perceive potential risks immediately in front. In fact, in 81% of the external tasks, older drivers glanced for longer than 2s away from the forward roadway. The authors conclude: "...we think that our drivers engaged in the external search task were truly distracted with potential serious consequences."
Strengths	The study is the first to directly compare the susceptibility to distraction from internal and external tasks between newly licensed and experienced drivers.
Weaknesses/Limitations	Older drivers were not included in this study. The representativeness of the outside-the-vehicle task is questionable.
Availability/Accessibility	TRB 2008 Annual Meeting CD-ROM



Date 1 <sup>st</sup> published/presented	2009
Location	UK (England, London)
Author(s)	Young, MS, Mahfoud, JM, Stanton, N. Salmon, PM, Jenkins, DP & Walker, GH.
Title	“Conflicts of Interest: The implications of roadside advertising for driver attention.”
Affiliation	Brunel University, West London, England
Forum	Transportation Research Part F: Traffic Psychology and Behaviour, Vol. 12(5), September 2009, 381-388.
Peer Reviewed?	Yes
Sponsor/funding source	Insurance company – The Rees Jeffreys Road Fund
Type of Study*	S
Type of Signs Studied**	C, H
Brief Description of Method	The study was conducted in the University’s driving simulator. 48 drivers drove urban, rural, and motorway routes in the presence and absence of billboards. Dependent variables included measures of speed and lateral control, and driver attention (mental workload, eye movements, and recall of signs and billboards).
Summary of Findings	The presence of billboards had a detrimental effect on lateral control, and appeared to increase crash risk. Longitudinal control was not affected. More striking effects were found for driver attention. Driver mental workload significantly increased in the presence of billboards. On rural roads and motorways, results showed that billboards were consciously attended to at the cost of more relevant road signs. “We must once again emphasize the persuasive overall conclusion that advertising has adverse effects on driving performance and driver attention. Whilst there are sometimes conflicts of interest at Local Authority level when authorizing billboards (since Councils often take a share of the profit from roadside advertising), these data could and should be used to redress the balance in favour of road safety.”
Strengths	A fully interactive high fidelity simulator was used. The use of the NASA-TLX instrument for measuring subjective mental workload was a useful tool that is used too infrequently in studies of driver performance. All participants experienced identical road and sign condition the only manipulation being the presence or absence of billboards.
Weaknesses/Limitations	The sample of participants did not include either older or younger drivers – the age groups thought to be at greatest risk for adverse consequences of billboard distraction. Measures of lateral and longitudinal variability were constrained by the study design and were not fully representative of the measures of these variables used most commonly in the US.
Availability/Accessibility	Journal is available online.

Date 1 <sup>st</sup> published/presented	2009
Location	Norway
Author(s) Title; Affiliation	Backer-Grøndahl, A., & Sagberg, F. "Relative crash involvement risk associated with different sources of driver distraction." Institute of Transport Economics, Norway
Forum	First International Conference on Driver Distraction and Inattention
Peer Reviewed?	Yes
Sponsor/funding source	Unknown
Type of Study*	E, QI
Type of Signs Studied**	C
Brief description of method	Used web- and paper-based questionnaire to ask 4300+ drivers who had been in a crash to identify from a list of possible choices the cause of their crash. Separated those at fault from those not at fault. Relative crash risk of each factor was estimated using the quasi-induced exposure method.
Summary of Findings	The most <i>frequent</i> sources of distraction were: (1) conversations with passengers, and (2) attending to children in the back seat. When the statistical method was applied to the data, it was found that distractions with the " <i>highest relative risk</i> " were: (1) billboards outside the vehicle, and, (2) searching for addresses. The authors note that both of the highest risk distractors were <i>visual</i> distractions, vs. physical, auditory, or cognitive.
Strengths	Authors controlled for possible confounding variables (such as age, gender, driving experience [years] and annual mileage driven) using logistical regression with culpability as the dependent variable.
Weaknesses/Limitations	Some researchers question the viability of the quasi-induced exposure method; cell phone use was (intentionally) excluded from the questionnaire. (It likely would have proven to be the highest risk factor). Confidence intervals were quite large.
Availability/Accessibility	Presented at large international conference; published in conference proceedings.

Date 1 <sup>st</sup> published/presented	2009
Location	UK - England
Author(s)	Chattington, M., Reed, N., Basacik, D., Flint, A., & Parkes, A.
Title	"Investigating Driver Distraction: The Effects of Video and Static Advertising:
Affiliation	Transport Research Laboratory
Forum	Report
Peer Reviewed?	Yes
Sponsor/funding source	Transport for London
Type of Study*	S
Type of Signs Studied**	C, V
Brief Description of Method	Used the high fidelity TRL driving simulator, with a specifically designed urban/suburban database typical of the area around London. 48 participants drove 4 different routes, each of which required about 15 minutes. Participants did not know the purpose of the study. Their eye movements were unobtrusively recorded. Roadside advertising was designed to vary by: location (placement within the scene); type (static or video); and exposure duration (at 30 MPH, drivers could see at least 50% of the advertisement for either 2, 4, or 6+ seconds. Video ads ran in a 6-second loop.
Summary of Findings	<p>"The report has found significant effects on both drivers' visual behavior and driving performance when static and video adverts are present and that the video adverts seem more potent distractors than similarly placed static adverts. The results support and extend (the findings of) other studies of driver distraction by advertising." (Here, the authors cite the work of Crundall, et al, and of Young and Mahfoud, both of which were extensively reviewed in the Wachtel 2009 report for AASHTO).</p> <p>The study showed that several different aspects of driving performance were adversely affected both video and static billboards, with the video signs generally more harmful to such performance than the static signs. The authors describe these effects as being "fundamental to the safe control of the vehicle." The effects include: speed control, braking, and the variability of each of these measures, as well as drivers showing that they are "less able to maintain a consistent lane position"</p>
Strengths	A very comprehensive and sophisticated simulation study. The researchers went so far as to pre-screen the content of the simulated advertisements to ensure that they were of equivalent interest to the different age groups in their participant population.
Weaknesses/Limitations	It is important to note that this study compared digital video billboards to traditional static billboards (i.e. it did not examine digital billboards with intermittent displays (i.e. those that change their message every 6-8 seconds) that are typical in the U.S. Although the authors state that their participants represented a "wide range of ages," it is not known how well young and old drivers were represented in the study. This is of concern because these two age groups at the ends of the driving population distribution are known to have the greatest degree of difficulty with attention and distraction.
Availability/Accessibility	TRL Report Number RPN256.

Date 1 <sup>st</sup> published/presented	2009
Location	Australia, Queensland
Author(s) Title Affiliation	Horberry, T., Regan, MA, & Edquist, J. Driver Distraction from Roadside Advertising: The clash of road safety evidence, highway authority guidelines, and commercial advertising pressure. University of Queensland (Australia), INRETS (France), Monash University (Australia).
Forum	Unknown
Peer Reviewed?	Yes
Sponsor/funding source	Swedish National Road and Transport Institute, VTI
Type of Study*	CR, D, G
Type of Signs Studied**	C, D
Brief Description of Method	Critical review of the research, worldwide, as well as existing guidelines and regulations.
Summary of Findings	“Road authorities around the world may ... be justified in using the best research information available (albeit incomplete) coupled with engineering judgment for the development of 3 <sup>rd</sup> party advertising guidelines.” The authors recommend that Main Roads Queensland adopt advertising restrictions at known areas of high driver workload including “locations with high accident rates, non-junction related lane merges, curves/bends, hills and road/works/abnormal traffic flows. This is broadly in line with Wachtel who recommended a restriction of advertisements at times when driver decision, action points and cognitive demand are greatest – such as at freeway exits/entrances, lane reductions, merges and curves. Although useful for all road users, such restrictions would be of specific benefit to older drivers.” The authors correctly point out the flaw in arguments that suggest that guidance or regulatory controls are premature because there is a lack of data showing a causal relationship between billboards and accidents
Strengths	The study examined in detail the existing (2002) guidelines that seek to “minimize the possibility for 3 <sup>rd</sup> party roadside advertisements to distract drivers...” with an intent toward developing upgraded guidelines.
Weaknesses/Limitations	The review of current guidelines, worldwide, is somewhat superficial.
Availability/Accessibility	<a href="https://document.chalmers.se/download?docid=653291678">https://document.chalmers.se/download?docid=653291678</a>

Date 1 <sup>st</sup> published/presented	2010
Location	Israel (Tel Aviv)
Author(s) Title Affiliation	Gitelman, V., Zaidel, D., & Doveh, E. "Influence of Billboards on Driving Behavior and Road Safety,"
Forum	Presented at: Fifth International Conference on Traffic and Transportation Psychology (2012); and at Annual Meeting of Transportation Research Board of the National Academies (2013)
Peer Reviewed?	Yes
Sponsor/funding source	Israel National Roads Authority
Type of Study*	E
Study Design	Quasi-experimental: Before and after crash data with controls – Crash data with DBBs present (2006-7) and absent (2008), with and without signs that were covered. Dependent measure – crashes and injuries. Control variable – traffic volume. Study sites – 8 treatment and 6 control.
Type of Signs Studied**	C
Brief Description of Method	Because of complaints, Israel's Supreme Court ruled that a series of billboards on an urban freeway near Tel Aviv had to be removed for 1 year while an evaluation took place. At control sites, the billboards remained visible throughout the study period. At treatment sites, billboards were visible in the "before" period (2006-7), and were covered during the "after" period (2008). Crashes were recorded and categorized (property damage only, injury or fatality) under four conditions: (a) at treatment sites while signs were visible; (b) at treatment sites after signs were covered; (c) at control sites where signs were visible; and (d) at the same control sites while signs were still visible but signs were covered at the treatment sites.
Summary of Findings	At control sites, crashes remained essentially the same throughout the 3-year study period; at the treatment sites, crashes declined dramatically after the billboards were covered. The results were the same for injury and fatal crashes. After adjusting for traffic volume, crashes were reduced at the treatment sites (where billboards were visible in the "before" period but covered during the "after" period) by the following percentages: all crashes by 60%; injury/fatal crashes by 39%; property damage crashes by 72%.
Strengths	For a field study, this used a well-controlled research design. Before-and-after measures were obtained both for sites where the billboards were covered during the study, and for the sites where the billboards remained visible during this same time period. Road sections were in close proximity, on the same highway, ensuring that traffic speeds and volumes, as well as weather conditions, law enforcement activity, etc. were comparable.
Weaknesses/Limitations	There might have been differences in certain roadway characteristics between the treatment and control sites (e.g. curves, merges, etc.) that were not identified.
Availability/Accessibility	Findings available as PowerPoint from either conference; original study is in Hebrew only; English translation not yet available.

Date 1 <sup>st</sup> published/presented	2010
Location	Saudi Arabia
Author(s)	Bendak, S., & Al-Saleh, K.
Title	"The Role of Roadside Advertising Signs in Distracting Drivers."
Affiliation	King Saud University
Forum	<i>International Journal of Industrial Ergonomics, 40, 233-236.</i>
Peer Reviewed?	Yes
Sponsor/funding source	Research Centre of the College of Engineering, King Saud University
Type of Study*	S, QI
Study Design	
Type of Signs Studied**	O, C, D, V
Brief Description of Method	Twelve male drivers, age 23-28, drove a simulator consisting of two urban roadways, each 9.3-km long, and matched for physical, environmental and traffic characteristics. One road contained advertising signs; the other was devoid of advertisements.
Summary of Findings	The average driving duration was 12.83 minutes for each route showing that the presence of advertising signs did not materially affect driving speed. There were no accidents. Lane placement and position maintenance suffered significantly in the presence of advertising signs. According to the authors: "swinging and drifting from lane in the presence of advertising signs is a strong indication of how such signs distract drivers and affect their performance." A second finding was that "recklessly crossing dangerous intersections" was also significantly and adversely affected by the presence of advertising signs. This finding, according to the authors "indicates the loss of this fine coordination between paying attention and driving. ... This can reasonably attributed... to the longer reaction time needed in the presence of hazards due to being distracted." All three of the other measures: tailgating, "overspeeding," and failure to signal, were poorer in the presence of advertising signs, but these were not statistically significant. In response to the questionnaire, 50% of the 160 respondents said they had been distracted by advertising signs, and 22% reported having been in a dangerous situation at least once due to being distracted by advertising signs.
Strengths	The two simulated routes driven were matched for key characteristics; the differences between them were essentially only in the presence or absence of advertising signs.
Weaknesses/Limitations	No females and no drivers older than 28 were included. "Advertising" signs of many different types were comingled, so it was impossible to identify the effects of any one category of signs, such as billboards. No definition is provided of the behavior identified as "recklessly crossing dangerous intersections." The authors attribute poorer performance in this measure to longer reaction time in the presence of the advertising signs, but there is no indication that they measured this response. The questionnaire completed by 160 respondents was not included in the paper.
Availability/Accessibility	<a href="http://www.elsevier.com/locate/ergon">www.elsevier.com/locate/ergon</a>

Date 1 <sup>st</sup> published/presented	2011
Location	Canada (Calgary, Alberta)
Author(s)	Milloy, SL; and Caird, JK.
Title	“External Driver Distractions: The Effects of Video Billboards and Wind Farms on Driver Performance.”
Affiliation	University of Calgary
Forum	Book chapter
Peer Reviewed?	Yes
Sponsor/funding source	Unspecified
Type of Study*	S
Type of Signs Studied**	V (simulated)
Brief Description of Method	The contribution to driver distraction from in-vehicle technologies such as cell phones, I-Pods, and navigation systems have been studied extensively. But it is external distractions that compose the single largest category of distraction-related crashes. The least is known about such crashes, possibly because the variety of people, objects and events that make up external distractions are very difficult to study in a controlled empirical fashion. In theory, drivers often have spare cognitive capacity that they can allocate toward distractors such as billboards. The question asked here was: what happens when an unlikely but totally plausible emergency event takes place – can the driver “reallocate” his or her attention so as to respond to the event in a timely manner. In this “event-based” scenario, either the driver responds adequately or not. In this simulator study, drivers on a freeway moving at 80 km/h (50 mph) in an industrial environment passed a video billboard at the same time that a lead vehicle suddenly braked hard.
Summary of Findings	The results found a <i>causal</i> (italics original) relationship between the presence of the video billboard and collisions with, and delays in responding to, the lead vehicle. The authors note that the billboards in this study were less able to capture the drivers’ attention than video billboards in the real world because the simulated billboards were not as bright as actual billboards, and because the study was not conducted at night, where the distracting effects were believed to be greater. The implication is that real world safety problems may be more significant than those indicated by the study.
Strengths	A high fidelity, interactive driving simulator with a 150-degree forward field of view was used. All 21 subjects made three drives, and viewed two static and two video billboards in each. The images on the billboards were different in each presentation. A lead vehicle appeared intermittently, and, twice during each presentation, braked suddenly so that the subject had to respond quickly to avoid a collision
Weaknesses/Limitations	Younger and older drivers, those believed to be most susceptible to such distractions, were not included in the study. Learning may have occurred from earlier drives, and subjects may have come to use the appearance of billboards as a visual cue to prepare to brake for the lead vehicle.
Availability/Accessibility	Published in: “Handbook of Driving Simulation for Engineering, Medicine and Psychology.” Edited by: D.L. Fisher, M. Rizzo, J.K. Caird, & J.D. Lee. Boca Raton: CRC Press.

Date 1 <sup>st</sup> published/presented	2011
Location	Australia, Perth
Author(s)	Edquist, J., Horberry, T., Hosking, S. & Johnston, I
Title	“Advertising billboards impair change detection in road scenes”
Affiliation	Monash University Accident Research Centre
Forum	2011 Australasian Road Safety Research, Education & Policing Conference
Peer Reviewed?	Yes
Sponsor/funding source	Unknown
Type of Study*	L
Type of Signs Studied**	C, H
Brief Description of Method	The authors used a “change detection” paradigm to study how billboards affect visual search and situation awareness in road scenes. Change detection time has been shown to correlate with at-fault errors in a simulated driving task. In a controlled experiment, inexperienced (mean age 19.3), older (73.0), and comparison (34.8) drivers searched for changes to road signs and vehicle locations in static photographs of road scenes. The road scenes ranged from suburban main streets to multilane highways to provide varying levels of background clutter. The actual experimental protocol is too complex to include in this summary, but may be found in the original article.
Summary of Findings	“The finding that the presence of billboards increases time to detect changes is an important one. This result lends support to the idea that billboards can automatically attract attention when drivers are engaged in other tasks, delaying their responses to other aspects in the environment. The effect of billboards was particularly strong in scenes where response times are already lengthened by high levels of built or designed clutter. This is particularly concerning, as road scenes with high levels of built and/or designed clutter are just the sort of busy, commercial, high traffic environments where billboards are most often erected.” Participants took longer to detect changes in road scenes that contained advertising billboards. This finding was especially true when the roadway background was more cluttered, when the change was to an official road sign, and for older drivers. The results are consistent with the small but growing body of evidence suggesting that roadside billboards impair aspects of driving performance such as visual search and the detection of hazards, and therefore should be more precisely regulated in order to ensure a safe road system.
Strengths	The change detection task has been shown to be relevant to safe driving performance, but has been underutilized in research. The inclusion of three diverse age cohorts addresses limitations in many other studies.
Weaknesses/Limitations	The study did not include an actual, or simulated driving task; rather a surrogate measure for visual subtasks required during driving. (However, the results are consistent with mounting evidence showing that roadside billboards impair key aspects of driving performance). Horberry, et al., (2009) argue that: “rather than waiting until it can be proven beyond doubt that roadside advertising is responsible for a particular collision, road authorities should regulate billboards to minimize the probability of interference with driving.”
Availability/Accessibility	<a href="http://casr.adelaide.edu.au/rsr/RSR2011/4CPaper%20166%20Edquist.pdf">http://casr.adelaide.edu.au/rsr/RSR2011/4CPaper%20166%20Edquist.pdf</a>



Date 1 <sup>st</sup> published/presented	2012
Location	Sweden (Stockholm)
Author(s) Title Affiliation	Dukic, T., Ahlstrom, C., Patten, C., Kettwich, C., & Kircher, K. "Effects of Electronic Billboards on Driver Distraction." Swedish National Road and Transport Research Institute, and Karlsruhe Institute of Technology
Forum	Journal of Traffic Injury Prevention
Peer Reviewed?	Y
Sponsor/funding source	Swedish Transport Administration
Type of Study*	Q
Type of Signs Studied**	D
Brief Description of Method	The Swedish government allowed 12 digital billboards to be erected along highways near Stockholm for a trial period during which this, and related research was conducted. 41 volunteers drove an instrumented vehicle past 4 of the billboards in both day (N = 20) and night (N = 21) conditions. Eye movements (and other measures) were recorded. "A driver (was) considered to be visually distracted when looking at a billboard continuously for more than two seconds with a single long glance, or if the driver looked away from the road for a 'high percentage of time'." (This is defined in the study based on prior research, but is too complex for inclusion in this brief summary). Dependent measures were eye tracking and driving performance measures.
Summary of Findings	Drivers had a significantly longer dwell time (time looking at the billboards), a greater number of fixations, and a longer maximum fixation duration when driving past a DBB compared to other signs along the same road sections. No differences were found for day-night, or for specific driver performance variables.
Strengths	Excellent review of the relevant literature and explanation of the psycho-physiological processes involved
Weaknesses/Limitations	It is known from other research that younger drivers (e.g. those under age 25) and older drivers (e.g. those over age 65) are more likely to be distracted by roadside stimuli that are irrelevant to the driving task; this study was limited to drivers between the ages of 35 and 55.
Availability/Accessibility	<a href="http://www.tandfonline.com/doi/abs/10.1080/15389588.2012.731546">http://www.tandfonline.com/doi/abs/10.1080/15389588.2012.731546</a>

Date 1 <sup>st</sup> published/presented	2012
Location	USA
Author(s) Title	Perez, WA, Bertola, MA, Kennedy, JF, & Molino, JA "Driver Visual Behavior in the Presence of Commercial Electronic Variable Message Signs (CEVMS)."
Affiliation	SAIC (now Leidos)
Forum	Unnumbered FHWA Report
Peer Reviewed?	N <sup>4</sup>
Sponsor/funding source	Federal Highway Administration
Type of Study*	C
Type of Signs Studied**	O, C, D, H
Brief Description of Method	FHWA contractor used instrumented vehicle with on-board eye glance data recording as participant drivers drove along predetermined routes in Reading, PA and Richmond, VA. Each route took the participants past a series of on-premise and off-premise (billboard) signs, apparently both conventional and digital, during daytime and at night.
Summary of Findings	Gazes to the road ahead were high across all test conditions; however, in three of the four test conditions digital and conventional billboards resulted in a lower probability of gazes to the road ahead as compared to the control conditions in which billboards were not present (although on-premise signs, including, potentially, electronic signs, might have been present). In Richmond, drivers gazed more at the digital than standard billboards at night, but this difference was not found in Reading.
Strengths	The study used state-of-the-art eye glance recording equipment. The study route had drivers pass signs on rural and urban routes, and surroundings that differed in visual complexity.
Weaknesses/Limitations	Numerous critical discrepancies between draft and final reports; errors in identifying billboard locations including size, distance from road edge, side of road; both far and near distances at which eye glances to billboards were recorded were artificially truncated; two experimenters sat in the vehicle with the participant driver; data overload required experimental vehicle to pull off road for resets; inappropriate recordation of billboard luminance levels; confounding of billboards with on-premise signs.
Availability/Accessibility	Report is available on the FHWA website at <a href="http://www.fhwa.dot.gov/real_estate/oac/visual_behavior_report/final/cevmsfinal.pdf">http://www.fhwa.dot.gov/real_estate/oac/visual_behavior_report/final/cevmsfinal.pdf</a>

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<sup>4</sup>In March 2011, FHWA released a draft version of the report to three pre-selected peer reviewers. The reviewers were not identified and the draft report was not made available to the public. The comments of two of the three reviewers (the third did not provide meaningful or comprehensive comments) were so critical of the draft report (stating, in essence, that the report's findings about eye glance durations to billboards were not credible) that FHWA spent the next 33 months revising and rewriting the report. A final report, which was *not* peer reviewed, was released on the agency's website on December 30, 2013, although the report was dated September 2012. Although the unreleased draft report was given the official agency report number FHWA-HEP-11-014, the final report remains unnumbered and unpublished.

Date 1 <sup>st</sup> published/presented	2013
Location	U.S. (Massachusetts, Amherst)
Author(s)	Divekar, G., Pradhan, AK, Pollatsek, A., & Fisher, DL;
Title	“Effects of External Distractions”
Affiliation	University of Massachusetts, Amherst
Forum	Journal
Peer Reviewed?	Yes
Sponsor/funding source	National Institutes of Health, National Science Foundation, Arbella Insurance Group Charitable Foundation
Type of Study*	S
Type of Signs Studied**	D (simulated)
Brief Description of Method	Following previous research in the same lab, the authors sought to understand: (a) why experienced drivers were taking such long glances at external distractions (simulated billboards) when they were unwilling to do so for distractors inside the vehicle, and (b) if these experienced drivers were sacrificing some of their ability to monitor visible hazards in the roadway ahead of their vehicle, are they sacrificing even more of their ability to anticipate unseen hazards. Novice and experienced drivers performed an external search task (reading a simulated billboard) while driving in a simulator. Eye movements were recorded, as were vehicle performance.
Summary of Findings	Distractions are a major contributor to crashes, and almost one-third of such distractions are caused by sources external to the vehicle. Of these, digital billboards stand out because of their brightness and changing imagery. Recent research indicates that such billboards may attract attention away from the forward roadway for extended periods of time, and converging evidence shows that looking away from the forward roadway for such extended periods is associated with elevated crash risk. The external tasks in this study were designed to be similar to scanning a sign dense with information in the real world, such as a digital billboard that changed message every few seconds. “This study provides clear evidence that external tasks are distracting not only for novice drivers, but also for more experienced drivers.” For both groups, external distractions significantly affect the drivers’ anticipation of hazards. Overall the study showed that experienced as well as novice drivers are at an elevated risk of getting into a crash when they are performing a secondary task such as looking at a billboard.
Strengths	Sophisticated driving simulator with realistic hazard scenarios.
Weaknesses/Limitations	The simulated billboards, although requiring an external, visual distraction task, were not very representative of roadside billboards. There was no effort to study the effects of such external distractions on older drivers, a group known to be at high risk for such distraction
Availability/Accessibility	Transportation Research Record, Journal of the Transportation Research Board No. 2321.

Date 1 <sup>st</sup> published/presented	2013
Location	Australia
Author(s)	Roberts, P., Boddington, K., & Rodwell, L.
Title	“Impact of Roadside Advertising on Road Safety”
Affiliation	ARRB Group (formerly Australian Road Research Board)
Forum	Austrroads Road Research Report: Publication No. AP-R420-13
Peer Reviewed?	Unknown
Sponsor/funding source	Austrroads (The Association of Australian and New Zealand Road Transport and Traffic Authorities)
Type of Study*	CR, G
Type of Signs Studied**	O, C, D, V
Brief Description of Method	(a) A critical review of existing literature to study the risk of distraction from roadside advertising, and to communicate these findings; (b) document and review existing guidelines across different highway agencies to identify gaps and inconsistencies; (c) develop guiding principles and make guidance recommendations that could be used to create guidelines and to harmonize guidelines across diverse agencies.
Summary of Findings	Most drivers, under most conditions, most of the time, probably possess sufficient spare cognitive capacity that they can tolerate driving-irrelevant information. The problem comes in some driving situations where it becomes likely that (the appearance of) movement or changes in luminance will involuntarily capture attention and that particularly salient emotional or engaging information will capture attention to the detriment of driving performance, particularly in inexperienced drivers. Where this happens in a driving situation that is also cognitively demanding, the consequences for driving performance are likely to be significant. Further, if this attentional capture also results in a situation where a driver’s eyes are off the forward roadway for a significant amount of time (i.e. 2 seconds or longer) this will further reduce safety. Additionally, road environments cluttered with driving-irrelevant material may make it difficult to extract information that is necessary for safe driving, particularly for older drivers. The studies that have been conducted show convincingly that roadside advertising is distracting and that it may lead to poorer vehicle control. Results from the Klauer, et al (2006) studies show that looking at an external object increased the crash risk by nearly four times, nonetheless the number of crashes resulting from such distraction is probably quite small. This suggests that the contribution of roadside advertising to crashes is likely to be relatively minor. Nonetheless, from the Safe System perspective it would be difficult to justify adding any infrastructure to the road environment that could result in increased distraction for drivers. The exception to this may be in the case long drives on monotonous roads where drivers are likely to suffer the effects of passive fatigue.
Strengths	A comprehensive review, not only of existing research, but also of relevant human factors principles, advertising sign technology, and best practices.
Weaknesses/Limitations	Although the authors extensively review and comment on existing regulations and guidelines, only brief mention is made of guidelines in the U.S.
Availability/Accessibility	Available on the Austrroads website

Date 1 <sup>st</sup> published/presented	2013
Location	Denmark
Author(s)	Herrstedt, L., Greibe, P., & Andersson, P.
Title	“Roadside Advertising Affects Driver Attention and Road Safety.”
Affiliation	Trafitec, Denmark
Forum	International Conference
Peer Reviewed?	Yes
Sponsor/funding source	Unknown
Type of Study*	Q
Type of Signs Studied**	C, D
Brief Description of Method	32 drivers, both men and women between the ages of 23 and 70, drove an instrumented vehicle on one of several comparable routes. Drivers had to have a current license and not require eyeglasses while driving. Drivers were not informed in advance of the purpose of the drive. The car’s instruments recorded eye movements, vehicle speed and position, and proximity to vehicles ahead of the test vehicle. A “safety buffer” was calculated which reflected the time available for the driver to respond to a sudden critical situation requiring immediate action to avoid an accident.
Summary of Findings	A total of 109 drives past advertising signs were completed, and a total of 233 glances to the 16 roadside advertising signs were recorded. Results showed that, in 69% of all drives, the driver glanced at the advertisement at least once. In nearly half of all drives, the driver glanced two or more times to the same billboard. 18% of all glances lasted for 1 second or longer, and the total duration of successive glances on a single drive was 1.5 seconds or longer in 29% of trials, 2.0 seconds or longer in 22% of trials, and 3.0 seconds or longer in 10% of trials. In 65 of the 233 glances (28%), a vehicle ahead was present within a time gap of less than 3.0 seconds. In 59 cases (25%) the safety buffer was less than 2.0 seconds, and in 20% of all cases, the safety buffer was as low as 1.5 seconds. The authors conclude that, in 25% of all cases, driving safety was reduced because the safety buffer was less than 2 seconds to the lead vehicle. Further, in 16% of all drives (17 out of 109), the sum of cumulative glances to the same billboard resulted in visual distraction using the method developed by VTTI (2.0 seconds or more within a 6.0 second window). In other words, the authors state: “In more than every sixth drive past, visual distraction occurs as a result of the advertising sign.” Their overall conclusion was that “the investigated advertising signs do capture drivers’ attention to the extent that it impacts road safety.”
Strengths	This is one of only two known on-road studies to combine measures of driver glance behavior (number and duration of glances to billboards) with the simultaneous measure of following distance to a vehicle ahead, and the only one to (apparently) calculate such following distances via laser scanner for accuracy. Older drivers were included in the participant group.
Weaknesses/Limitations	More details about the specific billboards studied would have been helpful.
Availability/Accessibility	<i>Proceedings of the 3<sup>rd</sup> International Conference on Driver Distraction and Inattention.</i>

Date 1 <sup>st</sup> published/presented	2014
Location	US
Author(s)	Hawkins, HG, Jr., Kuo, P-F, & Lord, D.
Title	“Statistical Analysis of the Traffic Safety Impacts of On-Premise Digital Signs”
Affiliation	Texas A&M University
Forum	93 <sup>rd</sup> Annual Meeting of the Transportation Research Board
Peer Reviewed?	Yes
Sponsor/funding source	On-premise sign industry (Signage Foundation, Inc.)
Type of Study*	E
Type of Signs Studied**	O
Brief Description of Method	135 sites in four states, where on premise signs had been installed in 2006-07, were compared to 1,301 control sites using the Empirical Bayes (EB) statistical methodology.
Summary of Findings	There were no statistically significant changes in crash frequency associated with the installation of the on-premise digital signs studied. A calculated safety effectiveness index was equal to 1.00, with the 95 percent confidence interval between 0.93 and 1.07. The findings were similar for each of the four investigated States. The researchers concluded that “there is no evidence (that) the installation of on-premise signs at the locations (studied) led to an automatic increase in the number of crashes.” The authors point out in their conclusions that it might be of interest to examine whether or not the index varies as a function of sign design and operation or characteristics of the crashes themselves.
Strengths	The study employed a large database and a robust statistical analysis procedure.
Weaknesses/Limitations	The on-premise signs to be studied were chosen by the sponsor and individual sign companies rather than by the authors or at random. It is possible that the selection criteria included a bias toward the least potentially distracting signs (in terms of size, color, contrast, animation, video, etc.).
Availability/Accessibility	Paper No.: 14-2772 of the 93 <sup>rd</sup> Annual Meeting of the Transportation Research Board.

Date 1 <sup>st</sup> published/presented	2014
Location	USA
Author(s) Title Affiliation	Schieber, F., Limrick, K., McCall, R., & Beck, A. "Evaluation of the Visual Demands of Digital Billboards Using a Hybrid Driving Simulator" University of South Dakota
Forum	Journal
Peer Reviewed?	Yes
Sponsor/funding source	Unknown
Type of Study*	S
Type of Signs Studied**	D (Simulated)
Brief Description of Method	The authors used a purpose-built hybrid driving simulator designed "for investigating the limits of sign reading performance while driving." The driving task and the view of the road ahead used a validated, commercial simulator; but the digital billboard stimulus was implemented on a separate 20:1 scaled LCD display mounted on a linear actuator rail that could move the simulated sign toward the observer at angular velocities simulating speeds up to 55 mph. 18 university undergraduates participated. Gaze direction (road ahead vs. billboard) was captured by a video recording of each participant's face as they drove- this technique was previously demonstrated by the senior author. Participants drove once at 25 and again at 50 mph. Digital billboard stimuli were presented at predetermined random intervals, and contained either 4, 8, or 12 frequently used English words, also displayed at random.
Summary of Findings	The authors state: "Although little or no decrement in lane keeping or reading performance was observed at slow speed (25 MPH) on straight roads, clear evidence of impaired performance became apparent at the higher driving speed (50 MPH). Lane keeping performance was significantly degraded when participants were required to read digital billboards with 8 or more words at the higher speed. This decrement became greater when the sign contained 12 words. Surprisingly, the decrements in lane keeping performance emerged <i>after</i> the participants had finished reading the sign. The participants tended to slowly drift away from the center of the lane, and then executed a large amplitude corrective steering input during the 8-second interval after encountering the digital billboard. Eye gaze statistics and reading performance showed that information processing overload began to emerge at a message length of 8 words and was clearly present when 12 words were displayed.
Strengths	Sophisticated, hybrid driving simulator with a custom built zoomed image sign projector designed to overcome traditional simulator constraints on sign legibility at realistic distances. Simulated digital billboards contained different, common words of 4-5 letters each, and each was presented in the same size and location on the billboard.
Weaknesses/Limitations	No older drivers were studied. There is no discussion of the validity of the hybrid driving simulator for this specific application. The simulated billboards were only 10 ft. in width, only about one-fifth the width of typical highway billboards.
Availability/Accessibility	<i>Proceedings of the Human Factors and Ergonomics Society 58<sup>th</sup> Annual Meeting, 2214-2218.</i>

Date 1 <sup>st</sup> published/presented	2014
Location	Israel (Tel Aviv)
Author(s)	Gitelman, V., Zaidel, D., Doveh, E., & Silberstein, R.
Title	“Accidents on Ayalon Highway - Three Periods Comparison: Billboards Present, Removed, and Returned”
Affiliation	
Forum	
Peer Reviewed?	Yes
Sponsor/funding source	Israel National Roads Authority
Type of Study*	E
Study Design	Quasi-experimental: Billboards present (2006-07), absent (2008), present again (2009-12) with controls. Dependent measure – property damage and injury crashes. Control variable – traffic volume. Study sites – 8 treatment and 6 control.
Type of Signs Studied**	C
Brief Description of Method	Because of complaints, Israel’s Supreme Court ruled that a series of billboards on an urban freeway near Tel Aviv had to be removed, i.e. covered, for one year while an evaluation took place. At the end of the experimental period, the billboards were uncovered such that they were again visible to motorists. At control sites, the billboards remained visible throughout the study period. At treatment sites, billboards were visible in the “present” period (2006-7), covered during the “removed” period (2008), and visible again in the “returned” period (2009-12). Crashes were recorded and categorized (property damage only, injury or fatality) under six conditions: (a) at treatment sites while signs were visible; (b) at treatment sites after signs were covered; (c) at treatment sites where signs were visible again after having been uncovered; (d) at control sites where signs were visible; and (e) at the same control sites while signs were still visible but signs were covered at the treatment sites; and (f) at control sites while signs were again visible at the treatment sites.
Summary of Findings	At control sites, crashes remained essentially the same throughout the 6-year study period; at the treatment sites, crashes declined dramatically after the billboards were covered, and returned just as dramatically once the billboards were uncovered and therefore again visible. The results were the same for injury and fatal crashes. After adjusting for traffic volume, crashes were reduced at the treatment sites (where billboards were visible in the “before” period but covered during the “after” period) by the following percentages: all crashes by 60%; injury/fatal crashes by 39%; property damage crashes by 72%.
Strengths	For a field study, this used a well-controlled research design. Before-and-after measures were obtained both for sites where the billboards were covered during the study, and for the sites where the billboards remained visible during this same time period. Road sections were in close proximity, on the same highway, ensuring that traffic speeds and volumes, as well as weather conditions, law enforcement activity, etc. were comparable.
Weaknesses/Limitations	There might have been differences in certain roadway characteristics between the treatment and control sites (e.g. curves, merges, etc.) that were not identified.
Availability/Accessibility	Complete study is in Hebrew only; English translation is available for the Executive Summary only.



Date 1 <sup>st</sup> published/presented	2015
Location	USA
Author(s)	Sisiopiku, VP, Islam, M., Haleem, K., Alluri, P. & Gan, A.
Title	“Investigation of the Potential Relationship between Crash Occurrences and the Presence of Digital Billboards in Alabama and Florida”
Affiliation	
Forum	Conference Paper
Peer Reviewed?	Yes
Sponsor/funding source	U.S. Department of Transportation/RITA, Alabama Department of Transportation, Florida Department of Transportation
Type of Study*	E
Type of Signs Studied**	D
Brief Description of Method	The authors analyzed historical crash records from the states of Alabama and Florida. They identified locations of digital billboards along major limited-access roadways and chose 18 suitable sites for analysis, each with its own control site. Crash records were obtained for a five-year period from a centralized database in Alabama, and crash rates were determined per million vehicle miles travelled at each site. The procedure was similar in Florida, although only three years were studied. Because many crashes in the vicinity of the billboards were found to be located incorrectly, the authors retrieved the actual police traffic collision reports for 783 crashes. Of these, 406 had to be eliminated due to coding errors in the original summary reports, leaving a total of 377 crashes for the safety assessment.
Summary of Findings	The authors state: “The overall results were consistent between the two states. The presence of digital billboards increased the overall crash rates at “digital advertising billboard influence zones” by 25% in Florida and 29% in Alabama, compared to control sites. In addition, sideswipe and rear-end crashes were overrepresented at digital billboard influence zones compared to control sites.
Strengths	Included in their influence zone was a short distance (minimum 0.05 mile) downstream of each billboard. This is in keeping with the findings of Schieber, et al., discussed elsewhere in the present document. The influence zone and associated control zone for each billboard were matched for traffic and roadway conditions.
Weaknesses/Limitations	The authors provide no explanation for how the specific billboard locations were chosen out of all possibilities that they identified. Apparently, they identified “influence zones” by calculating the distances upstream of each digital billboard from which the sign could be seen, using Google Street View. There seems to have been no effort to relate sight distance in the real world to that shown in the Google Street View images. It is unclear whether their 5 years of data (AL) and 3 years (FL) correspond to periods when the billboards studied were actually in place, given that the authors seem to have selected sites from Google Street View.
Availability/Accessibility	<i>Proceedings of the Human Factors and Ergonomics Society 58<sup>th</sup> Annual Meeting, 2214-2218.</i>

Date 1 <sup>st</sup> published/presented	2015
Location	Canada
Author(s) Title Affiliation	Rempel, G., Montufar, J., Forbes, G., & Dewar, R. “Digital and projected advertising Displays: Regulatory and Road Safety Assessment Guidelines.” MORR Transportation Consulting, Ltd., Intus Road Safety Engineering, Inc., Western Ergonomics, Inc.
Forum	Transportation Association of Canada Report
Peer Reviewed?	Yes
Sponsor/funding source	Transportation Association of Canada
Type of Study*	CR
Type of Signs Studied**	O, D
Brief Description of Method	The authors performed a critical literature review, met with representatives of Canadian government agencies and outdoor advertising companies, investigated practices and regulations/guidelines in other countries, and applied human factors principles toward the development of guidelines for Canada.
Summary of Findings	The resultant guidelines are specific to traffic safety issues – they do not address the aesthetic, “nuisance,” or economic factors of such signs. Guidance is developed for sign density, spacing, dwell time (which they call “frame duration”), illuminance (which they authors call “brightness”), proximity to traffic control devices and driver decision points, message sequencing and text scrolling, animation, and transition time between messages. The overriding principle proposed in this report is that digital advertising signs should “emulate” traditional signs.
Strengths	A comprehensive review, not only of existing research, but also of relevant human factors principles, advertising sign technology, and best practices.
Weaknesses/Limitations	Accepted industry practices regarding DBB lighting rather than getting the views of lighting experts or undertaking their own independent evaluation.
Availability/Accessibility	Available for purchase from Transportation Association of Canada at <a href="http://tac-atc.ca/en/digital-and-projected-advertising-displays-publication-now-available">http://tac-atc.ca/en/digital-and-projected-advertising-displays-publication-now-available</a>

Date 1 <sup>st</sup> published/presented	2015 <sup>2</sup>
Location	Australia
Author(s) Title Affiliation	Samsa, C., & Phillips, T. "Digital Billboards 'Down Under': Are they Distracting to Drivers and can Industry and Regulators Work Together for a Successful Road Safety Outcome?" Samsa Consulting, Outdoor Media Association of Australia
Forum	<i>4<sup>th</sup> International Conference on Driver Distraction and Inattention</i>
Peer Reviewed?	Yes
Sponsor/funding source	Outdoor Media Association of Australia
Type of Study*	C
Type of Signs Studied**	C, D, O
Brief Description of Method	29 participants, ages 25-54, drove an instrumented vehicle along a 14.6 km route in Brisbane, Queensland. Drivers were fitted with "eye tracking glasses."
Summary of Findings	Average fixation durations were "well below 0.75 s". There were no significant differences in average vehicle headway between the three signage types. There was a statistically significant difference in lateral deviation when billboards were present.
Strengths	The data showing significant differences in lateral deviation in the presence of billboards is in accord with findings from other recent studies.
Weaknesses/Limitations	No older drivers were studied. There is little description of the eye tracking glasses used, but this apparatus is not known to provide the precision necessary to determine exactly where the wearer is looking. No information is provided to enable the reader to determine how vehicle headways were measured; as such it is not possible to compare this study to the one conducted in Denmark, where headway measurement was clearly described.
Availability/Accessibility	<a href="https://www.ivvy.com/event/DD2015">https://www.ivvy.com/event/DD2015</a>

<sup>2</sup>At the present time, this paper is available only as an Abstract. Our comments might change once we are able to review the complete paper.

Date 1 <sup>st</sup> published/presented	2016
Location	USA
Author(s)	Belyusar, D., Reimer, B. Mehler B., & Coughlin, JF.
Title	“A Field Study on the Effects of Digital Billboards on Glance Behavior During Highway Driving.”
Affiliation	New England University Transportation Center & MIT Age Lab
Forum	Accident Analysis and Prevention, 88, 88-96
Peer Reviewed?	Yes
Sponsor/funding source	US Department of Transportation, Region 1 New England, University Transportation Center at MIT, and the Toyota Class Action Settlement Safety Research and Education Program.
Type of Study*	Q
Type of Signs Studied**	D
Brief Description of Method	This on-road study had 123 subjects, nearly equally divided between males and females and between young and old. Participants drove an instrumented vehicle under normal driving conditions, with no specific tasks to perform, past a digital billboard on a highway with a speed limit of 65 MPH.
Summary of Findings	The authors found statistically significant changes in total number of glances and, depending upon the direction of travel, moderate-to-long duration glances in the direction of the billboard as compared to sections of the roadway in which the billboard was not visible. Older drivers were particularly affected. The authors also found that: “Drivers glanced more at the time of a switch to a new advertisement display than during a comparable section of roadway when the billboard was simply visible and stable.” They concluded: “Given typical billboard dwell (cycle) times of six (6) or eight (8) seconds, these findings add to the argument the dwell times for such signs should be considerably longer.”
Strengths	The driving task was quasi naturalistic; both young and old drivers, and both males and females, were equally represented.
Weaknesses/Limitations	Only one billboard, with two faces, was used in the analysis. There could be characteristics of that sign, or its location, which make the results not generalizable to other billboards.
Availability/Accessibility	<a href="http://www.sciencedirect.com/science/article/pii/S0001457515301664">http://www.sciencedirect.com/science/article/pii/S0001457515301664</a>

Date 1 <sup>st</sup> published/presented	2018
Location	Belgium, Flanders
Author(s)	Mollu, K.
Title	“Influence of an Illuminated Digital Billboard on Driving Behavior with a Focus on Variable Display Time and Distance from a Pedestrian Crossing.”
Affiliation	Hasselt University and Flanders Agency for Roads and Traffic
Forum	TRB Subcommittee on Digital Billboards
Peer Reviewed?	Yes
Sponsor/funding source	Flanders Agency for Roads and Traffic
Type of Study*	N
Type of Signs Studied**	D (simulated)
Brief Description of Method	Using a driving simulator, investigators compared subjective workload and responses of drivers to pedestrians crossing in crosswalks. Subjects included 35 persons, age 20-60, with 54% male. Signs varied in dwell time and location in retail zones or in transitions to built-up areas.
Summary of Findings	Study participants rated their mental demand significantly higher and their own performance lower when a digital billboard was present. The minimum speed upon approach to the pedestrian was higher and was reached closer when a DBB was present. Although not statistically significant, lateral displacement was higher in the presence of the DBB. Brake-reaction time (perception reaction time) to the pedestrian was approximately 1.5 times higher in the presence of the DBB – and there was no effect of dwell time or distance to the sign.
Strengths	High definition driving simulator; roads agency sponsored; reasonably large number of subjects. A large number of billboards and road settings were used.
Weaknesses/Limitations	None of the display times matched those in most common use; simulated digital billboards were smaller than those in common use in the U.S.
Availability/Accessibility	Author

Citations:

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## Effects of Outdoor Advertising Displays on Driver Safety

*Requested by*

Suzy Namba, Caltrans Division of Design

October 11, 2012

*The Caltrans Division of Research and Innovation (DRI) receives and evaluates numerous research problem statements for funding every year. DRI conducts Preliminary Investigations on these problem statements to better scope and prioritize the proposed research in light of existing credible work on the topics nationally and internationally. Online and print sources for Preliminary Investigations include the National Cooperative Highway Research Program (NCHRP) and other Transportation Research Board (TRB) programs, the American Association of State Highway and Transportation Officials (AASHTO), the research and practices of other transportation agencies, and related academic and industry research. The views and conclusions in cited works, while generally peer reviewed or published by authoritative sources, may not be accepted without qualification by all experts in the field.*

### **Executive Summary**

#### **Background**

Digital and other outdoor advertising displays are becoming more common along California's highways, and Caltrans is considering generating income with advertisements on changeable message signs and outdoor advertising displays on state-owned rights of way outside of the operational highway. Local agencies, commercial businesses and private landowners are also looking at digital displays as a way to generate income.

However, the technology for digital displays is relatively new, and there has been little account taken of their effects on driver safety. Further, there are no regulations regarding their font size or complexity. Caltrans needed more data to determine whether digital displays and other forms of outdoor advertising constitute a safety hazard to drivers.

To conduct this investigation, CTC carried out a literature search to:

- Identify existing or in-progress research about the driver safety impacts of static signs, digital billboards and other displays, including the effects of brightness/illumination, font size and visual complexity of the signs.
- Review research on both on-premise and off-premise signage as well as the broader aspects of how guide signs (as given in the California Manual on Uniform Traffic Control Devices) affect safety.
- Investigate how other states are regulating the use of digital displays.

#### **Summary of Findings**

We gathered information in three topic areas:

- Federal Guidance on Digital Displays
- Related Research
  - The Wachtel Report and Pre-2009 Literature on Outdoor Advertising Safety
  - Literature on Outdoor Advertising Safety Since the 2009 Wachtel Report
  - Luminance Criteria and Other Human Factors for Sign Design
- State Regulations

Following is a summary of findings by topic area.

## Federal Guidance on Digital Displays

A 2007 Federal Highway Administration (FHWA) memo makes recommendations for changeable message sign message duration (8 seconds), transition time (1 to 4 seconds), brightness, spacing and locations.

## Related Research

The most thorough review of the literature to date on digital display safety is the 2009 report Safety Impacts of the Emerging Digital Display Technology for Outdoor Advertising Signs by Jerry Wachtel. Wachtel has been the president of [The Veridian Group](#), a California human factors research consulting firm, for 22 years and has published numerous studies on outdoor advertising safety.

We give a summary of this report and include a selection of the references cited for studies in or before 2009. (We found no relevant studies for this period not included in Wachtel's report, which covers both digital and nondigital outdoor advertising.) In a separate section, we discuss literature on outdoor advertising safety that has been published since Wachtel's report.

### The Wachtel Report and Pre-2009 Literature on Outdoor Advertising Safety

Based on the literature review, Wachtel concludes that:

- Studies regularly demonstrate that roadside advertising, including digital billboards, contributes to driver distraction at levels that adversely affect safe driving performance.
- There are consistent research recommendations regarding brightness, message duration and change interval, and other factors.

Wachtel also gives a thorough survey of national and international guidelines and regulations for digital billboards, and based on these (along with the literature review) makes recommendations for digital billboard guidelines, including:

- *Message duration*: A minimum display duration of sight distance to the digital billboard (feet)/speed limit (feet/second).
- *Message interval*: An interval between successive displays that is close to instantaneous as possible.
- *Display brightness*: Brightness, luminance and illuminance limits based on the ambient lighting conditions of digital billboards.
- *Digital billboard spacing*: Spacing between digital billboards that does not face a driver with two or more displays within his field of view at the same time.
- *Other*: The prohibition of visual effects, message sequencing, and the placement of digital billboards near traffic control devices and driver decision and action points.

Wachtel concludes that there is growing evidence that digital billboards distract drivers because these signs increase driver glance duration and the driver's gaze is reflexively drawn to objects of different luminance in the visual field.

Findings from the literature support the argument that while there is no definitive research showing increased crashes due to the presence of billboards or digital billboards, there is an increased crash risk based on research on the effects of billboards on driver attention and the effects of driver distraction on safety:

- Billboards can have a significant effect on driver speed, lateral control, mental workload, ability to follow road signs, and eye movements and fixations, with older drivers particularly affected. (*The Effects of Visual Clutter on Driving Performance and Driven to Distraction, An Evaluation of the Influence of Roadside Advertising on Road Safety*, and *Review of Roadside Advertising Signs*). And visual clutter generally can distract drivers (*Driver Distraction by Advertising*).
- Digital billboards attract more attention than regular billboards, with larger number of glances and longer glances (*Driving Performance and Digital Billboards* and *Observed Driver Glance*

*Behavior at Roadside Advertising Signs*). Wachtel notes that the implication is that the shorter the message duration, the longer the driver's glance in anticipation of the next message.

- Drivers engaging in visually demanding tasks have a crash risk three times higher than attentive drivers; while brief glances do not increase risk, glances of more than two seconds at least double crash risk (*The Impact of Driver Inattention on Near-Crash/Crash Risk*).
- While studies have not been able to establish a statistical relationship between the presence of billboards and traffic safety, these studies have been flawed in design, and the use of accident data in evaluating the impacts of billboard is ill-advised (*The Impact of Roadside Advertising on Driver Distraction, A Study of the Relationship between Digital Billboards and Traffic Safety in Cuyahoga County, Ohio, Driving Performance and Digital Billboards, and Driving Performance in the Presence and Absence of Billboards, Effects of Roadside Advertisements on Road Safety*).
- More research is needed. A 2009 FHWA study on the effects of commercial electronic variable message signs on driver attention and safety (of which Wachtel is a co-author) proposes a three-stage program of research: an on-road instrumented vehicle study, a naturalistic driving study and an unobtrusive observation study (*The Effects of Commercial Electronic Variable Message Signs (CEVMS) on Driver Attention and Distraction*).

#### Literature on Outdoor Advertising Safety Since the 2009 Wachtel Report

We found a number of studies on outdoor advertising safety that have been published since the Wachtel report; but only three on digital billboard safety specifically. These studies reaffirm the negative effects of billboards on driver attention, despite the fact that no correlation can be found between the presence of billboards and increased crash rates:

- Advertising billboards affect driver's ability to detect changes in road scenes, especially when the roadway background is more cluttered (*Advertising Billboards Impair Change Detection in Road Scenes*). In general they affect lateral control and mental workload (*Conflicts of Interest*), and change drivers' pattern of visual attention, increasing the amount of time needed for drivers to respond to road signs and increasing driving errors (*Effects of Advertising Billboards during Simulated Driving*). A 2010 study concludes that among distractions external to vehicles, roadside advertisements have the strongest correlation to collision frequency (*Quantifying External Vehicle Distractions and Their Impacts at Signalized Intersections*).
- A 2011 FHWA study scans outdoor advertising control practices in Australia, Europe and Japan (*Outdoor Advertising Control Practices in Australia, Europe, and Japan*).
- A 2010 Transport Research Laboratory study concludes that video billboards draw longer and more frequent glances from drivers than static advertisements, with drivers showing greater variation in lateral lane position, driving more slowly and braking harder (*Investigating Driver Distraction*). A 2011 study shows that video billboards also lead to more rear-end collisions when there is a hard-braking lead vehicle (*External Distractions: The Effects of Video Billboards and Windfarms on Driving Performance*).
- A 2010 study showed no impact on driver performance after the installation of a digital billboard (*The Impact of Sacramento State's Electronic Billboard on Traffic and Safety*), and a 2009 study shows no correlation between hazardous intersection and the presence of digital billboards in Los Angeles (*Digital Billboard Safety amongst Motorists in Los Angeles*).
- Preventing distraction by digital billboards requires controlling lighting at nighttime, lengthening message duration time, simplifying message information and prohibiting message sequencing (*Digital Billboards, Distracted Drivers*).

#### Luminance Criteria and Other Human Factors for Sign Design

We also include a number of studies on human factors for the design of signs in general (including guide signs). Topics include congruent visual information, legibility, message design for variable message signs and luminance criteria for digital billboards. A 2010 study by Arizona State University (*Digital LED Billboard Luminance Recommendations*) suggests that:

... drivers should be subjected to brightness levels of no greater than 10 to 40 times the brightness level to which their eyes are adapted for the critical driving task. As roadway lighting and automobile headlights provide lighting levels of about one nit, this implies signage should appear no brighter than about 40 nits.

### **State Regulations**

- An undated chart from the Outdoor Advertising Association of America summarizes state regulations on changeable message advertising signs. Generally minimum message duration is between 4 and 10 seconds, with 6 and 8 seconds most common; the maximum interval between messages is 1 to 4 seconds; and spacing is most commonly 500 feet. A review of state practices is also included in Appendices B and C of the 2001 FHWA study, *Research Review of Potential Safety Effects of Electronic Billboards on Driver Attention and Distraction* in **Related Research**.
- We survey the digital advertising display regulations of 12 states. Of note are Massachusetts and Tennessee, which are currently updating regulations to specifically address digital billboards.

### **Gaps in Findings**

- While there is a significant amount of research on the effects of outdoor advertising on driver distraction, there is little research definitively showing that outdoor advertising affects crash rates, and there are a limited number of studies on digital billboards specifically.
- We found little research justifying common regulations and design recommendations for digital billboards, including brightness/illumination, font size and visual complexity. Recommendations are typically based on common state practices.
- We found little research on the safety effects of signage in general, including guide signs.
- We did not find research in progress for any areas of inquiry.

### **Next Steps**

- Caltrans may be able to gather additional information about current practice and regulations by surveying the other state DOTs.
- Caltrans could consider launching a multi-year research study, either by itself or with other states, aimed at measuring changes in crash rates after installation of digital displays.
- Caltrans could follow up with the Outdoor Advertising Association of America to determine the sources and dates of the data presented in their State Changeable Message Chart; OAAA may also have other unpublished research of interest.

## **Federal Guidance on Digital Displays**

**Guidance on Off-Premise Changeable Message Signs**, Federal Highway Administration, September 2007.

<http://www.fhwa.dot.gov/realestate/offprmsgsguid.htm>

Guidance from this memorandum is as follows:

- Duration of message: Between 4 and 10 seconds; 8 seconds is recommended.
- Transition time between messages: 1 to 4 seconds.
- Brightness: Adjust brightness in response to changes in light levels so that signs are not unreasonably bright for the safety of the motoring public.
- Spacing: Not less than minimum spacing requirements for signs under the federal/state agreement (FSA), or greater if determined appropriate to ensure the safety of the motoring public.
- Locations: As where allowed by the FSA except where such locations are determined to be unsafe.

Related Resources:

**Outdoor Advertising Control**, Federal Highway Administration, January 3, 2012.

[http://www.fhwa.dot.gov/realestate/out\\_ad.htm](http://www.fhwa.dot.gov/realestate/out_ad.htm)

This web page provides a series of links to related topics, including a history and overview of the federal outdoor advertising control program, the possible effects of commercial electronic variable message signs on driving safety, and research about the potential safety effects of electronic billboards on driver attention and distraction.

## **Related Research**

Studies below that are industry sponsored are preceded by an asterisk and include an indication of the sponsor.

### **The Wachtel Report and Pre-2009 Literature on Outdoor Advertising Safety**

**Safety Impacts of the Emerging Digital Display Technology for Outdoor Advertising Signs**, Jerry Wachtel, NCHRP Project 20-7 (256), Final Report, April 2009.

[http://www.azmag.gov/Documents/pdf/cms.resource/NCHRP\\_Digital\\_Billboard\\_Report70216.pdf](http://www.azmag.gov/Documents/pdf/cms.resource/NCHRP_Digital_Billboard_Report70216.pdf)

Sections 2 and 3 of this report include the most thorough review to date of the literature on the use of digital displays for outdoor advertising signs. Summaries of a selection of the studies referenced in the report are provided on the following pages, along with Wachtel's comments on these studies, where relevant. (In the citations for this section, all references to "Wachtel" are to the 2009 report.)

Summaries of the following sections of the report are also provided:

- Conclusions from the literature.
- Section 4: Human Factors Issues.
- Section 5: Current and Proposed Guidelines and Regulations.
- Section 6: Recommendations for Guidelines.
- Section 7: Digital Billboards On-Premise and on the Right-Of-Way.
- Section 8: New Technology, New Applications, New Challenges.
- Section 9: Summary and Conclusions.

### Conclusions from the Literature

This report gives an exhaustive review of the literature (Sections 2 and 3) and concludes broadly (pages 5 and 6 of the report) that:

- Studies regularly demonstrate that the presence of roadside advertising signs such as digital billboards contributes to driver distraction at levels that adversely affect safe driving performance.
- There is consistency in research recommendations regarding brightness, message duration and change interval, and billboard location with regard to official traffic control devices, roadway geometry and vehicle maneuver requirements at interchanges, lane drops, merges and diverges, as well as regarding constraints that should be placed on such signs' placement and operation.

### Section 4: Human Factor Issues:

Beginning on page 115 of the report, Wachtel summarizes human factors issues related to digital billboards as follows:

- *Conspicuity*: Billboards with high levels of illumination and frequent changes can reduce the visibility of traffic control devices and other visual signs required for safety (vehicle brake lights, reflectors, etc.).
- *Distraction and inattention*: Inattention involves the failure of a driver to concentrate on the driving task for any reason, or for no known reason at all. It is distinguished from distraction in that it may have no known cause and possibly no remediation.
- *Information processing*: Billboards are often placed in ways that do not adhere to good human factors practice restricting the amount of information conveyed by signs.
- *The Zeigarnik Effect*: Discomfort related to task interruption may lead drivers to continue looking at changing messages on digital billboards to learn what comes next.
- *Brightness and glare*: The majority of public complaints about digital billboards concern their excessive brightness, particularly at night, to the extent that they become the most conspicuous item in the visual field and draw the eye away from other objects that need to be seen.
- *Legibility and readability*: Billboards may not adhere to Manual on Uniform Traffic Control Devices (MUTCD) guidelines on legibility, including font, letter size and color. Often they take more time to read than guidelines prescribe, taking multiple glances to communicate the intended message.
- *Novelty*: Novel stimuli make a greater demand on driver attention, and where drivers get used to static billboards, digital billboards have the ability to present new images to drivers every time the sign is approached.
- *Sign design, coding, redundancy*: Digital billboards lack the consistent design of traffic control devices, which is intended to assist recognition and decrease reaction time.
- *Visual attention*: Digital billboards, more than any previous technology used for roadside advertising, are capable of commanding drivers' attention by employing extremely high luminance levels; bright, rich colors; and a pattern of message display that may appear to flash.
- *Positive Guidance*: Drivers can be given sufficient information about road hazards when and where they need it, and in a form that enables them to avoid error that might result in a crash.
- *The Moth Effect*: Drivers may have the tendency to inadvertently steer in the direction of bright lights, leading to lane departures and crashes.

### Section 5: Current and Proposed Guidelines and Regulations

This section reviews national and international guidelines and regulations for digital billboards.

#### *Queensland, Australia*

Queensland had the most comprehensive regulations, including flowcharts and tables that enable an inspector to determine exactly what types and operational characteristics of advertising signs are permissible under different road and speed conditions. Page 121 of the report describes different levels of restriction for different road categories:

For advertising devices beyond the right-of-way but visible from “motorways, freeways, or roads of similar standard,” only non-illuminated signs or non-rotating static illuminated signs are permitted (p. 6-4). Where an advertising device is permitted on State-controlled roads, the same restrictions apply. Further, “variable message signs and trivision signs are not permitted on State-controlled roads” (p. 6-5). For those advertising devices that are permitted, a clear chart is provided (labeled Figure C6) that provides graphic depictions of the “device restriction area” (p. C-12).

Guidelines also establish maximum average sign luminance for zones with differing ambient street lighting. To limit the distracting potential of electronic billboards, Australia requires that digital billboards outside the boundaries of but visible from state-controlled roads (except motorways) (Category 1) be installed only where:

- There is adequate advanced visibility to read the sign.
- The environment is free from driver distraction points and there is no competition with official signs.
- The speed limit is 80km/h or less.
- The device is not a moving sign (defined elsewhere in the document).

For Category 1 digital billboards that display predominantly graphics:

- Long duration display periods are preferred in order to minimize driver distraction and reduce the amount of perceived movement. Each screen should have a minimum display period of 8 seconds.
- The time taken for consecutive displays to change should be within 0.1 seconds.
- The complete screen display should change instantly.
- Sequential message sets are not permitted.
- The time limits will be reviewed periodically.

For Category 1 digital billboards that display predominantly text:

- The number of sequential messages ... may range from one to a maximum of three; in locations with high traffic volume or a high demand on driver concentration, the number of sequential messages should be limited to two.
- Where a display is part of a sequential message set, the display duration should be between 2.5 to 3.5 seconds for a corresponding message length of three to six familiar words.
- The number and complexity of words used ... should be consistent with the display duration.
- The time taken for consecutive displays to change should be within 0.1 seconds.
- The complete screen display should change instantaneously.
- In a text-only display, the background color should be uniform and nonconspicuous.

Australia’s regulations do not allow changeable message signs, flashing signs or digital billboards of any type if such devices would be visible by motorists traveling on motorways (Category 2). Where advertising devices are permitted within the boundaries of state-controlled roads (Category 3), such signs must be nonrotating static illuminated and nonrotating, nonilluminated signs. Neither variable message signs nor trivision signs are permitted on state-controlled roads.

### *South Africa*

On page 126 of the report, Wachtel describes South Africa’s regulations, which require that no advertisement may:

- Be so placed as to distract, or contain an element that distracts, the attention of drivers of vehicles in a manner likely to lead to unsafe driving conditions.
- Be illuminated to the extent that it causes discomfort to or inhibits the vision of approaching pedestrians or drivers of vehicles.

- Be attached to traffic signs, combined with traffic signs, ... obscure traffic signs, create confusion with traffic signs, interfere with the functioning of traffic signs, or create road safety hazards.
- Obscure the view of pedestrians or drivers, or obscure road or rail vehicles and road, railway or sidewalk features such as junctions, bends, and changes in width.
- Be erected in the vicinity of signalized intersections which display the colours red, yellow or green if such colours will constitute a road safety hazard.
- Have light sources that are visible to vehicles traveling in either direction (p. 12).

Regulations provide guidance on advertisement size, colors, number of advertisements in the area, speed limit, quantity of information in the advertisement (measured in bits), illumination level and other factors.

#### *Victoria, Australia*

Regulations define the conditions under which an advertisement is a road safety hazard, including position and potential for distraction because of color or illumination. From page 130 of the report, signs must:

- Not display animated or moving images, or flashing or intermittent lights.
- Not be brighter than 0.25 candela per square metre.
- Remain unchanged for a minimum of 30 seconds.
- Not be visible from a freeway.
- Satisfy the ten point checklist.

#### *New South Wales, Australia*

Guidelines include recommendations for variable message signs on conventional roads, including message on- and off-time, changeover time, maximum distance to traffic signal, and minimum distances to other advertising devices or to official traffic devices. It also restricts the maximum luminance levels of advertising devices based on levels of ambient off-street lighting.

#### *The Netherlands*

The Netherlands has guidelines for visual distracters (including but not limited to billboards) that contain nondriving related information. Recommendations include (from page 132 of the report):

- There should be no information that actively attracts attention; this includes no moving objects, no LCD or LED screens, and no moving or changing pictures or images.
- Non-driving related information should not appear within the driver's central field-of-view (less than 10 deg from straight ahead).
- Signs should contain a maximum of five "items" (letters, numbers, symbols, etc.).
- No distractions should be permitted at merges, exits and entrances, close to road signs or in curves (specific constraints will follow).
- No telephone numbers will be permitted.
- No fluorescent colors are permitted.
- No ambiguity is permitted.
- No controversial information is permitted; examples include sex, violence, religion, nudity.
- No mixture of real and fake words is permitted.
- Commercial signs must be 90 deg to the road to minimize head turning.
- No signs will be permitted that mimic road signs in color or layout.

#### *Brazil*

A 1998 study proposes the following regulations (from page 134 of the report):

- Advertising signs should be located at a tangent to approaching drivers.
- Advertising signs should be no closer than 1000 m from one another on the same side of the road, and no closer than 500 m from the nearest advertising sign on the opposite side of the road.
- The display time of each image on a variable message sign should be long enough to appear static to 95% of drivers approaching it at highway speeds.



- The message change interval should not exceed 2 s.
- The displayed image should remain static from the moment it first appears until the moment it is changed.
- No animation, flashing or moving lights should be allowed.
- No message or image that could be mistaken for a traffic control signal should be displayed.
- Messages should be simple and concise.

### *United States*

#### New York State

Regulations proposed in 2008 include:

- Minimum message duration of 62 seconds, so that no motorist would be able to see more than one message change as he or she approached any particular changeable electronic variable message sign.
- Message transition time should be instantaneous to minimize distraction.
- Minimum spacing between changeable electronic variable message sign is 5,000 feet.
- Maximum changeable electronic variable message sign brightness of 5,000 cd/m<sup>2</sup> in daylight and 280 cd/m<sup>2</sup> at night.
- Prohibited locations:
  - On interstate and controlled access highways: Within 1,100 feet of an interchange, at-grade intersection, toll plaza, signed curve or lane merge/weave area; within 5,000 feet of another changeable electronic variable message sign or official traffic device that has changeable messages.
  - On primary highways: Within 1,100 feet of an entrance or exit from a controlled access highway, a signed curve or a lane/merge area; within 5,000 feet of another changeable electronic variable message sign or official traffic control device with changeable messages.

Revised criteria made these requirements less restrictive, reducing message duration from 62 to 6 seconds and changing spacing requirements and prohibited locations. The requirements for instantaneous message transition and maximum brightness did not change.

#### San Antonio, TX

Regulations for a trial evaluation of 15 off-premise digital signs included a message duration time of 10 seconds; change intervals of one second or less; brightness less than or equal to 7,000 nits during the day and 2,500 nits at night; and various other regulations. (One nit = one candela per square meter.)

#### Flowery Branch, GA

Regulations in this community begin on page 138 of the report and include:

- Minimum message duration: to the amount of time that would result in one message per mile at the highest speed limit posted within the 5000 feet approaching the sign for the road from which the sign is to be viewed.
- Transition time: less than one-tenth of a second, with no animated transitions.
- Illumination and brightness: not greater than 12 foot-candles from the nearest point of the road.
- Freezing of the display on malfunction.
- Prohibition of message sequencing.

#### Oakdale, MN

Brightness is limited to 2,500 nits during the day and 500 nits at night, with adjustments for ambient light conditions and a minimum display duration of 60 seconds.

### St. Croix County, WI

From page 140 of the report, signs with “external and uncolored” illumination are permitted. In addition to typical prohibitions against flashing, moving, traveling, or animated signs or sign elements, the following prohibitions apply to all signs with internal illumination:

- No illuminated off-premises sign which changes in color or intensity of artificial light at any time while the sign is illuminated shall be permitted.
- No illuminated on-premise sign which changes in color or intensity of artificial light at any time when the sign is illuminated shall be permitted, except one for which the changes are necessary for the purpose of correcting hour-and-minute, date or temperature information.
- A sign that regularly or automatically ceases illumination for the purpose of causing the color or intensity to have changed when illumination resumes (are prohibited).
- The scope of the ordinance’s prohibitions include, but are not limited to, any sign face that includes a video display, LED lights that change in color or intensity, “digital ink,” and any other method or technology that causes the sign face to present a series of two or more images or displays.

### Outdoor Advertising Industry

The Outdoor Advertising Association of America (OAAA) publication Regulating Digital Billboards suggests that digital billboards:

- Display a message that appears for no less than four seconds.
- Have message transitions of at least one second.
- Have spacing consistent with state requirements.
- Do not include animated, flashing, scrolling, intermittent or video elements.
- Appropriately adjust display brightness as ambient light levels change.

### Section 6: Recommendations for Guidelines

Wachtel makes recommendations for guidelines based on the review of literature and international, national, state and local regulations (despite the fact that “there are not yet comprehensive research-based answers to fully inform such guidance and regulation”):

- Minimum message display duration: The FHWA recommends 6 seconds, the OAAA recommends 4 seconds, and the OAAA reports that 41 states have set display minimums ranging from 4 seconds to 10 seconds. Wachtel is not aware of any research on this issue to support such guidelines, and notes that “good human factors practice would suggest that minimum display duration should differ with sight distance, prevailing speeds, and other factors.” The author recommends the following formula to minimize the chance that a motorist will see more than two successive messages:

$$\text{Sight distance to the digital billboards (ft) / Speed limit (ft/sec) = Minimum display duration (sec)}$$

- Interval between successive displays: This interval should be as close to instantaneous as possible so that a driver cannot perceive any blanking of the display screen.
- Visual effects between successive displays: Visual effects should be prohibited.
- Message sequencing: Sequencing should be prohibited.
- Amount of information displayed: To the author’s knowledge, no U.S. jurisdiction places restrictions on the amount of information that may be presented on billboards, including digital billboards (although some agencies outside the United States do). There is not enough research to make recommendations, although a good starting point are guidelines for South Africa and the Netherlands (which limit information based on how much a driver can read at a given speed and while the sign is visible).
- Information presentation: Considerable guidance is available to advertisers and digital billboard owners from sources inside the outdoor advertising industry as well as human factors and traffic

safety experts, and the MUTCD itself. Digital billboards should facilitate rapid, error-free reading of roadside advertisements with lower levels of driver attentional demand and distraction. Typeface, font, color and contrast of figure and background, character size, etc., all play a role in the legibility and readability of a display.

- Digital billboard size: Recommendations for size limitations are beyond the scope of the report. The most common size for billboards of any kind is 14 feet high by 48 feet wide.
- Brightness, luminance and illuminance: Since perceived brightness can change depending on ambient light conditions, it is necessary to establish objective, measurable limits on the amount of light that such billboards actually emit, and set different upper bounds for different environmental and ambient conditions.
- Display luminance in the event of failure: Roadway authorities should incorporate into their guidelines verifiable requirements that, in the event of any failure or combination of failures that affect DBB luminance, the display will default to an output level no higher than that which has been independently determined to be the acceptable maximum under normal operation.
- Longitudinal spacing between billboards: An approaching driver should not be faced with two or more digital billboard displays within his field of view at the same time.
- Digital billboard placement with relation to traffic control devices and driver decision and action points: Prohibitions against the placement of distracting irrelevant stimuli in roadway settings where drivers must make decisions and take actions should be imposed. The guidance for Queensland, Australia, might serve as a model.
- Annual operating permits: Government agencies and roadway operating authorities might consider the practice adopted in Oakdale, MN, where owners of digital billboards are granted a permit to operate a sign for a year and must renew the permit annually.

## Section 7: Digital Billboards On-Premise and on the Right-Of-Way

### *On-Premise Signs*

From page 161 of the report:

... On-premise sign regulation is typically accomplished through local zoning codes, and may, in general, be far more variable and likely less stringent with regard to the means of the display, display characteristics, or the size of the sign than comparable controls on billboards. Many such codes have changed little in recent years, despite the growth of digital technology for on-premise displays.

From the traffic safety perspective, it is possible that the risk of driver inattention and distraction is higher for some on-premise signs than for some [digital billboards], because on-premise signs may be larger and closer to the road, mounted at elevations closer to the approaching driver's eye level, and placed at angles that may require excessive head movements. In addition, many such signs may display animation, full motion video, sound, and other stimuli.

... Agencies might want to consider restrictions for on-premise sign operations at least as rigorous as those for billboards, as well as restrictions on size, height, proximity to the right-of-way, and angular placement with regard to the oncoming driver's line of sight. Of all of the guidelines proposed in this report for [digital billboards], there may well be an equal or greater need to consider similar controls for on-premise signs. In addition, consideration must also be given to such signs' capacity for animation, flashing lights or other special effects, and full motion video.

### *Digital Billboards within the Right-of-Way*

The FHWA opposes advertising of any kind within the right of way (despite proposals for public-private partnerships in California and Nevada).

Wachtel concludes that permitting California to study its proposed exceptions to the requirements of the MUTCD and existing federal law would bring about several adverse consequences, including undermining decades of human factors research, setting a dangerous precedent and opening to challenge the entire basis of the MUTCD.

#### Section 8: New Technology, New Applications, New Challenges

The potential for driver distraction displaying billboards (electronic and otherwise) on moving vehicles is high, as it is for personalized and interactive billboards.

#### Section 9: Summary and Conclusions

From page 179 of the report:

In short, the issue of the role of [digital billboards (DBBs)] in traffic safety is extremely complex, and there is no single research study approach that can provide answers to all of the many questions that must be raised in looking at this issue. ... A small number of important research studies, all published (or to be published) within the past several years, may have opened the door to a solution to the long-standing question of whether unsafe levels of driver distraction can occur from roadside billboards. ... [One study found] that a driver's eyes-off-road time due to external-to-the-vehicle distraction or inattention was estimated to cause more than 23% of all crashes and near crashes that occurred. ... [Another study shows] significantly longer average glance durations to roadside digital signs than to "baseline" sites and to traditional (fixed) billboards, and the researchers suggest, *all* measures of visual glances indicative of driver distraction would prove to be significantly worse in the presence of digital signs if a full study was to be conducted at night. ... [T]here is growing evidence that billboards can attract and hold a driver's attention for the extended periods of time that we now know to be unsafe.

... [A]n on-road study (Lee, et al., 2007) using an instrumented vehicle found many more such long glances made to DBBs and similar "comparison sites" consisting of (among other things) on-premise digital signs, than there were to sites containing traditional, static billboards, or sites with no obvious visual elements. ... From the same study, we have evidence expressed by the researchers that if we were to conduct our research at night we would find that *all* measures of eye glance behavior would demonstrate significantly greater amounts of distraction to digital advertisements than to fixed billboards or to the natural roadside environment, and that driver vehicle control behaviors such as lane-keeping and speed maintenance would also suffer in the presence of these digital signs.

... When we add the results of these recent, applied research studies, to the earlier theoretical work by Theeuwes and his colleagues (1998, 1999), in which they demonstrated that our attention and our eye gaze is reflexively drawn to an object of different luminance in the visual field, that this occurs even when we are engaged in a primary task, and regardless of whether we have any interest in this irrelevant stimulus, and that we may have no recollection of having been attracted to it, we have a growing, and consistent picture of the adverse impact of irrelevant, outside-the-vehicle distracters such as DBBs on driver performance.

Note: In the citations that follow, all references to "Wachtel" are from the 2009 report citation given on page 4 of this report.

**The Effects of Commercial Electronic Variable Message Signs (CEVMS) on Driver Attention and Distraction: An Update**, Federal Highway Administration, Report No. FHWA-HRT-09-018, February 2009.

<http://www.fhwa.dot.gov/realestate/cevms.pdf>

*From the abstract:* The present report reviews research concerning the possible effects of Commercial Electronic Variable Message Signs (CEVMS) used for outdoor advertising on driver safety. Such CEVMS displays are alternatively known as Electronic Billboards (EBB) and Digital Billboards (DBB). The report consists of an update of earlier published work, a review of applicable research methods and techniques, recommendations for future research, and an extensive bibliography. The literature review update covers recent post-hoc crash studies, field investigations, laboratory investigations, previous literature reviews, and reviews of practice. The present report also examines the key factors or independent variables that might affect a driver's response to CEVMS, as well as the key measures or dependent variables which may serve as indicators of driver safety, especially those that might reflect attention or distraction. These key factors and measures were selected, combined, and integrated into a set of alternative research strategies. Based on these strategies, as well as on the review of the literature, a proposed three stage program of research has been developed to address the problem. The present report also addresses CEVMS programmatic and research study approaches. In terms of an initial research study, three candidate methodologies are discussed and compared. These are: (1) an on-road instrumented vehicle study, (2) a naturalistic driving study, and (3) an unobtrusive observation study. An analysis of the relative advantages and disadvantages of each study approach indicated that the on-road instrumented vehicle approach was the best choice for answering the research question at the first stage.

Wachtel notes:

It should be noted that this project was performed essentially in parallel with the present study. Although both looked at the recent literature that addressed driver behavior and performance in the presence of DBBs, the two studies had different goals and took different approaches. The study by Molino and his colleagues was intended to identify gaps in our current knowledge and design a research strategy to begin to fill those gaps, with the ultimate goal of providing the FHWA Office of Real Estate Services with a sufficient empirical basis from which to develop or revise, if appropriate, guidance and/or regulation for the use of DBBs along the Federal Aid Highway System. These goals differed considerably from the present study, whose purpose was to review, not only the recent research literature, but also existing guidelines and/or regulations that have been developed in the U.S. and abroad to address DBBs. Finally, the ultimate goal of the present study was to take what is known from the research, combine this knowledge with what has worked for regulatory authorities, and recommend new guidelines and/or regulations that could be enacted by State and local governments, and private and toll road authorities, without the need or the ability to wait for the completion of additional research. The FHWA study had no such objective.

**The Effects of Visual Clutter on Driving Performance**, Jessica Edquist, Accident Research Centre, Monash University, February 24, 2009.

[http://www.tml.org/legal\\_pdf/Billboard-study-article.pdf](http://www.tml.org/legal_pdf/Billboard-study-article.pdf)

*From the abstract:* Driving a motor vehicle is a complex activity, and errors in performing the driving task can result in crashes which cause property damage, injuries, and sometimes death. It is important that the road environment supports drivers in safe performance of the driving task. At present, increasing amounts of visual information from sources such as roadside advertising create visual clutter in the road environment. There has been little research on the effect of this visual clutter on driving performance, particularly for vulnerable groups such as novice and older drivers. The present work aims to fill this gap. Literature from a variety of relevant disciplines was surveyed and integrated, and a model of the mechanisms by which visual clutter could affect performance of the driving task was developed. To determine potential sources of clutter, focus groups with drivers were held and two studies involving subjective ratings of visual clutter in photographs and video clips of road environments were carried out. This resulted in a taxonomy of visual clutter in the road environment: "situational clutter", including

vehicles and other road users with whom drivers interact; “designed clutter”, including road signs, signals, and markings used by traffic authorities to communicate with users; and “built clutter”, including roadside development and any signage not originating from a road authority. The taxonomy of visual clutter was tested using the change detection paradigm. Drivers were slower to detect changes in photographs of road scenes with high levels of visual clutter than with low levels, and slower for road scenes including advertising billboards than road scenes without billboards. Finally, the effects of billboard presence and lead vehicles on vehicle control, eye movements and responses to traffic signs and signals were tested using a driving simulator. The number of vehicles included appeared to be insufficient to create situational clutter. However billboards had significant effects on driver speed (slower), ability to follow directions on road signs (slower with more errors), and eye movements (increased amount of time fixating on roadsides at the expense of scanning the road ahead). Older drivers were particularly affected by visual clutter in both the change detection and simulated driving tasks. Results are discussed in terms of implications for future research and for road safety practitioners. Visual clutter can affect driver workload as well as purely visual aspects of the driving task (such as hazard perception and search for road signs). When driver workload is increased past a certain point other driving tasks will also be performed less well (such as speed maintenance). Advertising billboards in particular cause visual distraction, and should be considered at a similar level of potential danger as visual distraction from in-vehicle devices. The consequences of roadside visual clutter are more severe for the growing demographic of older drivers. Currently, road environments do not support drivers (particularly older drivers) as well as they could. Based on the results, guidance is given for road authorities to improve this status when designing and location road signage and approving roadside advertising.

**The Impact of Roadside Advertising on Driver Distraction: Final Report**, WSP Development and Transportation, June 2008.

[http://www.highways.gov.uk/knowledge\\_compendium/assets/documents/Portfolio/The%20impact%20of%20roadside%20advertising%20on%20the%20travelling%20public%20-%20Report%20-%201103.pdf](http://www.highways.gov.uk/knowledge_compendium/assets/documents/Portfolio/The%20impact%20of%20roadside%20advertising%20on%20the%20travelling%20public%20-%20Report%20-%201103.pdf)

This report argues against the use of accident data in evaluating the impacts of billboards. Wachtel summarizes these arguments as follows:

- There could be other unknown variables that could have led to the reported accidents.
- There are many opportunities for error or omission in data entry in police accident reporting forms.
- In minor accidents, the involved vehicles may move away from the point of rest (POR) to clear traffic lanes, thus further degrading the potential accuracy of identifying the true location. The POR of the involved vehicle(s) (which is what is commonly identified in police reports) may have little relationship to the point of distraction that was the proximal cause of the crash.
- Accidents, particularly minor accidents, are underreported.
- Accident data considers only those incidents that result in an actual collision. But there are likely many more incidences of distraction that result in driver error (such as late braking, lane exceedances) without consequence, and others that result in “near misses” that might have resulted in a crash but for the evasive actions of another driver. “As no data on ‘near misses’ is available, it is not possible to quantify the full effect of distraction” (p. 35).

Wachtel also summarizes the reports broad conclusions as follows:

- Although it is accepted that drivers are responsible for attending to the driving task, “visual clutter is liable to overload or distract drivers” (p. 63).
- The stakeholders could not provide statistical evidence to demonstrate the presence or absence of a correlation between roadside advertising and accidents.
- There is no desire for an outright ban on roadside advertising, but there is general agreement about the need for more guidance or regulation to control the type, location and content of such advertising.
- There is a need for additional governmental powers to remove unauthorized advertising, and there is a need to make enforcement a greater priority.

**\*A Study of the Relationship between Digital Billboards and Traffic Safety in Cuyahoga County, Ohio**, Tantara Associates, sponsored by the OAAA, July 2007.

Citation at <http://trid.trb.org/view/2007/M/1154756>

This study sponsored by the Outdoor Advertising Association of America uses police reports to examine the statistical relationship between certain digital billboards and traffic safety for seven locations in Cuyahoga County. Results show no statistical relationship between the presence of digital billboards and accidents.

Wachtel notes:

The authors performed a post-hoc accident analysis study in which they reviewed statistical summaries of traffic collision reports, the originals of which had been prepared by investigating police officers. There are serious, inherent weaknesses in the use of this technique; such weaknesses have been understood and well documented for many years (see, for example, Wachtel and Netherton, 1980; Klauer, et al., 2006b; Speirs, et al., 2008). The use of this approach to relate crashes to driver distraction from DBBs, however, raises additional concerns.

Wachtel goes on to give an extensive critique of this study (pages 89 to 101), reprising his criticisms in the following review:

**A Critical, Comprehensive Review of Two Studies Recently Released by the Outdoor Advertising Association of America**, Jerry Wachtel, The Veridian Group, October 18, 2007.  
[http://www.scenic.org/storage/documents/Wachtel\\_Maryland\\_review.pdf](http://www.scenic.org/storage/documents/Wachtel_Maryland_review.pdf)

*From the report:* In July 2007, the Outdoor Advertising Association of America (OAAA) announced on its website the issuance of two “ground-breaking studies” that addressed the human factors and driver performance issues associated with real-world digital (or electronic) billboards (EBBs), and the impact of such billboards on traffic accidents (Outdoor Advertising Association of America, 2007). ... As a result of the issuance of these two studies and the claims made for them, and because of the need to address this technology by Government agencies nationwide, the Maryland State Highway Administration (MDSHA) asked this reviewer to perform an independent peer review of each of the two studies. This report represents the results of that review. ... Having completed this peer review, it is our opinion that acceptance of these reports as valid is inappropriate and unsupported by scientific data, and that ordinance or code changes based on their findings is ill advised.

**\*Driving Performance and Digital Billboards**, Suzanne E. Lee, Melinda J. McElheny, Ronald Gibbons, Center for Automotive Safety Research, Virginia Tech Transportation Institute, sponsored by the OAAA, March 22, 2007.

<http://www.oaaa.org/UserFiles/File/Legislative/Digital/6.3.9b%20Driver%20Behavior%20Research.pdf>

*From the abstract:* Thirty-six drivers drove an instrumented vehicle on a 50-mile loop route in the daytime along some of the interstates and surface streets in Cleveland [OH]. ... The overall conclusion, supported by both the eyegance results and the questionnaire results, is that the digital billboards seem to attract more attention than the conventional billboards and baseline sites. Because of the lack of crash causation data, no conclusions can be drawn regarding the ultimate safety of digital billboards. Although there are measurable changes in driver performance in the presence of digital billboards, in many cases these differences are on a par with those associated with everyday driving, such as the on-premises signs located at businesses.

**Driven to Distraction: Determining the Effects of Roadside Advertising on Driver Attention**, Mark S. Young, Janina M. Mahfoud, Brunel University, 2007.

<http://bura.brunel.ac.uk/bitstream/2438/2229/1/Roadside%20distractions%20final%20report%20%28Brunel%29.pdf>

*From the abstract:* There is growing concern that roadside advertising presents a real risk to driving safety, with conservative estimates putting external distractors responsible for up to 10% of all accidents. In this report, we present a simulator study quantifying the effects of billboards on driver attention, mental workload and performance in Urban, Motorway and Rural environments. The results demonstrate that roadside advertising has a clear detrimental effect on lateral control, increases mental workload and eye fixations, and on some roads can draw attention away from more relevant road signage. Detailed analysis of the data suggests that the effects of billboards may in fact be more consequential in scenarios which are monotonous or of lower workload. Nevertheless, the overriding conclusion is that prudence should be exercised when authorising or placing roadside advertising. The findings are discussed with respect to governmental policy and guidelines.

Wachtel gives an extensive critique of the methodology for this industry-sponsored study (pages 101 to 114).

**The Impact of Driver Inattention on Near-Crash/Crash Risk: An Analysis Using the 100-Car Naturalistic Driving Study Data**, S.G. Klauer, T.A. Dingus, V.L. Neale, J.D. Sudweeks, D.J. Ramsey, Virginia Tech Transportation Institute, April 2006.

<http://www.nhtsa.gov/DOT/NHTSA/NRD/Multimedia/PDFs/Crash%20Avoidance/2006/DriverInattention.pdf>

*From the abstract:* The purpose of this report was to conduct in-depth analyses of driver inattention using the driving data collected in the 100-Car Naturalistic Driving Study. An additional database of baseline epochs was reduced from the raw data and used in conjunction with the crash and near-crash data identified as part of the original 100-Car Study to account for exposure and establish near-crash/crash risk. The analyses presented in this report are able to establish direct relationships between driving behavior and crash and near-crash involvement. Risk was calculated (odds ratios) using both crash and near-crash data as well as normal baseline driving data for various sources of inattention. The corresponding population attributable risk percentages were also calculated to estimate the percentage of crashes and near-crashes occurring in the population resulting from inattention. Additional analyses involved: driver willingness to engage in distracting tasks or driving while drowsy; analyses with survey and test battery responses; and the impact of driver's eyes being off of the forward roadway. The results indicated that driving while drowsy results in a four- to six-times higher near-crash/crash risk relative to alert drivers. Drivers engaging in visually and/or manually complex tasks have a three-times higher near-crash/crash risk than drivers who are attentive. There are specific environmental conditions in which engaging in secondary tasks or driving while drowsy is more dangerous, including intersections, wet roadways, and areas of high traffic density. Short, brief glances away from the forward roadway for the purpose of scanning the driving environment are safe and actually decrease near-crash/crash risk. Even in the cases of secondary task engagement, if the task is simple and requires a single short glance, the risk is elevated only slightly, if at all. However, glances totaling more than 2 seconds for any purpose increase near-crash/crash risk by at least two times that of normal, baseline driving.

**Driving Performance in the Presence and Absence of Billboards**, Suzanne E. Lee, Erik C.B. Olsen, Maryanne C. DeHart, Virginia Polytechnic Institute and State University, February 29, 2004.

Citation at <http://trid.trb.org/view/2004/M/811075>

*From the abstract:* The current project was undertaken to determine whether there is any change in driving behavior in the presence or absence of billboards. Several measures of eyeglance location were used as primary measures of driver visual performance. Additional measures were included to provide further insight into driving performance—these included speed variation and lane deviation. The overall conclusion from this study is that there is no measurable evidence that billboards cause changes in driver



behavior, in terms of visual behavior, speed maintenance, and lane keeping. A rigorous examination of individual billboards that could be considered to be the most visually attention-getting demonstrated no measurable relationship between glance location and billboard location. Driving performance measures in the presence of these specific billboards generally showed less speed variation and lane deviation. Thus, even in the presence of the most visually attention-getting billboards, neither visual performance nor driving performance changes measurably. Participants in this study drove a vehicle equipped with cameras in order to capture the forward view and two views of the driver's face and eyes. The vehicle was also equipped with a data collection system that would capture vehicle information such as speed, lane deviation, GPS location, and other measures of driving performance. Thirty-six drivers participated in the study, driving a 35-mile loop route in Charlotte, North Carolina. A total of 30 billboard sites along the route were selected, along with six comparison sites and six baseline sites. Several measures were used to examine driving performance during the 7-seconds preceding the billboard or other type of site. These included measures of driver visual performance (forward, left, and right glances) and measures of driving performance (lane deviation and speed variation). With 36 participants and 42 sites, there were 1,512 events available for analysis. A small amount of data was lost due to sensor outages, sun angle, and lane changes, leaving 1,481 events for eyeglance analysis and 1,394 events for speed and lane position analysis. Altogether, 103,670 video frames were analyzed and 10,895 glances were identified. There were 97,580 data points in the speed and lane position data set. The visual performance results indicate that billboards do not differ measurably from comparison sites such as logo boards, on-premises advertisements, and other roadside items. No measurable differences were found for visual behavior in terms of side of road, age, or familiarity, while there was one difference for gender. Not surprisingly, there were significant differences for road type, with surface streets showing a more active glance pattern than interstates. There were also no measurable differences in speed variability or lane deviation in the presence of billboards as compared to baseline or comparison sites. An analysis of specific, high attention-getting billboards showed that some sites show a more active glance pattern than other sites, but the glance locations did not necessarily correspond to the side of the road where the billboards were situated. The active glance patterns are probably due more to the road type than to the billboard itself. One major finding was that significantly more time was spent with the eyes looking forward (eyes on road) for billboard and comparison sites as compared to baseline sites, providing a clue that billboards may actually improve driver visual behavior. Taken as a whole, these analyses support the overall conclusion that driving performance does not change measurably in the presence or absence of billboards.

