Eugene Planning Commission

AGENDA

Meeting Location:
Virtual Meeting (Via Zoom)

Phone: 541-682-5481
www.eugene-or.gov/pc

The Eugene Planning Commission welcomes your interest in these agenda items. Feel free to come and go as you please at any of the meetings. This meeting location is wheelchair-accessible. For the hearing impaired, FM assistive-listening devices are available, or an interpreter can be provided with 48-hour notice prior to the meeting. Spanish-language interpretation will also be provided with 48-hour notice. To arrange for these services, contact the Planning Division at 541-682-5675.

Due to Governor Kate Brown's Stay Home, Save Lives Executive Order to combat the spread of Covid-19, this meeting will be held remotely using virtual meeting technology. Information about online or other options for access and participation is available on the reserve side of this agenda.

TUESDAY, JULY 28, 2020 – Public Hearing (5:30 p.m.)

A. Public Hearing & Possible Action: Sheppard Motors Metro Plan Amendment/Refinement Plan Amendment/Zone Change (MA 20- /RA 20- 1/Z 20- 1)

Metro Plan Amendment and Refinement Plan Amendment to change the land use designation of five properties from Campus Industrial to Light Medium Industrial. A concurrent Zone Change would also rezone the properties from E-1 Campus Employment to E-2 Mixed Use Employment. The properties are located between 1-5 and Old Coburg Road, South of Game Farm Road. Changes will enable the development of an auto dealership and electric charging stations.

Lead City Staff: Jeff Gepper, 541-682-5282, JGepper@eugene-or.gov

B. Public Hearing & Possible Action: Digital Sign Code Amendment (CA 20- 2)

The goal of the proposed land use code amendments is to modify existing sign code standards to allow and regulate digital billboards and digital readerboards. The proposed amendments focus on how best to allow conversion of existing billboards to new digital technology with specific standards for maximum size, message change intervals, brightness, location and separation. The proposed amendments also include digital allowances for institutional uses and service stations and minor changes to the existing sign code suggested by staff to add clarity.

Lead City Staff: Mike McKerrow, 541-682-5288, MMckerrow@eugene-or.gov

Public Hearing Format for the first hearing:
The order of procedure will be as follows, unless modified by the Planning Commission Chair as may be necessary or appropriate:

1. The Planning Commission Chair will summarize procedures and commence the hearing.
2. City staff will provide a brief introduction and summary of the application/appeal.
3. *Testimony will first be allowed from the applicant and those in support of the application
4. *Testimony will then be allowed from parties who are neither proponents nor opponents.
5. *Testimony will then be allowed from the opponents/appellant.
6. Staff may provide a response to testimony, as needed.
7. Planning Commissioners may then ask questions of staff (note that commissioners may also raise questions that might arise during any individual testimony).
8. Rebuttal will then be allowed from the proponent/applicant.
9. Finally, the Planning Commission Chair will announce whether the hearing and record is closed, held open, or if the public hearing will be continued.

*Due to the virtual meeting platform, the order of speakers providing testimony will be based on order that persons sign-up to speak, as opposed to the order noted above. For this reason, each person providing comment will be asked to state whether they are in support, neutral, or in opposition to the application.

Commissioners: John Barofsky; Ken Beeson; Tiffany Edwards (Chair); Lisa Fragala (Vice Chair); Dan Isaacson; Chris Ramey; Kristen Taylor

HOW TO ACCESS THE MEETING

- **To watch a webcast of the meeting after the hearing:** Visit https://www.eugene-or.gov/2109/Planning-Commission-Webcasts to view the webcast. **Important Note: This meeting will not be televised live on cable Channel 21 due to a conflict with a City Council meeting being held at the same time.**

- **To join/watch the meeting