**Effects of Roadside Advertisements on Road Safety, Finnish Road Administration, 2004.**

<http://alk.tiehallinto.fi/julkaisut/pdf/4000423e-veffectsofroadside.pdf>

*From the abstract:* The effects of roadside advertisements on road safety have been studied using various methods. The topic was studied in Finland especially in the 1970s and 1980s. The results of those studies can be summarised thusly:

- In general, the number of accidents occurring near roadside advertisements has not been observed to be higher than at reference sites.
- The negative effects of advertisements are, however, visible in accident statistics if they are focused on limited conditions (junctions).
- The effects of advertisements are apparent in driver behaviour, but the effects measured in normal traffic are small.
- Advertisements along main roads distract the detection of traffic signs and possibly also other objects relevant to the driver's task.

**“Observed Driver Glance Behavior at Roadside Advertising Signs,”** *Transportation Research Record* 1899, 2004: 96-103.

Citation at <http://trid.trb.org/view/2004/C/749677>

*From the abstract:* This study focused on the glance behavior of 25 drivers at various advertising signs along an expressway in Toronto, Ontario, Canada. The average duration of the glances for the subjects was 0.57 s [standard deviation (SD) = 0.41], and in total there was an average of 35.6 glances per subject (SD = 26.4). Active signs that contained movable displays or components made up 51% of the signs and received significantly more glances (69% of all glances and 78% of long glances). The number of glances was significantly lower for passive signs (0.64 glances per subject per sign) than for active signs (greater than 1.31 glances per subject per sign). The number of long glances was also greater for active signs than for passive signs. Sign placement in the visual field may be critical to a sign being noticed or not. Empirical information is provided to assist regulatory agencies in setting policy on commercial signing.

Wachtel notes:

The implication for digital signs is that the shorter the period of time for which a given message is presented, and thus the more likely it is that a given approaching driver will see one or more message changes, the more likely it is that a driver will glance at such a sign for a longer period in anticipation of the next message to be displayed. Further, digital billboards display some characteristics of both fixed, traditional billboards and the types of active signs examined here. For example, a digital billboard may display a fixed image to any particular approaching driver, but depending upon its message cycle time, a driver may see one or more different displays. In this way, it is not unlike the roller signs discussed in this study, and, depending upon the display duration and change interval, digital signs may attract the same kind of attention expressed by some of the respondents in this study. Finally, a digital billboard is likely to possess image brightness, color, contrast, and image fidelity far higher than that achieved by any of the four sign types examined by the authors in this study. While the implications of these technological advances suggest that digital billboards would be more effective at capturing attention, this remains an empirical question.

**“Driver Distraction by Advertising: Genuine Risk or Urban Myth?”** Brendan Wallace, *Proceedings of the Institution of Civil Engineers, Municipal Engineer*, Vol. 156, Issue 3, September 2003: 185-190.

Citation at <http://trid.trb.org/view/2003/C/688088>

*From the abstract:* Drivers operate in an increasingly complex visual environment, and yet there has been little recent research on the effects this might have on driving ability and accident rates. This paper is based on research carried out for the Scottish Executive’s Central Research Unit on the subject of external-to-vehicle driver distraction. A literature review/meta-analysis was carried out with a view to answering the following questions: is there a serious risk to safe driving caused by features in the external environment, and if there is, what can be done about it? Review of the existing literature suggests that, although the subject is under-researched, there is evidence that in some cases overcomplex visual fields can distract drivers and that it is unlikely that existing guidelines and legislation adequately regulate this. Theoretical explanations for the phenomenon are offered and areas for future research highlighted.

Wachtel summarizes the major conclusions as follows:

- The adverse effect of billboards is real, but situation specific.
- Too much visual clutter at or near intersections can interfere with drivers’ visual search and lead to accidents.
- It is “probable” that isolated, illuminated billboards in an otherwise boring section of highway can create distraction through phototaxis.

**Research Review of Potential Safety Effects of Electronic Billboards on Driver Attention and Distraction**, Federal Highway Administration, September 11, 2001.

<http://www.fhwa.dot.gov/realstate/elecbbbrd/elecbbbrd.pdf>

This report reviews the literature on electronic billboards (with a focus on implications for safety) from 1980 to 2001. Based on the literature review, it identifies knowledge gaps and potential research questions categorized by roadway characteristics such as curves, interchanges and work zones; electronic billboard characteristics such as exposure time, motion and legibility; and driver characteristics such as familiarity and age. Related research findings on the legibility of changeable message signs are also included.

Wachtel gives the following overview of the report's conclusions:

A number of the conclusions reached, while highly relevant, might be seen even more strongly in light of the observations made by other researchers. For example, the authors appropriately suggest that there may be lessons from studies into the legibility and conspicuity of official changeable message signs that could be applied to [digital billboards (DBBs)]. They further discuss the fact that low levels of illumination on official signs could lead to reduced conspicuity and, hence, reduced legibility. This difficulty might be exacerbated because DBBs typically have very high luminance levels, often leading to complaints by the traveling public as well as regulators. These high luminance levels may increase the conspicuity of the DBBs at the expense of official signs. Similarly, the authors discuss differences in response to signs by familiar vs. unfamiliar drivers, since it is understood that motorists who pass the same signs regularly become acclimated to their presence and may ignore them. Of course, one of the defining characteristics of DBBs is their ability to display a new message every few seconds, thus, in effect, presenting displays that are always new and therefore unfamiliar to all drivers.

The report also gives an overview of state regulations and practices as of 2001 (pages 5-9 and Appendices B and C) of 42 states:

- Thirty-six states had prohibitions on signs with red, flashing, intermittent or moving lights.
- Twenty-nine states prohibited signs that were so illuminated as to obscure or interfere with traffic control devices.
- Twenty-nine states prohibited signs located on Interstate or primary highway outside of the zoning authority of incorporated cities within 500 feet of an interchange or intersection at grade or safety roadside area.

**“An Evaluation of the Influence of Roadside Advertising on Road Safety in the Greater Montreal Region,”** J. Bergeron, *Proceedings of the 1997 Conference of the Northeast Association of State Transportation Officials*, 1997: 527.

Citation at <http://trid.trb.org/view/1997/C/539081>

Wachtel summarizes this report's conclusions as follows:

- Attentional resources needed for the driving task are diverted by the irrelevant information presented on advertising signs. This is an impact attributable to the “nature of the information” that is conveyed on such signs. This distraction leads to degradation in oculomotor performance that adversely affects reaction time and vehicle control capability.
- When the driving task imposes substantial attentional demands such as might occur on a heavily traveled, high speed urban freeway, billboards can create an attentional overload that can have an impact on micro- and macro-performance requirements of the driving task. In other words, the impact of the distraction varies according to the complexity of the driving task. The greater the driving task demands, the more obvious are the adverse effects of the distraction on driving performance.
- The difficulty of the driving task can vary in several ways. Those that relate to the physical environment (e.g., weather, roadway geometry, road conditions) are unavoidable, and drivers must adjust to them (unless they take an alternate route or wait for better conditions). Necessary

sensory information adds to the workload of the driving task, but is, of course, needed to perform safely. In addition, road signs and signals that communicate complex but necessary information contribute to the overall workload of driving. In this case, however, years of study have been directed toward making this information as clear and as easily accessible as possible.

- To some extent, the level of mental workload that impacts driving occurs at a pre-processing level. Bergeron cites, as an example, a complex or cluttered visual environment. In this case, the attentional effort that drivers expend in searching for target objects (e.g., signs and signals) will be more laborious, demand more resources, and lead to declines in performance levels.
- The presence of a billboard increases the confusion of the visual (back)ground and may lead to conflict with road signs and signals.
- Situational factors that are likely to create a heavy mental workload include: complex geometry, heavy traffic, high speeds, areas of merging and diverging traffic, areas with road signs where drivers must make decisions, roadways in poor repair, areas of reduced visibility, and adverse weather conditions.
- The very characteristics of billboards that their designers employ to enable them to draw attention are those that have the greatest impact on what Bergeron calls attentional diversion.
- Drivers must constantly carry out the work of recognizing stimuli that may not be immediately meaningful to them. This task requires time and mental resources, both of which are in limited supply.
- Attention directs perception, and vice versa. In other words, when we are looking for something, our sensory system places itself at the service of our attention. But it is also possible for a sensation to attract the attention of drivers because it may represent something that is of potential importance. For example, authorities put flashing lights on emergency vehicles because they want drivers to attend to them.

**Review of Roadside Advertising Signs**, Transportation Environment Consultants, Roads and Traffic Authority, August 1989.

Citation at <http://trid.trb.org/view.aspx?id=350317>

*From the abstract:* Some of the main findings are: 1) The review study did not identify any factor or experience which would substantiate, on safety grounds, the long standing policy of prohibiting the erection of advertising signs within the road reserves of declared roads, including freeways. In fact, the literature survey, embracing over 40 publications including a comprehensive safety survey as recently as 1985, did not identify any evidence to say that, in general, advertising signs are causing traffic accidents. 2) Human factors research confirms the principle of the limited processor capacity of the driver. Management of stimuli to the driver, both inherent to the driving task and from external (distractions) sources, requires scrutiny as driving performance deteriorates when high levels of attention and decision making are involved. 3) Motorists information needs systems comprise a 'navigational' and a 'services information' component. There is a strong correlation between these needs and the adequacy of display of such information by traditional forms of advertising. 4) Changing values of aesthetics and amenity have resulted from community concerns with the disorder and clutter of traditional roadside advertising; 5) Subject to specified control conditions, advertising signs may be permitted within the road reserve of declared roads, including freeways. Desirably such signs should provide directional, tourist, services and locational information.

Wachtel summarizes the report's conclusions as follows:

- Research confirms the limited processor capacity of a driver.
- It is important that management of stimuli to the driver, both inherent to the primary task of driving and external to it (distraction) must clearly aim not to exceed the optimum rate for safe and efficient driver performance.
- When these external stimuli fall significantly below optimum, driver performance may decrease (boredom), and additional external stimuli could benefit driver response.

- Additional attentional loading by advertising signs may impair driving performance when high levels of attention and decision making are required.
- Advertisements not associated with navigational and services information needs can, subject to relevant safety controls, be permitted at roadside locations where the driving task does not heavily load the attentional capacity of the driver.

Interestingly, they reported from their interview with a Dr. S. Jenkins of the ARRB, his recommendation that “changeable message signs could be used in roadside advertisements providing each message is ‘static for about 5 minutes’ (i.e., the message on-time) and the changeover period between messages ‘does not exceed about 2 seconds’” (p. 39).

In a later chapter of the report, the authors provide a series of “definitions and technology” (p. 49) to describe the different types of advertising signs that might be considered, and how they might be used. In a section on “internally illuminated signs” the authors provide a table showing what they consider to be the maximum luminance levels of advertising signs of different sizes which may be located in different driving environments. These data are based on recommendations from the Public Lighting Engineers in the U.K. With regard to “electronic variable-message signs” the authors devote several pages to defining terminology and identifying “factors” that should be taken into account when considering their impact (pp. 56-60). This discussion is taken directly from the Wachtel and Netherton (1980) report (pp. 68-74), and need not be repeated here.

### **Literature on Outdoor Advertising Safety Since the 2009 Wachtel Report**

**“Advertising Billboards Impair Change Detection in Road Scenes,”** J. Edquist, T. Horberry, S. Hosking, I. Johnston, *Proceedings of the Australasian Road Safety Research, Policing and Education Conference*, November 6-9, 2011.

<http://casr.adelaide.edu.au/rsr/RSR2011/4CPaper%20166%20Edquist.pdf>

*From the abstract:* The present experiment used the ‘change detection’ paradigm to examine how billboards affect visual search and situation awareness in road scenes. In a controlled experiment, inexperienced, older, and comparison drivers searched for changes to road signs and vehicle locations in static photographs of road scenes. On average, participants took longer to detect changes in road scenes that contained advertising billboards. This finding was especially true when the roadway background was more cluttered, when the change was to a road sign, and for older drivers. The results are consistent with the small yet growing body of evidence suggesting that roadside advertising billboards impair aspects of driving performance such as visual search and the detection of hazards, and therefore should be more precisely regulated in order to ensure a safe road system.

**“Are Roadside Electronic Static Displays a Threat to Safety?”** Rena Friswell, Elia Vecellio, Raphael Grzebieta, Julie Hatfield, Lori Mooren, Murray Cleaver, Michael De Roos, *Proceedings of the Australasian Road Safety Research, Policing and Education Conference*, November 6-9, 2011.

<http://casr.adelaide.edu.au/rsr/RSR2011/4CPaper%20172%20Friswell.pdf>

This study reviews the literature from 2001 to 2010 on the effects of electronic static displays (ESDs) on driver distraction, driving performance and safety, and discusses the implications of the findings for research and policy. Researchers found only 11 studies that bear directly on ESDs, and created two tables summarizing them (pages 5-8). Over half of the studies were conducted by Tantala and Tantala and were commissioned by the U.S. Outdoor Advertising Association of America, and most examined crash data before and after installation of ESDs. Five of the eight crash data studies reported no adverse effect of ESD installation on crashes, but both of the studies that compared post-installation crashes with the rates predicted by the trend in pre-installation crashes found statistically significant evidence of increased crashes following installation. Studies using measures other than crashes reported mixed findings. Gaze was directed toward the sign stimuli in the simulator and on-road studies, dual task reaction time was slowed in the presence of the sign stimuli in the laboratory experiment, and lane keeping was impaired in

the simulator study but reductions in lane keeping only approached significance on-road and there was no evidence of speed disruption on-road. Researchers conclude that while the research designs for these studies are weak, there does seem to be evidence that ESDs can have a negative impact on attention, driving performance and safety.

**Outdoor Advertising Control Practices in Australia, Europe, and Japan**, Federal Highway Administration, May 2011.

<http://ntl.bts.gov/lib/42000/42200/42240/FHWA-PL-11-023.pdf>

This study scanned practices in Australia, Sweden, the Netherlands and the United Kingdom to learn how they regulate outdoor advertising both inside and outside the roadway right of way, and also includes a desk scan of outdoor advertising practices in Japan.

General similarities between practices in the countries visited and those of the United States include (pages 1-2):

- Inconsistent enforcement and mixed success in developing more objective criteria for decision makers.
- Interest in growing commercial advertising in transportation corridors.
- Interest in generating revenue inside the right of way and removing some of the restrictions to commercial use of the right of way.
- Common interest in regulating new technologies to minimize driver distraction, such as use of and rules to govern commercial electronic variable message signs (CEVMS). The major focus is reducing crashes and fatalities.
- Prohibitions of signs that resemble official signs.
- Interest in reliable research on the safety impacts of outdoor advertising and CEVMS.

Differences (from pages 2-3 of the report) include:

- Where outdoor advertising is allowed in the countries visited, state and federal responsibility is limited to high-level and national routes.
- For permitting purposes, on-premise and off-premise signs are regulated.
- The national/federal government has a lesser role in the state's administration and program compliance.
- Sign businesses, site owners, and sign owners can incur penalties for noncompliance.
- Agencies in the countries visited rely more on safety factors and the relationship between the sign and the road environment for permitting decisions than agencies in the United States.
- Agencies have some control over message formatting, such as specifying font size and prohibiting phone numbers and e-mail addresses, to reduce driver distraction and reading time.
- Local planning authorities had more regulatory involvement in and control of sign permits in all countries visited because all areas were under some control, designation, or zoning. There were few unzoned areas because of more rigorous, comprehensive local planning and land use management.
- Use of the right- of- way for commercial billboards is limited, but more prevalent in locally controlled urban jurisdictions. One Australian state generated AU\$15 million with advertising inside the right- of- way, but most countries visited are waiting until more conclusive research is done on driver distraction. Sweden is beginning a pilot.
- Signs may be removed after permitted if safety is a concern.
- In all of the countries visited, traffic and public safety play a more critical role in the permitting process than in the United States.
- All of the countries have developed criteria to identify unacceptable signs, such as those that resemble traffic control devices, could direct traffic, or could distract or confuse drivers.
- The safety evaluation process is more comprehensive, both in the documentation and burden of proof applicants must provide that a sign will not create a safety hazard and the review process after an application is submitted.

Based on this scan, researchers suggest the following steps to enhance safety (from page 4 of the report):

- Develop criteria to evaluate permit applications to identify signs that are unacceptable from a safety perspective because they resemble traffic control devices or could distract or confuse drivers.
- Update the assessment criteria used to review permit applications to reflect design, planning, environmental, and public and traffic safety criteria used by several countries visited.
- Update permitting requirements to include an analysis of the technical feasibility, benefits, safety impacts, and other effects of a proposed outdoor advertising installation.
- Conduct research on the safety impacts of outdoor advertising, and possibly require applicants to conduct a safety analysis to demonstrate the design and safety feasibility of proposed installations. Assess whether existing traffic data from intelligent transportation systems or traffic control centers could be used to track traffic patterns and establish the potential impacts of commercial electronic variable message signs on traffic flow.
- Study the effects of full-motion video on driver attention.

**“Effects of Advertising Billboards During Simulated Driving,”** Jessica Edquist, Tim Horberry, Simon Hosking, Ian Johnston *Applied Ergonomics*, Vol. 42, Issue 4, May 2011: 619-626.

Citation at <http://trid.trb.org/view/2011/C/1100574>

*From the abstract:* The driving simulator experiment presented here examines the effects of billboards on drivers, including older and inexperienced drivers who may be more vulnerable to distractions. The presence of billboards changed drivers’ patterns of visual attention, increased the amount of time needed for drivers to respond to road signs, and increased the number of errors in this driving task.

**“Digital Billboards, Distracted Drivers,”** Jerry Wachtel, *Planning*, Vol. 77, Issue 3, March 2011: 25-27.

Citation at <http://trid.trb.org/view/2011/C/1106533>

*From the abstract:* This article discusses the negative consequences of billboards, especially those that employ digital technology. ... An industry study has shown that drivers take their eyes off the road for two seconds or longer twice as often when they are looking at digital advertising signs than when they are looking at traditional billboards. ... The author has identified four factors that could reduce the distraction caused by digital billboards: control the lighting at nighttime; lengthen the dwell time of messages; simplify the message by limiting the number and types of words and symbols; and prohibit message sequencing (i.e., the digital equivalent of Burma Shave-type signs).

**“External Distractions: The Effects of Video Billboards and Windfarms on Driving Performance,”** *Handbook of Driving Simulation for Engineering, Medicine and Psychology*, CRC Press, 2011: 16-1 – 16-14.

Citation at <http://trid.trb.org/view/2011/C/1114742>

This study used a driving simulator to study driver reactions to the braking of a lead vehicle in the presence of wind turbines and digital video billboard. While perception response time was not affected by the presence of wind turbines, significantly more rear-end collisions occurred to the hard lead-vehicle braking event in the presence of video billboards than conventional billboard and control conditions.

**\*“An Examination of the Relationship between Digital Billboards and Traffic Safety in Reading, Pennsylvania, Using Empirical Bayes Analyses,”** *Moving Toward Zero: 2011 ITE Technical Conference and Exhibit*, sponsored by the Institute of Transportation Engineers, 2011.

Citation at <http://trid.trb.org/view/2011/C/1103869>

*From the abstract:* This paper examines the statistical relationship between advertising digital billboards and traffic safety using Empirical Bayes Method analyses. Specifically, this paper analyzes traffic and accident data near 26 existing, non-accessory, advertising digital billboards along routes with periods of comparison as long as 8 years in the greater Reading area, Berks County, Pennsylvania. These studied digital billboards are one type of commercial electronic variable message signs (CEVMS) which display

static messages, include no animation, flashing lights, scrolling, or full-motion video, and have duration times of 6, 8, or 10 seconds. Temporal (when and how frequently) and spatial (where and how far) statistics are summarized within multiple vicinity ranges as large as one mile near billboards. The study uses the Empirical Bayes (EB) method to predict the “expected” range of accidents at locations assuming that no digital billboard technology was introduced. The method analyzes data near 26 billboard locations, incorporates data using 51 non-digital comparison sites, and establishes a multivariate Crash Estimation Model (CEM) with a negative binomial distribution to estimate expected numbers of crashes near locations. Predictive methods in the AASHTO Highway Safety Manual are used with the Pennsylvania Department of Transportation (PennDOT) highway, geometric, and crash data.

**Investigating Driver Distraction: The Effects of Video and Static Advertising**, TRL Published Project Report, Transport Research Laboratory, 2010.

Citation at <http://trid.trb.org/view/2010/M/919620>

*From the abstract:* Roadside advertising is a common sight on urban roads. Previous research suggests the presence of advertising increases mental workload and changes the profile of eye fixations, drawing attention away from the driving task. This study was conducted using a driving simulator and integrated eye-tracking system to compare driving behaviour across a number of experimental advertising conditions. Forty eight participants took part in this trial, with three factors examined; Advert type, position of adverts and exposure duration to adverts. The results indicated that when passing advert positions, drivers: spent longer looking at video adverts; glanced at video adverts more frequently; tended to show greater variation in lateral lane position with video adverts; braked harder on approach to video adverts; drove more slowly past video adverts. The findings indicate that video adverts caused significantly greater impairment to driving performance when compared to static adverts. Questionnaire results support the findings of the data recorded in the driving simulator, with participants being aware their driving was more impaired by the presence of video adverts. Through analysis of the experimental data, this study has provided the most detailed insight yet into the effects of roadside billboard advertising on driver behaviour.

**“Quantifying External Vehicle Distractions and Their Impacts at Signalized Intersections,”** Raheem Dilgir, Cory Wilson, *ITE 2010 Annual Meeting and Exhibit*, sponsored by the Institute of Transportation Engineers, 2010.

<http://www.ite.org/annualmeeting/compendium10/pdf/AB10H3702.pdf>

This study investigated the safety impacts of visual distractions for vehicles at 28 signalized intersections in greater Vancouver, British Columbia, and Calgary, Alberta. Site visits were conducted to assess each intersection, and three years of collision data and traffic volumes were provided by road agencies. The results indicated a positive relationship between distraction score and collision rate as well as between distraction score and collision frequency. Analysis of individual distraction criteria revealed that the strongest correlation exists between roadside advertising and safety. No other specific element was significantly more influential than another regarding safety performance, suggesting that the combined effect of various distraction features is correlated to safety performance.

**The Impact of Sacramento State’s Electronic Billboard on Traffic and Safety**, Mahesh Pandey, California State University, Sacramento, Summer 2010.

<http://csus-dspace.calstate.edu/bitstream/handle/10211.9/282/Project%20Report10a.pdf?sequence=1>

This student project evaluated the traffic and safety impact of a new electronic billboard near Sacramento State adjacent to Highway 50 by analyzing traffic flow parameters on upstream portions of electronic billboards on both directions of the highway before and after the installation. Data came from the California Freeway Performance Measurement System (PeMS) database for changes in common traffic flow parameters (speed, flow rate and lane occupancy) over a two-month period before and after the installation of the electronic billboard. This project also analyzed crash and collision data from PeMS for changes in noninjury, injury and fatal crashes over a one-year period before and a one-year period after the installation of the electronic billboard.



Results showed that the presence of the electronic billboard near Sacramento State does not appear to have a significant negative impact in traffic performance (flow, speed and lane occupancy) or incidents in the study section of the freeway. Because many of the road users at this segment are probably commuters, they may be familiar with the electronic billboard, and it does not appear to affect their driving. Even though electronic billboards are capable of displaying multiple messages/commercials at different times, the advertisements do not appear to be a major distraction to drivers at this location. No changes in measurable impact on road safety after the installation of the electronic billboard were observed. At the same time, a public opinion survey indicated that more than two-thirds of self-identified drivers through the study area who were surveyed believed that this electronic billboard does not pose a safety risk to traffic.

**“Conflicts of Interest: The Implications of Roadside Advertising for Driver Attention,”**

*Transportation Research Part F: Traffic Psychology and Behaviour*, Vol. 12, Issue 5, September 2009: 381-388.

Citation at <http://trid.trb.org/view/2009/C/902985>

*From the abstract:* There is growing concern that roadside advertising presents a real risk to driving safety, with conservative estimates putting external distractors responsible for up to 10% of all road traffic accidents. In this report, we present a simulator study quantifying the effects of billboards on driver attention, mental workload and performance in urban, motorway and rural environments. The results demonstrate that roadside advertising has clear adverse effects on lateral control and driver attention, in terms of mental workload. Whilst the methodological limitations of the study are acknowledged, the overriding conclusion is that prudence should be exercised when authorizing or placing roadside advertising. The findings are discussed with respect to governmental policy and guidelines.

**Digital Billboard Safety Amongst Motorists in Los Angeles**, Steven Clark Henson, California State University Northridge, Spring 2009.

[http://www.csun.edu/~sch60990/Geog\\_490\\_PAPER.pdf](http://www.csun.edu/~sch60990/Geog_490_PAPER.pdf)

The paper discusses the impact of digital billboards and driver safety in Los Angeles via a review of literature, driver behavior surveys and a spatial analysis of high traffic collision intersections and digital billboard locations. Of 76 intersections with digital billboards, only three (4 percent) were hazardous intersections (as defined by The 2008 California 5 Percent Report and driver surveys). However, 80 percent of drivers surveyed said they were more likely to glance at a digital billboard as opposed to a standard billboard, 42.8 percent said that digital billboards inhibited the ability of motorists to concentrate on the road, and all but two respondents said their glances are longer than two seconds.

**Luminance Criteria and Other Human Factors for Sign Design**

In the following studies, “luminance” refers to luminous intensity per unit area, measured in candela per square meter (cd/m<sup>2</sup>, or “nit”). Luminance differs from brightness, which measures the subjective perception caused by an object’s luminance, and can differ in various contexts for an object of the same luminance.

**“Congruent Visual Information Improves Traffic Signage,”** *Transportation Research Part F: Traffic Psychology and Behaviour*, Vol. 15, Issue 4, 2012: 438-444.

Abstract at: <http://trid.trb.org/view/2012/C/1141270>

*From the abstract:* This study investigated the interference effect produced by the position of the sign elements in traffic signage on response accuracy and reaction time. Sixteen drivers performed a flanker interference reaction time task. Incongruent graphical/space solutions, actually used for the airport stack-type sign, [led] to increased reaction time and a reduction in the proportion of correct answers. These results suggest that incongruent visual information should be avoided, as this might impair drivers’ performance. These findings provide important information for the specification of future signage design guidelines and for improving road safety.

**“A Study on Guide Sign Validity in Driving Simulator,”** Wei Zhonghua, Gong Ming, Guo Ruili, Rong Jian, *Transportation Research Board 91st Annual Meeting Compendium of Papers DVD*, Paper #12-1983, sponsored by Transportation Research Board, 2012.

Citation at <http://trid.trb.org/view/2012/C/1129560>

This project used a driving simulator to study guide sign legibility distance. Results indicated that legibility distance was inversely related to speed and positively related to the text height of the guide sign. When the speed is 20km/h, 30km/h or 40km/h, the magnifying power of text height is 4.3, 4.1 or 3.8, respectively.

**“Luminance Criteria and Measurement Considerations for Light-Emitting Diode Billboards,”** John Bullough, Nicholas Skinner, *Transportation Research Board 90th Annual Meeting Compendium of Papers DVD*, Paper #11-0659, sponsored by Transportation Research Board, 2011.

<ftp://ftp.hsrc.unc.edu/pub/TRB2011/data/papers/11-0659.pdf>

*From the abstract:* The present paper summarizes luminance measurements and calculations for advertising billboard signs located adjacent to highways. The primary purpose of the present information is to provide preliminary estimates of conventional externally-illuminated billboard panel luminances in the driving environment. These estimates could form a partial basis for maximum luminance requirements for electronic billboards adjacent to highways using self-luminous light sources such as light-emitting diodes. Also discussed are considerations when making luminance measurements of billboard signs in the field.

Table 1 on page 3 has a summary of luminance measurements:

**TABLE 1** Summary of Billboard Sign Characteristics and Luminance Measurements

Sign location, type and color	Direction of travel facing sign	Distance of sign from roadway edge (ft)	Measurement location (and distance)	Daytime luminance (cd/m <sup>2</sup> )	Nighttime luminance (cd/m <sup>2</sup> )
I-787 conventional (white)	northbound	125 (from southbound side)	I-787 southbound (n/a)	23,100	not measured
I-787 conventional	southbound	280	Erie Boulevard (340 ft away)	1230	4
I-90 conventional (beige)	westbound	70	Erie Boulevard (70 ft away)	2880	160
I-90 conventional (purple)	westbound	25 (from eastbound side)	Erie Boulevard (70 ft away)	540	8
I-90 conventional (white)	westbound	60	Anderson Drive (310 ft away)	3300	180
I-90 conventional (white)	eastbound	180	Watervliet Avenue (80 ft away)	13,100	240
I-90 conventional (yellow)	eastbound	75	Westgate Plaza (150 ft away)	3950	150
I-90 LED (yellow)	westbound	75	Anderson Drive (290 ft away)	3810	200
			I-90 westbound (n/a)	not measured	160
I-90 LED (light green)	eastbound	75 (from westbound side)	Anderson Drive (300 ft away)	4170	320
			I-90 eastbound (n/a)	not measured	220

**Digital LED Billboard Luminance Recommendations: How Bright is Bright Enough?** Christian B. Luginbuhl, Howard Israel, Paul Scowen, Jennifer and Tom Polakis, Arizona State University, November 9, 2010.

[http://www.illinoislighting.org/resources/DigitalBillboardLuminanceRecommendation\\_ver7.pdf](http://www.illinoislighting.org/resources/DigitalBillboardLuminanceRecommendation_ver7.pdf)

*From the abstract:* Careful and sensible control of the nighttime brightness of digital LED signage is critical. Unlike previous technologies, these signs are designed to produce brightness levels that are visible during the daytime; should too large a fraction of this brightness be used at night serious consequences for driver visibility and safety are possible. A review of the lighting professional literature indicates that drivers should be subjected to brightness levels of no greater than 10 to 40 times the

brightness level to which their eyes are adapted for the critical driving task. As roadway lighting and automobile headlights provide lighting levels of about one nit, this implies signage should appear no brighter than about 40 nits. Standard industry practice with previous technologies for floodlit billboards averages less than 60 nits, and rarely exceeds 100 nits. It is recommended that the new technologies should not exceed 100 nits.

**“Effect of Luminance and Text Size on Information Acquisition Time from Traffic Signs (With Discussion and Closure),”** *Transportation Research Record 2122*, 2009: 52-62.

Citation at <http://trid.trb.org/view/2009/C/881884>

*From the abstract:* This study investigated the effect of (legend) luminance and letter size on the information acquisition time and transfer accuracy from simulated traffic signs. Luminances ranged from 3.2 cd/m<sup>2</sup> to 80 cd/m<sup>2</sup> on positive-contrast textual traffic sign stimuli with contrast ratios of 6:1 and 10:1, positioned at 33 ft/in. and 40 ft/in. legibility indices, and viewed under conditions simulating a nighttime driving environment. The findings suggest that increasing the sign luminance significantly reduces the time to acquire information. Similarly, increasing the sign size (or reducing the legibility index) also reduces the information acquisition time. These findings suggest that larger and brighter signs are more efficient in transferring their message to the driver by reducing information acquisition time, or alternatively, by increasing the transfer accuracy. In return, reduced sign viewing durations and increased reading accuracy are likely to improve roadway safety.

Note: the “legibility index” is:

... a numerical value representing the distance in feet at which a sign may be read for every inch of capital letter height. For example, a sign with a Legibility Index of 30 means that it should be legible at 30 feet with one inch capital letters, or legible at 300 feet with ten inch capital letters. (See <http://www.usscfoundation.org/USSCSignLegiRulesThumb.pdf>)

**Driver Comprehension of Diagrammatic Freeway Guide Signs**, Susan T. Chrysler, Alicia A. Williams, Dillon S. Funkhouser, Andrew J. Holick, Marcus A. Brewer, Texas Transportation Institute, February 2007.

<http://tti.tamu.edu/documents/0-5147-1.pdf>

*From the abstract:* This report contains the results of a three-phase human factors study which tested driver comprehension of diagrammatic freeway guide signs and their text alternatives. Four different interchange types were tested: left optional exit, left lane drop, freeway to freeway split with optional center lane, and two lane right exits with optional lanes. Three phases of the project tested comprehension by using digitally edited photographs of advance guide signs in freeway scenes. Participants viewed a computer slideshow in which slides were shown for only three seconds to simulate a single driver eye glance at a sign. All signs were mounted overhead in the photographs. Participants were provided a route number and city name as a destination that could be reached either by the through route or the exit route. They indicated which lane or lanes they would choose to reach the given destination. The fourth phase of the study used a fixed-base driving simulator which presented full sign sequences consisting of two advance guides and one exit direction sign. Performance measures were distance from the gore at which required lane changes were made and number of unnecessary lane changes made. Results showed that for the left exits the standard text-only signs performed equal to or better than the diagrammatic signs. This performance was true for left lane drops also. For the right exit with optional lane, the standard text signs did well, as did the diagrammatic signs. For freeway-to-freeway splits, standard text signs with two arrows over the optional lane performed better than either style of diagrammatic sign. This report also contains an extensive literature review of previous work in the area, a discussion of testing methodology, and suggestions for future research.

**Enhancing Driving Safety through Proper Message Design on Variable Message Signs**, Jyh-Hone Wang, Charles E. Collyer, Chun-Ming Yang, University of Rhode Island, Kingston, September 2005. Citation at <http://trid.trb.org/view/2005/M/793262>

*From the abstract:* This report presents a study that assessed drivers' responses to and comprehension of variable message sign (VMS) messages displayed in different ways with the intent to help enhance message display on VMSs. Firstly, a review of literatures and current practices regarding the design and display of VMS messages is presented. Secondly, the study incorporates three approaches in the assessment. Questionnaire surveys were designed to investigate the preferences of highway drivers in regards to six message display settings, they were: number of message frames, flashing effect, color, color combinations, wording, and use of abbreviations. Lab experiments were developed to assess drivers' responses to a variety of VMS messages in a simulated driving environment. Two groups of factors, within-subject and between-subject factors, were considered in the design of experiment. Within-subject factors included message flashing and color combination. Between-subject factors were age and gender. To help validate results found from lab experiments, field studies were set up to study drivers' response to VMS in real driving environment. Thirty-six subjects, from three age populations (20-40, 40-60, above 60 years old) with balanced genders, were recruited to participate in both questionnaire surveys and lab experiments while eighteen of them participated in field studies on a voluntarily basis. The study findings suggest a specific set of VMS features that might help traffic engineers and highway management design VMS signs that could be noticed, understood and responded to in a more timely fashion. Safer and more proactive driving experiences could be achieved by adopting these suggested VMS features.

# State Regulations

## State and Local Regulation Summaries

**State Changeable Message Chart**, Outdoor Advertising Association of America, undated.

[http://www.superliciousdesign.com/ledmedia/State\\_Changeable\\_Message.pdf](http://www.superliciousdesign.com/ledmedia/State_Changeable_Message.pdf) (or see [Appendix A](#)).

This chart summarizes changeable message advertising sign regulations for 46 states:

- Three states (New Hampshire, North Dakota and Wyoming) do not allow these signs.
- Five states (Maryland, Massachusetts, Oregon, Texas and Washington) allow tri-action signs only.
- Thirty-eight states allow changeable message signs. Of these, 19 states (California, Colorado, Connecticut, Delaware, Florida, Georgia, Indiana, Kansas, Michigan, Minnesota, Missouri, New Jersey, New York, Ohio, Oklahoma, Tennessee, Utah, Virginia and Wisconsin) have statutes; 10 states (Arkansas, Idaho, Illinois, Iowa, Louisiana, Nebraska, Nevada, North Carolina, South Carolina and West Virginia) have regulations; seven states (Alaska, Arizona, Kentucky, Montana, New Mexico, Rhode Island and South Dakota) have interpretations of the federal/state agreement; and two states (Mississippi and Pennsylvania) have policy memoranda.

The document categorizes each of these states by regulations for minimum message duration (“dwell time”—generally from 4 to 10 seconds, with 6 or 8 seconds most common); maximum interval between messages (typically from 1 to 4 seconds), and spacing (500 feet is most common). It is unclear how up-to-date these regulations are; we were unable to determine the date for this chart or obtain the latest information from the OAAA, which requires paid registration for access.

**The Regulation of Signage: Guidelines for Local Regulation of Digital On-Premise Signs**, Menelaos Triantafillou, Alan C. Weinstein, National Signage Research and Education Conference, 2010.

<http://www.thesignagefoundation.org/LinkClick.aspx?fileticket=3inv%2fFyrfk%3d&tabid=59&mid=468>

*From the report:* Based on a recent survey of numerous jurisdictions by one of the authors, the most common regulatory provisions applicable to digital on-premise signs appear below:

- Require that the sign display remain static for a minimum of 5-8 seconds and require “instantaneous” change of the display; i.e., no “fading” in/out of the message.
- Prohibit scrolling and animation outside of unique—and mostly pedestrian-oriented—locations.
- Limit brightness to 5,000 nits during daylight and 500 nits at night.
- Require automatic brightness control keyed to ambient light levels.
- Require display to go dark if there is a malfunction.
- Specify distancing requirements from areas zoned for residential use and/or prohibit orientation of sign face towards an area zoned for residential use.

See also Appendices B and C in Research Review of Potential Safety Effects of Electronic Billboards on Driver Attention and Distraction in **Related Research** for an overview of state regulations and practices as of 2001.

## Survey of Current State Regulations

We found digital display regulations for 12 states. These regulations are summarized in the following table and then detailed by state.

State	Duration ≥	Inter- val ≤	Brightness/ Illumination	Font Size	Visual Effects	Sequencing	Spacing	Locations	Billboard Size
<b>DE</b>	10s	1s	Must appropriately adjust display brightness as ambient light levels change.	Size not specified. A sign that attempts or appears to attempt to direct the movement of traffic or which contains wording, color, shapes, or likenesses of official traffic control devices is prohibited.	May not contain or display any lights, effects, or messages that flash, move, appear to be animated or to move, scroll, or change in intensity during the fixed display period	Prohibited.	>2,500ft from another VMS  >500ft from a static sign	Permitted within 660ft of the edge of the right-of-way of any interstate or federal-aid primary highway.  > 1,000ft from an interchange, interstate junction of merging or diverging traffic, or an at-grade intersection.  May not be placed along designated Delaware byways.	Not specified.
<b>FL</b>	6s	2s	Lighting which causes glare or impairs the vision of the driver of any motor vehicle, or which otherwise interferes with any driver's operation of a motor vehicle is prohibited. A sign may not be illuminated so that it interferes with the effectiveness of, or obscures, an official traffic sign, signal or device. Lighting may not be added to or increased on a nonconforming sign.	Not specified.	Flashing, intermittent, rotating, or moving lights are prohibited.  Instantaneous transition for entire sign face required.	Not specified.	Not specified.	Not specified.	Not specified.

<b>State</b>	<b>Duration ≥</b>	<b>Inter- val ≤</b>	<b>Brightness/ Illumination</b>	<b>Font Size</b>	<b>Visual Effects</b>	<b>Sequencing</b>	<b>Spacing</b>	<b>Locations</b>	<b>Billboard Size</b>
<b>GA</b>	10s	3s	<p>Must be effectively shielded so as to prevent beams or rays of light from being directed at any portion of the traveled way, which beams or rays are of such intensity or brilliance as to cause glare or to impair the vision of the driver of any motor vehicle or which otherwise interfere with the operation of a motor vehicle.</p> <p>Must not obscure or interfere with the effectiveness of an official traffic sign, device, or signal.</p>	Not specified.	May not contain flashing, intermittent, or moving light or lights except those giving public service information such as time, date, temperature, weather.	Not specified.	>5,000ft from another multiple message sign.	Not specified.	Not specified.
<b>IA</b>	8s	1s	The intensity of the illumination may not cause glare or impair the vision of the driver of any motor vehicle or otherwise interferes with any driver's operation of a motor vehicle.	Not specified.	No traveling messages (e.g., moving messages, animated messages, full-motion video, or scrolling text messages) or segmented messages are allowed.	No segmented messages allowed.	<p>&gt;500ft from another LED display facing the same way in cities.</p> <p>&gt;1000ft in rural areas.</p>	Not specified.	Not specified.
<b>KS</b>	8s	2s	Must be effectively shielded so as to prevent beams or rays of light from being directed at any portion	Not specified.	Cannot contain or display flashing, intermittent or moving lights, including	Not specified.	>1000ft from another CMS.	Not specified.	Not specified.

State	Duration ≥	Inter- val ≤	Brightness/ Illumination	Font Size	Visual Effects	Sequencing	Spacing	Locations	Billboard Size
			<p>of the traveled way of any interstate or primary highway and are of such intensity or brilliance as to cause glare or to impair the vision of the driver of any motor vehicle or to otherwise interfere with any driver's operation of a motor vehicle.</p> <p>Must not be so illuminated that they obscure any official traffic sign, device or signal, or imitate or may be confused with any official traffic sign, device or signal.</p>		<p>animated or scrolling advertising.</p>				
<b>MA</b>	10s	0s	<p>Must automatically adjust the intensity of its display according to natural ambient light conditions.</p> <p>May not cause beams or rays of light from being directed at any portion of the traveled way, which beams or rays are of such intensity or brilliance as to cause glare or to impair the vision of the driver of any motor vehicle or otherwise interfere with the operation of a motor</p>	Not specified.	<p>May not contain flashing, intermittent, or moving lights; or display animated, moving video, scrolling advertising; or consist of a static image projected upon a stationary object.</p> <p>May not display illumination that moves, appears to move or changes in intensity during</p>	Not specified.	<p>&gt;500ft from any sign.</p> <p>&gt;2000ft from another off premise electronic sign on the same side of the highway.</p> <p>&gt;1000ft from another off premise electronic sign on the opposite side of the</p>	Not specified.	Not specified.



State	Duration ≥	Inter- val ≤	Brightness/ Illumination	Font Size	Visual Effects	Sequencing	Spacing	Locations	Billboard Size
			vehicle.  May not obscure or interfere with the effectiveness of an official traffic sign, device or signal, or cause an undue distraction to the traveling public		the static display period. This does not include changes to a display for time, date and temperature.		highway.		
<b>NY</b>	6s	3s	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.	Not specified.
<b>OH</b>	8s	3s	Not specified.	Not specified.	A multiple message or variable message advertising device shall not be illuminated by flashing, intermittent, or moving lights. No multiple message or variable message advertising device may include any illumination which is flashing, intermittent, or moving when the sign face is in a fixed position.	Not specified.	>1000ft from another MMS.	Not specified.	Not specified.
<b>OR</b>	8s	2s	Must operate at an intensity level of not more than 0.3 foot-candles over ambient light as measured by the distance to the sign	Not specified.	No flashing or varying intensity light; cannot create the appearance of movement.	Not specified.	Not specified.	Not specified.	Not specified.

State	Duration ≥	Inter- val ≤	Brightness/ Illumination	Font Size	Visual Effects	Sequencing	Spacing	Locations	Billboard Size
			depending upon its size (150 feet if the display surface of the sign is 12 feet by 25 feet, 200 feet if the display surface is 10.5 by 36 feet, and 250 feet if the display surface is 14 by 48 feet).						
<b>TN</b>	8s	2s	Not specified.	Not specified.	Video, animation, and continuous scrolling messages are prohibited.	Not specified.	>2000ft from another CMS.	Not specified.	Not specified.
<b>WS</b>	A single message or a message segment must have a static display time of at least two seconds after moving onto the signboard, with all segments of the total message to be displayed within ten seconds.	4s	No electronic sign lamp may be illuminated to a degree of brightness that is greater than necessary for adequate visibility. In no case may the brightness exceed 8,000 nits or equivalent candelas during daylight hours, or 1,000 nits or equivalent candelas between dusk and dawn. Signs found to be too bright shall be adjusted as directed by the department.	Not specified.	Displays may travel horizontally or scroll vertically onto electronic signboards, but must hold in a static position for two seconds after completing the travel or scroll.  Displays shall not appear to flash, undulate, or pulse, or portray explosions, fireworks, flashes of light, or blinking or chasing lights. Displays shall not appear to move toward or away from the viewer,	Not specified.	Not specified.	Not specified.	Not specified.

<b>State</b>	<b>Duration</b> ≥	<b>Inter- val</b> ≤	<b>Brightness/ Illumination</b>	<b>Font Size</b>	<b>Visual Effects</b>	<b>Sequencing</b>	<b>Spacing</b>	<b>Locations</b>	<b>Billboard Size</b>
	A one-segment message may remain static on the signboard with no duration limit.				expand or contract, bounce, rotate, spin, twist, or otherwise portray graphics or animation as it moves onto, is displayed on, or leaves the signboard.				
<b>WI</b>	6s	1s	No variable message sign lamp may be illuminated to a degree of brightness that is greater than necessary for adequate visibility.	Not specified.	No flashing, intermittent or moving light. Traveling messages prohibited.	Not specified.	Not specified.	Not specified.	Not specified.

## **Delaware**

**§ 1110. Delaware Byways Program**, Chapter 11: Regulation of Outdoor Advertising, Title 17: Highways, Delaware Code, State of Delaware, 2012.

<http://delcode.delaware.gov/title17/c011/sc01/index.shtml#1110>

*From the code:*

(3) Lighting. -- Signs may be illuminated, subject to the following restrictions.

a. Signs which contain, include, or are illuminated by any flashing, intermittent, or moving light or lights are prohibited, except those giving public service information such as time, date, temperature, weather, or traffic conditions, or as defined in paragraph (3)e. of this section.

e. Notwithstanding the provisions of paragraphs (b)(3)a. through d. of this section, signs commonly known as variable message signs may be changed at intervals by electronic or mechanical process or remote control, and are permitted within 660 feet of the edge of the right-of-way of any interstate or federal-aid primary highway so designated as of June 1, 1991, and of the National Highway System. These variable message signs are permitted, except as prohibited by local ordinance or zoning regulation or by the Delaware federal-state outdoor advertising agreement of May 1, 1968, and are not considered to be in violation of flashing, intermittent, or moving lights criteria provided that:

1. Each message remains fixed for a minimum of at least 10 seconds.
2. When the message is changed, it must be accomplished in 1 second or less, with all moving parts or illumination changing simultaneously and in unison.
3. A variable message sign along the same roadway and facing in the same direction of travel may not be placed, as measured along the centerline of the roadway, within 2,500 feet of another variable message sign, or within 500 feet of a static billboard sign regulated by this section, or within 1,000 feet of an interchange, interstate junction of merging or diverging traffic, or an at-grade intersection.
4. A variable message sign must contain a default design that will freeze the sign in 1 position if a malfunction occurs or, in the alternative, that will shut down.
5. A variable message sign may not contain or display any lights, effects, or messages that flash, move, appear to be animated or to move, scroll, or change in intensity during the fixed display period. A variable message sign must appropriately adjust display brightness as ambient light levels change.
6. A sign that attempts or appears to attempt to direct the movement of traffic or which contains wording, color, shapes, or likenesses of official traffic control devices is prohibited.
7. A sign may not be placed along designated Delaware byways.

## **Florida**

**Outdoor Advertising Sign Regulation and Highway Beautification Program**, Florida Administrative Weekly & Florida Administrative Code, Florida Department of Transportation, October 3, 2010.

<https://www.flrules.org/gateway/chapterhome.asp?chapter=14-10>

*From the code:*

### **14-10.004 Permit.**

(3) Changeable messages – A permit shall be granted for an automatic changeable facing provided:

(a) The static display time for each message is at least six seconds;

- (b) The time to completely change from one message to the next is a maximum of two seconds;
- (c) The change of message occurs simultaneously for the entire sign face; and
- (d) The application meets all other permitting requirements.
- (e) All signs with changeable messages shall contain a default design that will ensure no flashing, intermittent message, or any other apparent movement is displayed should a malfunction occur.

**Guide to Outdoor Advertising**, Florida Department of Transportation, 2012.

<http://www.dot.state.fl.us/rightofway/documents/GuidetoODA.pdf>

*From page 15 of the guide:*

Multiple messages: Your sign may display multiple messages, provided you do not have more than two sign faces for each direction the sign is facing. Mechanically changeable and digital display panels are allowed on conforming signs, provided the static display time is at least 6 seconds, and the time to change from one message to another is no great than 2 seconds. Scrolling or animated images are prohibited.

1. Flashing, intermittent, rotating, or moving lights are prohibited.
2. Lighting which causes glare or impairs the vision of the driver of any motor vehicle, or which otherwise interferes with any driver's operation of a motor vehicle is prohibited.
3. A sign may not be illuminated so that it interferes with the effectiveness of, or obscures, an official traffic sign, signal or device.
4. Lighting may not be added to or increased on a nonconforming sign.

## **Georgia**

**Article 3. Control of Signs and Signals**, Chapter 6: Regulation of Maintenance and Use of Public Roads Generally, Title 32: Highways, Bridges, and Ferries, *Georgia Code*, State of Georgia, 2008.

<http://oaag.net/guidelines/documents/32-6OutdoorAdvertisingStateLaw.pdf>

*From page 7 of the report:*

**32-6-75. Restrictions on outdoor advertising authorized by Code Sections 32-6-72 and 32-6-73; multiple message signs on interstate system, primary highways, and other highways.**

(a) No sign authorized by paragraphs (4) through (6) of Code Section 32-6-72 and paragraph (4) of Code Section 32-6-73 shall be erected or maintained which:

- (8) If illuminated, contains, includes, or is illuminated by any flashing, intermittent, or moving light or lights except those giving public service information such as time, date, temperature, weather, or other similar information except as expressly permitted under subsection (c) of this Code section. The illumination of mechanical multiple message signs is not illumination by flashing, intermittent, or moving light or lights, except that no multiple message sign may include any illumination which is flashing, intermittent, or moving when the sign is in a fixed position;
- (9) If illuminated, is not effectively shielded so as to prevent beams or rays of light from being directed at any portion of the traveled way, which beams or rays are of such intensity or brilliance as to cause glare or to impair the vision of the driver of any motor vehicle or which otherwise interfere with the operation of a motor vehicle;
- (10) If illuminated, is illuminated so that it obscures or interferes with the effectiveness of an official traffic sign, device, or signal;

(c) (1) Multiple message signs shall be permitted on the interstate system, primary highways, and other highways under the following conditions:

- (A) Each multiple message sign shall remain fixed for at least ten seconds;
- (B) When a message is changed mechanically, it shall be accomplished in three seconds or less;
- (C) No such multiple message sign shall be placed within 5,000 feet of another mechanical multiple message sign on the same side of the highway;
- (D) Any such sign shall contain a default design that will freeze the sign in one position if a malfunction occurs;
- (E) Any maximum size limitations shall apply independently to each side of a multiple message sign; and
- (F) Nonmechanical electronic multiple message signs that are otherwise in compliance with this subsection and are illuminated entirely by the use of light emitting diodes, back lighting, or any other light source shall be permitted under the following circumstances: (i) Each transitional change occurs within two seconds; (ii) If the department finds an electronic sign or any display or effect thereon to cause glare or to impair the vision of the driver of any motor vehicle or to otherwise interfere with the safe operation of a motor vehicle, then, upon the department's request, the owner of the sign shall promptly and within not more than 48 hours reduce the intensity of the sign to a level acceptable to the department; and (iii) The owner of any existing or nonconforming electronic sign shall have until October 31, 2006, to bring the electronic sign in compliance with this subparagraph and to request a permit from the department.

## **Iowa**

**Guide to Iowa Outdoor Advertising Regulations for Interstate Highways**, Iowa Department of Transportation, April 2009.

[http://www.iowadot.gov/iowaroadsigns/Guide\\_to\\_Outdoor\\_Advertising\\_for\\_Interstates.pdf](http://www.iowadot.gov/iowaroadsigns/Guide_to_Outdoor_Advertising_for_Interstates.pdf)

*From page 7 of the guide:*

### **Light emitting diode (LED) displays**

LED displays are permitted under the following conditions:

- Adding this type of technology for an existing billboard constitutes a billboard “modification” under Iowa law. Therefore, a new permit application is required.
- Each change of message must be accomplished in one second or less.
- Each message must remain in a fixed position for at least eight seconds.
- No traveling messages (e.g., moving messages, animated messages, full-motion video, or scrolling text messages) or segmented messages are presented.
- The intensity of the illumination does not cause glare or impair the vision of the driver of any motor vehicle or otherwise interferes with any driver's operation of a motor vehicle.
- LED displays must be located a minimum of 500 feet from any other LED display facing the same direction within cities. LED displays must be located a minimum of 1000 feet from any other LED display facing the same direction in rural areas.

## **Kansas**

**Section 68-2234. Highway Advertising Control; Sign Standards; Zoning Requirements**, Article 22, Highway Beautification Highway Advertising Control Act of 1972 – Revised 2006, Kansas Department of Transportation, 2006.

<http://www.ksdot.org/burrow/beaut/KHACARev6.pdf>

*From page 5 of the report:*

(d) Lighting.

- (1) Signs shall not be erected which contain, include or are illuminated by any flashing, intermittent, revolving or moving light, except those giving public service information such as, but not limited to, time, date, temperature, weather or news; steadily burning lights in configuration of letters or pictures are not prohibited;
- (2) signs shall not be erected or maintained which are not effectively shielded so as to prevent beams or rays of light from being directed at any portion of the traveled way of any interstate or primary highway and are of such intensity or brilliance as to cause glare or to impair the vision of the driver of any motor vehicle or to otherwise interfere with any driver's operation of a motor vehicle; and
- (3) signs shall not be erected or maintained which are so illuminated that they obscure any official traffic sign, device or signal, or imitate or may be confused with any official traffic sign, device or signal.

(e) Automatic changeable facing signs.

- (1) Automatic changeable facing signs shall be permitted within adjacent or controlled areas under the following conditions:
  - (A) The sign does not contain or display flashing, intermittent or moving lights, including animated or scrolling advertising;
  - (B) the changeable facing remains in a fixed position for at least eight seconds;
  - (C) if a message is changed electronically, it must be accomplished within an interval of two seconds or less;
  - (D) the sign is not placed within 1,000 feet of another automatic changeable facing sign on the same side of the highway, with the distance being measured along the nearest edge of the pavement and between points directly opposite the signs along each side of the highway;
  - (E) if the sign is a legal conforming structure it may be modified to an automatic changeable facing sign upon compliance with these standards and approval by the department. A nonconforming structure shall not be modified to create an automatic changeable facing sign;
  - (F) if the sign contains a default design that will freeze the sign in one position if a malfunction occurs; and
  - (G) if the sign application meets all other permitting requirements.
- (2) The outdoor advertising license shall be revoked for failure to comply with any provision in this subsection.

## **Massachusetts**

**Outdoor Advertising**, Office of Outdoor Advertising, Highway Division, Massachusetts Department of Transportation, 2012.

<http://www.massdot.state.ma.us/highway/Departments/OutdoorAdvertising.aspx>

On June 5, 2012, the Massachusetts Department of Transportation conducted a public hearing for proposed regulation changes that include provisions for electronic billboards.

### **3.17: Requirements for Electronic Sign Permits**

(1) Permits for Electronic Signs require the prior approval of the municipality wherein the proposed sign will be located unless otherwise exempted by State law.

(2) Except as otherwise prohibited by Federal or Massachusetts law and regulations, or local ordinances or zoning regulations, permits for Electronic Signs may be issued provided such sign complies with all of the following:

- (a) Has a static display lasting at least 10 seconds.
- (b) Achieves an instant message change.
- (c) Does not display illumination that moves, appears to move or changes in intensity during the static display period. This does not include changes to a display for time, date and temperature.
- (d) Automatically adjusts the intensity of its display according to natural ambient light conditions.

(3) A permit issued pursuant to this section shall indicate that it is for an Electronic Sign. Any such permit is determined to not be prohibited by any agreement between the Department and the Secretary of Transportation of the United States. All regulations provided by 700 CMR 3.00 et. seq. are applicable to Electronic Signs. In the event a provision of this section conflicts with another section of 700 CMR, this section controls.

(4) A legally conforming sign or site may be modified to an Electronic Sign if a new permit for the Electronic Sign is obtained by the Department.

(5) Electronic Signs shall not:

- (a) Emit or utilize in any manner any sound capable of being detected on a main traveled way by a person with normal hearing;
- (b) Cause beams or rays of light from being directed at any portion of the traveled way, which beams or rays are of such intensity or brilliance as to cause glare or to impair the vision of the driver of any motor vehicle or otherwise interfere with the operation of a motor vehicle;
- (c) Obscure or interfere with the effectiveness of an official traffic sign, device or signal, or cause an undue distraction to the traveling public;
- (d) Contain more than one face visible from the same direction on the traveled way;
- (e) Be located so as to obscure or otherwise interfere with a motor vehicle operator's view of approaching, merging or intersecting traffic;
- (f) Be within 500 feet of any type of permitted sign;
- (g) Be within 2000 feet of another off premise permitted Electronic Sign on the same side of the traveled way;
- (h) Be within 1000 feet of another off premise permitted Electronic Sign on the opposite side of the traveled way;
- (i) Face more than one direction of travel;
- (j) Contain flashing, intermittent, or moving lights; or display animated, moving video, scrolling advertising; or consist of a static image projected upon a stationary object.

(6) Any such sign shall contain a default design that will freeze the sign in one position if a malfunction occurs.



(7) If the Department finds an Electronic Sign or any display or effect thereon to cause glare or to impair the vision of the driver of any motor vehicle or to otherwise interfere with the safe operation of a motor vehicle, upon request, the permit holder shall promptly and within not more than 24 hours reduce the intensity of the sign to a level acceptable to the Department.

(8) In addition to any municipal requirement the Department may impose any restriction as to the hours of operation for each Electronic Sign.

(9) The permit holder of an Electronic Sign shall coordinate with governmental authorities, through the Department's Division of Highways, to display, when appropriate, emergency information important to the traveling public, such as Amber Alerts or alerts concerning terrorist attacks, or natural disasters. Emergency information messages shall remain in the advertising rotation according to the protocols of the agency that issues the information, or protocols established by the Department's Division of Highways.

(10) The permit holder shall provide the Director with contact information for a person who is available 24 hours a day, 7 days a week to turn off the Electronic Sign promptly if a malfunction occurs. The sign shall contain a default mechanism that freezes the sign in one display in the event of a sign malfunction.

(11) The permit holder shall designate a minimum of 25 hours per month of total advertisement time per permit to the Department for Public Service Announcement (PSA) purposes. Said time shall be equally distributed throughout the hours of operation of the Electronic Sign. The permit holder shall submit a detailed proof of play report each month to the Director to verify that PSA's are being displayed. The Director shall determine the total number of PSA's to be aired each month and will coordinate with the permit holder for their sign. Detailed Proof of Play (POP) Reports are due by the 5th day of each month for the prior month of play. Failure to submit a POP report or failure to adhere to the minimum PSA requirement may result in a fine or revocation of permit/s.

### *Criticism*

These regulations have been criticized for not being strong enough:

**New Rules Would Mean More Billboard Blight for Massachusetts**, Scenic America, 2012.

<http://www.scenic.org/blog/144-new-rules-would-mean-more-billboard-blight-for-massachusetts>

*From the web site:* A proposed set of new regulations on outdoor advertising would see Massachusetts go from having some of the strongest billboard controls in the country to some of the weakest, and result in a proliferation of signs all over the state.

**Massachusetts: Coming Billboard Regulations = Complete Deregulation**, Daily Kos Network, May 30, 2012.

<http://www.dailykos.com/story/2012/05/30/1096048/-Massachusetts-Coming-Billboard-Regulations-Complete-Deregulation>

*From the web site:* The strong Massachusetts billboard regulation legacy will come to a swift end if proposed new regulations by the Massachusetts Department of Transportation's Office of Outdoor Advertising (the "OOA", not to be confused with the OAAA, the Outdoor Advertising Association of America, the billboard industry lobby) are enacted.

## New York

**N.Y. HAY. LAW § 88: NY Code - Section 88: Control of Outdoor Advertising**, FindLaw, 2012.  
<http://codes.lp.findlaw.com/nycode/HAY/4/88>

*From the web site:*

Provided that, nothing in this section shall be construed to prohibit the erection or maintenance of outdoor advertising signs, displays and devices which include the steady illumination of sign faces, panels or slats that rotate or change to different messages in a fixed position, commonly known and referred to as changeable or multiple message signs, provided the change of one sign face to another is not more frequent than once every six seconds and the actual change process is accomplished in three seconds or less, when such signs, displays and devices are permitted or authorized pursuant to this section and by the agreement ratified and approved by this section.

## Ohio

**“Chapter 5501:2-2 – Ohio Administrative Code (OAC),”** Ohio Revised Code and Administrative Code for Advertising Device Control, Ohio Department of Transportation, November 2011.  
[http://www.dot.state.oh.us/Divisions/ContractAdmin/Contracts/ADC/ADC\\_RegBook.pdf](http://www.dot.state.oh.us/Divisions/ContractAdmin/Contracts/ADC/ADC_RegBook.pdf)

*From the report:*

**5501:2-2-02 General provisions for the erection and control of outdoor advertising.**

(A) (4) (b) A multiple message or variable message advertising device shall not be illuminated by flashing, intermittent, or moving lights. No multiple message or variable message advertising device may include any illumination which is flashing, intermittent, or moving when the sign face is in a fixed position.

(B) Multiple message and variable message advertising devices: such advertising devices may be permitted on the interstate system or the primary system under the following conditions: (1) Each message or copy shall remain fixed for at least eight seconds; (2) When a message or copy changes by remote control or electronic process, it shall be accomplished in three seconds or less; (3) No such advertising device shall be placed within one thousand feet of another multiple message or variable message advertising device on the same side of the highway visible in the same direction of travel; (4) Such advertising devices shall contain a default design that will freeze the device in one position if a malfunction occurs; (5) Any maximum size limitations shall apply independently to each face of a multiple message or variable message advertising device; and (6) Only one multiple message advertising device shall be permitted at a single location facing the same direction.

## Oregon

**Chapter 377—Highway Beautification; Motorist Information Signs**, Oregon Revised Statutes, 2011 edition.

<http://www.leg.state.or.us/ors/377.html>

*From the web site:*

**377.753 Permits for outdoor advertising signs; rules.** (1) Notwithstanding the provisions of ORS 377.715, 377.725 and 377.770, the Department of Transportation may issue permits for outdoor advertising signs placed on benches or shelters erected or maintained for use by customers of a mass transit district, a transportation district or other public transportation agency.

(2) The department shall determine by rule the fees and criteria for the number, size, and location of such signs but the department may not issue a permit for a sign that is visible from an interstate highway. [2007 c.199 §3]

**Division 60: Signs**, Department of Transportation, Highway Division, Oregon Administrative Rules, July 13, 2012.

[http://arcweb.sos.state.or.us/pages/rules/oars\\_700/oar\\_734/734\\_060.html](http://arcweb.sos.state.or.us/pages/rules/oars_700/oar_734/734_060.html)

*From the web site:*

**Digital Billboard Procedures**

- (1) This rule describes the process for applying for a permit for a digital billboard.
- (2) Definitions for the purposes of this rule:
  - (a) “Sign” means the sign structure, the display surfaces of the sign, and all other component parts of the sign.
  - (b) “Retire” means to use a relocation credit such that it no longer exists or to remove an existing sign.
  - (c) “Bulletin” means an outdoor advertising sign with a display surface that is 14 feet by 48 feet.
  - (d) “Poster” means an outdoor advertising sign with a display surface that is 12 feet by 25 feet.
  - (e) “Digital Billboard” means an outdoor advertising sign that is static and changes messages by any electronic process or remote control, provided that the change from one message to another message is no more frequent than once every eight seconds and the actual change process is accomplished in two seconds or less.
- (3) Qualifications for receiving a digital billboard state sign permit:
  - (a) The proposed site and digital billboard must meet all requirements of the OMIA including, but not limited to, the following:
    - (A) the digital billboard is not illuminated by a flashing or varying intensity light.
    - (B) the display surface of the digital billboard does not create the appearance of movement.
    - (C) the digital billboard must operate at an intensity level of not more than 0.3 foot-candles over ambient light as measured by the distance to the sign depending upon its size.
    - (D) The distance measurement for ambient light is: 150 feet if the display surface of the sign is 12 feet by 25 feet, 200 feet if the display surface is 10.5 by 36 feet, and 250 feet if the display surface is 14 by 48 feet.
  - (b) Applicant must submit a completed application for a digital billboard state sign permit using the approved form that may be obtained by one of the following methods:
    - (A) Requesting from Sign Program Staff by phone at 503-986-3656;
    - (B) Email: [OutdoorAdvertising@odot.state.or.us](mailto:OutdoorAdvertising@odot.state.or.us);
    - (C) Website  
[http://www.oregon.gov/ODOT/HWY/SIGNPROGRAM/contact\\_us.shtml](http://www.oregon.gov/ODOT/HWY/SIGNPROGRAM/contact_us.shtml)
  - (c) The Department shall confirm that any existing permitted Outdoor Advertising Sign or relocation credit being retired for the purpose of receiving a new digital billboard state sign permit has been removed within the 180 days allowed to construct the new permitted sign. The Department will not charge a Banking Permit Fee for the cancellation of state sign permits retired for the purpose of receiving a new digital billboard permit.
- (4) This section sets forth the criteria for determining the required relocation credits or existing permitted signs that an applicant shall retire to receive one new digital billboard state sign permit:
  - (a) Applicants who own 10% or less of all active relocation credits at the time the application is submitted shall either remove one existing state permitted outdoor advertising sign with a display area of at least 250 square feet or provide one active relocation credit of at least 250 square feet and retire that permit. Applicants meeting these criteria are not limited to either “Bulletin” or “Poster” billboards.
  - (b) Applicants who own more than 10% of all active relocations credits shall apply for a new digital billboard state sign permit as follows:

- (A) For a digital billboard that is intended to be a bulletin, the applicant has three options:
  - (i) Remove two existing bulletins, retire the permits for those signs, and retire three relocation credits; or
  - (ii) Remove one existing bulletin and two existing posters, retire those permits and retire three active relocation credits; or
  - (iii) Remove four existing posters, retire the permits for those signs, and retire three relocation credits.
- (B) For a digital billboard that is intended to be a poster, the applicant has two options:
  - (i) Remove two existing posters, retire the permits for those signs, and retire three relocation credits;
  - (ii) Remove one existing bulletin, retire the permit for that sign, and retire three relocation credits.
- (c) For an active relocation credit to be eligible it must be at least 250 square feet. All permits and relocation credits submitted under these procedures will be permanently cancelled and are not eligible for renewal.
- (d) Any state sign permits submitted for retirement must include the written statement notifying the Department that the “lease has been lost or cancelled.”
- (5) The Department will determine the percentage of relocation credits owned by an applicant by dividing the total number of unused relocation credits by the total number of unused relocation credits owned by the applicant on the day the application is received.
- (6) Two digital billboard state sign permits are required for any back to back or V-type digital sign. A separate application is required for each digital sign face.
- (7) The first time a digital billboard is permitted it is not subject to the 100-mile rule in ORS 377.767(4). The site of the newly permitted billboard will become the established location for future reference.
- (8) Relocation of permitted digital billboards. The Department will issue one digital relocation credit for each permitted digital sign that is removed. The digital relocation credit issued will be for the same square footage as the permitted digital sign that was removed. A digital relocation credit can only be used to relocate a digital billboard. A permitted digital sign can only be reconstructed as a digital billboard.
- (9) Use of renewable energy resource. The applicant must provide a statement with the application that clarifies what, if any, renewable energy resources are available at the site and are being utilized. If none, then a notarized statement to that effect must be included with the application.
- (10) All permitted digital billboards must have the capacity to either freeze in a static position or display a black screen in the event of a malfunction.
  - (a) The applicant must provide emergency contact information that has the ability and authority to make modifications to the display and lighting levels in the event of emergencies or a malfunction.
  - (b) The Department will notify the sign owner of a malfunction that has been confirmed by ODOT in the following instances:
    - (A) The light impairs the vision of a driver of any motor vehicle; or
    - (B) The message is in violation of ORS 377.710(6) or 377.720(3)(d).
- (11) All digital billboard signs must comply with the light intensity and sensor requirements of ORS 377.720(3)(d).
  - (a) The Department will take measurements of the permitted digital billboard when notified that the sign has been constructed and the permit plate has been installed.
  - (b) The Department will use an approved luminance meter designed for use in measuring the amount of light emitted from digital billboards using the industry standard for size and distance as follows:
    - (A) 150 feet for 12’x 25.’

- (B) 200 feet for 10.5'x 36'.
- (C) 250 feet for 14'x 48'.

## **Tennessee**

Control of Outdoor Advertising, Chapter 1680-2-3, Rules of Tennessee Department of Transportation Maintenance Division, Tennessee Department of Transportation, February 2003.

Current regulations do not include electronic billboards:

<http://www.tdot.state.tn.us/environment/beautification/pdf/1680-02-03.pdf>.

However, proposed revisions are under review that include guidance on digital displays:

<http://www.tdot.state.tn.us/environment/beautification/docs/Revised-ODA-Rules-Redline.pdf>.

*From the web site:*

### **1680-10-01-.03 CRITERIA FOR THE CONTROL OF OUTDOOR ADVERTISING DEVICES.**

#### **4. Spacing**

(i) (IV) The minimum spacing for changeable message signs with a digital display is two thousand (2,000) feet, except as follows:

- I. An outdoor advertising device that uses a digital display which does not exceed one hundred (100) square feet in total area to give public information such as time, date, temperature, or weather, or to provide the price of a product, the amount of a lottery prize or similar numerical information supplementing the content of a message otherwise displayed on the sign face shall not be subject to the two thousand (2,000) feet minimum spacing requirement in this item (IV).

#### **5. Changeable Message Signs**

Changeable message signs are permissible, subject to the following restrictions: (i) The message display time shall remain static for a minimum of eight (8) seconds with a maximum change time of two (2) seconds. (ii) Video, animation, and continuous scrolling messages are prohibited. (iii) Non-conforming devices shall not be converted to a changeable message sign. (iv) The changeable message sign shall contain a default design that will freeze the sign face to one position if a malfunction occurs. (v) The structure for a changeable message sign may contain sign faces that are in a double-faced, back-to-back, or V-type configuration. (vi) The minimum spacing for changeable message signs with a digital display is as provided in Rule 1680-10-.03(1)(a)4.(i)(IV).

## **Washington**

Highway Advertising Control, M22-95, Washington State Department of Transportation, March 2011.

<http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-95/HighwayAdvertisingControl.pdf>

*From the report:*

### **468-66-050 Sign classifications and specific provisions**

(3) Type 3 – On-premise signs.

(b) Type 3(b) – Business complex on-premise sign. A Type 3(b) business complex on-premise sign may display the name of a shopping center, mall, or business combination.

- (i) Where a business complex erects a Type 3(b) on-premise sign, the sign structure may display additional individual business signs identifying each of the businesses conducted on the premises. A Type 3(b) on-premise sign structure may also have attached a display area, such as a manually changeable copy panel, reader board, or electronically changeable message center, for advertising on-premise activities and/or presenting public service information.

- (g) Electronic signs may be used only as Type 3 on-premise signs and/or to present public service information, as follows:
  - (i) Advertising messages on electronic signboards may contain words, phrases, sentences, symbols, trademarks, and logos. A single message or a message segment must have a static display time of at least two seconds after moving onto the signboard, with all segments of the total message to be displayed within ten seconds. A one-segment message may remain static on the signboard with no duration limit.
  - (ii) Displays may travel horizontally or scroll vertically onto electronic signboards, but must hold in a static position for two seconds after completing the travel or scroll.
  - (iii) Displays shall not appear to flash, undulate, or pulse, or portray explosions, fireworks, flashes of light, or blinking or chasing lights. Displays shall not appear to move toward or away from the viewer, expand or contract, bounce, rotate, spin, twist, or otherwise portray graphics or animation as it moves onto, is displayed on, or leaves the signboard.
  - (iv) Electronic signs requiring more than four seconds to change from one single message display to another shall be turned off during the change interval.
  - (v) No electronic sign lamp may be illuminated to a degree of brightness that is greater than necessary for adequate visibility. In no case may the brightness exceed 8,000 nits or equivalent candelas during daylight hours, or 1,000 nits or equivalent candelas between dusk and dawn. Signs found to be too bright shall be adjusted as directed by the department.
- (h) The act does not regulate Type 3(a), 3(b), 3(c), and 3(d) on-premise signs located along primary system highways inside an incorporated city or town or a commercial or industrial area.

## **Wisconsin**

### **Control of Outdoor Advertising Along and Visible from Highways on the Interstate and Federal-Aid Primary Systems**, Chapter Trans 201, Wisconsin Administrative Code, February 2005.

[http://docs.legis.wisconsin.gov/code/admin\\_code/trans/201.pdf](http://docs.legis.wisconsin.gov/code/admin_code/trans/201.pdf)

*From the web site:*

#### **Trans 201.15 – Electronic signs**

- (3) Variable Message Signs.
  - (c) No message may be displayed for less than one-half second.
  - (d) No message may be repeated at intervals of less than 2 seconds.
  - (e) No segmented message may last longer than 10 seconds.
  - (f) No traveling message may travel at a rate slower than 16 light columns per second or faster than 32 columns per second.
  - (g) No variable message sign lamp may be illuminated to a degree of brightness that is greater than necessary for adequate visibility.
- (4) Multiple Message Signs.
  - (a) The louver rotation time to change a message shall be one second or less.
  - (b) The time a message remains in a fixed position shall be 6 seconds or more.

### **84.30 Regulation of Outdoor Advertising**, Wisconsin Legislative Documents, 2012.

<http://docs.legis.wisconsin.gov/statutes/statutes/84/30>

*From the web site:*

- (3)(c)(1) Signs that contain, include or are illuminated by any flashing, intermittent or moving light or lights are prohibited, except electronic signs permitted by rule of the department.

(4)(bm) Signs may contain multiple or variable messages, including messages on louvers that are rotated and messages formed solely by use of lights or other electronic or digital displays, that may be changed by any electronic process, subject to all of the following restrictions:

1. Each change of message shall be accomplished in one second or less.
2. Each message shall remain in a fixed position for at least 6 seconds.
3. The use of traveling messages or segmented messages is prohibited.
4. The department, by rule, may prohibit or establish restrictions on the illumination of messages to a degree of brightness that is greater than necessary for adequate visibility.

# APPENDIX A

## State Changeable Message Chart (Source: OAAA State Statute Matrix)

### No changeable message signs allowed:

(3 STATES)  
ND, NH, WY

### Tri- action Only

(5 STATES)  
MD, MA, OR,  
TX, WA,

### Changeable Message /Digital Technology

(38 STATES)  
AL, AR, AZ, CA, CO, CT  
DE, FL, GA, ID, IL, IA, IN,  
KS, KY, LA, MI, MN, MO,  
MS, MT, NE, NV, NJ, NM,  
NY, NC, OH, OK, PA, RI,  
SC, SD, TN, UT, VA, WV, WI

### State-by-state breakdown of the 38 states allowing Changeable Message/Digital technology

- States which have statutes (19):

CA, CO, CT, DE, FL  
GA, IN, KS, MI, MO  
MN, NJ, NY, OH  
OK, UT, TN, VA, WI

- Regulations (10):

AR, ID, IL, IA\*, LA, NE,  
NV, NC, SC, WV

- States with interpretations of the federal/state agreement (7):

AL, AZ, KY, MT,  
NM, RI, SD

- Policy memoranda (2):

MS approved a policy DOT memorandum

PA approved the technology through an internal PENNDOT memorandum (2002)

IA\* regulations are undergoing a comment period



OAAA Changeable Message Criteria  
Dwell Time Sequence – By State

<u>Dwell Time (Static Message)</u>	<u>State</u>
<u>4 seconds</u>	CA, CO, IA, VA
<u>5 seconds</u>	NM, PA
<u>6 seconds</u>	AL, AZ, CT, FL, GA, IA, MI, MN, NV, NY, SD, WI, RI (average)
<u>8 seconds</u>	AR, ID, IN, KS, LA, MO, MS, NJ, NC, OH, OK, OR, SC, TN, UT, WV, WA
<u>10 seconds</u>	DE, IL, NE, MD, TX
<u>Other/State-Company Discretion</u>	KY, MA, MT

Dwell and Twirl Times for message changes and spacing criteria

States Allowing Changeable Message/Digital Technology

<u>State</u>	<u>Dwell time</u>	<u>Twirl time</u>	<u>Spacing</u> <small>*traditional 500 ft</small>
AL	6 seconds		
AR	8 seconds or more	2 seconds or less	1500 feet
AZ	6 seconds	1 second	*
CA	4 seconds	4 seconds	1000 feet
CO	4 seconds	1 second	1000 feet
CT	6 seconds	3 seconds	*
DE	10 seconds	1 second	2500 feet
FL	6 seconds	2 seconds	1000 to 1500 feet
GA	10 seconds	2 seconds	5000 feet

Dwell and Twirl Times for message changes and spacing criteria (cont'd)

**States Allowing Changeable Message Including Electronics**

<b><u>State</u></b>	<b><u>Dwell time</u></b>	<b><u>Twirl time</u></b>	<b><u>Spacing</u></b>
<b>ID</b>	8 seconds	2 seconds	*
<b>IL</b>	10 seconds	3 seconds	*
<b>IN</b>	8 seconds	2 seconds	*
<b>IA</b>	6 seconds	1 second	*
<b>KS</b>	8 seconds	2 seconds	1000 feet
<b>KY</b> <i>At discretion of state DOT</i>			
<b>LA</b>	8 seconds	4 seconds	*
<b>MI</b>	6 seconds	1 second	*
<b>MN</b>	6 seconds	none	*
<b>MS</b>	8 seconds	instantaneous	*
<b>MO</b>	8 seconds	2 seconds	1400 feet
<b>MT</b> <i>At discretion of state DOT</i>			
<b>NE</b>	10 seconds	2 seconds	5000 feet
<b>NV</b>	6 seconds	3 seconds	*
<b>*NJ</b> <i>(regulatory change pending)</i>	8 seconds	1 second	3000 feet
<b>NM</b> <i>Company discretion</i>	5 seconds	1-2 seconds	*
<b>NY</b>	6 seconds	3 seconds	*
<b>NC</b>	8 seconds	2 seconds	1000 feet
<b>OH</b>	8 seconds	3 seconds	1000 feet
<b>OK</b>	8 seconds	4 seconds	*

Dwell and Twirl Times for message changes and spacing criteria (cont'd)

**States Allowing Changeable Message Including Electronics**

<b><u>State</u></b>	<b><u>Dwell time</u></b>	<b><u>Twirl time</u></b>	<b><u>Spacing</u></b>
<b>PA</b>	5 seconds	1 second	*
<b>RI</b>	5-7 seconds	2-3 seconds	*
<small>Company discretion</small>			
<b>SD</b>	6 seconds	none	*
<b>SC</b>	8 seconds	2-3 seconds	*
<b>TN</b>	8 seconds	2 seconds	2000 feet
<b>UT</b>	8 seconds	3 seconds	*
<b>VA</b>	4 seconds	none	*
<b>WV</b>	8 seconds	2 seconds	1500 feet
<b>WI</b>	6 seconds	1 second	*

**States Allowing Changeable Message Including Electronics**

**Tri-action Only**

<b><u>State</u></b>	<b><u>Dwell time</u></b>	<b><u>Twirl time</u></b>	<b><u>Spacing</u></b>
<b>MD</b>	10 seconds	4 seconds	*
<b>MA</b>	none	none	*
<b>OR</b>	8 seconds	4 seconds	1000 feet
<b>TX</b>	10 seconds	2 seconds	*
<small>Rural Roads Only</small>			
<b>WA</b>	8 seconds	4 seconds	*

# The Effects of Commercial Electronic Variable Message Signs (CEVMS) on Driver Attention and Distraction: An Update

PUBLICATION NO. FHWA-HRT-09-018

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U.S. Department of Transportation  
**Federal Highway Administration**

Research, Development, and Technology  
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McLean, VA 22101-2296

## FOREWORD

The Highway Beautification Act of 1965 outlined control of outdoor advertising, including removal of certain types of advertising signs, along the Interstate Highway System and the existing Federal-aid primary roadway system. Since that time, most States have evolved a body of legislation and/or regulations to control off-premise outdoor advertising (billboards), and many local governments have developed similar rules.

The advent of new electronic billboard technologies, in particular the digital Light-Emitting Diode (LED) billboard, has necessitated a reevaluation of current legislation and regulation for controlling outdoor advertising. In this case, one of the concerns is possible driver distraction. In the context of the present report, outdoor advertising signs employing this new advertising technology are referred to as Commercial Electronic Variable Message Signs (CEVMS). They are also commonly referred to as Digital Billboards (DBB) and Electronic Billboards (EBB).

The present report reviews research concerning the possible effects of CEVMS used for outdoor advertising on driver safety, including possible attention and distraction effects. The report consists of an update of earlier published work, an investigation of applicable research methods and techniques, recommendations for future research, and an extensive bibliography. The report should be of interest to highway engineers, traffic engineers, highway safety specialists, the outdoor advertising industry, environmental advocates, Federal policy makers, and State and local regulators of outdoor advertising.

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Director, Office of Safety  
Research and Development

Gerald Solomon  
Director, Office of Real Estate  
Services

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16. Abstract The present report reviews research concerning the possible effects of Commercial Electronic Variable Message Signs (CEVMS) used for outdoor advertising on driver safety. Such CEVMS displays are alternatively known as Electronic Billboards (EBB) and Digital Billboards (DBB). The report consists of an update of earlier published work, a review of applicable research methods and techniques, recommendations for future research, and an extensive bibliography. The literature review update covers recent post-hoc crash studies, field investigations, laboratory investigations, previous literature reviews, and reviews of practice. The present report also examines the key factors or independent variables that might affect a driver's response to CEVMS, as well as the key measures or dependent variables which may serve as indicators of driver safety, especially those that might reflect attention or distraction. These key factors and measures were selected, combined, and integrated into a set of alternative research strategies. Based on these strategies, as well as on the review of the literature, a proposed three stage program of research has been developed to address the problem. The present report also addresses CEVMS programmatic and research study approaches. In terms of an initial research study, three candidate methodologies are discussed and compared. These are: (1) an on-road instrumented vehicle study, (2) a naturalistic driving study, and (3) an unobtrusive observation study. An analysis of the relative advantages and disadvantages of each study approach indicated that the on-road instrumented vehicle approach was the best choice for answering the research question at the first stage.			
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# SI\* (MODERN METRIC) CONVERSION FACTORS

## APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	645.2	square millimeters	mm <sup>2</sup>
ft <sup>2</sup>	square feet	0.093	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yard	0.836	square meters	m <sup>2</sup>
ac	acres	0.405	hectares	ha
mi <sup>2</sup>	square miles	2.59	square kilometers	km <sup>2</sup>
<b>VOLUME</b>				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft <sup>3</sup>	cubic feet	0.028	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.765	cubic meters	m <sup>3</sup>
NOTE: volumes greater than 1000 L shall be shown in m <sup>3</sup>				
<b>MASS</b>				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
<b>TEMPERATURE (exact degrees)</b>				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
<b>ILLUMINATION</b>				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m <sup>2</sup>	cd/m <sup>2</sup>
<b>FORCE and PRESSURE or STRESS</b>				
lbf	poundforce	4.45	newtons	N
lbf/in <sup>2</sup>	poundforce per square inch	6.89	kilopascals	kPa
<b>APPROXIMATE CONVERSIONS FROM SI UNITS</b>				
Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
<b>AREA</b>				
mm <sup>2</sup>	square millimeters	0.0016	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	10.764	square feet	ft <sup>2</sup>
m <sup>2</sup>	square meters	1.195	square yards	yd <sup>2</sup>
ha	hectares	2.47	acres	ac
km <sup>2</sup>	square kilometers	0.386	square miles	mi <sup>2</sup>
<b>VOLUME</b>				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m <sup>3</sup>	cubic meters	35.314	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.307	cubic yards	yd <sup>3</sup>
<b>MASS</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
<b>TEMPERATURE (exact degrees)</b>				
°C	Celsius	1.8C+32	Fahrenheit	°F
<b>ILLUMINATION</b>				
lx	lux	0.0929	foot-candles	fc
cd/m <sup>2</sup>	candela/m <sup>2</sup>	0.2919	foot-Lamberts	fl
<b>FORCE and PRESSURE or STRESS</b>				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in <sup>2</sup>

\*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.  
(Revised March 2003)

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## 1.0 INTRODUCTION

The present report reviews research concerning the possible effects of Commercial Electronic Variable Message Signs (CEVMS) used for outdoor advertising on driving safety. The report consists of an update of earlier published work by Farbry et al., which consists of an investigation of applicable research methods and techniques, recommendations for future research, and an extensive bibliography.<sup>(1)</sup> The Federal Highway Administration (FHWA) has evaluated possible safety effects of CEVMS in two previous studies. The first study was completed in 1980 and the second in 2001.<sup>(1,2)</sup> Since then, CEVMS technology has evolved, in particular the expanded use of digital Light Emitting Diode (LED) arrays, as well as the implementation of new programmable formats and messages. The present report concentrates on identifying potential factors that may contribute to determining whether there are any significant safety concerns or distraction effects with regards to CEVMS used for outdoor advertising. Throughout the present report, the acronym CEVMS will be employed to refer to both the singular and plural case.

### 1.1 BASIC RESEARCH QUESTION

The basic research question being addressed in this report is whether the presence of CEVMS along the roadway is associated with a reduction in driving safety for the public. Increases in vehicle crashes along a certain portion of the roadway are generally regarded as an indication of a possible safety concern. Thus, the measurement of crash rates in the vicinity of CEVMS in comparison with crash rates at matched control locations without CEVMS is one possible way to determine possible safety impacts. But, the crashes are rare multicausal events which are difficult to measure. Therefore, measurements of driving behavior in near-crash situations are sometimes taken as a substitute for crashes. These safety surrogate measures may then be generalized to other driving behaviors that represent possible precursors of crashes—like sudden braking, sharp swerving, or traffic conflicts—even though no crash occurs. Usually, because these safety surrogate measures are more frequent and easier to measure, they are often employed instead of or in addition to crashes. Thus, determining the frequency of occurrence of certain relevant safety surrogate driving behaviors in the vicinity of CEVMS in comparison with the frequency of occurrence of such behaviors at matched control locations without CEVMS is another possible way to determine possible safety impacts. The validity of using such safety surrogate measures rests on the assumption that they are related to actual vehicle crashes, which seems intuitively reasonable but has not been conclusively demonstrated.

There is another approach to determining the possible safety impact of CEVMS. This approach is based upon the abstract psychological constructs of driver attention and distraction. A driver must devote a certain amount of attention to the driving task at hand, and sufficient distraction from that driving task could be associated with the higher risk of a crash. The measurement of driver eye glance behavior is often taken as an indirect indicator of attention. Thus, the driver's eye glances should be concentrated in the region of the roadway ahead, and any frequent or long eye glances away from this region toward other objects, including CEVMS, could be regarded as an indication of possible driver distraction. If the eye glances toward a certain object and away from the roadway ahead are sufficiently frequent or sufficiently long to exceed criteria established for safe driving, this outcome can be taken as an indication of a possible safety impact. The validity of using eye glance behavior measures in this manner rests on two

assumptions: that eye glances are related to attention and/or distraction and that there are generally accepted safety criteria for excessive eye glances away from the roadway ahead. These assumptions are not universally accepted.

In summary, the basic research question is whether the presence of CEVMS along the roadway is associated with a reduction in driving safety for the public. The three fundamental methods for answering this question include if there is an increase in crash rates in the vicinity of CEVMS, if there is an increase in near-crashes or safety surrogate measures in the vicinity of CEVMS, and if there are excessive eye glances away from the roadway ahead in the vicinity of CEVMS.

## **1.2 SCOPE**

In this report, a CEVMS will be defined as a self-luminous advertising sign which depicts any kind of light, color, or message change which ranges from static images to image sequences to full motion video. The CEVMS may also be referred to as an Electronic Billboard (EBB) or a Digital Billboard (DBB). The present report concentrates on the possible effects of CEVMS on driver attention, driver distraction, and roadway safety. The report is divided into 10 sections: Introduction, Literature Review Update, Key Factors and Measures, Research Strategies, Future Research Program, Recommended First Stage Study, Conclusions, References, Bibliography, and Appendices.

Investigating the possible safety effects of CEVMS is sufficiently complex so that no single experiment will answer all of the relevant scientific and engineering questions. The present report outlines a top-level broad program of potential future research, and it defines in greater detail three possible studies, any one of which could serve as a possible first step. After these discussions, a course of action is recommended. Although off-premise advertising signs constitute the main focus of FHWA attention, the influence of on-premise advertising signs will also be considered to create a more comprehensive and consistent research approach.

In parallel with the present project, a related study is being performed under National Cooperative Highway Research Program (NCHRP) Project 20-7 (256), titled "Safety Impacts of the Emerging Digital Display Technology for Outdoor Advertising Signs." Both the present project and the NCHRP study begin with the understanding that, despite years of research, there have been no definitive conclusions about the presence or strength of adverse safety impacts from CEVMS. The two projects differ in three significant ways. First, the NCHRP study is undertaking a broad, critical review of the research literature in this field. The present project is more focused on literature update oriented toward the identification of suitable independent and dependent variables for future research. Second, the NCHRP study is reviewing current regulations and guidelines for the control of roadside advertising that may exist in foreign countries to assess their applicability to U.S. highways and streets. Aside from mention in the literature review update portion, the present report does not directly address regulations and guidelines. Third, the NCHRP study will synthesize current research results and current regulations and guidance to recommend how State and local governments might enact reasonable temporary guidance for the control of CEVMS within their own jurisdictions. Such guidance may be applicable on an interim basis pending the outcome of future, more conclusive research outlined in the present project. As a result, such interim guidance may need to change as new

technical information is developed. The present report does not provide guidance to States on the control of CEVMS.



## 2.0 LITERATURE REVIEW UPDATE

### 2.1 BACKGROUND

The research that addresses the possible safety and distraction effects of outdoor advertising billboards has been extensive and long standing. Dating back to the 1930s, this research reached a peak in the 1950s and 1960s. Research continued at low ebb through the 1980s, and then all but ceased. With the advent of newer billboard technologies (e.g., lamp matrix, rotating disc, television, and, most recently, LED) and with the corresponding questions raised by regulators, safety researchers, and the public, research has increased again since the turn of the century. These newer billboard technologies, especially the LED technology, ushered in the increasing use of CEVMS for on-premise and off-premise advertising. The current research focuses on information that has become available since the publication of the most recent FHWA report, but it also includes earlier relevant studies not previously identified.<sup>(1)</sup> The present review is organized into five major categories according to the research context for the study: post-hoc crash studies, field investigations, laboratory investigations, previous literature reviews, and reviews of practice. The categories that contain empirical data have a brief discussion of potential methodological problems inherent in the types of studies characteristic of that category.

### 2.2 POST-HOC CRASH STUDIES

Post-hoc crash studies review police traffic collision reports or statistical summaries of such reports to understand the causes of crashes that have taken place in the vicinity of some change to the roadside environment. In the present case, the change of concern is the introduction of CEVMS to the roadside or the replacement of conventional billboards with CEVMS.

A number of studies have been conducted over the years using the crash methodology. Three such studies were not reviewed in prior FHWA studies. In a study similar to that conducted in the 1970s in Massachusetts, the Freeway Operations Unit of the Wisconsin Department of Transportation (WisDOT) analyzed bidirectional crashes on I-94 near an electronic billboard with a 5.0 s message dwell time.<sup>(3,4)</sup> Crash rate data were collected for 3 years prior to and 3 years after sign operation began. For eastbound traffic, total crashes increased 36 percent over the 3 year post operational period compared to the baseline preoperational condition. In addition, side-swipe crashes increased 8 percent, and rear-end crashes increased 21 percent. For westbound traffic, total crashes increased 21 percent, sideswipe crashes increased 35 percent, and rear-end crashes increased 35 percent. The authors of the WisDOT study concluded that, “it is obvious that the variable message sign has had an effect on traffic, most notably in the increase of the side-swipe rate” (p. 3).<sup>(4)</sup>

Stutts et al. conducted an analysis of several crash data reporting systems to identify major sources of driver distraction and the relative importance of different types of distraction as contributing factors in motor vehicle crashes.<sup>(5)</sup> Distraction was described as one form of inattention, and it has been implicated as a factor in more than half of the police reported inattention crashes identified by the National Highway Transportation Safety Administration.<sup>(6)</sup> In this study, 8.3 percent of drivers involved in police-reported crashes were identified as distracted, but 35.9 percent of these crashes were coded as “unknown.” For this and other



reasons, it is believed that the reported percentage of distraction-related crashes substantially under-represents the true statistics.<sup>(5)</sup> Among the types of distractions coded in the database, the largest contributor (29.4 percent) was “outside person, object, or event,” and the second largest (25.6 percent) was “other.”

Smiley et al. studied the relationship between video advertising signs and motor vehicle crashes at downtown intersections and on the freeway.<sup>(7)</sup> Crash data were analyzed from three intersections before and after the introduction of video advertising signs. When the three intersections were evaluated individually, two demonstrated increases in both total and rear-end crashes; the third showed no significant increase in such crashes. The authors believe that the lack of statistical significance may be due to the small number of crashes identified. For the freeway environment, crash data on the video approach was compared to crash data for three non-video approaches, one of which was deemed the most comparable (control) segment. For this comparison, the authors report a negligible increase in injury collision crash frequencies on the video approach.

Following the design of their earlier study on conventional billboards, Tantala and Tantala analyzed police accident reports in the vicinity of seven digital billboards on interstate highways near Cleveland, OH.<sup>(8)</sup> Both their current and earlier studies were sponsored by the outdoor advertising industry. Reported crashes were analyzed for a period of 18 months prior to and after the conversion of these billboards from conventional to digital. They found essentially no statistically significant differences in crash rates before and after the conversion.

Unfortunately, all post-hoc crash studies are subject to certain weaknesses, most of which are difficult to overcome. For example, the vast majority—more than 80 percent in one study—of accidents are never reported to police; thus, such studies are likely to underreport crashes. Also, when crashes are caused by factors such as driver distraction or inattention, the involved driver may be unwilling or unable to report these factors to a police investigator. Another weakness is that police, under time pressure, are rarely able to investigate the true root causes of crashes unless they involve serious injury, death, or extensive property damage. Furthermore, to have confidence in the results, researchers need to collect comparable data in such studies before and after the change and in the after phase at equivalent but unaffected roadway sections. Last, since crashes are infrequent events, data collection needs to span extended periods of time, both before and after introduction of the change. Few studies are able to obtain such extensive data. For a more specific analysis of some possible design and methodological concerns with the study by Tantala and Tantala, see Wachtel.<sup>(8,9)</sup>

## **2.3 FIELD INVESTIGATIONS**

The spectrum of field investigations related to roadway safety is broad. It includes unobtrusive observation, naturalistic driving studies, on-road instrumented vehicle investigations, test track experiments, driver interviews, surveys, and questionnaires. Klauer et al., in one of several papers to emerge from a National Highway Traffic Safety Administration (NHTSA) project known as the “100-Car Naturalistic Driving Study,” provides preliminary information about the role of driver inattention in crashes and near-crashes.<sup>(10)</sup> Although the study did not specifically address CEVMS, it represents an important methodology for investigating driver distraction. Their results show that 78 percent of crashes and 65 percent of near-crashes included driver

inattention and/or distraction as a contributing factor. This contribution from inattention and distraction is larger, by a factor of three, than previous research has indicated. The authors believe that the “100-Car Naturalistic Driving Study” provides the first direct link (i.e., without reliance on crash surrogate measures) showing distraction/inattention as a contributing factor to motor vehicle crashes. In another variant of the “100-Car Naturalistic Driving Study,” Klauer et al. identifies four specific unsafe behaviors that contributed to crashes and near-crashes.<sup>(11)</sup> One of these, inattention and/or distraction, is of direct relevance to the present project. This term is operationally defined by Klauer et al. as a driver looking away from the forward roadway for greater than 2.0 s. Under these conditions, the odds of a crash or near-crash are nearly twice those than when the driver attends to the forward roadway. The study stresses the importance of including near-crashes in the database for two reasons. First, the kinematics of crashes and near-crashes are similar, meaning they involved comparable levels of driver emergency actions, such as swerving and hard braking. Second, 83 percent of the crashes in this study were not reported to the police. Thus, the study indicates that relying on crash statistics alone will substantially underreport crashes due to inattention and/or distraction.

Lee, McElheny, and Gibbons undertook an on-road instrumented vehicle study on interstate and local roads near Cleveland, OH.<sup>(12)</sup> The project, conducted on behalf of the outdoor advertising industry, looked at driver eye glance behavior toward digital billboards, conventional billboards, comparison sites (sites with buildings and other signs, including digital signs), and control sites (those without similar signage). Performance measures, such as speed maintenance and lane keeping, were also recorded. Although the major data collection was done in daylight, a small pilot study was conducted at night. One of the key questions that the study sought to answer was whether longer glances consisting of over 1.6 s were associated more with any of the event types.<sup>(12)</sup> This question is based on findings from various studies, including the “100-Car Naturalistic Driving Study,” which indicates that longer glances away from the road are associated with higher crash rates.<sup>(13)</sup> In discussing their results, the authors state, “...the distributions of glance duration were similar across all event types, and there was no obvious pattern of longer glances being associated with any of the event types” (p. 59).<sup>(13)</sup> The findings from the nighttime pilot study led to, “the overall conclusion, supported by both the eye glance results and the questionnaire results, that the digital billboards seem to attract more attention than the conventional billboards and baseline sites (as shown by a greater number of spontaneous comments regarding the digital billboards and by longer glances in the direction of these billboards” (p. 10).<sup>(13)</sup> However, in view of the small number of participants, these data were not analyzed. The authors suggest that at least some of these findings, “would show statistical significance” if a larger study were to be conducted (p. 64).<sup>(13)</sup>

Beijer, Smiley, and Eizenman, working on behalf of the Government of Toronto, Canada, evaluated driver eye glances toward four different types of roadside advertising signs on roads in the Toronto, Canada area.<sup>(14)</sup> The study employed an on-road instrumented vehicle approach with a head-mounted eye-tracking device. Active signs—all but traditional billboards—consistently received longer glances and more total glances than fixed signs. The study found that 22 percent of all glances were defined as long or greater than 0.75 s. Since 22 of the 25 subjects made at least one long glance at an advertising sign, the authors conclude that, “distraction... was not just an isolated incidence” (p. 101).<sup>(14)</sup> The authors suggest that active signs may result in greater distraction than past studies of the effects of commercial signing might indicate.

After a previous study raised concerns about the number and duration of glances made to video advertising signs along an expressway in Toronto, Canada, Smiley et al. conducted another study at the request of the city government.<sup>(7,15)</sup> Five different measures were taken, including eye movements, traffic conflicts, traffic speed and headway, crash data, and public surveys. The crash data results were described earlier. The results from the other measures were mixed. All of the video signs attracted attention; the probability of a driver's looking at such a sign upon approach was nearly 50 percent. The average glance duration was 0.5 s, similar to those for official traffic signs. However, one-fifth of the video sign glances lasted longer than 0.75 s, and some lasted as long as 1.47 s, which were considered unsafe amounts of time. About 38 percent of glances at the video billboards were made when headways were 1.0 s or less, and 25 percent of the glances took place when the signs were more than 20 ° off the line-of-sight. These glances were also considered to be unsafe. According to the study, glances at static billboards and bus shelter ads were made at even greater angles and shorter headways.

It is noteworthy that the earlier study that led to this research, also evaluating a video billboard on an expressway in Toronto, Canada, produced dramatically different results. This study found five times the number of glances per subject and three times the glance duration than did the later 2004 study.<sup>(15)</sup> Smiley et al. attribute these differences to the longer sight distance available for the sign in the earlier study, the uninterrupted view, and the location of this sign on a curve.<sup>(7)</sup>

Smiley et al. also employed safety surrogate measures of conditions which might be precursors of a possible crash.<sup>(7)</sup> The study measured these safety surrogate indicators by means of the unobtrusive observation method. The drivers of the vehicles were not aware that they were being observed. In this context, the study measured traffic conflicts, vehicle speed, and vehicle headway. When comparing video and non-video approaches at the same intersection, at one intersection the authors found no differences in traffic conflicts; however, at the other, they found a significant increase in drivers who applied their brakes without cause on the video approach. Given the comparability of sites, they concluded, "the only reason that could be found for increased braking... was the presence of the video sign" (p. 108).<sup>(7)</sup> The speed and headway data were inconclusive.

In addition, Smiley et al. employed a "public" survey method to determine whether video advertising might be considered to have "a negative effect on traffic safety" (p. 110).<sup>(7)</sup> Participants in the survey were approached at three intersection sites which had video advertising. Of the 152 persons surveyed at the 3 locations, 65 percent felt that video advertising signs had a negative effect on the ability of a driver to attend to pedestrians and cyclists. Furthermore, 59 percent of the people said that as drivers, their attention was drawn to such signs, while 49 percent of those felt that such signs had a negative effect on traffic safety. A surprisingly large number of people—9 out of 152—stated that they personally had experienced near-crashes, and 2 had experienced actual rear-end crashes that they associated with video advertising signs. In addition, 86 percent of the respondents suggested that restrictions should be placed on those types of signs, such as their locations and brightness.

Three of the field investigations of CEVMS effects mentioned earlier employ indirect measures of driver attention (eye glances) in the context of an on-road instrumented vehicle experimental approach. Although CEVMS stimuli are real, the experimental approach suffers from a degree of artificiality in its implementation. The research participants usually drive in an experimental

vehicle along a route which is contrived for experimental purposes, and the route does not serve a useful purpose in their daily lives. The research participants sometimes drive with an experimenter present in the instrumented vehicle, and they sometimes wear a head-mounted eye-tracking device. Two of the three studies cited used a somewhat intrusive but more accurate head-mounted eye-tracking device. One study used a less obtrusive but also less accurate vehicle-mounted eye-tracking device, where cameras were mounted in the vehicle cab. Although the research participants were not told the purpose of the investigation, the participants were definitely aware that they were participating in a driving experiment of some kind, and they may not have exhibited entirely natural behaviors as a result. Furthermore, eye glance behavior is difficult to measure, and it is not easy to relate directly to attention and distraction. For a more specific analysis of some further design and methodological concerns with the Lee et al. study cited above, see Wachtel.<sup>(12,9)</sup>

The unobtrusive observation method employed in the field by Smiley et al. to collect safety surrogate measures of potential crashes (e.g., sudden braking, inadequate headway, etc.) does not create an artificial environment for the driver.<sup>(7)</sup> Usually, the sensing devices (loop detectors, remote cameras, or posted human observers) are hidden in the environment, and they are not noticed by the drivers. There is no problem of artificiality; the drivers in the study are not even aware that they are part of a study. However, the safety surrogate variables being measured are usually infrequent, often multicausal, comparatively subtle, and difficult to measure. For CEVMS, these variables can also occur over great distances, adding to the difficulty in accurately and reliably capturing data relating to these variables.

Finally, the public survey method employed by Smiley et al. collected the opinions, attitudes, and feelings of passersby at intersections with video advertising signs.<sup>(7)</sup> The results, while interesting as a measure of public sentiment, are difficult to relate to the basic research question of determining whether there are any significant distraction effects or concrete safety concerns with regards to CEVMS used for outdoor advertising.

## **2.4 LABORATORY INVESTIGATIONS**

Laboratory investigations related to roadway safety can be classified into several categories: driving simulations, non-driving simulator laboratory testing, and focus groups.

For one such investigation, a non-driving simulator laboratory testing environment was used.<sup>(16)</sup> For this study, researchers filmed a 27 minute drive and had 200 licensed drivers view the film while their eye movements were recorded. Billboards generated greater levels of visual attention than suggested by measures of recall. Billboards were viewed by individuals whether they were in the “target” audience or not and regardless of whether the billboard was of high or low interest. In addition, billboards located close to official highway signs received more attention than those that were farther away.

In a driving simulation laboratory, Crundall et al. compared street level advertisements (SLAs), such as those on bus shelters, to raised level advertisements (RLAs), which include elevated ads on poles or streetlights.<sup>(17)</sup> The study was based on the understanding that, in undemanding situations, drivers have spare attentional capacity; however, when cognitive demands increase, spare capacity diminishes. As a result, eye movements must focus on the driving task at hand.

Based on their prior research, Crundall et al. believe that if an advertisement is within the driver's visual field during a search for hazards, it will attract visual fixations and distract attention needed to safely perform the driving task.<sup>(17)</sup> Because the most relevant information for hazard detection is distributed along a horizontal plane, the authors believe that the majority of visual fixations will fall within this plane when the driver is looking for driving-relevant information. Thus, if an advertisement is located within this window, it will receive more fixations than will advertisements located outside this window. The principal research hypotheses tested were that during conditions when drivers were looking for hazards, SLAs would receive the most attention. When spare capacity was greater, the attention given to RLAs would increase. The results supported these hypotheses. A post-drive survey showed that SLAs were judged more hazardous than RLAs.

Young and Mahfoud used a driving simulator in which subjects drove three routes in the presence and absence of billboards.<sup>(18)</sup> The presence of billboards adversely affected driving performance in terms of lateral control and crashes. Billboards also had an adverse impact on driver attention in terms of the number of glances made to them, and they were associated with a higher subjective mental workload. In addition, the recall of official road signs was adversely affected by billboards, which the authors interpreted to mean that drivers were attending to billboards instead of relevant road signs. The authors reached a "persuasive overall conclusion that advertising has adverse effects on driving performance and driver attention" (p. 18).<sup>(18)</sup>

In a recent study using a driving simulator, Chan and her colleagues compared the impacts of in-vehicle versus external-to-vehicle distractors on performance of inexperienced versus experienced drivers.<sup>(19)</sup> The authors were particularly concerned with young, novice drivers because of the elevated crash risk for this segment of the driving population. They were also concerned because the researchers believed that distraction could adversely affect the novice drivers' poorly developed hazard detection and avoidance skills. Chan et al. theorized that external distraction may be more harmful than internal distraction because when drivers are looking within the vehicle, it should be obvious to them that they are not processing relevant roadway information. However, when drivers are looking at sources outside the vehicle, it is likely that the forward roadway is still somewhere within the field of view. Thus, it may not be obvious to drivers (particularly inexperienced drivers) that this important information is not being fully processed since it is peripheral, unattended, or both.

Chan et al. were primarily interested in the longest glances away from the forward roadway since these have been implicated in prior studies (e.g., Horrey and Wickens<sup>(20)</sup>) as major contributors to crashes. Thus, they used as their dependent measure the maximum time that drivers spent continuously looking away from the forward roadway during a specific distraction task. In terms of in-vehicle distractors, as hypothesized, inexperienced drivers showed a consistent pattern of looking away from the roadway for longer periods of time than experienced drivers. However, the findings about external distractions were quite different and unexpected in two key ways. There was very little difference in the duration of distraction episodes between the experienced and inexperienced drivers, and the maximum distraction durations were significantly longer for the out-of-vehicle tasks than for the in-vehicle tasks. The two experience groups showed little differences in the percentage of distraction episodes longer than 2.0 s, 2.5 s, and 3.0 s, in all cases longer for the external than for the in-vehicle distractors. The study also demonstrated that, "drivers are more willing to make extended glances external to the vehicle than internal to the

vehicle” (p. 17).<sup>(19)</sup> Chan et al. conclude that, “it is likely that our out-of-vehicle tasks (which not only engage attention but also draw the eyes and visual attention away from in front of the vehicle) would have quite significant detrimental effects on processing the roadway in front of the vehicle” (p. 22).<sup>(19)</sup>

Three of the laboratory investigations of possible distraction effects mentioned above employ indirect measures of driver attention (eye glances) in the context of a driving simulation experimental approach. The interactive driving simulator approach offers considerable experimental control over stimulus parameters, like the size, number, proximity, and change rate of CEVMS or other advertising display. The simulator is also well suited for executing parametric studies of the effects of these variables on possible driver distraction. However, the approach suffers from all of the sources of artificiality found in the on-road instrumented vehicle approach for conducting field research mentioned earlier. Also, the approach adds the important source of virtual driving as opposed to real driving. Although the vehicle cab of the driving simulator may have certain degrees of motion (pitch, roll, heave, etc.) to enhance the sense of virtual driving, the vehicle cab does not move down the roadway. The visual scene passes by while the driver and vehicle remain stationary. This degree of artificiality requires considerable adaptation on the part of the research participants, most of whom need some amount of training to become accustomed to the differences between driving in a simulator and driving on a real road. Moreover, in the case of CEVMS, present driving simulators do not have sufficient visual dynamic range, image resolution, and contrast ratio capability to produce the compelling visual effect of a bright, photo-realistic LED-based CEVMS on a natural background scene.

One laboratory investigation had research participants watch films of driving scenes containing billboards while their eye movements were being recorded.<sup>(16)</sup> This study represents an example of a non-driving simulator laboratory method. It suffers from all of the aforementioned limitations of laboratory CEVMS or billboard research. In addition, it does not measure the participants’ response while engaged in a driving task.

## **2.5 PREVIOUS LITERATURE REVIEWS**

Garvey summarizes the literature on sign visibility, legibility, and conspicuity on behalf of the advertising industry.<sup>(21)</sup> One of his recommendations bears on the issue of distraction from billboards. He suggests that signs need not be detectable at distances greater than the minimum required legibility distance. Specifically, he states, “if a sign is detected before it is legible, the driver will take numerous glances at the sign in attempts to read it” before it becomes legible, and “these momentary diversions are inefficient and potentially dangerous” (p. 1).<sup>(21)</sup>

Cairney and Gunatillake, working on behalf of the Government of Victoria, Australia, undertook a review of the literature with the goal of generating recommendations for guidelines for the control of outdoor advertising in that State.<sup>(22)</sup> They cited two prior reviews by Wachtel and Netherton in the United States and by Andreassen in Australia as the basis of their review.<sup>(2,23)</sup> Since these earlier studies, the technology used for the display of roadside advertising and the addition of in-vehicle distractors has changed. Cairney and Gunatillake conclude that the principal concern remains the effects that a sign may have on a driver’s visibility of other road users, the roadway, and traffic control devices, particularly at high-demand locations, such as interchanges. They suggest several research approaches, including case studies, site

investigations, and laboratory simulations to address these newer technologies. They conclude that the best of the studies conducted to date demonstrate that when all confounding variables are controlled statistically, sites with advertising signs have higher crash rates than sites without them. However, large, well-controlled studies will be required to detect significant effects because the effect size is small. They further conclude that changeable message signs may have a more direct bearing on crash rate than static signs. The findings of the study suggest that unregulated roadside advertising has the capability of creating a significant safety problem. The conclusions from their review run counter to Andreassen's conclusion that, "there is no current evidence to say that advertising signs, in general, are causing accidents" (p. 4).<sup>(23)</sup>

On behalf of the Scottish government, Wallace undertook the most extensive and critical review of the literature since the two earlier FHWA studies.<sup>(24)</sup> The study concludes that driver distraction from attention-getting sources can occur even when the driver is concentrating on the driving task. Furthermore, there is abundant evidence that billboards can function as distractors, particularly in areas of visual clutter. Billboards can distract in "low information" settings, and distraction from external factors is likely to be underreported and underrepresented in crash databases.

The Dutch National Road Safety Research Institute reviewed the recent literature for the Dutch authorities and emphasized some of the stronger, more consistent points made in other studies, such as billboards should not be placed near challenging road settings, especially at or near intersections. Also, they should not resemble official traffic signs in pattern or color.<sup>(25)</sup> Furthermore, dynamic signs that display motion or include moving parts should not be permitted. A key conclusion was that, "precisely in a dangerous situation it is important for the driver to have his attention on the road; an advertising billboard can slow the driver's reaction time, which increases the chance of a crash" (p. 2).<sup>(25)</sup>

The WisDOT sponsored a study which summarizes available information about the safety impacts of outdoor electronic billboards and tri-vision signs.<sup>(26)</sup> Similar to Crundall, et al. and Wallace, the authors of this study determined that greater visual complexity associated with a high-volume location, such as intersections, required drivers to search the environment more than at lower-volume locations.<sup>(17,26)</sup> The authors stated, "it can be conjectured that additional visual stimuli such as billboards may add additional demand to driver workload in high-volume intersections" (p. 6).<sup>(26)</sup>

Bergeron, on behalf of the Government of Quebec, Canada, re-reviewed many of the studies originally examined by Wachtel and Netherton and added reviews of several studies conducted subsequent to 1980.<sup>(2,27)</sup> His findings and conclusions, similar to those of other researchers, indicate that attentional resources needed for the driving task are diverted by the irrelevant information presented on advertising signs. This distraction leads to degradation in oculomotor performance, which adversely affects reaction time and vehicle control capability. The study concludes that when the driving task imposes substantial attentional demands that might occur on a heavily traveled, high-speed urban freeway, billboards can create an attentional overload that can have an impact on micro and macropformance requirements of the driving task.

## 2.6 REVIEWS OF PRACTICE

Bergeron also performed a site review at a major elevated expressway in Montreal, Canada, which was proposed for two future billboards.<sup>(28)</sup> By reviewing the scene and considering various parameters such as traffic volumes, road geometry, and traffic control devices, Bergeron concludes that this 1.1 km section was already causing excessive cognitive demands, particularly for the many unfamiliar drivers. He concluded that the billboards would be inadvisable for several reasons. First, the location creates a substantial demand on drivers' mental workloads because of its complex geometry, heavy traffic, high traffic speeds, merging and diverging traffic, and the presence of signs and signals that require drivers to make rapid decisions. Also, at the perceptual level, the billboards would add confusion to the visual environment, thus impairing drivers' visual search, tracking, and reaction time. In addition, at an attention level, billboards could distract drivers. Last, the billboards could add to a driver's mental workload in a setting where workload is already quite high. In a road situation such as this one, Bergeron concludes that the billboard is a "useless drain on limited attentional resources" (p. 5), and it could lead to reduced performance through inattention errors by overloading the driver's information processing abilities.<sup>(28)</sup>

du Toit and Coetzee address the current regulatory process for advertising signs visible from national roads.<sup>(29)</sup> The authors report that the South African government engages in careful scrutiny of proposed advertising signs before they are approved for use. All applications receive a desktop review followed by a site visit. If a decision cannot be made at this point, the authorities evaluate crash statistics for the proposed location to determine that if it is hazardous. Key questions asked as part of the review include the following:

- Will the proposed sign obscure the view of an official road sign?
- Will the sign cause a disruption of information flow to the driver?
- Will the sign's location distract the driver's attention at merge/diverge areas, curves, and interchanges?

A clear system exists in South Africa that requires certain spacing between road signs, particularly those that are close to interchanges; proposed advertising signs must fit within the parameters. This system, as codified in the South African Road Traffic Signs Manual (SARTSM), is intended, "to allow adequate time for the driver to read, interpret and react on the information on the road sign" (p. 7).<sup>(29)</sup> The authors report that for a recent review period, 86.7 percent of all applications were rejected. Of those, 40.8 percent were rejected because the advertisement was too close to existing road signs, 20 percent were rejected because the sign disrupted the flow of information to the driver, and 7.5 percent were rejected because the sign was too close to a ramp gore.

As a result of his work cited immediately above, Coetzee reviewed literature, performed a regulatory analysis, and recommended changes to regulations for outdoor advertising control in South Africa.<sup>(30)</sup> Although superficially similar to regulations in the United States, billboard control in South Africa goes much further, regulating the design and amount of information (in bits) that can be displayed on a given sign, as well as the proximity of two or more advertising



signs to one another and to road features, such as official signs and interchanges. In South Africa, message sequencing, visual clutter, and sign size are restricted for different display technologies. This document includes a description of the terms *critical event* and *critical zone*, and it demonstrates how regulations would control advertising signs in these applications. Coetsee finds support from the earlier work of Ogden and the experiments of Johnston and Cole, concluding that, whereas drivers may be able to ignore advertisements when the driving task requires attention, it is possible that an attention-getting sign can assume primary importance and interfere with not only any spare capacity that a driver might have but also the information processing capacity reserved for primary task performance.<sup>(31,32)</sup> The danger arises, according to Coetsee, when processing the information on the advertisement interferes with the driver's principal vehicle control task in situations that demand attention and rapid reactions.<sup>(30)</sup> The Coetsee report is the only work in the present review of the literature that has attempted to establish the parameters of billboard location and content based on theories of information processing and cognitive demand.

## **2.7 CONCLUSIONS FROM LITERATURE REVIEW**

### **2.7.1 Basic Research Question**

The basic research question being addressed in the present report is whether the presence of CEVMS used for outdoor advertising is associated with a reduction in driving safety for the public. When regarded from a scientific perspective, the present literature review does not provide an adequate answer to this question. The studies reviewed are inconclusive.

The present literature review reveals a disjointed array of isolated studies revealing sometimes contradictory and inconclusive results. Some studies show statistically significant driver safety concerns or distraction effects, but not all levels of distraction have negative safety impacts. Some studies go one step further and compare a statistically significant distraction with a criterion level of distraction claimed to represent the threshold of negative safety performance. This approach represents a substantial improvement, but it depends heavily upon the veridicality of the chosen criterion level of distraction. Other studies show no statistically significant safety or distraction effects at all, or they show mixed results. Some studies which show no statistically significant safety or distraction effects have been demonstrated to have serious flaws in their experimental and/or statistical designs. These studies are often plagued with two intrinsic methodological problems. First, they may not have sufficient measurement accuracy and precision to distinguish CEVMS distraction from noise in the data. Second, they may not have sufficient statistical power to reveal a small but important distraction effect which may really exist; i.e., they have not sampled enough events, drivers, or conditions to demonstrate an effect which may be obscured by variability due to sampling. In summary, from the perspective of strict statistical hypothesis testing, the present literature review is inconclusive with regard to demonstrating a possible relationship between driver safety and CEVMS exposure. From this perspective, the more stringent restrictions on the placement of billboards found in other countries might be regarded as a conservative precautionary measure, erring on the side of protecting public health from a possible but unproven threat and not as a response to an established driving safety hazard. That is not to say that such a conservative approach is inappropriate, but it should be acknowledged as such.

The present literature review does reveal a preponderance in the number of studies (5:1) which show some driver safety effects due to traditional billboards and CEVMS in comparison with the number of studies that show no driver safety effects at all due to these stimuli. In addition, four other studies show mixed results. Three lists were prepared below to demonstrate this outcome. These lists included only empirical research studies, regardless of the methodology employed. Studies that reviewed literature or practice were not included unless they also contained an original research component. Studies previously reviewed in the earlier FHWA projects were also not included.

The following research studies reported potential adverse safety effects for all dependent measures:

- Wisconsin Department of Transportation.<sup>(4)</sup>
- Young.<sup>(16)</sup>
- Crundall, et al.<sup>(17)</sup>
- Young and Mahfoud.<sup>(18)</sup>
- Chan, et al.<sup>(19)</sup>

The research study by Tantala and Tantala<sup>(8)</sup> reported no adverse safety effect on any dependent measure.

The following research studies reported potential adverse safety effects using some dependent measures and no effects using other dependent measures:

- Lee, McElheny, and Gibbons.<sup>(12)</sup>
- Beijer, Smiley, and Eizenman.<sup>(14)</sup>
- Beijer.<sup>(15)</sup>
- Smiley et al.<sup>(7)</sup>

Such an outcome could lead one to conclude that there is more evidence for a possibly meaningful negative safety impact than evidence against such an impact. This conclusion is not warranted for at least two reasons. First, a simple tally of the number of studies which support a given research hypothesis compared with the number of studies which do not support the hypothesis may be misleading. Such a tally neglects to weight the various studies for their intrinsic strength of experimental design, statistical power, and care of execution. One strong landmark study with a robust experimental design and a sufficiently large sample of cases or drivers can topple a host of weaker investigations with fewer credentials. Yet, credentialing and weighting studies can become a subtle and subjective matter. It is difficult to judge studies on their relative strengths because it requires experience and judgment. While it may be relatively

easy to identify the champion study and give that study a strong weighting, it is more difficult to evaluate the weaker studies at the middle and bottom of the list.

Second, there is a strong propensity in scientific research to search for differences. The current Western model of reductionist scientific inquiry, coupled with its reliance on the paradigm of parametric statistics, is aligned against supporting the null hypothesis. This hypothesis states that there are no observed differences between two or more different treatments, i.e., that matters under scientific scrutiny are due to chance. This propensity to search for differences is so strong that when anticipated results are small or subtle, researchers often seek out conditions in nature that are worst case examples to find any affect at all. This causes the results to suffer from a lack of generalization when the entire population becomes the frame of reference. Thus, the present literature review acknowledges a possible natural and intrinsic bias toward including more studies that show a possible distraction effect of CEVMS exposure than studies that do not. Once these two considerations are recognized—a lack of weightings for comparing studies and a propensity to emphasize differences—the present literature review realigns to its original inconclusive outcome. In summary, present scientific techniques are not adapted to providing proof that CEVMS do not distract drivers; they only afford opportunities to demonstrate that they do distract drivers and possibly to what extent. If the demonstrated extent of distraction is minor and below the accepted criterion to interfere with safe driving, then the safety impact may be considered negligible.

### **2.7.2 Methodological Implications**

The inconclusive literature review findings suggest the need for carefully controlled and methodologically sound investigations of the relationships between CEVMS, driver distraction, and safety. The review also suggests several factors that need to be considered in future research. One plausible model posits that drivers often have spare attentional capacity, and they can afford to divert their visual attention away from the driving task to look at objects irrelevant to the driving task, such as CEVMS. According to this model, when driving demand increases because of fixed hazards (such as dangerous roadway geometry or complex interchanges) or transient hazards (such as slowing traffic, vehicle path intrusion, or adverse weather), spare capacity is reduced or eliminated, and the driver devotes more capacity to the driving task. In this model, driver workload emerges as an important issue. By applying this model, in some countries, outdoor advertisements are not allowed in areas where known fixed hazards exist. Such locations include, but are not limited to, sharp horizontal or vertical curves and areas where high cognitive demand is imposed by the roadway, traffic, or environment, like intersections, interchanges, and locations of merging or diverging traffic. In some countries, billboards are also not allowed where they might interfere with the processing of important information from official road signs. These prohibitions do not in themselves prove that distraction is worse in high driver workload situations. However, they do point to the need to consider conditions of differing driver workload in an effective future research program on possible safety effects from CEVMS exposure.

When scanning for hazards, drivers' eye movements tend to fall within a horizontal window centered on the focus of expansion in the forward view. This focus of expansion is related to the visual flow of the moving scene where points and objects all emerge from a single point. Because an attention-getting billboard may be able to attract a driver's glance even unintentionally, a CEVMS that falls within this scanning pattern can interrupt the pattern and

cause a distraction at an inopportune time. Furthermore, research suggests that the distraction from a roadside billboard may be unconscious. Consequently, drivers may not be aware that they are being distracted, and they are unable to verbalize that any distraction occurred. Although where someone's eyes look may not be the same as where his or her attention is focused, a theoretical connection may be implied. Through this connection, measurements of eye glance behavior permit the researcher to gain potential entrance into this realm of unconscious allocation of attention. This allocation of attention should play an important role in an effective program for future research.

In addition, it cannot be assumed that all CEVMS are equal, even those of the same size, height, and LED technology to display their images. The impact of a CEVMS in an undeveloped area with relatively low levels of nighttime ambient lighting may be quite different from that of a CEVMS in a more urban context among other buildings and structures in an area with high nighttime illumination levels. Furthermore, characteristics of the CEVMS displays may, in and of themselves, lead to measurable differences in distraction, such as information density, colors of figure and background, character size and font, and message content. These characteristics cannot be assumed to be equivalent for purposes of comparisons. One possible solution to this problem may be for future research studies to exercise a certain degree of experimental control over the CEVMS message itself. This may require a deeper level of cooperation with the billboard industry than has been encountered in previous studies. Such increased cooperation could be beneficial in establishing a collaborative research environment among industry, government, and university stakeholders.

Finally, a frequently changing CEVMS, which can generally be seen long before it can be read, raises a particular concern for distraction. This is because drivers may continue to glance at the CEVMS to observe changes in varying content with various sizes of lettering until the sign content can be read. The implication here is that future studies may need to embrace longer viewing distances.



### 3.0 KEY FACTORS AND MEASURES

The study of possible CEVMS effects on driver safety represents a complex research endeavor. There are numerous key factors affecting a driver's response to CEVMS. Many of these influential factors may be designated as independent research variables in need of specification or control within a given research design. Likewise, there are numerous inferred measures of driver safety which may serve as possible dependent variables for observation and measurement. Depending upon the specific research design, some of these independent and dependent variables may swap places.

#### 3.1 KEY FACTORS (INDEPENDENT VARIABLES)

For classification purposes, the key factors, or major independent variables, may be categorized into various types. The list of key factors shown below gives some of the independent variables which might be considered in the study of possible safety effects of CEVMS. These key independent variables were selected from a more comprehensive analysis by means of a process to be described later. This analysis grouped all of the independent variables into five major categories according to source as follows:

- Billboard.
- Roadway.
- Vehicle.
- Driver.
- Environment.

After this initial analysis, a subsequent evaluation selected only the most important, or key, factors or variables. Each category lists the key independent variables which belong to that category. The lists below contain independent variables from four of the five above mentioned categories. The vehicle category is missing because all of the variables belonging to that category were eliminated in the selection process. For cross reference purposes, the decimal number shown in brackets to the right of each variable gives the outline number from the more detailed analysis upon which the selection was based (see table 1 in appendix A). In parentheses to the right of certain variables are given some examples and explanations which serve to clarify that particular variable.

The following are the key factors relating to the billboard:

- Location [1.1] (lat./long., GPS, mile marker, survey location, reference location).
- Sight distance [1.1.3].
- Resolution [1.2.3] (dpi, LEDs/inch, crispness).

- Luminance [1.2.4] (brightness).
- Contrast ratio [1.2.4].
- Day/night settings [1.2.4].
- Change rate [1.3.2] (image changes).
- Dwell time [1.3.2].
- Change time [1.3.2].
- Sequencing [1.3.2] (apparent motion).
- Full motion video [1.3.4].
- Engagement value [1.3.5] (ability to hold attention).
- Message [1.4].

The following are the key factors relating to the roadway:

- Category [2.1.1] (two-lane rural, collector, arterial, freeway).
- Geometry [2.2.2] (curve radius: horizontal, vertical).
- Intersection [2.2.3] (signalized, stop controlled).
- Interchange [2.2.4].
- Exit [2.2.4].
- Entrance [2.2.4].
- Merge [2.2.4].
- Gore [2.2.4].
- Traffic [2.3] (average daily traffic, peak traffic, level of service).

The following are the key factors relating to the driver:

- Age [4.1].
- Gender [4.1].
- Demographics [4.1].

- Years driving [4.2].
- Route familiarity [4.2].
- State [4.3] (alert, fatigue, alcohol, drugs).

The following are the key factors relating to the environment:

- Visual clutter [5.1.1].
- Nearby billboards [5.1.1].
- Ambient lighting [5.1.1].
- Official signs [5.2] (illuminated, luminous (VMS), retro-reflective).
- On-premise signs [5.3] (conventional, tri-vision, digital, full motion video).

The combined list of key factors given above represents a subset of the most influential independent variables in terms of importance to a future program of research. This subset of variables was selected from a more extensive list of the major independent variables which might play a role. As mentioned previously, the list of all major independent variables may be found in outline form in table 1 in appendix A. The bracketed decimal numbers in the list of key factors refer to the corresponding outline numbers in table 1. In addition, the table cites some of the advantages and disadvantages of employing that particular variable. The combined list of key factors presents the 32 variables which were judged to be the most influential variables from table 1.

The more comprehensive and detailed analysis represented in table 1 identifies considerably more possible independent variables. The approximately 60 types of variables listed in the table are further broken down into 185 specific subtypes or levels of independent variables which could play an important role in studying the possible effects of CEVMS on driver distraction and roadway safety. It is encouraged to carefully examine the many independent variables and their advantages and disadvantages, as described in table 1 in appendix A, to gain a greater appreciation of the complexity of the research problem. With such a profusion of important factors affecting the study of CEVMS effects, no single experiment could possibly answer all of the relevant scientific or engineering questions.

The key independent variables were selected from the expanded list represented in table 1 by three senior research psychologists, all coauthors of the present report and familiar with CEVMS research. The criterion for selection was the importance of that factor in conducting research on CEVMS effects. Thus, the list of key factors indicates critical independent variables which need to be considered in any proposed program of research. The brightness and crispness, or photo realism, of the CEVMS images are extremely important. Any image changes, apparent motion or video motion in the CEVMS, and location parameters are also critical factors. The next level of importance relates to environmental factors. Two distinct classes of variables must be taken into account: general visual clutter and the presence of other off-premise commercial CEVMS



(nearby billboards). In particular, compelling information from CEVMS used for advertising may conflict with important roadway safety information conveyed by nearby traffic control devices (official signs). The question should also be raised concerning possible enhanced distraction caused by the urgency of Amber Alerts and other public safety messages displayed on CEVMS. Any contextual links among the messages from several sequential CEVMS, as well as any specific user interactions with the CEVMS must be taken into account. Factors to consider for drivers include their familiarity with the driving route and the expected presence or absence of CEVMS. Lastly, the complexity of the roadway geometry and the volume of traffic are likely to play significant roles.

### **3.2 KEY MEASURES (DEPENDENT VARIABLES)**

The study of driver safety is a complex area of investigation. There are numerous objective, inferred, and subjective measures of driver behavior which might serve as dependent variables in a program of proposed research on the possible safety effects of CEVMS. As demonstrated in the discussion concerning independent variables, the key measures or dependent variables may be categorized into types. The list of key measures shown below gives 28 key measures, or dependent variables, which might be considered possible safety effects of CEVMS. As was the case for the list of key factors (independent variables), the list of key measures represents a down selection from a more extensive list of the major dependent variables of interest (see table 2 in appendix A). The dependent variables are grouped into the following four major categories:

- Vehicle behavior.
- Driver and vehicle interactions.
- Driver attention and distraction.
- Crashes.

The structure of the list of key measures for dependent variables is similar to that for the list of key factors for independent variables. In the case of dependent variables, the major variable categories of driver and vehicle interactions and crashes found in table 2 are missing from the list of key measures below because all of the variables belonging to these two categories were eliminated in the selection process.

Key measures relating to vehicle behavior are as follows:

- Speed [1.1] (continuous, exceeding speed, speed variance).
- Lane position [1.2] (continuous, lane excursions, lane variance).
- Acceleration [1.3] (longitudinal, lateral, heave).
- Other vehicle interactions [1.4].
- Headway [1.4.1] (time to collision).

- Gap acceptance [1.4.2] (merge, passing).
- Conflicts [1.4.3] (near-crashes).
- Violations [1.4.4] (red light running, failure to yield, failure to stop).
- Errors [1.4.5] (missed exit, wrong lane).
- Timing [1.4.6] (late movements, premature movements).
- Infrastructure interactions [1.5].
- Response to roadway geometry [1.5.1] (swerves, sudden braking).
- Response to traffic control devices [1.5.2] (misses, delays).
- Pedestrian interactions [1.5.3] (yields).

Key measures relating to driver attention/distraction are as follows:

- Eye glance behavior [3.1.1] (number and duration of glances, glance object).
- Distractor performance [3.1.2] (secondary task).
- Visual occlusion [3.1.3].
- Feature detection [3.1.4].
- Feature recognition [3.1.5].
- Driver workload [3.1.6] (task performance).
- Head turning [3.1.7].
- Driver errors [3.1.8].
- Reaction time [3.1.9] (perception-reaction time).
- Surprise [3.2.1] (orienting response).
- Conspicuity [3.2.2] (attention grabbing).
- Search patterns [3.2.3].
- Capacity [3.2.4] (self-regulated attention, spare capacity).
- Subjective measures [3.3].

As mentioned above, the more detailed analysis underlying the combined list of key measures shown above may be found in table 2 in appendix A. Table 2 for the dependent variables has the same general structure as table 1 for the independent variables. The approximately 65 types of dependent variables listed in table 2 are further broken down into 105 specific subtypes or levels of variables which could play an important role in measuring the possible effects of CEVMS on driver distraction. As noted before, it is encouraged to carefully examine the many dependent variables and their advantages and disadvantages, as described in table 2 in appendix A, to gain a greater appreciation of the wide variety of ways that driver safety can be measured as they relate to possible influences from CEVMS. With so many potential measurement techniques available, care must be taken in selecting appropriate dependent variables for any proposed program of research.

Only the key dependent variables are listed in the combined list of 28 key measures given above. They were selected by the same process used to select the key independent variables in the list of key factors. As indicated before, the criterion for selection was importance in conducting research on CEVMS effects. Thus, the list of key measures indicates critical measures which need to be considered in future research. Eye glance behavior can serve as a particularly important potential indicator of specific visual distractions. The concept of self-regulated attention is very important for establishing excessive levels of distraction, despite difficulties in establishing a criterion threshold. This concept refers to attention that is under the driver's conscious control, as opposed to involuntary attention, which may compel the driver to glance away from the road for an excessive amount of time. Increases in driving conflicts and errors are likewise effective measures of safety. The next level of importance relates to other observations of vehicle behaviors, including determinations of acceleration, lane position, and speed. Similarly important infrastructure interactions, such as driver responses to roadway geometry and traffic control devices, need to be considered.

## 4.0 RESEARCH STRATEGIES

To successfully investigate the potential safety effects of CEVMS, the key factors (independent variables) and key measures (dependent variables) described in the previous section need to be selected, combined, and integrated into an effective research strategy. There are a number of possible research strategies that could address the basic research question. The list of recommended research strategies shown below lists eight key research approaches that might be considered. This list was generated from a more comprehensive and detailed analysis of the research strategies which might be of interest. This comprehensive analysis of research strategies was divided into six major groups (see table 3 in appendix A). The first group focuses on observing or counting actual motor vehicle crashes as they might occur or have occurred in the field. This field portion includes retrospective crash data base studies. The second group entails observing motor vehicle crashes as they might occur in a driving simulator. The third group involves observing safety surrogate measures as they might actually occur in the field. The fourth group focuses on observing safety surrogate measures as they might occur in a driving simulator. The fifth and sixth groups relate to social surveys and analytical studies. In this instance, the down-selection process eliminated all research strategies concerning crashes, social surveys, and analytical studies. Within the parentheses next to each strategy are some selected advantages and disadvantages associated with using that type of strategy in conducting research.

Only the key strategies are shown in the list of recommended research strategies. They were selected by the same process used to select the key independent and dependent variables, with one important exception. This exception involves the incorporation of several assumptions which were derived from the antecedent analysis of potential independent and dependent variables. First, the brightness, sharpness, photo realism, and visual context of the CEVMS are extremely important. Since these characteristics are difficult to reproduce in a laboratory, laboratory methods tended to be judged low. In addition, certain participant-related variables, in particular eye glance behavior, are highly effective measures of distraction and workload. Any research method that supported the measurement of such variables tended to be judged high. Last, crash data involve rare events with multiple causal factors, making them difficult to measure. The CEVMS technology is too new to have an adequate crash heritage. In general, crash estimation methods tended to be judged low.

After incorporation of the above assumptions, the following final list of recommended research strategies was developed. This final list included strategies from only two of the original six groups of strategies.

The recommended research strategies for the safety surrogate field group include the following:

- Unobtrusive observation [3.1] (natural driving context/no eye glance data, expensive).
- Naturalistic driving [3.2] (natural driving context/insensitive eye glance data, expensive).
- On-road instrumented vehicle [3.3] (experimental control, sensitive eye glance data, efficient, cost effective/artificial drive purpose).

- Closed-course test track [3.4] (stimulus control, efficient, cost effective/out of context driving).
- Commentary driving [3.5] (easy/artificial response, interfere with driving).
- Non-vehicle based field testing [3.6] (easy/artificial, out of context).

The recommended research strategies for the safety surrogate laboratory group include the following:

- Driving simulator [4.1] (experimental control, sensitive eye glance data, efficient/limited stimulus, artificial).
- Non-simulator laboratory [4.2] (relatively easy/artificial, out of context).

The more detailed analysis underlying the above combined list of recommended research strategies may be found in table 3 in appendix A. In the table, the more comprehensive analysis of research strategies is further broken down into approximately 55 specific categories and 165 subtypes or levels of these categories. The reader is encouraged to carefully examine the many strategies and their advantages and disadvantages, as described in the table, to gain a greater appreciation of the wide variety of potentially relevant research methods which might be employed to study possible CEVMS effects.

Table 3 can be used to discriminate among potential candidate research strategies. Certain research strategies can be eliminated from further consideration. Analytical studies cannot fill knowledge gaps and consequently often fall prey to reliance on unfounded assumptions. Social surveys are based on memory and opinion, and they are generally administered far from the event of interest both in terms of time and space. Crash rates, whether observed in the field or in the laboratory, represent extremely rare events, which are often the result of multiple complex causes and thereby difficult to evaluate. CEVMS technology has not been deployed long enough to accumulate a sufficient number of proximal motor vehicle crashes to make reliable estimates concerning population crash statistics in the field. Driving simulators used to measure safety surrogates have the advantage of careful control over stimulus parameters and testing conditions, but they suffer the disadvantage of being unnatural and artificial. More importantly, driving simulators have difficulty reproducing the luminance contrast and bright photorealism of the new CEVMS technology. In a similar manner, the closed-course test track and non-vehicle based field testing techniques represent a comparatively artificial and out-of-context experimental environment even though they are conducted in the field. Finally, commentary driving also affords natural billboard stimuli, but the driving task becomes somewhat artificial.

The three research strategies which were judged to be the most effective were the on-road instrumented vehicle, the naturalistic driving, and the unobtrusive observation method, which were all used to measure driver distraction and safety surrogates. Thus, the outcome of the present investigation of research strategies recommends three primary candidates for consideration in any program of future research to study the possible effects of CEVMS on driver distraction and roadway safety. Each of the three study methods represented has its own unique advantages and disadvantages. All three of these top candidate research strategies should

be considered in developing any future research program on CEVMS effects. They provide the basis for selecting a recommended first stage study in such a program.

This is not to say that other research strategies do not have a significant role to play in a comprehensive research program directed toward a common goal. For example, if significant negative CEVMS safety effects have already been found using one of the primary research strategies, subsequent driving simulator experiments might be employed to systematically vary certain billboard location, timing, or spacing parameters in a controlled and consistent manner to establish billboard placement guidance. In addition, combinations of research strategies can result in synergistic efficiency. For example, both the unobtrusive observation and the naturalistic driving methods naturally support the simultaneous collection of crash, near-crash, or safety surrogate data. The analysis of crash data will also be needed to relate measures of driver distraction to more direct determinants of roadway safety.



## 5.0 FUTURE RESEARCH PROGRAM

As stated previously, it is not possible to answer all of the critical questions concerning possible attention, distraction, and safety impacts from CEVMS in a single experiment. Instead, a carefully crafted program of research needs to be conceived and implemented to embrace a series of interrelated experiments and studies directed at answering different facets of this complex issue. This section describes the important elements of a recommended research program. This research program is broadly defined to provide a background and context for more concrete alternative first stage studies outlined in section 6.0. This section describes a long-range multistudy research program covering a number of years. Section 6.0 will outline three methods for implementing the first stage of that program.

### 5.1 STAGES

The proposed research program would have the following three stages:

- Stage 1—The attention and distraction effects of CEVMS would be investigated to determine whether any observed or measured distractions due to CEVMS is sufficient to interfere with attentional criteria for safe driving. This stage is directed at discovering whether or not distraction from CEVMS represents a potential driving hazard. Initial CEVMS parameters must be chosen carefully so as not to bias the result from the outset.
- Stage 2—If potential interfering distraction is observed, it would be necessary to investigate the relationship between the observed distraction and various CEVMS parameters (e.g., luminance, change rate, distance, CEVMS spacing, engagement level of sign content, and road geometry) to determine possible limitations on CEVMS deployment and operation which might reduce distraction to noninterfering levels. This stage is directed at developing empirical data to support the development of possible restrictions or regulation of CEVMS to reduce potential driving hazards.
- Stage 3—As related to CEVMS, researchers would have to investigate the relationship between distraction, defined in terms of eye glance behavior and safety surrogate measures (driving conflicts, errors, etc.), and safety, defined more directly in terms of crashes, fatalities, injuries, and property damage. This stage focuses on validating the eye glance and safety surrogate measures used to infer attention and distraction effects of CEVMS through the primary safety criterion of protecting life, health, and property.

The above stages of the proposed research program are to be pursued sequentially. The initial stage is directed at determining whether or not a potentially harmful CEVMS distraction effect exists. To demonstrate such a distraction effect, an independent and objective threshold criterion of excessive distraction must be employed. If no potentially harmful distraction is shown, at least as far as driving safety is concerned, there would be little need to pursue the second stage of developing a basis for regulating CEVMS or the third stage of relating CEVMS distraction to more direct measures of safety (crashes). If potentially harmful distraction is shown in the first stage, the second and third stages would be implemented in order. The order of the last two stages may appear to be reversed. Normally, it would seem desirable to establish a relationship



between CEVMS distraction and crashes before developing a basis for regulation. However, in this instance, the LED-based digital CEVMS technology is so new that it will not be possible to reliably measure crashes for some time. Meanwhile, if possible distraction is shown, the community of practitioners engaged in outdoor advertising control will need near-term technical information on the luminance, contrast, change rates, and spacing of CEVMS to minimize that distraction. For this reason, the stages have been proposed in the order given above.

## **5.2 APPROACH**

The literature review update in section 2.0 points to some important principles that should be incorporated into the proposed program of research to enhance the probability that the program can successfully achieve its goals. These principles can be regarded as lessons learned from the experience of previous research. First, empirical studies should employ CEVMS stimuli, as well as a variety of comparison stimuli, including standard (non-digital) billboards, built objects of casual visual interest (e.g., houses, barns), and natural background control scenery (e.g., trees, fields). This principle establishes a relevant visual context against which to contrast CEVMS stimuli. Next, empirical studies should be constructed so as to compare the effects of CEVMS and the effects of the various comparison stimuli. This principle implies that some measurable (statistically significant) effect should be demonstrated for as many of the comparison stimuli as possible, at least for the standard billboards. It is necessary to show some distraction effect for both CEVMS and standard billboards relative to a baseline to be sure that the study is not just measuring random noise in the data. In addition, for the case of distraction and safety surrogate performance measures, the measured effects of CEVMS and standard billboards need to be compared with each other and with an independently determined criterion of potentially harmful consequences. The application of this criterion needs to incorporate the concept of self-regulated attention, as indicated in section 3.0. Last, to the degree possible, direct experimental control should be exerted over the CEVMS stimuli. In the first stage of determining a meaningful distraction effect, this control can be limited to turning the CEVMS on and off for predetermined periods according to a strict experimental protocol. In the second stage of establishing possible parameter limitations, this control may need to be expanded to changing the luminance, message change rate, or some other CEVMS characteristic according to an experimental protocol.

These four principles define the basic approach for implementing the proposed research program. They provide guidance and direction to the proposed program. It should be emphasized that only a systematic multiyear broad program of research can adequately answer the important questions posed by the community interested in outdoor advertising control concerning the possible distraction effects and safety implications of CEVMS. No single experiment can provide the solution. It should also be emphasized that all stages of the research program must be sensitive to the practical needs of the outdoor advertising community, which includes highway engineers, traffic engineers, the outdoor advertising industry, environmental advocates, and outdoor advertising regulators. Even though the second stage is where most of these practical needs are addressed, at all stages of the research, investigators need to try to provide practical information on the luminance, contrast, change rate, display size, display spacing, or other parameters over which the outdoor advertising community could possibly exert some control. Administrators concerned with issuing permits for billboards need practical engineering results to assist them in their daily jobs.

## **5.3 STRUCTURE**

As outlined above, the proposed research program consists of three stages. The first stage focuses on determining the potential existence of harmful distraction effects due to CEVMS. The second stage involves determining limitations or restrictions to CEVMS parameters which could reduce or eliminate the implied potentially harmful distracting effects. The third stage focuses on relating the reduction in implied potentially harmful distraction to actual safety benefits of decreasing crashes, fatalities, injuries, and property damage on the roadway. The sections below describe these stages in more detail.

### **5.3.1 Stage 1—Determination of Distraction**

The first stage, to determine the potential existence of harmful CEVMS distraction, may be implemented in many different ways. According to the analysis of research strategies in section 4.0, the three most effective approaches are the on-road instrumented vehicle, the naturalistic driving, and the unobtrusive observation methods.

The on-road instrumented vehicle method is sensitive to a wide range of variables, including accurate eye glance measurements. It affords the opportunity to ensure that the test participants drive by many CEVMS and comparison sites in a structured and reproducible manner.

The naturalistic driving method is similar to the on-road instrumented vehicle technique, but it has less control since the test participants drive their own vehicles according to their own personal daily schedules. As a result, the participants may pass few, if any, billboards. Furthermore, the naturalistic driving method has difficulty supporting accurate eye glance measurements, and it requires considerably more effort and expense. However, the naturalistic driving method is less artificial and has a high degree of face validity.

Although the unobtrusive observation method also involves considerable effort and expense, the data collected are based on the observation of vehicles rather than individual drivers. The unobtrusive observation method is the least artificial of the three because with this technique, research participants are generally unaware of being observed.

This first stage of the research program would employ one or more of these study approaches as a first step. A single method could be selected, or more than one approach could be combined. For example, the on-road instrumented vehicle and the unobtrusive observation method could make an effective combination, but the cost would be high. In either case, this first stage should also be designed to answer, at least in a preliminary manner to whatever degree possible, some of the practical questions of interest to the community concerned with outdoor advertising control.

### **5.3.2 Stage 2—Basis for Regulation**

If the results of the first stage reveal a CEVMS driver distraction effect sufficient for public concern, then the second stage of the proposed research program would be implemented to provide an initial technical basis for possible regulation. This stage would consist of a series of eye glance and safety surrogate evaluations in the field and in the laboratory designed to investigate the various parameters of CEVMS which contribute to driver distraction. Although field methods can capture the realism of the CEVMS stimulus, they do not allow the researcher

to independently vary a variety of CEVMS parameters one at a time so as to isolate the effect of that variable, as some of the laboratory techniques would. For example, this second stage might begin with attempts to estimate the gross effects of certain salient CEVMS parameters in the field. Throughout this section, the brightness of the CEVMS will be used as an example, but the approach can be adapted to many other relevant CEVMS characteristics. For example, many current CEVMS displays adjust their brightness for day and night. If the outdoor advertising industry would agree to adjust the brightness of several installations both during the day and at night for the purposes of experimentation, partial estimates of the effects of brightness on eye glance behavior might be elaborated for selected luminance levels.

To obtain a more complete functional relationship between eye glance distraction and CEVMS luminance, a test track or driving simulator experiment might be devised. If it were possible to erect an experimental CEVMS installation at a test track location, the test track experiment would have realistic brightness and contrast levels, as well as controlled exposure conditions. However, it would suffer from a highly constrained and unnatural driving environment. The driving simulator experiment could easily portray a wide variety of driving environments with realistic contexts, but it would suffer from a severely restricted range of luminance and contrast ratios. Nonetheless, to overcome these disadvantages, correction factors or transformations might be applied to the test track data to account for discrepancies in level of attention and to the driving simulator data to account for photometric discrepancies. The incorporation of such correction factors or transformations to relate test track and laboratory data to driving data on real roads underscores the necessity of conducting a combination of field and laboratory testing environments in this stage of the proposed research program. Some degree of field validation needs to be a part of any laboratory component of the research during this stage.

This second stage of the research program must be designed to answer, to the degree possible, the practical questions of the community interested in outdoor advertising control. This is the stage of research which addresses functional relationships regarding the effects of CEVMS luminance (brightness), change rates, size, display spacing, and other variables on driver distraction and roadway safety. These functional relationships could subsequently be translated by outdoor advertising administrators and regulators into concrete rules which protect the safety of the driving public while at the same time allowing commercial growth and the rights of the outdoor advertising industry. To be fully successful, this stage of the research program must be pursued with active participation from all stakeholders, which include industry, environmentalists, researchers, and regulators alike.

### **5.3.3 Stage 3—Relationship to Crashes**

The third stage of the proposed research program relates changes in potentially harmful distraction effects due to various CEVMS parameters to changes in actual roadway safety (crashes and their consequent fatalities, injuries, and property damage). This stage is directed at validating the earlier findings with regard to CEVMS distraction based on eye glance and safety surrogate measures in the context of retrospective crash data. This stage of the program would likely employ the Empirical Bayes, or Bayesian, method of analyzing crash statistics. The Bayesian approach formally incorporates prior knowledge into the process of current research, and it translates probabilistic calculations into statements of belief concerning statistical hypotheses in place of the classical confidence interval concept employed in parametric

statistics. The Empirical Bayes method also incorporates the crash history of other control sites with similar traits to account for extraneous factors which may be influencing the crash data at the site of interest. In short, the Empirical Bayes method possesses distinct statistical advantages over the naïve before/after technique and even the before/after technique with a simple control. The Empirical Bayes method is well suited for the task of estimating vehicle crash rates along different stretches of roadway, including those stretches with CEVMS. The prediction of baseline crash rates, and their potential increase or decrease with the introduction of CEVMS, is essential to this final stage of the proposed research program. This final stage should also be designed to answer, to whatever degree possible based on crash statistics, some of the practical questions of interest to the community concerned with outdoor advertising control. Because of the low numbers of crashes and their susceptibility to multiple determining causes, considerable effort, time, and expense will likely have to be expended on this final stage.



## **6.0 RECOMMENDED FIRST STAGE STUDY**

The first stage of the research program, determination of distraction, provides the context for selecting the recommended next study. The first goal of this stage of the program is to determine whether any observed or measured distraction due to CEVMS is sufficient to interfere with attentional criteria for safe driving. The second goal is to provide some preliminary practical technical information that could be of help to the community interested in outdoor advertising control. This goal could consist of furnishing initial indications of the possible distraction effects produced by one or more of the concrete variables over which the community might exert some control, such as luminance (brightness), change rate, display size, and display spacing. According to the analysis summarized in section 4.0, to provide an initial answer to these types of questions, the three most effective research strategies are the on-road instrumented vehicle, the naturalistic driving, and the unobtrusive observation methods. In the present section, one possible preliminary study is briefly described using each of these three approaches. A more detailed description of each study approach is given in appendix B. This detailed description includes more specific information on the general method, factors and measures employed, advantages and disadvantages, and budgetary cost. After project initiation, a more comprehensive work plan and more in-depth budget will need to be developed. That comprehensive work plan should receive inputs from all of the important stakeholders in CEVMS research, which include industry, environmentalists, researchers, and regulators alike. After careful and thorough deliberation, the final details of that comprehensive work plan and budget may differ considerably from what is suggested in this section or in appendix B.

### **6.1 SUMMARY OF STUDY APPROACHES**

#### **6.1.1 On-Road Instrumented Vehicle**

The on-road instrumented vehicle method employs an instrumented vehicle which is brought to the study site. The study site is a location where there are one or more CEVMS installations along a public access roadway. Each research participant drives the instrumented vehicle along a prescribed route, which includes CEVMS installations, standard (non-digital) billboards, objects of casual visual interest (e.g., houses and barns), and natural background control scenery (e.g., trees and fields). Each participant completes several such drives. The instrumented vehicle is capable of measuring vehicle speed, vehicle lane position, longitudinal acceleration, lateral acceleration, GPS time and position, and driver eye glance direction and duration. The instrumented vehicle is also equipped with accurate vehicle-mounted or head-mounted eye-tracking equipment, video cameras (forward and cab views), and a voice recorder. The major independent variable in the study is the presence or absence of CEVMS and other comparison visual stimuli along the driving path. If possible, the CEVMS should be capable of being turned off and on or changing along some other dimension like luminance or change rate, according to a prearranged experimental design. Other important independent variables are the time of day (day/night), traffic conditions (peak, nonpeak) and driver variables (age, gender, and route familiarity). The primary dependent variables are the frequency, direction, and duration of driver eye glances. Secondary dependent measures are safety surrogate indicators associated with driver errors and other measures of driver performance, such as speed changes, headway, lane

deviation, and traffic conflicts. A rough budgetary estimate for conducting such an on-road instrumented vehicle study is between \$400,000 and \$800,000 (see appendix B for more details).

### **6.1.2 Naturalistic Driving**

The naturalistic driving method employs a standardized instrument package which is installed in each participant's own private vehicle or in a vehicle loaned to the participant. The participant's vehicle appears and performs as it normally would. Participants drive their vehicles as part of their daily life routines, making control of CEVMS exposure difficult. The instrument package is capable of measuring speed, lane position, acceleration, GPS time and position, driver eye glance frequency, direction, and duration. However, because of the unobtrusive nature of the experimental technique, this method cannot support the use of accurate head-mounted or vehicle-mounted eye-tracking equipment. Once the participant's vehicle has been instrumented, data are collected by means of automatic wireless downloads without participant awareness or involvement. The major independent variable is the presence or absence of CEVMS and other comparison visual stimuli (standard billboards, buildings, control settings, etc.) along the driven path. If possible, the CEVMS should be controlled according to a prearranged experimental protocol. Secondary independent variables could include the type of vehicle (sedan, pickup, or SUV) and driver characteristics (age, gender, and route familiarity). The primary measures or dependent variables are the frequency, direction, and duration of the driver's eye glances. However, as a result of the lower degree of accuracy in eye movement recording, this study method depends more heavily on secondary dependent variables. Safety surrogate measures associated with driver errors and other measures of driver performance (headway, lane deviation, conflicts, and erratic maneuvers) are of increased importance in this method. Additional dependent variables may include the time of day (day/night), traffic conditions (peak, nonpeak), in-vehicle distractions (eating, cell phone use), state of fatigue, etc. A rough budgetary estimate for conducting such a naturalistic driving study is between \$2 million and \$4 million (see appendix B for more details).

### **6.1.3 Unobtrusive Observation**

The unobtrusive observation method employs an array of static cameras or other sensors mounted near the locations of the CEVMS and other comparison stimuli. The cameras are capable of recording the behavior of vehicles passing the various relevant visual stimuli as a part of the natural flow of traffic. The drivers are usually completely unaware that their vehicles are being observed. Post-hoc analysis of the video recordings from these cameras can yield data similar to some of that obtained by the on-road instrumented vehicle and naturalistic driving methods including vehicle speed, lane position, acceleration, and time. However, the data from distal video cameras are usually far less accurate and reliable than what can be collected by instruments on board the vehicle. Moreover, with present measurement technology, such video recordings cannot yield any data concerning driver eye glance movements. The major independent variable is the presence or absence of CEVMS and other comparison visual stimuli (standard billboards, buildings, etc.) along the driving path. If possible, the CEVMS should be controlled according to a prearranged experimental protocol.

Some secondary independent variables might include the time of day (day/night) and traffic conditions (peak, nonpeak). This study method depends completely on safety surrogate measures

associated with driver errors and other measures of driver performance (headway, lane deviation, and erratic maneuvers), and it requires a large camera array over a long distance recording for extended periods, as well as extensive data analysis. A rough budgetary estimate for conducting such an unobtrusive observation study is between \$1 million and \$3 million (see appendix B for more details).

## **6.2 COMPARISON OF STUDY ALTERNATIVES**

This section has introduced and described three different candidate approaches for the recommended next study, which include the on-road instrumented vehicle method, the naturalistic driving method, and the unobtrusive observation method. Each study method would be capable of addressing the two-part basic research question to determine whether any observed or measured distraction due to CEVMS is sufficient to interfere with attentional criteria for safe driving, and to provide some preliminary practical technical information that could be of help to the community interested in outdoor advertising control. However, each method has certain advantages and disadvantages with regard to its ability to address these two questions.

The on-road instrumented vehicle method was judged the best, having the advantage of being sensitive to a wide range of participant variables, including accurate eye glance measurements with real CEVMS stimuli in natural settings. The degree of experimental control afforded by this method makes it the most productive of the three. Driving scenarios can be selected with a number of CEVMS and standard billboard stimuli along a single drive, which can be repeated both within and across research participants. To the degree that accurate measurements of visual distraction and eye glance behavior are pivotal dependent variables, the on-road instrumented vehicle method has the clear advantage. The high degree of experimental control ensures that exposure to CEVMS and to comparing visual stimuli is uniform and consistent. The on-road instrumented vehicle approach is the most productive research method for producing quality data in the shortest amount of time for the least cost.

The naturalistic driving method was judged the second best, offering some similar advantages to the on-road instrumented vehicle method. However, it suffered from less experimental control over CEVMS exposure, less ability to capture participant-related variables, and more logistical complication and expense. Both of these methods are somewhat related from the perspective of the research participant. In both cases, the research participant is driving in an instrumented vehicle on a real road. Both allow the determination of driver eye glance behavior to some degree, but the increased level of experimental control exercised in the on-road instrumented vehicle method gives this technique a distinct advantage, both in terms of more accurate eye glance measurements and more consistent driver exposure.

Finally, unobtrusive observation of safety surrogate measures involves no direct contact with the driver, thus preserving a completely natural driving environment. However, this method is not sensitive to participant variables. In particular, it is not possible to measure eye glance behavior with this method. This method depends solely on safety surrogate measures. Furthermore, since these safety surrogate measures are relatively subtle to detect at a distance, this method can be costly and time-consuming to implement.



The on-road instrumented vehicle method has a strong advantage in productivity and efficiency. The major advantage of the other two methods is the natural and unobtrusive nature of the study procedure from the perspective of the research participants. However, some degree of artificiality may be a small price to pay to gain the cost effectiveness of the on-road instrumented vehicle method. In the final analysis, the present report recommends the on-road instrumented vehicle method as the best choice for the first stage study. This recommendation is made on the basis of scientific merit, timeliness of producing a meaningful result, and cost.

## 7.0 CONCLUSIONS

The present report reviews the possible safety effects of CEVMS. The report consists of an update of earlier published work, an investigation of applicable research methods and techniques, recommendations for future research, and an extensive reference list and bibliography. The literature review update covers recent post-hoc crash studies, field investigations, laboratory investigations, previous literature reviews, and reviews of practice. The conclusion of the literature review is that the current body of knowledge represents an inconclusive scientific result with regard to demonstrating detrimental driver safety effects due to CEVMS exposure. This outcome points toward the importance of conducting carefully controlled and methodologically sound future research on the issue.

The present report also analyzes the key factors or independent variables affecting a driver's response to CEVMS and the key measures or dependent variables which serve as indicators of driver safety. These key factors and measures are selected, combined, and integrated into a set of optimal research strategies. Based on these strategies, as well as on lessons learned from the literature review update, a proposed long-term program of research has been developed to address the problem. This research program consists of three stages, which include determination of distraction, basis for possible regulation, and relationship of distraction to crashes.

The present report only addresses the first stage of the proposed research program in detail. For this first stage, three candidate studies, which are an on-road instrumented vehicle study, a naturalistic driving study, and an unobtrusive observation study, have been introduced and compared. An analysis of the relative advantages and disadvantages of each study indicate that the on-road instrumented vehicle study is the best choice as the recommended first stage in answering the basic research question.



## APPENDIX A—EXPANDED TABLES

### A.1 KEY FACTORS (INDEPENDENT VARIABLES)

**Table 1. Expanded key factors (independent variables).**

Variable	Ref. #	Advantages	Disadvantages
<b>1.0 Billboard</b>			
1.1 Location	8, 129, 38, 15, 44, 32		
1.1.1 Lat./long.; GPS; mile marker; survey location; reference location; mobile	13, 53, 160	Important to define stimulus; Easy to measure.	Likely to require travel expenses.
1.1.2 Distance from roadway; setback			Less important.
1.1.3 Sight distance; visual occlusions; distance first detected	13, 53	Determines exposure time.	
1.1.4 Orientation; angle to road; side of road; two-sided	144		Less important.
1.2 Display	144		
1.2.1 Type: Conventional; Digital; Tri-vision	125, 48	Digital type stands out.	Tri-vision likely to disappear.
1.2.2 Size; length; height; visual angle; mounting height	129, 32	Off-premise sizes somewhat standard.	On-premise sizes variable.
1.2.3 Resolution; dpi; LEDs/in	95, 48, 53	Crispness (sharpness) of image important.	
1.2.4 Luminance; contrast ratio; day/night settings	48, 53, 144	Brightness (luminance) extremely important.	Night setting may depend upon background illumination.
1.3 Dynamics	31		

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
1.3.1 Type: static; changing	158, 129, 26	Changing images extremely important. Static serves as control.	
1.3.2 Change rate; dwell time; change time; sequencing	48, 50, 158, 94	Change pattern important. Easy to measure.	
1.3.3 Special effects: wipe, dissolve, scintillate		Adds to uniqueness and conspicuity.	More difficult to measure.
1.3.4 Full motion video	125, 126	Full motion video extremely compelling.	Difficult to specify exact content seen.
1.3.5 Engagement value: ability to hold attention		Important overall distraction variable	Difficult to measure; requires subjective rating.
1.3.6 Sound			
1.4 Message	129, 44, 144, 53		
1.4.1 Type: text; graphics; mixed; targeted	32, 31	Particular message may be secondary.	
1.4.2 Text: word count; font size; color; content; legibility; affect	32, 48		Many variations. Less important.
1.4.3 Graphics: size; complexity; color; content; affect	31, 50		Difficult to specify. Many varieties.
1.4.4 Public safety alerts		Social benefit.	May be more distracting than advertising.
1.4.5 Interactive: encourages driver response		Interactive may require more attention.	
<b>2.0 Roadway</b>			
2.1 Type			

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
2.1.1 Category: two-lane rural; collector; arterial; freeway	13, 15 71, 54	Important determinate of driver workload.	Many variations even in single category.
2.1.2 Lanes: number; width; markings; medians; shoulders; rumble strips			Less important.
2.1.3 Speed: posted; advisory; 85 <sup>th</sup> percentile; median	50	Changes urgency of correct driving responses.	
2.1.4 Condition: dry, wet, ice, rain; oil slick		Important to driver control over vehicle.	
2.1.5 Traction: coefficient of friction			
2.2 Complexity	15		
2.2.1 Tangent: level; grade			Less important.
2.2.2 Curve: horizontal; vertical	13, 44, 118	May place sudden demand on driver attention.	
2.2.3 Intersection: signalized; stop controlled	129, 38, 48	Increased driver workload.	Wide variety of intersection complexities.
2.2.4 Interchange: exit, entrance, merge, gore	26, 44, 32, 48	Controlled access. More carefully engineered.	
2.2.5 Driveway; entrance			Less important.
2.2.6 Lane change: merge; diverge; lane drop		May place sudden demand on driver attention.	
2.2.7 Other: bicycle lane; fire house			Less important.
2.3 Traffic	158, 38, 15, 113,		

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
2.3.1 Average daily traffic; peak traffic; level of service	118	Likely to increase driver workload.	
2.3.2 Traffic mix: cars, trucks, buses, motorcycles			Less important.
2.3.3 Pedestrians			Mainly only in urban settings.
<b>3.0 Vehicle</b>	59		
3.1 Type: automobile; SUV; truck; motorcycle		Motorcycle has least obstructed view.	
3.2 Condition: response; vehicle dynamics			Hard to determine in field.
3.3 Windshield: size; tinting; field of view		Defines some stimulus exposure characteristics.	
<b>4.0 Driver</b>	10		
4.1 Characteristics: age; gender; demographics	53, 23, 12, 54		Less important.
4.2 Experience: years driving; route familiarity	15, 100	Route familiarity extremely important.	
4.3 State: alert; fatigue; alcohol; drugs			Difficult to measure.
4.4 Distractions: conversation; eating; cell phone	24, 90, 25		
<b>5.0 Environment</b>			
5.1 Visual—general	113		
5.1.1 Visual clutter; nearby billboards; ambient lighting	160, 15, 32, 44	Complexity of visual environment extremely important.	Difficult to specify.

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
5.1.2 Day/night viewing: dawn; dusk; sun-glare	53	Nighttime viewing of bright images important.	
5.1.3 Visual flow			Less important.
5.2 Official signs	160, 2, 26, 100		
5.2.1 Type: regulatory, advisory, navigational	94	Regulatory most important.	
5.2.2 Location: left, right, overhead	44, 15	Billboard can conflict with sign.	
5.2.3 Lighting: illuminated; luminous (VMS); retro-reflective		Luminous (VMS) signs most important.	
5.2.4 Density: number in view, type mix	15		Many variations in urban settings.
5.2.5 Dynamics: change rate; motion; video		Extremely important point of possible conflict.	Motion and video not yet allowed.
5.2.6 Message: text; graphics			Less important
5.3 On-premise signs			
5.3.1 Type: conventional; Tri-vision; digital; full motion video	144	Digital and video most important.	Tri-vision likely to disappear.
5.3.2 Location: left, right, high, low	144		
5.3.3 Lighting: illuminated; luminous; LED	144	Bright, high resolution very compelling.	Difficult to measure.
5.3.4 Density: number in view, type mix		Can add to visual clutter.	Many variations possible.
5.3.4 Dynamics: change rate; motion; video; sound	144	Extremely important variable.	



<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
5.3.5 Message: text; graphics; interactive		Interactive important.	Text and graphics less important.
5.4 Geographic	15		
5.4.1 Population: urban; suburban; rural	13, 71	Can affect visual clutter.	Many variations.
5.4.2 Terrain: mountain; valley; desert; hilly; near water		Can affect driver workload.	Many variations.
5.4.3 Area: city; state; region			Less important.
5.5 Meteorological			
5.5.1 Temperature; humidity; cloud cover	53		Less important.
5.5.2 Precipitation: rain; snow; fog; ice; visibility	53	Can affect driver workload.	

## A.2 KEY MEASURES (DEPENDENT VARIABLES)

**Table 2. Expanded key measures (dependent variables).**

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
<b>1.0 Vehicle Behavior</b>	48		
1.1 Speed	125, 50		
1.1.1 Continuous		More accurate profile.	Large amounts of data. Expensive.
1.1.2 Discrete locations		Less data.	Cheaper.
1.1.3 Speed exceedances: high; low		Distraction indicator.	
1.1.4 Speed variance		Distraction indicator.	Best with continuous data.
1.2 Lane position	161, 48, 54		
1.2.1 Continuous		More accurate profile.	Large amounts of data. Expensive.
1.2.2 Discrete locations		Less data.	Cheaper.
1.2.3 Lane excursions: right; left	23	Distraction indicator.	More difficult to measure.
1.2.4 Lane variance		Distraction indicator.	Best with continuous data.
1.3 Acceleration	48, 54		
1.3.1 Longitudinal: hard braking; delayed acceleration; braking without cause		Excellent surrogate for distraction.	
1.3.2 Lateral: swerves	39	Good surrogate for distraction.	
1.3.3 Heave: bumps	125, 48		Not important.
1.4 Other vehicle interactions	39		

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
1.4.1 Headway (car following); time to collision	125, 48, 118	Good surrogate for distraction.	
1.4.2 Gap acceptance: merge; passing		Good surrogate for distraction.	Difficult to measure.
1.4.3 Conflicts; near-crashes	125	Extremely important measure.	
1.4.4 Violations: red light running; failure to yield; failure to stop			Low probability events.
1.4.5 Errors: missed exit; wrong lane		Good surrogate for distraction.	
1.4.6 Timing: late movements; premature movements			Difficult to measure.
1.5 Infrastructure interactions			
1.5.1 Response to roadway geometry: swerves; sudden braking	118, 15	Surrogate for distraction.	
1.5.2 Response to traffic control devices: misses, delays	15	Surrogate for distraction.	
1.5.3 Pedestrian interactions; yields			Only in urban settings.
1.6 Signals	39		
1.6.1 Brake light	125	Indication of sudden deceleration.	
1.6.2 Turn signals			Less important.
1.6.3 Other: backup lights			Not important.

Variable	Ref. #	Advantages	Disadvantages
<b>2.0 Driver/Vehicle Interactions</b>			
2.1 Steering			
2.1.1 Gross movements: curves; turns		Surrogate for distraction.	
2.1.2 Fine movements: lane keeping	60		Difficult to measure.
2.2 Throttle			
2.2.1 Pedal press; pedal position; duration			Less important.
2.2.2 Pedal release; duration			Less important.
2.3 Brake	125		
2.3.1 Pedal press; duration; excursion		Surrogate for distraction.	
2.3.2 Pedal release			Less important.
2.4 Shift (manual only)			
2.4.1 Gear selection (speed)			Not important.
2.4.2 Gear transitions (shifts)			Not important.
2.5 Displays	154		
2.5.1 Speedometer		Secondary visual distractor.	
2.5.2 Other: gauges; radio			Less important.
2.6 Other controls	154, 25		
2.6.1 Safety: windshield wipers; instrument lights; horn; turn signals	54		Less important, except turn signals.

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
2.6.2 Entertainment: radio; CD player	48, 24, 54	Secondary distractor.	
2.6.3 Auditory/vocal: voice actuated	154		Low probability of occurrence.
<b>3.0 Driver Attention / Distraction</b>	79, 113, 32, 146, 145		
3.1 Objective measures	129		
3.1.1 Eye glance behavior: eye movements; number of glances; duration of glances; glance object	129, 42, 125, 53, 160, 83, 161, 78	Excellent measure of unconscious attention / distraction.	Delicate, expensive equipment. Difficult to calibrate. Expensive to analyze data.
3.1.2 Distractor performance; secondary task	83, 53	Excellent measure of distraction.	Can increase risk in field experiments. Can be artificial.
3.1.3 Visual occlusion	15	Good measure of distraction.	Can increase risk in field experiments. Unnatural driving task.
3.1.4 Feature detection	48		
3.1.5 Feature recognition	48	Good measure.	
3.1.6 Driver workload; task performance	38, 15, 113	Excellent indicator of distraction.	Complicated to measure.
3.1.7 Head turning	78	Easy to measure.	Less important.
3.1.8 Driver errors	83	Excellent measure of distraction.	Many varieties. Low probability of occurrence.
3.1.9 Reaction time; perception-reaction time	15	Good indicator of distraction.	Difficult to measure.
3.2 Inferred measures			
3.2.1 Surprise; orienting response			Difficult to measure.

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
3.2.2 Conspicuity; attention grabbing			Difficult to measure.
3.2.3 Search patterns	15	Indicative of visual hypotheses.	
3.2.4 Capacity: self-regulated attention; spare capacity	15	Extremely important concept.	Hard to establish criterion threshold.
3.3 Subjective measures	161		
3.3.1 Conversational drive		Good possible method.	Lots of extraneous data.
3.3.2 Rating scale		Inexpensive.	Imprecise.
3.3.3 Questionnaire		Inexpensive.	Imprecise.
3.3.4 Survey	125	Relatively inexpensive.	Sampling frame difficult.
3.3.5 Focus group		Small sample. Lots of data.	Confounding social variables.
<b>4.0 Crashes</b>	158, 125, 26, 44, 128, 161, 95, 121		
4.1 Type: head-on; sideswipe; rear-end; backing; run-off-road; pedestrian	39	Very important discriminator variable. Related to ultimate goal.	Rare events. Many contributing factors. Difficult to estimate statistically.
4.2 Severity: fatal; injury; property damage; unreported		Important to determine impact.	Rare events. Many factors. Difficult to estimate statistically.
4.3 Method of measurement			Rare events. Hard to estimate.
4.3.1 Direct observation: simulator; field camera	42	Best studied in simulator. No chance of injury.	
4.3.2 Before/after study	39, 158	Most common study type.	No control site. Regression toward mean.

<b>Variable</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
4.3.3 Before/after with control		Control adds rigor.	Regression toward mean.
4.3.4 Before/after/before		More convincing causal effect.	Regression toward mean.
4.3.5 Regression model		Directly account for multiple factors	Large amounts of data on many variables
4.3.6 Empirical Bayes		Control for regression toward mean.	More complicated statistical model.
4.3.7 Full Bayes		More complete treatment of conditional probabilities.	Not widely used.

### A.3 KEY RESEARCH STRATEGIES

**Table 3. Expanded key research strategies.**

<b>Method</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
<b>1.0 Crashes: Field</b>	97, 95, 21		
1.1 Unobtrusive observation			
1.1.1 Participant: random, uncontrolled; usually unknown	49	No sampling bias.	Do not know participant sample.
1.1.2 Experimenter: usually absent; remote observation; unknown to participant	49	No artificial participant behaviors due to experimenter.	
1.1.3 Stimuli: natural, ordinary, in context; variable, uncontrolled	49	Natural stimuli.	Stimuli not uniform; e.g., weather effects.
1.1.4 Responses: crashes; antecedent vehicle behaviors; rare; few participant variables	49	Directly related to the safety goal.	Extremely rare events; insensitive to participant variables.
1.1.5 Scenario: natural route and purpose; uses own vehicle	49	Completely natural experimental context; uses own vehicle.	Long-term monitoring required.
1.2 Naturalistic driving			
1.2.1 Participant: selected, sampled	79, 78, 42	Know participant sample.	Possible sampling bias.
1.2.2 Experimenter: absent; remote observation; known to participant	79, 78, 42		Possible artificial participant behaviors.
1.2.3 Stimuli: natural, ordinary, in context; variable, uncontrolled	79, 78, 64, 42	Natural stimuli.	Stimuli not uniform; e.g., weather effects.
1.2.4 Responses: crashes; antecedent vehicle and participant behaviors; rare	79, 78, 64, 42	Directly related to ultimate goal; sensitive to some participant variables.	Extremely rare events; difficult to collect adequate sample of crashes.



<b>Method</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
1.2.5 Scenario: natural route and trip purpose; uses own vehicle	79, 78, 64, 42	Mostly natural experimental context; uses own or borrowed vehicle.	Participant aware of test status; may be injured or killed; vehicle may be damaged or destroyed; expensive.
1.3 Retrospective database: fatal, injury, property damage	87, 49, 128, 14, 58,	Directly related to ultimate goal.	Crashes are rare events; difficult to estimate.
1.3.1 Before-after study	158, 1, 130	Most common study type.	No control site; regression toward mean.
1.3.2 Before-after study with control	120	Control adds rigor.	Regression toward mean.
1.3.3 Before-after-before study		More convincing causal effect.	Regression toward mean.
1.3.4 Regression model		Directly account for multiple factors.	Large amounts of data on many variables.
1.3.5 Empirical Bayes		Control for regression toward mean.	More complicated statistical model.
1.3.6 Full Bayes		More complete treatment of conditional probabilities.	Not widely used.
<b>2.0 Crashes: Laboratory</b>			
2.1 Driving simulator			
2.1.1 Participant: selected, sampled	70	Know participant sample.	Possible sampling bias.
2.1.2 Experimenter: remotely present, unobtrusive observation	70	More experimenter control.	Possible artificial participant behaviors.
2.1.3 Stimuli: simulated, artificial; consistent, controlled	70	Extremely repeatable stimulus conditions.	Artificial stimuli; hard to simulate conspicuity and legibility.

<b>Method</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
2.1.4 Responses: programmed crashes; antecedent participant and vehicle behaviors; can be more frequent crashes	70	Some control over crashes; can program more frequent crash opportunities.	Lack of negative consequences can unnaturally alter frequency of crashes.
2.1.5 Scenario: contrived route, artificial; unnatural vehicle and environment; safe from harm	70	Control over driving scenario; participant safe from harm.	Unnatural vehicle and environment; artificial scenario; simulator sickness.
2.2 Non-simulator laboratory	87		
2.2.1 Crash scenarios: movies, pictures, acting out		Relatively easy; less resources.	Artificial, out-of-context testing environment.
2.2.2 Crash reconstructions: questionnaires, focus groups		Relatively easy; focus groups more expensive.	Artificial, out-of-context testing environment; focus group social biases.
<b>3.0 Safety Surrogate: Field</b>	34, 85		
3.1 Unobtrusive observation			
3.1.1 Participant: random, uncontrolled; usually unknown	15	No sampling bias.	Do not know participant sample.
3.1.2 Experimenter: usually absent; remote observation; unknown to participant	15	No artificial participant behaviors due to experimenter.	
3.1.3 Stimuli: natural, ordinary, in context; variable, uncontrolled	15	Natural stimuli.	Stimuli not uniform; e.g., weather effects.
3.1.4 Responses: crash precursors; antecedent vehicle behaviors; more frequent; few participant variables	15	More frequent events than crashes; can collect more data with less risk.	Crash precursors only indirect indicators; insensitive to participant variables.
3.1.5 Scenario: natural route and trip purpose; uses own vehicle	15	Completely natural experimental context; uses own vehicle.	
3.2 Naturalistic driving			

<b>Method</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
3.2.1 Participant: selected, sampled	79, 78, 42	Know participant sample.	Possible sampling bias.
3.2.2 Experimenter: absent; remote observation; known to participant	79, 78, 42		Possible artificial participant behaviors.
3.2.3 Stimuli: natural, ordinary, in context; variable, uncontrolled	79, 78, 42	Natural stimuli.	Stimuli not uniform; e.g., weather effects.
3.2.4 Responses: crash precursors; antecedent vehicle and participant behaviors; more frequent events	79, 78, 42	More frequent events than crashes; can collect more data with less risk.	Crash precursors only indirect indicators.
3.2.5 Scenario: natural route and trip purpose; uses own vehicle	79, 78, 118, 42	Mostly natural experimental context; uses own or long-term borrowed vehicle.	Participant aware of test status; may be injured or killed; vehicle may be damaged or destroyed; expensive.
3.3 On-road instrumented vehicle	14		
3.3.1 Participant: selected, sampled	54, 18	Know participant sample.	Possible sampling bias.
3.3.2 Experimenter: present; direct observation and interaction	83	More experimenter control; increased experiment safety.	Possible artificial participant behaviors.
3.3.3 Stimuli: selected; natural, in context	83, 18	Natural stimuli.	Stimuli not uniform; e.g., weather effects.
3.3.4 Responses: crash precursors; antecedent vehicle and participant behaviors; more frequent	54, 18	More frequent events than crashes; can collect more data with less risk.	Crash precursors only indirect indicators.
3.3.5 Scenario: natural route, artificial trip purpose; uses experimental vehicle	54, 83, 18	Semi-natural experimental context; more safe.	Artificial trip purpose; unfamiliar vehicle.
3.4 Closed-course test track			

<b>Method</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
3.4.1 Participant: selected, sampled	136	Know participant sample.	Possible sampling bias.
3.4.2 Experimenter: present; direct observation and interaction	136	More experimenter control; increased experiment safety.	Possible artificial participant behaviors.
3.4.3 Stimuli: selected; out of context	136	Semi-natural stimuli.	Stimuli not uniform; some possible control.
3.4.4 Responses: crash precursors; antecedent vehicle and participant behaviors; more frequent	136	More frequent events than crashes; can collect more data with less risk.	Crash precursors only indirect indicators.
3.4.5 Scenario: unnatural route, artificial trip purpose; uses experimental vehicle	136	Low probability of harm to participant or vehicle.	Unnatural experimental context.
3.5 Commentary driving			
3.5.1 Participant: selected, sampled	36	Know participant sample.	Possible sampling bias.
3.5.2 Experimenter: present; direct observation; extensive interaction	36	More experimenter control; increased experiment safety.	Possible artificial participant behaviors.
3.5.3 Stimuli: selected; natural, in context	36	Natural stimuli.	Stimuli not uniform; e.g., weather effects.
3.5.4 Responses: extensive driver commentary; running verbal description; crash precursors observable		Collect large amounts of data; direct observation of gross attention.	Commentary could interfere with driving task; artificial task.
3.5.5 Scenario: natural route, artificial trip purpose		Semi-natural experimental context; more safe.	Artificial trip purpose.
3.6 Non-vehicle based field testing			
3.6.1 Roadside interviews	14, 125, 85	Relatively easy; less resources.	Artificial, distal testing environment.

<b>Method</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
3.6.2 Fuel station, nearby mall interviews		Relatively easy; less resources.	Artificial, out-of-context testing environment.
<b>4.0 Safety Surrogate: Laboratory</b>	36		
4.1 Driving simulator			
4.1.1 Participant: selected, sampled	161, 4, 70, 82	Know participant sample.	Possible sampling bias.
4.1.2 Experimenter: remotely present, unobtrusive observation	161, 4, 70, 82	More experimenter control.	Possible artificial participant behaviors.
4.1.3 Stimuli: simulated, artificial; consistent, controlled	161, 4, 70, 82	Extremely repeatable stimulus conditions.	Artificial stimuli; hard to simulate conspicuity and legibility.
4.1.4 Responses: programmed crash precursors; antecedent participant and vehicle behaviors; can have more frequent events	10, 82, 4	Some control over near-crashes; can program more frequent near-crash opportunities.	Lack of negative consequences can unnaturally alter frequency of near-crashes.
4.1.5 Scenario: contrived route, artificial; unnatural vehicle and environment; safe from harm	161, 4, 70, 82	Control over driving scenario; participant safe from harm.	Unnatural vehicle and environment; artificial scenario; simulator sickness.
4.2 Non-simulator laboratory	75		
4.2.1 Pre-crash scenarios: movies, pictures, acting out	160, 36	Relatively easy; less resources.	Artificial, out-of-context testing environment; weak response measure.
4.2.2 Pre-crash reconstructions: questionnaires, focus groups	36	Relatively easy; focus groups more expensive.	Artificial, out-of-context testing environment; weak response measure; focus group social biases.
<b>5.0 Social Survey</b>	14, 125		
5.1 Telephone survey		Less resources; personal interviewer; more flexible.	Out of context; opinions only; more labor intensive; smaller scale.

<b>Method</b>	<b>Ref. #</b>	<b>Advantages</b>	<b>Disadvantages</b>
5.2 Mail survey		Less resources; standardized; larger scale.	Out of context; opinions only.
5.3 E-mail survey		Less resources; standardized; large scale.	Out of context; opinions only; internet user bias.
<b>6.0 Analytical Study</b>			
6.1 Literature review	53, 38, 26, 129, 52	Benefit from previous knowledge and mistakes.	Based on old information; abstract; hard to apply.
6.2 Review of practice	15, 44	Socially oriented, practical, legal.	Based on old information; not scientific; possibly misleading.
6.3 Deductive-inductive reasoning study	26	Less resources; no need for new data.	Must often make dangerous assumptions; cannot fill in knowledge gaps.



## APPENDIX B—DETAILED DESCRIPTION OF STUDIES

### B.1 ON-ROAD INSTRUMENTED VEHICLE APPROACH

The most effective research strategy to emerge from the analysis undertaken in section 6.0 is the on-road instrumented vehicle method. The following describes one possible study which might be conducted using this method.

#### B.1.1 Method

The on-road instrumented vehicle method employs an instrumented vehicle which is brought to the study site, along with a crew of about two or three researchers. The study site is a location where there is at least one CEVMS installation along a public access roadway. Preferably, there would be several CEVMS installations at the location so that a single test driving scenario might pass a few different CEVMS in the course of about half an hour of driving. The investigation should include at least two or three study sites which already have CEVMS in place. At each study site, approximately 20 to 30 research participants would be recruited from the local area.

Each research participant would drive the instrumented vehicle along a prescribed route, which includes CEVMS installations, standard (non-digital) billboards, human-constructed objects of casual visual interest (houses, barns, etc.), and natural background control scenery (trees, fields, etc.). Each drive takes less than 1 hour (preferably about 30 minutes), and each participant would return for several drives on different days. Other aspects would vary as well, such as the time of day, traffic density, and CEVMS conditions (e.g., CEVMS turned on versus CEVMS turned off). Each participant would complete between three and six such drives. The instrumented vehicle and crew would usually remain at a given study site for about 1 to 2 months. The crew would consist of an experimenter and a safety observer, who would both be present in the instrumented vehicle. The safety observer would also serve as a research assistant or technician. The instrumented vehicle is capable of measuring vehicle speed, vehicle lane position, longitudinal acceleration, lateral acceleration, GPS time and position, and driver eye glance direction and duration. The instrumented vehicle is also equipped with accurate vehicle-mounted or head-mounted eye-tracking equipment, video cameras (forward and cab views) and a voice recorder.

#### B.1.2 Factors and Measures

The major factors or independent variables in the study are the presence or absence of CEVMS and other comparison visual stimuli (standard billboards, buildings, etc.) along the driving path. If possible, the CEVMS should be capable of being turned off and on or changed along some other dimension like luminance or change rate, according to a prearranged experimental design. The period of time that the CEVMS is off or changed could be kept relatively brief and carefully controlled since the study will follow a strict protocol. Other important independent variables are the time of day (day/night), traffic conditions (peak and nonpeak), and driver variables (age, gender, and route familiarity). One or more of the primary CEVMS variables of interest to the community concerned with outdoor advertising control should be represented by varying levels along the driving route (e.g., different degrees of luminance, change rate, or display spacing) as much as possible. Direct experimental control would be preferable to site selection in this regard.



The primary measure or dependent variable in this study is the frequency, direction, and duration of driver eye glances, which serves as an indication of visual attention and distraction. The fundamental hypothesis is that drivers have limited attention; they self-regulate their attention to perform demanding tasks. In the case of the driving task, a certain proportion of their attention needs to be concentrated on the roadway scene ahead. To the degree that eye glance behavior can serve as a measure of visual attention, eye glances need to be concentrated on the roadway ahead. If the frequency and duration of eye glances away from the roadway ahead exceed accepted norms or criteria for keeping a driver's eyes on the road, then driver safety may be compromised. Thus, eye glance behavior is the primary dependent variable in the study. Eye glance behavior has an intuitive connection to visual attention and is sensitive to subtle visual search strategies, including those which are below the level of conscious awareness (see section 2.7.2). Depending upon the type of eye glance measuring instrumentation selected, the act of measuring eye glance behavior may prove to be a more or less significant distraction to the driver in itself. This experimentally-induced artifact can be controlled by selecting a minimally intrusive measurement method or by ensuring adequate adaptation to the instrumentation on the part of the research participant.

This study includes another class of secondary dependent variables. These are safety surrogate measures associated with driver errors and other measures of driver performance, such as speed changes, headway, lane deviation, and traffic conflicts. These secondary variables can be measured by instrumentation in the vehicle in terms of speed, acceleration, and lane position. These secondary variables can also be directly observed and noted by the experimenter and/or safety observer in the instrumented vehicle for later analysis in terms of sudden braking, inadequate headway, swerving, and conflicts. Thus, events indicative of possible driver error or other maladaptive behavior can be flagged by human observers. Also, for these events, only objective vehicle performance data needs to be analyzed, saving considerable effort and expense by eliminating the need to analyze large amounts of continuous vehicle performance data.

### **B.1.3 Advantages/Disadvantages**

One advantage of this method is its ability to implement accurate eye-tracking measurements which afford the opportunity to observe subtle and often unconscious eye movements. This ability to measure unconscious eye movements correlates with unconscious distraction facilitates incorporation of the notion of self-regulated attention into the experimental paradigm. When a driver is attempting to concentrate on the roadway ahead, a distractor, which unconsciously diverts attention away from the roadway against the driver's will, may have a more severe safety consequence than a distractor which can be maintained under conscious and voluntary control. Thus, in addition to being able to measure distraction which is both conscious and voluntary, accurate eye-tracking determinations have the potential to probe other phenomena, such as unconscious and involuntary distraction as they relate to CEVMS exposure.

Another advantage of this method is the ability to structure driving scenarios to have an appropriate number of CEVMS, standard billboard, and other visual stimuli all located on a controlled course, which all research participants drive in a consistent manner. The ability to choose and structure the test drive assures adequate and uniform exposure to CEVMS and other relevant visual stimuli. The ability to exert experimental control is a valuable asset to this method. It facilitates a clean and robust statistical analysis of the data because all of the

participants are exposed to all of the experimental conditions the same number of times in a relatively controlled manner. Experimental control ensures a high level of CEVMS exposure, thereby contributing to the productivity and cost effectiveness of this technique.

However, examined from a different perspective, such a degree of experimental control may also be regarded as a disadvantage. A certain amount of artificiality is introduced into the driving situation thereby. Research participants are definitely aware that they are participating in a controlled experiment, driving someone else's car on a contrived route which does not serve a personal purpose related to daily life. In addition, with the experimenter riding along with the participants in the vehicle, there may be a tendency for the participants to try to please the experimenter and to drive in some unnatural way. The introduction of eye-tracking equipment adds to the artificiality of the situation. Wearing head-mounted eye-tracking gear definitely represents unnatural driving attire. However, most research participants rapidly adapt to the gear with time, and they often report that they are unaware of its presence after a short drive. Vehicle-mounted eye-tracking equipment can be far less intrusive, although the tedious calibration procedures and the presence of the cameras in the car remind participants that their head and eye movements are constantly being monitored. These are all valid experimental concerns; however, none of these interventions is likely to profoundly alter the driving behavior, much less the eye glance movements, of the research participants, as long as they are not informed of the purpose of the study. The enhanced experimental efficiency that this approach has to offer far outweighs its artificiality drawbacks.

#### **B.1.4 Budgetary Cost**

A rough budgetary estimate for conducting such an on-road instrumented vehicle study is between \$400,000 and \$800,000. The main cost drivers for this method are the eye glance measuring technology and the crew needed to implement the experiment at the study sites. The range in this estimate relates to the number of study sites, adequacy of the sites, length of the experimental drive, number of experimental drives, number of research participants, difficulty in obtaining research participants, ability to turn the CEVMS off and on, and numerous other factors which cannot be determined without further planning.

### **B.2 NATURALISTIC DRIVING APPROACH**

The naturalistic driving method is similar to the on-road instrumented vehicle method. The major difference is that the participants drive their own vehicles (or loaned vehicles) for their own personal purposes. The method typically employs a large number of such vehicles. The following describes one possible study which might be conducted using this method.

#### **B.2.1 Method**

The naturalistic driving method employs a standardized instrument package which is installed in the participant's own private vehicle or in a vehicle loaned to the participant. The installation is made as unobtrusive as possible so that the participant's vehicle appears and performs as it normally would. The instrument package is capable of measuring many of the same variables as the on-road instrumented vehicle, such as speed, lane position, acceleration, GPS time and position, driver eye glance frequency, direction, and duration. The instrument package is also

connected to the vehicle data bus so that additional vehicle-related measures of engine, braking, and steering performance are also recorded. However, because of the unobtrusive nature of the experimental technique, this method cannot support the use of extremely accurate head-mounted or vehicle-mounted eye-tracking equipment. In the present state of technology, these accurate eye movement instruments involve careful calibration procedures with the driver. With this method, the eye-tracking system is mounted in the dashboard in a manner which involves little or no driver interaction. Once the participant's vehicle has been instrumented, data are collected by means of automatic wireless downloads without participant awareness or involvement. The instrumentation is left in the vehicle for a period of 3 to 6 months, during which time the participant drives the vehicle for normal personal or business use.

The fact that participants drive their own vehicles for their own use reduces control and adds uncertainty to the study. It is difficult to control where the participants are going to drive and when. The study site must be selected carefully so that participants are likely to drive by at least some of the target CEVMS installations. The participants must be selected carefully so that they are likely to take the selected roadway with some reasonable frequency. As a result of this increased uncertainty, the number of study sites must be increased to 4 and 5, the number of research participants selected at each site must be increased to 50 and 75, and the duration of measurement for each participant must be increased to 3 and 6. In this study, it is even more important that there are several CEVMS installations at each study site. As was the case for the on-road instrumented vehicle study, each study site needs to include CEVMS installations, standard (non-digital) billboards, objects of casual visual interest (houses, barns, etc.), and natural background control scenery (trees, fields, etc.).

### **B.2.2 Factors and Measures**

As with the on-road instrumented vehicle study, the major factors or independent variables are the presence or absence of CEVMS and other comparison visual stimuli (standard billboards, buildings, control settings, etc.) along the driven path. If possible, the CEVMS should be turned off and on or changed in some other way, according to a prearranged experimental design. However, in this instance, the CEVMS would have to be turned off or changed for longer periods of time because it is not certain when the instrumented test vehicles might pass. These are the primary independent variables. Secondary independent variables could include the type of vehicle (sedan, pickup, or SUV) and driver characteristics (age, gender, and route familiarity). In addition, as much as possible, one or more of the primary CEVMS variables of interest to the community concerned with outdoor advertising control should be represented by varying levels in the selection of CEVMS stimuli.

As in the on-road instrumented vehicle study, the primary measure or dependent variable is the frequency, direction, and duration of driver eye glances. The fundamental hypothesis of self-regulated attention which needs to be concentrated on the roadway scene ahead remains the same. As before, if the frequency and duration of eye glances away from the roadway ahead exceed accepted norms or criteria, then driver safety is assumed to be compromised. Thus, eye glance behavior is the primary dependent variable in this study, as well. However, the particular unobtrusive and disengaged dashboard-mounted eye-tracking device may not be capable of making as accurate measurements of eye-movements as can other more delicate vehicle-mounted or head-mounted devices which require periodic participant calibration. Consequently, this study

method depends more heavily on secondary dependent variables. Safety surrogate measures associated with driver errors and other measures of driver performance (headway, lane deviation, conflicts, and erratic maneuvers) become increasingly important in this method. Since the participants will be driving according to their own personal schedules, additional dependent variables may include the time of day (day/night), traffic conditions (peak and nonpeak), in-vehicle distractions (eating and/or cell phone use), and state of fatigue.

### **B.2.3 Advantages/Disadvantages**

The naturalistic driving method possesses one major advantage over the on-road instrumented vehicle method: the driving scenario, driving task, and driving purpose are all completely natural. The research participants drive their own vehicles (or ones loaned to them) on their own personal schedules along personally selected routes to meaningful destinations. Although to a lesser degree, the naturalistic driving method shares another advantage with the on-road instrumented vehicle method: its ability to implement eye-tracking measurements. In fact, the dashboard-mounted eye-tracking device is far less intrusive to the driver than the head-mounted eye-tracking device sometimes employed in the on-road instrumented vehicle method.

Unfortunately, some dashboard-mounted eye-tracking devices may not be as sensitive and accurate as a head-mounted device. Also, they may not be able to track extensive head movements or measure subtle eye glances indicative of unconscious distraction. The useful field of view can also be an issue with certain unobtrusive vehicle-mounted eye-tracking equipment. Consequently, this experimental method may be less effective in its ability to probe the subtle phenomena of unconscious and involuntary distraction as they relate to CEVMS exposure.

Another disadvantage of this method is its inherent lack of structured driving scenarios. Since participants drive whenever and wherever they want, it is difficult to ensure adequate and uniform exposure to CEVMS and other relevant visual stimuli. This lack of experimental control and higher degree of uncertainty necessitate an increase in the number of study sites, research participants, and duration of the study, which negatively impacts the productivity and cost effectiveness of the technique. For example, this method typically requires the instrumentation of a relatively large number of vehicles at any given study site instead of the instrumentation of just one vehicle which is shared by many research participants. Another minor disadvantage is that research participants are aware that they are participating in an experiment, even if the study is minimally intrusive in terms of daily life routine.

### **B.2.4 Budgetary Cost**

A rough budgetary estimate for conducting such a naturalistic driving study is between \$2 million and \$4 million. The main cost drivers for this method include increasing the number of study sites, installing instruments in a large number of vehicles at a single site, and collecting and analyzing data covering a long period of time. The range in this budgetary estimate relates to the number of study sites, adequacy of the sites, number of vehicles which need to be instrumented at one time, number of research participants, difficulty in obtaining research participants, driving patterns of the research participants, length of the study at any given site, ability to turn the CEVMS off and on, and numerous other factors which cannot be determined without further planning.

### **B.3 UNOBTRUSIVE OBSERVATION APPROACH**

The unobtrusive observation method is different from the on-road instrumented vehicle method and the naturalistic driving method. The major distinction is that no study participants are selected, and all data are obtained from the natural flow of traffic past the CEVMS and other comparison stimuli. The following describes one possible study which might be conducted using this method.

#### **B.3.1 Method**

The unobtrusive observation method employs an array of static cameras or other sensors mounted near the locations of the CEVMS and other comparison stimuli. The other sensors may include loops, tubes, or radar to measure vehicle passes and driving parameters. The present report will focus on video recording of traffic. The cameras are capable of recording the behavior of vehicles passing the various relevant visual stimuli as a part of the natural flow of traffic. The drivers are usually completely unaware that their vehicles are being observed. Post-hoc analysis of the video recordings from these cameras can yield data similar to some of that obtained by the on-road instrumented vehicle and naturalistic driving methods, which include vehicle speed, lane position, acceleration, and time. However, the data from distal video cameras are usually far less accurate than what can be collected by instruments onboard the vehicle. Moreover, with present measurement technology, such video recordings cannot yield any data concerning driver eye glance frequency, direction, and duration. The camera arrays are usually left in place for a period of several months to 1 year at each study site. There would typically be three to four such sites in the study. At each study site, separate camera arrays would need to be installed at the locations of all selected CEVMS displays, standard (non-digital) billboards, objects of casual visual interest (houses, barns, etc.), and natural background control scenery (trees, fields, etc.).

#### **B.3.2 Factors and Measures**

As in the on-road instrumented vehicle and naturalist driving studies, the major independent variables are the presence or absence of CEVMS and other comparison visual stimuli (standard billboards, buildings, etc.) along the driving path. If possible, the CEVMS should be controlled according to a prearranged experimental protocol. However, in this instance, the CEVMS would have to be changed for longer durations because it is possible to predict when vehicles might pass. In addition, one or more of the primary CEVMS variables of interest to the community concerned with outdoor advertising control should be represented by varying levels in the selection of CEVMS stimuli. These constitute the primary independent variables. Since continuous video recording will be employed, the experimenter can decide to select different times of data collection for further analysis. This capability can provide insight into some secondary independent variables such as time of day (day/night) and traffic conditions (peak, nonpeak).

In contrast to the on-road instrumented vehicle and naturalistic driving studies, the primary dependent variable is not driver eye glance behavior. Instead, this study method depends completely on safety surrogate measures associated with driver errors and other measures of driver performance (headway, lane deviation, and erratic maneuvers). These are subtle driving behaviors to measure by means of distal cameras mounted along the roadway. Unless the

cameras are mounted very high, multiple vehicle images may occlude each other. For a long stretch of roadway, such as might required for CEVMS exposure, a relatively large array of cameras may be needed. Thus, a large amount of data needs to be collected and analyzed in such a study. Automatic machine vision video analysis algorithms can help in the data analysis process, but such algorithms are not yet sufficiently sensitive and robust to reliably identify all of the subtle indicators of driver errors, conflicts, or maladaptive performance which might accompany CEVMS exposure. The use of other sensors instead of or in addition to cameras may mitigate some of these data analysis problems to a certain extent.

### **B.3.3 Advantages/Disadvantages**

The unobtrusive observation method possesses one major advantage over the other two methods: the data are derived from the natural flow of traffic. Other than erecting camouflaged camera arrays at various locations along the roadway, the experimenter does not disturb the natural flow of human driving. As opposed to the other two methods, the vast majority of drivers are completely unaware that they are part of a study depending on how well the camera camouflage works. Other sensors used for this application can also be hidden and made extremely hard to detect. This is the major advantage of the unobtrusive observation method. Another strong advantage is the large number of vehicles which pass by the CEVMS and other comparison stimuli every day. Sample sizes can be relatively large.

Like the other techniques, the unobtrusive observation method has disadvantages as well. First, with present technology, it is not possible to implement eye-tracking measurements in such a study. The inability to measure eye glance behavior makes it difficult to investigate important constructs, like self-regulated attention and unconscious distraction as they relate to CEVMS exposure. The method is left to rely on safety surrogate measures, such as driver errors and maladaptive maneuvers. These relatively subtle pre-crash and near-crash driving behaviors are difficult to measure by means of distal video cameras. Such driving behaviors also occur very seldom and need to be observed over great distances, leading to the necessity to collect large amounts of video data from extended camera arrays over long periods of time. The collection, reduction and analysis of such large amounts of data tend to make this method time-consuming and expensive.

### **B.3.4 Budgetary Cost**

A rough budgetary estimate for conducting such an unobtrusive observation study is between \$1 million and \$3 million. The main cost drivers for this method include designing camera arrays which can measure subtle vehicle maneuvers, installing camera arrays to record a large extent of roadway for all CEVMS and comparison stimuli, and collecting and analyzing data covering a long period of time. The range in this budgetary estimate relates to the number of study sites, adequacy of the sites, number and location of cameras in an array, method of recognizing safety surrogate measures, length of the study at any given site, ability to turn the CEVMS off and on, and numerous other factors which cannot be determined without further planning.



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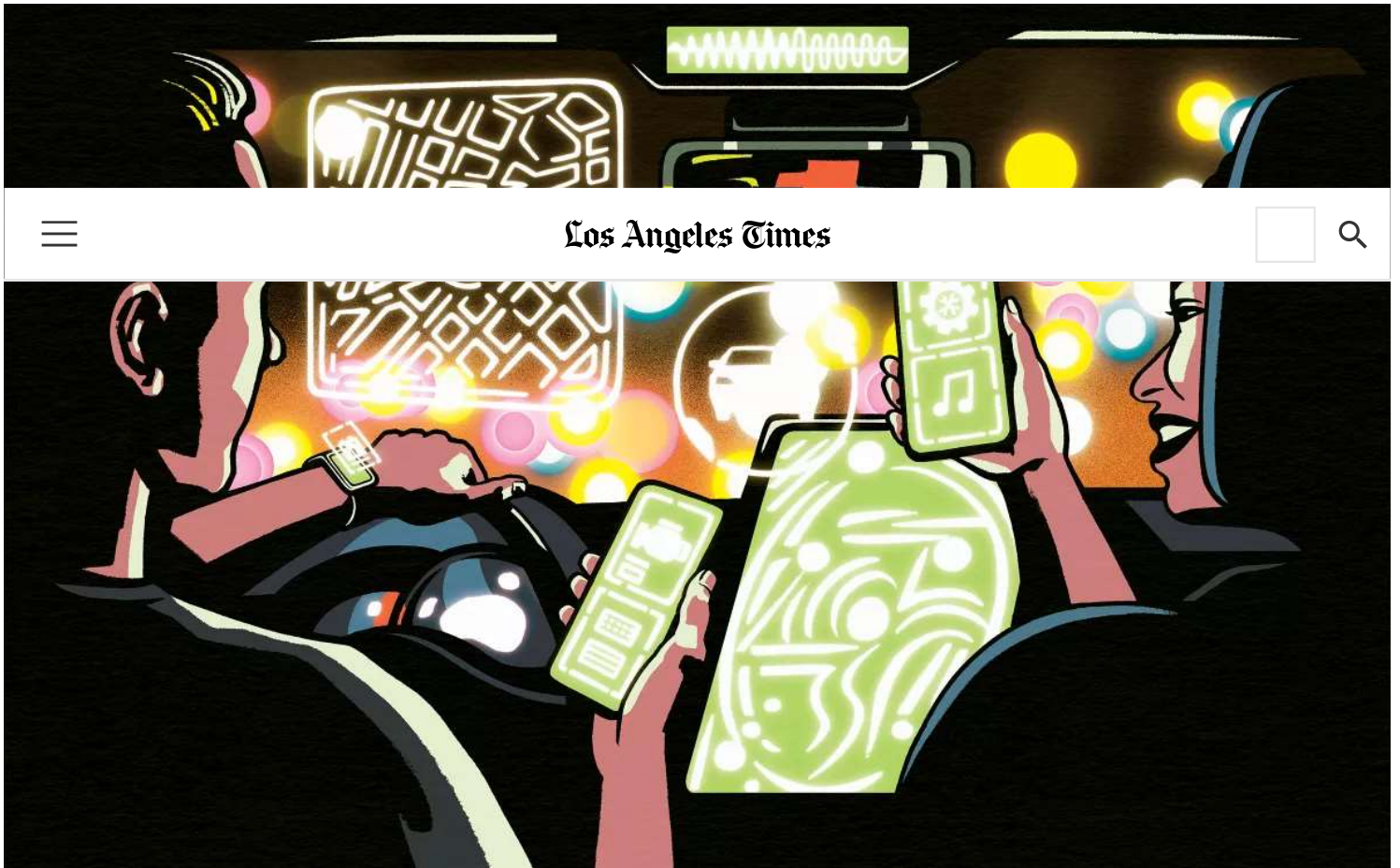


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BUSINESS

# 'We are killing people': How technology has made your car 'a candy store of distraction'



(Lily Qian)

BY RUSS MITCHELL | STAFF WRITER

JULY 6, 2022 5 AM PT



In the late 1980s, the U.S. Army turned to outside experts to study how pilots of Apache attack helicopters were responding to the torrent of information streaming into the cockpit on digital screens and analog displays. The verdict: not well.

The cognitive overload caused by all that information was degrading performance and raising the risk of crashes, the researchers determined. Pilots were forced to do too many things at once, with too many bells and whistles demanding their attention. Over the next decade, the Army overhauled its Apache fleet, redesigning cockpits to help operators maintain focus.

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***For the record:***

**4:48 p.m. July 6, 2022** *An earlier version of this article said a poll found that 63% of drivers use their cellphones while driving, with that figure increasing to 73% among those who use their cars for work; the correct figures are 70% and 86%. The article also incorrectly credited Advocates for Highway & Auto Safety for a poll finding that 70% of drivers have never used a do-not-disturb feature on their phones; that poll was conducted by Nationwide Insurance.*

Cognitive psychologist David Strayer was among those called in to help the Army with its Apache problem. Since then, he has watched as civilian cars and trucks have filled up to an even greater extent with the same sorts of digital interfaces that trained pilots with honed reflexes found so overwhelming — touch screens, interactive maps, nested menus, not to mention ubiquitous smartphones. In his lab at the University of Utah, he's been documenting the deadly consequences.

“We are instrumenting the car in a way that is overloading the driver just like we were overloading the helicopter pilots,” said Strayer, director of the university’s Center for the Prevention of Distracted Driving.

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“Everything we know from pilots being overloaded we can apply to motor vehicles,” Strayer said. But rather than apply it, makers of smartphones and automobiles largely have ignored the research, persistently adding popular but deadly diversions. “They’ve created a candy store of distraction. And we are killing people.”

To be sure, new automotive technology also includes innovative safety features such as lane-departure warning and blind spot detection. Yet, despite these and other crash-prevention systems, the highway death count continues to rise.

After decades of falling fatality rates, U.S. roads have become markedly more dangerous in recent years. In 2021, motor vehicle crashes [killed nearly 43,000 people](#). That’s up from about 33,000 in 2012, and a 16-year high.

Theories about why range from bigger vehicles — mammoth SUVs and pickup trucks on steroids — to aggression caused by COVID-era trauma. But no one in the safety field doubts that distracted driving is a main ingredient.

Reported fatalities due to distracted driving have remained flat for the last 10 years, 3,000 to 4,000 a year. But there is good reason to consider those figures a major undercount, as they rely on people admitting they were distracted, or a police officer or someone else witnessing a driver with phone in hand before a crash.

“It’s against people’s self-interest to say, ‘I was on the cellphone’ or ‘I was using the infotainment system’” after a crash, “because there can be serious consequences,” said Cathy Chase, who heads Advocates for Highway & Auto Safety.

“I don’t think we’re getting an accurate picture of what’s happening on the roads,” she said.

Other measures point to a much higher toll. In early 2020, the National Safety Council said cellphones were involved in more than a quarter of crashes. A poll by Nationwide Insurance shows its agents believe 50% of all crashes involved distracted driving. And safety experts say the problem has only grown worse since the start of the pandemic.

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Pretending that the toll is only a few thousand people a year makes it more difficult to change policies that could improve safety, Mark Rosekind said. He ran the National Highway Traffic Safety Administration during the Obama administration and is now chief safety innovation officer at driverless car company Zoox.

“People will use those low numbers as a way to minimize this, that it’s not a big problem,” he said.

Most people know distracted driving is bad — 98% of those polled told Advocates for Highway & Auto Safety they are extremely or very concerned about it as a safety issue.

But most do it anyway. Seventy percent of polled drivers said they use their cellphones while driving. That increased to 86% of people who use their cars for work.

State Farm in April released survey statistics even more disturbing. More than half of respondents said they “always” or “often” read or send text messages while driving, 43% said they watched cellphone videos always or often while driving, and more than a third said they always or often drove while engaged in a video chat.

Elene Bratton’s 5-year-old son [Jamie](#) died in a car crash back in 2002 caused by a driver distracted while using a cellphone. She thought the mounting deaths would lead to serious action by lawmakers and safety regulators but instead has watched the problem grow much worse. “We act like there’s nothing to be done with car crashes like this, like we all have to deal with it,” said Bratton, who runs a website, [jamiesjoy.org](#), in part to raise money to help push policy changes.

How do the companies behind all those distracting screens and apps — the automakers and smartphone manufacturers — view their responsibility for the problem and their role in solving it?

It’s hard to say. The Times asked the five top-selling carmakers in the U.S. — General Motors, Ford, Toyota, Stellantis and Honda — to provide an executive to speak about what they’re doing to help prevent distracted driving. All declined, offering instead to make written public relations material available. Apple and Samsung, the two leading smartphone makers, also declined interview requests.

When companies do talk about distracted driving, they tend to frame it as a problem with cellphones. Their solution: Integrate the same functionality and more into dashboard interfaces and voice-recognition systems.

Apple executive Emily Schubert, in a [flashy video](#) internet presentation in June, announced major new features for the company’s CarPlay infotainment system. Apple



declined to make Schubert or any other executive available for an interview, but in an email a spokesperson called CarPlay “the smarter, safer way to use iPhone in the car.” What makes it safer, and to what degree? No details were provided.

The company did note it provides Driving Focus mode on its phones, which, if engaged by the customer, keeps the phone silent and doesn't allow notifications to come through. A Nationwide Insurance poll showed 70% of respondents had never used such a feature.

A Honda spokesperson said by email that “the biggest thing we can do to reduce distraction is to reduce the likelihood of a driver looking at their mobile phone while driving” by putting more focus on infotainment systems, through which the company is making “an attempt to minimize distraction while satisfying the driver's ease of use and access to desired information.”

Honda offered few details and declined an interview about the subject. The company did say it's working with researchers at Ohio State University on the infotainment interface. The professors involved declined to offer details as well, saying their work for Honda is proprietary.

One problem with relying on infotainment systems to improve safety is that they don't work very well. “Infotainment systems remain the most problematic area” for new car customers, auto market research firm J.D. Power wrote in its latest new-car quality report. Customers complain about frequent problems with connectivity, Bluetooth syncing, touch screens and built-in voice recognition.

The ability to control features such as air conditioning and music playlists via voice commands theoretically improves safety by letting drivers keep their eyes on the road. But with the technology still a work in progress, scientists are learning it can be just as dangerous as fiddling with a smartphone.

In a [2019 paper](#), Strayer's team reported that completing tasks using voice commands took much longer than other kinds of interaction with smartphones and infotainment systems. The extra time significantly increased the driver's cognitive load. Believing that verbal communication doesn't interfere with driving shows a "naive understanding of how language works," Strayer said. Brain scans show that "language uses a lot more of the parts of the brain than driving does."

State laws that ban holding a cellphone or texting while driving give the impression that the danger stops there. But what the Apache research showed, and decades of subsequent research on automobile distraction has confirmed, is that the distracted driving problem is more than mere distraction. The problem is asking the brain to do too many things at once. The technical term is cognitive overload, which includes distraction and multitasking and sensory input from a variety of sources.

As part of its 2019 study, Strayer's team assembled data on driver use of infotainment systems in more than two dozen cars. Drivers were fitted with sensors attached to the head and the chest, and data on driver heart and brain activity were collected to assess distraction and cognitive load.

Although some systems were more distracting than others, all hampered the driver's ability to safely pay attention to the task of maneuvering a two-ton vehicle on public roads, the study found.



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Meanwhile, building the distractions into the car has the effect of sanctioning its use in the eyes of drivers. Thomas Goeltz, a Minnesota man whose 22-year-old pregnant daughter, Megan, was killed by a distracted driver in 2016, said that although people know talking or texting on the phone while driving is dangerous, the options offered on

a car's dashboard offer a false basis for complacency. "People think, it came with the car, it must be safe," he said.

In a glancing acknowledgment of their shortcomings, NHTSA in 2015 issued guidelines on infotainment systems that recommend they be designed so a driver's attention is not distracted for more than two seconds out of six.

The guidelines are voluntary, however. Strayer said that many of the actions tested in his research require drivers to take their eyes off the road for 12 seconds or more.

Any company hoping to do something about driver distraction must grapple with the majority of U.S. drivers who refuse to stop scrolling and swiping behind the wheel. For now, smartphone companies, auto companies, app makers, advertisers, retailers — just about the whole consumer information ecosystem — are happy to fill the demand. Consulting firm McKinsey projects in-car advertising, entertainment and consumer data sales will generate \$11 billion in annual revenue by 2030.

By then, it's conceivable consumer cars will be equipped with a version of the autonomous driving technology that's beginning to be deployed in robotaxis and delivery vehicles in limited areas. At that point, turning the interior of a car into an immersive infotainment bubble makes perfect sense.

What can be done in the meantime? The National Transportation Safety Board has called for a total ban on in-car device use — excluding built-in infotainment systems — while driving, except in emergencies. At least, the NTSB says, companies should restrict device use by employees.

In Europe, automakers will soon be required to install monitors to detect driver distraction in order to receive top safety scores. No such move is being publicly contemplated in the U.S.

Safety advocates say education campaigns aren't nearly enough to deal with the enormity of the problem but are one necessary component. They also call for stricter enforcement by police. Above all, they say, drivers need to be more responsible for their own safety and to keep from harming others.

Without major changes in driver behavior and public policy, uncounted tens of thousands of people will die each year, with devastating results on their families and their friends. That's part of the cost of the infotainment culture — which, thus far, Americans have been willing to accept.

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# Big Sign Firm Accused of Corruption

BY TED ROHRLICH

OCT. 23, 2005 12 AM PT



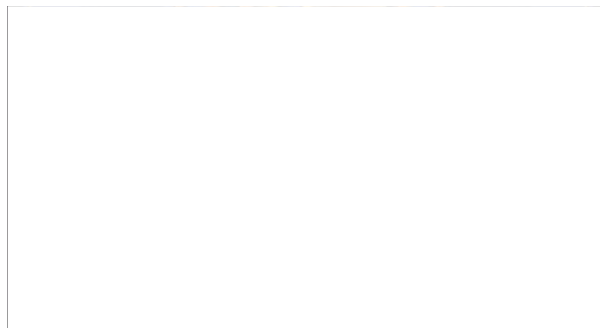
TIMES STAFF WRITER

In the quiet of New Year's Eve morning on the Sunset Strip, hours before partygoers celebrated the arrival of 2005, Brian Kennedy tried to give himself a present -- a new billboard that could bring him a million dollars a year.

It didn't matter that he had no permit. Kennedy had gotten his start in the sign business many years earlier by going out at night and pasting movie posters on construction fences without permission.

The scofflaw approach seemed to suit him. He could build his 40-foot billboard now and let the city of West Hollywood take him to court later while he raked in profits.

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Kennedy picked a day when City Hall was closed. He had canvas draped over a see-through fence to mask what he was doing.

He might have gotten away with it if Joan English, a deputy city manager, hadn't driven by the lot Kennedy owned at Sunset Boulevard and Queens Road. English could see the top of a crane lifting a billboard pole into place.

She got out of her car and peeled back the canvas to see a sopping-wet Brian Kennedy directing workers in the rain.

“I said, ‘Brian, what are you doing?’ ”

First, Kennedy claimed he had a permit, she said. Then he said he didn't need one because West Hollywood's restrictions on billboards were unconstitutional.

Kennedy and his brother, Drake, co-own Regency Outdoor Advertising, the largest family-owned billboard company in Southern California, worth an estimated half a billion dollars.

The brothers have bulldozed their way to success, letting little stand in their way. They have donated hundreds of thousands of dollars to causes of politicians who control where signs can be placed. They have filed lawsuit after lawsuit asserting 1st Amendment rights to bombard motorists with slogans.

And, according to sworn statements in lawsuits by a former Regency executive and an attorney who represented the firm, the Kennedy brothers have paid off politicians, bribed the Caltrans billboard inspector for Los Angeles and Orange counties and even poisoned palm trees obstructing some of their most lucrative signs outside Los Angeles International Airport.

On the Sunset Strip that rainy morning, Kennedy was unmoved by English's demand that he and his crew stop work.

"It became obvious they weren't going to listen to me," English recalled, so she called the L.A. County Sheriff's Department. Only when three deputies arrived and threatened them with arrest did Kennedy and his crew relent, according to the city attorney.

Nearly a year later, the billboard pole English saw being lowered into place is still standing. The fight has shifted to courtrooms. Kennedy faces trial on a misdemeanor charge of trying to erect a billboard without a permit. He is also suing the city, alleging that it violated his civil rights.

The Kennedy brothers declined to be interviewed for this article. In a letter, Brian Kennedy asserted that he and his brother "categorically deny any wrongdoing or the bribing of public officials, or civil servants, in order to obtain favorable treatment. That said," the letter continued, "we can say that the outdoor advertising industry is heavily regulated and that, as a result, we work closely with government officials and civil servants at all levels."

## The Lords

### of the Sunset Strip

The Kennedys work out of headquarters without a sign, across from Tower Records in the heart of the Sunset Strip.

In the world of outdoor advertising, the Sunset Strip is a prime showcase, in a league with New York's Time Square and Tokyo's Ginza district. Billboards and ads on the sides of buildings are so much a part of the Strip's visual distinctiveness that six years ago, the West Hollywood Chamber of Commerce started awards for the best billboards and "tall walls" signs.

Regency, which owns more billboards on the Strip than any of its competitors, has won its share of honors.

The company does not have the reach of Viacom or Clear Channel, publicly traded giants that reportedly lease about 5,000 billboards each in the Los Angeles area. But Regency's inventory of 500 sign faces is seen by some as the most valuable, sign for sign, in Southern California.

Brian Gurnee, who once ran part of Regency's sales team and is suing the firm in a financial dispute, estimates that the Kennedy brothers, with their high concentration of valuable freeway and Sunset Strip signs, net tens of millions of dollars a year. A full-size billboard costs \$40,000 to \$100,000 to build but, in the right location, can pay for itself in a month. Regency asks advertisers for \$3,000 to \$80,000 a month, depending on the exclusivity of the neighborhood and how many motorists pass by.

Brian Kennedy, 64, is the firm's public face. A robust man with a hail-fellow-well-met manner, he is in charge of selling billboard space to advertisers and securing sign locations along the Strip. Drake Kennedy, 62, is the behind-the-scenes brother. Slightly built, with eyeglasses so large they resemble small windshields, he is in charge of arranging locations and permits everywhere but the Strip.

The brothers grew up in San Gabriel, immersed in the billboard business and in local politics. Their father, George, owned a small billboard company, Kennedy Outdoor Advertising, and later sat on the commission overseeing the Los Angeles Department of

Water and Power. Their mother, Helen, served for 17 years as a councilwoman or mayor in San Gabriel.

Both brothers attended USC. Drake has said he dropped out to help his ailing father sell his sign business. Brian graduated and has donated hundreds of thousands of dollars to Trojan football. The defending national champions practice on Brian Kennedy Football Field.



Regency Christmas party. It invited callers to “press one” if Regency was suing them, “two” if they were suing Regency, and so on, concluding: “If you have never been involved in any litigation with Regency Outdoor Advertising and do not anticipate any action in the future, please check the number you are calling and dial again.”

In building and defending what they regard as their billboard “boutique,” the Kennedy brothers relied heavily on J. Keith Stephens, for years Drake Kennedy’s right-hand man, and Paul E. Fisher, Regency’s principal lawyer.

Stephens, 46, came to the firm after he built his own signs without permits. His job included overseeing Fisher, 45, Regency’s outside counsel and a 1st Amendment specialist who had convinced several courts that laws restricting billboards were unconstitutional limitations on free speech. Things went well for Stephens, Fisher and Regency for several years.

But in 2001, Regency lost two civil trials involving Regency signs. Drake Kennedy blamed Fisher and Stephens, telling Stephens in a letter that Fisher’s poor performance had cost the brothers millions. The Kennedys dismissed Fisher in early 2002 and sued him for malpractice in a case they dropped just as it was to go to trial. Fisher unsuccessfully countersued, claiming the Kennedys owed him money.

Soon after Fisher was fired, Stephens quit. He sued Regency after Drake Kennedy demanded that he turn over some of his own billboards to make up for Regency's losses.

Regency quickly settled that case, agreeing to let Stephens keep his billboards. But an embittered Stephens has repeatedly sued Regency on other matters. One of his current suits alleges that Regency engaged in bribery and vandalism.

In interviews and in pretrial testimony taken in these legal battles, Stephens and Fisher told of alleged Regency bribery schemes and acknowledged their own roles in one of them.

The Kennedys, through spokesmen, asserted that Stephens and Fisher were con artists with records of making false statements under oath. Their bribery allegations, Regency contends, are part of an attempt "to extract financial settlements" from the firm.

A review of court documents shows that Fisher and Stephens have made contradictory statements about business dealings under oath. A civil court jury recently discounted their testimony and found that they were secret partners in a scheme to swindle a small rival firm out of some signs. Mitzi McCook, a billboard executive from yet another small firm and former friend of Stephens, also alleged improper conduct.

In a sworn declaration in 2003 to the State Bar, McCook said Stephens told her Fisher submitted inflated bills to Regency, which Stephens approved. In return, she said, Fisher did free legal work for Stephens.

McCook also said that Stephens told her that Brian and Drake Kennedy had engaged in "illegal activity" and that if need be, "he would use this information to put them in jail."

Secret Financier

in Monterey Park



In Monterey Park, home to stretches of the 60 and the 710 freeways, billboard opponent Judy Chu remembers a war that Regency waged against her in the early 1990s over the city's billboard ban.

Chu, now a state Assemblywoman, was then Monterey Park's mayor and a member of its five-person City Council.

Regency was campaigning to get the council to lift the ban and allow it to build freeway signs.

The firm employed a veteran lobbyist, Robert Katherman. He began popping up at political and charitable functions offering large donations to council members' favorite charities, Chu said.

"For me he said, 'Oh. I could make a big donation to the Asian Youth Center,' " she said.

Chu, who regards billboards as an aesthetic "abomination," said she was appalled by the way he attempted to curry favor. Katherman declined to comment. Her council colleagues supported lifting the ban.

When Chu countered by helping to organize a voter initiative to retain the ban, Regency launched a "campaign of terror" against her, she said.

It included an 18,000-piece barrage of political mail just before election day 1997, when both Chu and the billboard initiative were on the ballot.

One mailer sought to stir racial passions. The headline: "What's Judy Chu's Problem with Latinos?" The state Fair Political Practices Commission investigated and concluded in 2001 that Regency had secretly paid for most of the mailers. Drake Kennedy at first told a state investigator he didn't know anything about the mailers, records show.

However, Katherman, others who worked on the mailers and eventually Regency itself provided records that showed Regency paid for them.

The commission fined Drake Kennedy \$18,000 for illegally concealing his role.

Chu was reelected handily to city office despite the attacks and the billboard ban survived.

## Alleged Bribes

### in South El Monte

In nearby South El Monte, Drake Kennedy seemed to become fixated on erecting a billboard on the property of a man who didn't want it.

To get his way, Kennedy allegedly bought control of the city government.

Sandy Bettelman's family owns a three-acre miniature golf course whose green- and blue-carpeted holes are visible from the 60 Freeway, near the Peck Road exit.

Regency approached Bettelman in the late 1980s and again in the early 1990s, offering compensation if the family would allow a billboard on its land. Bettelman declined, explaining that he was concerned a billboard would draw attention from his own much smaller sign.

Kennedy would not take no for an answer.

In 1996, Regency persuaded the city to sue the Bettelman family for possession of a dirt road next to the golf course so that Regency could put a billboard there, court records show.

Kennedy testified that Regency paid about \$50,000 on the lawsuit. The city lost when Superior Court Judge Irving Feffer ruled in 1998 that the Bettelmans owned the road; the city just had a right to maintain it. Kennedy sought city permission to build anyway, court records show. When a majority of the five City Council members balked, he allegedly decided that the two who were coming up for reelection had served long enough.

Stephens testified in one of the lawsuits he brought against Regency that Kennedy told him he secretly bankrolled the 1999 campaigns of challengers.

Al Perez and Raul Pardo were elected and joined holdover Mayor Art Olmos to form a pro-Regency majority. Neither man reported campaign contributions from Regency.

In February 2000, the council voted 3 to 2 to allow Regency to build its billboard on the road, despite a second ruling by Feffer that such approval would be “a legal impossibility.”

Regency agreed to pay the city \$100,000 immediately and \$20,000 a year for the sign.

In interviews, Olmos and Perez said they did not know about the judge’s rulings. “I would have never gone against the ruling of a judge,” Perez said.

City records show council members received written notice of one of the rulings as they prepared to vote on Regency’s request. William Vallejos, then city attorney, said in an interview that he also told council members about the ruling. Two members who opposed Regency, George Lujan and current Mayor Blanca Figueroa, backed Vallejos’ account.

Several months after the council vote, Regency built its sign.

Bettelman couldn't believe it. "The judge told them they didn't have the right to do it, and they did it anyway," he said.

He sued Regency.

One of his lawyers, Frank Nemecek, posed a question to the jury: "How did they get the city to agree to something that a judge had said five months earlier that the city couldn't do?"

Fisher, Regency's lawyer in the case, provided a possible answer in depositions in the malpractice case Regency brought against him. Regency, he said, bribed the City Council.

Fisher testified that Stephens and Drake Kennedy told him Ernie Moreno was Regency's bagman. A former legislative aide, Moreno was tried in the 1970s on federal perjury charges related to allegations that he'd taken payoffs for political favors. A jury could not reach a verdict and prosecutors dropped the case.

Fisher testified in his malpractice case that he once saw Drake Kennedy counting out stacks of \$100 bills in Moreno's presence.

He also testified that conversations with Moreno and Kennedy left him convinced that the money was going to members of the South El Monte City Council.

Drake Kennedy has testified Moreno was a Regency consultant who helped get government permission to build signs.

Olmos and Perez said in interviews that they are friends of Moreno's. But both denied ever speaking with him about the Regency deal or taking money.

Pardo declined to be interviewed. Moreno did not respond to requests for comment.

In ruling against Regency in the Bettelman lawsuit in late 2001, Superior Court Judge John Shook found that the Kennedys had trespassed and asked the jury to decide how much Regency should pay. The jury awarded the family \$1.5 million.

Regency took down its sign once its appeals were exhausted three years later.

Bettelman said his family spent \$600,000 on litigation to fight the Kennedys.

“They thought we’d knuckle under,” he said. “They just hit the wrong person. How many people have the money to fight them?”

### A Hardball Squeeze Play in Baldwin Park

City officials in Baldwin Park asked that question when Regency threatened them with a lawsuit. Ultimately, the city decided it did not have enough money to fight, and Regency’s billboards went up.

The dispute arose in 2000, when the firm asked the City Council for permission to build billboards along the 10 Freeway.

Regency had watched as the council allowed another firm to build signs along the 605 Freeway for fees of \$50,000 per sign.

But even with Regency offering \$100,000 per sign, it could not line up the necessary votes.

Finally, it seemed, the Kennedy brothers’ patience wore thin.

At dawn on the start of a long Fourth of July weekend in 2000, crews and cement mixers arrived at most spots Regency coveted and started erecting billboards without permission.

Baldwin Park Chief of Police Mark Kling, then a captain, recalled running into a cocky Stephens directing workers. Work stopped before the signs could be finished when authorities threatened arrests.

Stephens said in an interview that he then disclosed Regency's strategy of spending the city into submission.

Stephens said he told City Atty. Arnold Alvarez-Glasman that Regency was prepared to spend half a million dollars on legal fees to attack the city's sign law as unconstitutional. In a longshot bid for financial help, the cash-strapped city turned to its legal insurance carrier, the Independent Cities Risk Management Authority, which was designed to help cities defend against conventional lawsuits, not constitutional claims.

The city's request for help put Regency's lobbyist, Ken Spiker Jr., in an awkward spot. Spiker stood to make \$100,000 for every sign Regency won in Baldwin Park. His firm also made hundreds of thousands of dollars administering the risk management authority. If the authority helped the city fight Regency, he could be harming himself.

Spiker fired off a letter to the city saying he had nothing to do with Regency's decisions to build and to sue.

Regency's Stephens, however, testified in one of his lawsuits against the firm that Spiker told him he would work against Baldwin Park's interests.

Stephens testified that Spiker and an associate, David Neal Smith, told him they would see that the risk management authority denied Baldwin Park's bid for insurance coverage.

Spiker and Smith denied the allegations through their lawyers, and the insurer's general counsel, J. Kenneth Brown, said Baldwin Park's claim was denied routinely, with no pressure from Spiker or Smith.

There is no evidence to contradict them, but there is evidence that Spiker bragged he had the city over a barrel.

However, another billboard firm owner, Mark Kudler, said in a lawsuit against Spiker that Spiker told him he was involved in an effort to threaten Baldwin Park financially to force the city to cave in.

In any event, the city capitulated after its claim was denied.

Alvarez-Glasman, the city attorney, said the council directed him to negotiate with Regency rather than fight.

Baldwin Park gave Regency permission for six signs -- one more than it originally requested -- as part of a deal in which Regency increased its promised contribution to youth services.

Spiker and Smith also worked for Regency in Lynwood, to which Regency agreed to pay \$5 million for permission to build billboards along the 105 Freeway.

The signs never went up because enemies of then-Mayor Paul Richards canceled the deal. City Council and other records show that Richards and his allies arranged to divert \$1 million of the fee to a company owned by the mayor's sister.

Richards is on trial in federal court for this and other alleged acts of political corruption.

Smith pleaded guilty in August to a charge of giving a \$7,500 "illegal gratuity" to Richards for backing the Regency deal.

Smith also testified at Richards' trial that Regency agreed to pay the Spiker firm \$25,000 in "consulting fees" that would actually be used to support Richards' reelection campaign.

Neither Spiker nor Regency has been charged.

When Trees

Got in the Way

In 2000, with the Democratic National Convention slated for Los Angeles, the city planted 160 Canary Island palms on city property along the Century Boulevard approach to LAX to impress conventioners. The trees cost \$10,000 apiece.

For Regency, the beautification program was a problem. It blocked sight lines to valuable signs. Regency, represented by Fisher, sued the city, seeking \$18 million in damages.

Superior Court Judge Jean Matusinka ruled in 2002 that under California law, Regency could not collect for “loss of visibility.”

Soon after, two of the trees blocking Regency signs died.

Airport landscapers called in Donald Hodel, a palm tree specialist from the University of California Cooperative Extension. He couldn't figure out what caused the deaths. He said it might be Fusarium wilt, a fatal disease affecting some other palms in the area. But a lab test by a plant pathologist found no evidence of the disease.

Stephens provided another explanation last year when he testified in a deposition in a lawsuit he brought against Regency. He testified that Brian and Drake Kennedy each told him Regency was responsible for poisoning the trees.

“Drake ... was really proud of the fact,” Stephens testified.



Pathologist Paul Santos said in an interview that the tests he did would not detect poison.

Regency, meanwhile, appealed the trial court decision but offered to drop its appeal if the city would allow it to replace many remaining palms with smaller trees.

It was up to the Airport Commission to accept or reject Regency's offer. Two members appointed by then-Mayor James K. Hahn -- Peter Weil, a real estate lawyer, and commission president Ted Stein, a lawyer-developer -- saw no reason to settle, Weil said. After all, the city had won at trial.

Their stance left Brian Kennedy fuming, according to two people close to Hahn who asked not to be identified. The Kennedys had provided \$260,000 worth of billboard space in 2001 to help Hahn get elected.

They had also given \$125,000 in billboard advertising to help the election campaign of City Atty. Rocky Delgadillo.

Kennedy personally negotiated with the city attorney's office, which had won the case against Regency at trial. The city attorney's office submitted four settlement proposals to the commission in 2003 and 2004.

City officials, speaking on condition of anonymity, said only one commissioner privately pushed for a settlement -- the late labor leader Miguel Contreras. Campaign finance records show Regency had donated \$31,000 in billboard space to promote Martin Ludlow, Contreras' protege, in his successful 2003 run for a City Council seat.

Months after settlement efforts failed, a third palm tree died in front of the same Regency signs. Airport landscapers again sent samples to a lab, which again found no sign of disease.

A few months later, the state Court of Appeal ruled against Regency. The state Supreme Court has agreed to hear the case, and the city attorney's office said it has reopened talks.

Regency has had problems with other city-owned trees at LAX. Coral trees next to the elevated extension of Century Boulevard had grown so tall by 2000 that they blocked views of a Regency billboard at the entrance to the airport.

In a 2003 memo to Stephens, apparently prepared as they sought to help each other in litigation involving Regency, Fisher wrote that Drake Kennedy had told him he "had an employee who was taking a chain saw and destroying the coral trees."

Two LAX landscape supervisors recalled in interviews that someone had repeatedly sawed part way through branches so they eventually fell off of their own weight. Over time, said supervisor Ed Manara, trees that once stood 35 to 40 feet tall were reduced to 5 feet in height.

The landscapers complained about the vandalism to airport police, whose reports estimated the damage at \$100,000.

The culprit never was caught.

West Hollywood has had similar troubles figuring out who has illegally and often radically trimmed 43 of its trees along the Sunset Strip during the middle of the night in recent years.

Twenty-seven of the trees were in front of Regency signs. Two were palms that were decapitated and died.

Billboards, Public Toilets and the MTA

When it wasn't trying to protect its own billboards from visual obstruction, Regency sometimes worked hard attacking competitors' plans.

In one instance, Regency tried to keep a small Philadelphia company, Strategic Technologies International, from completing a multimillion-dollar deal with the Metropolitan Transportation Authority for billboards on MTA rights of way along freeways.

It called upon Moreno, its alleged bagman in South El Monte, for an introduction to a legislator willing to help.

Drake Kennedy has testified that Moreno introduced him in 2001 to Richard Polanco, a Los Angeles Democrat who was then the state Senate majority leader and dean of the Latino Caucus.

Polanco agreed to carry a bill written by Regency that would require the MTA to get approval for its signs from local governments, some of which were hostile to more billboards.

Spiker, Regency's lobbyist, helped line up the Independent Cities Assn., an alliance of small Southern California cities managed by his firm, to support the bill.

Polanco said his interest was in preserving local control.

At a hearing, Senate Transportation Committee Chairman Kevin Murray (D-Culver City) expressed skepticism about Regency's motives.

"Why would a billboard company want to restrict the amount of billboards?" he asked.

The Regency lawyer who drafted the bill, Michael Tidus, answered that his client believed its competitors should have to jump through the same hoops it did. Regency,

he added, believed in local control.

“You’re for good government, huh?” Murray asked.

“Yes,” Tidus said, smiling.

“I understand,” Murray said, chuckling.

With the support of municipalities, the bill sailed through the Legislature and was signed into law in 2001.

The new law killed the billboard deal and, with it, the MTA’s plans to use revenue from the signs to pay for the first public toilets at its subway and light rail stations so riders would not have to relieve themselves in “station elevators and planting areas,” as one MTA memo put it.

A few months after the bill passed, Drake Kennedy testified, Polanco contacted him. “I believe that we were requested to make out two checks to certain PAC [political action committee] groups,” Kennedy testified.

In late February 2002, records show, Regency gave \$25,000 to the California Latino Alliance, which transferred \$25,000 the next day to the Latino PAC, controlled by the Latino caucus of state legislators. In March, Regency gave another \$25,000 directly to the Latino PAC.

At the time, the Latino PAC was waging a campaign against Democratic Assemblyman Mervyn Dymally, a political rival of Polanco’s.

Polanco did not respond to requests for comment.

Chicanery in

## West Hollywood

In early February 2003, Steve Martin, then a West Hollywood city councilman, said he received a phone call from an old acquaintance who wanted to see him urgently.

Martin named the acquaintance privately but would identify him publicly only as a former city planning commissioner.

Martin said the man drove to his house and insisted that they go for a ride. As the man drove, he delivered what he said was a message from Brian Kennedy, Martin recalled.

Martin said he was told that Kennedy would pay him \$10,000. All he had to do was vote against a Regency competitor's request for city permission to maintain ads on the side of a building on Beverly Boulevard.

At the time, Martin was running for reelection and Brian Kennedy was supporting his opponents. Martin said he feared he was being set up.

A lawyer, he recounted the alleged bribe offer to three fellow city officials, one of whom reported it to the Sheriff's Department. But when a detective interviewed him, Martin did not mention Kennedy and declined to identify the intermediary, records show. The investigation was dropped.

Kennedy prevailed in the wall ad controversy on a 3-2 council vote without Martin's help. In the recent interview, Martin said he did not name the intermediary because he had no way to prove he had been offered a bribe. It would be his word against the other fellow's.

But he said he had no doubt about what had happened.

"It was very clear," he said. "I was being offered money for my vote."

## Inspector Accused

### of Taking Bribes

A civil servant named Raj Champaneri is an influential figure in Regency's world.

He is a billboard inspector for the California Department of Transportation, the only one for all of Los Angeles and Orange counties.

Fisher said in a recent interview that Champaneri approached him in the late 1990s and suggested he could use extra cash.

Fisher said he delivered Champaneri's message to Stephens and Drake Kennedy. He testified in one of Stephens' lawsuits against Regency that Champaneri complained to him some time later that his monthly bribe from Regency was late.

Stephens testified in the same lawsuit that he delivered bribes from Drake Kennedy to Champaneri three times. Stephens testified that on one occasion, he watched as Drake "counted out several thousand dollars, put it in an envelope" and gave it to him to deliver to the inspector.

This spring, at the imposing new Caltrans building downtown, Stephens and Champaneri came face to face in the hallway before a public hearing. Stephens was there to appeal a ruling the inspector had made against his company and in favor of Regency.

Stephens introduced Champaneri to a reporter as the inspector who was on the Regency payroll for \$5,000 a month.

Asked whether the allegation was true, Champaneri turned and walked away. Pressed for a response, he glanced back and said, "Of course not."

Stephens repeated the accusation while sitting across a table from Champaneri at the hearing.

Afterward, Caltrans asked the California Highway Patrol to investigate. Champaneri has been assigned to a desk job pending completion of the probe, a Caltrans spokesman said. Stephens said CHP officers accompanied by FBI agents and federal prosecutors recently interviewed him about this and other allegations.

To illustrate what he said were favors that Regency obtained from Champaneri, Stephens directed a reporter to two Regency billboards along the 10 Freeway in El Monte.

Champaneri and his Caltrans superiors permitted the billboards on the condition that they advertise only businesses in El Monte's redevelopment area.

Regency has not complied. Stephens provided a copy of a letter he said he hand-delivered to Champaneri in 2003 telling him that the Regency signs were carrying ads for movies and a store out of town.

Champaneri took no action. A Caltrans spokesman said they found no such letter in their files.

Recently, the signs advertised a television show and new Cadillacs.

There are plenty of Cadillac dealerships in Southern California.

There are none in El Monte.

\*

(BEGIN TEXT OF INFOBOX)

## Regency's reach

Government officials and former associates of Regency Outdoor Advertising, the largest family-owned billboard company in Southern California, have accused the firm of a variety of illegal activities, including building signs without permits, poisoning trees that obstructed views of some of its signs and secretly financing a smear campaign.

- Joan English, a West Hollywood city official, noticed Brian Kennedy putting up a billboard without a permit last New Year's Eve morning and turned him in.
- Steve Martin, a former West Hollywood city councilman, says a former city planning commissioner offered him \$10,000 in 2003 to vote the way Brian Kennedy wanted on a matter coming before the council.
- Donald Hodel, a palm tree specialist with the University of California Cooperation Extension, said the death of three Canary Island palms blocking Regency signs on Century Boulevard near LAX is a "perplexing and vexing case. ... It could possibly be Fusarium wilt," he said, referring to a fatal palm disease in the area. "But
- Ed Manara, LAX landscape supervisor, said vandals repeatedly and radically cut back coral trees blocking sightlines to a Regency sign near the airport entrance. "I got so tired of it that we used to call airport police," he said.
- David Neal Smith, an associate of lobbyist Ken Spiker Jr., has pleaded guilty to giving an "illegal gratuity" to former Lynwood Mayor Paul Richards to thank him for backing a Regency proposal to put billboards along the 105 Freeway.
- Judy Chu, now a state assemblywoman, was Monterey Park's mayor in the 1990s and an opponent of a Regency billboard plan. Drake Kennedy secretly financed a smear campaign against her, according to the state Fair Political Practices Commission.



- Sandy Bettelman, whose family owns a miniature golf course along the 60 Freeway in South El Monte, told Regency he did not want one of its billboards on his property. Regency built one anyway.
- Ken Spiker Jr., whose firm provided management services for an alliance of small Southern California cities, represented Regency as a lobbyist in two of those cities, Baldwin Park and Lynwood.

Source: Times reporting

\*

(BEGIN TEXT OF INFOBOX)

Among the players

Regency Outdoor Advertising owns billboards in some of the best locations in the L.A. area. The company has donated hundreds of thousands of dollars to causes of politicians who control where signs can be placed.

To protect its interests, it has filed lawsuits asserting its 1st Amendment rights to bombard motorists with commercial slogans.

- Drake Kennedy secures most sign locations.
- Brian Kennedy mainly deals with advertisers.
- Richard Polanco carried a Regency bill.
- Paul E. Fisher was Regency's chief lawyer.

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**From:** [benjamin.hanelin@lw.com]  
**Sent:** 10/24/2022, 2:22 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Cc:** [cindy.starrett@lw.com](mailto:cindy.starrett@lw.com)  
**Subject:** Metro's Draft EIR re TCN: Draft EIR Comment Letter

Good afternoon.

Please see that attached comment letter on Metro's Draft EIR for its TCN program.

Please let us know if you have any problems accessing the document.

Best regards,  
Benjamin

**Benjamin J. Hanelin**  
**LATHAM & WATKINS LLP**  
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## LATHAM & WATKINS LLP

October 21, 2022

### BY EMAIL

Los Angeles County Metropolitan Transportation Authority  
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One Gateway Plaza  
Los Angeles, California 90012  
Email: [tcn@metro.net](mailto:tcn@metro.net)

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Hamburg	Shanghai
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London	Tel Aviv
Los Angeles	Tokyo
Madrid	Washington, D.C.

Re: Transportation Community Network Program Draft EIR

Dear Ms. Ling:

Thank you for the opportunity to comment on Metro's Draft EIR for its Transportation Communication Network ("TCN"). We are writing on behalf of our client, Clear Channel Outdoor, to provide these comments on the Draft EIR and also look forward to participating when the City moves forward to consider its implementation actions in connection with the TCN program.

We and Clear Channel appreciate that Metro and the City of Los Angeles are working to create meaningful opportunities for the reduction of existing off-site signage and provision of public benefits to local communities through traffic improvements funded by new digital signage. Clear Channel has worked with the City over many years in connection with the City's ongoing efforts to update the City's signage regulations to be consistent with dozens of other cities across California that have embraced sign reduction and modernization. Doing so will allow the City and its residents to see the benefits of a modern, forward looking ordinance – one that protects residential communities while modernizing the City's signage infrastructure. Community benefits from digital signs are manifest – from supporting small and local businesses through cost effective advertising, to support for local non-profits, and emergency and safety messaging. Moreover, allowing digital signs and realizing the revenue generated from such signs directly supports both small businesses and communities still recovering from the pandemic .

The proposed TCN builds on a tried and true method for reducing the numbers of existing, aging signs by requiring a two to one square footage take-down ratio, which would lead to the reduction of a significant number of existing non-digital off-premise displays. While beneficial when applied to Metro's signs alone, the true, comprehensive benefits will be far greater if a similar program is adopted City-wide. This approach mirrors that of relocation agreements, authorized by state law, that dozens of California cities have used to achieve the reduction of existing billboards.

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Specifically, section 5412 of California's Outdoor Advertising Act states in relevant part that

***Cities, counties, cities and counties, and all other local entities are specifically empowered to enter into relocation agreements on whatever terms are agreeable to the display owner and the city, county, city and county, or other local entity, and to adopt ordinances or resolutions providing for relocation of displays.***

The City process proposed under this limited Transportation Communication Network program would constitute rules allowing the placement of new digital signs on Metro-owned property while requiring that existing signs be removed and "relocated" to the new sign's location. This is the heart of what a "relocation agreement" is. ***When the City continues this program, we look forward to discussing the potential for the City to adopt such a policy for the entire City and not just for Metro-owned property.***

Regarding the Draft EIR's conclusions, we believe this analysis is similar to the conclusions reached by many other cities, recognizing the many safety requirements incorporated into the design and operation of modern digital signage. The conclusions are very reasonable in that the Draft EIR identifies no significant impacts in the areas of transportation (i.e., traffic safety and hazards), no light or glare impacts that would adversely affect day or nighttime views, and only limited impacts regarding aesthetics as related to the placement of new signage proximate to historic resources. In fact, the Draft EIR concludes that the program would have no aesthetic impacts, save for a few signs located near historic resources.

Similarly, we agree with the Draft EIR's conclusion that the program would not conflict with the majority of the City's local plans adopted to avoid or mitigate environmental impacts. The only potential land use impacts are site-specific and mitigations can address issues such as potential impacts from proximity to historic resources in four locations, and the goals and policies related to these resources, and two sites in a Community Plan area that prohibits off-site advertising. Otherwise, the Draft EIR correctly concludes that there are no land use impacts.

That said, we believe there are some areas where the Draft EIR could be improved and provide a fuller and more complete assessment of both potential project impacts and of a more complete policy to encourage meaningful sign reduction and modernization.

***Project Alternatives.*** The Draft EIR assesses three alternatives to the project: (i) a no project alternative; (ii) an alternative that eliminates impacts to historic resources; and (iii) an alternative that eliminates all significant and unavoidable impacts.

We recommend that the EIR also consider an alternative that would result in additional reduction of existing non-digital signage through the implementation of relocation agreements to non-Metro owned property within the City. Not only would this improve aesthetics through the reduction of existing billboards, it would create additional funding for transportation improvements.

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***Analysis Under the Outdoor Advertising Act.*** The placement of off-site signage visible from freeways is also regulated by the State's Outdoor Advertising Act administered by Caltrans.

The Outdoor Advertising Act sets various standards for locating off-site signs along freeways. These include prohibiting the placement of off-site signs along landscaped freeway segments and setting spacing and size requirements, and the City has its own regulations addressing similar issues. The Outdoor Advertising Act's spacing requirements provide the following.

- Signs must be 500 feet from any other permitted display on same side of any highway that is a freeway.
- Signs must be 300 feet from any other permitted display on same side of any primary highway that is not a freeway in an unincorporated area.
- Signs must be 100 feet from any other permitted display on same side of any primary highway that is not a freeway and is within the limits of an incorporated city.
- Signs must be 500 feet from an interchange; intersection at grade or safety roadside rest if the highway is a freeway and the location is outside the limits of an incorporated city and outside the limits of an urban area.

Regarding a sign's size, the maximum area is 25 feet in height and 60 feet in length with an overall maximum of 1,200 square feet.

We bring these limitations to your attention because it is not clear that the Draft EIR's analysis considered fully the project's consistency with the Outdoor Advertising Act. While the Draft EIR says that the project would comply with the Outdoor Advertising Permit requirements (IV.K-16), there does not appear to be an analysis of the Act's requirements on a location-by-location basis.

For example, Metro properties are located on landscaped freeways. These include locations the Draft EIR identifies as FF-04, FF-05, FF-08, FF-09, FF-15 through FF-20, and FF-26 to FF-30. The Draft EIR states that the new signs would be 500 feet from any scenic highway or landscaped segment of a freeway. (IV.K-21.) It is unclear how this is possible if the signs are intended to be viewed from the freeway. Further, under the Outdoor Advertising Act, outdoor advertising signs require a permit from Caltrans if they are within 660 feet from the edge of the right-of-way and viewed primarily by persons traveling on the main-traveled way of the freeway. The suggestion in the EIR that this distance is 500 feet, rather than 660 feet, should be clarified.

Similarly, other locations are located within 300 and 500 feet of existing off-site signs. For example, locations FF-12, FF-27, FF-29, and FF-30 are located within close proximity of existing signs. Yet the Draft EIR states that "at Project completion, none of the TCN Structures would be located within 500 feet of an existing sign..." (IV.K-21.) How is this guaranteed? Existing signs are secured by leasehold or ownership interests and cannot merely be removed by



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the City or Metro. As such, it is not clear that signs would be permitted at these locations under the Outdoor Advertising Act.

***Precise Location of Signs on Metro Property Should be Identified.*** While the Draft EIR identifies the locations of Metro's properties on which the digital signs could be located, the Draft EIR does not identify specifically on each property where the signs would be located. Similarly, the Draft EIR does not state how tall the signs would need to be to be visible from adjacent freeways. This information will be helpful in understanding the potential scope of the impacts. For Metro properties along surface streets, will signage be permitted to overhang the public right-of-way? This information should be provided to inform the environmental analysis as well as consistency with the Outdoor Advertising Act and other laws governing the location of off-site signage.

\* \* \* \*

Thank you for your attention to these issues. We look forward to working with the City and Metro on crafting a sign ordinance that benefits all of the City's communities and residents through the reduction of existing signage, community benefits, and the advent of modern signage capable of delivering real-time safety, transportation, and community messaging.

Very truly yours,



Benjamin J. Hanelin  
of LATHAM & WATKINS LLP

cc: Cindy Starrett, Esq.

---

**From:** Travis Longcore [travislongcore@laaudubon.org]

**Sent:** 10/24/2022, 2:00 PM

**To:** [tcn@metro.net](mailto:tcn@metro.net)

**Subject:** Transportation Communications Network Draft Environmental Impact Report

Please see attached letter from Los Angeles Audubon Society.

Los Angeles Audubon Society  
P.O. Box 411301  
Los Angeles, California 90041-8301



**Via email ([tcn@metro.net](mailto:tcn@metro.net))**

October 24, 2022

Shine Ling, Development Review Team  
One Gateway Plaza, Mail Stop 22-9  
Los Angeles, California 90012

Re: Transportation Communications Network Draft Environmental Impact Report


Dear Ms. Ling:

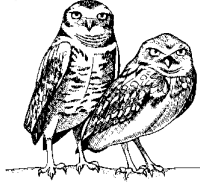
The Draft Environmental Impact Report (DEIR) for the Transportation Communications Network (TCN) acknowledges that the facilities would be constructed in locations that would impact sensitive species, including federally and state listed endangered species, and sensitive bat species (see Biological Resources Technical Report, All Vision LLC, August 2022). The analysis of biological impacts does not include a description of or even an attempt to quantify the effects of light pollution on these sensitive species.

The environmental impacts of light pollution on sensitive species are well-documented. See attached reports and papers for an introduction to these issues.

The lighting study for the DEIR only addresses impacts to humans, not to sensitive wildlife. Notwithstanding existing light pollution, its impacts on wildlife are cumulative and must be evaluated under CEQA. Therefore, the DEIR must be revised and recirculated so that the impacts to sensitive wildlife are evaluated, and the U.S. Fish and Wildlife Service must be consulted because of the potential adverse impacts to species listed under the U.S. Endangered Species Act at the Ballona Wetlands Ecological Reserve.

Sincerely,

  
Travis Longcore, Ph.D.  
President



## **Land Protection Partners**

P.O. Box 24020, Los Angeles, CA 90024-0020

Telephone: (310) 247-9719

### **Review of Biological Impacts Analysis in Mitigated Negative Declaration for State Route 78 Digital Sign, City of Oceanside, California**

June 22, 2015

Travis Longcore, Ph.D.

#### **1 Introduction**

This report addresses the analysis of biological impacts from a proposed digital billboard in the City of Oceanside, California. As an expert on the effects of artificial night lighting on wildlife and ecosystems and in environmental impact analysis, I have been asked for technical comments on this particular aspect of the project by the firm DeLano & DeLano. I have reviewed the following documents:

- U.S. Fish and Wildlife Service, Comments on the Draft Mitigated Negative Declaration for the State Route 78 Digital Sign, City of Oceanside, California (SCH #2014111075);
- Response to USFWS Comments in Final Mitigated Negative Declaration;
- Mitigation Measures in Final Mitigated Negative Declaration for the State Route 78 Digital Sign, City of Oceanside, California;
- Letter report on “State Route 78 Sign” from John Muse and Associates, Inc.;
- Night Lighting Study in Coastal California Gnatcatcher Occupied Habitat, State Route 78 Digital Sign Project Located in the City of Oceanside, California.

The analysis of the impacts of artificial night lighting from the proposed sign on biological resources contains many errors of fact and relies on evidence, specifically the “Night Lighting Study,” that is scientifically useless. The applicant’s own reports show that the sign will cause nightly illumination on the order of that caused by the full moon (>0.1 lux) over 1,000 feet away from the sign site. This level of illumination is biologically relevant and should be considered a significant impact when experienced in sensitive natural communities or at sites where sensitive species will be found.

## 2 Factual Basis of Analysis Is Faulty

CEQA analysis should be based on facts and expert opinion based on facts, and should use the best available information at the time of the review. The Mitigated Negative Declaration (MND) and the response to comments in the MND fail in this regard.

### 2.1 Claim That Little Information Is Available About Effects on Songbirds Is False

In the response to the U.S. Fish and Wildlife Service (USFWS) comment letter, the preparers of the MND assert that “there was very little applicable information regarding night lighting effects on songbirds, including gnatcatcher for the proposed project. Nonetheless, the IS used the best available information at the time of preparation” (Response to Comments A-4).

It is factually incorrect that little information exists about the impacts of night lighting on songbirds. The research on the effects of ambient and artificial lighting on bird reproduction goes back to the 1920s (Rawson 1923, Rowan 1938). Birds can be extremely sensitive to illumination, and extension of foraging by species under artificial lights is documented in the literature (Goertz et al. 1980, Sick and Teixeira 1981, Frey 1993, Rohweder and Baverstock 1996). Established research also shows an earlier start to seasonal breeding of birds in urban (lighted) environments than rural (dark) environments (Havlin 1964, Lack 1965). Many of the physiological impacts of lighting on birds are conveniently reviewed by De Molenaar et al. (2006) and Longcore (2010). Further studies illustrate the growing knowledge on this topic that was available to the preparers of the MND, had they used a scientific indexing research tool to search for it:

- Dawn song in American Robins (*Turdus migratorius*) is influenced by ambient illumination (Miller 2006);
- Dawn song and lay date in a songbird have been shown to be associated with proximity to streetlights, with evidence that this affected mate choice, which has implications for fitness (Kempnaers et al. 2010);
- Light of 0.3 lux can move reproductive seasonality of songbirds by a month and cause irregular molt progression (Dominoni et al. 2013a, Dominoni et al. 2013b);
- Light is a major driver of the daily activity patterns of songbirds (study animal European Blackbird; *Turdus merula*), causing them to be active earlier in the morning (Dominoni et al. 2014);
- A songbird (Tree Sparrow; *Passer montanus*) exposed to 6 lux in the laboratory secreted luteinizing hormone earlier than controls, and urban birds exposed to 3–5 lux exhibited this pattern in the field; both of these response were statistically associated with night lighting (Zhang et al. 2014);
- Artificial light outside of nest boxes affects perceived photoperiod of Great Tits (*Parus major*), which the authors interpret as creating an ecological trap (Titulaer et al. 2012);
- Artificial light rather than traffic noise affects dawn and dusk song timing in common European songbirds (Da Silva et al. 2014).

Even more recent research, although not available to the preparers of the environmental review, must now be considered because it is available before a final decision is reached. These studies continue to support the proposition that lighting at levels associated with streetlights affects the

daily and seasonal timing of song in songbirds and these parameters are tied to fitness (Da Silva et al. 2015).

Finally, the MND takes the narrow view that only impacts directly on birds themselves are relevant, failing to recognize that impacts to their prey items could also be significant. Many families of insects are attracted to lights, including moths, lacewings, beetles, bugs, flies, wasps, and bush crickets (Sustek 1999, Kolligs 2000, Eisenbeis 2006, Frank 2006, Pawson and Bader 2014, Poiani et al. 2014, Longcore et al. 2015). Such impacts are relevant both for the potential effects on the prey base and as a direct impact on a sensitive vegetation type that receives independent consideration under CEQA.

## ***2.2 Assertion That Diurnal Species Are Not Affected by Lighting Is False***

The response to the USFWS comment letter contains the following assertion (Response to Comments A-4):

Gnatcatchers and most other passerine birds are active during the daylight not nighttime hours. As a result the sign illuminance would be non-substantial during bird activity periods and of little consequence to gnatcatcher activities.

Artificial night lighting affects diurnal species substantially. As noted above, it affects timing of dawn and dusk song, seasonality of reproduction, mate choices, and can extend activities of diurnal species into the night (Stracey et al. 2014). This is true for impacts across species, where diurnal species are affected in numerous ways by an altered nighttime environment (Miller 2006, Kempenaers et al. 2010, Titulaer et al. 2012, Dominoni et al. 2013a, Dominoni et al. 2013b, Da Silva et al. 2014, Dominoni et al. 2014, Zhang et al. 2014, Da Silva et al. 2015). Although California Gnatcatchers do not participate in a dawn chorus, they do vocalize from the early morning through the day (Preston et al. 1998). The interruption of circadian signals causes significant impacts on the physiology and behaviors of other species. There is no evidence to suggest that California Gnatcatchers would not be similarly affected.

## ***2.3 Assertion That Illumination Less Than 2 Lux Does Not Differ From Background Is False***

The “Night Lighting Study,” and the engineer’s study upon which it relies, sets an arbitrary standard of 2 lux below which the authors of both reports assume that the impacts of the proposed digital billboard are not significant. They base this assumption on a single passage in the engineer’s report, stating:

Based on my measurements, the light from freeway vehicles would often be over of 0.2 footcandles (2.15 lux) at the line extending from the center of the proposed sign. Therefore, outside the 274 foot radius circle, the light from the sign would often be less than the lights from vehicles on SR78.

The engineer does not share any raw measurements of illumination from freeway lights. He also creates an equivalency between the potential impacts of intermittent lighting from vehicles and constant lighting (until midnight) from the proposed sign. The sign itself may increase and decrease in illumination as images change, but it will remain on constantly until midnight. Both

the engineer and the biologists also ignore that the light from the two sources is cumulative and the increase in illumination from the sign will establish a minimum level below which illumination cannot fall during the operational period of the sign. They ignore that the illumination levels caused by the sign will increase greatly in foggy and cloudy conditions because of the scattering of light by particulates and reflection from clouds (Kyba et al. 2011). Finally, they ignore that the sign will be creating illumination levels that exceed that of the full moon (defined as 0.1 lux, by their own table, “Night Lighting Study,” Table 3) by 20 times at 274 feet and would extend lighting equivalent to the full moon more than 1,000 feet from the sign (John Muse & Associates, State Route 78 Sign, Appendix; see Distance 9, 1,000 feet would create illumination of 0.16 lux).

Any time a natural environment is experiencing illumination greater than the full moon ( $>0.1$  lux), or even greater than a quarter moon (0.01 lux), one can assume that species are being affected. This is the case because many species show lunar cycles in behavior, often driven by predator–prey relationships that can be interrupted by elevated illumination (Price et al. 1984, Daly et al. 1992, Upham and Hafner 2013). For example, light as dim as 0.01 lux can inhibit foraging by small rodent species (Kotler 1984).

The entire ensuing analysis of the effects of lighting from the sign that is limited to a 274-foot radius is therefore faulty. In truth, the sign will contribute, cumulatively, to ecological impacts on nocturnal ecology for well over 1,000 feet.

### **3 Study of Lighting at Gnatcatcher Habitats Is Not Useful for Assessing Impacts**

The “Night Lighting Study” presented in support of the analysis of impacts of lighting from the proposed sign on California Gnatcatchers has a number of fatal flaws.

#### ***3.1 Study Design Is Flawed***

The investigators measured illumination levels under lighting sources that were in the vicinity of California Gnatcatcher territories that had been occupied. Instead of measuring lighting levels throughout the territories, they concentrated on spots under illumination sources. This is not useful for understanding the relationship between territories being maintained and illumination levels because the measurements describe neither the nest site nor the territory as a whole. Perhaps the investigators thought this was acceptable because their light meter read “0 lux” once they were a certain distance from the lighting. This, however, is a fatal flaw in the equipment that they used, which apparently could not resolve illumination less than 1 lux (which is 10 times brighter than the full moon).

#### ***3.2 Equipment Unable to Measure Natural Lighting Levels at Night***

The “Night Lighting Study” was undertaken with a piece of equipment that is identified as a “LuxMeter.” No manufacturer is given, so it is difficult to determine what device this was. It is evident from the way in which the investigators describe the results, however, that the device had a resolution of 1 lux. The “Night Lighting Study” contains many statements that the illumination levels dropped to 0 lux and there are no reports of any measurements that have precision to 0.1 lux or 0.01 lux. The implication of measuring light with a device of this nature is that it is impossible to tell the difference between 10 times brighter than the full moon (1 lux), the full

moon (0.1 lux), and 10 times dimmer than the full moon (0.01 lux, which is still important to species at night). That is, the equipment cannot measure light at illumination levels that matter to species. Humans have visual systems that are several times less sensitive than most other species (Gaston et al. 2012) and therefore equipment to measure light that is not specially designed for biological investigations is usually inappropriate.

### ***3.3 Assumption That Lower Illumination in Foliage Eliminates Impacts Is Misguided***

The authors of the “Night Lighting Study” make the assertion that because California Gnatcatchers roost in the foliage of shrubs, and by the authors’ measurements (with equipment that could not measure illumination below 1 lux) the illumination in the shrubs is “0 lux,” the additional light from the sign could not have an effect. Of course the illumination in the shrubs is not 0 lux, but rather some fraction of 1 lux, which the authors did not measure. The illumination in the foliage around light sources would be elevated; the “Night Lighting Study” just did not have the proper equipment to measure it. It is therefore impossible to conclude that the shade of the foliage would reduce impacts to a less than significant level.

### ***3.4 All Measurements and Discussion Pertain to Clear Weather Conditions***

Even if the measurements in the “Night Lighting Study” were to be of sufficient accuracy, they would not come close to describing the range of night lighting conditions that are experienced near illumination sources. Fog is extremely efficient at reflecting light and recent research has shown that foggy conditions result in a 6-fold increase in night sky brightness (a measure of light pollution) (Ścieżor et al. 2012). Fog also scatters light down into habitats. Furthermore, clouds reflect light downward, so even if it were only cloudy (and not also foggy), the light reflected downward would be substantially greater than that under a clear sky (Kyba et al. 2011, Ścieżor et al. 2012). These basic facts about the propagation of light in the atmosphere are not considered in the “Night Lighting Study”; the measurements of sites in that study are all under clear skies and the modeled illumination from the proposed sign is under clear sky conditions.

## **4 Sign Would Exceed Allowable Lumens for an Entire Acre in Pattern Outdoor Lighting Code**

The Pattern Outdoor Lighting Code is designed to help jurisdiction wishing to reduce light pollution and its adverse impacts. The code sets limits per acre for the amount of outdoor lighting, measured in lumens. Depending on the zone (roughly corresponding to residential and commercial), the number of allowable lumens is either 50,000 per acre or 100,000 per acre (Pattern Outdoor Lighting Code, Standard ver. 2). By comparison, the proposed sign, a single structure, would emit 69,000 lumens, according to the engineer’s report. That is, the proposed sign itself would emit more than the allowable number of lumens for an entire acre of a residential area under this model ordinance.

## **5 Author Qualifications**

Dr. Travis Longcore is a principal of Land Protection Partners. He is Associate Professor (Research) at the USC Spatial Sciences Institute and formerly Associate Adjunct Professor at the UCLA Institute of the Environment and Sustainability. He has taught, among other courses, Bioresource Management, Environmental Impact Analysis, Field Ecology, and in the



Environmental Science Practicum. He was graduated *summa cum laude* from the University of Delaware with an Honors B.A. in Geography, holds an M.A. and a Ph.D. in Geography from UCLA, and is professionally certified as a Senior Ecologist by the Ecological Society of America. He is co-editor *Ecological Consequences of Artificial Night Lighting* (Island Press, 2006) has authored or co-authored over 30 scientific papers in top peer-reviewed journals such as *Conservation Biology*, *Biological Conservation*, *Current Biology*, *Environmental Management*, and *Frontiers in Ecology and the Environment*. Dr. Longcore is among the world's leading authorities on the effects of artificial night lighting on species and ecosystems. Land Protection Partners has provided scientific review of environmental compliance documents and analysis of complex environmental issues for local, regional, and national clients for 17 years.

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# Determining the Effects of Artificial Light at Night on the Distributions of Western Snowy Plovers (*Charadrius nivosus nivosus*) and California Grunion (*Leuresthes tenuis*) in Southern California

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## ABSTRACT

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This study covers the role of exposure to artificial light at night (ALAN) in shaping the spatial distributions of two species of conservation concern, roosting sites of the Western Snowy Plover and locations of California Grunion spawning runs, along the coast of southern California. Observational data on plover and grunions, derived from community science sources, were obtained along with remotely sensed environmental measurements along the coast of southern California. The study area comprises a 1.5 km wide coastal strip, bounded by the mean low-tide line, and stretching from 10 km north of the northern Ventura County line to 10 km south of the southern Orange County line. These data were used as inputs within three species distribution models: a generalized linear model, Maxent, and random forest. Exposure to ALAN was based on a ground-verified model of night sky illuminance. In the highest performing models, which used random forest modeling, exposure to ALAN was the most important environmental factor influencing distribution of grunion runs and second-most important factor for plover roosts. Significant declines were found in the likelihood of plovers roosting in locations where exposure to ALAN exceeded illuminance levels equivalent to that produced by approximately one half a full moon and for grunion spawning at one full moon. Disruption of behaviors related to reproduction, roosting, and spawning associated with elevated levels of ALAN are likely a result of increased predation risk in illuminated coastal areas. With evidence of ALAN providing significant ecological disturbances to these two managed species, it is therefore recommended that control of nighttime illumination be used, even at naturalistic intensities, to mitigate disturbances to critical reproductive coastal habitats and potentially other environments.

**ADDITIONAL INDEX WORDS:** *Artificial light at night, coastal habitats, ecological light pollution, species distribution modeling, citizen science, community science.*

## INTRODUCTION

A substantial body of evidence in ecology has demonstrated a significant role for artificial light at night (ALAN) in disturbing animal behaviors (Lacoeuilhe *et al.*, 2014; Longcore and Rich, 2004), with implied subsequent changes to their use of space, which have been documented for migratory routes (Cabrera-Cruz, Smolinsky, and Buler, 2018). In coastal habitats, light pollution is of particular concern (Bolton *et al.*, 2017); given rapid urbanization (Sterzel *et al.*, 2020), this will increasingly be the case (Hölker *et al.*, 2010). Although an influence of ALAN in general is now well known, managers lack information on specific thresholds of influence for species of concern. This indicates a need to determine species-specific thresholds for behavioral disturbances due to ALAN exposure and for the subsequent development of policies to help mitigate impacts of existing conditions or future development. In part, this lack of knowledge arises from the difficulty of measuring light at night from the perspective of an organism,

extrapolating those measurements across landscapes, and analyzing space use relative to those and other environmental features. Schirmer *et al.* (2019) presented an analysis for space use of urban-tolerant wildlife in Chicago, finding a threshold for reduced activity at an exposure to nighttime illuminance exceeding 6000 millilux (mlx). This is a level of illuminance equivalent to approximately 60 full moons (assuming a full moon produces illumination of 0.1 lux or 100 mlx; Kyba, Mohar, and Posch, 2017). This paper demonstrates a method to evaluate such effects on more sensitive species at a regional scale, using the sandy beach ecosystem of southern California as an example.

Focus was placed on factors associated with the spatial distribution of two managed species, California Grunion (*Leuresthes tenuis*) (Figure 1C) and threatened Western Snowy Plover (*Charadrius nivosus nivosus*) (Figure 1B), along the biodiverse and urbanized southern California coast (Myers *et al.*, 2000). These species of interest were selected given their sensitivity to anthropogenic stressors (Martin and Adams, 2020), as well as evidence of sensitivity to ALAN within similar species (Burger and Gochfeld, 1991; Dwyer *et al.*, 2013; Reynolds, Thomson, and Casterlin, 1977).

Even with disturbances associated with urbanization, sandy beaches are important habitats for a range of species

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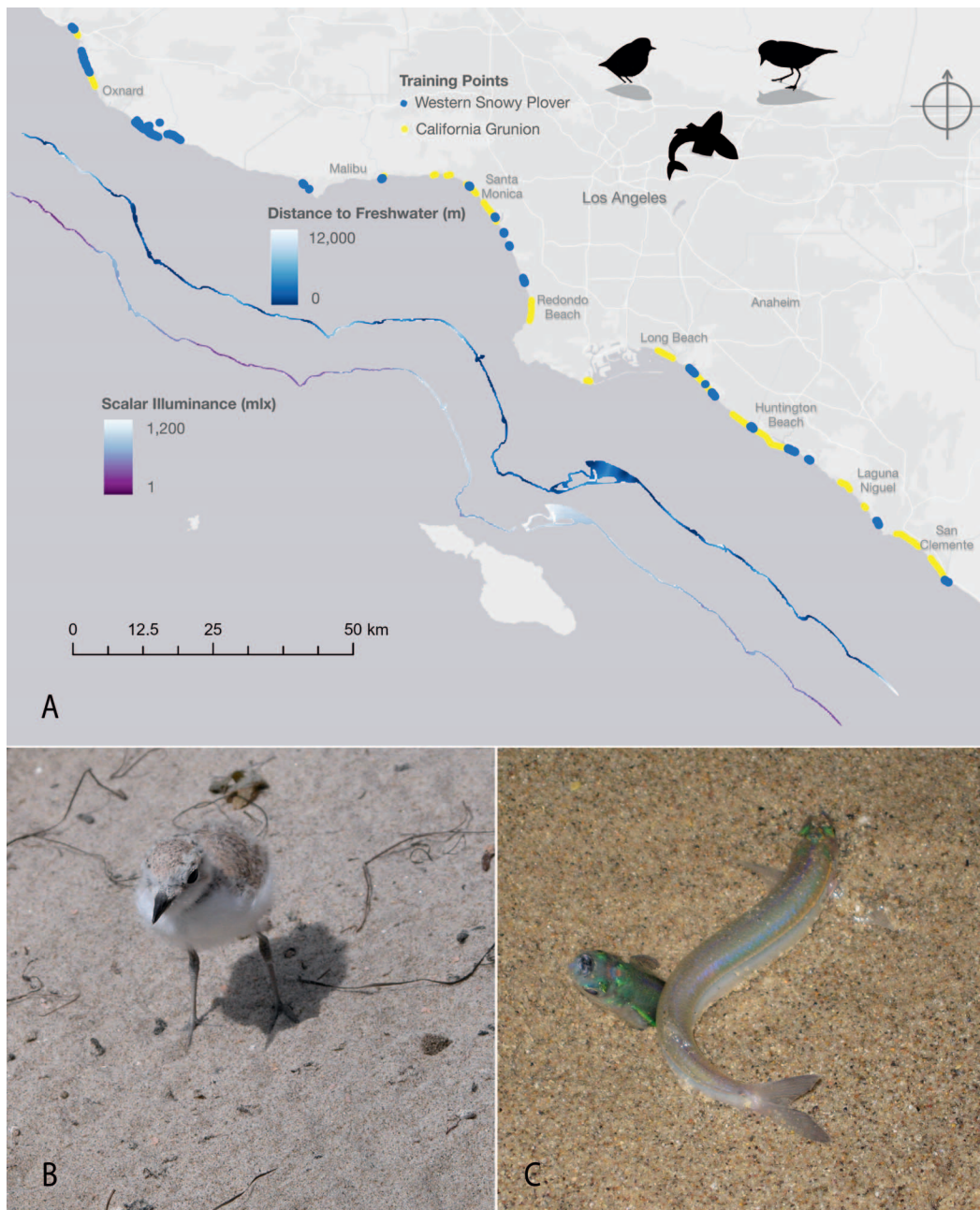


Figure 1. (A) Project area with species data. Distribution of training points for plover roosts and grunion run locations on sandy beaches in Los Angeles, Orange, and Ventura counties, California. Included are examples of environmental layers for hemispherical illuminance (mlx) and distance to freshwater (m). (B) Western Snowy Plover chick (Photo: T. Longcore). (C) Spawning California Grunion (Photo: D. Martin, Grunion.org).

(Schlacher *et al.*, 2007). Sandy shores can be nighttime refuges, with some species foraging and others roosting during periods of low human activity. But beaches themselves are threatened by climate change and anthropogenic activities (Martin, 2015; Schlacher, Thompson, and Price, 2007). Levels of nighttime illumination can inhibit habitat use by native species, even at protected beaches. This is the case with both terrestrial and marine species, such as beach mice (Bird, Branch, and Miller,

2004) and sea turtles (Hu, Hu, and Huang, 2018). Both California Grunion and Western Snowy Plover rely solely on beaches for critical parts of their life cycles, including reproduction and nesting for both species and roosting and feeding for the plovers. Identification and quantification of thresholds for impacts of lighting is essential to developing conservation policies that allow for continued persistence and recovery of these species.

Additional nighttime light, whether moonlight or artificial, increases foraging efficiency of predators and reduces activity of prey (Longcore and Rich, 2004; Seligmann *et al.*, 2007). This phenomenon has been shown in different habitats, including beaches (Bird, Branch, and Miller, 2004; Schlacher *et al.*, 2007). For species in a roost, such as Western Snowy Plover, two responses to illumination are possible. When the species exhibits communal predator defense, greater illumination may be preferred because of enhanced group vigilance. This is reflected in the concentrations of urban American Crow roosts in illuminated areas (Gorenzel and Salmon, 1995) and the schooling of some fishes under illumination (Nightingale, Longcore, and Simenstad, 2006). Many shorebirds forage at night, including plovers (Burger and Gochfeld, 1991; Lafferty, 2001; Page *et al.*, 1995), although this is likely due to a combination of defense against predation (Thibault and McNeil, 1994) and an increase in invertebrate activity along nighttime beaches (Evans, 1987). A second response to illumination is avoidance, using darkness to hide from predators. So, although many species of waterfowl, including other species of plovers, have been recorded foraging or roosting under artificial light (Thibault and McNeil, 1994), it is then hypothesized that Western Snowy Plover, given its small size and susceptibility to predation, will roost at darker sites on beaches.

California Grunion emerge onto sandy beaches at night, during the highest tides, to engage in spawning runs, despite the predation risk from various shorebirds and other predators, including humans (Martin, 2015; Martin and Raim, 2014). It can then be hypothesized that grunion will avoid more brightly illuminated locations to minimize predation risk. Mass spawning events by grunion are likely a form of predator swamping, but their location may also indicate avoidance of lights to minimize visibility to predators. The grunion runs occur within roughly four nights after either the new moon or full moon, and so they are not limited to the darkest nights. Anecdotally, however, grunion may favor the darker parts of the beaches on which they spawn (Sandrozinski, 2013; personal observation), and coastal conditions often result in overcast nights during full moons.

This study covers an analysis of associations between locations of Western Snowy Plover nighttime roosts and spawning locations of California Grunion, with ambient nighttime illumination, while accounting for other habitat features. This analysis involved development of a high-resolution map of ground-level hemispherical illuminance, that is, the illuminance of the full night sky, validated by extensive field data and incorporation of observational datasets collected by community scientists for species distributions. The results provide quantifiable thresholds that can inform policies to control light pollution and to illustrate how satellite and ground-based measurement of ALAN can be integrated to understand its effects on species distributions in the wild, with important implications for conservation of coastal biodiversity.

## METHODS

The study area is a 1.5 km wide coastal strip, the outer boundary of which is defined by the mean low-tide line, running from 10 km north of Ventura County through Ventura, Los

Angeles, and Orange Counties, to a point 10 km south of Orange County in California (Figure 1A). This coastline contains many highly urbanized areas and is close to residences, businesses, and the Pacific Coast Highway. The study area also contains numerous public beaches, which welcome millions of visitors a year.

Observational data were collected on areas where significant grunion runs were aggregated by the community science group Grunion Greeters (Martin *et al.*, 2020). Although observations made on behalf of Grunion Greeters focus on wide beaches opportunistically, they have been repeatedly vetted as reliable between observers over the more than two decades of data acquisitions (Martin *et al.*, 2020). Beach areas were considered to contain a significant run if they were recorded as having a Walker scale (Martin, Schaadt, and Lawrenz-Miller, 2021) observation of W-2 or higher during the period 2013–16. The Walker scale was developed specifically for assessing grunion spawning runs (Martin, Schaadt, and Lawrenz-Miller, 2021). It ranges from W-0, where few or no fish appear, to W-5, with thousands of fish carpeting the shoreline for over an hour. A score of W-2 or higher indicates hundreds to thousands of fish involved at the peak of the run and a high likelihood of many clutches of eggs under the sand. Within the study area (Figure 1A) an initial set of 2200 presence and 17,900 pseudo-absence points was then generated for the grunion (supplemental information).

Data on plover roost areas were collected by volunteers and staff organized by the Los Angeles Audubon Society and Santa Monica Bay Audubon Society (Ryan *et al.*, 2014; Ryan *et al.*, 2017), Point Mugu Naval Air Station, and California State Parks. Community scientists for the Western Snowy Plovers survey the entire sandy beach coastline four times a year, and roosts are surveyed monthly. Both grunion and plover data spanned the period 2013–16. Within the study area (Figure 1A), an initial set of 6301 presence and 31,428 pseudo-absence points was then generated for the plovers (supplemental information).

Eight environmental measures were used across the study area (supplemental information): elevation, slope, distance to freshwater, distance to saltwater, nighttime illuminance, land use category adjacent to the beach, beach width, and a measure of the fraction of the sky unobscured by structures or topography along the horizon known as the sky view factor (SVF; Kidd and Chapman, 2012). These environmental measures were used because they describe both the natural landscape, such as elevation and slope, as well as long-term anthropogenic disturbances, such as nighttime illuminance and land use. Of these layers, distance to saltwater and elevation were omitted from species distribution modeling of grunion runs because they were not expected to vary; grunion emerge from saltwater to spawn in the high intertidal zone of sandy beaches. All environmental layers were then rendered at a horizontal resolution of 10 m, as this provided the highest spatial resolution while being manageable with the available computational resources. All data were projected into the State Plane Zone 5 coordinate system (EPSG:6423).

The nighttime illuminance layer was derived from modelling the illuminance across the entire hemisphere of the night sky, known as scalar illuminance (SI), as a function of zenith sky

Table 1. Evaluation metrics for three SDMs. Comparison of evaluation metrics for three SDMs of the likelihood of observing plover roosts or significant grunion runs. Values recorded as the mean value (standard deviation on the mean value) and the possible range of values is indicated, with higher values indicating better model performance.

Organism	Model	AUC 0–1	Pearson Correlation –1–1	Cohen's Kappa <0–1	Yule's Q –1–1	TSS <0–1
Grunion	GLM	0.78 (0.04)	0.18 (0.02)	0.27 (0.06)	0.73 (0.09)	0.27 (0.04)
	Maxent	0.90 (0.03)	0.46 (0.04)	0.46 (0.07)	0.91 (0.03)	0.39 (0.03)
	RF	0.92 (0.03)	0.55 (0.07)	0.55 (0.07)	0.93 (0.03)	0.47 (0.04)
Plover	GLM	0.69 (0.06)	0.14 (0.04)	0.26 (0.08)	0.56 (0.13)	0.18 (0.06)
	Maxent	0.93 (0.02)	0.54 (0.05)	0.62 (0.08)	0.95 (0.02)	0.43 (0.02)
	RF	0.95 (0.03)	0.73 (0.06)	0.73 (0.08)	0.96 (0.02)	0.46 (0.03)

brightness from the World Atlas of Artificial Night Sky Brightness (WAANSB; Falchi *et al.*, 2016) and the SVF. This map layer describes the expected illuminance of the full night sky given the predicted brightness of its zenith as modelled by the WAANSB. This model of nighttime sky SI was parameterized using photographs taken at 515 locations under new moon conditions and stratified within categories of satellite-measured upward nighttime radiance within the study area, with SI measured using Sky Quality Camera (Euromix Ltd., Ljubljana, Slovenia; Simons, Yin, and Longcore, 2020). The photos used to build this model were taken under various levels of cloud cover over multiple seasons, but it was found that neither the sampling date nor the percentage of the night sky covered with clouds made significant contribution to it (Simons, Yin, and Longcore, 2020). A log-10 transformed SI (mlx), designated as log(SI), was then used for each 10-m cell for ALAN exposure.

To provide a comparison with the influence of exposure to ALAN and other measures of anthropogenic disturbance, each beach polygon was assigned a categorical attribute based one of six categories of landscape: (1) flat, undeveloped landscapes containing no buildings within 100 m of the shoreline; (2) flat, developed landscapes containing buildings within 100 m inland of the coastline; (3) elevated, undeveloped landscapes where land rises to more than 10 m of elevation within 100 m inland of the coastline; (4) elevated, developed landscapes where land rises to more than 10 m of elevation within 100 m inland of the coastline and contains buildings within 100 m of the shoreline; (5) beaches backed by water where open water bodies are within 100 m inland of the coastline; and (6) beaches backed by

Table 2. Relative importance of variables in random forest SDMs. The mean and standard deviation of the relative importance, as measured by the mean decrease in their Gini indices, of variables in explaining the likelihood of observing significant grunion runs or plover roosts using a random forest model. Values recorded as the mean value (standard deviation on the mean value), with higher values indicating greater importance of the variable to the model.

Variable	Relative Importance (Grunion)	Relative Importance (Plover)
Elevation	NA	10.44 (0.89)
Distance to freshwater	12.66 (2.02)	16.13 (1.55)
Log(SI)	16.42 (3.70)	14.76 (1.41)
Distance to saltwater	NA	9.56 (1.12)
Slope	10.66 (1.11)	7.34 (0.52)
Beach category	3.28 (0.35)	4.65 (0.71)
Beach width	15.35 (2.82)	10.51 (1.37)
SVF	13.01 (2.16)	10.55 (1.30)

water that is developed into a marina or port. These beach polygons were then rasterized.

To develop the species distribution models, 100 presence and 1000 pseudo-absence points were randomly sampled from the initial set of points, for both grunions and plovers, across the study area, and the environmental data associated with these points were extracted (supplemental information). Then the following species distribution models were run in order to identify influential environmental factors: general linear models (GLM) with logistic regressions between environmental variables and species presence, MaxEnt, and random forest (RF; Liaw and Wiener, 2002). Each model was run 100 times using training and testing sets split with fivefold partitioning with the *kfold* function within the R package *dismo* (Hijmans *et al.*, 2017). The mean and standard deviation of a set of evaluation metrics were then calculated (supplemental information), with models based on RF outperforming either those using MaxEnt or a GLM (Table 1). The means, standard deviations, and the relative importance values of environmental variables in the random forest models were then calculated (Table 2). The relative importance values of environmental variables within each model were then calculated and visualized as heat maps of these 100 partial dependence plots (supplemental information).

## RESULTS

Building on previous analysis (Simons, Yin, and Longcore, 2020), a regional-scale ALAN exposure layer was developed to estimate hemispherical light exposure (measured in mlx) as a function of the WAANSB and the proportion of the horizon visible (Figure 1A). With this and other environmental layers, species distribution models that used random forest classifiers generally outperformed either generalized linear models or Maxent models (Table 1). The area under curve for RF models exceeded 0.9 for both species, which is considered to be an excellent fit.

Focusing on the output of RF models, the nighttime exposure to ALAN was found to be the environmental variable with the greatest relative importance in explaining the likelihood of detecting grunion runs and, of second-most importance, in detecting plover roosts (Table 2). The RF models also indicated an increase in the likelihood of both species being present in association with an increase in beach width (Figures 2 and 3). The likelihood of grunion runs peaked near 100 mlx, equivalent to the illumination from a full moon (Kyba, Mohar, and Posch, 2017), and declined at

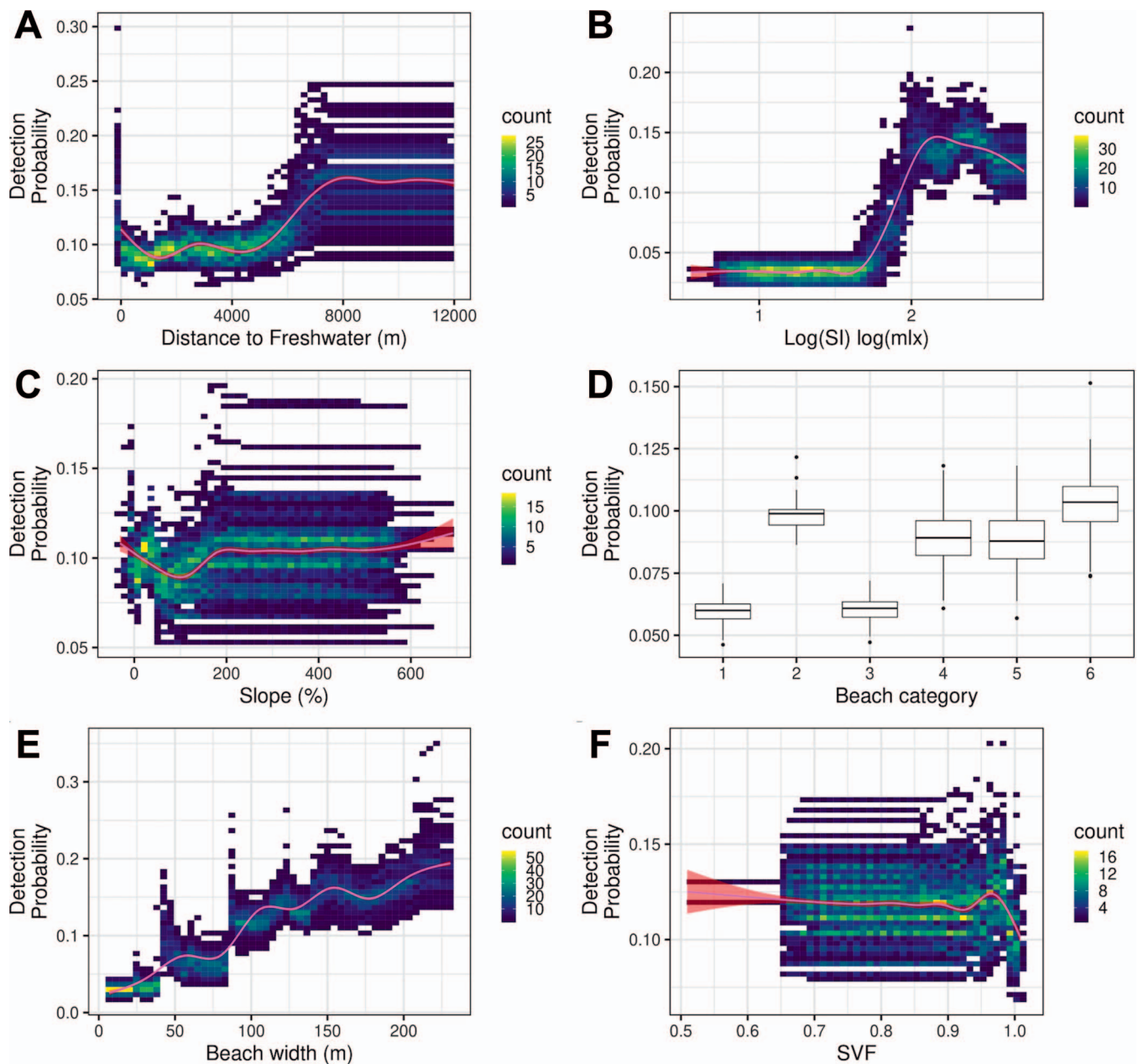


Figure 2. Partial dependence plots for grunion runs for environmental variables. Density of 100 partial dependence plots for random forest models of the likelihood of significant grunion runs for distance to freshwater (m), log-transformed scalar (hemispherical) illuminance ( $\log[\text{SI}]$ ; mlx), slope (%), beach category (1: flat, undeveloped land, 2: flat, developed land, 3: elevated, undeveloped land, 4: elevated, developed land, 5: water, undeveloped, 6: water: developed), beach width (m), and SVF. The pink line represents a nonparametric loess curve with associated 95% confidence interval.

>100 mlx (Figure 2). Consistent with this observed peak, grunion runs were found to be more common in categories of beaches backed by illuminated bodies of water rather than those backed by undeveloped areas.

For plovers, the likelihood of a roosting site declined significantly at illumination greater than 50 mlx, falling to 50% of their peak probability of presence above 100 mlx (Figure 3). Models also indicated increased roost prevalence near freshwater and with wider beaches (Figure 3).

## DISCUSSION

Although it was unsurprising to find that ALAN exposure was a significant factor associated with the location of grunion runs and plover roosts, the importance of this factor was high compared with other environmental factors. The thresholds for impacts for both species (50–100 mlx SI) is similar to natural illumination levels (*e.g.*, from the full moon with a clear sky; 100–300 mlx) and contrasted with the higher levels of light



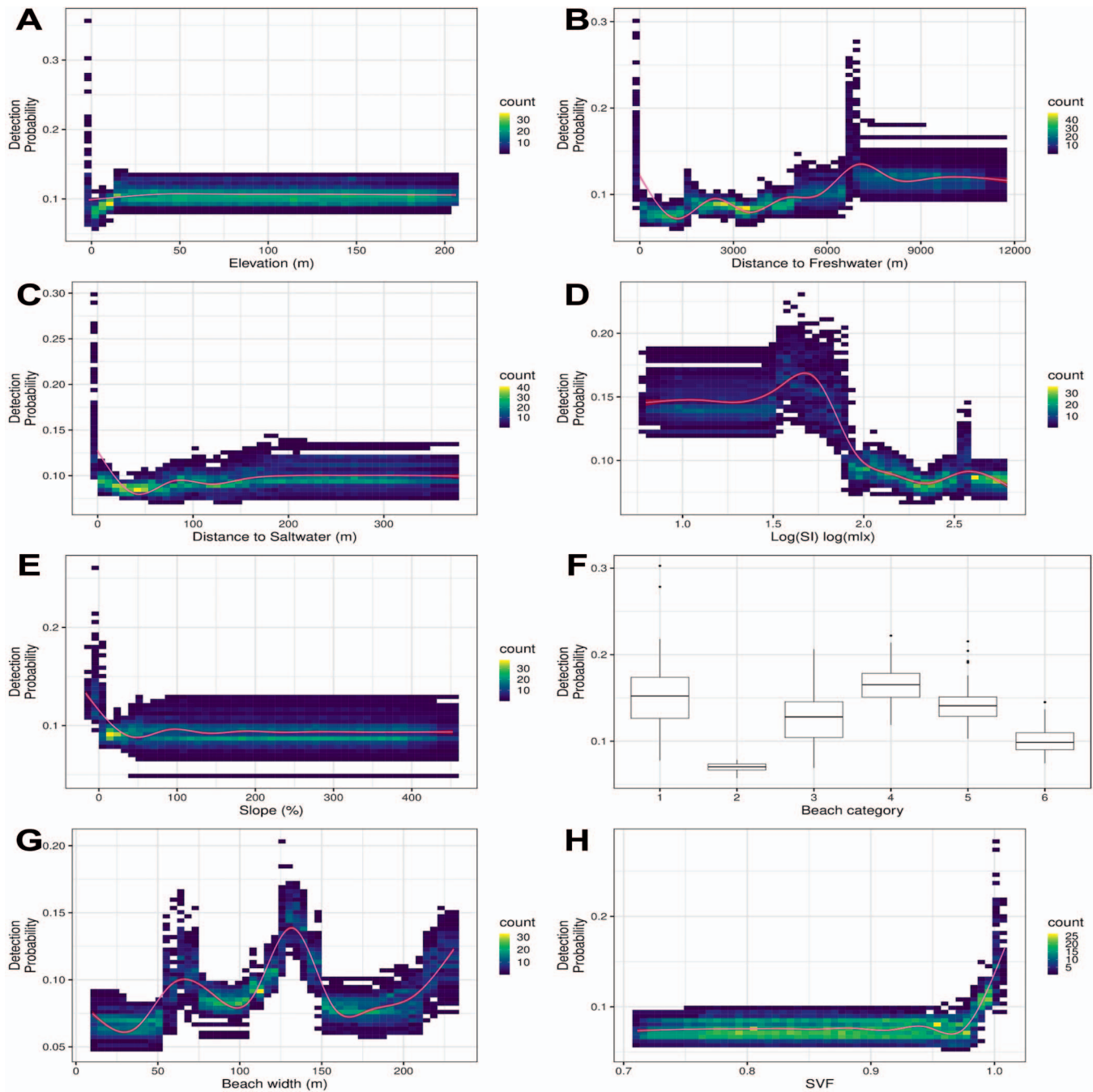


Figure 3. Partial dependence plots for plover roosts. Density of 100 partial dependence plots for random forest models of the likelihood of significant grunion runs for elevation, distance to freshwater (m), distance to saltwater (m), log-transformed scalar (hemispherical) illuminance ( $\log(\text{SI})$ ; mlx), slope (%), beach category (1: flat, undeveloped land, 2: flat, developed land, 3: elevated, undeveloped land, 4: elevated, developed land, 5: water, undeveloped, 6: water: developed), beach width (m), and SVF. Density of 100 partial dependence plots for random forest models of the likelihood of plover roosting. The pink line represents a nonparametric loess curve with associated 95% confidence interval.

found to influence urban-tolerant species in previous studies (6000 mlx; Schirmer *et al.*, 2019).

For each species, model results were consistent with previous research on environmental determinants of habitat use, while adding additional information about ALAN exposure. For

example, models of grunion runs also found the distance to freshwater and beach slope to be important factors, with flat beaches close to freshwater sources more conducive to spawning (Martin *et al.*, 2020). Similarly, the importance of distance to freshwater and beach width in the model of plover

roosting sites is supported by prior observations of plover behavior and associated models of habitat suitability (Brindock and Colwell, 2011; MacDonald, Longcore, and Dark, 2010).

The responses to ALAN that were found for each species are also consistent with their ecology. The decline in grunion run likelihood above 100 mlx of ALAN likely stems from predator avoidance. Although larval grunion are attracted to light (Reynolds, Thomson, and Casterlin, 1977), adults in spawning aggregations avoid lights underwater (KLMM, personal observation). Grunion runs are stronger after new moons than after full moons (see figure 2 in Martin and Raim [2014]), suggesting photophobia or predator avoidance under the brightest conditions. The concentration of plover roosts in darker portions of beaches as a means to avoid disturbance and nocturnal predation is consistent with previous studies of nocturnal foraging (Mouritsen, 1992) and predator avoidance (Santos *et al.*, 2010). One might expect plovers to use brighter locations where approaching predators would be visible, but the data suggest that on an open beach, darkness is a refuge for this species. As with daytime behavior, plovers tend to remain in place when predators approach and rely on their cryptic coloration to evade detection.

This study, however, has limitations. First, the study is correlational. Given the sensitivity of the species involved it is not feasible to experimentally increase lighting levels at the scale needed to draw inferences nor is it feasible within the context of an experiment to decrease lighting levels at scale. Second, light has been described in mlx, a thousandth of a lux, which is a unit that is calculated based on the response of the human eye. This has been done in part as a limitation of the tools available to quantify low-light conditions in a cost-effective manner. Tools are not yet available that measure spectrally resolved irradiance at nighttime intensities, and so reliance has been placed on human-centered mlx as a proxy measure that does not account for the different visual systems of birds and fish, although future research may yield further insights in this regard.

Notwithstanding limitations of current methodological tools, this study presents an advance that is important to conservation. Studies are needed that validate the presumed impacts of ALAN on species distributions in field conditions and that can be connected to quantifiable thresholds to develop policy. This study analyzes a uniquely large study area and demonstrates the importance of controlling light pollution that falls within the range of what has been termed naturalistic light at night (nLAN; Walbeek *et al.*, 2021), comprising light equivalent to that cumulatively produced by the moon, stars, and other natural light (*e.g.*, zodiacal light, airglow). Even nLAN, including light similar to that produced by a half moon under a clear sky, can exceed the threshold beyond which habitat suitability declines for these two sensitive beach-dependent species. This information is essential for beach managers and environmental regulators to control the sources of direct glare that illuminate sensitive coastal habitats, especially during planning and environmental analysis. This knowledge can also be used to encourage nearby cities, including the coastal megalopolis of southern California, to put in place policies that reduce coastal light pollution, starting at the beach and moving inland.

## CONCLUSIONS

The coast of southern California is exposed to levels of ALAN far in excess of natural nighttime conditions, and this exposure is highly variable even on spatial scales on the order of hundreds of meters (Simons, Yin, and Longcore, 2020). As a consequence, and in conjunction with other environmental factors, ALAN is likely contributing to habitat fragmentation for a wide variety of species (Challéat *et al.*, 2021). It has therefore been found that exposure to ALAN to be a significant stressor for these beach-dependent species, challenging the ecosystem integrity of coasts and potentially many other ecosystems, and placing an obligation on conservation planners to integrate quantitative performance thresholds into plans and policies to protect sensitive species in these contexts.

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Salt Lake City Street Lighting Master Plan

# Nocturnal Infrastructure for Ecological Health

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May 2020



*Lights of Salt Lake City wash out the Milky Way viewed from Antelope Island State Park.  
Photograph: Ryan Andreasen.*

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## 1 Introduction

Salt Lake City is located in a region connected to its night sky. The awe and wonder inspired by a view of the Milky Way and sky overflowing with stars attracts visitors to Utah and contributes to the identity of the region for residents. Salt Lake City itself is brightly illuminated, with its cultural and institutional centers, commercial zones, and unique urban design. But just north of the city, Antelope Island State Park has sought and received recognition as a Dark Sky Park by the International Dark-Sky Association, joining eight other Dark Sky Parks, a Dark Sky Community, and a Dark Sky Heritage Place in Utah (Figure 1). The future of Antelope Island's long-term status as a Dark Sky Park depends on the decisions of the cities along the Wasatch Front in protecting the night sky (see cover).

Cities set the tone for night lighting in a region. They are the most brightly lit, and their size influences the markets, practices, and professionals in a region. Commercial zones of cities and towns tend to contribute the most light escaping upward (and therefore wasted), along with lighted sports fields when they are illuminated (Luginbuhl et al. 2009). Historically, street lights contributed a significant and constant amount to both useful and wasted light through the night, while residential lights and lighting from vehicles declines substantially through course of the night (Bará et al. 2017). Within residential zones, most of the light is from the

streetlighting system, especially later in the evening when traffic rates are low and ornamental lighting is switched off (Bará et al. 2017). Decisions made at municipal level about its street lighting system therefore have a large contribution to the overall amount of useful and wasted light in a city. Because perception of lighting is based on contrasts (the same light appears dim next to a brighter source and bright next to a dimmer source), the decisions made in terms of municipal street lighting systems have ramifications to the nocturnal environment that extend beyond the system itself. As a metropolitan area, compared with the 125 largest metropolitan areas in the United States, Salt Lake City is well above average in terms of the average amount of light escaping upward that can be measured by satellites (Figure 2). It does not waste as much light as other larger cities with their greater areas, but on a per area basis it contributes more to regional light pollution than the average city, although not so much as New Orleans, which is a similar size.

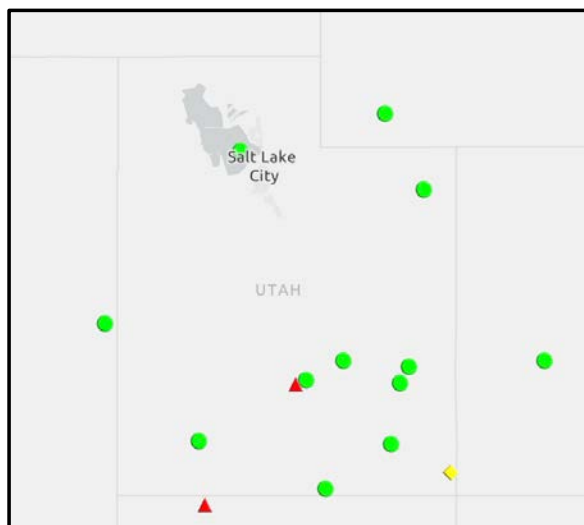


Figure 1. Distribution of recognized dark sky places in and near Utah. Circles are Dark Sky Parks, triangles are Dark Sky Communities, and diamonds are Dark Sky Heritage Sites. Source: List of Dark Sky Places maintained by Dark Skies Advisory Group, IUCN.

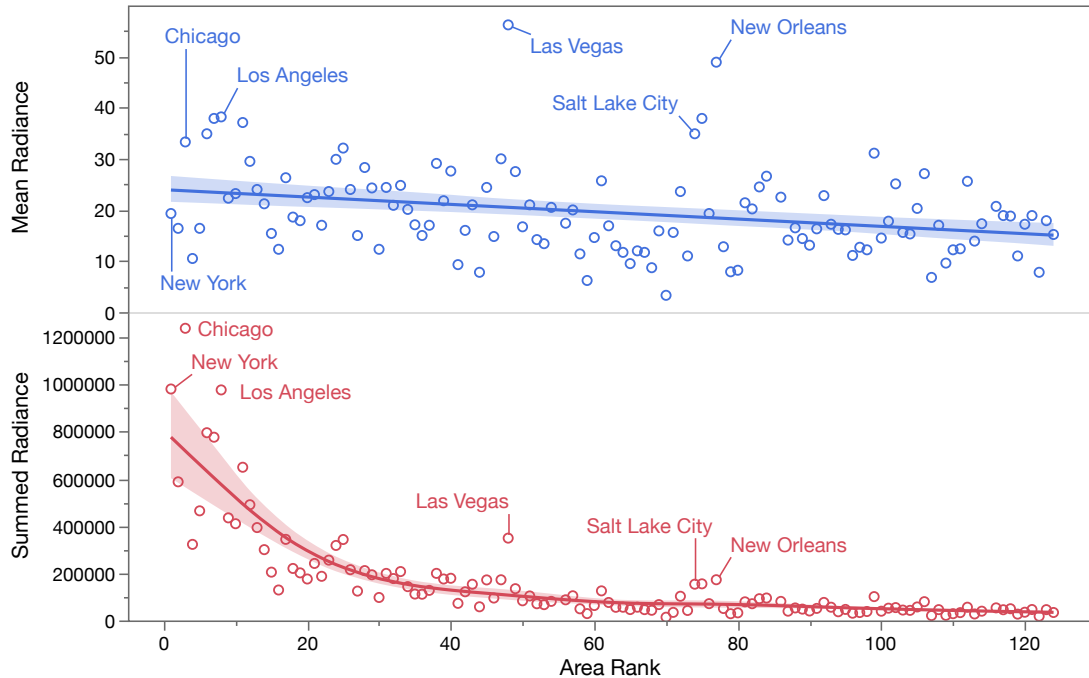


Figure 2. Light escaping upwards from Salt Lake City 2012–2017 within the 125 largest metropolitan regions in the United States. Top: radiance normalized for area. Bottom: total radiance from entire city extent. Data from VIIRS DNB as analyzed by Horton et al. (2019).

Large-scale transformations of municipal street lighting systems have occurred over the past decade as older lighting technologies have been replaced by light emitting diode (LED) systems. Because of the history of the technology, where the early high-efficiency LEDs had a high content of blue light, residents of many jurisdictions objected to the new lights. The bluish-white light of LEDs in those installations was perceived as brighter because of the visual sensitivity of the human eye to the greater proportion of shorter (blue) wavelengths in the light produced. In addition, when lights are more efficient and less expensive to operate, there is a tendency to use more light (Kyba et al. 2014). Not only does the color of light affect how humans perceive the lights; the color of lights is recognized as influencing the contributions lights have to light pollution (Aubé et al. 2013, Kinzey et al. 2017), wildlife (Longcore et al. 2015b, Donners et al. 2018, Longcore 2018), and human health (Garcia-Saenz et al. 2018).

Researchers and engaged lighting designers are developing techniques to minimize undesirable effects of outdoor lighting on both astronomical and ecological light pollution. These include guidance for protected lands (Longcore and Rich 2017), recommendations for specific groups of species (Voigt et al. 2018), and recommendations balancing human vision and wildlife impacts (Longcore et al. 2018a). As Salt Lake City prepares a new Street Lighting Master Plan, this research can be synthesized and applied to inform decisions about the design of the future street lighting system that is consistent with the values embodied in the plan.

This report provides guidance for minimizing the adverse impacts of unnecessary light at night on species, habitats, and ecosystems in the development of a Street Lighting Master Plan for Salt Lake City. The organization of the report is as follows. In the next chapter, the potential impacts of street lighting on wildlife in Salt Lake City are reviewed, based on the published scientific research. The following chapter explores the role of spectrum in determining the level of impact on dark skies, circadian rhythms, and wildlife. Then, this information is synthesized in a chapter outlining spatially explicit design strategies to reduce adverse impacts of street lighting on sensitive biological resources within the context of the further development of Salt Lake City's municipal lighting system. With these strategies, Salt Lake City can build a nocturnal infrastructure that supports ecological health by providing high-quality lighting for human safety and well-being while protecting the night sky and nighttime environment within the city and across the region, setting an example for others to follow.



## 2 Potential Impacts of Streetlights on Wildlife in Salt Lake City

Street lighting has a large spatial footprint within the area of a city. For a medium-sized city like Salt Lake City, street lighting is provided throughout its residential, commercial, and industrial districts to different extents. In this chapter, the potential effects of this system on wildlife are considered, which requires assessment of the geographic extent of the city.

To describe the environment potentially affected by lighting in Salt Lake City, the physical geography and habitats of the city were described and lists of sensitive species were compiled. Together, these natural features and species distributions can provide the background to devise spatially explicit schemes to minimize potentially adverse effects.

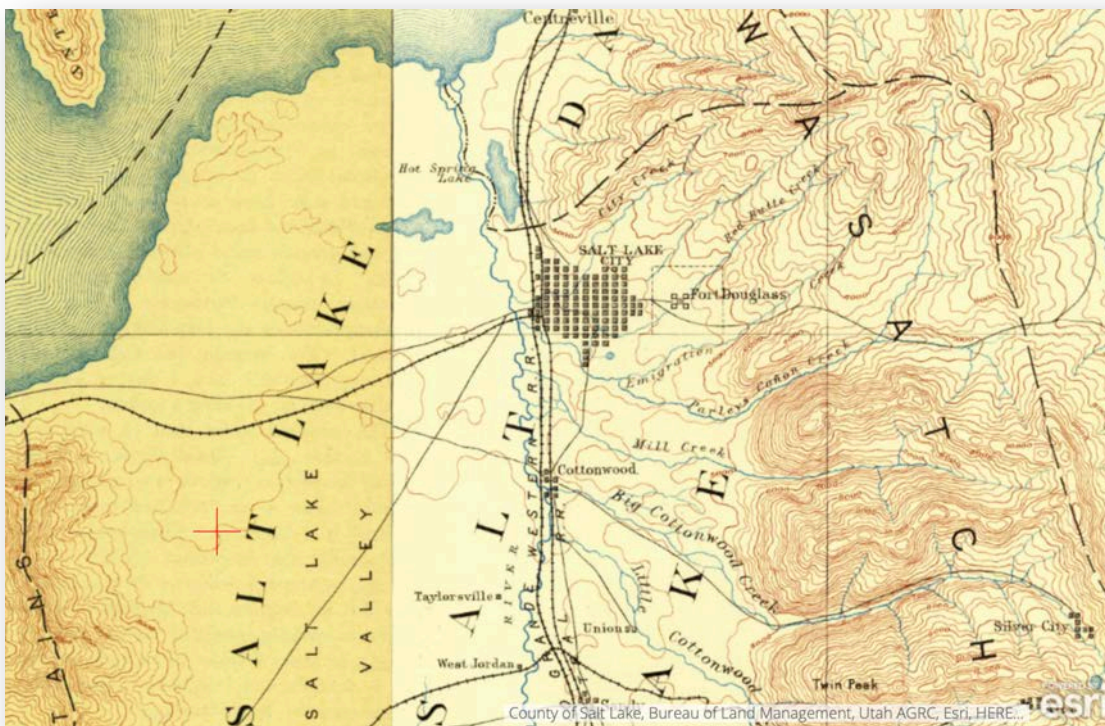


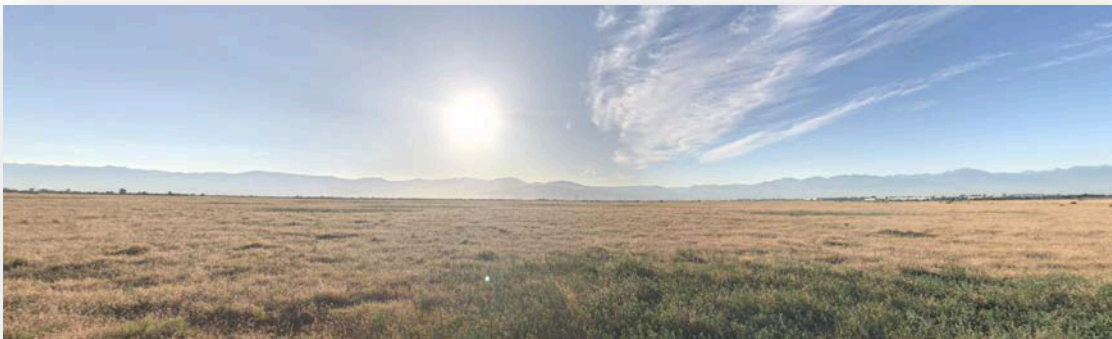
Figure 3. Location of Salt Lake City within the physical geography of the region (USGS topographic maps, 1885, from <http://historicalmaps.arcgis.com/usgs/>).

### 2.1 Physical Geography

Salt Lake City is located on lacustrine terraces between the Wasatch Mountains and the Great Salt Lake. It grew up as a central location for travel, commerce, and mining, supported by a swath of irrigated lands extending north-south along the Wasatch Mountains. Although other regional cities were established first (e.g., Ogden), Salt Lake City arose as the most significant city through a confluence of its irrigation resources and its importance as a religious center.

The growth of Salt Lake City depended in part on the array of some 35 streams that flowed downward from the Wasatch Mountains to the rich soils of the terraces above the Great Salt Lake (Harris 1941). These streams were not deeply incised and therefore they could be diverted for irrigation, compared with the rivers of the region, which although larger, are incised into canyons and consequently could not be used easily by irrigation by the white settlers in the 1840s. The climate is mild, with a long growing season extended by proximity to the Great Salt Lake. Snow accumulation in the mountains and a long melt season made agriculture attractive and productive within the region. The creeks flowing out of the Wasatch Mountains, City Creek, Red Butte Creek, Emigration Creek, Parley's Cañon Creek (now Parley's Creek), Big Cottonwood Creek, in turn flowed into the Jordan River, which flowed northward to debouche through a small distributary delta into the Great Salt Lake (Figure 3). The Jordan River has a winding, low-gradient pathway that remains to this day, dividing the territory of the city into eastern and western halves. The eastern half is characterized by the rising terraces climbing up toward the mountains with the remaining extents of the westward-flowing creeks, while the western portion of the city is an almost entirely flat open plain extending toward the shore of the Great Salt Lake (Figure 3).

These features of the physical geography of Salt Lake City are a useful organizing framework to discuss zones that remain important to the ecology and sensitive species of the City today: 1) the Salt Lake shorelands, 2) the Jordan River, 3) the urban creeks, and 4) the Wasatch Mountains.



*Figure 4. Example of the open landscape of the Great Salt Lake shorelands. Photo from Google Local Guide Neil Martin, looking due east toward Salt Lake City.*

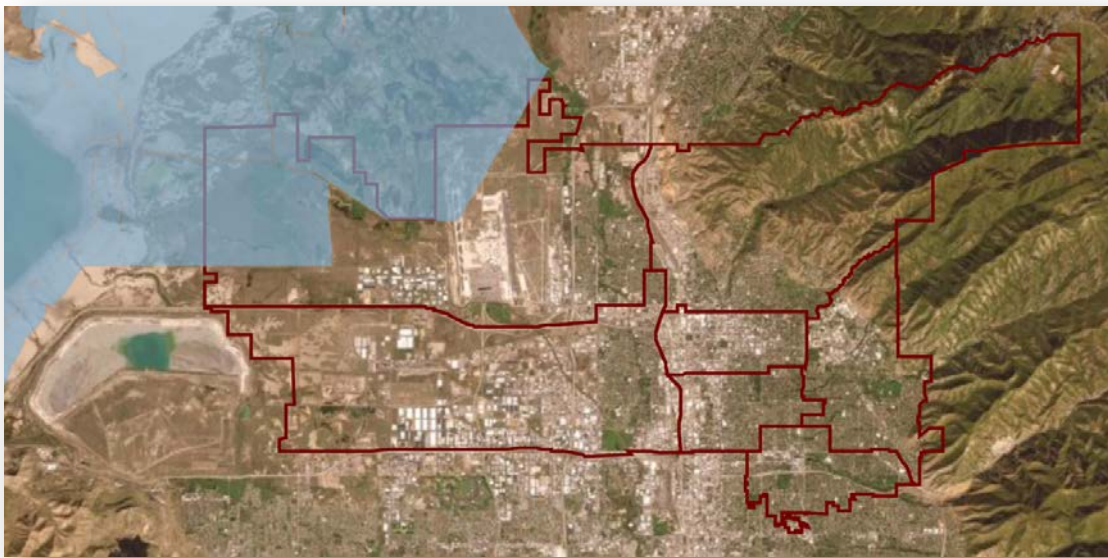
### **2.1.1 Great Salt Lake Shorelands**

The shorelands surrounding the Great Salt Lake extend far into the City limits of Salt Lake City. The airport and western commercial and industrial areas extend into this zone. These flat, open areas are made up of deep lacustrine sediments of clay and loam (Flowers 1934). Although the vegetation changes by zones extending away from the lake, the plains and ponds within them tend to be saline, which leads to a flora free from trees and dominated by low succulent herbs and low shrubs, such as pickleweed, salt bush, salt grass, and seepweed (Flowers 1934). Open habitats such as these (Figure 4) are vulnerable to disruption by light pollution because light encounters no barriers and even a single unshielded streetlight can be seen from a great distance

(De Molenaar et al. 2006, Longcore and Rich 2017). Birds in landscapes like this can be influenced by the direct glare from streetlights and will locate nests farther from lights when such sites are available (De Molenaar et al. 2006).

These shoreland ecosystems are extremely important to shorebirds for foraging and breeding. The brine shrimp and salt flies that feed on algae in and around the lake provide food and the undisturbed open areas are used by Snowy Plovers, American Avocets, Black-necked Stilts, Long-billed Curlew, and dozens of other shorebird and waterbird species (Jones 2008). A portion of this area with Salt Lake City has been established and managed as the [Inland Sea Shorebird Reserve](#) by Rio Tinto/Kennecott as mitigation for impacts from its nearby mining operations. They took advantage of existing shallow depressions with soils high in clay that naturally held water and managed the drainage system to extend inundation times and provide high-quality bird habitat. The 3,670-acre reserve provides habitat for around 120,000 birds annually.

The Great Salt Lake as a whole has been recognized as a site of “hemispheric importance” within the Western Hemisphere Shorebird Network (Andres et al. 20016). Nearly all the western shorelands with Salt Lake City have been designated as Very Important Bird Areas (IBAs) by Birdlife International. They are the Gilbert Bay/South Arm IBA and the Farmington Bay IBA, which each extend into and cover the undeveloped reaches of the shorelands. These IBAs are of global importance (the highest possible ranking).



*Figure 5. Extent of globally significant Important Bird Areas (blue) in Salt Lake City with City Council districts (red) for reference.*



*Figure 6. Example of the vegetation of the Jordan River as it winds through Salt Lake City. Image from Google Local Guide Ross Pincock.*

### **2.1.2 Jordan River**

The Jordan River is a low-gradient, meandering river that flows north to south through Salt Lake City. Considerable development has affected the banks and floodplain, but recent years have brought attention and restoration efforts to enhance the river, its habitats, and its water quality.

The Jordan River supports riparian (streamside) habitats that are used for nesting by neotropical migratory bird such as Bullock’s Oriole, Willow Flycatcher, and Yellow-breasted Chat, all of which nest along the Jordan River and then migrate to Central America for the winter.

The Tracey Aviary conducts surveys and nest monitoring along the Jordan River and birding hotspots along the river include Glendale Golf Course, Jordan River Parkway (200 S to 2100 S), Fife Wetlands Preserve, and Rose Park Golf Course.

### **2.1.3 Urban Creeks**

Salt Lake City has a series of creeks that flow down from the Wasatch Mountains and cut east to west across the city toward the Jordan River (Figure 7). Over time, the lower extents of these creeks have been undergrounded, cutting off the surface flows and diverting them to underground pipes. For example, City Creek, was undergrounded along North Temple Street in 1909 (Love 2005). These creeks have been the focus of daylighting and restoration activities that may



*Figure 7. Footprint of the Jordan River running south to north through the center of Salt Lake City.*

extend into the future (Love 2005). Because of the water flows and support of riparian vegetation, the remaining aboveground creeks remain important habitats for wildlife. They are now surrounded by neighborhoods and receive heavy recreational use and provide valuable access to nature within the urban fabric (Figure 8).



Figure 8. Image of Emigration Creek as it flows through the Wasatch Hollow Open Space. Photo by Google Local Guide Joseph Muhlestein.

#### 2.1.4 Wasatch Mountains

The foothills of the Wasatch Mountains to the west of the Salt Lake City are contiguous with a large block of contiguous open space and wilderness area and therefore are easily recognized as being environmentally sensitive. One of the vulnerabilities of mountainous habitats to light pollution is that their slopes are directly in the light of sight for any light that is emitted upward from nearby sources (Longcore and Rich 2017). Any light from Salt Lake City that is emitted above the horizontal plane and directed toward the east has the potential to degrade the habitats of the Wasatch Mountains.

#### 2.2 Sensitive Species

Important wildlife species of Salt Lake City were reviewed in a 2010 program for the acquisition of natural lands. The program identified and mapped the distribution of critical habitat for wildlife. A list of species for which potential habitat is found in the City was also provided. This map identified all parcels within the city that intersected with areas that had potential habitat for Black Bear, Band-

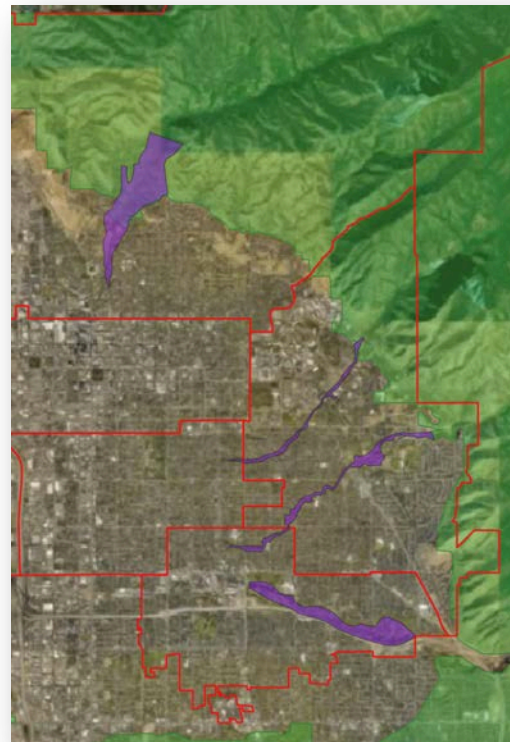
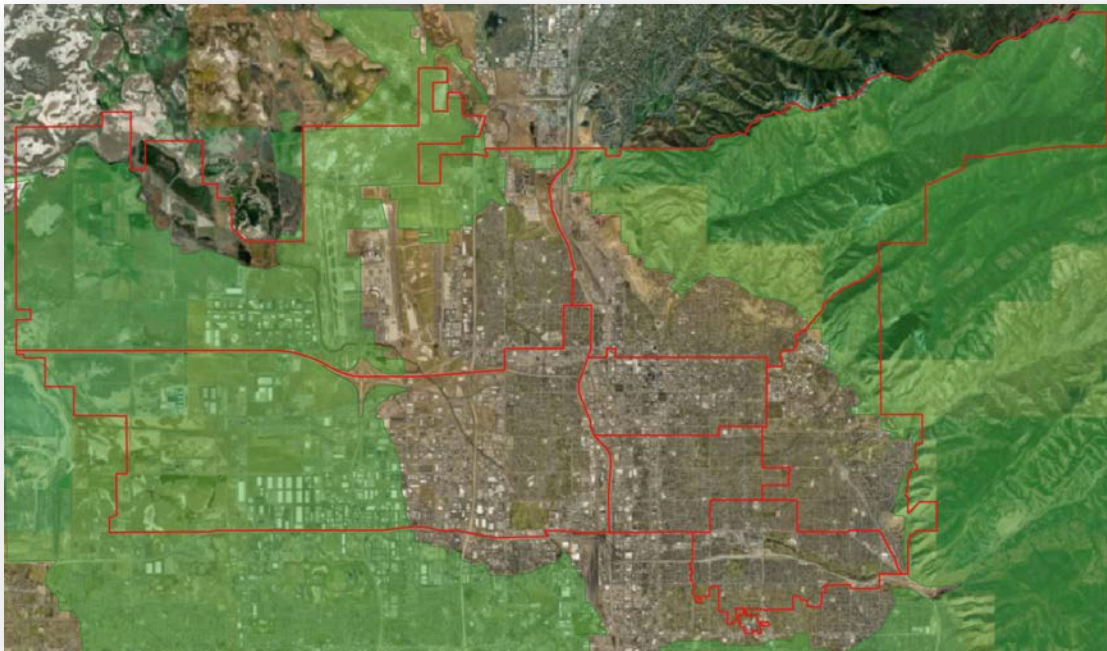


Figure 9. Four urban creeks (purple) extending out of the Wasatch Mountains into Salt Lake City.

tailed Pigeon, Blue Grouse, Chukar Partridge, Moose, Mule Deer, Ring-necked Pheasant, Rocky Mountain Elk, Ruffed Grouse, or Snowshoe Hare. The resulting map forms a ring around the core of Salt Lake City, with critical wildlife habitat extending down the slopes of the Wasatch range to the urban edge on the east and also enveloping the shorelands and extending from the west to and around the north of the airport (Figure 10).

The city also has potential habitat for a range of sensitive plant and wildlife species. These species include birds of the open shorelands (Bobolink, Burrowing Owl, Long-billed Curlew, Northern Goshawk, Short-eared Owl) those associated with the foothills and creeks (Lewis's Woodpecker, Three-toed Woodpecker, Greater Sage Grouse, and some found throughout (e.g., Ferruginous Hawk, Grasshopper Sparrow). Other sensitive wildlife species include the Smooth Greensnake, found in the mountains, spotted bat and Townsend's big-eared bat.



*Figure 10. Distribution of parcels (green) that intersect with critical wildlife habitat, with City Council districts for reference.*

Other wildlife species, although not recognized formally as sensitive, deserve attention in a street lighting plan intended to reduce and avoid impacts. Fireflies are known to be sensitive to light pollution and have popular appeal as wondrous symbols of the dusk and nighttime environment (Lloyd 2006). The Natural History Museum of Utah is collecting firefly sightings from around the state and has reports from both north and south of Salt Lake City and a few records have been reported from within Salt Lake City.

Bats are also significantly influenced by lighting conditions. Mexican free-tailed bats (*Tadarida brasiliensis*) are well-known to residents because they roost at West High School near downtown during migration. Other documented species include hoary bat (*Lasiurus cinereus*; <https://www.inaturalist.org/observations/3742269>). It is likely that more species and locations for bat foraging and roosting would be documented if acoustic surveys were conducted (O’Farrell et al. 1999).

## 2.3 Effects of Lighting on Key Wildlife Groups

Artificial light at night can have a range of lethal and sub-lethal effects on wildlife (Longcore and Rich 2004, Rich and Longcore 2006, Gaston et al. 2012, Gaston et al. 2013, Meyer and Sullivan 2013). Some wildlife species will avoid areas with additional lighting (Beier 1995, 2006, Stone et al. 2009, Stone et al. 2012) or otherwise be adversely impacted (Hölker et al. 2010a, Hölker et al. 2010b, Longcore 2010, Gaston et al. 2013).

The formally recognized sensitive species in Salt Lake City, or at least potentially present, include large and small mammals, migratory and resident birds, bats, one reptile, and at least one plant species. The types of disruption from lighting that could occur for these groups include attraction and disorientation leading to injury or death, disruption of connectivity between habitat patches, interference with predator-prey relations and circadian rhythms that influence foraging decisions, and disruption of pollination.



### 2.3.1 Attraction and Disorientation

Attraction/repulsion and disorientation are possible outcomes of encounters between wildlife and artificial light at night (Longcore and Rich 2004). The most well-known situation is the attraction and disorientation of hatchling sea turtles on ocean beaches, which results in the death of the juvenile turtles that do not reach the ocean (McFarlane 1963). The two most relevant instances of attraction and disorientation for Salt Lake City are the impacts on migratory birds and on insects.

*Migratory Birds.* Research with weather radar over the past five years has dramatically improved understanding of the influence of city lights on migrating birds. Most songbird species migrate at night and they can be detected and mapped on weather radar. A massive trove of radar data has been accumulated over the past 25 years and so researchers can now use those data and powerful new computing approaches to understand the influence of lights on the migratory paths of birds.

Light at night escaping upwards so that it can be measured by a satellite is associated with greater numbers of birds present during the day, especially in the fall when juveniles are migrating south (La Sorte et al. 2017). As the birds are migrating southward they are attracted to the lights of the city and then end up disproportionately using habitats in and around cities as compared with potentially better habitats farther from cities (McLaren et al. 2018). Lights can rapidly increase the density of migratory birds in an area at night. A study of the Tribute in Light installation in New York documented an increase from 500 birds within 0.5 km of the vertical

light beams before they were turned on to 15,700 birds within 0.5 km 15 minutes after illumination (Van Doren et al. 2017).

Attraction at night is only the first hazard. Urban habitats and especially business districts are quite hazardous to these birds because once they are on the ground, they are susceptible to collisions with glass, which they do not perceive as a barrier (Klem 1990, Sheppard and Phillips 2015). The combination of night-time lights followed by daytime glass exposure is a significant threat to songbirds during the already strenuous migratory period (Cabrera-Cruz et al. 2018).

Radar data have been used to track the relative exposure of migratory birds to lights within U.S. metropolitan areas ranked by area. The Salt Lake City–West Valley City urban area ranks 74<sup>th</sup> in area among cities in the continental US by area. When evaluated for the number of migrating birds based on radar tracking (average for 1995–2017) and the intensity to light as measured by the VIIRS DNB satellite (average for 2012–2017), the city ranks 120<sup>th</sup> in exposure for the spring and 112<sup>th</sup> in exposure for the fall (Horton et al. 2019) (Figure 11). Other cities have far more migratory birds flying overhead per unit area. For example, New Orleans has many more birds flying overhead because of its location on the Gulf Coast, where all of the birds heading to the northern forests and back again to Central and South America funnel overhead.

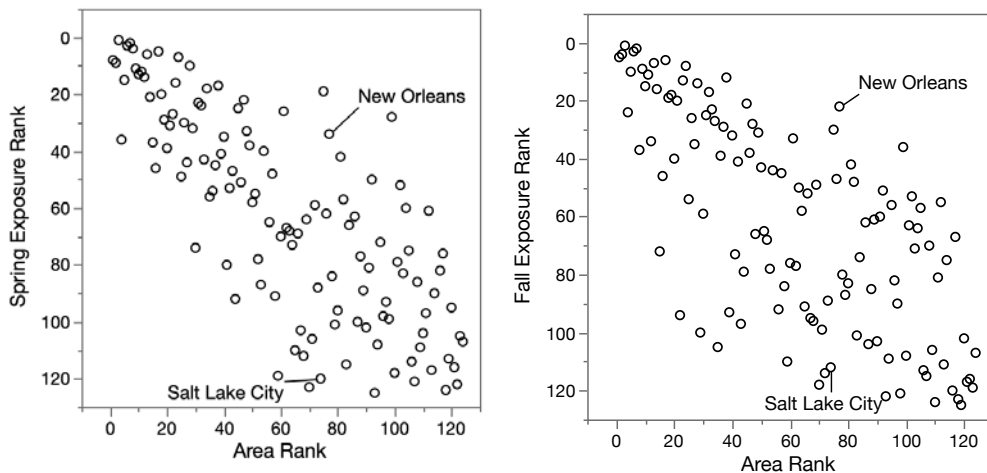


Figure 11. Relative exposure of migrating birds to light in Salt Lake City within the 125 largest metropolitan regions in the United States (Horton et al. 2019). Salt Lake City has relatively fewer migratory bird species overhead during migration than other similarly sized metropolitan regions.

Even though the relative exposure is low compared with other similar-sized cities, birds are attracted to and die at the buildings of Salt Lake City. The city can take a leadership position by reducing the amount of light escaping upward from lighting throughout the city and especially downtown to reduce this unfortunate outcome.

*Insects.* Many families of insects are attracted to lights, including moths, lacewings, beetles, bugs, caddisflies, crane flies, midges, hoverflies, wasps, and bush crickets (Sustek 1999, Kolligs 2000, Eisenbeis 2006, Frank 2006, Longcore et al. 2015a). Any lamp with significant emissions



in the ultraviolet or blue wavelengths is highly attractive to insects (Eisenbeis 2006, Frank 2006, van Langevelde et al. 2011, Barghini and de Medeiros 2012). Insects attracted to lights are subject to increased predation from a variety of predators, including bats, birds, skunks, toads, and spiders (Blake et al. 1994, Frank 2006).

Moths are especially attracted to lights and they play a special role in the ecosystem as pollinators. Moths are killed in collisions with the lights or by becoming trapped in housings (Frank 1988, 2006). Short of death, this attraction removes native insects from their natural environments (Meyer and Sullivan 2013) in what Eisenbeis (2006) calls the “vacuum cleaner effect.” Attraction of insects by light results in significant reduction in pollination (Macgregor et al. 2015, Macgregor et al. 2017) and this effect spills over into daytime insect communities because of the decreased seed set and reproduction of plants (Knop et al. 2017).

*Bats.* The responses of different bat species to lighting are complex (Rydell 2006). Some faster-flying and more maneuverable species will be attracted to lights, where they forage on insects also attracted to the lights. Slower and less maneuverable species will avoid lights, essentially being repulsed by their presence (Stone et al. 2009, Stone et al. 2012, Stone et al. 2015). Light at the entrance of a roost can keep bats from emerging for their nightly foraging (Boldogh et al. 2007).

### 2.3.2 Loss of Connectivity

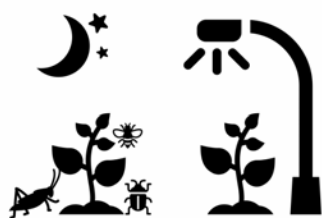
As is implied by the repulsion of some bat species by nighttime lighting, the presence of permanent outdoor lighting can sever landscape connectivity for wildlife species (Stone et al. 2009). The existence of the lights themselves, shielded or not, is sufficient to influence wildlife movement (Beier 1995, 2006). This phenomenon was illustrated by a radio telemetry study of young mountain lions in Orange County, California (Beier 1995):



All travel in corridors and habitat peninsulas occurred at night. During overnight monitoring, the disperser usually avoided artificial lights when in the corridor or peninsula. For example, M12 [a juvenile mountain lion] consistently used dark areas as he rapidly (<4 hr) traveled the grassy ridge (6.0 X 1.5 km) separating San Juan Capistrano from San Clemente (Fig. 1). Also M12 seemed to use light cues when he negotiated the tightest part of the Pechanga Corridor; his consistent movements in the direction of the darkest horizon caused him to miss the only bridged undercrossing of I-15.

Overnight monitoring showed that dispersers especially avoided night-lights in conjunction with open terrain. On M12’s initial encounter with a well-lit sand factory and adjacent sand pits, he took 2 hours and 4 attempts to select a route that skirted the facility, after which he rested on a ridgetop for 2 hours. During 2 nights in the Arroyo Trabuco, M8 explored several small side canyons lacking woody vegetation. He followed each canyon to the ridgetop, where city lights were visible 300–800 m west. He stopped at each canyon ridgetop for 15–60 minutes before returning to the arroyo, without moving >100 m into the grasslands west of the ridgeline in view of the city lights.

Further data on the use of underpasses and the influence of lighting on landscape connectivity have been reported. An experimental evaluation of underpass use by wildlife found that for mule deer, even nearby lights affected movement compared with a reference period (Bliss-Ketchum et al. 2016). Research conclusively shows that artificial night lighting can have an adverse impact on the foraging behavior of bat species, and exclude certain species from foraging routes or areas (Stone et al. 2009, Polak et al. 2011).



### 2.3.3 Foraging

Small mammals respond to illumination in their foraging activities. For example, artificial light of 0.3 and 0.1 lux reduced the activity, movement, or food consumption of a cross-section of rodent species (Clarke 1983, Brillhart and Kaufman 1991, Vasquez 1994, Falkenberg and Clarke 1998, Kramer and Birney 2001). This phenomenon also has been shown in natural (in addition to laboratory) conditions (Kotler 1984a, Bliss-Ketchum et al. 2016, Wang and Shier 2017, Wang and Shier 2018).

The driving force behind patterns of activity and foraging by animals influenced by artificial lights is presumably predation. Additional (artificial) light might increase success of visually foraging predators, thereby increasing risk to their prey, with one critical exception: prey species with a communal predator defence, such as schooling or flocking, have decreased risk of predation with additional light. Evidence for this general pattern continues to accrue. Partridge are documented to roost closer to each other on darker nights and can see predators farther away on lighter nights (Tillmann 2009). Some species of bats avoid artificial lights to reduce predation risk (Stone et al. 2009, Polak et al. 2011). A general review of nocturnal foraging suggests that night is a refuge with decreased overall predation on birds and mammals, and that foraging groups are larger at night, especially for clades that are not strictly nocturnal (Beauchamp 2007). Songbirds that were experimentally relocated moved back to their home ranges at night, a result that is most consistent with predator avoidance (Mukhin et al. 2009). Pollination is determined by foraging activities and the distribution of insect foragers, which in turn are susceptible to attraction, disorientation, and other behavioral disruptions from artificial lights (Knop et al. 2017).

Predator-prey systems are tightly tied into lunar cycles, with many relationships affected by lunar phase (Williams 1936, Sutherland and Predavec 1999, Topping et al. 1999, Riou and Hamer 2008, Upham and Hafner 2013). Even within species, variation in color interacts with lunar cycle to affect foraging success. White-morph Barn Owls have an advantage foraging during the full moon because the light reflecting off their white feathers triggers their rodent prey to freeze in place, while Barn Owls with darker colored feathers do not have this advantage (San-Jose et al. 2019). Light pollution can be expected to interfere with such patterns (San-Jose et al. 2019).

Predator-prey relations probably also drive the influence of artificial lighting on bird nest location. The one experimental study of the effect of streetlights on breeding bird density shows a negative impact (De Molenaar et al. 2006). The streetlights in De Molenaar et al.'s study created a maximum illumination of 20 lux (1.8 footcandles). The adverse effects of these lights (decreased density of Black-tailed Godwit nests) were experienced up to 300 m (984 ft) from

these lights, extending into areas with negligible increased illumination, which means that the adverse impact results from the light being visible, rather than the amount of light incident on the sensitive receptor.

### 2.3.4 Interference with Visual Communication

Artificial light at night affects species such as fireflies that communicate visually at night with light. Although the distribution of fireflies is limited within the city, their recovery could be a laudable urban conservation goal. Artificial light washes out the signals that fireflies use for communication and is potentially contributing to the decline of fireflies and other organisms that rely on bioluminescent communication (Lloyd 2006, Hagen and Viviani 2009, Viviani et al. 2010, Bird and Parker 2014). A Brazilian study documented lower species richness of fireflies in areas of 0.2 lux and greater (even from sodium vapour lamps, which are otherwise considered to be more wildlife friendly), except for those few species that naturally fly at greater illumination (Hagen and Viviani 2009).

### 2.3.5 Physiological Responses

*Birds.* The research on the effects of ambient and artificial lighting on bird reproduction goes back to the 1920s (Rawson 1923, Rowan 1938). Birds can be extremely sensitive to illumination, and extension of foraging by species under artificial lights is documented in the literature (Goertz et al. 1980, Sick and Teixeira 1981, Frey 1993, Rohweder and Baverstock 1996). Research shows an earlier start to seasonal breeding of birds in urban (lighted) environments than rural (dark) environments (Havlin 1964, Lack 1965). Many of the physiological impacts of lighting on birds are reviewed by De Molenaar et al. (2006) and Longcore (2010).



- Dawn song in American Robins (*Turdus migratorius*) is influenced by ambient illumination (Miller 2006);
- Dawn song and lay date in a songbird have been shown to be associated with proximity to streetlights, with evidence that this affected mate choice, which has implications for fitness (Kempnaers et al. 2010);
- Light of 0.3 lux can move reproductive seasonality of songbirds by a month and cause irregular molt progression (Dominoni et al. 2013a, Dominoni et al. 2013b);
- Light is a major driver of the daily activity patterns of songbirds (study animal European Blackbird; *Turdus merula*), causing them to be active earlier in the morning (Dominoni et al. 2014);
- A songbird (Tree Sparrow; *Passer montanus*) exposed to 6 lux in the laboratory secreted luteinizing hormone earlier than controls, and urban birds exposed to 3–5 lux exhibited this pattern in the field; both of these response were statistically associated with night lighting (Zhang et al. 2014);
- Artificial light outside of nest boxes affects perceived photoperiod of Great Tits (*Parus major*), which the authors interpret as creating an ecological trap (Titulaer et al. 2012);
- Artificial light rather than traffic noise affects dawn and dusk song timing in common European songbirds (Da Silva et al. 2014).

Artificial night lighting affects diurnal species substantially as well. As noted above, it affects timing of dawn and dusk song, seasonality of reproduction, mate choices, and can extend activities of diurnal species into the night (Stracey et al. 2014). Birds that sing earliest are responding to increases in illumination so faint that they are undetectable by humans (Thomas et al. 2002). This is true for impacts across species, where diurnal species are affected in numerous ways by an altered nighttime environment (Miller 2006, Kempnaers et al. 2010, Titulaer et al. 2012, Dominoni et al. 2013a, Dominoni et al. 2013b, Da Silva et al. 2014, Dominoni et al. 2014, Zhang et al. 2014, Da Silva et al. 2015).

*Mammals.* Similar impacts on both seasonality and daily rhythms are documented for mammals. For example, lighting from a military base was shown to desynchronize the breeding time of tamar wallabies in the field in Australia, as well as to suppress nightly melatonin production (Robert et al. 2015). Studies on the physiological effects of light at night on mammals are abundant, partly because of the implications for understanding human health (e.g., Zubidat et al. 2007, Zubidat et al. 2010). As a whole, they show that artificial light at levels far less intense than previously assumed are able to entrain circadian rhythms and influence physiological functions such as immune response (Bedrosian et al. 2011). For example, extremely dim light is sufficient to entrain rhythms in mice, and can be done without phase shifting or reducing production of melatonin (other physiological indicators of light influence) (Butler and Silver 2011). For shorter wavelengths (blue and green) entrainment takes place at  $10^{-3}$  lux. Much greater intensity, 0.4 lux, is needed for red light to entrain rhythms (Butler and Silver 2011). This research is consistent with recently documented differences in mice behaviour for exposure to 20 lux vs. 1 lux at night (Shuboni and Yan 2010). Mice that were exposed to dim (5 lux) light at night consumed the same amount of food as those under dark controls, but gained weight as a result of the shift in time of consumption (Fonken et al. 2010).

*Plants.* Plants “anticipate” the dawn with a synchronized circadian clock and increase immune defence at the time of day when infection is most likely (Wang et al. 2011). The timing of resistance (R)-gene mediated defences in *Arabidopsis* to downy mildew is tied to the circadian system such that defences are greatest before dawn, when the mildew normally disperses its spores (Wang et al. 2011). Preliminary experiments show that carbon assimilation is lower in trees exposed to continuous night lighting, compared with controls in a “stereotypical urban setting” (Skaf et al. 2010). Some plants might use light-triggered circadian rhythms to synchronize expression of anti-herbivory compounds with periods of peak herbivory, leading to increased loss from herbivory in out-of-phase plants (Goodspeed et al. 2012). The importance of circadian rhythms in plants, for everything from disease response and flowering time to seed germination, and the potential for disruption by night lighting, has not been explored widely (Resco et al. 2009, Bennie et al. 2016).

Light at night also affects the perception of seasonal change by plants and their associated physiological responses. Exposure to light at night is associated with earlier budburst in plants in the United Kingdom, in a pattern that cannot be explained by the greater temperatures in cities (French-Constant et al. 2016). Trees exposed to nearby lights have long been observed to hold on to their leaves later in the fall (Briggs 2006, Škvareninová et al. 2017, Massetti 2018) and prevent seed set in plants cued to shorter daylengths (Palmer et al. 2017).

### 3 Consideration of Spectrum in Municipal Street Lighting Systems

The LED revolution in outdoor lighting has created new possibilities to select the spectral composition of lights. Unlike lighting technology of the past, such as high-pressure sodium or metal halide lamps, the range of colors that can be deployed using LEDs is wide. As a result, it is possible to select spectral profiles that can either reduce or increase the effects of a street lighting system on the visibility of stars in the night sky, on human circadian rhythms, and on wildlife (Longcore 2018).

#### 3.1 *Effects on Wildlife*

This review of the effects of lighting spectrum on wildlife is drawn from my recent article (Longcore 2018), which can be consulted for additional details.

The effects of lights of different spectral composition on wildlife depends on the responses of different wildlife groups to those lights. A limited number of “response curves” are available that track the response for a species or group of species to light throughout the entire visible spectrum (and into the portion of the spectrum invisible to humans). These curves have been developed for insects in general, bees, moths, juvenile salmon, seabirds, and sea turtles. My colleagues and I have developed methods to compare different lamp types for their effects across these groups (Longcore et al. 2018a).

Some patterns are clear. Insect attraction to LEDs is lower across the board when compared with lamps that emit ultraviolet light. Both “warm” and “cold” LEDs have been compared with metal halide and mercury vapor lamps and found to attract less than a tenth of the number of insects, a finding that is attributable to the difference in ultraviolet emissions (Eisenbeis and Eick 2011). Conversely, most broad-spectrum LEDs used in outdoor lighting do have a potential to adversely impact the perception of daylength (and thus seasonality) in plants, because the peak sensitivity of the phytochromes that detect daylength are in range of LED peak emissions for most full-spectrum LEDs.

Several approaches are available to summarize the quality of light from different sources. One is to use the Correlated Color Temperature (CCT). This metric, although imperfect, is widely used in lighting design. Some jurisdictions that regulating lighting to protect species have a hard cut-off (e.g., no light allowed < 540 nm) or measure the amount of light emitted below certain thresholds. Another possible metric is the degree to which a light interferes with the non-image forming photoreceptors that result in disruption in circadian rhythms in humans, because nearly all vertebrates will have a similar response curve for suppression of melatonin production at night. Drawing on data from Longcore et al. (2018a), the response of different wildlife groups against these possible metrics describing spectrum were plotted (Figure 12). Across all groups, less blue light (shorter wavelengths) resulted in lower effects. As for metrics to describe this pattern, correlation with CCT was strong, but melanopic lux (the brightness of the light as sensed by melanopsin) correlated the best. These results will only hold true for lamps without ultraviolet or violet emissions, however.

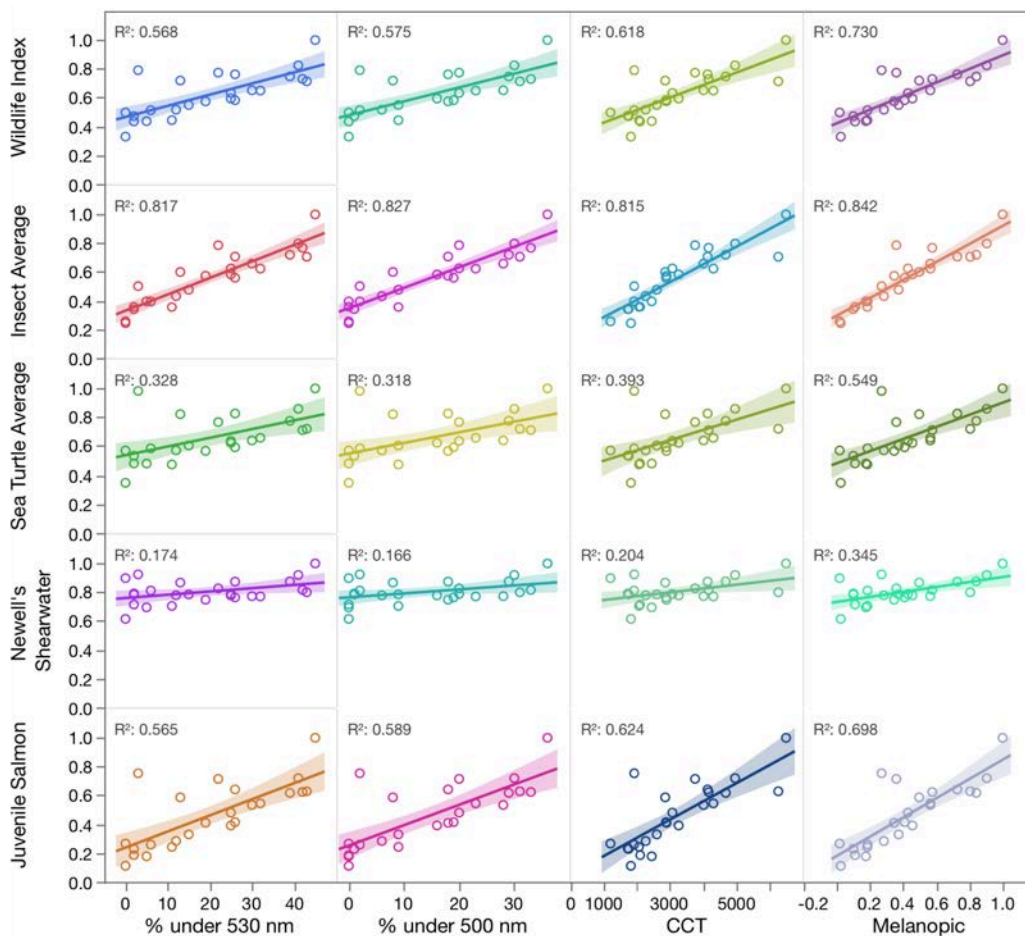


Figure 12: Relationship of modeled effect of lamps on different wildlife species or groups (juvenile salmon, Newell's shearwater, sea turtles, insects, and their average) with percent emissions <530 nm, % emissions < 500 nm, correlated color temperature (CCT), and melanopic power of the lamps. Data from (Longcore et al. 2018b).

CCT is not a perfect predictor of effects on wildlife, but it is a reasonable rule of thumb that lower CCT will be less disruptive to wildlife and we already know that it will be less disruptive for circadian rhythms and astronomical observation (Aubé et al. 2013). The lamps with the lowest projected influence on wildlife overall were low pressure sodium (which is being phased out), high pressure sodium, PC amber LEDs, and filtered LEDs (Figure 13).

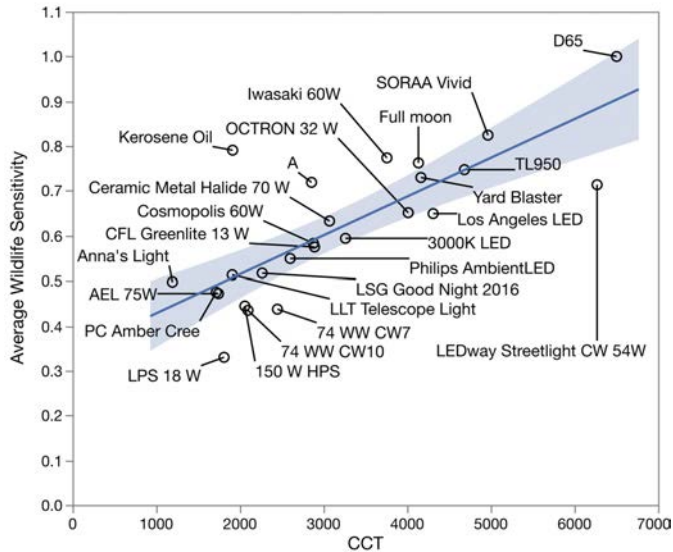


Figure 13: Relationship of correlated color temperature to average wildlife sensitivity with lamps and illuminants labelled. Data from (Longcore et al. 2018b).

These results represent the predicted effects of the lamps on wildlife. To account for preferences in outdoor lighting, another ranking was created that incorporated a penalty for low color rendering index (CRI). Any lamp with a CRI over 75 was assumed to have adequate color rendering, while those with lower CRI were penalized in the overall index. The resulting ranking of lamps is notable in that low pressure sodium ranks lower because of its extremely low CRI, while PC Amber and filtered LEDs rank the highest, balancing both lower wildlife impacts with reasonable if not high CRIs (Figure 14).

As a rule of thumb, CCT can be used as an indicator of wildlife effects, but this may not hold true across all applications. Migrating birds cannot orient under red light and therefore solid red lights are to be avoided on communication towers (Longcore et al. 2008). Green light has support for minimizing attraction of nocturnal migrant birds (Poot et al. 2008). Many other special cases exist and would require consultation with experts on a taxonomic group or species at risk. For the species of concern in Salt Lake City, however, including insects as indicators of riparian health, bats, and nesting birds, lower CCT will decrease ecological impacts when combined with other good street lighting practices (low glare, no uplight, appropriate intensity, and only lighting when warranted).

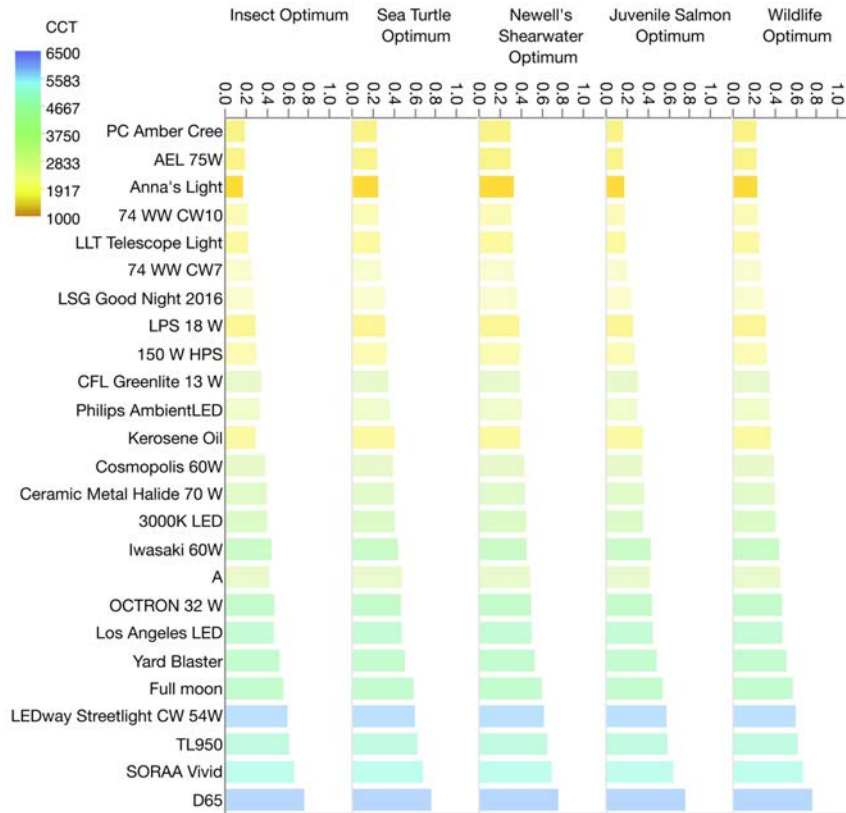


Figure 14: Ranking of lighting sources that equally weights wildlife response, melanopic response, astronomical light pollution (Star Light Index (Aubé et al. 2013)), and Color Rendering Index. Reprinted from (Longcore et al. 2018b). Shorter bars represent a combination of lower wildlife responses and higher CRI.

None of the effects measured with these metrics addresses the scattering of light in the atmosphere, but tools to evaluate the effects of different spectra on astronomical light pollution are available to do that.

### 3.2 Effects on Dark Skies

The introduction and widespread adoption of 4000K and greater LED streetlights poses a significant threat to astronomical observation and the quality of the night sky as a recreational amenity. It is well-established that the preponderance of light at shorter wavelengths found in high color temperature LEDs scatters more in the atmosphere and if replacing high-pressure sodium lamps with similar intensity and shielding, will result in degradation of the night sky (Kinzey et al. 2017). The effects of the adoption of high color temperature LEDs were quickly noticed and documented by night sky advocates, who could see the degree to which full-spectrum white lights adversely impacted the aesthetics of the night sky when compared with lower color temperature high-pressure sodium systems (Figure 15).





*Figure 15. View eastward from Antelope Island State Park, showing visible effect of spectrum on night sky aesthetics. Photo from park's application to become recognized as a Dark Sky Park by the International Dark-Sky Association (2017).*

Although the U.S. Department of Energy originally paid little attention to the adverse environmental impacts of high-color temperature LEDs, focusing instead solely on energy savings, it has recently returned to this question and issued a report (Kinzey et al. 2017) investigating the role of lamp spectrum in degradation of the night sky, measured as sky glow.

Rather than focusing solely on spectrum, the report investigates the influence of associated variables that are commonly adjusted in the process of converting from older lighting technology to LEDs. For example, it is common for older lamps to have a drop lens below the lamp that results in a portion of the light being reflected upward, above the horizontal plane from the lamp. It has also become increasingly common for full-spectrum LEDs (e.g., at CCT 2700–4200 K) to be reduced in measured intensity for daytime (photopic) vision when compared with the high-pressure sodium lamp that the LED is replacing. Such reductions in intensity result from complaints from residents that the new LEDs, although producing the same (photopic) illumination (in lux) as the HPS, are perceived as far brighter because they intersect more with the sensitivity of human dark-adapted (scotopic) vision. It is therefore often possible to reduce the intensity of LEDs (measured in photopic lux) compared with HPS and still achieve equal or greater visibility.

The study modeled the effects of different combinations of spectrum, uplight, and intensity under different weather conditions, human vision adaptation levels, and distance from the lights. For the purpose of illustration, the nearby viewer results are reproduced here (Figure 16). These results compare high-pressure sodium as the baseline, with PC Amber LED (1872 K), and 2700–6100 K LEDs. When compared on an equal basis for other factors (same uplight and intensity), only the PC Amber produced roughly equivalent light pollution compared with HPS and all full-spectrum LEDs produced significantly more light pollution, especially when considering human night vision. When both HPS and LEDs were assumed to have 0% uplight and the LEDs were set at half the intensity of the LEDs, then LEDs with CCT < 3000 K were comparable to or produced less light pollution than HPS. Results were similar with HPS at 2% uplight and LEDs at 0% uplight and 50% intensity.

The take-home message of this research for the Salt Lake City street lighting master plan is that for LED lamps lights to reduce light pollution compared with the previously common HPS lamps, they must be 0% uplight, 50% less bright, and with a CCT of no greater than 3000 K. The minimum impact on light pollution could be achieved with PC Amber or comparable filtered LEDs that produce a similar CCT as HPS (~ 1800 K).

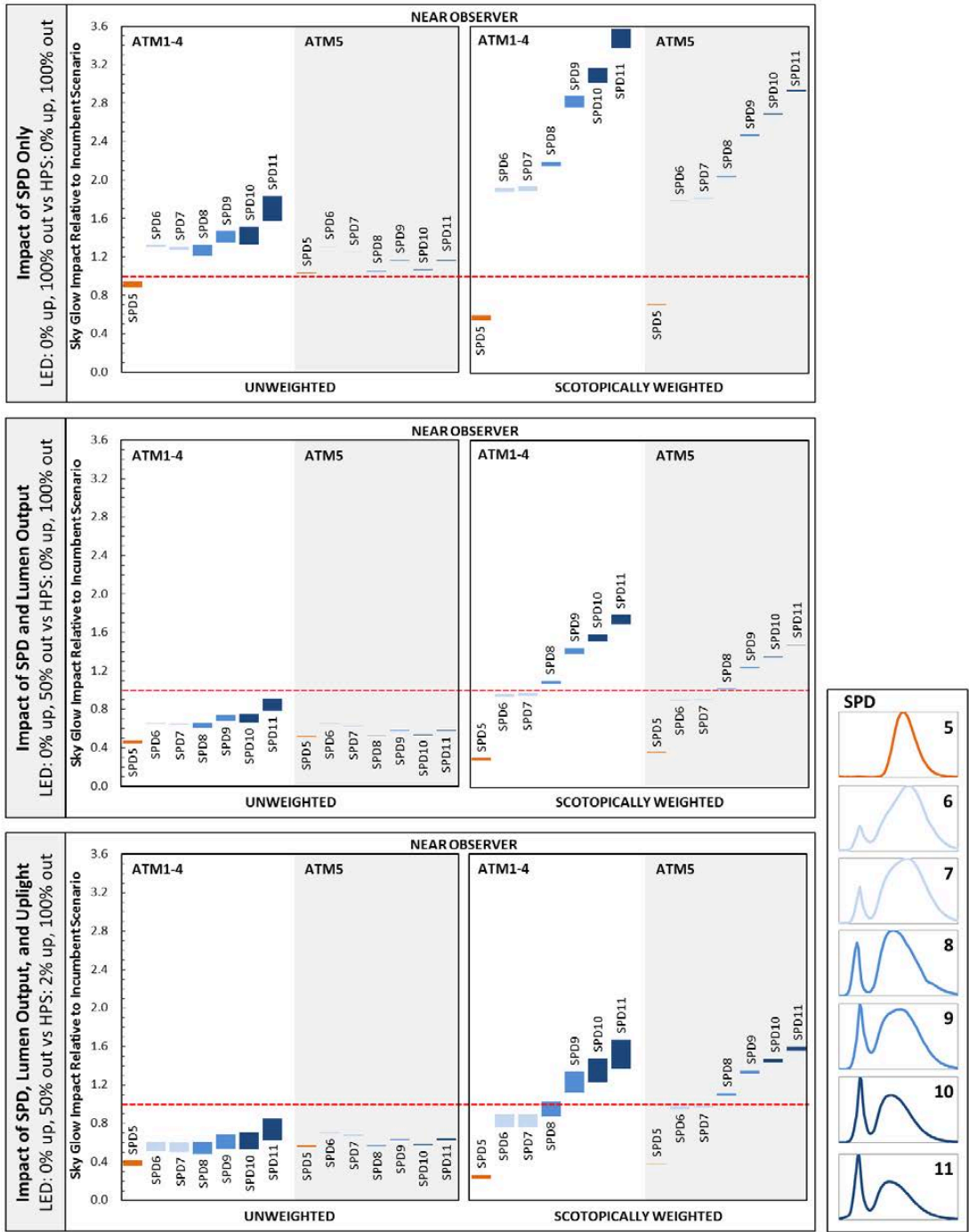


Figure 16. Comparison of light pollution from different LED spectral power distributions (SPDs) with light pollution from a high-pressure sodium light (horizontal dotted red line). SPDs (see right): SPD5: 1872 K (PC Amber), SPD6 = 2704 K, SPD7 = 2981 K, SPD8 = 3940 K, SPD9 = 4101 K, SPD10 = 5197 K, SPD11 = 6101 K.

### 3.3 *Human Circadian Rhythms*

It is only in the last twenty years that the mechanism by which light affects human circadian rhythms has been discovered (Berson et al. 2002). The human eye has non-image forming retinal ganglion cells that detect light and perhaps contribute to perception of brightness but not to discerning objects (Hattar et al. 2002). The pigment that detects the light is called melanopsin and it differs in its sensitivity to light from the rods and cones that humans use for vision (Brainard et al. 2001, Schmidt and Kofuji 2009). The peak sensitivity of melanopsin is around 480 nm, in the middle of the blue portion of the spectrum.

Evidence is strong that chronic exposure to light at night increases risk of cancer, diabetes, obesity, and heart disease (Fonken and Nelson 2014, Bedrosian et al. 2016, Lunn et al. 2017). The question for human circadian impacts from outdoor lighting is whether the exposures are bright enough and whether time of exposure is sufficient to affect circadian rhythms.

Circadian rhythms can be affected by light in many pathways. The first pathway is suppression of melatonin through exposure in the evening, especially after dusk. This exposure could be indoors or outdoors, either in the sleeping habitat or not. Dose-response curves for light exposure and melatonin suppression have been developed and it is the basis for the definition of Circadian Light (Rea et al. 2010). The second pathway is through sleep disruption through exposure to light in the sleeping habitat, even if the light levels are insufficient to suppress melatonin. Lack of sleep and reduced long wave sleep, which is critical to recovery and repair (Cho et al. 2016), can result from disturbance glare, as anyone ever awakened by moonlight can attest.

It remains an open question whether indoor exposure to street lighting is of sufficient magnitude to affect circadian rhythms directly, but recent research investigating light spectrum and cancer risk suggests that the color of light outdoors in the vicinity of residences is an important risk factor (Garcia-Saenz et al. 2018).

The influence of outdoor lighting on sleep has been investigated through epidemiological studies that measure exposure using satellites, epidemiological studies using portable individual-level measuring devices (comparing with satellite measures), and experimental studies in humans.

A set of studies from Haim, Kloog, Portnov, and colleagues provided correlational data connecting satellite-measured light at night from the DMSP OLS system to breast and prostate cancer, indicating a connection between outdoor lighting levels and rates of these cancers (Kloog et al. 2008, Kloog et al. 2009a, Kloog et al. 2009b, Kloog et al. 2010, Kloog et al. 2011, Haim and Portnov 2013). Similar studies have reinforced these findings in different populations around the world (Bauer et al. 2013, Hurley et al. 2014, James et al. 2017).

Studies investigating sleep as the outcome also find an association with satellite-measured outdoor lighting. For example, those in the higher exposure to light at night in South Korea as measured by DMSP were 20% more likely to sleep less than 6 hours per night and on average slept 30 minutes less than subjects in areas with lower outdoor lighting levels (Koo et al. 2016). In a study in the United States, higher levels of outdoor lighting as measured by DMSP was significantly associated with reporting < 6 hours of sleep per night, an effect that remained in

place even after accounting for noise and population density (Ohayon and Malesi 2016). In this study, people who lived in the brightest areas were more likely to go to bed later, get up later, and sleep less. They also were more likely to report that they were dissatisfied with sleep quality or quantity and to be sleepy during the day. DMSP-measured light at night was negatively associated with restorative long wave sleep. Importantly, this study validated that brightness in bedrooms correlated positively with satellite-measured outdoor light (Ohayon and Malesi 2016).

Satellite-measured light at night was also associated with the use of more drugs for insomnia in a second South Korean study (Min and Min 2018). Residents living in the lowest two quartiles of light at night as measured by DMSP used significantly less insomnia medication, even after accounting for age, sex, population density, income, body mass index, smoking status, alcohol consumption, exercise, and psychiatric disease. Mean use of insomnia medication increased with each quartile of light exposure from lowest to highest for each of three insomnia medications (Min and Min 2018).

Most recently, a study of the NIH-AARP Diet and Health Study cohort in the United States investigated sleep and exposure to light at night as measured by the DMSP satellite (Xiao et al. 2020). The highest levels of light exposure associated with 16% (women) and 25% (men) increased probability of reporting short or very short sleep duration. Probability of reporting short or very short sleep increased from lowest to highest quintiles of light at night in models that adjusted for age, race, marital status, state of residency, smoking, alcohol, vigorous physical activity, TV viewing, and median home value, population density and poverty rate at census tract level (Xiao et al. 2020). The authors concluded that, “Taken together, these findings suggest that the prevalence of sleep deficiency is higher in places with higher levels of LAN [Light at Night]” (Xiao et al. 2020).

While studies using remotely sensed data detect associations between sleep disturbance, circadian disruption, and associated diseases and light at night, others question the relationship between outdoor lighting and indoor exposure to light at night. Leaving aside the point that outdoor exposure to lighting can also contribute to circadian disruption, these studies focus on relationships between indoor and outdoor exposure. Recent work confirms the relationship between ground-level irradiance outdoors and satellite-based proxies for light at night. Using a dataset of 515 ground-based measurements of illumination from the upper hemisphere, Simons et al. (2020) showed that ground-based light exposure correlates highly with remotely-sensed light (VIIRS DNB annual composite) and even more with the New World Atlas of Artificial Night Sky Brightness (Falchi et al. 2016). This work conclusively establishes that satellite-measured light at night is a proxy for ambient light in the environment on the ground at night, as one would expect.

With this relationship now established (Simons et al. 2020), in retrospect the individual-level studies of correlation between indoor light levels and satellite-measurements of light at night are testing whether increased outdoor light levels correlate with higher indoor light levels and documenting what those indoor levels might be. Along these lines, Rea et al. (2011) used a Daysimeter device with a resolution of 0.1 lux and found that DMSP measurements had “no apparent relationship” with personal-level exposure. The study concluded that outdoor lighting could have little effect on circadian rhythms in their study population of teachers in upstate New York, basing this conclusion on the assumption that measurable melatonin suppression would be

needed to cause sleep disruption. That is, they assume that light equivalent to a full moon shining into a sleeping environment cannot affect sleep or circadian rhythms, which is a dubious assumption. In a more recent Dutch study, individual-level light exposure for children was measured indoors with a device that had a resolution of 0.1 lux (Huss et al. 2019). They found an influence of outdoor light on indoor light during the darkest time period with a correlation of 0.31. It should be noted, however, that 94% of the children in the study had curtains that controlled light entering the room. In a survey of lighting designers using their own light meters, Miller and Kinzey (2018) reported measurements in a number of different contexts within homes. At windows without drapes a maximum of 20 lux was reported, with a mean of 5 lux and median of 0.5 lux. All of these dramatically elevated above natural conditions (a full moon would produce 0.1–0.2 lux).

Experiments that involve exposures to light at night document illumination levels that affect health and sleep outcomes. Sleeping under 5 lux of 5779 K light caused more frequent arousals, more shallow sleep, and more REM sleep (at the expense of long wave deep sleep) (Cho et al. 2016). Light greater than 3 lux during the last hour of sleep was associated with weight gain in an elderly population (Obayashi et al. 2016). In another study of an elderly population, increased light at night and especially light at night > 5 lux was associated with 89% increased risk of depression (Obayashi et al. 2013). Further studies indicate that elevated illumination is associated with higher blood pressure as well, with associated excess deaths, at 3, 5, and 10 lux exposures (Obayashi et al. 2014). Metrics of sleep quality (efficiency) were also consistently lower with higher illumination at each category (3, 5, and 10 lux) (Obayashi et al. 2014).

Taken together, this research is consistent with a few different interpretations of the influence of outdoor lighting on human circadian rhythms and health outcomes. It is possible that the correlations between light at night and adverse health outcomes indicate instead variation in another factor, such as air pollution, as suggested by Huss et al. (2019). The robustness of sleep disruption correlations when controlling for population density, however, argues against that interpretation (Ohayon and Milesi 2016). Xiao et al. consider this question and conclude: “[I]t is also possible that the observed associations in our study population represent a true relationship, but primarily driven by individuals whose ALAN exposure was more heavily influenced by outdoor ALAN (e.g. individuals living in rooms facing bright streets and/or with insufficient window treatments to block out light, or individuals with a high amount of nighttime activities outside home).” Such an interpretation, that outdoor light can influence indoor sleeping environments and associated sleep and health outcomes, is consistent with the literature as it currently stands.

Accepting a plausible argument that outdoor lighting affects human sleep in at least some contexts that depend on factors associated with socioeconomic status, the following areas of concern follow for design of a street lighting system.

First, attention should be paid to minimize direct glare into windows of any habitable structure. One cannot assume that people only sleep in bedrooms; residents challenged by housing costs often use many rooms in apartments and houses for sleeping environments and the safest assumption is that any room in a residence might be used for sleeping. The assumption should also not be made that all residents have or can afford blackout shades or curtains. This becomes an issue of environmental justice; circadian disruption is exacerbated in low income communities

(Xiao et al. 2020), presumably because the same amount of light results in more impact because of a lack of capacity to block light.

Second, circadian responses that result from melatonin suppression are heavily dependent on the spectrum of light. As light is concentrated closer to the wavelengths of peak sensitivity for melatonin, the intensity of light (measured in lux) required to suppress melatonin decreases (Grubisic et al. 2019). At 424 nm, the minimum illuminance for melatonin suppression is 0.1 lux (Souman et al. 2018). The relative impact of different lighting sources can be predicted using the melanopic response curve (Aubé et al. 2013, Longcore et al. 2018a). To illustrate this approach, the melanopic power of lamp sources was standardized to compare with high pressure sodium (HPS; Figure 17). All full-spectrum LED sources have a greater potential circadian impact than HPS, including 2200 K (1.5 times HPS), 3200 K (2.5 times HPS), and 4300 K (3 times HPS).

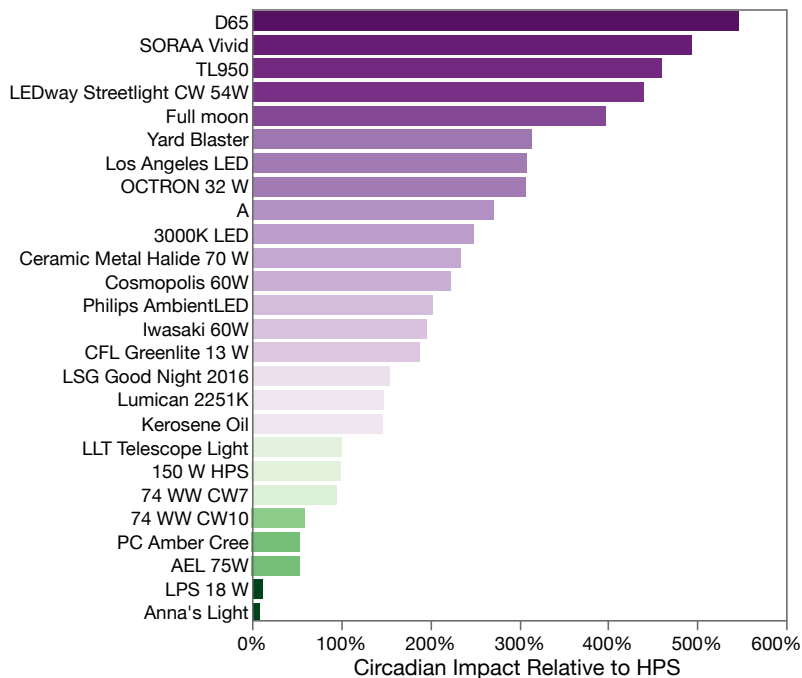


Figure 17. Ranking of light sources by melanopic response (i.e. potential for circadian disruption), compared with a typical High Pressure Sodium (HPS) lamp. Green colors have equal or less melanopic response per lux, while purple colors have more melanopic response per lux than HPS.

The sources that would have the lowest circadian impact are filtered LEDs that avoid the blue portion of the spectrum almost entirely, or PC amber LEDs that do the same. Calculations have not been done to compare LEDs at 50% intensity as has been done for astronomical light pollution impacts. It is reasonable to assume that a similar result would be obtained, with a reducing 50% in intensity for a ~3000K LED compared with HPS bringing it into parity with the potential circadian disruption potential of HPS.

Third, planning for a healthy circadian environment should recognize high variation between individuals in their sensitivity to light, including a 50-fold variation between people in melatonin response to light exposure (Phillips et al. 2019). Children are more sensitive to disruption from light at night than adults (Nagare et al. 2019). Office workers exposed only to dim light during the day are more sensitive to disruption from light at night than those who work outside. Men are more sensitive to light at night, including decreased “long sleep” with increased exposure (Xiao et al. 2020). Some individuals are debilitated by the visual glare from LEDs that are not properly directed and diffused (Ticleanu and Littlefair 2015).

A fair and equitable lighting design approach would recognize a need to accommodate the most sensitive individuals in society in a manner that still allows lighting to achieve its goal of providing a safe environment for pedestrians, cyclists, and people in vehicles. Because some of the medical conditions that are exacerbated by glare may be considered disabilities, it furthermore might be a prudent risk management step to explicitly incorporate these concerns in design to ensure compliance with the Americans with Disabilities Act. Published studies thus far have not shown a decrease in traffic accidents associated with conversion to full-spectrum white LEDs (e.g., >2700 K) (Marchant et al. 2020). Total pedestrian and cyclist deaths in Los Angeles have increased since conversion from HPS to 3000–4300 K LEDs in 2009.<sup>1</sup> Whatever marginal benefits might be associated with higher CCT street lighting, they have not been sufficient to result in significant decreases in accidents that have been documented in published studies. Although a full cost-benefit analysis is beyond the scope of this report and should be the subject of future research, a prudent approach to balance these human health and safety issues is to: use the lowest CCT deemed acceptable, specify high-quality optics to ensure delivery of light on desired surfaces instead of as glare, and avoid light trespass onto windows of any residential property.

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<sup>1</sup> See <https://la.streetsblog.org/2019/10/29/vision-non-zero-the-human-and-financial-toll-of-los-angeles-dangerous-roads/>

## 4 Design Strategies for a Healthy Nocturnal Infrastructure

With the adoption of a Street Lighting Master Plan, an opportunity arises to reduce unwanted outcomes from outdoor lighting that might include degradation of the experience of the night sky in the region, disruption of human circadian rhythms, and interference with behavior of sensitive wildlife species within the city. Strategies are available to reduce these impacts, some of which can be implemented at all locations where street lighting is warranted, and others that could be applied in zones with sensitive resources or known adverse impacts.

### 4.1 Systemwide Approaches

Reducing the adverse effects of artificial light at night is a matter of ensuring that the light is away enough for the identified need, but not more.

#### 4.1.1 Need-based Lighting

In defining the terms under which street lighting is warranted, consideration should be given in all instances to the threshold for need to ensure that the installation is supported by verifiable benefits. The need for lighting at night is in part a subjective judgment based on human feelings, so equal consideration should be given to those who are more comfortable with less light as to those who desire more light and final determinations made through a transparent and fair process that evaluates the costs and benefits.

#### 4.1.2 Shielding and Directionality

For all of the reasons discussed in this report, lights should be directed toward their intended targets (mostly roads and sidewalks) and not upwards or into other locations where sensitive receptors might be present (e.g., bedroom windows, habitats). This consideration will usually be built into a modern street lighting plan through specification of luminaire performance in terms of backlight, uplight, and glare. Uplight should be assiduously avoided throughout the system. This step alone will significantly reduce the current contribution of Salt Lake City to light pollution in the region as viewed from the surrounding open spaces and natural lands.

#### 4.1.3 Intensity, Dimming, and Controls

Any time a natural environment is experiencing illumination greater than the full moon ( $>0.1$  lux), or even greater than a quarter moon (0.01 lux), one can assume that species are being affected. This is the case because many species show lunar cycles in behavior, often driven by predator-prey relationships that can be interrupted by elevated illumination (Price et al. 1984, Daly et al. 1992, Upham and Hafner 2013). For example, light as dim as 0.01 lux can inhibit foraging by small rodent species (Kotler 1984b).

Strategies that could be deployed around light intensity across the street lighting system include setting the maximum intensity of lights lower, dimming or extinguishing lights according to a pre-set schedule, and use of programmable and flexible controls to adjust intensity in response to need.



1. If full-spectrum LEDs are to be used (e.g., 2700K, 3000K), then the intensity must be at least half of that measured (in lux) for high pressure sodium to avoid increased light pollution impacts. Lower color temperature LEDs (e.g., 1800K, 2000K, 2200K) would require testing to set the maximum operational intensity to achieve system objectives.
2. Regularly programmed dimming or shut-off is a possibility for the system. Part-night lighting, where lights are shut off after a curfew is an improvement over whole-night lighting for bats but not adequate to reduce all impacts (Azam et al. 2015, Day et al. 2015). For the whole system in Salt Lake City, a dimming schedule, especially for residential areas, that reduced output from (for example) midnight to 5 a.m. seems feasible and would reduce overall contribution to regional light pollution, reduce human circadian disruption, and save energy.
3. Controls can be used as a complement to a lower overall intensity setting. When additional illumination is needed, in coordination with City officials, lighting levels can be increased during the period of the need and then reduce to the “normal” level. Controls can also be used on a neighborhood by neighborhood basis to find the illumination level that is most consistent with and useful within the character of the neighborhood.

#### 4.1.4 Spectrum

The unwanted impacts of the street lighting system would be minimized by using the lowest possible CCT for the most lights in the system. For wildlife, human health, and preserving dark skies, the preferable choice would be lamps with CCT <2000K. Other considerations lead to the use of higher color temperatures in some zones, but the lower the color temperature can be kept on average, the greater the environmental benefit.

Low CCT lights are commercially available. For example, Signify makes 1800K cobra-head street lights (StreetView, RoadView, EcoForm, RoadStar) and decorative models as well (Domus, MetroScape, UrbanScape, LytePro). Cyclone produces a 1800K street light, as does Ignia Light (Figure 18). SNOC provides a 2200K light that mixes white and amber diodes, as does Ignia Light (Figure 19). Lumican also sells a range of street light luminaires that include 1700K through 2200K. RAB lighting sells a 2000K luminaire (Triboro) to match the color of HPS (<https://www.rablighting.com/feature/led-roadway-lighting-triboro>; Figure 20). Siteco sells 1750K, 1900K and 2200K street lights. CWES builds luminaire systems that use a warm white LED and a filter to avoid blue light emissions while keeping lumens per Watt high in comparison with 2700K and 3000K LEDs (Figure 21). Some communities in Utah are even manufacturing their own filters to protect the night sky and the tourism industry associated with it (Figure 22).

Where full-spectrum light is desired for aesthetic reasons or other considerations, it should in no instance exceed 3000K and preferably not 2700K. Lower CCTs should be considered for residential neighborhoods citywide as acceptable to City officials and residents.



Figure 18. Application of PC Amber lights by Ignia Light.



Figure 19. Demonstration of mix of white and amber diodes to produce 2200K light for a roadway application by Ignia Light.



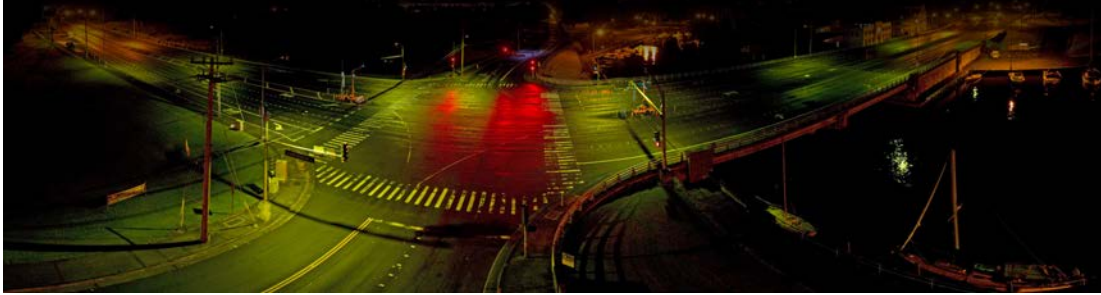


Figure 21. C+W Energy Solutions provides filtered LEDs that use with a warm white LED and filter blue light, resulting in a greenish yellow color that contrasts with yellow light of stop lights.



Ivins Fleet Mechanic Wilson Jimenez fits a shield onto his light-filter prototyping station in the city garage. He designed the amber insert that adapts the city's LED bulbs to be "night sky friendly" and has custom-built about 150 inserts to date.

CREDIT DAVID FUCHS / KUER

Figure 22. Ivins, Utah is using filtered LEDs to protect the night sky (<https://www.kuer.org/post/fast-growing-southwest-utah-one-city-organizes-protect-night-sky#stream/>).

#### 4.2 Ecological Overlay Strategies

In addition to systemwide strategies, which would be implemented throughout all instances of land uses and road segment conditions (e.g., roadway type and associated land use combinations), several ecological overlay strategies would be appropriate that recognize the sensitive natural resources of Salt Lake City. These strategies are tailored to geographic regions where modifications to the light specifications could be used to reduce unwanted environmental impacts.

Each of these strategies is based on a geographic footprint. Spatial data to delineate these regions were either obtained from custodians of those data or digitized by hand based on aerial photograph interpretation. These data sources include:

- Important Bird Areas (from National Audubon Society spatial data webserver);
- Bird Collision Survey Zone (digitized from map provided by Tracy Aviary);
- Parcels that intersect with Critical Wildlife Habitat (digitized from Salt Lake City open space acquisition plan);
- Jordan River Habitat Zone (digitized from aerial photograph interpretation of natural habitat);
- Urban Creek Zone (digitized from aerial photograph interpretation of natural habitat);
- and
- Community Parks and Neighborhood Parks (from Salt Lake City spatial data webserver).

The digitized habitat zones could be revised with field checks. The purpose of these layers is only to classify roadway lengths for lighting strategies and should not be interpreted as a precise mapping of habitat values.

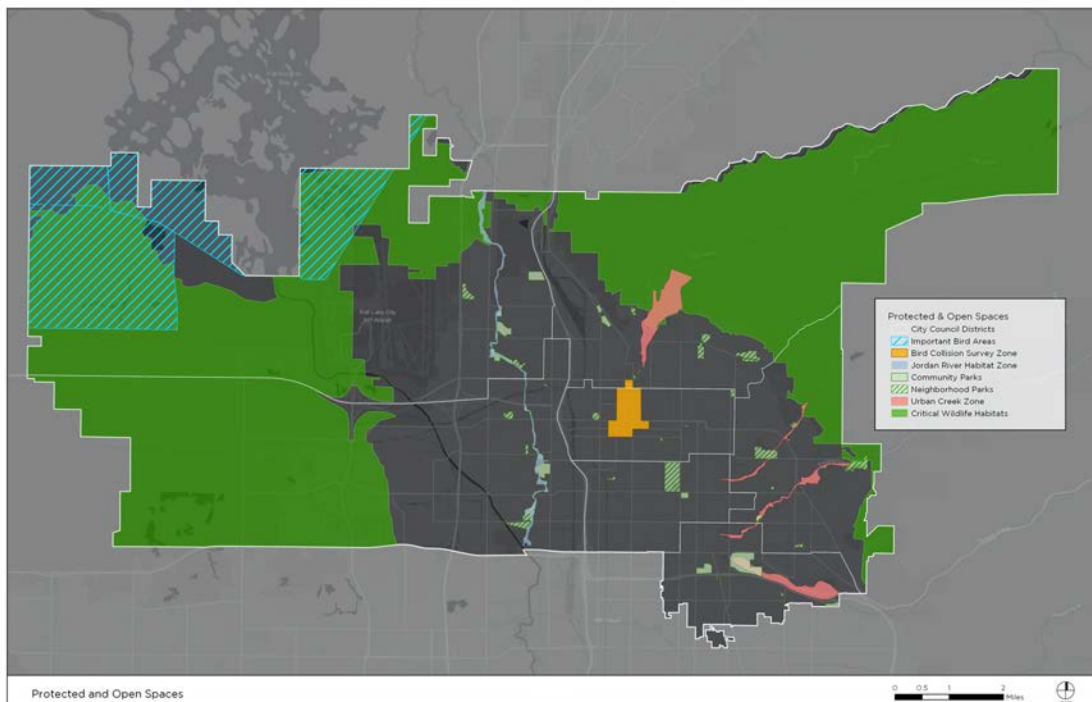


Figure 23. Zones considered for ecological lighting strategies.

A set of additional guidance to reduce impacts that are targeted to the resources in each of these zones is proposed (Table 1).

Table 1. Strategy matrix for ecological overlay zones and major land uses.

Strategy	Uplight	Spectrum (CCT K)	Dimming	Part-night lighting	Intensity (of HPS lumens)
Commercial / Bird collision zone	0.02	≤3000	During migration	No	50%
Critical Wildlife Habitat	0	≤2200K	No	No	50%
Community Parks Natural Lands	0	≤2200K	No	Yes	50%
Jordan River	0	≤1900K	No	Yes	50%
Urban Creeks	0	≤1900K	No	Yes	50%

#### 4.2.1 Bird Collision Zone

The area which is currently monitored for bird collisions is found in the central business district. It is also the brightest location when observing the region from space. Mortality of birds results from the mixture of lights that attract nocturnally migrating birds with the presence of tall buildings with large expanses of glass with which birds collide. The lights draw the birds in and then the glass kills them (Sheppard and Phillips 2015). Current lighting in this zone includes many decorative lights that are not yet shielded to direct light downward. The high lighting levels provided in a commercial zone with the lack of shielding explains the brightness of this area from above at night. Recognizing the need for lighting appropriate for a commercial business district and its level of activities leads to a suggestion of compromise for lighting. Rather than proposing no uplight, even reducing uplight to 2% would represent a dramatic improvement over existing conditions. If no uplight is possible, it would be preferable. Color temperature in this area, and other commercial zones, should be capped at 3000 K. Intensity of lights should be set to 50% of that measured for previous high-pressure sodium lamps to account for human sensitivity to 3000 K lights. With full controls available for the system, a dimming program could be further implemented during peak migration periods (April/May and September/October). If only one period is chosen, it should be fall because the fall migration includes all of the young of the year, which are especially susceptible to collision. Such additional dimming could be implemented either all night or after midnight or another set time. For this area, actions on the part of the City might catalyze participation in mitigation approaches by property managers (Light Out Salt Lake organized by the Tracy Aviary); turning lights out inside buildings at night would further reduce attraction of birds and resulting mortality.

#### 4.2.2 Critical Wildlife Habitat Zone

The region that intersects with parcels containing critical wildlife habitat is found in the foothills to the east of downtown and then in the flat shorelands to the west. The western area also includes the two globally significant Important Bird Areas. Because this zone contains a range of land uses, including commercial, industrial, and residential areas, the proposal is to match the low color temperature of previous lighting systems (e.g., 2000–2200 K) with full cut-off lighting

to reduce impacts on nearby sensitive resources. This lower temperature is especially important near the Great Salt Lake, which is a source of fog (Hill 1988). Fog is extremely efficient at reflecting light and recent research has shown that foggy conditions result in a 6-fold increase in night sky brightness (a measure of light pollution) (Ścieżor et al. 2012). Fog also scatters light down into habitats. Full cut-off lighting at a low enough color temperature to allow reasonable color rendering should balance the needs of the land uses in these zones with the sensitive resources found there.

#### ***4.2.3 Jordan River and Urban Creeks***

The Jordan River and the urban creeks cut through the street grid such that they intersect with only a few street lights along any given segment. It might therefore be possible to minimize impacts to these riparian zones by using low color temperature lights as street segment intersect these zones. Two major considerations in riparian zones are insect attraction and bat impacts, since both groups will be found at higher density in these zones. Best practices for reducing impacts to bats (Voigt et al. 2018) include a limit on light at the edge of habitat of 0.1 lux, avoiding direct glare into habitats, and seeking to avoid light <540 nm. A low CCT light would minimize insect attraction (Longcore et al. 2018a). Red lights are being used in Europe to minimize impacts to bats (Spoelstra et al. 2017) but it is not clear if red light would be acceptable within this context.

#### ***4.2.4 Community Parks and Natural Lands***

Community parks and natural lands may contain sensitive species and often have areas that are closed after dark. Lighting surrounding them could be limited in CCT to 2200 K and lights on roads within parks might be shut off after a curfew. Darkness in these instances can serve to reduce unwanted activity because any lights brought into a dark park would indicate unallowable activity. Recommendations for community parks and natural lands will probably need to be tailored by site to accommodate variations in use, park type, and surrounding land uses. Tracy Aviary is located in a community park and has captive birds that are kept outdoors. Reducing or eliminating street lighting around any outdoor enclosures with captive birds is recommended for the health of the birds.

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# Ecological and Organismic Effects of Light Pollution

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Advanced article

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**Since the invention of the electric light bulb in 1879, a significant portion of the planet has been transformed from experiencing a natural pattern of light and dark determined by the sun, moon, stars and occasional other transient lights to being subjected to intermittent and perpetual illumination from human civilisation that is unprecedented in the history of Earth. The pervasiveness of this phenomenon and its exponential growth has measurable and significant consequences for living organisms. The results of recent research have extended knowledge about the geographic scope and specific impacts of artificial night lighting on animal behaviour, physiological processes and ecological interactions across a range of taxa and its broader ecosystem effects.**

## Introduction

Even a cursory review of satellite-derived composite maps of nocturnal light emissions reveals the global reach of human-produced disruption of the night-time environment. Remotely sensed images can be used to discern city and other electric lights, fires, flares from hydrocarbon facilities and fishing boats (**Figure 1**). The influence of lights on surrounding terrestrial and aquatic habitats depends in large part on the total amount of light directed outwards and downwards and on the amount of cloud cover and particulates in the air that are available to scatter light that otherwise would propagate upwards (Kyba *et al.*, 2011). The geographic rate of increase in outdoor lighting is estimated to be 6% per year (Hölker *et al.*, 2010).

*Light pollution* within the context of the life sciences requires a context-dependent definition. From the perspective of evolutionary history and the environment to which all life has adapted, any human-generated light can be considered pollution in that it

disrupts natural conditions. Such a definition is unsatisfactory, because nocturnal illumination is a hallmark of modern society and viewed as being indispensable to economic and social well-being. Consequently, a definition of light pollution could be limited to human-generated nocturnal lighting that is excessive or unnecessary or that has adverse impacts on particular species or species groups that are of concern. This definition is also subjective, because one person's excessive lighting is another's artistic expression. For practical purposes, therefore, a definition of light pollution is negotiated in a context-dependent manner that weighs the reality that all artificial lighting disrupts natural patterns of light and dark against the utility and desirability of that light for a range of human activities. The focus on impacts to either the natural environment or the human view of the night sky leads to recognition of 'ecological light pollution' and 'astronomical light pollution' (Longcore and Rich, 2004).

Light at night as an influence on biological processes is a global phenomenon that is highly spatially variable. Global night lights have been measured by satellites at a ~1 km resolution since 1992 and at a ~500 m resolution since 2012 (Kyba *et al.*, 2015). These sensors measure the amount of light that escapes upwards, which is correlated with the amount of light that might be received by any person or organism in the environment. Across the globe, lighting visible from space is correlated with economic activity, population density, industrial production and other human activities. Night-time lights have their greatest concentration on continents and in the Northern Hemisphere but are highly variable within these regions (Gaston *et al.*, 2014). The effects of lights extend far beyond locations where they occur because light is scattered and reflected in the atmosphere (Kyba *et al.*, 2011). The resulting light visible on the ground is called *sky glow* and can reach intensities equal to the illumination from the full moon (**Table 1**). Extrapolation of satellite-measured night-time lights to the associated sky glow effects has shown that very few night skies in the world are entirely unaffected by scattered light from human sources (Cinzano *et al.*, 2001).

The natural range of illumination between day and night is 11 orders of magnitude (**Table 1**). Illumination at a forest floor can be  $10^{-4}$  or  $10^{-5}$  lx or less, while a full moon usually produces around 0.1 lx (or more at high altitudes or near the equator) and full sunlight can exceed  $10^5$  lx. As a result of this variation, species have evolved powers of perception and navigation adapted to the large differences in ambient illumination between day and night. For example, some species have the ability to navigate, by sight, in conditions that are far darker than what

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**Figure 1** The global extent and intensity of artificial night lighting is visible in this photograph of the India–Pakistan border taken from the International Space Station on August 21, 2011. The border itself is entirely illuminated with the characteristic orange light of sodium vapour floodlights installed by the Indian government. Photograph ISS028-E-029679 from NASA.

humans would consider complete darkness (Warrant and Dacke, 2010). Bioluminescent organisms have evolved to exploit the natural conditions of illumination for signalling, especially in the oceans and forests. Disruption of these natural conditions, even at light levels imperceptible to the human eye, therefore has adverse consequences on a range of species and interactions (Longcore and Rich, 2004) and, potentially, their evolutionary trajectories (Swaddle *et al.*, 2015). These effects could be profound; even streetlights are a million times brighter than typical ambient night-time conditions (Perry *et al.*, 2008).

## Processes of Biological Disruption by Light Pollution

The degree to which artificial night lighting affects biological systems depends on the species involved and the type of disruption in question, combined with the characteristics of the light itself. Gaston *et al.* (2013) identified six biological and ecological processes that could be disrupted by light at night: photosynthesis, niche partitioning, dark repair and recovery, photoperiodism/circadian rhythms, visual perception and spatial orientation. The extent of impacts varies with the duration, intensity and wavelengths of light that are in the environment (Gaston *et al.*, 2013; Longcore and Rich, 2016).

### Photosynthesis

Photosynthesis under artificial lighting is desirable in greenhouse agricultural production, where large amount of energy from light that is concentrated in wavelengths at which plants are photosynthetically active (400–700 nm) is required. Little photosynthesis

occurs under artificial lighting outdoors and it is limited to areas close to the light sources (Raven and Cockell, 2006). Lighting can affect photosynthesis indirectly as well, through triggering of other physiological responses in plants that influence photosynthesis (Skaf *et al.*, 2010).

### Niche partitioning

Niche partitioning associated with lighting levels has developed as a result of the historically predictable daily, monthly and annual patterns of light and dark. Diurnal animals that exploit artificial night lighting as a means to extend activity periods occupy the ‘night light niche’, thereby disrupting normal species interactions during the time locations are illuminated. Perry *et al.* (2008) provide an extensive list of diurnal reptiles and amphibians that exploit the night light niche, including geckos, iguanas, skinks, snakes, toads and treefrogs. This phenomenon was also measured for fishes around offshore platforms, where it was referred to as a ‘visual subsidy’ for the fishes exploiting the night light niche (Keenan *et al.*, 2007). Although it is tempting to interpret use of the night light niche as being ‘good’ in some abstract sense, this is misleading; every species that benefits from day-like conditions at night intrudes into a niche already occupied by species adapted to natural patterns of light and dark.

Other species that are normally active between twilight and dawn can have their niches disrupted as well. Fireflies are active during particular ambient illumination conditions that sequentially separate the activity periods of different species (Lloyd, 2006). This temporal niche partitioning is vulnerable to changes in nocturnal lighting conditions.

The logical and predictable extension of the erosion of light as a means to maintain niche partitioning is that local species diversity

**Table 1** Illumination from natural and artificial sources compared with ecological consequences across taxonomic groups

Magnitude (lx)	Natural and artificial illumination levels (lx)	Species responses with illumination levels (lx)
10 <sup>5</sup>	103 000 Full sunlight	
10 <sup>4</sup>	50 000 Partial sunlight 10 000 Cloudy	
10 <sup>3</sup>		
10 <sup>2</sup>	188 Sunset (Nowinszky, 2004)	
10 <sup>1</sup>	10 Parking lot	
10 <sup>0</sup>	1 Light pollution in urban marsh habitat	2.1 Reduction in seed set in short-day soya beans 1 Initiation of downstream drift and emergence from winter substrate in fishes
10 <sup>-1</sup>	0.5 Illumination from urban sky glow (Kiel, Germany) 0.1 Typical full moon (0.4 maximum) 0.18–0.71 Light pollution on beaches (Taiwan) (Santos <i>et al.</i> , 2010) 0.178 Illumination from urban sky glow (Vienna)	0.5 Maximum for foraging in some fishes 0.3 Melatonin reduced in Senegal sole (Oliveira <i>et al.</i> , 2010) 0.25 Disrupted melatonin, promoted tumour growth in rats 0.2 Maximum illumination for most fireflies (Brazil) (Hagen and Viviani, 2009) 0.1 Reduced foraging in rodents and schooling in fishes 0.1 Desynchronisation of coral planula production (Jokiel <i>et al.</i> , 1985)
10 <sup>-2</sup>	0.01 Lower limit of many commercial light meters 0.01–0.04 Crescent to half illuminated moon	0.06 Prairie rattlesnakes forage more compared with 0.35 lx 0.04 Maximum illumination for activity in frogs 0.01 Delayed foraging on forest floor (Wise, 2007) and increased number of visual threat displays in salamanders
10 <sup>-3</sup>	0.001 Instream illumination from billboards	0.003 Less activity and females hide nest in frogs 0.001 Foraging in brown trout
10 <sup>-4</sup>	0.0005 Starry sky without moon	0.001–0.01 Most moth activity (Nowinszky, 2004) 0.0006 Circadian rhythm of <i>Drosophila jambulina</i> influenced (Thakurdas <i>et al.</i> , 2010) 0.0001 Maximum for activity of <i>Ascaphus truei</i> frogs
10 <sup>-5</sup>		0.00001 Lower foraging limit in fishes
10 <sup>-6</sup>	0.000001 Dark night in forest	0.000004 Negative phototaxis in phantom midge

Common sources of artificial light, including light reflected in the atmosphere (sky glow), produce illumination both brighter than many naturally occurring night-time conditions and above threshold levels to influence many biological phenomena. Sources in Rich and Longcore (2006) unless otherwise noted.

will decline when the full range of light and dark conditions no longer occurs and breadth of potential light-associated niches is reduced. **See also:** [Coexistence](#)

## Dark repair and recovery

Dark repair and recovery refers to nocturnal physiological processes that are essential to healthy functioning of organisms inactive at night. Exposure to artificial lighting during these periods, even for short bursts, can disrupt these physiological processes and have adverse consequences. The production of the hormone melatonin during dark hours and the consequent repair benefits is an example (Liu *et al.*, 2013). Melatonin is produced in organisms ranging from single celled to the most complex because of its early origins in evolutionary history (Jones *et al.*, 2015). In vertebrates, its function as an antioxidant and scavenger of free radicals can be suppressed by exposure to light at night.

Suppression of melatonin production is greatest for wavelengths of light in the blue portion of the spectrum (Brainard *et al.*, 2001). The response to light is dose dependent, with small reductions in melatonin production documented down to within

the measurement accuracy of melatonin in the saliva or blood (Rea *et al.*, 2010). The lower levels of illumination associated with measurable melatonin suppression in humans is on the order of magnitude of that provided by a streetlight shining directly through a window. The epidemiological studies of melatonin suppression and associated circadian disruption of humans by exterior lighting do suggest an effect; the brightness of human sleeping environments is associated with obesity (McFadden *et al.*, 2014), breast cancer (Hurley *et al.*, 2014) and prostate cancer (Kloog *et al.*, 2009), with the intermediate mechanism of circadian disruption and melatonin suppression assumed. Such studies involve use of satellite imagery of night lighting at multiple scales and provide epidemiological indications that light pollution affects these chronic diseases in humans through interruption of dark repair and recovery.

## Photoperiodism and circadian rhythms

Light is a signal that influences the timing of activities for organisms at several scales. Circadian rhythms are entrained daily by light and dark cycles for all organisms living in illuminated

environments. Similarly, daylength signals trigger physiological responses associated with seasonal changes in environmental conditions for species living in seasonal environments.

Circadian clocks have evolved to synchronise physiology, metabolism and behaviour to the 24-h cycle of Earth (Vanin *et al.*, 2012). In diverse organisms, circadian oscillators can be entrained to local time through the detection of an environmental cue, known as a zeitgeber, such that the endogenous timing of peaks and troughs stably corresponds to an environmental reference point, frequently dark-to-light transition, for which specialised photoreceptive and phototransductive mechanisms have evolved to be capable of functioning as pacemakers to synchronise downstream rhythmic events to the environment. **See also: Circadian Rhythms**

Studies of the effects of artificial lighting on photoperiodic responses are abundant, partly because of the implications for understanding human health (Zubidat *et al.*, 2010). As a whole, they show that artificial lighting can entrain circadian rhythms and influence physiological functions such as immune response at relatively low levels (Bedrosian *et al.*, 2011). For example, extremely dim light is sufficient to entrain rhythms in mice and can be done without affecting the other physiological indicators of light influence such as phase shifting or reduced melatonin production (Butler and Silver, 2011). For shorter wavelengths (blue and green), entrainment takes place at  $10^{-3}$  lx. Adverse effects of mistiming have been documented on immune response, metabolism and stress associated with exposure to dim light at night (Bedrosian *et al.*, 2011; Fonken *et al.*, 2010; Zubidat *et al.*, 2010).

Light pollution might reset interactions among species whenever synchronisation is important because entrainment requirements are different between species. For instance, plants 'anticipate' the dawn with a synchronised circadian clock and increase immune defence at the time of day when infection is most likely (Wang *et al.*, 2011). The timing of resistance (R)-gene-mediated defences in *Arabidopsis* to downy mildew is tied to the circadian system such that defences are greatest before dawn, when the mildew normally disperses its spores (Wang *et al.*, 2011). The importance of circadian rhythms in plants, for everything from disease response and flowering time to seed germination, and the potential for disruption by artificial night lighting, has not been explored widely (Resco *et al.*, 2009). Some plants might use light-triggered circadian rhythms to synchronise expression of antiherbivory compounds with periods of peak herbivory, leading to increased loss from herbivory in out-of-phase plants (Goodspeed *et al.*, 2012). **See also: Plant Circadian Rhythms**

In animals, research on timing of morning birdsong illustrates how lights can subtly influence reproductive behaviours through influences on circadian rhythms. For forest birds in Vienna, proximity to night lights advanced the morning chorus and resulted in more extrapair copulations than would be expected for younger Blue Tits (*Cyanistes caeruleus*) that were defending lower quality territories on forest edges adjacent to streetlights (Kempnaers *et al.*, 2010). Other work has shown an earlier dawn chorus in light-polluted environments e.g., (Miller, 2006).

Artificial lighting can also induce or delay seasonal changes that are asynchronous with actual conditions, described as 'seasons out of time' (Haim *et al.*, 2005). Such mistiming leads to failure of organisms to adjust appropriately to changing seasons, with a range of results that include plants not setting seed with shortened days or failing to drop leaves in the fall (Bennie *et al.*, 2016) and disruption of reproductive synchronisation necessary to exploit environmental conditions (Robert *et al.*, 2015). Integrating studies of circadian disruption on species in the wild with research on human and animal models is at the frontier of chronobiological research (Dominoni *et al.*, 2016).

## Visual perception

Artificial lighting can allow species to see at night that would otherwise not be able to do so. This has the potential to affect a whole range of behaviours and species interactions. Many studies link foraging activity with specific lighting conditions, presumably optimised to reduce predation risk while maximising foraging efficiency for each species. For example, onset of foraging time is delayed in lesser horseshoe bats (*Rhinolophus hipposideros*) when exposed to lighting and the lit areas of hedgerows were avoided (Stone *et al.*, 2009). This pattern of delay is now seen in multiple taxa, from salamanders (Wise, 2007) to sugar gliders (*Petaurus breviceps*) (Barber-Meyer, 2007) to bats (Boldogh *et al.*, 2007).

A driving force behind patterns of activity and foraging by animals influenced by artificial lighting is presumably the balance between rewards of foraging and risk of predation. The general pattern that has emerged is that increased light assists predators to locate prey. As a result, primary consumers that might otherwise forage under cover of darkness avoid illuminated areas. This general rule has an exception, which is that prey species with a communal predator defence, such as schooling or flocking, experience decreased risk of predation with additional light. Observations of individual species and of communities are consistent with this pattern. The insect community under streetlights has elevated proportions of predators (Davies *et al.*, 2012), while schooling fish are aided by group vigilance afforded by additional light (Nightingale *et al.*, 2006). A general review of nocturnal foraging suggests that birds and mammals are subject to less predation pressure at night and that the number of animals foraging together is greater at night, especially for clades that are not strictly nocturnal (Beauchamp, 2007).

## Spatial orientation

The orientation of species relative to artificial light sources at night, or the inability of species to orient in the presence of artificial light sources, is perhaps the most visible impact of artificial lighting on ecology (Verheijen, 1985). For example, migratory birds are attracted to and collide with oil platforms, cruise ships, communication towers, buildings and athletic stadia and seabirds are attracted to lighted vessels (reviewed in Longcore and Rich, 2016). Hatchling sea turtles are unable to orient properly to crawl to the ocean in areas influenced by artificial lights (Salmon, 2003) and insects are attracted to artificial light sources (Figure 2).



**Figure 2** Different light sources along a riverside meadow verge in Germany, including cold-white LED (light-emitting diode), halogen spotlight, neutral-white LED, high-pressure sodium vapour, mercury vapour and metal halide. Greatest numbers and species of insects were collected at traps affixed to lamps rich in blue and ultraviolet lights (mercury vapour and metal halide). LEDs, which did not contain ultraviolet light, attracted the fewest insects compared with other types of lighting, but among LEDs, cold-white LEDs attracted the greatest number of insects (Eisenbeis and Eick, 2011). Reproduced with permission from A. Hänel.

Movement and distribution of animals are limited by their ability to orient within the environment. Visual cues and light detection are used by almost all species except those living in perpetual darkness. The pervasiveness of light detection in orientation is shown by the discovery in *Drosophila* larvae of photoreceptors not associated with vision, which are found in each body segment and are sensitive in the ultraviolet, violet and blue wavelengths (Xiang *et al.*, 2010). These are precisely the areas of the spectrum associated with light avoidance because daylight is rich in these spectra. Even those species that restrict their activities to the darkest, moonless nights have means of using available light to orient. Nørgaard *et al.* (2008) documented the visual ability of a nocturnal spider in the Namib Desert that presumably uses spatial and temporal summation to identify landscape structures, allowing it to orient and be active in the darkest conditions, thereby minimising predation risk.

The mechanisms by which artificial lighting influences spatial orientation of different taxa may differ. For nocturnally migrating songbirds, the disorientation of birds at lighted communication towers or tall buildings tends to occur when cloud cover has precluded navigation by celestial cues and the bird has encountered a bright light on the landscape. The behaviour is described as the bird being ‘trapped’ within the zone of influence of the lights. Studies show that flashing lights attract far fewer birds and that turning off a light temporarily allows birds to leave an area and continue on their migratory route. The process for insect attraction and disorientation is similarly described as the animal being ‘trapped’ or ‘dazzled’ at the light, with several hypotheses

for the mechanism of the phenomenon. For hatchling sea turtles, experimental evidence has established that individuals move away from the horizon with dark silhouettes, which for most of evolutionary history would have been the onshore dune and beach vegetation. Artificial lighting onshore is inconsistent with that pattern and hatchlings either orient towards lights or do not have a fixed orientation (Salmon, 2003).

## Synergistic Effects

The effects of light pollution may extend beyond directly observed impacts on physiology and behaviour. In humans, disturbance by light at night could lead to behaviours that increase circadian disruption such as turning on additional lights. In ecosystems, the behavioural or physiological changes caused by artificial night lighting could have cascading effects (Bennie *et al.*, 2015). The ecological and evolutionary consequences that result from the global increase in night lighting can interact synergistically with other hazards. For example, lights attract birds to other hazardous sites such as offshore petroleum platforms, wind turbines and buildings where they subsequently are at risk of colliding with glass.

Another synergistic consequence is the creation of polarised light by night lighting (Horváth *et al.*, 2009). For example, mayflies are attracted to wet pavement at night because polarised light created by reflecting lights off the pavement is similar to the polarised light signal of water bodies.

The documented disruption of immune function by artificial lighting across a range of taxa has potentially synergistic adverse

effects in combination with emerging pathogens and the spread of well-known pathogens under changed climates.

## Mitigating Light Pollution

A comprehensive approach to mitigating the effects of light pollution on biological systems would include five considerations: need, spectrum, intensity, direction and duration (Longcore and Rich, 2016). In short, adverse impacts of artificial night lighting could be minimised if

- unnecessary lights are extinguished or not installed;
- spectrum of light is chosen to minimise impacts (especially not ultraviolet or blue, with a preference to reduce and avoid light less than 540 nm (Falchi *et al.*, 2011));
- lights are only as bright as necessary for the purpose;
- light is directed only where it is needed, including shielding sensitive habitats from lights, even if those lights are directed downwards; and
- lights are only illuminated as long as necessary and are turned off when not needed (e.g. using timers, motion detectors or bilevel lighting systems that reduce light during low-use periods).

As an example of these considerations, duration and spectrum of lights are important for efforts to mitigate impacts on migrating birds. Attraction varies by wavelength of light (Poot *et al.*, 2008) and much work remains to be done on the functioning of avian magnetoreception under different spectra and irradiances of artificial lighting and how these interact in the field. Both red and white solid lights attract birds in a way that flashing lights do not (Gehring *et al.*, 2009). Attraction of birds to lights can be reduced by flashing (with a completely dark phase), regardless of spectrum (Gehring *et al.*, 2009), so that changes to duration can mitigate spectrum. Where lights must be on all of the time, such as on offshore hydrocarbon platforms, green lights will apparently attract far fewer birds than full-spectrum (white) lights (Poot *et al.*, 2008).

New technologies create both opportunities and challenges for mitigation of light pollution. LED (light-emitting diode) lamps have short warm-up time, are highly directional and can be dimmed easily to allow for a dynamic lighting system, but many also contain far more light in the blue spectrum than those lamps they might replace. These attributes provide the opportunity for better lighting control in terms of intensity and direction, but often also result in increased exposure to physiologically active short wavelengths that propagate more in the atmosphere. In 2016, the American Medical Association issued a statement warning against the use of blue-rich street lighting because of potential harmful effects on human health, public safety and the environment (see <http://www.ama-assn.org/ama/pub/news/news/2016/2016-06-14-community-guidance-street-lighting.page>). LEDs that are lower in blue content are reaching the market, and to reduce ecological and astronomical impacts, light and filter combinations are now being developed and installed.

Many approaches are available to mitigate the effects of light pollution on biological systems (Falchi *et al.*, 2011), and

unlike other forms of pollution, no costly clean-up is needed. Because other interest groups are involved in attempts to control lighting for the purpose of astronomical observation or energy conservation, full engagement by biologists and life scientists of all specialties is needed to ensure that measures proposed as solutions also reduce impacts to people, ecosystems and evolutionary processes. Testing and defining mitigation strategies for artificial night lighting will be an important research direction.

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October 18, 2022

Shine Ling  
Development Review Team  
Metro Transportation Communication Network  
One Gateway Plaza  
Mail Stop 22-9  
Los Angeles, CA 90012

**Executive Summary:**

The Metro Transportation Communications Network (TCN) plan to install 34 freeway-facing and 22 non-freeway facing digital billboards within the City of Los Angeles will harm drivers, and is bad policy for the City. The Draft Environmental Impact Report (DEIR) is flawed and does not account for the harms caused by digital signs, nor does it fully account for the City of Los Angeles' [ban on billboards](#) that was adopted in 2002 to reduce visual blight and improve community aesthetics and traffic safety.

Dear Shine Ling, Development Review Team, and Metro TCN Staff,

As the only national nonprofit dedicated to protecting and enhancing America's visual character, Scenic America actively supports local efforts to preserve scenic beauty and oppose visual blight in cities throughout the United States. Our organization has identified billboards as a particularly harmful form of scenic blight, with significant negative impacts, and for almost 40 years we have worked with national, state, and local officials to ensure that outdoor advertising is properly regulated.

We have learned of Metro TCN's plan to install digital signs on Metro-owned property within the City of Los Angeles, and we have reviewed the project's DEIR, published September 9, 2022. Based on the experiences of cities which have completed similar projects, as well as robust research evidence, Scenic America recommends that Metro and the City halt this project. The DEIR is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN project would increase scenic blight throughout the city, and create hazards to human health, natural environment, and quality of life.

To begin, on page IV.A-49, in the Aesthetics section, the DEIR concludes:

"...the Project would conflict with plan polices regarding scenic quality. To the extent that there are related projects that also would result in inconsistencies with plan policies regarding scenic quality, cumulative impacts associated with scenic views would be significant."

This is accurate, and the DEIR includes details about specific scenic impacts to residences and businesses at certain proposed sign locations. The DEIR also includes a review of potential for

mitigation related to alternative proposals, and concludes that allowing any digital signs will have negative aesthetic impacts. This section of the report clearly acknowledges the ways in which the proposal will conflict with the City of Los Angeles General Plan, but does not sufficiently account for the Mobility Element, specifically regarding Scenic Highways. The DEIR mentions the historic Arroyo Seco Parkway, but dismisses potential impacts to the scenic quality of the route. In light of the General Plan, these potential harms must be reevaluated.

Regarding Scenic Highways, the General Plan Mobility Element states:<sup>1</sup>

“2.16 Scenic Highways: Ensure that future modifications to any scenic highway do not impact the unique identity or characteristic of that scenic highway. Scenic Highways include many of the City’s iconic streets. Preservation and enhancement of these streets and their scenic resources need to be preserved per the Scenic Highways Guidelines in Appendix B of this Plan.”

Appendix B includes the following provisions;

“Appendix B: Inventory of Designated Scenic Highways and Guidelines

4. Signs / Outdoor Advertising

- a. Only traffic, informational, and identification signs shall be permitted within the public right-of-way of a Scenic Highway.
- b. Off-site outdoor advertising is prohibited in the public right-of-way of, and on publicly-owned land within five hundred feet of the center line of, a Scenic Highway.
- c. A standard condition for discretionary land use approvals involving parcels zoned for non-residential use located within five hundred feet of the center line of a Scenic Highway shall be compliance with the sign requirements of the CR zone.
- d. Designated Scenic Highways shall have first priority for removal of nonconforming billboards or signs. Such priority extends to properties located along, or within five hundred feet of the center line of, designated Scenic Highways.”

To ensure the above was appropriately implemented, the following language was adopted by City Council at the request of CM Rosendahl when the bus bench contract came up for renewal in 2011:

"(6) CONTRACTOR's site preference. New Bus Benches will be installed in a manner that is consistent with all local zoning codes, including restrictions on off-site advertising set forth in the General Plan, Community Plans, Specific Plans as enacted by City Ordinance, the California Coastal Act, and all other applicable law."

Regarding the traffic safety portion of the DEIR raises other concerns:

Contrary to the findings of the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior. In brief, digital billboards create dangerous and unavoidable driver distractions, by design and for the

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<sup>1</sup> <https://planning.lacity.org/plans-policies/initiatives-policies/mobility>

purpose of drawing driver attention away from the road and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws to ban cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. For an extensive list of the dangers which digital billboards pose to drivers, please refer to this compendium of research studies which describe the hazards at length.<sup>2</sup> Also note that the illumination standards, hours of operation and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in [Version B+ May 2021](#).

The latest research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous.<sup>3</sup>

The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety, and relies on a literature review of stale and inadequate research. This review was itself limited to three studies. First, it cites a FHWA 2013 report on digital signs which is badly flawed, as explained at length in the 2015 report “A Peer-Reviewed Critique of the Federal Highway Administration (FHWA) Report Titled: *“Driver Visual Behavior in the Presence of Commercial Electronic Variable Message Signs (CEVMS)”* The other two studies in the report were sponsored by the outdoor advertising industry.<sup>4</sup> The other two studies were sponsored by the outdoor advertising industry, and should not be taken at face value.

This is not a sufficiently robust research design for concluding that digital signs will not harm drivers. The compendium of research cited above contains a thorough meta-analysis of dozens of studies, including tests of individual driver behavior, and concluded that digital signs draw driver attention to a dangerous degree. The DEIR acknowledges that the City of Los Angeles has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, regarding this program, the draft concludes:

*“The TCN Structures would be located outside of the public right-of-way on Metro-owned property. Thus, the TCN Structures would not preclude the City from installing Vision Zero improvements to enhance the safety of the High Injury Network and, therefore, would not conflict with the Vision Zero Program.”*

Essentially, Metro states that hazards created by installing digital signs are a problem which the rest of the city must mitigate. However, the dangers posed by Metro’s signs would not be limited to its property. The City’s roadway users would suffer the consequences, which would undermine the Vision Zero Program.

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<sup>2</sup> Compendium of Recent Research Studies on Distraction from Commercial Electronic Variable Message Signs (CEVMS), Jerry Wachtel, CPE President, The Veridian Group, Inc. Berkeley, California, Feb., 2016 (October 2020 edition), <https://www.scenic.org/wp-content/uploads/2021/10/Billboard-Safety-Study-Compendium-10-16-2020.pdf>

<sup>3</sup> <https://www.scenic.org/blog/research-shows-that-digital-traffic-safety-messages-contribute-to-highway-accidents-and-fatalities/>

<sup>4</sup> <https://www.scenic.org/wp-content/uploads/2021/06/Critique-of-FHWA-2013-Billboard-Safety-Final-Report.pdf>

The DEIR and related TCN communications cite the advantages of digital signs as an opportunity to remove static billboards. This tactic has been employed by other cities and its implications are significant, because it acknowledges that billboards are undesirable, and that reduction in the total number of billboard structures or faces can serve as a compromise to expediate the approval of digital billboards. If they were to accept a compromise like this, Los Angeles should understand the exchange ratios which other cities have negotiated.

For example, Tampa, FL accepted a deal for a ten to one ratio. Kansas City, MO considered a proposal for an equivalent seven to one conversion agreement. Gulfport, MS had an agreement for a six to one conversion ratio. The terms in the Los Angeles plan are uncompetitive, with a two to one ratio. Once again, the basis of these provisions is an understanding that billboards in general are bad for communities. Further, the LA City Planning Commission recommended a take-down ratio of ten static billboards for every digital billboard.

Finally, evidence indicates that all billboards, including digital billboards, can reduce property values by more than \$30,000 for individual homes.<sup>5</sup> Because of the high visibility of digital billboards, many homeowners would be impacted by the TCN plan. In addition, while the TCN plan notes that no sign structures are to be erected on residentially-zoned land, recent housing programs are incentivizing the placement of residential housing units on commercial and other zoned lots. Thus increasing the likelihood of direct impacts of these signs in and around residential dwelling units and all of those who live within them.

In light of these concerns, which the DEIR fails to address, we strongly recommend that neither Metro nor the City move forward with the installation of digital signs on its property within the City of Los Angeles.

Thank you for your consideration, and we will be available to answer your questions and provide guidance as needed.

Sincerely,



Mark Falzone,  
President, Scenic America

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<sup>5</sup> [https://www.scenic.org/wp-content/uploads/2019/09/Beyond\\_Aesthetics1.pdf](https://www.scenic.org/wp-content/uploads/2019/09/Beyond_Aesthetics1.pdf)

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**From:** Wendy-Sue Rosen [rosenfree@aol.com]

**Sent:** 10/24/2022, 5:02 PM

**To:** [tcn@metro.net](mailto:tcn@metro.net)

**Cc:** [patrick.frank@scenic.org](mailto:patrick.frank@scenic.org); [wncluc@gmail.com](mailto:wncluc@gmail.com)

**Subject:** Scenic Los Angeles Response to Metro's TCN Draft EIR

Please include the attached letter from the Coalition for a Scenic Los Angeles to the record in response to Metro's TCN Draft EIR. We look forward to reviewing Metro's responses. Please add [rosenfree@aol.com](mailto:rosenfree@aol.com), [wncluc@gmail.com](mailto:wncluc@gmail.com), and [patrick.frank@scenic.org](mailto:patrick.frank@scenic.org) to the notification list for this Project.

Thank you,

*Wendy-Sue Rosen*

Scenic Los Angeles



October 24, 2022

Attn: Shine Ling, Development Review Team  
Metro Transportation Authority  
One Gateway Plaza, Mail Stop 22-9  
Los Angeles, CA 90012  
Transmitted via email to: tcn@metro.net

Re: Metro Transportation Communications Network Program Draft EIR  
City of Los Angeles Council File #: 22-0392

Dear Metro Development Review Team:

The Coalition for a Scenic Los Angeles (“Scenic LA”)<sup>1</sup> submits the following comments and questions (see Question Appendix) in response to the Los Angeles County Metropolitan Transportation Authority (“Metro”) Transportation Communications Network (“TCN”) Program (“Project or TCN Program”) Draft Environmental Impact Report (“DEIR” or “Draft EIR”) on behalf of our 20,000 members. Scenic LA is the leading voice dedicated to the enhancement and protection of the visual environment of the greater Los Angeles area.

According to the Draft EIR, Metro proposes to implement the TCN Program, which would provide a network of structures with digital displays (“TCN Structures”) that would incorporate intelligent technology components to promote roadway efficiency, improve public safety, augment Metro’s communication capacity, and provide for outdoor advertising revenues. Implementation of the Project would include the installation of up to 34 Freeway-Facing TCN Structures and 22 Non-Freeway Facing TCN Structures all on Metro-owned property. The total maximum amount of digital signage associated with the TCN Structures would be up to approximately 55,000 square feet. As part of the TCN Program, a takedown component would be implemented at a 2 to 1 square footage takedown ratio of existing off-premise static displays. Signage to be removed would include, at a minimum, approximately 200 off-premise static displays located within the City of Los Angeles (“City”).

Metro’s TCN Program promises to improve traffic safety and congestion, reduce the amount of outdoor advertising in the City, and raise revenue to fund new Metro programs. These goals may appear laudable, but the first two are unsupported by fact-based evidence, and the efficacy of the third is both uncertain and far outweighed by the negative impacts of the Project, which

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<sup>1</sup> The Coalition for a Scenic Los Angeles, formerly the Coalition to Ban Billboard Blight, is a non-profit organization dedicated to protecting and enhancing the city's visual environment. A chapter of the national non-profit organization, Scenic America, the Coalition for a Scenic Los Angeles advocates through education and political action on behalf of many important issues, including: reducing visual blight from billboards and other forms of commercial signage to promote traffic safety and improve public health; preserving urban forest and open space; establishing federally-recognized Scenic Byways; undergrounding utility lines; treating our scenic resources as treasures to be passed on to future generations; promoting equitable public policies to accomplish those goals.

include creating traffic hazards, degrading the City's visual environment, and greatly increasing the exposure of a captive audience of children and adults to commercial advertising of products and services that studies have shown have deleterious effects on physical and mental health.

The DEIR fails to adequately examine these impacts and arrives at faulty conclusions regarding their significance. The DEIR is inadequate because its conclusions are not supported by substantial evidence. The City of Los Angeles and Metro must therefore reject these conclusions, for the reasons that follow:

#### IV.A. Aesthetics

The Project proposes to place 34 digital billboard structures along eight Los Angeles freeways. All but one are 672 sq. ft., the size of a standard full-sized billboard. Most are double-sided. The heights of the signs range up to 95 ft. above grade, and 50 ft. above the adjacent roadway. The result is 62 freeway-facing sign faces with a total of 42,192 sq. ft. of advertising and public message space. The Project also proposes to place 22 primarily double-sided digital billboard structures along 16 different commercial streets. These signs range in size from 300 sq. ft. to 672 sq. ft. and from 30 to 65 ft. above grade. The result is an additional 35 non-freeway-facing sign faces with a total of 12,732 sq. ft. of advertising and message space.

By any measure, Metro's proposed digital signs are an assault on the visual landscape of the City, which is a public resource and not "owned" by commercial advertisers. As a comparison, between 2006 and 2008, two billboard companies were allowed to convert 101 full-sized conventional billboards on City streets to digital. The result was a public outcry over the intrusion of bright, distracting, ever-changing advertisements in communities that had successfully fought for the City's 2002 ban on new off-site advertising signs. The City Council recognized that digital billboards were uniquely intrusive visual elements, and banned any new digital billboard conversions. All but two of the digital billboards were turned off by court order, a state in which they remain today.

The DEIR ignores this history in concluding that the visual impact of the Project would be less than significant, with the exception of five cases where the billboards are close to or within historic resources and/or districts. The billboard locations are only shown through aerial renderings (there are no photographs or drawings/maps specific enough to show the setting or exact location of structure placement), which provide almost no information about the visual impact on the near and distant landscape, including residential properties. The DEIR is therefore inadequate as an informational document, as it fails to provide sufficient information to allow decisionmakers and members of the public to fully and accurately evaluate visual impacts of the Project. Even more egregious, the renderings of actual billboards are shown in the daylight (when contrast between the sign and its background is least evident) against a backdrop of blue sky with a few scattered clouds. One is left to guess how such a sign would appear against a backdrop of buildings or the trees and parks and mountains that make up such a notable part of the Los Angeles landscape.

The DEIR asserts in its "Impact Analysis" that views of the Santa Monica, Verdugo, and San Gabriel Mountains from the freeways slated for new digital billboards are "intermittently available." There is no effort to define "intermittent" or to explain why a billboard rising 50 ft. into the air above the roadway would not intrude upon such views, regardless of how long such views were available. In fact, anyone familiar with travel on these freeways can attest that views of mountains and other natural features of the landscape are "available" to people in vehicles for extended periods of time. The conclusion that a full-sized digital billboard high in the air with commercial ads changing every 8 seconds has a less than significant impact on the surrounding natural landscape of the City is completely unwarranted.

As a specific example, the DEIR asserts that impacts on views of the Ballona Wetlands adjacent to the SR-90 freeway wouldn't be significantly impacted by two, double-sided digital billboards 80 feet above grade because such views would be transitory. This apparently assumes that a view has value only if the viewer is stationary, but the DEIR presents no evidence or argument in support of this assumption. The DEIR also asserts that impacts of views of concrete-lined sections of the Los Angeles River are insignificant because the City of Los Angeles doesn't consider that section of river a scenic resource. This statement displays either ignorance or willful disregard of the City's Los Angeles River Revitalization project, which envisions park space, trees, and other amenities along that part of the river, and will clearly make it an important visual resource. Full-sized, digital billboards within 300 ft. of that channel would clearly impact the scenic views of that section of the river once that project becomes reality. The correct environmental baseline for the Project is the future condition including park-related amenities.

The DEIR concludes that impacts of light and glare from the proposed billboards are less than significant. The conclusion is based on a prediction that light trespass from a particular digital sign on the nearest residential property will not exceed the 3.0 footcandles limit set forth in the Los Angeles municipal Sign Ordinance. This measure is widely considered outmoded when applied to digital signs, because it doesn't adequately reflect the visual impact of such signs. When digital billboard conversions started appearing in Los Angeles in 2007, the City began receiving complaints from residents about the effect of the signs near their homes and apartments, especially at night. Yet, in almost every case when the City responded to such complaints, the light from the sign measured at that residential property line was under the 3.0 foot-candles limit. This phenomenon is related to the brightness of the surface of the sign as viewed from a distance, as well as the effect of advertisements changing (typically, every 8 seconds). This creates a flickering effect that many residents likened to that of a TV in a darkened room, the brightness changing every time the advertisement changes. This phenomenon is highly disturbing to affected residents even when signs don't rise to the level of a violation of a city ordinance.

As one example in the TCN Program, a full-sized, double-sided sign along the I-405 freeway at Exposition Blvd. would be within 100 ft. of a large, 4-story apartment building. Residents of apartments with windows oriented toward that sign would certainly suffer from the light effects, and may have to resort, as some residents did in the past, to buying blackout curtains. The DEIR makes no attempt to analyze such impacts on that residential property or any other that



may afford views of the TCN signs, but simply dismisses any light and glare impacts as insignificant.

It is notable that the digital sign standards for brightness originally enacted by the City in 2009 were part of an ordinance initially considered entirely exempt from review.<sup>2</sup> Ordinance number 180,841, which sets the City's regulatory standards for digital billboard brightness was ultimately adopted based on a negative declaration (ENV-2009-0009-ND) that simply assumed the brightness regulations were sufficient to avoid any environmental impacts. Moreover, in recommending the adoption of the negative declaration to justify the ordinance including the brightness limitations, then-Director of City Planning S. Gail Goldberg, AICP, noted that "**The proposed new citywide sign regulations included a ban on new off-site signs, including new off-site digital displays...**"<sup>3</sup> The digital sign brightness standards adopted as part of LA Ordinance 180,841 were thus never intended to apply to the present situation, and the potentially significant impact of digital signage at or near freeways and other roadways, particularly where they impact a visual resource such as a park or river have never been reviewed by the City. The City has not adequately justified its use of the chosen threshold, which was never studied to determine whether it is sufficient to avoid potentially significant environmental impacts.

The DEIR concludes that the TCN Program will improve aesthetics in the City because it will require the removal of existing billboards at a 2:1 ratio to the new digital signs, calculated on the square footage of the signage space. This conclusion is totally unwarranted. The DEIR provides no information about the location of the signs, only stating that many "are in a state of disrepair." In the first place, comparing a brand-new, full-sized digital billboard on a freeway or commercial corridor to an existing static billboard is an extreme case of comparing apples and oranges. Beyond the difference in light effects already discussed, a digital billboard generates much more revenue than a static billboard and thus is much more valuable. That revenue is related to the volume of traffic, or potential "eyeballs" on a given advertisement. Thus, a TCN sign on the I-405 freeway, which carries more than 300,000 vehicles a day, would have an aesthetic impact far greater and be many multiples more valuable than a static billboard likely in a state of disrepair at some unknown location on a city street.

These disparities have been recognized by the Los Angeles City Planning Commission, which adopted a revised Sign Ordinance (currently pending with the City Council) that allows new digital off-site signs in special sign districts only if existing static billboards in the City are removed at a ratio of 10:1, based on square footage of signage area. Other cities in the country have imposed similar "takedown" ratios as part of allowing new digital billboards. Thus, for the TCN Program to have anything approaching a meaningful positive impact on the City's aesthetic environment, the takedown ratio would have to be dramatically increased.

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<sup>2</sup> See ENV 2009-0009-CE, available as part of City of Los Angeles Council File 08-2020, available at <https://cityclerk.lacity.org/lacityclerkconnect/index.cfm?fa=ccfi.viewrecord&cfnumber=08-2020>.

<sup>3</sup> Los Angeles Director of Planning S. Gail Goldberg, Aug. 5, 2009 letter to Los Angeles City Attorney Carmen Trutanich, p. 2, included as an exhibit to LA City Attorney Carmen Trutanich's August 5, 2009 report to the City Council, available at: [https://clkrep.lacity.org/online/docs/2008/08-2020\\_rpt\\_atty\\_8-5-09.pdf](https://clkrep.lacity.org/online/docs/2008/08-2020_rpt_atty_8-5-09.pdf) (see pdf p. 8).

Additionally, the DEIR is silent on the issue of the legality of the billboards to be removed as part of the TCN Program. In 2013, an inventory by the Los Angeles Department of Building and Safety revealed that more than 800 existing billboards had either been erected without permits, or altered (typically enlarged, raised, or had a second face added) in violation of their permits. In 2015, City Attorney Mike Feuer wrote a formal letter to the City Council's Planning and Land Use Management Committee stating his office's readiness to bring legal action against the owners of those billboards, but the Committee never approved a request by Building and Safety for inspectors and funding to proceed with that enforcement effort. It would be a travesty for unlawful billboards to be counted against the TCN Program's takedown requirement, regardless of the ratio. Unless billboards in those categories are excluded from the Project's takedown of existing billboards, the DEIR's conclusions about the billboard takedown's impact on aesthetics are based on fallacious information and an improper environmental baseline and cannot be relied upon.

#### IV.E. Energy

The conclusion that cumulative impacts related to energy use are less than significant is not supported by substantial evidence. The total electricity consumption of the TCN Program is estimated to be 3,288,690 kWh per year. In comparison, the U.S. Energy Information Administration estimates the average household's electricity use at 11,000 kWh per year. Thus, the Project's electricity use would be the equivalent of 298 households. The DEIR estimates a savings of 1,000,000 kWh per year from the takedown of existing billboards, but provides no evidence, such as DWP utility charges, to support this. In any case, the assertion that electricity used to illuminate 110,000 sq. ft. of static billboard space in nighttime hours is nearly one-third the amount used to operate 55,000 sq. ft. of digital signage operating 24 hours per day is unsupported by substantial evidence and may not be relied upon.

The conclusion that the Project's annual increase of 514 metric tons of carbon dioxide is less than significant is also doubtful. The U.S. Environmental Protection Agency estimates the average greenhouse gas emission by an average gasoline powered passenger car to be 4.6 metric tons, meaning the TCN Program's emissions would be equivalent to that of 111 cars. However, the DEIR relies on questionable assumptions. It asserts that overall vehicle emissions would be reduced because messages on the signs regarding traffic conditions and alternate routes in the event of traffic jams would reduce congestion. However, it cites no studies nor does it provide other evidence to support this assertion, which means it must be regarded as guesswork, not substantial evidence.<sup>4</sup> In fact, amber alert signs on major Los Angeles freeways currently display messages regarding traffic conditions and travel times, calling into question the efficacy of TCN signs for the same purpose. The DEIR also assumes a reduction in emissions due to the fact that static signs slated for takedown require monthly maintenance trips by trucks, whereas changes of messages on the TCN signs can be done remotely. Again, there are no facts and figures to accompany this assertion. Furthermore, the DEIR's statement that many static signs slated for takedown are in a state of disrepair would

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<sup>4</sup> CEQA Guidelines 15384 defines "substantial evidence" as "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion."

seem to imply that no maintenance is currently being performed on those billboards. If that is true, the DEIR's calculations regarding emissions are faulty and its conclusion invalid.

#### IV.I. Land Use and Planning

The DEIR correctly concludes that two freeway-facing billboards and four non-freeway-facing billboards in the TCN network conflict with official land use policies and thus their impacts are significant in the absence of mitigations, which include relocation and/or removal from the Project. However, the TCN Program in its entirety is in serious conflict with land use policies, for the following reasons:

The TCN Program would violate the City's 2002 prohibition of new off-site advertising signs in letter and spirit. That ban was approved after public outcry over the proliferation of billboards and their negative impacts on the City's visual environment. The City's off-site sign ban was repeatedly attacked in court by billboard companies, but the City ultimately prevailed, with courts holding that the City could limit this form of speech in the interest of improving traffic safety and the City's aesthetic qualities. As previously discussed, billboard companies tried to circumvent this ban by converting static billboards to digital, but the City's right to prohibit those conversions was also upheld by the courts.

In 2009, the City undertook a revision of its Sign Ordinance to strengthen community protections against outdoor advertising and, most importantly, to insure that it would stand up against future legal challenges. After numerous public hearings, the City Planning Commission ultimately approved a revision that restricted any new off-site signs, including digital, to sign districts in 22 intensive commercial areas. As previously stated, that revision is now pending before the Los Angeles City Council.

Because legal questions are so closely entwined with the City's billboard history, it is necessary to look at those questions in light of the Project's land-use impacts. In 2009, the Ninth Circuit Court of Appeals ruled in *Metrolights v. City of Los Angeles* that the City's ad-supported Street Furniture Program was lawful because it was consistent with the goals of enhancing aesthetics and traffic safety. However, the court also said that making exceptions to the off-site sign ban for the primary purpose of raising revenue would render it unconstitutional. The essence of that ruling was reiterated in a number of subsequent lawsuits by sign companies seeking to overturn the off-site sign ban.

This is a critically important point, because it can be persuasively argued that the primary purpose of the Metro TCN Program is to raise revenue, and there is scant evidence that the Project will have a positive effect on traffic safety and aesthetics. The issue of traffic safety will be discussed below; suffice it to say that the studies cited in Section IV.K. Transportation lack credibility, and ample evidence exists to show that large, digital billboards in the line of sight of freeway drivers are distracting and potentially dangerous. As for aesthetic impacts, the DEIR's deficiencies in its analysis have previously been discussed. But in the context of the aforementioned court rulings, one might compare the aesthetic impact of a static advertisement in a street-level bus shelter with a full-sized, brightly-lighted digital billboard 50 feet above the

freeway surface and visible for long distances to upwards of 300,000 vehicle drivers and passengers every day. Once again, the proverbial comparison of apples and oranges.

City history shows that the policy of Los Angeles in the past 20 years has been to severely limit new static and digital billboards. It is likewise obvious that the Metro TCN Program would seriously undermine this policy, and thus its negative impact on land use policies is therefore highly significant and needs to be properly evaluated.

Other land-use goals and policies are undermined by the TCN Program. On September 28, 2022, California Governor Gavin Newsom signed two bills that would essentially allow the building of by-right housing on property zoned for commercial use. Debate on such measures was taking place before and during the preparation of the DEIR, but doesn't include a single word of discussion about how any of the 62 freeway-facing billboards and 35 non-freeway-facing billboards on major commercial corridors might impact future residential developments and their residents. This is a serious omission, and undermines the conclusion that the Project's impacts on residential property would be less than significant.

The DEIR also fails to acknowledge the fact that the City has existing policies to incentivize the construction of housing on commercial corridors. Both the Transit Oriented Communities Program (TOC) and projects built under the Residential Accessory Services Zone Program (RAS) have resulted in additional housing units constructed on some of the City's busiest corridors – some of which are targeted for non-freeway-facing billboards.

Finally, the DEIR asserts that the TCN Program would reduce air pollution by reducing traffic congestion and raising revenue for Metro programs. However, it is silent on the well-documented negative effects of billboard advertising on public health and wellness, which is the subject of the City's "Plan for a Healthy Los Angeles," officially adopted by the City Council in 2015 as an Element of the City's General Plan – part of the City's long-range planning goals.

According to the DEIR, the TCN signs would not carry ads for alcohol, tobacco, or cannabis products, and any content containing violence, obscenities, and "other related subject matters." This leaves such categories as fast food, sugary drinks, and gambling, all of which have been shown to have a deleterious effect on physical and mental health. A 2020 study of billboard advertising in Los Angeles by AdQuick found that McDonald's was the top billboard advertiser in the city. Other fast food purveyors are frequent billboard advertisers, as well as Coca-Cola and other soft-drink brands. Consumption of these products has been shown to contribute to unhealthy levels of obesity throughout the United States.

A 2013 study titled "Outdoor advertising, obesity, and soda consumption: A cross-sectional study," by UCLA researchers found a strong correlation between the percentage of outdoor advertising promoting unhealthy food and beverages and the rate of obesity among residents of 220 census tracts in Los Angeles and New Orleans. Another study titled, "A Cross-Sectional Prevalence Study of Ethnically Targeted and General Audience Outdoor Obesity-Related Advertising" by researchers at UCLA and four other universities, plus the California Department of Public Health, found that low-income and ethnic minority communities in Los Angeles and

three other major cities were disproportionately exposed to outdoor advertising for fast food, soda, and other products that can promote obesity. A third study, titled “Clustering of unhealthy outdoor advertisements around child-serving institutions: A comparison of three cities,” found that unhealthy ads, including those for junk food, were clustered around child-serving institutions in Los Angeles and Philadelphia. The study, conducted by the UCLA School of Public Health, the University of Pennsylvania, the University of Texas, and American University, concluded that zoning and land use regulations should protect children from unhealthy commercial messages, particularly in neighborhoods with racial/ethnic minority populations.

The audience for the TCN Program freeway-facing signs will be everyone in vehicles traveling those freeways, which means people of all ages, ethnicities, and economic status. The audience for the Project’s non-freeway-facing signs will be those same persons, plus people traveling by City bus or taxi, people riding bicycles, and pedestrians. A number of those digital billboards are in lower-income/ethnic minority neighborhoods, and some are near schools and parks. As one example, Non-Freeway-Facing Sign 07 on Venice Blvd. just west of Robertson Blvd. is less than 1/3 mile from Hamilton High School. And this 300 sq. ft. digital sign is near a major transit stop, which means a large number of students could be passing it on their way to and from school. Because all the proposed signs are on Metro property, many are near transit stops where younger persons tend to congregate.

The DEIR is incomplete without an analysis of the Project’s public health impacts in the context of City policies such as the “Plan for a Healthy Los Angeles.” The DEIR acknowledges significant impacts from four non-freeway-facing signs and two freeway-facing signs, but a thorough analysis must examine the potential public health impact of each and every one of the 98 digital billboards that will be advertising commercial products to millions of people, including vulnerable young people and those in communities where access to healthy food, medical care, and other factors, including outdoor advertising, have led to obesity and other unhealthy outcomes.

#### IV.K. Transportation

The environmental analysis concludes that the TCN Program would not create any significant road hazards. In support of this conclusion, three studies are cited, one by the Federal Highway Administration (FHWA) in 2012, and two by the Foundation for Outdoor Advertising Research and Education (FOARE) in 2007. The FHWA study has been widely criticized as flawed in its methodology and conclusions, and the two FOARE studies cannot be considered credible, since the foundation is an arm of the outdoor advertising industry and has billboard company executives on its Board of Directors.

Scientifically sound studies conducted by independent bodies have found that digital billboards are indeed a distraction to drivers, with statistical evidence showing an increase in accidents in their proximity. These studies are summarized in “Compendium of Recent Research Studies on Distraction from Commercial Electronic Variable Message Signs” by Jerry Wachtel of the Veridian Group, an independent human factors research firm. In addition to ignoring studies from places such as Florida and Alabama that call into question the safety of digital billboards

on highways, the DEIR flatly dismisses any studies outside the United States, including ones conducted in Sweden and Australia that indicate the hazardous potential of digital signs on highways.

Rather than look at these studies for possible information relevant to analysis of the TCN Program, the DEIR simply dismisses them out of hand on the grounds that the United States has unique roadway characteristics. No evidence is included to support this assertion. Instead, the public is apparently expected to assume that the experience of driving outside the United States is so fundamentally different that even looking at these studies would be a waste of time. This calls into question the conclusions in this section, and the fundamental credibility of the analysis.

The analysis, once again, ignores history. In 2008, former Gov. Arnold Schwarzenegger proposed allowing commercial advertising on “amber alert” message boards on freeways and state highways. The Los Angeles City Council, citing the potential for driver distraction and potential safety hazards, unanimously approved a resolution to oppose the plan, which was eventually dropped. The message boards are closer to motorists’ line of sight than the proposed TCN signs, but it’s certainly relevant that traffic safety concerns were raised by the City’s major legislative body as well as many others.

For these reasons, the traffic safety analysis and the conclusion that impacts are less than significant should be completely rejected.

## V. Alternatives

The only alternative that addresses the serious environmental issues discussed above is Alternative 1: No Project Alternative.

According to the analysis, this alternative would mean that none of eight project goals would be realized. A number of those goals concern the broadcasting of information and data to motorists concerning traffic conditions, hazards, and other public safety matters, such as natural disasters. But this data is already being broadcast on CalTrans “amber alert” message boards on major freeways, and that network could be expanded and updated at a fraction of the cost of the proposed TCN Program. The DEIR provides no analysis of the problems that could arise from the mixing of rapidly-changing, brightly-lighted, colorful digital advertisements for products and services with important messages about traffic issues and public safety. During the public debate on the Schwarzenegger proposal, many people said that they tended to tune out billboard advertising, meaning that ads on message boards might have caused them to miss any traffic information and public safety messages. While this is anecdotal evidence, it would certainly seem to warrant consideration and further analysis into the wisdom of mixing two entirely different forms of information. However, the DEIR is silent on this issue.

The most significant goal that would go unrealized by the No Project Alternative is the raising of revenue for Metro and the City of Los Angeles. Indeed, it is clear from the scope of this Project and the amount of commercial advertising it would beam at motorists on Los Angeles streets

and freeways that the revenue source has been, from the very beginning, the major goal of the TCN Program. But should the city put its off-site sign ban in legal jeopardy for the sake of revenue? Should it potentially turn the city freeways and streets over to thousands of new billboards? Should it allow motorists and residents to suffer the adverse effects of distracting signs and the light they emit? Should public health be put at risk in the city's most vulnerable communities? Should public property be used to sell products and services for private businesses? The answer is NO, meaning that the No Project Alternative is the only alternative.

Thank you for your consideration,

A handwritten signature in black ink, appearing to read "Patrick Frank". The signature is fluid and cursive, with a large initial "P" and "F".

Patrick Frank  
Scenic Los Angeles

cc: City of Los Angeles

## Question Appendix

### IV.A. Aesthetics

**Q:** Without full disclosure of total ad faces in the Project Description, the Project Description is inadequate. Please update the Project Description and fully analyze all ad faces proposed.

**Q:** The City Planning Commission has recommended 10 to 1 takedown ratio for sign removal and Metro recommends 2 to 1. What is the basis for the decision to adopt a 2:1 ratio? Why aren't you complying with the City Planning Commission's recommendation?

**Q:** Provide renderings, both day and night to demonstrate impact of signage and distance of light passage.

**Q:** In addition to the list of sign locations and map drawings provided in the DEIR, please provide renderings of each sign face in its exact location using photographs that demonstrate the setting, direction, projected light trespass, and location of the proposed structures, the distance from the center of the roadway, the zone for adjacent properties to each sign, and a description of adjacent properties. Please provide site-specific analysis.

**Q:** Please explain why there has been no disclosure of the total number of ad faces proposed? The total number of proposed sign faces is not referred to in the DEIR anywhere. Why not?

**Q:** Please define intermittent and please explain why a billboard rising 50 feet above the roadway would not intrude upon the near and distant views from each sign.

**Q:** The DEIR appears to assume that "freeway-facing" digital billboards will not have an impact on nearby residential properties and fails to evaluate such impacts. Please disclose potential significant impact from freeway-facing sign locations to residential properties and the natural environment nearby.

**Q:** Please provide research regarding the health impacts of 24/7 light trespass and changing light intensities on nearby residences, people with light sensitive eye conditions, seizure disorders, ADHD, open space, insects and birds.

**Q:** How can Metro justify a 2:1 takedown in light of the City's recommended 10:1 ratio. Please analyze the difference of Metro's small takedown ratio in contrast to the City's much higher recommended takedown ratio.

**Q:** How many of the 200 Metro static signs are in a state of disrepair?

**Q:** How many of the 200 Metro static signs have current permits? How many have no permits on file? How many have been altered and are out of compliance with their existing permits?



#### IV.E. Energy

**Q:** Please provide facts and figures to explain the reduction in emissions claimed.

**Q:** Given the volume of our freeways, what proof can you present that freeway messaging will result in the reduction in greenhouse gasses related to congestion? Might it merely transfer congestion to nearby streets?

**Q:** What energy savings would be experienced should the digital billboards be shut off nightly between the hours of midnight and 7:00 a.m.?

**Q:** What studies exist to provide evidence of greenhouse gas reductions as a result of freeway messaging signs?

**Q:** Please provide data to corroborate the assertion that electricity used to illuminate 110,000 sq. ft. of static billboard space in nighttime hours is nearly one-third the amount used to operate 55,000 sq. ft. of digital signage operating 24 hours per day.

#### IV.I. Land Use and Planning

**Q:** You have not taken scenic or natural resources in the siting of these billboards into consideration. There will be impacts to Ballona Wetlands, Sepulveda Basin, etc. Have you analyzed these impacts?

**Q:** Will you be going to the Coastal Commission for permitting the signs that are located in and will impact the Coastal zone?

**Q:** How can you prohibit violent and other content (open to interpretation)? That would be a violation of the 1st amendment. The billboard industry is very litigious as the City of LA has experienced.

**Q:** How do these placements comply with the Highway Beautification Act?

**Q:** Some of the proposed locations are also proposed for adjacent or nearby housing development? How will the proposed signs impact these future projects and existing residentially zoned areas?

**Q:** The City of LA has a billboard ban. How will this approval impact the ban and will it make it so the ban cannot be defended in court?

**Q:** Please provide information about future housing developments that have been and may be proposed for adjacent properties. Please provide information about current housing that will be within the viewshed of proposed signs.

**Q:** Housing bills recently signed into law by the Governor permitting by-right housing development on commercial corridors, and the City's TOC and RAS programs must be analyzed in relationship to future development in areas where Metro intends to place digital billboards. Housing development is being placed on commercial corridors. The DEIR failed to acknowledge this important fact. Current and future cumulative impacts must be analyzed and the information provided in a recirculated Supplemental EIR.

**Q:** What legal analysis has been done to assess whether this Project will exceed the court's standard for the City's ability to uphold the 2002 Sign Ordinance and the City's ability to regulate off-site signage. Will the TCN Program undermine or jeopardize the 2002 sign ban in any way?

**Q:** How will the City, Metro and/or outdoor advertising partners operating the TCN Program define the appropriateness or representations of acceptable violence, obscenities, and "other related subject matters" related to the expression of free speech, especially in light of how litigious the billboard industry is?

**Q:** Do the proposed sign locations all comply with existing Specific Plans, Community Plans and Scenic Roadway designations as noted in the Mobility Element of the City's General Plan?

**Q:** The DEIR fails to address cumulative impacts of the TCN Program in the context of other off-site advertising programs currently approved or seeking approval in the City. Cumulative impacts need to be addressed in conjunction with the recently adopted new City Street Furniture Program ("STAP"), and the proposed Interactive Kiosk Experience ("IKE") promoted by the Tourism and Convention Board.

#### IV.K. Transportation

**Q:** The traffic safety studies you rely on in the Draft EIR have been debunked. Will you update studies to include those that are relied on by experts in the field?

**Q:** Please provide accident rates at the proposed billboard locations and if you don't have them, please request necessary studies.

**Q:** Do any of the proposed sign locations appear at or near locations identified in the LAPD/Vision Zero - High Injury Network?

**Q:** Please provide evidence to corroborate your statement that vehicle emissions will be reduced as stated. Please review recent traffic study that notes the impact of digital changing traffic safety messaging on traffic indicating that signs tend to slow traffic and contribute to accidents (which also slow traffic). The typical freeway driver in Los Angeles knows well the fact that when a CalTrans digital messaging board has a message posted that drivers slow and often brake thus contributing to traffic slowdowns and artificially created congestion.

**Q:** Please provide accident records for all locations targeted for digital messaging signs.

**Q:** Did Metro consider the dangers of placing freeway-facing digital billboards at locations in close proximity to freeway interchanges where drivers are required to change lanes and merge from one route to another?

**Q:** Do the proposed sign locations comply with the Highway Beautification Act?

**Q:** Please review additional studies that evaluate driver distraction resulting from the viewing of digital changing messaging on billboards.



# Villa Marina Council

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Marina del Rey, CA 90292  
VillaMarinaCouncil@gmail.com

September 28, 2022

Los Angeles City Council  
200 N. Spring Street  
Los Angeles, CA 90012

Dear Council Members:

I'm writing on behalf of 685 families who live in the Villa Marina community in Marina Del Rey, represented collectively by the Villa Marina Council. We have learned about the proposed Metro Transit Network Communication Program putting up digital billboards, including two at the intersection of the 90 Freeway and Culver Boulevard, in close proximity to our homes.

Councilmembers should be aware that of all the residents who have commented on this idea not a single one has expressed any support for the proposal. The response has been universally negative among our homeowners and renters, who have reviewed the suggested benefits and find that none stands up to scrutiny except the desire for revenue – and strongly object to selling off the environment surrounding the Ballona Wetlands for a share of advertising dollars.

Digital billboards along the freeway are very poor media for sharing information about road conditions or emergencies. There are other, safer and less disruptive methods already in place for doing so, including cell phone texts and emails that can be read and digested in more than an instant, when one is not driving at freeway speeds.

Because of their brightness and changing imagery, digital billboards are far more distracting to drivers than stationary billboards, and high speed makes a lapse in attention more dangerous. When the 90 Freeway comes to an intersection a few hundred feet further, cars run the light, causing accidents with the traffic on Mindanao Way. The greater distraction caused by a digital billboard would take an increased toll in accident victims and make our neighborhood less safe for drivers, passengers, and pedestrians.

The 90 Freeway is a poor choice of location for other reasons. The traffic moves very quickly, but the 90 is really a short stretch of roadway. Cars headed southwest at the proposed location are just about to exit the freeway, while those headed northeast frequently turn off after brief local trips. Digital billboards are distracting and uninformative over any freeway, but they seem particularly ill suited to the 90 at Culver Boulevard.

Light pollution in the city is an issue that will have to be addressed eventually by the Council, and the best time to address it is before additional electronic media are allowed on the skyline. A digital billboard creates constant visual “noise” that cannot be dialed down. We have seen what they have done to the look of rapidly developing cities or entertainment centers. Picture those changing images blinking through your curtains as you try to sleep, casting a digital glow over the Ballona Wetlands from a height above the freeway.

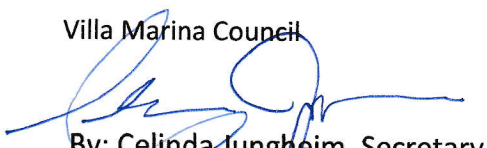
We are not alone in objecting to billboards in this proposed location. In his letter to Shine Ling of June 1, 2022, Councilmember Mike Bonin refers to these billboards (FF-29 and FF-30) and expresses concern over their proximity to the Ballona Wetlands, which he calls “the only State Ecological Reserve in Los Angeles County. Metro should seek input ... and analyze the aesthetic and biological impacts to visitors and wildlife of having illuminated advertising in such close proximity to the Ecological Reserve. The Ballona Wetlands are also a critical coastal resource under the jurisdiction of the California Coastal Commission. Both the resources themselves and the views of those resources from public roads are protected.”

We have read and endorsed the letter of August 2022 submitted by the Del Rey Residents Association, objecting to the plan to post digital billboards in our neighborhood. They have articulated a series of concerns raised by the project that have been echoed by our residents. We would add that exchanging digital billboards for static one is not an appropriate solution, nor a trade-off to be negotiated. Our residents oppose the two digital billboards proposed for our vicinity and believe that people living in other communities of the city are likely to feel just as strongly about billboards proposed for their neighborhoods. When static billboards come down, they should not be replaced with digital ones.

For the sake of safety, aesthetic concerns, and the landscape of our neighborhood, we urge the City Council to refrain from allowing digital billboards along the 90 freeway. On behalf of the 685 families comprising our residential community, the Villa Marina Council has voted to share with you the thoughts and feelings expressed in this letter.

Respectfully yours,

Villa Marina Council



By: Celinda Jungheim, Secretary  
Marina Del Rey, California

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**From:** Karl Eggers [karl@walkbikelb.org]

**Sent:** 9/15/2022, 4:18 PM

**To:** [tcn@metro.net](mailto:tcn@metro.net)

**Subject:** Comment to Draft EIR, Transportation Communication Network (TCH) Program

I believe that the project proponents need to reconsider the impacts to Energy,. Specifically, the proposed digital signs will use electricity 24 hrs a day. 7 days a week. 365 days per year. Los Angeles, and California as a whole, has just gone through a period of daily power emergency events. These signs, while individually may place little additional load on the electrical grid, in their totality, along with other digital displays added by others, will add a significant load. If this program is pursued, then there should be mitigation measures designed to turn them off during declared power emergencies.

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Karl Eggers

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**From:** Jay Ross [jayr@westlasawtelle.org]

**Sent:** 10/19/2022, 9:33 AM

**To:** [tcn@metro.net](mailto:tcn@metro.net)

**Cc:** [jason.p.douglas@lacity.org](mailto:jason.p.douglas@lacity.org); [noah.fleishman@lacity.org](mailto:noah.fleishman@lacity.org)

**Subject:** Freeway digital billboards EIR comment period - request for extension

Can you extend your public comment period to Oct. 30.

Our West LA Sawtelle Neighborhood Council meets on Wed., Oct. 26, which is after your Oct. 24 comment deadline.

Your meetings were Oct. 6 and 7, I believe, and less than a month is insufficient time for NCs to schedule meetings and vote on comments to submit.

Metro also presented at our Planning Cmte meeting last night, and our Board's next regular meeting is Oct. 26.

I cc:ed Los Angeles Council District #11.

Thank you,

Jay Ross  
Secretary  
WLASNC

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**From:** Westside NC Land Use/Mobility Committee [wncluc@gmail.com]  
**Sent:** 10/24/2022, 4:52 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Comment letter: DEIR Metro TCN program

Attached please find our comment letter sent on behalf of Westwood South of Santa Monica Blvd. HOA.

Please acknowledge receipt to:

[bbroide@hotmail.com](mailto:bbroide@hotmail.com)

[info@wssmhoa.org](mailto:info@wssmhoa.org)

[wncluc@hotmail.com](mailto:wncluc@hotmail.com)

Thank you,

Barbara Broide





Westwood South of Santa Monica Blvd Homeowners' Association  
P.O. Box 64213, Los Angeles, CA 90064  
wssmhoa.org • info@wssmhoa.org



October 24, 2022

Attn: Shine Ling, Development Review Team  
Metro Transportation Authority  
One Gateway Plaza, Mail Stop 22-9  
Los Angeles, CA 90012  
Transmitted via email to: tcn@metro.net

Re: Metro Transportation Communications Network Program Draft EIR  
City of Los Angeles Council File #: 22-0392

Dear Metro Development Review Team:

This letter is submitted on behalf of Westwood South of Santa Monica Blvd. Homeowners Association (WSSM) in response to the Draft Environmental Impact Report issued by the Los Angeles County Metropolitan Transportation Authority (Metro) for its proposed Metro Transit Communications Network Program (TCN).

WSSM represents 3800 single family and condominium households located in the area between Santa Monica and Pico Blvds. on the north and south, and between Beverly Glen and Sepulveda Blvds. on the east and west.

We submit this letter as a community that has had significant experience living with a number of full-sized digital billboards that were erected in our neighborhood between 2006 and 2008 as a result of a legal settlement agreement between the City of Los Angeles (the City) and two outdoor advertising companies, Clear Channel and CBS Outdoor (now Outfront Media). With three digital billboards in the immediate vicinity of Santa Monica and Westwood Blvds. and two digital billboards on Westwood Blvd. (one between Pico and Olympic Blvds. and one north of Santa Monica Blvd.) as well as an additional sign just east of Beverly Glen on Santa Monica Blvd., we have first-hand experience with the many negative impacts of these signs on aesthetics, neighborhood character and viewshed, energy, land use and planning, transportation, public safety, and the quality of life of those living and passing within the area of these signs. Those signs were all later removed as a result of a successful legal challenge that saw the court ordering them to be shut down (Summit Media vs. the City of Los Angeles).

The TCN DEIR fails to acknowledge the many negative impacts that these proposed signs will have on those living in their vicinity. You ignore the fact that housing is now being built and housing construction is being incentivized on commercial arterials – the very place where you

propose to have digital off-site signs. These signs have significant negative impacts on the health of those who are forced to live within the scope of the 24/7 “digital sunrise” that come with them. The light pollution emitted by these signs creates a strobe effect visible in adjacent properties (inside structures and outside) in both daylight and at night. The renderings of the sign structures do not illustrate how the structures will halt the light trespass from these signs to nearby neighbors – both commercial and residential. How will that be accomplished? What will be the change in intensity and will the flickering or strobe light effect that come with changing messaging be neutralized and not seen by those across from or below any signage? What will the impacts be on night sky and the upward transmission of light? How will this light affect insect and bird populations in their vicinity? The presence of bright lights at night not only affects the health and quality of sleep of humans (where are your citations about the studies documenting these affects and recognition that you cannot fully mitigate against this impact?), but it can affect the behavior of the natural environment. Studies have shown that lighting at night affects insects who would normally feed and pollinate plants during the night (<https://www.npr.org/sections/thetwo-way/2017/08/03/541383664/study-suggests-artificial-light-deters-nocturnal-pollinators>) What impacts would changes of behavior in insects have on the bird population that might rely upon these insects as a food source? Will bright lights affect the behavior of other naturally occurring wildlife, birds, insects?

In addition to our very relevant experience, there is, in addition, significant factual data that could and should have been included in the Metro DEIR that was ignored in an effort to downplay the impacts of the proposed 56 billboard structures that are proposed to be erected and operated and that will house 62 full-sized digital billboards in freeway facing locations and another 35 changing digital sign in non-freeway facing locations. It should be noted that while the DEIR attempts to separate the signs according to these two designations (freeway facing and non-freeway facing), the impacts of freeway facing signs will be seen beyond their freeway locations and the non-freeway facing signs will be visible from beyond the local area adjacent to their installation. The DEIR fails to do the due diligence that is warranted for a program of this nature. The DEIR gives short shrift to evaluating the impacts of the proposed signage in an effort to advance the program under the guise of improving traffic safety and congestion. Yet there is no proof that it will accomplish these goals. Metro’s efforts to present this program as a “Transportation Communication Network” is a disingenuous effort to package this initiative by downplaying its main purpose -- to generate advertising revenues. Less costly alternatives designed to promote roadway efficiency and augment Metro’s communication capacity with far fewer negative impacts were not adequately explored. Where are the alternatives to meet these goals? What partnerships could be forged with other agencies and jurisdictions to better coordinate meeting these goals?

In addition to the physical, public health and public safety negative impacts of the program, many of which cannot be mitigated and are considered to be significant, there are major policy implications that approval and implementation of the TCN program will bring. None of these have been addressed in the DEIR. Where is the discussion related to the City of Los Angeles’ 2002 Sign Ordinance and the court cases that challenged it and sought to nullify the City’s ability to regulate off-site signage? A discussion of the legal challenges and the guidelines

issued by the courts in the Summit, Metrolights and other relevant litigation is needed. Metro must acknowledge the courts' guidance provided to the City as to the permissible limits of permitted off-site advertising. The Metro TCN program does not meet the standards issued by the courts. Implementation of this program will serve to undermine the City's authority to regulate off-site signage and open the door to new litigation challenging those rights. What is the possible outcome of such a challenge? The TCN program will jeopardize the City's right to regulate off-site signage opening up the entire City to a barrage of new off-site advertising signage. (That signage, by the way, will result in the dilution of the value of any existing and future signage as advertisers have a set amount of revenue to spend on advertising and more signs do not necessarily generate more revenues for those chasing after "out-of-home" advertising income.)

From a policy perspective, any new signage programs proposed for implementation in the City should conform with the 2002 Sign Ordinance and with the City Planning Commission's (CPC) recommendations presented to the City Council and now referred to as "Version B+." The adoption of the CPC's measures designed to clarify and strengthen the Sign Ordinance are currently pending at Council and were crafted following multiple public hearings. Their adoption was slowed by the efforts of now disgraced former Councilmembers and PLUM Committee members, Chair Jose Huizar and Mitch Englander. One important aspect of sign regulation has to do with any required takedown ratios associated with the placement of new signage such that the City will experience an overall reduction in signage and the impact of those signs. The replacement of static billboard square footage with digital billboard space clearly represents an unequal trade – even at the Metro TCN requested 2 to 1 ratio. There are many cities that require a much higher takedown ratio. Where is your research to show why your selected a 2:1 ratio is a reasonable one? The CPC recommendation is set at 10:1. We support that policy and believe that anything less is not acceptable. Where is your survey of takedown ratios?

As we presented to the CPC and PLUM, it is important that in ordering the takedown of any signs, that it be documented that the signs to be removed be legally permitted signs that are currently in conformity with their permits. Those signs that do not have permit documentation or that have been altered to be out of compliance with their permits should be removed and not be considered eligible to be included as takedown credits. Placement of new signage in LA should be considered to be a privilege and one that results in significant community benefits that reduce existing sign blight. If Metro does not own billboards to reach the 10:1 removal ratio, it should explore purchasing permitted billboards from other companies in Los Angeles so that it can comply with reducing blight. The proposed 2:1 ratio is, in short, completely insufficient. The value of the static signs is so insignificant in comparison with the value and impact of new digital signage.

The impact of commercial advertising, particularly on vulnerable populations and youth, is something that has not been addressed in the DEIR. This is especially important understanding that these signs will likely carry messaging related to sugar-laden beverages, junk foods, fast food and other unhealthy products. The ability of Metro to limit the types of product advertisements placed on its message boards is limited understanding free speech rights. The refer"ences made to Metro's attempts to limit advertising is difficult to grasp as terms used in the

DEIR are likely to be viewed as subjective rather than objective. How will Metro protect vulnerable populations from advertisements that promote unhealthy lifestyles and obesity? In addition, “the commercial messaging may contribute to excessive consumption of advertised products, shopping addiction, consumption of unhealthy and fast food which leads toward obesity and a series of diseases.” (<http://science-gate.com/IJAAS/Articles/2021/2021-8-9/1021833ijaas202109013.pdf>)

The commercialization of the public and Metro right-of-way is inconsistent with sound urban planning and the fostering of pedestrian-friendly neighborhood, and great streets. When tourists come to Los Angeles, they come to see the Hollywood sign, not billboards littering our landscape and obstructing the views of our more attractive attributes – our mountains, palm trees, green winters, beaches, etc. The DEIR fails to address the impact that these signs will have on the character of our City and on the neighborhoods in which they will be visible. This can be expressed as disruption of identity of place. Impacts on historical resources, Ballona wetlands and plain old neighborhoods are underplayed. These signs are seen from considerable distance. We know that the sign erected on Westwood Blvd. just north of Rochester Avenue could be clearly seen (at day and night) from the bridge across Westwood Blvd. just south of Pico at Westside Pavilion. It completely altered the landscape of the area looking north to the Santa Monica Mountains and the distance from the intersection of Westwood and Rochester to Westwood and Pico is 1.36 miles. How far will these signs be visible? How will this affect nearby properties and all others that will see them?

The DEIR does not provide sufficient descriptions of each proposed sign location and exactly where it will be placed. It does not provide adequate information about nearby uses and how they might be impacted. The Seattle traffic study concludes that no changing messaging signs should be placed within 120 feet upstream of intersections or driveway entrance/exits from businesses, commercial parking lots or garages. This because of the need to take into account a reasonable driver perception-reaction time assuming that an average driver will take his/her eyes off the road for two seconds. What recommendations are to be sought for this program?

The DEIR completely fails to acknowledge current land use policies that incentivize the construction of residential housing on commercial corridors. The signs on commercial corridors will directly impact residences and the quality of life of those who live in them. These impacts have not been assessed. How can aesthetics be adequately evaluated without such information? When explaining the nature of this program to our constituents, the response most commonly given is a simple and direct one: These signs are ugly. One member recited the Ogden Nash poem as follows:

I think that I shall never see  
A billboard lovely as a tree  
Perhaps unless the billboards fall,  
I'll never see a tree at all.

Scenic vistas from each sign need to be assessed. The City is said to recognize the value of preserving sightlines (view access) to designated scenic resources or subjects of visual interest

from public vantage points. The subjects may be focal or panoramic. Existing views affected may be a single feature (a building, garden, panoramic view). While the DEIR notes impacts on five historic structures, there does not appear to be an assessment of landscaping, natural trees or landforms with aesthetic value. These are important when they are located within the viewshed of a proposed digital billboard.

The cumulative impact of all these signs in total is also something to be assessed. Currently there are no digital billboards adjacent to freeways in Los Angeles. One can clearly “feel” the difference when traveling south on the 405 when one sees the digital signs that have been placed in smaller municipalities. The aesthetics markedly change. The scenic quality of an area is important and refers to the visual appeal of an area. The addition of digital billboards to an area would add a new feature that detracts from the overall aesthetic character. How could this be mitigated? Could it be mitigated? The City has policies that assess scenic quality and requires specifications /requirements for street trees, building heights, setbacks, exterior lighting and signage. The City has no requirements for billboards. Why would these signs be considered to be an asset to the City? This program must be evaluated in conjunction with other sign programs now under consideration in LA and those recently approved to assess the full cumulative impact of this program coupled with others. When a DEIR is done for a development project, all nearby projects must be listed and cumulative impacts considered. This DEIR should be no different and the STAP program, and IKE program as well as any additional signage programs currently being contemplated at City Hall must be included. The amount of visual information on streets and highways can cause distractions and traffic accidents that can put the lives of pedestrians, bike/scooter riders and drivers and their passengers at risk.

Billboards are viewed as neighborhood disruptions and contribute to a decline in resident perception of life, street-facing activity, sidewalk interaction, residential property values. (Appleyard (1981); Pikoraa et al (2003); Cao et al (2005). Cities of Menlo Park, Los Angeles, and Palo Alto) “The clutter caused by visual pollution is more than just an eyesore though. It not only robs a person of the pleasure of a beautiful landscape but also affects one’s mental and emotional health. Exposure to unpleasant visuals has reportedly caused stress, anxiety, exhaustion, distraction, accidents, eye fatigue among other effects. Continuous exposure to visual pollution is also believed to cause lack of sleep, mental irritability and psychological disturbances in children as well as adults. Distracting advertisements and bright lights on billboards can also cause traffic accidents or lead to an increase in stress levels among drivers.” (<https://byjus.com/question-answer/what-is-visual-pollution/> ) The DEIR needs to evaluate these impacts as billboards are considered to be an important contributor to visual pollution.

The negative health consequences of digital billboards have not been adequately addressed. The role of billboards as “urban stressors” has been cited in research studies and is related to a growing environmental clutter around us. A Texas A&M University study determined that main commuter roads cluttered with strip malls, billboards, and garish on-premise signs contribute to “commuter stress.”

While Metro's TCN Program promises to improve traffic safety and congestion, we would contend that it is just as likely to diminish traffic safety and instead will contribute to traffic congestion! Digital billboards with their changing messaging are proven driver distractions. There are countless studies that document this fact. Yet, the DEIR relies upon a widely criticized and unverified study by the FHWA and two studies that were sponsored by outdoor industry interests. This is hardly an acceptable effort to evaluate the dangers presented by digital billboards. Metro must seek a full review of the studies available.

We can tell you that based upon our experience both watching and sitting in traffic at intersections where digital signs were in operation that the following was true:

- a) When left turn arrows would appear at SM/Westwood intersection, instead of responding to the signal and initiating a left turn, drivers would remain motionless – watching the changing billboard messages. Oftentimes this would result in an entire lane of cars waiting to turn being unable to do so. Traffic would then overflow from the left turn lane into the traffic lanes and all would be affected while waiting for the following signal sequence. When patience frays, drivers often respond poorly thus contributing to poor roadway behavior. Collision rates are sometimes correlated with automobile delays. Delay is particularly predictive of safety for left turn movements where delay influences signal timing and phasing designs that, in turn, influence safety. ( Zhang & Prevedouros, 2002)
- b) When drivers are watching billboards instead of the roadway, it is the most vulnerable roadway users who are at highest risk. Pedestrians and bike riders who do not have the luxury of a steel protective coat suffer the greatest dangers from distracted drivers. What are the accident rates at the locations selected for digital signage?
- c) Why has Metro sought to locate digital billboards on freeways often in proximity to interchanges - -the very places where drivers need to focus on making safe lane changes and merges into traffic?

Billboards are a safety hazard. Even the Outdoor Advertising Association of America boasts, "You can't zap it. You can't ignore it." Billboards are designed to distract motorists' attention from the road. Thus, it is no surprise that a 1980 Federal Highway Administration study found a positive correlation between billboards and accident rates. Moreover, federal and state courts have long cited traffic safety as a legitimate basis for billboard regulation. It is troubling to find that Metro is attempting to portray digital billboards (ever more distracting than the static signs of 1980) as tools to improve traffic safety.

In a study by Luomo ( cited in <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7923428/>), Luoma developed and tested a simulation method that found billboards distract and reduce the conscious perception of traffic signs. Clark and Davies found that non-driving-related signs delay the responses to road signs in a simulated driving task. Bendak and Al-Saleh found that driving performance (lane drifting and recklessly crossing dangerous intersections) was worse on a road with advertising signs compared with no advertising signs. A recent study found both

content of advertising and billboard location to drivers' viewing field have high influence on driver distraction. This information, again, suggests that the traffic safety studies in the DEIR are inadequate and that the ability to mitigate has not been evaluated.

It is likely that many will comment on the clear and present dangers that distracting digital signage has on roadway safety. We contend that the negative impacts of these signs will far outweigh any positive impacts that traffic warning signage may bring. In fact, a recent study from Texas documents that the simple traffic safety warning message broadcast on a message sign resulted in an increase in traffic accidents in proximity to the sign.

While many traffic studies focus on distractions caused by in-vehicle distractions, there is a healthy body of studies that focus on outside-the-vehicle distractions (such as billboards). It is important to recognize that outside-the-vehicle distractions are seen as dangerous, if not more so, than in-vehicle distractions. According to a study done for the City of Seattle, (<https://www.scenic.org/wp-content/uploads/2021/12/SEATTLE-STREET-FURNITURE-FINAL-REPORT.pdf>) "This is because, with in-vehicle distractions, the driver is aware that he has taken his eyes off the road, whereas, when attending to an outside distractor such as a sign or billboard, the driver tends to think that he maintains a view of the road in his peripheral vision and can therefore respond to incidents that may arise; this research, however, demonstrates that such response is compromised." By relying upon faulty and biased studies, the DEIR fails to evaluate the true dangers posed to roadway users by digital billboards. That assessment is needed.

On the topics of energy and lighting, there is no discussion in the DEIR pertaining to the impacts of light-emitting diodes (LEDs). A group in Monterey County ("Turn Down the Lights") addressed the harmful nature of LEDs. While the typical Californian may believe that LED fixtures are a welcome technological advancement by providing better light at lower cost, upon installation of LED street lights in Monterey County, some residents noted impacts on their vision: "Their eyes were now hurting." They noted that LED lights were dangerous for drivers (because of glare and shadows), and residents (because of sleep deprivation). A study from the Northwestern University's Center for Circadian and Sleep Medicine found that sleeping, even with a little bit of light isn't good for your health. That study, published in the Proceedings of the National Academy of Sciences documented elevated heart rates during the night and increased insulin resistance in the morning from those sleeping with exposure with a moderate amount of artificial light. It also noted that light can disrupt metabolism and increase the risk of chronic illness. The health impacts of the proposed digital signage were not adequately evaluated (in part because the DEIR fails to acknowledge proximity to residential housing and those who live there).

Residences are considered light-sensitive since they are typically occupied by persons who have an expectation of darkness and privacy during evening hours and who can be disturbed by bright light sources. It was our experience that condo, home and apartment residences all reported significant negative impacts from nearby digital sign light. As was previously mentioned, the flickering or strobe light effect of the changing messaging was a cause of great discomfort – even if the intensity of light was within accepted brightness range. Certain kinds of

LED lights, while being more energy efficient, actually will dramatically increase light pollution, according to representatives of the International Dark-Sky Association.

Light pollution is now gaining in recognition as a form of pollution, and the DEIR must assess how it will avoid adding light trespass on the built environment, but also as it contributes to the night sky light pollution of our metropolitan basin. If not, we may come to a time where no stars will be visible in the nighttime sky here. Nighttime natural scenery needs protection just like daytime scenery. In addition to issues related to intensity of light, digital billboards are associated with glare – both in daytime and nighttime. The broad expanse of brightly lit panels creates glare. Activities, including driving and uses such as parks and residences, are considered glare sensitive as the presence of glare could interfere with vision and/or result in an irritant to these activities//uses. How has glare been evaluated for each sign location? We know that the line of sight to the Westwood Rochester billboard from south of Pico Blvd. was crisp and clear and overshadowed all other elements within view. The DEIR fails to acknowledge the health impacts that these changing LED lights have on people with seizure disorders, ADHD, cataracts and other eye conditions. How can these signs be used without causing negative impacts on those with these conditions? There is no discussion in the DEIR about the need to address visual pollution as part of the aesthetic evaluation. Visual pollution is

There is no rationale presented for the selection of an 8-second refresh rate. What studies were used to justify such a rotation rate? One could easily argue that no driver should be able to watch multiple changing images and that if digital signage is used as a mechanism for the posting of messaging, that those messages should appear to be static in nature. One Canadian study developed proposed guidelines that suggest that digital signs “emulate” static billboards which meant that they should be no brighter than conventional billboards (which rarely exceed 100 nits at night), and that they should appear static to the extent possible, to any given motorist.) This also suggests that the refresh rate should be established based upon the speed of traffic passing. Has this been explored in the research that went into drafting the DEIR? It should be evaluated. While it has been mentioned that individual frames will not have ads with movements, there has been nothing said about forbidding serial messaging whereby one ad related to another that was screened before it. Such messaging should not be permitted.

The EIR is not meant to evaluate the financial aspects of the current proposal. However, we cannot help but comment as to the apparent desire of those promoting this program and the new commercial advertising programs at the City level by saying that it would be a far better strategy for the City and Metro to consider developing a strategy that seeks to MINIMIZE sign blight while maximizing potential revenues from those signs. The apparent strategy to blanket the City with all forms of digital commercial messaging signage on our public right-of-way is folly. It compromises the City’s aesthetics, wastes energy, and ignores the importance of preserving our shared open space. Whether that space is on the ground or in the air, it is ever more important in a City that seeks to build taller and denser to accommodate significant numbers of new housing units in coming years. With reduced building setbacks, increased building heights and added population, the open space that we share should not be occupied with ad structures on our street, on our sidewalks and in our airspace. Those spaces should be



treated as valuable shared public resources and important to the health and well-being of all who share this City.

We conclude that the TCN DEIR is inadequate as an informational document, as it fails to provide sufficient information to allow decisionmakers and members of the public to fully and accurately evaluate the visual impacts, public health and safety aspects and other impacts of the proposed project. Levels of significance of impacts cannot be adequately assessed nor can potential mitigations, if any.

Thank you for your consideration.

Sincerely,



Barbara Broide  
President

cc: LA City Planning Department  
Council President Krekorian  
Councilmember Paul Koretz

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**From:** Sharifa Abdul-Wahid  
**Sent:** 10/22/2022, 9:07 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Sharifa Abdul-Wahid

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**From:** Julie Adelson  
**Sent:** 10/22/2022, 1:36 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Julie Adelson

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**From:** Katherine Aker  
**Sent:** 10/22/2022, 1:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Katherine Aker

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**From:** Janet Albaugh  
**Sent:** 10/23/2022, 2:08 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Janet Albaugh

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**From:** Peter Alexander  
**Sent:** 10/22/2022, 11:14 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Peter Alexander

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**From:** Jon Amsden  
**Sent:** 10/22/2022, 8:04 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jon Amsden

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**From:** Eic Anches  
**Sent:** 10/22/2022, 10:10 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Eic Anches



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**From:** Frank and Mary Jane Anderson  
**Sent:** 10/22/2022, 10:55 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Frank and Mary Jane Anderson

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**From:** Judith S Anderson  
**Sent:** 10/22/2022, 7:50 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Judith S Anderson

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**From:** Nicole Antoine  
**Sent:** 10/23/2022, 11:07 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Nicole Antoine

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**From:** Stephanie Aston  
**Sent:** 10/23/2022, 5:59 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Stephanie Aston

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**From:** cheryl auger  
**Sent:** 10/22/2022, 7:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Cheryl Auger

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**From:** Charles B.  
**Sent:** 10/24/2022, 10:13 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Charles B.

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**From:** Sherry Barnett  
**Sent:** 10/22/2022, 11:58 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Sherry Barnett

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**From:** Lisa Battista  
**Sent:** 10/24/2022, 7:51 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Lisa Battista



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**From:** Malissa D. Beeson  
**Sent:** 10/24/2022, 8:18 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Malissa D. Beeson

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**From:** Ann Bein  
**Sent:** 10/22/2022, 10:46 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Ann Bein

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**From:** Karen Berger  
**Sent:** 10/22/2022, 9:08 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Karen Berger

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**From:** Abbie Bernstein  
**Sent:** 10/24/2022, 12:24 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Abbie Bernstein

Sincerely,  
Abbie Bernstein

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**From:** Barbara Betlem-Ringuette  
**Sent:** 10/22/2022, 9:16 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Barbara Betlem-Ringuette

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**From:** Andrea Birnbaum  
**Sent:** 10/22/2022, 8:08 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Andrea Birnbaum

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**From:** Martha Bissell  
**Sent:** 10/24/2022, 7:50 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Martha Bissell

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**From:** Bruce Block  
**Sent:** 10/22/2022, 9:46 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Bruce Block



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**From:** Ellen Blum  
**Sent:** 10/22/2022, 8:34 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Ellen Blum

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**From:** Danielle Bond  
**Sent:** 10/25/2022, 11:59 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Danielle Bond

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**From:** Andrea Bonnett  
**Sent:** 10/22/2022, 8:02 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Andrea Bonnett

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**From:** Michael Bourke  
**Sent:** 10/22/2022, 6:17 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Michael Bourke

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**From:** Candy Bowman  
**Sent:** 10/22/2022, 10:52 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Candy Bowman

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**From:** Renee Bradford  
**Sent:** 10/22/2022, 8:14 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Renee Bradford

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**From:** Victoria Brandon  
**Sent:** 10/22/2022, 8:49 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Victoria Brandon

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**From:** Blaise Brockman  
**Sent:** 10/22/2022, 8:40 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Blaise Brockman



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**From:** Jacqueline Broulard  
**Sent:** 10/22/2022, 9:15 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jacqueline Broulard

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**From:** Damon Brown  
**Sent:** 10/22/2022, 4:11 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Damon Brown

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**From:** Sandy Brown  
**Sent:** 10/24/2022, 10:21 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Sandy Brown

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**From:** Hali Burton  
**Sent:** 10/22/2022, 1:45 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Hali Burton

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**From:** Terrence Butler  
**Sent:** 10/22/2022, 12:16 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Terrence Butler

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**From:** Sharon Byers  
**Sent:** 10/23/2022, 11:23 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Sharon Byers

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**From:** Laurel Cameron  
**Sent:** 10/22/2022, 3:01 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Laurel Cameron

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**From:** Patricia Carlson  
**Sent:** 10/22/2022, 2:26 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Patricia Carlson



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**From:** Mixhael Casey  
**Sent:** 10/24/2022, 10:44 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Mixhael Casey

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**From:** Gary Charles  
**Sent:** 10/22/2022, 9:38 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Gary Charles

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**From:** Andrew Charlton  
**Sent:** 10/24/2022, 9:39 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Andrew Charlton

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**From:** Felicia Chase  
**Sent:** 10/24/2022, 12:41 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Felicia Chase

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**From:** Norma Chavez  
**Sent:** 10/23/2022, 9:25 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Norma Chavez

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**From:** Mark Chernack  
**Sent:** 10/22/2022, 1:59 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Mark Chernack

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**From:** Robert Chirpin  
**Sent:** 10/22/2022, 10:44 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Robert Chirpin

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**From:** Calvin Christopher  
**Sent:** 10/24/2022, 3:12 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Calvin Christopher



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**From:** Sandra Christopher  
**Sent:** 10/22/2022, 8:19 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Sandra Christopher

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**From:** Dominick Clark  
**Sent:** 10/23/2022, 6:12 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Dominick Clark

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**From:** William J. Cleary Jr.  
**Sent:** 10/26/2022, 8:30 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
William J. Cleary Jr.

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**From:** Allen Clement  
**Sent:** 10/22/2022, 8:28 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Allen Clement

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**From:** Jennie Cohen  
**Sent:** 10/22/2022, 7:13 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jennie Cohen

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**From:** Lynda Cook  
**Sent:** 10/22/2022, 8:22 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Lynda Cook

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**From:** Daniel Costa  
**Sent:** 10/22/2022, 4:32 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Daniel Costa

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**From:** Georgianne Cowan  
**Sent:** 10/24/2022, 11:06 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Georgianne Cowan



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**From:** Stacie Cox  
**Sent:** 10/22/2022, 10:49 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Stacie Cox

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**From:** Russell Curl  
**Sent:** 10/23/2022, 8:38 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Russell Curl

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**From:** Casey Danson  
**Sent:** 10/22/2022, 1:20 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Casey Danson

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**From:** Barbara Dave  
**Sent:** 10/22/2022, 12:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Barbara Dave

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**From:** Jill Davine  
**Sent:** 10/24/2022, 10:17 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Jill Davine

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**From:** Erika Davis  
**Sent:** 10/22/2022, 10:09 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Erika Davis

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**From:** Sylvia De Baca  
**Sent:** 10/22/2022, 4:53 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Sylvia De Baca

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**From:** Javier Del Valle  
**Sent:** 10/23/2022, 9:59 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Javier Del Valle



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**From:** Marie DiMassa  
**Sent:** 10/27/2022, 10:10 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Marie DiMassa

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**From:** Renate Dolin  
**Sent:** 10/24/2022, 8:01 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Renate Dolin

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**From:** Lee Doolan  
**Sent:** 10/24/2022, 1:26 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Lee Doolan

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**From:** L.L. Dored  
**Sent:** 10/22/2022, 6:08 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

L.L. Dored

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**From:** Ann Dorsey  
**Sent:** 10/22/2022, 4:22 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Ann Dorsey

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**From:** Paulette Doulatshahi  
**Sent:** 10/22/2022, 9:20 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Paulette Doulatshahi

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**From:** Su Du  
**Sent:** 10/22/2022, 12:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Sincerely,

Su Du

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**From:** B. E.  
**Sent:** 10/22/2022, 12:43 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

B. E.



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**From:** Lurlie Edgecomb  
**Sent:** 10/22/2022, 11:54 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Lurlie Edgecomb

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**From:** Karen Emanuel  
**Sent:** 10/22/2022, 3:16 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Sincerely,

Karen Emanuel

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**From:** Barbara Epstein  
**Sent:** 10/22/2022, 9:55 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Barbara Epstein

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**From:** Sa Er  
**Sent:** 10/22/2022, 6:26 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Sa Er

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**From:** Vanessa Escamilla  
**Sent:** 10/22/2022, 11:42 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

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**From:** Judith Esposito  
**Sent:** 10/23/2022, 10:26 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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Sincerely,

Judith Esposito

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**From:** Carlos Etcheverry  
**Sent:** 10/23/2022, 11:35 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Carlos Etcheverry

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**From:** Helen Fallon  
**Sent:** 10/22/2022, 3:04 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Helen Fallon



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**From:** Tom Feldman  
**Sent:** 10/22/2022, 9:39 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Tom Feldman

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**From:** Jeffrey Findeis  
**Sent:** 10/22/2022, 10:29 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jeffrey Findeis

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**From:** Michael Fishbein  
**Sent:** 10/23/2022, 6:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Michael Fishbein

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**From:** Mayra Flores  
**Sent:** 10/24/2022, 12:48 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Mayra Flores

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**From:** Joyce Foster  
**Sent:** 10/22/2022, 12:15 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Joyce Foster

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**From:** Nick Fotiadis  
**Sent:** 10/22/2022, 8:24 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Nick Fotiadis

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**From:** Darren Frale  
**Sent:** 10/22/2022, 5:42 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Darren Frale

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**From:** Patrick Frank  
**Sent:** 10/22/2022, 8:25 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Sincerely,  
**Sent:** 10/23/2022, 11:07 AM



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**From:** Joe Gallagher  
**Sent:** 10/24/2022, 3:51 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Joe Gallagher

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**From:** Rob Gallinger  
**Sent:** 10/22/2022, 8:14 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Rob Gallinger

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**From:** Glenda Ganis  
**Sent:** 10/22/2022, 8:34 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Glenda Ganis

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**From:** David Garfinkle  
**Sent:** 10/24/2022, 12:21 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
David Garfinkle

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**From:** Steve Geddis  
**Sent:** 10/22/2022, 9:16 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Steve Geddis

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**From:** Inez Gelfand  
**Sent:** 10/22/2022, 11:45 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Inez Gelfand

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**From:** Mark Giordani  
**Sent:** 10/22/2022, 5:23 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Mark Giordani

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**From:** Kim Glann  
**Sent:** 10/23/2022, 3:54 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Kim Glann



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**From:** Mark Glasser  
**Sent:** 10/22/2022, 6:49 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Mark Glasser

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**From:** Frances Goff  
**Sent:** 10/24/2022, 10:34 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Frances Goff

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**From:** Fred Golan  
**Sent:** 10/22/2022, 4:46 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Fred Golan

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**From:** Greg Goldin  
**Sent:** 10/24/2022, 8:00 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Greg Goldin

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**From:** Leslie Gonzales  
**Sent:** 10/22/2022, 9:14 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Leslie Gonzales

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**From:** Linda Gonzales  
**Sent:** 10/23/2022, 12:02 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Linda Gonzales

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**From:** Beth Goode  
**Sent:** 10/22/2022, 8:04 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Beth Goode

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**From:** Luna Gooding  
**Sent:** 10/24/2022, 8:49 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Luna Gooding



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**From:** Carol Gordon  
**Sent:** 10/22/2022, 1:47 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Carol Gordon

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**From:** Dara Gorelick  
**Sent:** 10/24/2022, 6:15 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Dara Gorelick

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**From:** Jeff Gould  
**Sent:** 10/22/2022, 11:55 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jeff Gould

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**From:** Stephanie Greenwald  
**Sent:** 10/22/2022, 11:00 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Stephanie Greenwald

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**From:** Maria Gritsch  
**Sent:** 10/22/2022, 10:25 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Maria Gritsch

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**From:** Natalie Haddad  
**Sent:** 10/23/2022, 12:11 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Natalie Haddad

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**From:** Brenda Haig  
**Sent:** 10/22/2022, 9:40 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Brenda Haig

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**From:** Lisa Hammermeister  
**Sent:** 10/22/2022, 8:23 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Lisa Hammermeister



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**From:** John Hammond  
**Sent:** 10/22/2022, 9:03 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

John Hammond

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**From:** Tim Hanson  
**Sent:** 10/22/2022, 9:21 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Tim Hanson

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**From:** Lynda Harris  
**Sent:** 10/22/2022, 3:14 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Lynda Harris

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**From:** Karen Hellwig  
**Sent:** 10/22/2022, 8:56 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Karen Hellwig

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**From:** Vikki Helperin  
**Sent:** 10/22/2022, 5:58 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Vikki Helperin

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**From:** Carrie Henderson  
**Sent:** 10/22/2022, 10:10 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Carrie Henderson

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**From:** Lynette K. Henderson  
**Sent:** 10/22/2022, 8:21 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Lynette K. Henderson

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**From:** Dena G. Henriquez  
**Sent:** 10/22/2022, 10:28 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Dena G. Henriquez



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**From:** Laura Herndon  
**Sent:** 10/24/2022, 9:30 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Laura Herndon

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**From:** Celeste Hong  
**Sent:** 10/24/2022, 7:00 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Celeste Hong

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**From:** Judith R. Howard  
**Sent:** 10/24/2022, 7:58 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,  
Judith R. Howard

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**From:** Della Howarth  
**Sent:** 10/22/2022, 8:44 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Sincerely,

Della Howarth

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**From:** Kathryn W. Howe  
**Sent:** 10/23/2022, 7:20 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Kathryn W. Howe

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**From:** Ken Hughes  
**Sent:** 10/22/2022, 9:17 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Ken Hughes

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**From:** Tayfur Ingalls  
**Sent:** 10/24/2022, 4:17 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Tayfur Ingalls

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**From:** Joel Isaacs  
**Sent:** 10/24/2022, 8:55 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Joel Isaacs



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**From:** Julie S. Jacobson  
**Sent:** 10/22/2022, 9:36 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Julie S. Jacobson

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**From:** Audrey Jin  
**Sent:** 10/24/2022, 1:51 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Audrey Jin

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**From:** Amelia Jones  
**Sent:** 10/22/2022, 8:57 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Amelia Jones

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**From:** David Jones  
**Sent:** 10/22/2022, 8:15 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

David Jones

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**From:** Stanleigh Jones  
**Sent:** 10/25/2022, 2:47 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Stanleigh Jones

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**From:** Alena Jorgensen  
**Sent:** 10/22/2022, 3:13 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Alena Jorgensen

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**From:** Scott Jung  
**Sent:** 10/22/2022, 10:32 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Scott Jung

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**From:** Saran K.  
**Sent:** 10/22/2022, 12:54 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Saran K.



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**From:** Batsheva Kasdan  
**Sent:** 10/22/2022, 6:10 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Batsheva Kasdan

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**From:** Robert Kent  
**Sent:** 10/22/2022, 10:53 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Robert Kent

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**From:** Mha A. S. Khalsa  
**Sent:** 10/22/2022, 9:50 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Mha A. S. Khalsa

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**From:** Christina Kirk  
**Sent:** 10/22/2022, 4:08 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Christina Kirk

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**From:** George Kleiman  
**Sent:** 10/22/2022, 11:26 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

George Kleiman

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**From:** Renee Klein  
**Sent:** 10/22/2022, 2:58 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Renee Klein

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**From:** Cordi Koga  
**Sent:** 10/24/2022, 10:09 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Cordi Koga

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**From:** Susan Kornfeld  
**Sent:** 10/22/2022, 11:52 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Susan Kornfeld



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**From:** Cathy Kraus  
**Sent:** 10/22/2022, 3:20 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Cathy Kraus

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**From:** Davida Kristy  
**Sent:** 10/22/2022, 6:41 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Davida Kristy

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**From:** April Kullis  
**Sent:** 10/22/2022, 4:08 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

April Kullis

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**From:** Bonita Lacy  
**Sent:** 10/22/2022, 12:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Bonita Lacy

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**From:** JOHN Lamb  
**Sent:** 10/24/2022, 11:48 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

JOHN Lamb

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**From:** Venetia Large  
**Sent:** 10/22/2022, 3:39 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Venetia Large

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**From:** Janet Laur  
**Sent:** 10/22/2022, 5:32 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Janet Laur

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**From:** Harlan Lebo  
**Sent:** 10/22/2022, 2:24 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Harlan Lebo



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**From:** Brenda Lee  
**Sent:** 10/22/2022, 11:47 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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Sincerely,

Brenda Lee

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**From:** Mary Lou Leo  
**Sent:** 10/22/2022, 4:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Mary Lou Leo

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**From:** O. Lewis  
**Sent:** 10/22/2022, 10:45 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

O. Lewis

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**From:** Suzanne Licht  
**Sent:** 10/22/2022, 2:54 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Suzanne Licht

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**From:** Elaine Livesey-Fassel  
**Sent:** 10/22/2022, 8:32 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Elaine Livesey-Fassel

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**From:** Diane L. London  
**Sent:** 10/22/2022, 12:27 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Diane L. London

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**From:** Michael Lueras  
**Sent:** 10/22/2022, 10:39 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Michael Lueras

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**From:** Tulse Luper, Jr.  
**Sent:** 10/22/2022, 8:18 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Tulse Luper, Jr.



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**From:** Kare M.  
**Sent:** 10/22/2022, 9:30 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Kare M.

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**From:** Donald S. Mackay  
**Sent:** 10/22/2022, 8:59 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Donald S. Mackay

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**From:** Janet MacLeod  
**Sent:** 10/23/2022, 10:47 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Janet MacLeod

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**From:** Janet Maker  
**Sent:** 10/22/2022, 8:13 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Janet Maker

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**From:** Arax Maksoudian  
**Sent:** 10/22/2022, 12:58 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Arax Maksoudian

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**From:** Mitzi Malet  
**Sent:** 10/22/2022, 8:24 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Mitzi Malet

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**From:** Hayley Marcus  
**Sent:** 10/22/2022, 8:49 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Hayley Marcus

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**From:** Melissa Marote  
**Sent:** 10/23/2022, 1:56 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Melissa Marote



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**From:** Tyson Martin  
**Sent:** 10/22/2022, 8:25 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Tyson Martin

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**From:** Linda Martinez  
**Sent:** 10/25/2022, 11:58 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Linda Martinez

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**From:** Maria Mastroyannis  
**Sent:** 10/22/2022, 10:09 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Maria Mastroyannis

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**From:** Casee Maxfield  
**Sent:** 10/22/2022, 5:23 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Casee Maxfield

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**From:** Suellen Mayfield  
**Sent:** 10/22/2022, 3:54 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Suellen Mayfield

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**From:** Colleen McCaskey  
**Sent:** 10/22/2022, 5:31 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Colleen McCaskey

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**From:** Karen McCaw  
**Sent:** 10/24/2022, 10:04 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Karen McCaw

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**From:** Maureen McDonald  
**Sent:** 10/22/2022, 8:47 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Maureen McDonald



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**From:** Rosemary Mcmillan  
**Sent:** 10/22/2022, 1:51 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Rosemary Mcmillan

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**From:** Gail McMullen  
**Sent:** 10/22/2022, 9:47 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Gail McMullen

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**From:** Susan Meals  
**Sent:** 10/22/2022, 10:02 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Susan Meals

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**From:** Frank Mendoza  
**Sent:** 10/22/2022, 4:19 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Frank Mendoza

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**From:** Barbara Mesney  
**Sent:** 10/22/2022, 8:06 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Barbara Mesney

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**From:** Ken Milbrand  
**Sent:** 10/22/2022, 9:11 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Ken Milbrand

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**From:** John Miller  
**Sent:** 10/24/2022, 8:01 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
John Miller

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**From:** Victoria Miller  
**Sent:** 10/22/2022, 8:39 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Victoria Miller



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**From:** Cory Misek  
**Sent:** 10/22/2022, 9:34 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Cory Misek

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**From:** Kelly Misek  
**Sent:** 10/22/2022, 9:22 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Kelly Misek

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**From:** Kim Moise  
**Sent:** 10/22/2022, 9:51 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Kim Moise

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**From:** Karin Morris  
**Sent:** 10/22/2022, 10:29 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Karin Morris

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**From:** Erica Munn  
**Sent:** 10/22/2022, 1:46 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Erica Munn

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**From:** Keith Nakata  
**Sent:** 10/24/2022, 3:54 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Keith Nakata

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**From:** Diana Nave  
**Sent:** 10/22/2022, 8:13 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Diana Nave

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**From:** Alex Nevil  
**Sent:** 10/22/2022, 8:29 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Alex Nevil



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**From:** Chris Nevil  
**Sent:** 10/22/2022, 8:17 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Chris Nevil

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**From:** Sandra Noah  
**Sent:** 10/22/2022, 11:12 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Sandra Noah

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**From:** Carlos Nunez  
**Sent:** 10/22/2022, 8:31 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Carlos Nunez

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**From:** Tim O'Brien  
**Sent:** 10/24/2022, 10:39 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Tim O'Brien

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**From:** Polly O'Malley  
**Sent:** 10/25/2022, 5:16 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Polly O'Malley

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**From:** Michelle Oberman  
**Sent:** 10/24/2022, 12:28 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Michelle Oberman

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**From:** Diane Olson  
**Sent:** 10/22/2022, 11:23 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Diane Olson

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**From:** Gary Osterhout  
**Sent:** 10/22/2022, 8:36 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Gary Osterhout



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**From:** Hillary Ostrow  
**Sent:** 10/24/2022, 1:05 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Hillary Ostrow

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**From:** Katherine Otis  
**Sent:** 10/22/2022, 8:31 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Katherine Otis

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**From:** Cinzia Paganuzzi  
**Sent:** 10/22/2022, 9:25 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Cinzia Paganuzzi

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**From:** Elvira Paglici  
**Sent:** 10/23/2022, 4:41 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Elvira Paglici

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**From:** John Paladin  
**Sent:** 10/22/2022, 3:10 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

John Paladin

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**From:** Heather Parker  
**Sent:** 10/22/2022, 10:29 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Heather Parker

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**From:** Christopher Parsons  
**Sent:** 10/22/2022, 8:20 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Christopher Parsons

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**From:** Marian P. Pasternack  
**Sent:** 10/22/2022, 10:28 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Marian P. Pasternack



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**From:** Karen Pedersen  
**Sent:** 10/22/2022, 8:38 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Karen Pedersen

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**From:** Marilyn Perna  
**Sent:** 10/24/2022, 10:22 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Marilyn Perna

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**From:** Steven Pickering  
**Sent:** 10/22/2022, 9:20 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Steven Pickering

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**From:** Susan Porter  
**Sent:** 10/24/2022, 5:12 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Susan Porter

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**From:** Zach Rasmussen  
**Sent:** 10/23/2022, 1:45 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Zach Rasmussen

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**From:** Sa Re  
**Sent:** 10/22/2022, 6:26 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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Sincerely,

Sa Re

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**From:** Sa Rei  
**Sent:** 10/22/2022, 6:27 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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Sincerely,

Sa Rei

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**From:** Allison Rensch  
**Sent:** 10/22/2022, 8:18 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Allison Rensch



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**From:** Michael Reppenhagen  
**Sent:** 10/22/2022, 1:31 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Michael Reppenhagen

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**From:** Robert Ricewasser  
**Sent:** 10/22/2022, 2:08 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Robert Ricewasser

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**From:** Barbara Ringuette  
**Sent:** 10/23/2022, 7:26 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Barbara Ringuette

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**From:** Lee Ringuette  
**Sent:** 10/24/2022, 4:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Lee Ringuette

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**From:** Laurie Rittenberg  
**Sent:** 10/22/2022, 8:54 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Laurie Rittenberg

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**From:** Patricia Ritter  
**Sent:** 10/22/2022, 10:53 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Patricia Ritter

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**From:** Jim Robertson  
**Sent:** 10/22/2022, 5:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jim Robertson

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**From:** Mary Robinson  
**Sent:** 10/24/2022, 10:45 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Mary Robinson



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**From:** Joel Rochlin  
**Sent:** 10/24/2022, 9:58 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Joel Rochlin

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**From:** Martha Ronk  
**Sent:** 10/24/2022, 7:52 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Martha Ronk

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**From:** Charlene Rothstein  
**Sent:** 10/24/2022, 2:05 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Charlene Rothstein

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**From:** Christine Rowe  
**Sent:** 10/24/2022, 2:23 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Christine Rowe

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**From:** Carol Royce-Wilder  
**Sent:** 10/22/2022, 7:00 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Carol Royce-Wilder

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**From:** Lynn Ryan  
**Sent:** 10/22/2022, 1:03 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Lynn Ryan

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**From:** Susan Ryan  
**Sent:** 10/23/2022, 1:37 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Susan Ryan

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**From:** Faye Rye  
**Sent:** 10/22/2022, 12:54 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Faye Rye



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**From:** Judy Sachter  
**Sent:** 10/22/2022, 9:24 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Judy Sachter

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**From:** Dalia Salgado  
**Sent:** 10/22/2022, 5:41 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Dalia Salgado

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**From:** Cindy Sanders  
**Sent:** 10/22/2022, 8:26 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Cindy Sanders

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**From:** Jollee Saphier  
**Sent:** 10/24/2022, 8:05 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Jollee Saphier

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**From:** Jerry Schneider  
**Sent:** 10/22/2022, 3:19 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jerry Schneider

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**From:** Carolyn Seeman  
**Sent:** 10/24/2022, 11:41 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Carolyn Seeman

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**From:** Ellen Segal  
**Sent:** 10/22/2022, 10:37 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Ellen Segal

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**From:** Donald Seligman  
**Sent:** 10/24/2022, 8:45 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,  
Donald Seligman



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**From:** Lonnie Sheinart  
**Sent:** 10/22/2022, 8:08 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Lonnie Sheinart

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**From:** AmirAli Siassi  
**Sent:** 10/22/2022, 11:00 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

AmirAli Siassi

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**From:** Tracy Silverman  
**Sent:** 10/22/2022, 8:02 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Tracy Silverman

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**From:** Ray Simmons  
**Sent:** 10/24/2022, 8:06 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Ray Simmons

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**From:** Nicole Siskind  
**Sent:** 10/24/2022, 12:43 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Nicole Siskind

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**From:** Susan Smith  
**Sent:** 10/25/2022, 2:12 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Susan Smith

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**From:** Stacey Smith-Clark  
**Sent:** 10/22/2022, 9:23 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Stacey Smith-Clark

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**From:** Madeleine Smith-Lawrence  
**Sent:** 10/22/2022, 8:48 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Madeleine Smith-Lawrence



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**From:** Pamela Smyth  
**Sent:** 10/22/2022, 11:47 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Pamela Smyth

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**From:** Alan P. Socol  
**Sent:** 10/22/2022, 10:31 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Alan P. Socol

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**From:** Kristi Somers-Kawas  
**Sent:** 10/22/2022, 1:55 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Kristi Somers-Kawas

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**From:** Crystal M. Soria  
**Sent:** 10/22/2022, 8:22 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Crystal M. Soria

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**From:** Daryl Spafford  
**Sent:** 10/24/2022, 8:20 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Daryl Spafford

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**From:** Darren Spurr  
**Sent:** 10/24/2022, 4:39 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Darren Spurr

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**From:** Barbara St. John  
**Sent:** 10/24/2022, 8:55 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Barbara St. John

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**From:** Beth Stein  
**Sent:** 10/23/2022, 2:01 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Beth Stein



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**From:** Alice Stek  
**Sent:** 10/24/2022, 10:11 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Alice Stek

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**From:** Evelyn Stern  
**Sent:** 10/23/2022, 11:17 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Evelyn Stern

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**From:** Angela Stewart  
**Sent:** 10/22/2022, 6:32 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Angela Stewart

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**From:** Tara Strand  
**Sent:** 10/22/2022, 12:07 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Tara Strand

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**From:** Julie Svendsen  
**Sent:** 10/22/2022, 12:09 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Julie Svendsen

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**From:** Alison Taylor  
**Sent:** 10/24/2022, 11:57 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Alison Taylor

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**From:** Warren TenHouten  
**Sent:** 10/22/2022, 10:25 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Warren TenHouten

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**From:** Meghan Tracy  
**Sent:** 10/22/2022, 10:16 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Meghan Tracy



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**From:** Tia Triplett  
**Sent:** 10/22/2022, 12:18 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Tia Triplett

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**From:** Gina Truex  
**Sent:** 10/22/2022, 8:22 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Gina Truex

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**From:** Michael Tullius  
**Sent:** 10/22/2022, 2:43 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Michael Tullius

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**From:** Ellen Turner  
**Sent:** 10/22/2022, 8:03 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Ellen Turner

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**From:** Kimberly Turner  
**Sent:** 10/22/2022, 3:18 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Kimberly Turner

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**From:** Marilyn Tusher  
**Sent:** 10/23/2022, 4:04 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Marilyn Tusher

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**From:** Evelyn Valdez  
**Sent:** 10/22/2022, 10:38 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Evelyn Valdez

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**From:** Richard Valencia  
**Sent:** 10/22/2022, 12:26 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Richard Valencia



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**From:** Chris Van Hook  
**Sent:** 10/24/2022, 8:03 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Chris Van Hook

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**From:** Sherry Vatter  
**Sent:** 10/22/2022, 12:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Sherry Vatter

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**From:** William Visevich  
**Sent:** 10/22/2022, 8:48 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

William Visevich

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**From:** Suellen Wagner  
**Sent:** 10/22/2022, 9:01 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Suellen Wagner

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**From:** Lynne Weiske  
**Sent:** 10/22/2022, 11:43 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Lynne Weiske

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**From:** Dorcia White-Brake  
**Sent:** 10/22/2022, 10:24 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Dorcia White-Brake

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**From:** Ree Whitford  
**Sent:** 10/22/2022, 8:15 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Ree Whitford

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**From:** Michael Wiles  
**Sent:** 10/24/2022, 9:24 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Michael Wiles



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**From:** Daniel Wilkinson  
**Sent:** 10/22/2022, 9:00 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Daniel Wilkinson

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**From:** Dorothy Wilkinson  
**Sent:** 10/22/2022, 10:29 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Dorothy Wilkinson

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**From:** Sheila Willens  
**Sent:** 10/22/2022, 1:45 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Sheila Willens

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**From:** Donna Williams  
**Sent:** 10/24/2022, 1:35 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Donna Williams

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**From:** Ken Windrum  
**Sent:** 10/22/2022, 9:32 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Ken Windrum

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**From:** Laura Winikow  
**Sent:** 10/24/2022, 4:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Laura Winikow

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**From:** Joie Winnick  
**Sent:** 10/24/2022, 6:08 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Joie Winnick

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**From:** Sheila Winston  
**Sent:** 10/22/2022, 8:27 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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Sincerely,

Sheila Winston



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**From:** Michael Wisniewski  
**Sent:** 10/22/2022, 8:23 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Michael Wisniewski

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**From:** Marc Woersching  
**Sent:** 10/24/2022, 2:04 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Marc Woersching

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**From:** Leslie Wood  
**Sent:** 10/22/2022, 11:37 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Leslie Wood

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**From:** Matthew Wright  
**Sent:** 10/23/2022, 9:31 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Matthew Wright

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**From:** Jennifer Yamamoto  
**Sent:** 10/22/2022, 9:45 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Jennifer Yamamoto

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**From:** Noah Youngelson  
**Sent:** 10/22/2022, 6:15 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Noah Youngelson

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**From:** J. Yudell  
**Sent:** 10/22/2022, 8:33 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

J. Yudell

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**From:** Molly Zalman  
**Sent:** 10/26/2022, 12:32 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Molly Zalman



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**From:** Tim Zemba  
**Sent:** 10/22/2022, 2:48 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Tim Zemba

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**From:** Christine Zembal  
**Sent:** 10/24/2022, 8:53 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Christine Zembal

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**From:** John Zuehlke  
**Sent:** 10/22/2022, 5:34 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

John Zuehlke

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**From:** pat allinson  
**Sent:** 9/19/2022, 10:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** info on Public Hearings Oct 6/7 ??

I am interested in the proposed TCN program, and am requesting 2 things:

- 1) please add me to your email list
- 2) I'd like info on how to e-attend the Public Hearings on Oct 6 and 7 2022 (as mentioned at the Del Rey Neighborhood Council's Land Use and Planning Committee meeting).

Thank you !  
Pat Allinson  
Del Rey Resident

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**From:** pat allinson  
**Sent:** 10/24/2022, 2:37 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Cc:** [pallinson@yahoo.com](mailto:pallinson@yahoo.com); [councilmember.bonin@lacity.org](mailto:councilmember.bonin@lacity.org)  
**Subject:** Comment Letter, TCN Proposed Project, DEIR; 3rd try :-)

Hello,

Apologies if you are receiving duplicates of my email, I'm sure it's user error on my part; but I am sending it one more time 'just in case'.

Attached is my comment letter pdf file. I would appreciate a 'message received' response from Metro.

fyi, I did try to send this directly to [Shine.Ling@metro.net](mailto:Shine.Ling@metro.net), but that e-address was rejected, and the operator at metro said the [tcn@metro.net](mailto:tcn@metro.net) was the only e-address for the TCN project.

Thank you for your efforts on the proposed project,  
Pat Allinson  
Del Rey Resident

Patricia Allinson  
Comments Re: Transportation Communication Network DEIR  
October 24, 2022

Shine Ling, Manager, Development Review  
Metro  
One Gateway Plaza, MS 22-9  
Los Angeles, CA 90012  
Via email to: [tcn@metro.net](mailto:tcn@metro.net); [shine.ling@metro.net](mailto:shine.ling@metro.net)

Re: Transportation Communication Network (TCN),  
Draft Environmental Impact Report (DEIR)

I am writing in response to the TCN's DEIR. The TCN project proposes establishing 56 structures for digital billboards within the City of Los Angeles, a proposal that is contrary to the City's current rules regarding digital billboards.

My general concerns:

- The stated benefits of the project are presented as mitigating factors, yet they are vague and have no benchmarks. These unspecified 'benefits' should not be considered in evaluating the environmental impact of this project.
- The method of selecting locations for the project was not specified. It is easy to believe locations were proposed based almost entirely on expected ad revenue.
- The project considers it appropriate to install digital billboards on/near environmentally sensitive sites, and/or near possible future residential properties.
- The DEIR was prepared prior to finalizing the required changes to the City's digital billboard rules, and those rule changes should be available to the public as part of the evaluation of the project.
- Additional comments should have been solicited, received and made public prior to the issuance of the DEIR. Only seven Comment Letters are included in Appendix A.3, indicating a lack of effective outreach and/or relevant responses. The seven letters include only one City Councilmember's response, a response from the County's Fire Department but not the City's Fire Department, etc. It is unclear if the relatively few specific comments in the seven letters were addressed in the DEIR. There were no comments from CALTRANS, or the Department of Fish and Wildlife, or the City Attorney.
- Drivers, residents, and wildlife deserve a thorough and complete evaluation.
- More concerns are included in my letter via the following additional comments and attachments.

While some of the stated goals of the program are promising, it does appear they could be accomplished in ways other than building massive digital billboards.

Patricia Allinson  
Comments Re: Transportation Communication Network DEIR  
October 24, 2022

As a resident of Los Angeles, I am concerned with anything that increases the visual blight and driving dangers within the City. I am also concerned with anything that has a negative impact on sensitive ecological areas. The benefits of this project have not been detailed, leaving it unclear if they are truly beneficial or not. The potential harm from proceeding with this project and committing to a 20 year contract for massive billboard structures should be thoroughly examined prior to any vote on the project.

Alternative I is the only alternative that is acceptable.

Thank you for your attention to this project.



Patricia Allinson  
Del Rey Resident

Attachments: Additional Comments (following)  
Mike Bonin Letter  
My 9/19/22 email (no response found)  
Metro TCN presentation, pages 9-12

via email: [councilmember.bonin@lacity.org](mailto:councilmember.bonin@lacity.org)  
[Shine.Ling@metro.net](mailto:Shine.Ling@metro.net)  
[TCN@metro.net](mailto:TCN@metro.net)

**Additional Comments:**

1. **Executive Summary, Alternatives, Project Description**
  - a. **Page I-5: 'No Site Locations are zoned for residential use.'**

No site locations zoned for residential use does not mean the locations are not near zoning classifications which allow residential use (see zoning rules, Housing Plan, Community Plans). Which site locations are within a half mile of any zoning that may be used now and/or in the future for residential facilities?
  - b. **The 2:1 ratio must be explained. Which specific static billboards are slated for removal and where are they located? What logic was used to determine 2:1 was the 'correct' ratio? How many of the selected static billboards are slated for removal and/or maintenance in the next 5 years? Add a link and/or chart showing which billboards would be removed, and their current repair status.**
  - c. **What other revenue raising alternatives were evaluated by Metro? Were the results of these evaluations shared with the public? Were the results shared with the City Council and/or City Planning Department?**
  - d. **What is the impact of the STAP Program? Will this program provide any features of Intelligent Technology, Roadway Efficiency, and Features to Promote Public Safety & Communication? What parts of STAP can be modified to assist with the TCN program?**
  - e. **List the 'unique attributes' of the TCN technology. Are these attributes unique to Los Angeles? Are they unique to one vendor? What makes them 'unique' ?**
  - f. **Page II-5: '...the TCN Program would be designed to support future innovations such as autonomous vehicles, smart energy grids, and high-speed wireless cameras'. List the unique attributes of the TCN Program that would require digital billboards as opposed to updating existing methods of informing drivers. List the specific future abilities that will be supporting (stay in your lane? Merging? etc). What is the cost comparison to adding transit signals etc to a structure that does Not have digital billboards?**
2. **Page II-4: "Locate the TCN Structures at sites, elevations, and angles that would not increase distraction to motorists while still efficiently relaying information to commuters."**
  - a. **Add a specific explanation for each site explaining why the distraction to motorists would not increase.**
  - b. **In particular, for sites FF-29 and FF-30 explain why going from ground level at Mindanao/90, driving up ~30 feet (on a curve) towards 2 massive digital billboards (placed at the site where the 90 goes over Culver Boulevard, and then remains 'high' to cross Ballona Creek), will not distract drivers. Show the exact spot each billboard will be directed at, and the circumference of the light once it reaches that location (a flashlight directed to a wall will have a larger/smaller diameter of light depending on how close you are). In addition, do the same for drivers coming from**



the opposite direction which is basically a wide curve. Also do the same for drivers using the four on/off ramps at the Culver/90 intersection.

- c. Page II-6 "The Zoning Ordinance would not authorize new signage other than the TCN Structures." Provide an opinion by the City Attorney that the proposed zoning ordinance change would not provide a basis for other billboard operators to challenge the new ordinance in an attempt to allow digital billboards on private property as long as these private billboards meet the same criteria as the TCN project billboards.
  - d. Page II-6 "The digital display faces would be designed to provide efficient and effective illumination while minimizing light spill-over, reducing sky-glow, and improving nighttime visibility through glare reduction." Note there is no eliminating all light spill-over, sky-glow, and/or glare reduction. Define 'minimizing' as it relates to this project.
  - e. Page II-7 "The digital display faces of the TCN Structures would use light emitting diodes (LED) lighting with a daytime maximum up to 6,000 maximum candelas and 300 maximum candelas at nighttime, depending on the Site Location." Would the effect of these lighting benchmarks be doubled or quadrupled with two TCN Structures and four digital billboards at essentially one location (e.g. FF-29 and FF-30 at Culver/90)?
  - f. Page II-15 Conceptual Design. Are there any similar digital billboards located in California? In the U.S.? If so, add photos. Will the TCN project be the first of its kind? If so, how will Metro monitor the costs so Los Angeles is not paying while serving as a test subject and/or beta tester?
  - g. Page 11-17 "The TCN Structures would be constructed with the use of a drill rig that would drill a hole up to 50 feet in depth on an approximately 10-foot by 10-foot area, depending on soil conditions and size of the digital display." What additional steps will be taken when building structures near wetlands where the water level may be much closer to the surface than 50 feet (e.g. FF29 and FF30)? How close to the surface is the water level at Culver/Marina? How does this project impact the flow of water into the Ballona Wetlands and Ballona Creek?
3. Appendix B: Lighting
- a. Per the DEIR: "This study concludes the proposed project will not introduce a new source of light trespass and or glare at residential use properties or other sensitive use properties within the City of Los Angeles, California."  
To a non-technical person, this is obviously not true.
    - i. Detail and explain the formula modifier that was included in the calculation for
      1. Double-sided billboards on two sites within feet of each other (e.g. FF-29 and FF-30).
      2. Light seen across wetlands vs light seen with buildings in between.
    - ii. Detail and explain the formula modifier and/or change in evaluation method that was included in the calculation to determine the acceptable impact on

nearby wildlife, during various times and conditions (e.g. dawn, early evening, fog, etc) .

- b. Page IV.A-28: 'Note that since the TCN Structures are located in urban areas...'. The structures may be located in 'urban' areas, but the light from the structures is not. FF29 and FF30 are:
    - i. Across the road from the Ballona Wetlands (not an urban area),
    - ii. Near the Ballona Creek,
    - iii. Not far from the Tule Wetlands,
    - iv. And because of the above, close to wildlife habitats (e.g. birds and butterflies that do not recognize lines on maps).
  - c. Detail the light limitations guidelines and the effect on the DEIR for:
    - i. Non-urban areas,
    - ii. Wetland Reserves, and
    - iii. Wildlife and/or Riparian Corridors.
  - d. Page IV.A-34 "Many of these static displays to be removed are in a state of disrepair." The removal of static billboards is mentioned often in this DEIR. List the alternatives for removing static billboards if the TCN project is not completed. Detail the disrepair, and which City Department is responsible for maintaining the static billboards. Will the cost of removal of the static billboards be part of the TCN project? Would normal repair costs and removal be paid for by a particular City Department (if so, which one/s)?
  - e. Detail how removal of static billboards contributes to each of the 4 stated components of the TCN project. List the purposes served by removal of static billboards as part of the TCN program.
4. The DEIR declares Biological mitigation measures are beneficial.
- a. What specific mitigation measures will be implemented that will be beneficial to the Ballona Wetlands throughout the life of the digital billboards, and not just during construction of the structures?
  - b. What specific steps will be taken to ensure migratory wildlife is not adversely impacted by these structures and the digital billboards (note the recent 'hard landing' of a goose in the middle of a Dodger playoff game)?
  - c. What specific mitigation measures will be implemented to ensure birds using the Ballona and Centinela Creeks will not be adversely impacted?
5. The entire DEIR as presented assumes digital billboards are the answer, without addressing the basic 'other alternatives' question. Additional questions must be asked and answered when considering this project.
- a. How were the selected sites evaluated? Provide a chart showing how each site is rated for i) installation of the intelligent technology, ii) roadway efficiency, and iii) features to promote public safety and communication. Explain for each structure location why that location is better than any random location that is owned by Metro and has the required footprint.

Patricia Allinson

Comments Re: Transportation Communication Network DEIR

October 24, 2022

- b. In particular, detail how 4 digital billboards (at FF29 and FF30) were evaluated on anything other than their ability to host ads; keep in mind that the 90 freeway is approximately 3 miles in length, and public service messages might be better placed 'elsewhere' (e.g. at either end of the 90, and read by drivers as they sit at stoplights).
  - c. Prepare a report listing the alternatives to Digital billboards that were considered (e.g. utilizing STAP? Having mobile message boards available? installing unknown future technology on a structure without a digital billboard? etc); and detail why these alternatives were rejected.
6. For What It's Worth:
- a. It was impossible for me to read the entire DEIR in the time allotted. It seems to be typical to release a long report late in the year and request a quick response. This is not conducive to a complete response.
  - b. How is the TCN project being paid for? Will a bond issue be proposed? Which budget will the cost of the DEIR/EIR preparation be charged to? Which budget will the construction costs be charged to? Fyi, the internet says a monopole structure with two LED faces can cost up to \$1,000,000.
  - c. References in the TCN DEIR to the recent Ballona Wetlands EIR should also include mention of the on-going (I think) lawsuits challenging that EIR. The TCN DEIR must have the Department of Fish and Wildlife on record about the TCN proposal. Please add a current letter from the Department of Fish and Wildlife that indicates it has read the TCN DEIR and either approves of the TCN project or does not; including specific references to the FF-29 and FF-30 sites.
  - d. How will Metro's TCN program interact with the State's message boards along the freeways? Will the State have fewer structures along the freeway as a result of the TCN program? Please add a current letter from the State that indicates it has read the TCN DEIR and either approves of the TCN project or does not.
  - e. I am unable to find any response to my prior email (attached) nor receipt of any email notices related to the TCN DEIR. If I missed something, or should be directing emails elsewhere, please let me know.
  - f. I agree with Councilmember Bonin's June 1, 2022 Comment Letter; in particular:
    - i. "... the scope and intent of the project is clear: install large digital billboards at highly visible Metro-owned locations for revenue generation purposes."
    - ii. Re digital billboards: "Proof of their danger is self-evident: if they did not effectively pull drivers' eyes off the road ahead, they would not be valuable for advertising."
    - iii. "Metro should seek input from the Department of Fish and Wildlife..."
7. Thank you !



# MIKE BONIN

City of Los Angeles  
Councilmember, Eleventh District

June 1, 2022

Shine Ling  
Metro  
One Gateway Plaza, MS 22-9  
Los Angeles, CA 90012

*via email: [tcn@metro.net](mailto:tcn@metro.net)*

## **RE: Metro's Transportation Communication Network NOP Comments**

Dear Shine Ling,

I write with significant concerns about the breadth and potential impact of Metro's Transportation Communications Network (TCN) project. As described, the TCN would construct a number of digital displays in prominent locations throughout the Los Angeles region. While there are ancillary communication and intelligent transportation system (ITS) elements, the scope and intent of the project is clear: install large digital billboards at highly visible Metro-owned locations for revenue generation purposes.

As a matter of policy and principle, I do not support billboards—especially digital ones. In almost every instance, they are bright, unsightly, and are a blight on the urban environment. In many locations, they pose a distraction to drivers on already dangerous streets and freeways. Proof of their danger is self-evident: if they did not effectively pull drivers' eyes off the road ahead, they would not be valuable for advertising. These are significant impacts that must be analyzed both cumulatively and at individual proposed locations.

In addition to general objections, I have specific concerns about proposed locations of new digital billboards in my district. The locations in West Los Angeles (NFF-14, NFF-15, FF-27, and FF-26) along the Expo Line are either immediately adjacent to or in close proximity to residential dwellings. In fact, the City has worked collaboratively with Metro to plan for transit-oriented housing in these exact areas. While some of this land has underlying commercial zoning, the planned use is residential or mixed-use. Metro's assessment of residential proximity in these locations appears to not consider permitted and/or planned housing. Analysis in the EIR should ensure compatibility with planned and reasonably foreseeable residential use, not just zoning. Furthermore, adequate mitigation measures must include siting, orientation, buffering, and screening from all residential dwellings.

Metro also proposes locations in Del Rey (FF-29 and FF-30) that are immediately adjacent to and will be visible from the Ballona Wetlands Ecological Reserve, the only State Ecological Reserve in Los Angeles County. Metro should seek input from the Department of Fish and Wildlife and analyze the aesthetic and biological impacts to visitors and wildlife of having illuminated advertising in such close proximity to the Ecological Reserve. The Ballona Wetlands

### **Westchester Office**

7166 W. Manchester Boulevard  
Los Angeles, CA 90045  
(310) 568-8772  
(310) 410-3946 Fax

### **City Hall**

200 N. Spring Street, Room 475  
Los Angeles, CA 90012  
(213) 473-7011  
(213) 473-6926 Fax

### **West Los Angeles Office**

1645 Corinth Avenue, Room 201  
Los Angeles, CA 90025  
(310) 575-8461  
(310) 575-8305 Fax



are also a critical coastal resource under the jurisdiction of the California Coastal Commission. Both the resources themselves and the views of those resources from public roads are protected.

Finally, Metro proposes two locations in Westchester with potentially significant aesthetic impacts. One is along Century Boulevard (NFF-17) within the Century Boulevard Streetscape Plan area, which conditions public agencies and private developers to construct improvements within the public right of way whenever a City permit is required. Los Angeles World Airports (LAWA) and commercial property owners have spent millions of dollars—and will spend millions more—to transform Century Boulevard into a gateway to Los Angeles for international visitors. It would not be fair or reasonable for this significant public and private investment in the corridor's aesthetics to be undermined by Metro. The EIR should analyze both the compatibility with and the applicability of the streetscape plan to this project, and propose specific mitigation measures or discontinue consideration of this location.

The second proposed Westchester location (NFF-18) is on the property of the Airport Metro Connector Station, a \$900 million marquee station in Metro's rail network designed by world-renowned architects. Metro would not consider placing a digital billboard in front of Union Station and likewise a digital billboard in this location should be out of the question.

Thank you for your consideration of these comments. If you have any questions, please contact my Transportation Director, Eric Bruins, at [eric.bruins@lacity.org](mailto:eric.bruins@lacity.org).

Regards,



**MIKE BONIN**  
*Councilmember, 11<sup>th</sup> District*

## info on Public Hearings Oct 6/7 ??

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From: pat allinson (pallinson@yahoo.com)

To: tcn@metro.net

Date: Monday, September 19, 2022, 10:40 PM PDT

I am interested in the proposed TCN program, and am requesting 2 things:

- 1) please add me to your email list
- 2) I'd like info on how to e-attend the Public Hearings on Oct 6 and 7 2022 (as mentioned at the Del Rey Neighborhood Council's Land Use and Planning Committee meeting).

Thank you !

Pat Allinson

Del Rey Resident

## Project Overview

> METRO proposes to implement the Transportation Communication Network (TCN) Program, which would provide a network of structures with digital displays (TCN Structures) that would incorporate the following components:

- Intelligent Technology
- Roadway Efficiency
- Features to Promote Public Safety & Communication
- Revenue Generation for Transportation Projects



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## Transportation Communication Network

- **Intelligent Technology:** TCN Structures would incorporate Metro's Regional Integration of Intelligent Transportation Systems technology
  - TCN Structures would provide real-time information regarding freeway traffic, transit and emergency systems
  - TCN Structures would allow for communication and coordination across various agencies such as LADOT, CHP, Caltrans District 7 and other agencies during emergency events and implementation of roadway improvements
- **Roadway Efficiency:** TCN Structures would provide real time data collection to aid in traffic control, bus transit signal priority, and overall bus/rail passenger experience



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## Transportation Communication Network

- **Improve Public Safety & Communication:** TCN Structures would broadcast public safety and Metro messaging throughout the TCN to commuters
  - Amber Alerts, Earthquake Early Warning System, Fire Alerts
  - Promotion of Metro and City services to the traveling public
- **Revenue Generation for Transportation Projects**
  - TCN Structures would include outdoor advertising that would create revenue for Metro and the City to fund new and expanded transportation programs consistent with the goals of the Metro Vision 2028 Plan



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## TCN Project Details

- > TCN would consist of 34 Freeway-Facing structures and 22 Non-Freeway-Facing structures in the City of Los Angeles on Metro-owned property
  - Freeway Facing structures can be viewed from freeways and highways, and Non-Freeway-Facing structures would be viewed from major streets and boulevards
  - All TCN Structures would be located primarily on rail, bus, parking, and equipment storage properties
  - All TCN site locations are zoned industrial, manufacturing, commercial, or public facilities
  - No TCN site location is zoned for residential use
  - All TCN Structures would comply with State and Federal guidelines and regulations



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From: Hector Alonzo  
Sent: 10/5/2022, 3:28 PM  
To: [tcn@metro.net](mailto:tcn@metro.net)  
Subject: RE: Digital Signage

To whom it may concern:

everyone iv'e spoken to is oppossed to any digital or lighted signage. Few were even aware of this action. even less will respond. On behalf of my family, myself, and many others. please do not allow them. The ones already along the freeways are disturbing to drive past. They are a blight on our community and pose a safety hazard, as they are a distraction to drivers. They disturb mental wellbeing; light pollution. Please, put People Before Profits!

Thank you,

Hector

---

**From:** Robert Aronson  
**Sent:** 10/24/2022, 9:28 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I am strongly opposed to any Metro STAP/TCN program which includes advertising. It's selling our outdoor space to the highest bidder who will create visual blight by installing clutter and distracting signage. Studies show that digital billboards are unsafe. They are a menace to drivers, who then injure pedestrians. How does the STAP Program reconcile with the City's ban on off-site outdoor advertising?

The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

The illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

The DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

Thank you for considering my opinion.

Sincerely,  
Robert Aronson

---

**From:** George Ball  
**Sent:** 10/23/2022, 7:50 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

Distracting driver's from their purpose--driving safely--and contributing to light pollution in a time to cutback. No! No!

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program

Sincerely,  
George Ball

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Wejeha Bilal  
9/26/2022  
Voicemail

Hi. My name is Wejeha Bilal. My telephone number is [REDACTED]. I'm calling for Shine Ling. Uh, I'm calling about that EIA, ah, impact report, uh, for the Transportation Community Network. And, um, we are in the old historical train station on 103rd and, in Watts. We have five historical buildings there and, um, ah, you know, we would like to be a part of this, you know? My telephone number again is [REDACTED]. Thank you.

**6245 Gentry Ave.  
North Hollywood, CA 91606**

October 15, 2022

*Via Email & US Mail*

Mr. Shine Ling  
Development Review Manager  
LA METRO  
One Gateway Plaza MS 22-9  
Los Angeles, CA 90012

RE:Draft EIR for the Transportation Communication Network

Dear Sir:

Please accept my response and attached illustrations to your draft EIR-**SCH #20220400363** Transportation Communication Network.

The use of off-site digital billboards including what the State has termed “changeable message signs” — is not settled public policy in the US as reported by Scenic America (e.g. recent city action by Cape May, New Jersey to ban freeway-facing digital billboards).

**THIS YEAR the City of Los Angeles and LA METRO have been joined by City Tourism and StreetsLA departments in anticipation of (a) new municipal rules for digital billboards on the public right of way and (b) revenue sharing with community offices of City Council, etc. from commercial advertising.**

- City Council approval of a Board of Public Works Sidewalk and Transit Amenities Program (STAP) (CF 2001536-S2) to include installation of hundreds of digital billboards at bus transportation stops was anticipated by 5 days in a Board of City Tourism Commissioners’ recommendation to

Page Two – Transportation Communication Network

“explore proposed piggyback agreement with IKE Smart City, LLC (IKE) with the City of Houston, Texas, for the installation and maintenance of interactive kiosks — Board Report 22-004,” September 15, 2022 (emphasis added).

- The October 6, 2022, approval by Mayor Garcetti of Municipal Ordinance 187635 was also anticipated by City Tourism and LA METRO in your draft EIR (Exhibit A — Ordinance 187635). To quote —

The provisions of Subsection (a) of this section shall not apply to any advertising structure associated with an outdoors advertising program for the public right-of-way that is approved by the Board of Public Works, Amendment to Section 2 Section 67.02(b) of the LA Municipal Code (emphasis added).

I observe that City Tourism’s description of an “Approval Process” for digital kiosks begins with a report on the Municipal Code amendment to 67.02(b) and ends with no *detailed* accounting for public comment or review. CEQA is referred to as follows:

CEQA — this project will be required to comply with statues (their spelling) and provisions under the California Environmental Quality Act (CEQA), Board of City Tourism Commissions, September 15, 2022, Recommendation, p.3.

In view of *prima facie* evidence that the City and the County are embarking on a coordinated effort to build off-site, freeway & street facing digital billboards — to include precedent-setting commercial advertising on the public right of way — I request that a comprehensive CEQA-qualified Environmental Impact Report be prepared for all of the following sources of digital billboards and signs in different City and County departments or agencies:

## Page Three —Transportation Communication Network

1. Transportation Communication Network (LA METRO & LA City)
2. Sidewalk and Transit Amenities Program (LA City)
3. Tourism Kiosks (LA City)

### **Misleading Conceptual Designs**

Your draft EIR provides conceptual designs of the freeway-facing and non freeway-facing digital billboards more suitable to a sales promotional program than a good faith effort to educate the public and others about the visual impact of this proposed program.

Specifically, I request substitutions for the renderings of freeway-facing and non-freeway facing signs provided on appendix pages II-16 and II-17 of the draft EIR for TCN (Exhibit B). Your conceptual designs fail to provide *any* reference to typical surrounding landscapes and improvements — most of which will be impacted by the TCN program. Clouds are not sufficient for this comparison.

Please consider:

- How CALTRANS illustrated the Changeable Message Signs in a March 2018 report to the State, “Outdoor Advertising Report” (Exhibit C).
- How an off-site digital billboard currently operating at NoHo West in North Hollywood was represented in a CEQA document / sales promotion at ENV-2015-888-EIR for this project (Exhibit D).

Developers have also installed markers for the outline of a project, which then the public can view at their convenience over a period of weeks, Signs 30-50 feet above grade merit this type of review.

I appreciate this opportunity to share observations with you.

Regards,

/s/

Ron Bitzer

North Hollywood

# EXHIBIT A



ORDINANCE NO. 187635

An ordinance amending Sections 67.01(a) and 67.02(b) of the Los Angeles Municipal Code to clarify the definition of outdoor advertising structure, and to exempt certain approved structures from the prohibition of outdoor advertising structures in the public right-of-way.

**THE PEOPLE OF THE CITY OF LOS ANGELES  
DO ORDAIN AS FOLLOWS:**

Section 1. Section 67.01(a) of the Los Angeles Municipal Code is amended to read as follows:

(a) The term "**outdoor advertising structure**" as used in this article is hereby defined to be any structure or device erected upon the surface of the ground for outdoor advertising purposes, or to attract the attention of the public and visible from any public street, alley, or other public place, as distinguished from any sign attached to or placed on a building, upon which any poster, bill, printing, painting, device, electronic display, or other advertisement of any kind whatsoever may be placed, posted, painted, fastened, or affixed, or used in connection with, including a so-called electric and/or cutout sign; provided, however, that the same shall not be deemed to include any board, sign, or surface used exclusively to display official notices issued by any court or public officer in performance of a public duty or a private person in giving a legal notice; nor shall the same include any sign not exceeding 20 square feet in area used exclusively to advertise the sale or lease of the property on which the sign is placed, or to designate the name of the owner or occupant of the premises, or to identify the premises such as a physician's, or surgeon's name sign, apartment house sign, post sign, or accessory sign.


Sec. 2. Section 67.02(b) of the Los Angeles Municipal Code is amended to read as follows:

(b) The provisions of Subsection (a) of this section shall not apply to any outdoor advertising structure associated with an outdoor advertising program for the public right-of-way that is approved by the Board of Public Works.

Sec. 3. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy, either in a daily newspaper circulated in the City of Los Angeles or by posting for ten days in three public places in the City of Los Angeles: one copy on the bulletin board located at the Main Street entrance to the Los Angeles City Hall; one copy on the bulletin board located at the Main Street entrance to the Los Angeles City Hall East; and one copy on the bulletin board located at the Temple Street entrance to the Los Angeles County Hall of Records.

Approved as to Form and Legality

MICHAEL N. FEUER, City Attorney

By   
EDWARD M. JORDAN  
Assistant City Attorney

Date 11/16/21

File No. 20-1536

[M:\GENERAL COUNSEL DIVISION\ORDINANCES AND REPORTS\ORDINANCES - FINAL YELLOW\Ordinance LAMC 67.01 and 67.02 Outdoor Advertising Structures 10.26.21.docx

The Clerk of the City of Los Angeles hereby certifies that the foregoing ordinance was passed by the Council of the City of Los Angeles.

CITY CLERK

MAYOR





Ordinance Passed September 28, 2022

Approved 10/06/2022

Posted Date: 10/07/2022  
Ordinance Effective Date: 11/16/2022

## EXHIBIT B

feet



Figure II-5  
Non-Freeway Facing TCN Structure Conceptual Design

feet

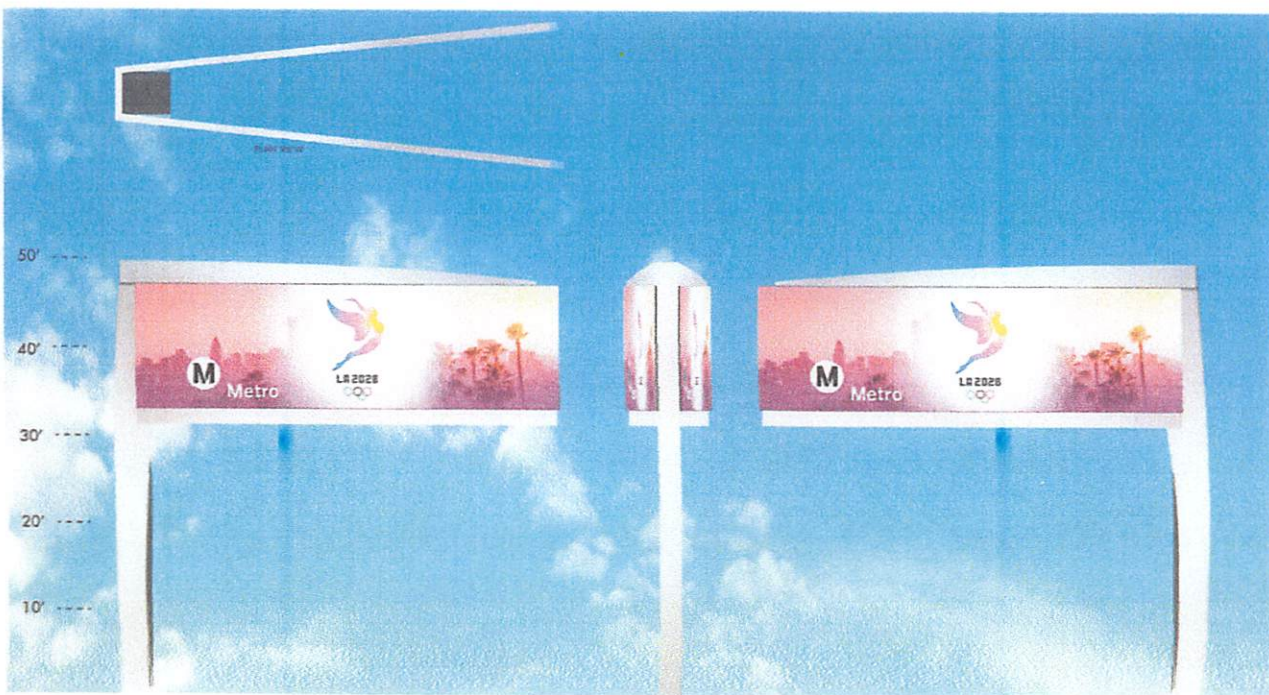


Figure II-4  
Freeway Facing TCN Structure Conceptual Design

# EXHIBIT C

Photo 7: Example of a Concept Safety Message



Photo 8: Example of a Concept AMBER Alert Message



**EXHIBIT D**



ices, LLC

Figure 4B-8  
Alternative 4B, Rendering, Aerial View Looking Southeast



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From: Tony Butka  
Sent: 10/14/2022, 12:12 PM  
To: [tcn@metro.net](mailto:tcn@metro.net)  
Subject: TCN Program

I would like to be put on the update list for this project. I live in Glassell Park, and it appears that two billboards will be in our area off the 2 freeway. However I can't see anything about what they will look like and exactly where they will be placed. It also appears that they will be two sided.

Tony Butka, Citywatch

---

**From:** Greg Cahill  
**Sent:** 10/22/2022, 9:51 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. This is contrary to everything that makes a city livable and instead trends toward the nightmare of Bladerunner. May we have no relief from relentless commercial harassment?

Sincerely,  
Greg Cahill

---

**From:** Matthew Canchola  
**Sent:** 10/22/2022, 1:00 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

As an avid cyclist, I am strongly opposed to the distractions digital signs can pose to drivers.

Sincerely,

Matthew Canchola

---

**From:** Dawn Coulson  
**Sent:** 10/7/2022, 10:36 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** RE: Reminder: Public Hearing This afternoon

Hearing for what? What project? Who is sending out these emails without specific information for recipients to see?

Oh wait – let me take the time to go open the PDF and try to figure out what you’re supposed to be presenting. Oh – halfway down it appears that it’s some sort of signage public hearing? Really?

Recommendation: hire someone with communications background. This email communication is not effective.

**Dawn M. Coulson**

---

**From:** Suzanne Danziger  
**Sent:** 10/24/2022, 7:41 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

This weekend, I was driving on Sunset Blvd in West Hollywood and was blinded by a giant electronic billboard playing video.

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Suzanne Danziger

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**From:** Elizabeth East [elizabeth@lalouver.com]  
**Sent:** 10/22/2022, 10:14 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program. The handling of this matter has been shocking and a most unfortunate reflection of public priorities,

Sincerely,  
Elizabeth East

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**From:** Thomas Fukuman [nobachi2007@gmail.com]  
**Sent:** 10/22/2022, 8:22 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Has anyone the EMF exposure to workers and people living close to the signs including children in nearby schools?

Sincerely,  
Thomas Fukuman

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**From:** Frances Goff  
**Sent:** 10/22/2022, 11:42 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would jeopardize the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence of the negative impacts digital billboards have on public safety by drawing driver attention away from the roadway and toward the advertisements. Lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate; however, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, we all must stand with Scenic Los Angeles in recommending that neither Metro nor the City move forward with the installation of digital signs as described in this program.

Sincerely,

Frances Goff



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**From:** Nancy Goldberg  
**Sent:** 10/24/2022, 10:18 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans for the Metro TCN Program. The Draft Environmental Impact Report (DEIR) omits key information about the impacts of digital signs. The TCN program would increase scenic blight, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of the DEIR, there is a preponderance of evidence of the negative impacts digital billboards have on public safety by drawing driver attention away from the roadway and toward the ads. Human error is the leading cause of traffic accidents, and lawmakers have recognized the importance of reducing driver distraction by enacting laws banning cell phone use while driving. An emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies is at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this. The report has no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also, the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths, but Metro essentially states that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Also, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Nancy Goldberg

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**From:** Amy Gustincic  
**Sent:** 10/24/2022, 8:17 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

Plans to move forward with the Metro TCN Program must STOP. The DEIR leaves out important information about the negative impacts of digital signs: increasing scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs), and creating hazards to human health, the natural environment, and quality of life.

Evidence shows that digital billboards draw driver attention away from the roadway and toward the advertisements—which is exactly what they're designed to do—but this distraction can increase accidents, putting drivers and pedestrians at risk. This is the same type of distraction caused by cell phones, the use of which while driving has been outlawed.

The Traffic Safety section of the DEIR fails to account for the evidence of the hazards caused even by changing electronic signs erected solely for public information purposes. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Amy Gustincic

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**From:** Amber Hernandez [hernandezamber556@gmail.com]  
**Sent:** 10/14/2022, 2:48 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Re: Reminder: Public Hearing This afternoon

I love metro

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**From:** Jill Holden [jilly.holden@gmail.com]  
**Sent:** 10/24/2022, 4:49 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

No more BILLBOARDS. REALLY. Are we selling everything in our lives? I am constantly distracted by the billboards that are already in place. Stop. There was not enough time to find out what folks really want screaming at them as they drive and walk. You know that this is a bad idea. Please, I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program

Sincerely,  
Jill Holden

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**From:** Nancy Hubbs-Chang  
**Sent:** 10/24/2022, 8:17 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. We don't need any more billboards of any sort, and the Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health (up to and including distracted drivers hitting pedestrians), the natural environment, and quality of life.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

Contrary to the findings in the DEIR, there is more than a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The city's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Nancy Hubbs-Chang

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**From:** Janice Hynek  
**Sent:** 10/22/2022, 6:01 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

Please! Please! Please!! I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Janice Hynek

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**From:** Stephanie Jackel  
**Sent:** 10/23/2022, 3:59 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

With respect, I am totally appalled by your plan to install these new digital billboards.

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program

Sincerely,  
Stephanie Jackel

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**From:** Laurie Kelson  
**Sent:** 10/22/2022, 9:02 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

There are already many accidents! Do not add to this problem.

Sincerely,  
Laurie Kelson



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**From:** Julie Klabin [jklabin@aol.com]  
**Sent:** 10/22/2022, 9:11 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

LA residents don't want further distractions for already distracted drivers, light pollution, or unsightly digital signs. I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this progra

Sincerely,  
Julie Klabin

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**From:** Dr. Tony Knight  
**Sent:** 10/22/2022, 10:32 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

This proposal is beyond irresponsible. The people of this city want to see you fund the metro stops with money that is already in [sic]

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Dr. Tony Knight

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**From:** Cindy Koch [ck55@verizon.net]  
**Sent:** 10/22/2022, 8:26 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

**WHAT ARE YOU THINKING?!**

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

Cindy Koch

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**From:** Scott Levine [redacted@redacted.com]  
**Sent:** 10/18/2022, 8:29 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Add me to distribution list

Hello,

Can I please be added to the distribution list for news / updates on this project?

Thank you,  
Scott



**Scott Levine**  
Real Estate  
New Tradition

[redacted]

[redacted]@redacted.com

[redacted].com

This email is intended solely for the recipients named above and may contain information that is confidential, privileged or legally protected. Unauthorized use or dissemination of this email and any attachments is strictly prohibited. If you received this communication in error, please immediately notify the sender by return e-mail and delete all copies of the original email and attachments.

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**From:** John Lorick  
**Sent:** 10/22/2022, 9:27 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

Los Angeles has enough eyesores. Please do not add to the problem with these digital billboards. These signs will enrich a few billboard companies at the expense of many. Once approved and installed they will be in place for decades.

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,

John Lorick

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**From:** Zachariah Love [zoofus@gmail.com]  
**Sent:** 10/23/2022, 6:57 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Zachariah Love

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**From:** Steven Luftman [sluftman@yahoo.com]  
**Sent:** 10/24/2022, 4:03 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

Please rethink the plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Steven Luftman

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**From:** Patricia Mace [patriciamace@ca.rr.com]  
**Sent:** 10/22/2022, 9:39 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I WAS HORRIFIED 2 DAYS AGO TO SEE THE SHOCKING NEW 30FT?NEON MASSIVE SPORTS? SIGN FACING THE JOINING TRAFFIC ON THE 10 FWY ONTO THE 110 FWY N TO PASADENA !!! I COULD NOT BELIEVE THE LEVEL OF BRIGHT DISTRACTING LIGHTS AT THIS DANGEROUS POINT IN TRAFFIC !!!!!!! SUBSEQUENTLY I URGE YOU TO HALT ALL PLANS FOR THESE DREADFUL UGLIFICATION PLANS YOU HAVE AND ARE INSISTING ON PUSHING ONTO / FOR OUR LOVELY CITY OF LOS ANGELES !! YOU HAVE NO RIGHT TO UGLIFY OUR CITY FOR EVERYONE, WITH THESE SIGNS FOR A FEW BUSINESS OWNERS !!! YOU NEED TO HALT ALL PLANS TO MOVE FORWARD WITH THESE HIDEOUS SIGNS YOU HAVE PLANNED !!! I MEAN, HOW DARE YOU THINK YOU HAVE THIS RIGHT TO UGLIFY OUR LOS ANGELES ??? YOU NEED TO HALT ALL PLANS TO MOVE FORWARD WITH THIS HIDEOUS METRO TCN PROGRAM !!! WE WANT OUR LOVELY LOS ANGELES, NOT THIS TCN PROGRAM OF UGLY BLIGHT !!!!!!!!!!!!!

The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).  
rogram.

All billboards can reduce property values. With high visibility of digital billboards, many properties would be impacted by this plan. Not to mention the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in thi

Sincerely,  
Patricia Mace



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**From:** Patricia Mace  
**Sent:** 10/24/2022, 12:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

PLEASE HALT ALL PLANS FOR THESE UGLY NEON SIGNS IN OUR LOVELY CITY OF LOS ANGELES. WE DO NOT NEED OR WANT THIS UGLIFICATION OF LOS ANGELES !!! YOU SHOULD NEVER HAVE THIS POWER TO PUT THESE SIGNS UP IN OUR CITY, EVER !!!! I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with this installation.

Sincerely,  
Patricia Mace

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**From:** [REDACTED]@ [REDACTED]

**Sent:** 10/24/2022, 3:26 PM

**To:** [tcn@metro.net](mailto:tcn@metro.net)

**Cc:** [REDACTED]

**Subject:** Metro Transportation Communication Network DEIR Comments

Hello,

I'd like to submit the attached comments on the Metro TCN DEIR.

Could you please send a brief response to confirm you received this?

Could you also please add me to the distribution list for further communications related the this project?

Thanks,

Casey Maddren

October 24, 2022

Los Angeles Metro  
One Gateway Plaza  
Los Angeles, CA 90012  
Attn: Shine Ling, Development Review Team  
Sent Via E-mail to: tcn@metro.net

Re: Transportation Communication Network  
Draft Environmental Impact Report (EIR)  
DEIR Comments

To Whom It May Concern,

I would like to submit the following comments on the DEIR for the Transportation Communication Network.

Casey Maddren

████████████████████  
Los Angeles, CA ██████

## **Metro Transportation Communication Network DEIR**

### **Comments**

#### **Biological Resources**

The DEIR fails to adequately assess cumulative light impacts from the TCN project on avian wildlife, in particular, migratory birds. As the DEIR acknowledges, the billboards will be installed in urban areas where substantial light pollution already exists. Research has shown that urban light can have significant negative impacts on avian wildlife. The DEIR makes no effort to assess cumulative impacts, let alone mitigate them.

#### **Bright Lights, Big City:**

**Why Light Pollution Threatens Migratory Birds, from Yale Environment Review**

<https://environment-review.yale.edu/bright-lights-big-city-why-light-pollution-threatens-migratory-birds>

*Migratory birds may not fly directly into cities, but their proximity to urban areas can still have a grave impact on their health. Birds that stop near cities at night forgo the opportunity to eat and rest at more suitable, forested stopover sites. They are also more likely to die or be injured from encountering urban hazards like roads and buildings. Consequently, birds that land in urban areas could become less fit for the remainder of their migration and arrive in poorer condition.*

## **Energy**

The analysis of energy consumption only appears to assess energy used by the individual digital billboards, and does not appear to assess energy consumed by necessary network infrastructure. For this reason, the analysis of impacts related to energy is inadequate.

## **Greenhouse Gas Emissions**

The analysis of GHG emissions only appears to assess emissions related to the individual digital billboards, and does not appear to assess GHG emissions from necessary network infrastructure. For this reason, the analysis of impacts related to GHG emissions is inadequate.

## **Transportation**

### **FHWA MUTCD**

While the DEIR briefly mentions FHWA's Manual on Uniform Traffic Control Devices, there is no indication that an assessment of the project's compliance with the MUTCD has been completed. This is crucial. If the program fails to meet the standards set by the MUTCD, or if aspects of the program are in conflict with the MUTCD, this clearly opens the door to litigation initiated by the Federal government.

### **Studies Used for Review**

It's hard to believe that the authors of the DEIR are basing their analysis on the following three studies:

*Driver Visual Behavior in the Presence of Commercial Electronic Variable Message Signs*, U.S. Department of Transportation Federal Highway Administration, September 2012 (FHWA Study);

*Driving Performance and Digital Billboards*, Foundation for Outdoor Advertising Research and Education, 2007 (Driving Performance Study)

*A Study of the Relationship Between Digital Billboards and Traffic Safety in Cuyahoga County, Ohio*, Foundation for Outdoor Advertising Research and Education, 2007 (Cuyahoga County Study).

Really?! The authors choose to use a FHWA study that other researchers assert is seriously flawed, and two other studies prepared by an outdoor advertising industry group? Regarding the first study, please see the following critique, which raises serious questions about the report's validity.

*A Peer-Reviewed Critique of the FHWA Report: "Driver Visual Behavior in the Presence of Commercial Electronic CEVMS"*, Jerry Wachtel, Veridian Group, January 2015  
<https://www.scenic.org/wp-content/uploads/2021/06/Critique-of-FHWA-2013-Billboard-Safety-Final-Report.pdf>

Here's an excerpt:

*The present report, which was subjected to independent peer review, reviews these three FHWA documents, and concludes that the final report is seriously flawed due to confounding methodological issues, substantive factual discrepancies between the draft and final reports,*

*failure to incorporate advances in the state of knowledge in the field from recent research, serious oversights in experimental procedures, and significant equipment constraints.*

As for the second and third studies cited, do the authors really think that an outdoor advertising industry group is a reliable source for objective analysis? The authors even acknowledge that there is extensive literature on the subject, and instead of taking advantage of the wealth of research, they rely on TWO reports by the SAME industry group. Relying on these reports for their analysis calls into question not only the authors' competence, but also their integrity.

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**From:** Jonny Pray  
**Sent:** 10/22/2022, 8:02 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to IMMEDIATELY halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the NEGATIVE impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of these hideous disgusting dangerous digital signs as described in this program.

Sincerely,  
Jonny Pray

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**From:** Leslie Andrew Ridings  
**Sent:** 10/11/2022, 9:31 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Public Comment re: TCN project

Dear Metro TCN staff,

As a native angeleno and resident, I write in full-throated support of your proposal to replace/reduce current static billboards with new, electronic displays in order to increase revenue for transit funding. Of your three proposed alternatives, I support “Alternative Two” - which would allow for the most static billboards to be replaced with electronic ones. The best future for Los Angeles County is one that relies not on cars to get around, but transit and active mobility. To that end, the more funds Metro can acquire via these new displays, the better. Indeed, if there were an alternative to expand the program, notwithstanding the broadly defined “environmental impacts” you outline in the Draft EIR, I would support that option. However, since “Alternative Two” is the most expansive of your three proposals, I would like to cast my vote for it, for what it’s worth!

I do have one suggestion: ear-marking the funds acquired via these new displays for specific **mass transit** purposes - ie, Heavy Rail, Light Rail, BRT expansion, speeding up the EIR process, etc. Or, In the alternative, simply **bar the funds being used for freeway expansion.**

**We must move away from increasing personal passenger car usage and expanding highway/street capacity.** Instead, we should utilize extant space for bus-only lanes, protected bicycle lanes and other active mobility updates, bus bulb-outs, and surface/aerial LRT on the common right of way - you get the idea.

Thank you for your time, and your continued leadership in building a more cohesive, accessible, and equitable Los Angeles.

Leslie Ridings

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Leslie Andrew Ridings  
He/Him/Él

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**From:** Judith Roach  
**Sent:** 10/22/2022, 9:01 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program. Please don't pollute our visual enjoyment of our city with this digital blight.

Sincerely,  
Judith Roach



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**From:** Judith Roach  
**Sent:** 10/24/2022, 6:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

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The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program. Please stop this visual blight. Judy Roach

Sincerely,  
Judith Roach

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**From:** Linda rosenthal  
**Sent:** 10/22/2022, 2:21 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

**NO MORE BILLBOARDS AND NEVER ANY DIGITAL ONES!!!**  
End the toxic blight and actual safety danger!

Sincerely,  
Linda rosenthal

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**From:** Jay Ross  
**Sent:** 10/24/2022, 9:43 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I oppose especially the two FF signs on the 405 in West LA, and the 2 NFF signs on Pico Blvd in West LA.

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Jay Ross

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**From:** Robin Rudisill  
**Sent:** 10/24/2022, 9:56 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

In addition, adverse cumulative impacts together with other City or DPW programs have not been considered, a gross violation of CEQA.

Contrary to the findings in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City should move forward with the installation of digital signs as described in this program.

Sincerely,  
Robin Rudisill  
3003 Ocean Front Walk  
Venice, CA 90291

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**From:** Lisa Schumacher  
**Sent:** 10/23/2022, 2:16 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Cc:** [councilmember.bonin@lacity.org](mailto:councilmember.bonin@lacity.org)  
**Subject:** Digital Sign Proposal

Dear Shine Ling,

I learned the City plans to install large digital billboards at several locations, including at the 90 freeway intersection with Culver Boulevard.

I agree with Mike Bonin's June 1, 2022 Comment Letter: The proposed project is clearly for revenue generation purposes, digital billboards are self-evidently dangerous, and the Ballona Wetlands are a critical coastal resource.

I am strongly opposed to this idea. Having lived in this area for the past 28 years, the wetlands are a vital part of our ecosystem. Any light pollution that disrupts the delicate balance for animals and plants is bad for our environment. I would hope that we have learned something about the importance of considering our impact on the world around us with all of the evidence of climate change. Placing digital signs to make money at the risk to our environment is a bad decision.

I am urging the City Council to say no to the currently proposed Metro Transit Communication Network.

Los Angeles deserves better.

Respectfully,

Lisa M Schumacher

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**From:** Eric Sheehan  
**Sent:** 9/13/2022, 12:47 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** This idea is unsafe and unsustainable

Cancel this entire project.

We don't need more moving distractions on our highways.

Light pollution and electricity usage are not worth the ad dollars.

Stop it.

Eric Sheehan

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**From:** Dan Silver  
**Sent:** 10/22/2022, 9:55 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I am appalled by this proposed action. You would sacrifice public safety and the public space.

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Dan Silver

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**From:** Ed and Bee Simpson  
**Sent:** 10/24/2022, 12:02 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

We oppose Metro TCN Program. It omits key information about the impacts of digital signs and would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Drivers are already extremely at risk with increasing numbers of people, drugs, alcohol, speeding, etc.

In light of the many stated concerns by Scenic Los Angeles, we support them and urge you do the same.

Sincerely,  
Ed and Bee Simpson



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**From:** Flara#Volis#

**Sent:** 9/15/2022, 2:09 PM

**To:** [alice.roth@lacity.org](mailto:alice.roth@lacity.org); [councilmember.kevindeleon@lacity.org](mailto:councilmember.kevindeleon@lacity.org); [emma.howard@lacity.org](mailto:emma.howard@lacity.org); [sarah.flaherty@lacity.org](mailto:sarah.flaherty@lacity.org); [tcn@metro.net](mailto:tcn@metro.net)

**Subject:** EIR re TCN attn: Attn: Shine Ling, Development Review Team

Initial Comments re Draft EIR Re TCN

I am opposed to this project. I support the no build alternative.

1. We don't need it.
2. It will cause more corruption in an already corrupt City.
3. It will be dangerous to drivers
4. It will impact historic resources
5. It will be harmful to biological resources. It will hurt an already at risk bat population. It will hurt our bird population.
6. It will impact communities of color disproportionately because there are more freeways and public transportation project in these communities.

Clara Solis

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**From:** David Swartz  
**Sent:** 10/18/2022, 8:40 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Signage along freeway- Metro

Hi TCN:

Metros goal should be for creating a safe environment to access your exposition line. There is no security. Anyone can get on this line and not pay which means that we have homeless sleeping, eating, screaming ,urinating and smoking on the train. The revenue raised due to these signs in the expo area should pay for this level of security. Secure each entry. Most metro areas you cannot just get on without security.

Thanks:

David

**David Louis Swartz**

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**From:** Christina Turbeville  
**Sent:** 10/24/2022, 1:31 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

I live in the West LA Sawtelle Neighborhood, and it is unclear how close NFF-14 & NFF-15 to be located on Pico Boulevard will be to the West LA Animal Shelter. Changing light from these signs could also disrupt to well-being of animals housed at the shelter. The DEIR fails to address this issue.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Christina Turbeville

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**From:** Tina Turbeville [tina@scatterit.com]

**Sent:** 10/24/2022, 1:41 PM

**To:** [tcn@metro.net](mailto:tcn@metro.net); [councilmember.bonin@lacity.org](mailto:councilmember.bonin@lacity.org)

**Subject:** Comments about the Transportation Communication Network Draft Environmental Impact Report

I oppose the project and feel we should not have digital signage, particularly with moving images. My concerns follow:

- Billboards are dangerous. They contribute to distracted driving, putting pedestrians and motorists at risk.
- Billboards damage the scenic qualities of our city and our scenic byways.
- As a West LA Sawtelle neighborhood resident, I am concerned about the proximity of the NFF-14 and NFF-15 signs proposed for Pico Boulevard to the West LA Animal Shelter located on Pico between Corinth and Purdue. I foresee continuous changes in light as damaging to the animals.

I urge you to stop this project.

Best Regards,  
Tina Turbeville

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**From:** Kent Vinson  
**Sent:** 10/5/2022, 11:37 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Cc:** [bonin@lacity.org](mailto:bonin@lacity.org)  
**Subject:** Metro Transit Communication Network (TCN) Comments and City Council File No. 22-0392

Dear Shine Ling and City Council Members,

I learned the City plans to install large digital billboards at several locations, including at the 90 freeway intersection with Culver Boulevard.

I agree with Mike Bonin's June 1, 2022 Comment Letter:

The proposed project is clearly for revenue generation purposes, digital billboards are self-evidently dangerous, and the Ballona Wetlands are a critical coastal resource.

When regularly driving to SoFi stadium, I exit the Manchester exit, and there is a large digital billboard that is assaulting to the eyes, distracting to the drivers, and out of place for the area.

I most definitely do not want that light pollution and driving distraction at the highway 90/Culver Blvd. area.

I urge you to say no to the currently proposed Metro Transit Communication Network.

Los Angeles deserves better.

Respectfully,

Kent Vinson  
President, Board of Directors  
Villa San Remo

**From:** Jeanette Vosburg  
**Sent:** 10/19/2022, 1:14 PM  
**Subject:** Re: Grassroots Coalition DEIR response comments to Metro; PlanCheckNCLA

I am a Board Member of Grassroots Coalition. I support Patricia McPherson and Travis Longcore's statements:

**METRO-**

Two signs are planned for SR 90 East and West (Freeway Facing FF 29 an FF 30) shown in the map of the project EIR.

Here is information about the comment due date:<https://planchekncla.com/2022/10/05/metros-transportation-communication-network-digital-signage/>

**RESPONSE:**

**DIGITAL SIGNS ARE UNECESSARY for the FREEWAY 90SR 90 East and West (Freeway Facing FF 29 an FF 30,DEIR Map)  
AND THEIR LIKELIHOOD OF CAUSING ENVIRONMENTAL HARM IN THIS AREA IS HIGH.**

**Please be responsive to the scientific studies included below per assessment of creating new lighted signage on SR 90 which is alongside and ending in areas that are sensitive biological, ecological areas.**

**Bright city lights exacerbate air pollution**

*http://cires1.colorado.edu › science › spheres › lights*

Stark's measurements indicated the energy of the nighttime lights slowed down nighttime *cleansing* by up to 7 percent and also increased the starting chemicals ...

This area is an environmentally sensitive area that the public has paid over \$200 million for its acquisition and study. Further studies must also be done for full CEQA and federal EIS studies.

*https://travislongcore.net › research › light-pollution*

**LIGHT POLLUTION , Travis Longcore, Catherine Rich**

In 2002, the American researchers Travis Longcore and Catherine Rich organized the first conference on the ecological consequences of artificial *light* at night.

**Ecological light pollution - Travis Longcore - Academia.edu**

*https://www.academia.edu › Ecological\_light\_pollution*

REVIEWS REVIEWS REVIEWS 191 *Ecological light* pollution Travis Longcore and Catherine Rich Ecologists have long studied the critical role of natural *light* in ...

**Ecological Consequences of Artificial Night Lighting**

*https://www.researchgate.net › publication › 40777410...*

Jul 5, 2022 — Travis Longcore at University of California, Los Angeles ... Therefore, *light pollution* through its impact on internal clock time which ...

## Lighting's Impact on the Animal World with Travis Longcore

<https://www.youtube.com/watch>



Lighting for Safety and CPTED (Crime Prevention Through Environmental Design) with Art Hushen. International Dark-Sk...

YouTube · International Dark-Sky Association · Apr 22, 2020

## Study reveals which outdoor lighting minimizes harm to insects

<https://www.ioes.ucla.edu/article/study-reveals-whic...>

Mar 17, 2021 — UCLA–Smithsonian research confirms *certain LED colors cause less damage* than ... co-authors is UCLA conservation scientist Travis Longcore

Thank you for your time spent in review of this information and please preclude new illuminated signage in all areas that may be negatively impacted.

Patricia McPherson, Grassroots Coalition

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**From:** Suellen Wagner  
**Sent:** 10/22/2022, 8:58 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, THREATENED WILDLIFE AND HABITAT, PUBLIC PARKLANDS, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. VENTURA BLVD. IN STUDIO CITY IS PART OF THE HIGH INJURY NETWORK! As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address impacts on hillside neighborhoods or scenic highways Laurel Canyon, Coldwater Canyon.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Suellen Wagner



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**From:** diana` waters [dianawaters09@gmail.com]

**Sent:** 10/22/2022, 9:43 AM

**To:** [tcn@metro.net](mailto:tcn@metro.net)

**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

**WE DO NOT WANT FURTHER INEVITABLE TRAFFIC ACCIDENT DEATHS FROM  
DISTRACTED DRIVERS.**

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
diana` waters

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**From:** diana` waters  
**Sent:** 10/24/2022, 11:35 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

I urge you to halt plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

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Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

**DANGEROUS, WILL CAUSE DEATHS. UGLY - WILL MAKE OUR CITY LESS BEAUTIFUL AND HAVE A NEGATIVE EFFECT ON DOLLARS FROM TOURISM.**

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program

Sincerely,  
diana` waters

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**From:** Eric Wrobbel  
**Sent:** 10/22/2022, 8:25 AM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

Why are you hellbent to turn this city into a cesspool of hucksterism? STOP this madness with digital billboards. Say NO!

Please STOP plans to move forward with the Metro TCN Program. The Draft Environmental Impact Report (DEIR) is flawed and incomplete, omitting key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

Contrary to the findings of in the DEIR, there is a preponderance of evidence demonstrating the negative impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements. Human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is inherently dangerous. The Traffic Safety section of the DEIR fails to account for this evidence. The report contains no original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal do not match those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021).

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs are a problem that the rest of the city must mitigate. However, the dangers posed by Metro's signs would not be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that all billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I stand with Scenic Los Angeles in recommending that neither Metro nor the City moves forward with the installation of digital signs as described in this program.

Sincerely,  
Eric Wrobbel

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**From:** Hilary Young  
**Sent:** 10/22/2022, 2:48 PM  
**To:** [tcn@metro.net](mailto:tcn@metro.net)  
**Subject:** Oppose Metro TCN Program

To whom it may concern:

Unbelievable!!

I URGE you to IMMEDIATELY HALT plans to move forward with the Metro TCN Program!!

The Draft Environmental Impact Report (DEIR) is FLAWED and INCOMPLETE!! It omits key information about the impacts of digital signs. The TCN program would increase scenic blight throughout the city, jeopardizing the City's 2002 sign ordinance (and authority to regulate off-site signs) while creating hazards to human health, the natural environment, and quality of life.

YOU METRO PEOPLE ARE DUPLICITOUS !!

CONTRARY to the findings of in the DEIR, there is a preponderance of evidence demonstrating the NEGATIVE impacts digital billboards have on public safety by altering driver behavior, drawing driver attention away from the roadway and toward the advertisements.

We all know that human error is the leading cause of traffic accidents, and lawmakers have come to recognize the importance of reducing driver distraction by enacting laws banning cell phone use while driving. As digital billboards have become more common, an emerging body of research indicates that digital billboards create similar distraction conditions. A comprehensive compendium of digital billboard safety studies can be found at [www.scenic.org/compendium](http://www.scenic.org/compendium).

Recent research demonstrates that even changing electronic signs erected solely for public information purposes create hazards for drivers, indicating that the medium of digital signs is INHERENTLY DANGEROUS. The Traffic Safety section of the DEIR fails to account for this evidence!! The report contains NO original analysis of the relationship between signs and driver safety and relies on a literature review of stale and inadequate research.

Also note that the illumination standards, hours of operation, and take-down rate of the TCN proposal DO NOT MATCH those recommended by the LA City Planning Commission in Version B+ of the revised City Sign Ordinance, (May 2021) !!

The DEIR acknowledges that the City of LA has committed to the Vision Zero program, with the goal of eliminating pedestrian deaths. However, Metro essentially states in this program that hazards created by installing digital signs ARE A PROBLEM that the rest of the city must mitigate. However, the dangers posed by Metro's signs would NOT be limited to its property. The City's roadway users would suffer the consequences, which would undermine the Vision Zero Program.

Evidence indicates that ALL billboards, including digital billboards, can reduce property values. Because of the high visibility of digital billboards, many properties would be impacted by this plan. Additionally, while the DEIR notes the scenic impacts on residences and businesses, it does not address the impact on the scenic qualities of byways such as the Arroyo Seco Parkway.

In light of these concerns, I STAND WITH SCENIC LOS ANGELES in recommending that NEITHER Metro nor the City moves forward with the installation of digital signs as described in this program !!

Sincerely,  
Hilary Young

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**TCN Community Meeting—October 6, 2022**  
**Recording Transcript**

1

00:00:43.410 --> 00:00:47.600

Ginny Brideau, LA Metro: Good evening. Welcome to the

2

00:00:48.020 --> 00:01:01.600

Ginny Brideau, LA Metro: probably caring for the transportation communications network. We'll get started in a few moments. We're gonna let folks file in this almost six o'clock. Thanks for joining us.

3

00:01:57.840 --> 00:02:00.379

Ginny Brideau, LA Metro: Great! Well, it is six o'clock.

4

00:02:02.080 --> 00:02:13.080

Ginny Brideau, LA Metro: I want to thank everyone for joining us this evening for the transportation communication network. We've released the draft environmental document. And uh, this is tonight's public hearing

5

00:02:14.210 --> 00:02:21.259

Ginny Brideau, LA Metro: before we get started. Wanted to share some big news which hopefully you've heard, which is tomorrow.

6

00:02:21.780 --> 00:02:33.330

Ginny Brideau, LA Metro: The K line opens. The events uh started about ten o'clock in the morning, but the K line will be open for public noon tomorrow. We've got a

7

00:02:34.480 --> 00:02:53.369

Ginny Brideau, LA Metro: the whole weekend of events. Big parties tomorrow. Big party Saturday. Hope that you can join us all the information, everything that you need to know about where the stations are, at, what kind of music is being played, and where where the foods at um is going to be on the Metro website at Kayline Dot Metro dot net

8

00:02:53.390 --> 00:02:54.750

Ginny Brideau, LA Metro: Hope to see you there.

9

00:02:58.720 --> 00:03:00.110

Ginny Brideau, LA Metro: All right.

10

00:03:01.830 --> 00:03:02.800

Ginny Brideau, LA Metro: Yeah.

11

00:03:03.660 --> 00:03:09.070

Ginny Brideau, LA Metro: The reason why you're here tonight. Let me just double check. Make sure, awesome.

12

00:03:10.050 --> 00:03:12.460

Ginny Brideau, LA Metro: The transportation communication

13

00:03:13.580 --> 00:03:31.840

Ginny Brideau, LA Metro: network public meeting just as a reminder uh your camera is off and um! The microphones are needed, so we can not hear our audience right now. During the meeting you can submit comments and questions using that Q. A. Feature,

14

00:03:32.720 --> 00:03:42.220

Ginny Brideau, LA Metro: and if you need any technical support, go ahead and call or text. Two, one, three, two, seven, six, six zero, zero, eight

15

00:03:45.150 --> 00:03:57.640

Ginny Brideau, LA Metro: for those of you who need interpretation this evening we have live interpretation right now, since we're in Zoom, you can click the interpretation. Icon Pick the language that you'd like to listen to,

16

00:03:57.650 --> 00:04:05.220

Ginny Brideau, LA Metro: and then uh, once we have uh the translated presentations. If they're requested, we'll go ahead and post those

17

00:04:07.750 --> 00:04:11.030

Ginny Brideau, LA Metro: we'll give Edna our interpreter a moment to go over that again,

18

00:04:11.070 --> 00:04:15.710

Ginny Brideau, LA Metro: for those who may be joining into the Spanish Channel.

19

00:04:19.089 --> 00:04:20.450

Ginny Brideau, LA Metro: All right.

20

00:04:20.600 --> 00:04:21.710

Ginny Brideau, LA Metro: So

21

00:04:21.820 --> 00:04:41.239

Ginny Brideau, LA Metro: just like during our scoping meeting, Metro is remains committed to ensuring that all participants can fairly and clearly share ideas, comments and concerns about this project to provide a safe environment and that equitable, equitable process. We are asking for your help. So during this meeting, please

22

00:04:43.960 --> 00:04:53.300

Ginny Brideau, LA Metro: the format of the meeting and allow for everyone to have an opportunity to comment and treat our fellow community members. Agency representatives, Metro Staff and others. With respect

23

00:04:54.990 --> 00:05:01.139

Ginny Brideau, LA Metro: presenting this aging as myself. My name is Jenny Prudeau, Community relations manager at Metro,

24

00:05:01.980 --> 00:05:08.780

Ginny Brideau, LA Metro: John Potts, executive officer, with real estate at Metro and Ashley Wright, Principal planner with I stone environmental.

25

00:05:12.120 --> 00:05:15.180

Ginny Brideau, LA Metro: Let me just check, for one thing.

26

00:05:15.220 --> 00:05:20.460

Ginny Brideau, LA Metro: Great time for my mouse to have some problems. Okay, we'll go ahead and move on to the next slide.

27

00:05:20.630 --> 00:05:34.700

Ginny Brideau, LA Metro: So again, thanks for joining us this evening. We'll go over the project overview. Talk about the impact analysis. Some of the alternatives at that point we'll turn it over to our audience. Take your public comments, and then we'll offer up some closing remarks,

28

00:05:34.780 --> 00:05:39.300

Ginny Brideau, LA Metro: going over again how to submit public comment after this evening.

29

00:05:42.440 --> 00:05:43.340

Ginny Brideau, LA Metro: So

30

00:05:45.470 --> 00:06:05.060

Ginny Brideau, LA Metro: with the project overview Metro is looking, is proposing to implement the transportation Communications network. The Tcn program, which would provide a network of structures with digital displays, Pcn structures that would incorporate the following components: Intelligent technology, roadway efficiency,

31

00:06:05.070 --> 00:06:10.810

Ginny Brideau, LA Metro: features to promote public safety and communication, revenue generation for transportation. Projects.

32

00:06:15.400 --> 00:06:26.979

Ginny Brideau, LA Metro: What this means little bit more detail. Intelligent technology means that Tcn structures would incorporate Metro's regional integration of intelligent transportation systems, technology,

33

00:06:27.370 --> 00:06:41.810

Ginny Brideau, LA Metro: those structures would provide real time information regarding freeway traffic transit and emergency systems. The structures would allow for communication and coordination across various agencies, such as La do T.

34

00:06:41.870 --> 00:06:50.239

Ginny Brideau, LA Metro: The Highway Patrol, Cal Trans District, seven and other agencies during emergency events and the implementation of roadway improvements.

35

00:06:50.500 --> 00:07:03.350

Ginny Brideau, LA Metro: The structures would provide real time data, collection to aid and traffic control, bus transit, signal priority and overall bus rail uh improved overall bus rail passenger experience.

36

00:07:05.940 --> 00:07:13.650

Ginny Brideau, LA Metro: The structures would broadcast public safety and metro messaging throughout the Tcn. To commuters,

37

00:07:14.090 --> 00:07:15.740

Ginny Brideau, LA Metro: Amber alerts

38

00:07:15.800 --> 00:07:22.659

Ginny Brideau, LA Metro: Here earthquakes, early warning systems and fire alerts and promotion of Metro and city services to the traveling public.

39

00:07:24.290 --> 00:07:42.380

Ginny Brideau, LA Metro: This also includes the revenue generation for transit transportation projects. So the Tcn structures would include outdoor advertising that would create revenue for Metro and the city to fund new and expanded transportation programs consistent with the goals of the metro vision. Two thousand and twenty-eight plan,

40

00:07:45.220 --> 00:07:55.729

Ginny Brideau, LA Metro: the tcn would consist of thirty-four freeway facing structures and twenty-two non freeway facing structures in the city of Los Angeles, on Metro owned property,

41

00:07:55.740 --> 00:08:12.359

Ginny Brideau, LA Metro: Freeway structure. Aside freeway facing Tcn. Structures can be viewed from freeways and highways and non freeway facing structures would be viewed from major streets and boulevards. All structures would be located primarily on rail, bus parking and equipment, storage properties.



42

00:08:12.950 --> 00:08:26.730

Ginny Brideau, LA Metro: All tc and structure sites, locations are zoned industrial, manufacturing, commercial or public facilities. There are no Tcn structure, site, location site located in zones for residential use.

43

00:08:27.030 --> 00:08:31.589

Ginny Brideau, LA Metro: All Tcn structures would comply with State and Federal guidelines and regulations.

44

00:08:36.130 --> 00:08:38.839

Ginny Brideau, LA Metro: I don't know if actually

45

00:08:39.140 --> 00:08:40.409

Ginny Brideau, LA Metro: um

46

00:08:41.429 --> 00:08:50.309

Ginny Brideau, LA Metro: Ashley or um Kevin is available to answer or provide it overview on our site locations.

47

00:08:55.820 --> 00:09:05.690

Ashley Wright: All right, Jenny. So there's um three. The following three maps right here show the freeway facing locations and non freeway facing location.

48

00:09:05.960 --> 00:09:19.929

Ashley Wright: Um at a high level, and then within the eir the drop dir. There are also um tables within the project description that show exactly what cross streets where they're located, and also include the Apn.

49

00:09:29.610 --> 00:09:35.280

Ginny Brideau, LA Metro: So these are also part of the conversation that actually just mentioned.

50

00:09:37.770 --> 00:09:43.360

Ashley Wright: Yeah. So there's three different slides here, and then also within the environmental setting and aesthetics

51

00:09:43.770 --> 00:09:51.589

Ashley Wright: sections of the draft. Ir, there are aerials zoomed in of each location as well as straight view level

52

00:09:53.600 --> 00:09:54.590

Ashley Wright: of each location.

53

00:09:55.260 --> 00:09:56.360

Ginny Brideau, LA Metro: Thank you,

54

00:10:02.930 --> 00:10:18.119

Ginny Brideau, LA Metro: hey? So the free weight facing Tcn structures range in size from six hundred and seventy-two square feet to one thousand two hundred square feet per sign, with the majority being approximately six hundred and seventy-two square feet.

55

00:10:19.180 --> 00:10:32.829

Ginny Brideau, LA Metro: Freeway facing structures would be located adjacent to elevated freeways or freeway on and off ramps the freeway basing structures would be located up to fifty feet in height above finished grade of the adjacent highway.

56

00:10:32.870 --> 00:10:37.470

Ginny Brideau, LA Metro: Non freeway, facing Tcm structures would face

57

00:10:37.600 --> 00:10:56.929

Ginny Brideau, LA Metro: have have digital display faces that would range in proximate size from three hundred square feet to six hundred and seventy two square feet per sign, with the majority being approximately three hundred square feet. Non freeway facing structures would be located up to thirty feet in height above the finished grade.

58

00:11:00.960 --> 00:11:14.229

Ginny Brideau, LA Metro: So, in in compliance with metro systems, advertising, content, restrictions. There would be no advertising of alcohol, smoking, and cannabis, and any content containing violence, vicinities, or other related subject matters.

59

00:11:14.570 --> 00:11:32.359

Ginny Brideau, LA Metro: The tcms would use led lighting with the daytime maximum of up to six thousand maximum candleows and three hundred maximum candle is at night time. Each structure would include glovers to shade the led elimination and minimize light spill Over

60

00:11:32.370 --> 00:11:38.049

Ginny Brideau, LA Metro: we do skyl the sky, glow and improve. Nighttime visibility through glare, reduction,

61

00:11:38.610 --> 00:11:44.850

Ginny Brideau, LA Metro: elimination from the tcm structures would be directed away from residential areas

62

00:11:44.960 --> 00:11:50.609

Ginny Brideau, LA Metro: to set to refresh every eight seconds, and would transition instantly,

63

00:11:50.990 --> 00:11:54.980

Ginny Brideau, LA Metro: with no motion, moving parts, flashing or scrolling messages.

64

00:11:59.260 --> 00:12:04.520

Ginny Brideau, LA Metro: And here is an example of a freeway-facing Tcn structure, conceptual design.

65

00:12:09.850 --> 00:12:12.039

Ginny Brideau, LA Metro: We'll go ahead and move to the next slide.

66

00:12:13.290 --> 00:12:17.849

Ginny Brideau, LA Metro: This is a non freeway facing Tcm structure conceptual design.

67

00:12:24.300 --> 00:12:33.720

Ginny Brideau, LA Metro: There is also um removal of at least one hundred and ten thousand square feet, two to one square footage. Take down ratio of existing static displays

68

00:12:33.760 --> 00:12:45.479

Ginny Brideau, LA Metro: approximately two hundred static displays located within the city will be removed. These range inside from approximately eight foot by eight foot to approximately ten foot by thirty foot in size.

69

00:12:45.530 --> 00:12:52.499

Ginny Brideau, LA Metro: Removal of the existing static signage would occur. Concurrently with the installation of the Tcn structures.

70

00:12:55.800 --> 00:12:59.300

Ginny Brideau, LA Metro: Each Tcn is constructed on a ten

71

00:12:59.630 --> 00:13:10.630

Ginny Brideau, LA Metro: by ten foot area and installed in a phase approach with up to four signs installed at once. Installation would take approximately four weeks per Tc. In structure.

72

00:13:10.700 --> 00:13:19.089

Ginny Brideau, LA Metro: The Overall Tcm Project construction is anticipated to begin in two thousand and twenty-three, and would be completed in two thousand and twenty-five

73

00:13:19.140 --> 00:13:26.569

Ginny Brideau, LA Metro: take down of existing static displays would take up to uh, it would take approximately half a day per sign,

74

00:13:28.420 --> 00:13:32.320

Ginny Brideau, LA Metro: and at this point i'm going to go ahead and hand it over to Ashley

75

00:13:32.690 --> 00:13:35.370

to talk about the Environmental review process.

76

00:13:36.150 --> 00:13:37.280

Ashley Wright: Thanks, Jenny.

77

00:13:40.030 --> 00:13:41.680

Ashley Wright: You can go to the next slide.

78

00:13:44.190 --> 00:13:59.890

Ashley Wright: The California Environmental Quality Act requires government agencies to analyze and the environmental effects of a project before approval. The secret process is intended to inform the public and decision makers about the project's. Potential environmental effects,

79

00:13:59.910 --> 00:14:13.659

Ashley Wright: encourage public participation in the environmental review process, identify mitigation measures or alternatives to avoid or minimize potential environmental impacts of the project and disclose

80

00:14:13.670 --> 00:14:22.969

Ashley Wright: potentially significant impact on the environment and keep the public informed on how decisions are reached when a significant impact is identified.

81

00:14:25.030 --> 00:14:25.920

Next slide.

82

00:14:29.820 --> 00:14:39.199

Ashley Wright: Earlier this year an initial study was prepared and determined that the project could result in potentially significant impacts for further study than an Eir.

83

00:14:39.380 --> 00:14:56.660

Ashley Wright: They included the following aesthetics, air, quality, biological resources, cultural and historical resources, energy, geology and soils, greenhouse gas emissions, hazards, and hazardous materials. Land you some planning noise,

84

00:14:56.690 --> 00:15:01.930

Ashley Wright: transportation, tribal cultural resources and electric electricity,

85

00:15:11.400 --> 00:15:23.850

Ashley Wright: the draft dir sound that the project would have significant and unavoidable environmental impacts related to a subset of the Pcn structures for the following resource areas, aesthetics,

86

00:15:24.250 --> 00:15:30.669

Ashley Wright: historical resources and land use. Specifically, the project would result in historical resources

87

00:15:30.740 --> 00:15:33.719

Ashley Wright: and associated aesthetic impacts

88

00:15:33.850 --> 00:15:40.559

Ashley Wright: related to visual character and setting at four of the non freeway facing site location

89

00:15:40.580 --> 00:15:43.799

Ashley Wright: numbers two, three, sixteen, and twenty. One

90

00:15:44.280 --> 00:15:58.940

Ashley Wright: Further, the project would be inconsistent with the goals and policies of the central city, North Central City and North Hollywood Valley Village community plans regarding historical resources as a result of the four previously mentioned site location.

91

00:15:59.530 --> 00:16:07.419

Ashley Wright: Additionally, the project would be inconsistent with the palms. Mar Vista del Ray Community plan policies regarding placement of offsite premise

92

00:16:07.500 --> 00:16:14.420

Ashley Wright: signs within the coastal area relative to site locations freeway facing twenty-nine and thirty

93

00:16:15.730 --> 00:16:16.839

Ashley Wright: next slide

94

00:16:19.330 --> 00:16:22.979

Ashley Wright: as part of the draft, three alternatives were analyzed.

95

00:16:23.110 --> 00:16:41.910

Ashley Wright: Alternative. One assumes that the project would not be approved or would not be approved. No new permanent development would occur within the site, location, and the existing environment would be maintained. Thus the the physical conditions of the site locations would generally remain as they are today.

96

00:16:41.920 --> 00:16:47.060

Ashley Wright: No new construction would occur, and no existing static signs would be removed.

97

00:16:47.340 --> 00:16:53.569

Ashley Wright: Further, no revenue would be generated from the project to fund new and expanded transportation programs

98

00:16:58.260 --> 00:17:08.290

Ashley Wright: alternative to would eliminate Tcn structures at Non three way facing site locations, two, three, sixteen, and twenty. One proposed by the project.

99

00:17:08.349 --> 00:17:11.930

Ashley Wright: With the elimination of these four tcn structures

100

00:17:11.990 --> 00:17:18.060

Ashley Wright: impacts the historical resources and the related aesthetic and land use impacts would be eliminated

101

00:17:18.230 --> 00:17:23.340

Ashley Wright: the remaining fifty-two Pcm. Structures would be proposed under this alternative,

102

00:17:23.400 --> 00:17:30.359

Ashley Wright: as with the project alternative to would provide for an overall reduction in static displays throughout the city,

103

00:17:31.440 --> 00:17:33.600

Ashley Wright: as with the proposed project

104

00:17:33.830 --> 00:17:42.210

Ashley Wright: under alternative to the city would establish a zoning ordinance that would provide a mechanism to review and approve the Pcm Structures City. Wide

105

00:17:47.310 --> 00:17:55.470

Ashley Wright: alternative three assumes that the project would eliminate Tc. And structures at non freeway facing site locations,

106

00:17:55.620 --> 00:18:11.240

Ashley Wright: two, three, sixteen, and twenty, one as well as eliminate or relocate freeway facing Tcm structures twenty-nine and thirty outside of the coastal area of the palm. Smart Vista del Ray community Plan.

107

00:18:11.630 --> 00:18:18.600

Ashley Wright: Under this alternative all impacts to aesthetics, historical resources, and land use would be eliminated.

108

00:18:18.880 --> 00:18:23.610

Ashley Wright: The remaining fifty Pcn structures would be proposed under this alternative,

109

00:18:23.690 --> 00:18:30.280

Ashley Wright: as with the project, alternative, three would provide for an overall reduction in status displays

110

00:18:31.160 --> 00:18:35.990

Ashley Wright: at least two to one square foot takes down ratio throughout the city.

111

00:18:36.360 --> 00:18:46.549

Ashley Wright: As with the project under alternative three, the city would establish a zoning Gordon that would provide a mechanism to review and approve the Pcm. Structure of citywide,

112

00:18:52.620 --> 00:18:56.369

Ashley Wright: the flow chart shown here. It takes the project Milestone.

113

00:18:56.670 --> 00:19:01.240

Ashley Wright: The notice of availability of the draft. The Ir was published on September ninth,

114

00:19:01.400 --> 00:19:08.169

Ashley Wright: two thousand and twenty-two, and the draft year. Common period will conclude on October the twenty fourth two thousand and twenty. Two

115

00:19:08.660 --> 00:19:12.660

Ashley Wright: The dialogue icons indicate opportunities for public input

116

00:19:12.820 --> 00:19:20.840

Ashley Wright: at the close of the comment period metro will evaluate all sequel-related comments received on the drop er and prepare the final er.

117

00:19:21.420 --> 00:19:28.319

Ashley Wright: Towards the end of the year Metro will conduct a public hearing and issue a decision on the certification of the finally Ir,

118

00:19:28.780 --> 00:19:39.949

Ashley Wright: with approval of the project and certification of the Eir, take down of the existing static displays and installation of the Tcn structures is proposed to begin in mid two thousand and twenty-three

119

00:19:44.000 --> 00:19:45.040

Ashley Wright: next slide.

120

00:19:46.940 --> 00:19:53.689

Ashley Wright: Metro will consider the project proposed, requested entitlements which are listed, and summarized on this slide

121

00:20:13.500 --> 00:20:14.990

Ashley Wright: to follow project

122

00:20:17.220 --> 00:20:22.140

Ashley Wright: to follow project milestones and updates. Information is available on the project website

123

00:20:22.310 --> 00:20:23.579

Ashley Wright: shown here.

124

00:20:23.980 --> 00:20:33.490

Ashley Wright: The drop by our comment period will end on October twenty, fourth, two thousand and twenty-two, and the public is encouraged to mail written comments to the address included below,

125

00:20:33.520 --> 00:20:37.950

Ashley Wright: or submit electronically at Tcn at Metro dot net

126

00:20:51.040 --> 00:20:52.170

Ginny Brideau, LA Metro: all right,

127

00:20:52.750 --> 00:21:07.069

Ginny Brideau, LA Metro: and with that Um, We do have some folks out in the audience, so um feel comfortable. Uh, if you want to go ahead and raise your hand if you'd like to submit a verbal comment. We do have a time limit of a

128

00:21:07.220 --> 00:21:12.399

Ginny Brideau, LA Metro: of a minute, and I just want to point out that we are accepting comments and questions.

129

00:21:12.440 --> 00:21:18.979

Ginny Brideau, LA Metro: However, Staff not able to respond. They'll be responding in the environmental document when the final comes out.

130

00:21:19.810 --> 00:21:23.699

Ginny Brideau, LA Metro: So if you would like to speak. Go ahead and raise your hand.

131

00:21:23.860 --> 00:21:30.370

Ginny Brideau, LA Metro: This with the raise hand function, and i'll go ahead and unmute you, and if you um



132

00:21:36.090 --> 00:21:38.930

Ginny Brideau, LA Metro: i'll just wait for any raised hands.

133

00:21:42.040 --> 00:21:43.800

Ginny Brideau, LA Metro: Awesome. Okay,

134

00:21:45.410 --> 00:21:46.870

Ginny Brideau, LA Metro: we need to go ahead.

135

00:21:47.320 --> 00:22:06.139

Wendy-Sue Rosen: I am Wendy. See Rosen, i'm with uh scenic Los Angeles, and my question is the city of Los Angeles um banned billboards in two thousand and two, and the courts have been very clear about the requirement that all billboards be um allowed only in commercial districts.

136

00:22:06.150 --> 00:22:24.359

Wendy-Sue Rosen: Um, these are not in commercial districts uh not ones designated by C of La. So how do you defend uh this as not impacting the ban on billboards in the city of Los Angeles. And how, uh, can that be defended in court? Because the industry is incredibly vitigious?

137

00:22:31.090 --> 00:22:38.560

Ginny Brideau, LA Metro: Thank you for your comment, and Wendy, I'm: sorry. Thank you for your comment, Wendy Su. We will be responding to that in the environmental document.

138

00:22:42.800 --> 00:22:43.970

Ginny Brideau, LA Metro: Okay,

139

00:22:44.550 --> 00:22:46.610

Ginny Brideau, LA Metro: checking for raise hands again.

140

00:22:51.470 --> 00:22:52.780

Ginny Brideau, LA Metro: All right.

141

00:22:54.340 --> 00:22:55.370

Ginny Brideau, LA Metro: Go ahead.

142

00:22:57.390 --> 00:22:58.220

Yeah,

143

00:22:58.620 --> 00:23:07.190

Wendy-Sue Rosen: Wendy Su, go ahead. Oh, am I the only person raising my hand? Okay? Well, you are. I have another question for you, and that is um.

144

00:23:07.510 --> 00:23:22.319

Wendy-Sue Rosen: The um city of la has a take down recommendation of ten to one, and yours is basically two to one. I I understand that square footage. Um, but that's quite a different. So I would just like that, responded to um. And then one more question that I have

145

00:23:22.330 --> 00:23:36.029

Wendy-Sue Rosen: um, and i'll put my hand down, and hopefully other people will raise their hand hands. Um! Is that this? Uh this? The safety studies that you've relied on are uh have been debunked. They're out of date, and they've been debunked, and it's known

146

00:23:36.040 --> 00:23:52.759

Wendy-Sue Rosen: um! The studies that are relied on. You have not not quoted or put in your um draft ir at all. So we'd like to see you do an update on the studies that have actually been used that are relied on by the industry and by experts, and also ask that um that you provide

147

00:23:52.770 --> 00:24:03.070

Wendy-Sue Rosen: traffic data and all kinds of information about um accident rates, pedestrian deaths in those areas, and if that hasn't been done that a study be conducted.

148

00:24:03.260 --> 00:24:04.170

Wendy-Sue Rosen: Thank you.

149

00:24:04.280 --> 00:24:05.610

Ginny Brideau, LA Metro: Thank you.

150

00:24:18.240 --> 00:24:32.850

Ginny Brideau, LA Metro: All right. Well, I will remain online uh for at least until seven o'clock, so that should additional folks show up for this evening Um! That they'll be available to take their comment,

151

00:24:32.860 --> 00:24:51.029

Ginny Brideau, LA Metro: they'll be the recording on um. Just so folks know um. Our typical process for um after online meetings is to provide a copy of the Powerpoint along with the recording um that we'll be posting up on the project website uh, so that um folks who are unable to make

152

00:24:51.140 --> 00:24:59.679

Ginny Brideau, LA Metro: get this evening have a chance to watch the recording and view with the Powerpoint. In addition, the draft environmental document is up on the project website

153

00:25:00.270 --> 00:25:13.290

Ginny Brideau, LA Metro: at Metro Dot net forward slash. Tcn: If you are already receiving emails about this project. You don't need to ask to get listed on to the distribution list again. Um, But um!

154

00:25:13.540 --> 00:25:19.269

Ginny Brideau, LA Metro: We are encouraging folks to submit their comments in writing or attend

155

00:25:19.640 --> 00:25:27.010

Ginny Brideau, LA Metro: the the hearing. We have another one tomorrow afternoon and um the same information will be provided,

156

00:25:31.060 --> 00:25:34.209

Ginny Brideau, LA Metro: so i'm gonna go ahead and and mute myself,

157

00:25:34.530 --> 00:25:36.169

Ginny Brideau, LA Metro: and but i'll be here,

158

00:25:57.930 --> 00:26:06.199

Wendy-Sue Rosen: Wendy, go ahead. Um! I just have a question. Does it? Does it show you how many people are on this call, and you could tell us how many people are on.

159

00:26:06.760 --> 00:26:10.900

Ginny Brideau, LA Metro: It is a low number for for this evening.

160

00:26:12.580 --> 00:26:13.550

Wendy-Sue Rosen: Okay, thanks.

161

00:26:14.160 --> 00:26:15.060

Ginny Brideau, LA Metro: Mhm

162

00:26:53.580 --> 00:27:03.199

Ginny Brideau, LA Metro: We'll say that the Rsvps that I got for for the hearings. The majority of folks did say that they would be attending tomorrow afternoon, and not this evening

163

00:32:11.270 --> 00:32:15.440

Ginny Brideau, LA Metro: alright, checking in. Let folks know that. Uh,

164

00:32:15.730 --> 00:32:25.999

Ginny Brideau, LA Metro: we're going to remain online till seven o'clock. The chance that uh additional folks show up, and we need to accept any spoken comment

165

00:32:27.150 --> 00:32:42.959

Ginny Brideau, LA Metro: for those who may be joining us later in the evening. Uh, we did start at six o'clock, and um went through the presentation, have accepted some submit, submitted questions, using the Q. A. Feature, and also we took some verbal comments.

166

00:32:43.780 --> 00:32:48.450

Ginny Brideau, LA Metro: But again we do have another hearing tomorrow in the afternoon.

167

00:32:50.420 --> 00:32:56.079

Ginny Brideau, LA Metro: So if you do uh show up late this evening it is okay.

168

00:32:56.900 --> 00:33:03.299

Ginny Brideau, LA Metro: And then again, as a reminder, we'll be emailing out this presentation along with a link to the recording.

169

00:33:03.340 --> 00:33:05.870

Uh and um

170

00:33:05.970 --> 00:33:15.999

Ginny Brideau, LA Metro: the Pdf. So that if uh folks want to take a look at it on their own time, it's available to them. The draft environmental document has been up on Project website

171

00:33:16.140 --> 00:33:17.870

Ginny Brideau, LA Metro: for a couple of weeks now.

172

00:33:18.730 --> 00:33:20.799

Ginny Brideau, LA Metro: Can't believe it's october already

173

00:46:42.030 --> 00:46:46.490

Ginny Brideau, LA Metro: All right. We're coming up on six forty-five. We'll be here for about fifteen more minutes.

174

00:46:47.500 --> 00:46:50.630

Ginny Brideau, LA Metro: So taking any more of the

175

00:46:50.720 --> 00:46:57.910

Ginny Brideau, LA Metro: typed in comments using the q A. Feature, or if you want to raise your hand. We'll go ahead and accept spoken comments this evening.

176

00:47:01.880 --> 00:47:08.910

Ginny Brideau, LA Metro: Do appreciate the fact that the project team has remain online this year.

177

00:47:09.080 --> 00:47:10.399

Ginny Brideau, LA Metro: Good evening.

178

00:47:11.400 --> 00:47:13.600

Ginny Brideau, LA Metro: No. I told them that the

179

00:47:15.100 --> 00:47:19.560

Ginny Brideau, LA Metro: John had to stay behind, but the rest of them have stayed. So. Thanks, guys,

180

00:51:12.760 --> 00:51:23.499

Ginny Brideau, LA Metro: all right. We're coming up on ten minutes to seven o'clock, gonna wrap up at seven o'clock, just to remind folks, especially for those who uh

181

00:51:23.620 --> 00:51:25.500

Ginny Brideau, LA Metro: watching the recording.

182

00:51:25.640 --> 00:51:31.219

Ginny Brideau, LA Metro: Please be sure to submit your written comment by October twenty fourth, two thousand and twenty-two.

183

00:51:32.400 --> 00:51:47.680

Ginny Brideau, LA Metro: We are accepting written and electronic comments by email and I uh postal by sending in an envelope um either way, if you could uh email your comments to Tcn at Metro dot net

184

00:51:47.740 --> 00:51:49.300

Ginny Brideau, LA Metro: uh, you can

185

00:51:49.410 --> 00:51:58.770

Ginny Brideau, LA Metro: also review the environmental document and all of the materials for this project under Metro, dot net Pcn: Sorry Metro dot net forward slash Tcn.

186

00:52:02.920 --> 00:52:07.619

Ginny Brideau, LA Metro: And again we're accepting comments until October twenty, fourth, twenty, twenty-two

187

00:56:48.380 --> 00:56:52.079

Ginny Brideau, LA Metro: all right We're coming up on five minutes till the top of the hour.

188

00:56:52.670 --> 00:56:59.889

Ginny Brideau, LA Metro: We'll go through a little bit of this. One more time, which is right. Now we're accepting public comments until October twenty fourth,

189

00:57:00.010 --> 00:57:01.790

Ginny Brideau, LA Metro: two thousand and twenty-two.

190

00:57:02.050 --> 00:57:05.719

Ginny Brideau, LA Metro: At that point the project team will go back

191

00:57:05.740 --> 00:57:08.149

Ginny Brideau, LA Metro: and respond to those

192

00:57:08.170 --> 00:57:12.620

Ginny Brideau, LA Metro: comments and questions, and we'll include those in the final eir.

193

00:57:12.750 --> 00:57:24.580

Ginny Brideau, LA Metro: When uh those next steps happen, we'll be sending out an email notice. So if you commented by email, we're gonna go ahead and get back to you by email with a link to the final document.

194

00:57:25.800 --> 00:57:38.680

Ginny Brideau, LA Metro: Let me go ahead and go down again to the next slide to showcase again. How can you submit public comment? You can do it uh by sending a letter in the mail to shine

195

00:57:39.510 --> 00:57:42.339

Ginny Brideau, LA Metro: at one gateway. Plaza.

196

00:57:42.460 --> 00:57:47.099

Ginny Brideau, LA Metro: I'll stop twenty, two minus nine in Los Angeles. Zip code is nine zero zero,

197

00:57:47.140 --> 00:57:48.299

Ginny Brideau, LA Metro: one, two.

198

00:57:48.880 --> 00:57:54.299

Ginny Brideau, LA Metro: You can send us an email at Tcn. At Metro dot net.

199

00:57:54.350 --> 00:57:59.819

Ginny Brideau, LA Metro: You can get to the project website by going to Metro Dot. Forward, slash! Tcn:

200

00:58:01.130 --> 00:58:16.619

Ginny Brideau, LA Metro: again. I will be get sending out a copy of uh the presentation this evening along with the link to the recording as well as the link to the draft environmental document That's currently. It posted on the Project website,

201

00:58:17.210 --> 00:58:22.729

Ginny Brideau, LA Metro: so that you have access to all of the materials that have been made publicly available to date

202

00:58:27.270 --> 00:58:36.440

Ginny Brideau, LA Metro: as we come up at the top of the hour. Do you want to take a moment to say Thank you for coming out this evening to both our project staff

203

00:58:36.640 --> 00:58:41.560

Ginny Brideau, LA Metro: and our community members who participated in the meeting

204

00:58:42.030 --> 00:58:42.859

Ginny Brideau, LA Metro: me.

205

00:58:43.250 --> 00:58:49.340

Ginny Brideau, LA Metro: I know that tonight is actually a very busy night. I see that there's a male world debate

206

00:58:49.470 --> 00:58:54.790

Ginny Brideau, LA Metro: on top of uh a lot of excitement for the K line opening tomorrow morning,

207

00:58:56.120 --> 00:59:00.450

Ginny Brideau, LA Metro: so just wanted to thank everyone for their time tonight.

208

00:59:00.570 --> 00:59:03.440

Ginny Brideau, LA Metro: Apparently there's a rotary meeting happening

209

00:59:04.560 --> 00:59:09.620

Ginny Brideau, LA Metro: in my living room. I was not aware of. So i'm gonna hide it here after seven o'clock

210

00:59:16.660 --> 00:59:19.050

Ginny Brideau, LA Metro: and again Thank you for coming out this evening.

211

01:01:46.360 --> 01:01:54.780

Ginny Brideau, LA Metro: All right, Thank you again. Everyone for joining us this evening. This was the first of two public hearings for the transportation communication network.

212

01:01:55.370 --> 01:02:02.899

Ginny Brideau, LA Metro: We will have another one tomorrow afternoon. Look forward to seeing everyone. Then, in the meantime, I will get to emailing.

213

01:02:02.940 --> 01:02:04.009

Ginny Brideau, LA Metro: Take care.

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**TCN Community Meeting—October 6, 2022**  
**Chat Comments**

**Wendy-Sue Rosen:**

The traffic safety studies you rely on in the Draft EIR have been debunked. Will you update studies to include those that are relied on by experts in the field?

**Wendy-Sue Rosen:**

The City Planning Commission has recommended 10 to 1 removal and you only recommend 2 to 1. That is not enough.

**Wendy-Sue Rosen:**

You have not taken scenic or natural resources in the siting of these billboards into consideration. There will be impacts to Ballona Wetlands, Sepulveda Basin, etc. Have you analyzed these impacts?

**Wendy-Sue Rosen:**

Will you go to the Coastal Commission for permitting for the signs that will impact the Coastal zone.

**Wendy-Sue Rosen:**

How can you prohibit violent and other content (open to interpretation)? That would be a violation of the 1st amendment. The billboard industry is very litigious as the City of LA has experienced.

**Wendy-Sue Rosen:**

The City of LA has a billboard ban. How will this approval impact the ban and will it make it so the ban cannot be defended in court?

**Wendy-Sue Rosen:**

How do these placements comply with the Highway Beautification Act?

**Wendy-Sue Rosen:**

Some of the proposed locations are also proposed for adjacent or nearby housing development? How will the proposed signs impact these future projects and existing residentially zoned areas?



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**TCN Community Meeting—October 7, 2022**  
**Recording Transcript**

123

00:32:49.080 --> 00:33:03.429

Barbara Broide: Hello, Yes. Hi, Hi! There! How are you? I'm. Good. I'm. Good. I'm. Good.

124

00:33:03.450 --> 00:33:08.040

Barbara Broide: Because this program is called the Transit Communications Network.

125

00:33:08.080 --> 00:33:11.930

Barbara Broide: People don't realize what it intends to do

126

00:33:12.180 --> 00:33:17.510

Barbara Broide: it. They don't know that they are digital billboards, and I think this is terribly disingenuous.

127

00:33:19.520 --> 00:33:27.740

Barbara Broide: I don't know uh you know you're going through a process. Um! That is kind of like the wolf and sheep's clothing,

128

00:33:29.080 --> 00:33:44.620

Barbara Broide: and it's very troubling. I also get tons of messaging from Metro, and going back to the Eir process, I sent a letter in after the fact. I was never notified of the scoping process, nor was anyone I spoke with

129

00:33:45.230 --> 00:34:12.029

Barbara Broide: uh, at neighborhood councils, plan, check and all over. So I get the impression that this process is an expedited process that seeks to avoid public comment and participation. And um, and this is, uh again a politically driven uh exercise to to figure out how to generate revenue without engaging the public in an open and transparent manner.

130

00:34:12.040 --> 00:34:13.549

Barbara Broide: It concerns me.

131

00:34:14.889 --> 00:34:17.499

Ginny Brideau, LA Metro: Thank you. I appreciate it

132

00:34:27.929 --> 00:34:33.020

Ginny Brideau, LA Metro: all right. Um! I'm going to go ahead and unmute a couple of more folks.

133

00:34:34.370 --> 00:34:39.529

Ginny Brideau, LA Metro: I'm not going to run the timer unless I need to, just because um

134

00:34:41.929 --> 00:34:47.379

Ginny Brideau, LA Metro: want to be respectful of Everyone's time. I'm going to go ahead and unmute Blue Falcon.

135

00:34:56.429 --> 00:34:59.820

Ginny Brideau, LA Metro: Okay. So if I can go ahead and unmute yourself.

136

00:34:59.830 --> 00:35:27.620

Blue Falcon: Oh, hello, yeah. My name is Jr: I'm a resident of Southgate. I received an email inform me about this meeting today, and I I quickly jumped in, but I think I might have jumped in late. I just. I joined it around one hundred and eight. Could you clarify for me? What time did the meeting start? And what is the purpose of this meeting? Is it just to address uh signage uh along the uh, I seven, ten uh uh freeway, or can I ask uh other questions outside of that

137

00:35:28.700 --> 00:35:32.630

Ginny Brideau, LA Metro: i'm going to go ahead and mute, you and I'm going to bring John back on for a moment,

138

00:35:36.560 --> 00:35:38.910

Ginny Brideau, LA Metro: John, if you wouldn't mind,

139

00:35:41.940 --> 00:35:45.830

Ginny Brideau, LA Metro: can you? Um let's see here, let's um,

140

00:35:46.820 --> 00:35:55.259

Ginny Brideau, LA Metro: because we did start right at the top the hour. If you wouldn't mind going through the the project overview one more time

141

00:35:55.540 --> 00:36:05.060

John Potts, LA Metro: uh this project is a interdisciplinary effort of Metro, three to three different departments or its department, Metro real estate,

142

00:36:05.070 --> 00:36:17.659

John Potts, LA Metro: and our Uh marketing department, and we're proposing to implement a transportation communication network Pcn. Program which will provide a network of digital display structures.

143

00:36:17.770 --> 00:36:30.579

John Potts, LA Metro: It'll incorporate the following components: it's intelligent technology and roadway efficiency and features to promote public safety and communication as well as generate revenue from uh outdoor signage.

144

00:36:31.070 --> 00:36:31.910

John Potts, LA Metro: Okay,

145

00:36:33.050 --> 00:36:34.819

John Potts, LA Metro: if like, please,

146

00:36:35.610 --> 00:36:46.600

John Potts, LA Metro: intelligent technology portion is an enhancement of what we use today to disseminate uh information to Cal Trans. To Chp

147

00:36:46.710 --> 00:36:48.410

John Potts, LA Metro: and Um

148

00:36:51.050 --> 00:37:06.180

John Potts, LA Metro: and the county as well. The structures will provide real time information regarding freeway traffic transit and emergency systems. In addition, we'll have roadway efficiencies, um enhancements that structures will provide real time data, collection

149

00:37:06.190 --> 00:37:15.769

John Potts, LA Metro: Uh and I in traffic, control, bus transit, signal priority and overall bus rail uh experience enhancement. Next slide, please,

150

00:37:19.600 --> 00:37:27.470

John Potts, LA Metro: We'll improve the public safety and communication. Our structures will broadcast public safety and metro messaging through the Tc. And to commuters.

151

00:37:27.480 --> 00:37:46.149

John Potts, LA Metro: Uh, we'll be able to produce amber alerts, earthquake warning systems, fire alerts. We'll be able to promote metro events as well as give information out about metro facilities. If we have an incident on the line, or if we want to inform people that there are certain number parking spaces available in a parking right,

152

00:37:46.760 --> 00:38:09.109

John Potts, LA Metro: and we generate revenue. Fees project from these signs as well. They will include outdoor advertising that will result, create revenue for Metro and the city to fund and expanded transportation programs consistent with Metro's goals, our vision two thousand and twenty-eight plan and the city as part of our an agreement is They will any revenue they get, It will be spent on transit and transportation projects.

153

00:38:09.120 --> 00:38:10.520

John Potts, LA Metro: Next slide, please.

154

00:38:12.830 --> 00:38:27.310

John Potts, LA Metro: The network will consist of, or at least in the analysis of the eir. We've got um thirty-four freeway facing structures with twenty-two non freeway facing structures in the city. This is all just in the city of Los Angeles, all on Metro owned property.

155

00:38:27.320 --> 00:38:46.400

John Potts, LA Metro: The freeway facing structures could be viewed from freeways and highways, and the non freeway structures would be major streets and boulevards. All the structures would be located on rail bus parking that we own equipment storage properties. But again, all owned by Metro, all the structures are in areas that are zoned

156

00:38:46.890 --> 00:38:50.819

John Potts, LA Metro: today, industrial, manufacturing, commercial or public facilities,

157

00:38:51.000 --> 00:39:02.259

John Potts, LA Metro: and all the structures are. There are no structures zoned in any residential use areas today. All the Tc. And structures will comply with the State Federal guidelines and the regulations as well.

158

00:39:02.750 --> 00:39:04.459

John Potts, LA Metro: Next slide, please.

159

00:39:06.740 --> 00:39:36.119

John Potts, LA Metro: There's three maps that you can. The resolution here on our uh zoom call isn't isn't that great. But if you go to the Metro website, these maps are there, and you can see the they're divided into the south area of town, the north area of town, and then the central business district, and all the signs, the the the entire fifty-six are all shown here designated on the freeway facing the red, and then the amber color which is the non freeway facing So why Don't, we flip through the next two slides.

160

00:39:36.130 --> 00:39:41.869

John Potts, LA Metro: That's that's the south area. And then the third one, we, the downtown area

161

00:39:44.980 --> 00:39:46.549

John Potts, LA Metro: next slide, please,

162

00:39:49.670 --> 00:40:03.379

John Potts, LA Metro: on the structure. Design the freeway facing structures. The digital faces range anywhere from six hundred and seventy-two square feet up to one thousand two hundred square feet up with majority in that six hundred and seventy-two square foot range.

163

00:40:03.410 --> 00:40:28.259

John Potts, LA Metro: The freeway facing structures will be located adjacent to the elevated freeways or freeway. On and off ramps. The freeway facing structures will be located up up to fifty feet in height above the finish grade of the adjacent highway. The non freeway structures are not quite as large. Their

digital display faces it would range in so some three hundred to six hundred and seventy-two square feet per sign, with the majority of being in that three hundred square foot range.

164

00:40:28.280 --> 00:40:32.080

John Potts, LA Metro: The non-freeway structures will be located up to thirty feet in Height

165

00:40:32.410 --> 00:40:34.019

John Potts, LA Metro: about finish grade

166

00:40:34.050 --> 00:40:35.620

John Potts, LA Metro: next slide, please.

167

00:40:39.370 --> 00:40:55.449

John Potts, LA Metro: All of our advertising on these signs will we'll comply with Metros advertising content restrictions. There's a prohibition on advertising, alcohol, smoking, cannabis, and any tenth containing violence and obscenities and some other related subject matters

168

00:40:56.440 --> 00:41:16.110

John Potts, LA Metro: effective illumination and efficient elimination. These signs will be led lighting. It has the daytime uh lumen value Kandela value of six thousand max and three hundred maximum Kendallas at night time. Each of the structures will also include louvers to shade the led elimination and complete light into

169

00:41:16.120 --> 00:41:28.430

John Potts, LA Metro: to minimize any light. Spill over, and it'll reduce sky glow and improve the night time, visibility through glare, reduction, and all of the illumination. The structures will be directed away from residential areas.

170

00:41:29.210 --> 00:41:41.199

John Potts, LA Metro: Signs are set to refresh. The messaging is set to refresh every eight seconds, and they transition instantly. There are no mood, there are no moving parts, there's no motion. There's no flashing and no scrolling messages.

171

00:41:41.670 --> 00:41:44.540

John Potts, LA Metro: Next sign, please. Next slide, Please,

172

00:42:07.160 --> 00:42:09.240

Ginny Brideau, LA Metro: John, you may have muted yourself.

173

00:42:10.020 --> 00:42:18.410

John Potts, LA Metro: Thank you. How much did it did I? Did, I miss. I think I lost you right at the previous sign. Here, hold on, there we go.

174

00:42:18.420 --> 00:42:37.119

John Potts, LA Metro: Okay, Thank you. I apologize for that. Um. This sign This is indicative of what's been installed in North America by a partner, and these signs, as you can see, are cantilever, but they have some architectural uh design to them. Uh, they do go up to fifty feet in height. Not all of them are fifty feet, but that would be the Max.

175

00:42:37.130 --> 00:42:39.030

John Potts, LA Metro: Next slide, please.

176

00:42:40.490 --> 00:42:57.209

John Potts, LA Metro: Again. These are indicative of our non freeway facing structures. You can see there's a little bit more uh shape variety again, uh structural architectural nature of the pylons, and some of them will be uh center mounted, some possibly be cantilever as well.

177

00:42:57.920 --> 00:42:59.490

John Potts, LA Metro: Next slide, please.

178

00:43:04.220 --> 00:43:23.619

John Potts, LA Metro: Part of the program that that, uh we're instituting is that when Metro and bought the right away from the railroad, we inherited over three hundred signs, county wide, and two of those hundred, those displays are located within the city. And as part of this program we're taking down all the static displays that are on our property,

179

00:43:23.780 --> 00:43:27.320

John Potts, LA Metro: it'll be at least one hundred and ten thousand square feet will come down

180

00:43:27.540 --> 00:43:33.029

John Potts, LA Metro: versus the two to one square footage. Take down versus what? What? We're putting back up

181

00:43:33.150 --> 00:43:41.460

John Potts, LA Metro: uh the range in size are coming down, and proximately eight by eight or ten by thirty in size, ten feet by thirty feet size.

182

00:43:41.730 --> 00:43:47.880

John Potts, LA Metro: Removal of the existing static signage would occur concurrently with the installation of of the structures

183

00:43:49.140 --> 00:43:50.669

John Potts, LA Metro: next slide, please,

184

00:43:52.270 --> 00:44:08.240

John Potts, LA Metro: on the construction side. Each sign is constructed on a about a ten by ten footprint. Many of them like five by five footprint, and they're installed in a phase approach with as many as four signs being built at one time. The installation of each sign takes about four weeks.

185

00:44:18.000 --> 00:44:23.630

John Potts, LA Metro: Take down in the existing static displays would take up approximately about a half a day per sign

186

00:44:25.940 --> 00:44:27.500

John Potts, LA Metro: next slide. Please.

187

00:44:37.500 --> 00:44:44.239

Ginny Brideau, LA Metro: Thank you, John. Okay, Kurt: I'm gonna go ahead and unmute you. So you want to go ahead and take him out.

188

00:44:44.820 --> 00:44:46.060

Get ready,

189

00:44:47.760 --> 00:44:52.940

Ginny Brideau, LA Metro: and just to let folks know we're at one hundred and forty-five. This is expected to go until two o'clock.

190

00:44:54.310 --> 00:44:55.990

Ginny Brideau, LA Metro: Okay, correct. Go ahead,

191

00:45:02.440 --> 00:45:09.670

Kurt: uh Barbara had said. Which uh like this uh notification to join this meeting. Kind of came out of nowhere,

192

00:45:09.770 --> 00:45:11.329

Kurt: and I guess there was.

193

00:45:11.870 --> 00:45:15.310

Kurt: I guess there was one yesterday. Um!

194

00:45:15.400 --> 00:45:16.299

Kurt: But

195

00:45:16.420 --> 00:45:19.070

Kurt: I I did. I was not aware

196

00:45:19.210 --> 00:45:22.400

Kurt: of that at all. So it does kind of seem a little shady.

197

00:45:22.660 --> 00:45:30.969

Kurt: Uh, you know that I I You guys are trying to get more funding and trying to diversify your funding sources,

198

00:45:31.130 --> 00:45:40.749

Kurt: and you know the fewer questions that you have to answer the better. But at the same time, you know. Um, I really want Metro to

199

00:45:40.840 --> 00:45:44.459

Kurt: be something that people associate positively, and

200

00:45:44.670 --> 00:45:47.049

Kurt: you know ultimately freeway

201

00:45:47.080 --> 00:45:48.439

Kurt: billboards.

202

00:45:48.660 --> 00:45:53.429

Kurt: Isn't necessarily something that people feel very good about,

203

00:45:53.590 --> 00:45:55.189

Kurt: uh at all

204

00:45:55.270 --> 00:45:57.229

Kurt: at the best of times,

205

00:45:57.290 --> 00:46:08.600

Kurt: and I worry that uh Metro's logo being on them is going to negatively associate Metro to people who are in vehicles uh

206

00:46:09.070 --> 00:46:19.709

Kurt: which you know. Obviously the the goal is to get people out of their cars and on to some trains and buses. Um and I don't know that

207

00:46:20.250 --> 00:46:28.590

Kurt: this is necessarily going to help people do that. But, hey, you know, if it if it's another few million dollars of the expected revenue per year.



208

00:46:28.900 --> 00:46:30.120

Kurt: Um,

209

00:46:30.230 --> 00:46:38.780

Kurt: And that improves service significantly. You know I don't know. Maybe it'll be worth it. But uh, yeah, I guess my questions are in relation to

210

00:46:38.810 --> 00:46:52.840

Kurt: how much uh money you guys expect to make from the sale of the billboards. Obviously, that'll change once the Olympics come around. But uh, how much you guys expect to make, you know, during a year off of these billboards, and then

211

00:46:52.990 --> 00:46:59.250

Kurt: you know just kind of how much they cost in terms of revenue. I I don't know anything about billboards, so

212

00:46:59.440 --> 00:47:04.940

Kurt: you know, like I i'm wondering what the what the actual profits for Metro would be

213

00:47:05.060 --> 00:47:10.429

Kurt: for for this, because I mean if the billboards are expensive to build and to run

214

00:47:10.670 --> 00:47:14.679

Kurt: I don't know. I I guess it's got to be worth it right. It's still a sign.

215

00:47:14.920 --> 00:47:17.550

Kurt: Um, But yeah, those are those are my questions.

216

00:47:17.690 --> 00:47:20.009

Ginny Brideau, LA Metro: Thank you. Kurt. Appreciate it

217

00:47:21.700 --> 00:47:22.740

All right.

218

00:47:22.790 --> 00:47:34.349

Ginny Brideau, LA Metro: Give me a moment to run through the questions, and i'll be right back. We've got a little under fifteen minutes before the end of this meeting, and I do appreciate the questions that are being submitted.

219

00:47:35.130 --> 00:47:42.690

Ginny Brideau, LA Metro: And um once you have spoken, if you wouldn't, if you would please consider lowering your hand unless you want to speak again,

220

00:50:38.650 --> 00:50:40.919

Ginny Brideau, LA Metro: i'm gonna go ahead and unmute. You

221

00:50:42.170 --> 00:50:43.330

go ahead.

222

00:50:43.880 --> 00:50:51.229

Barbara Broide: Uh, thank you. I I wondered, in terms of the presentation that was made, whether the speaker could address

223

00:50:51.330 --> 00:50:58.750

Barbara Broide: how this program relates to the full Tcn program broader than La City,

224

00:50:58.950 --> 00:51:05.979

Barbara Broide: because we don't really have a picture of the entire program. This is just the La City piece.

225

00:51:09.920 --> 00:51:15.559

Ginny Brideau, LA Metro: Let me check. Hold! Hold on, i'm, John, it's It's your discretion.

226

00:51:16.510 --> 00:51:28.989

John Potts, LA Metro: Um, If I understand the the question, Are you asking about what is the entire network look like uh county Wide versus just the city. Is that

227

00:51:29.000 --> 00:51:48.919

John Potts, LA Metro: right? Well, I I understand. The full program is three hundred digital billboards and No, no, ma'am, no, ma'am. Well, could you explain what the full program is? So we understand the setting. Yeah, the the the setting will be the the network will only be in La County.

228

00:51:48.930 --> 00:51:53.140

John Potts, LA Metro: That's where we own land, so there won't be um

229

00:51:53.250 --> 00:52:11.840

John Potts, LA Metro: anything. The the city, the majority of the boards are in the city, but there are boards and other areas of the county that will complete the network. But the vast majority are in the city, and so we'll be taking down all of our boards and putting up um these fifty-six, and then the few others that are in the county as well.

230

00:52:11.850 --> 00:52:29.549

John Potts, LA Metro: Well, we haven't looked at the county yet, but here I mean we're talking about fifty-six faces. Uh and that's it. Uh So this is mean uh you could have two faces on one board, so it's fifty-six faces but um,

231

00:52:30.910 --> 00:52:43.889

Ashley Wright: And then, then whatever we would have in the county which we've not looked at yet.

232

00:52:45.840 --> 00:52:47.829

John Potts, LA Metro: Does that make sense, ma'am?

233

00:52:48.650 --> 00:53:00.069

Barbara Broide: Uh, yeah, I had read something a while ago about a three hundred um signed program. We've got about three hundred static boards that will be coming down

234

00:53:00.100 --> 00:53:18.879

Barbara Broide: right that I understand. I I You know I la City, has a recommendation from the city planning commission for a ten to one. Take down ratio for digital billboards and a five to one for statics. If you erect a static billboard they want five statics to remove the removed. So,

235

00:53:18.890 --> 00:53:23.800

Barbara Broide: um i'll i'll submit a comment about the take down ratio as being inadequate.

236

00:53:26.770 --> 00:53:40.960

Barbara Broide: The revenue that's generated. I'm sure you have revenue figures for how much the static billboards generate in a comparison between static and digital and the the the comparison market value is nowhere near,

237

00:53:41.450 --> 00:53:54.049

Barbara Broide: so that's I mean. It's very nice to remove some billboards. But also do you have a map that shows where the static billboards are being removed versus where the impacts are from the new billboards

238

00:53:54.210 --> 00:54:00.930

John Potts, LA Metro: we do have uh maps that show the static boards. I'm not. I think that's in the our document. It is not.

239

00:54:01.590 --> 00:54:08.669

Barbara Broide: I may have missed that I I wanted to.

240

00:54:08.720 --> 00:54:16.569

Ashley Wright: It's not in the er yet. Um! It's still being worked out, I think, with the city and the

241

00:54:16.670 --> 00:54:26.409

Ashley Wright: the Tc. Or the take down portion of the program allows for take downs on Metro property as well as within the city of La. So

242

00:54:26.430 --> 00:54:36.540

Ashley Wright: the the way that the Eir is written is that it allows for at least a two to one take down. I know that's still going to be discussed with the city. Um,

243

00:54:36.830 --> 00:54:49.399

Ashley Wright: So that's where it's at. So It's the removal of at least one hundred and ten thousand square feet, with at least the two to one. Take down ratio. How How is that decided, though. Who's Who decided? That was the number?

244

00:54:49.410 --> 00:55:10.299

John Potts, LA Metro: What was the process used to decide that? Well, we can only commit thus far on the boards that we control completely, and that's why it's the two to one. Because those are the boards that we own. So we we can commit. We'll take hours down. There'll be further negotiations with other owners going forward. But that's not something we could commit to today.

245

00:55:12.830 --> 00:55:15.110

Barbara Broide: Thank you. Thank you, Barbara.

246

00:55:22.620 --> 00:55:34.330

Ginny Brideau, LA Metro: Let's see. Here we are coming up at five minutes to kind of go ahead and take the last hand up. But folks can continue to submit their questions. Um, just to

247

00:55:35.200 --> 00:55:48.970

Ginny Brideau, LA Metro: reiterate, um staff is not in a position to answer a lot of questions today. We're encouraging you to submit those questions using the Q A. Feature. But let me go ahead and call her color. Um!

248

00:55:49.070 --> 00:55:51.240

Ginny Brideau, LA Metro: I'm gonna go ahead and unmute you.

249

00:55:55.690 --> 00:55:56.950

Ginny Brideau, LA Metro: Go ahead,

250

00:55:58.030 --> 00:56:00.770

Ginny Brideau, LA Metro: caller. You are unmuted.

251

00:56:01.540 --> 00:56:19.129

Call-In User\_1: Good afternoon. Yes, i'm a stakeholder, and I have some issue that I hope, and perhaps you could at least direct me to advise if they are in the eir. But some issues first, when I was notified of this, and just by the presentation, the pictures first thing it reminded me was of Las Vegas.

252

00:56:29.370 --> 00:56:37.579

Call-In User\_1: Um. I hope that there will be elements to make it not accessible,

253

00:56:37.810 --> 00:56:40.270

Call-In User\_1: because

254

00:56:40.600 --> 00:57:01.199

Call-In User\_1: that is an issue also regarding accessibility of the electricity. I know when riding Metro Subway, when i'm down in the underground and the platforms many of the billboard automatic billboards. I believe they're used for information for the Metro also, but there's advertisements,

255

00:57:01.210 --> 00:57:08.670

many of the people experiencing homelessness. They've removed the panels from the bottom, and there are

256

00:57:08.760 --> 00:57:27.370

Call-In User\_1: chargers connected. I mean it's amazed once to be able to leave the actual train to go up to the escalator sometimes can be an obstacle course trying to avoid these chargers. But is is those type of Are those type of mechanisms going to be considered for access at the bottom portion

257

00:57:27.380 --> 00:57:31.770

to avoid encampments being created around these structures.

258

00:57:32.480 --> 00:57:37.250

Call-In User\_1: Also regarding the advertisement, let me go back to the

259

00:57:37.650 --> 00:57:44.889

statement that it was Tcn. Structures would comply with State and fed girl guidelines. Currently.

260

00:57:44.990 --> 00:57:51.420

Call-In User\_1: Ah, Federal guidelines indicate that people like me assigned female at birth have no reproductive rights.

261

00:57:51.830 --> 00:58:11.689

Call-In User\_1: So I really am concerned with what Federal guidelines are regarding the the advertisements will not include violence or obscene uh personal personal comment. This whole project is upseen. So therefore it would not uh go forward

262

00:58:11.720 --> 00:58:14.210

regarding the advertisement.

263

00:58:14.270 --> 00:58:31.190

Call-In User\_1: What is the ratio of actual traffic information that will be displayed to advertisements? For instance, in one hour. Could it be ten minutes of actual factual traffic information with fifty minutes of advertisements?

264

00:58:31.810 --> 00:58:44.260

Call-In User\_1: What is the screen of this company? Brings you the following traffic report is that considered advertisement, or is that considered traffic information?

265

00:58:44.650 --> 00:58:51.179

Call-In User\_1: I hope these issues will be addressed in future public arenas to allow public

266

00:58:51.440 --> 00:58:56.390

Ginny Brideau, LA Metro: this type of information. Thank you for your consideration. Thank you so much.

267

00:58:57.710 --> 00:59:07.560

Ginny Brideau, LA Metro: Go ahead and disable talking books are coming up at the top of the hour when I again thank you for submitting the comments and participating this afternoon,

268

00:59:07.810 --> 00:59:11.769

Ginny Brideau, LA Metro: the questions and the comments that were submitted during the call.

269

00:59:12.110 --> 00:59:25.039

Ginny Brideau, LA Metro: Um! Even if John replied to what was said. These will still be responded to in the environmental document. Let me go ahead and pull up to the last page here as a reminder.

270

00:59:25.920 --> 00:59:31.309

Ginny Brideau, LA Metro: Um, that we're accepting comments until October twenty fourth

271

00:59:31.460 --> 00:59:32.819

Ginny Brideau, LA Metro: this year

272

00:59:32.870 --> 00:59:35.989

Ginny Brideau, LA Metro: you can submit comments by email

273

00:59:36.200 --> 00:59:39.029

at Tcn. At Metro Dot net.

274

00:59:39.210 --> 00:59:59.039

Ginny Brideau, LA Metro: You can also view all of the materials at Metro. Dot net forward, slash, Tcn: You can also send in a written comment through the mail uh we're at one gateway. Plaza mail Stop twenty-two nine in Los Angeles, and the Zip code is nine zero zero one two.

275

01:00:00.030 --> 01:00:03.500

Ginny Brideau, LA Metro: John I want to give you an opportunity for last word.

276

01:00:05.960 --> 01:00:22.969

John Potts, LA Metro: Just want to thank everybody for the input, and we'll get your questions answered in the Comments section. And uh, just to the last lady that um uh had the concern about the the sites being secure, our sites will be very secure. They'll only be access by those that do need to do the maintenance.

277

01:00:29.140 --> 01:00:36.350

Ginny Brideau, LA Metro: Thank you all. Again,

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**TCN Community Meeting—October 7, 2022**  
**Chat Comments**

**Hutch Topikian:**

Good afternoon. I'm inquiring about making The Glendale Train Station a quiet zone or grade separated. This train station generates five times the public nuisance and noise pollution from train horns disrupting the peace and quiet to the residents of Atwater Village. This noise pollution is continual everyday 24 hours a day. This train station should be at the top of the list of revamping. If your prime directive is public safety then you need to prioritize to give the residence the peace and quiet

**Barbara Broide:**

As Metro currently yields income from the existing static inherited signs you are aware of their value in generating revenues. Digital signs generate significantly higher revenues and the City Planning Commission has recommended a 10:1 takedown for new signage in the City. 2:1? How was that determined? It is insufficient.

**Barbara Broide:**

You mention a partner for the program. Was there an RFP issued for this project?

**Barbara Broide:**

What determined the 8 second refresh rate? Changing messaging distracts drivers and are a cause of accidents. The project fails to acknowledge traffic safety studies done worldwide that demonstrate the dangers associated with digital changing messaging. The study which the DEIR cites has been criticized by traffic safety professionals and is not respected.

**Barbara Broide:**

METRO should review the recent study related to Texas traffic safety warnings on highways that demonstrated that even those signs (without commercial changing ads) cause traffic accidents. What has Metro done to assess not only the traffic safety dangers, but to evaluate the impact on the flow of traffic and the creation of delay?

**Barbara Broide:**

What reviews were done to evaluate the currently proposed locations vis a vis the City's high injury network? What were the criteria used to select the locations? Were factors such as the intricacies of traffic movements considered? The levels of congestion?

**Kurt2:**

How much money does Metro expect to earn from selling advertisements of these new digital billboards?

**Anonymous Attendee:**

One train because of an archaic infrastructure generates more public nuisance than 100 buses. Can't commission trains like buses. You're priority is to identify and recognize these areas and grade separate the Right of Way. Recognize that these horns cause serious health concerns to citizens and their peace and quiet



**Barbara Broide:**

What has been done to assess the impacts that this program will have on the overall value (in advertising revenues) of other outdoor advertising programs in the City? While some might think that more signs equal more money, that is not necessarily the case. There are only so many advertising dollars to be spent in a marketplace (Disney will not produce more movies to take advantage of additional billboard availability) and at some point (what point is that), the Metro signs will devalue the City's transit shelter signage. Add to that the proposed IKE program public right-of-way signage proposed. Where is the evaluation of the cumulative impacts not only economically in terms of ad revenue yield, but in aesthetics and quality of life?

**Barbara Broide:**

When it is stated that the signage is not to be placed in residential zones, that ignores the fact that the City (and State ) have advanced programs to accelerate the development of residential housing on commercial corridors. Likewise, even industrially zoned land has been and will continue to be used for housing. The large 600 unit housing development adjacent to the Sepulveda EXPO line stop was light manufacturing land before that project was built. So, the claim that these signs are not near residences or will not be near residences is not truthful and the nature of housing and housing development in LA must be acknowledged and addressed.

**Hutch Topikian:**

Or at the least make these areas a Quiet Zone.

**Barbara Broide:**

Some signs are to be placed in areas that fall within Coastal Commission authority. What has been done to assess the ability to obtain permits for the signs that you seek to place in environmentally sensitive locations? Impacts on the Wetlands in Ballona Creek watershed? Sepulveda Basin?

**Barbara Broide:**

While other agencies have successfully restricted signage related to alcohol (and federal law restricts tobacco advertising, marijuana although it may be necessary to call out vaping, etc.), it is difficult to restrict other types of signage as the definition as to what constitutes, for example violence, is open

**Barbara Broide:**

continued..... open to interpretation

**Barbara Broide:**

PLEASE EXPLAIN IN THIS PROGRAM HOW THE LA PROGRAM RELATES TO THE ADDITIONAL SIGNS IN THE COUNTY /BEYOND LA CITY. Total of 300 signs? Where is that in the environmental review process?

**Barbara Broide:**

The Federal Highway Administration is responsible for administering the Highway Beautification Act. What involvement have they had in the review of these proposed signs? Do these signs comply with the Highway Beautification distancing requirements?

**Kurt2:**

How much does Metro expect installations of the billboards to cost?

**Barbara Broide:**

I request a release of renderings of each proposed sign and its placement and how it will appear to communities and drivers passing by.

**Anonymous Attendee:**

Have any environmental impact studies been performed on your railroad regarding noise, public nuisance, noise pollution of the commissioning and operations of trains for commuter, passenger and freight?

**Kurt2:**

Will Metro use these digital billboards to advertise travel times using Metro during peak traffic hours?

**Barbara Broide:**

What has been done to request an analysis of the implications this program may have on the City's future ability to regulate signage? The courts have ruled to support the City's right to regulate signage via its 2002 sign ordinance. This program fails to meet qualifications for a sign district and thus could be used by outdoor advertising companies to challenge the City's right to continue to regulate offsite signage. What assessment has been done to determine the likelihood of that?

**Barbara Broide:**

What legal liability will Metro have if METRO has been warned that these digital billboards distract drivers and then there is an accident that causes a fatal accident or one with serious injury and the victims of those accidents go after Metro as having created an unsafe situation.

**Blue Falcon:**

Hello, my name is Mario Dominguez, Jr. thank you very much for repeating the overview. Now it all makes sense. Thanks again. Good job.

**Anonymous Attendee:**

What is the estimated revenue to be generated by the advertisements? What is the percentage of Metro communications on display and commercial advertisements? Who reviews the advertisements?

**Anonymous Attendee:**

How many comments has Metro' received thus far on this Draft EIR? Have comments received thus far been supportive of the propose "digital displays"?

**Anonymous Attendee:**

Will Metro operate/maintain the billboards or hire out a billboard company to operate and maintain it, with the intent of Metro receiving a percentage of revenues? Please provide this information.

**Barbara Broide:**

Comparisons of removed billboard locations vs. proposed billboards is needed.

**Anonymous Attendee:**

Who is the vendor that Metro intends to hire to operate/maintain the billboards? Will a procurement be issued to select the vendor?

**Barbara Broide:**

Given the difference in income yield between static and digital signage and the hoped for revenues from the proposed signs, removal of the 200 static signs is not adequate.

**Barbara Broide:**

Is LA's General Plan and provisions to protect Scenic Roadways being respected or are any of these signs in conflict?

**Barbara Broide:**

Will these signs comply with all zoning requirements in the areas where located, such as height limits?

**Anonymous Attendee:**

Will political advertisement be permitted as well? Metro funding sources are usually public funds and are not permitted to be used for political campaigns.

**Barbara Broide:**

What efforts will be made to study proposed locations, to gather information about traffic flow and current conditions and accident data to then bear the responsibility to document continuing impacts and to remove signage if negative impacts related to public safety are seen? What process will be defined and how will it be implemented and monitored? What assurances does the public have to travel safely on our streets?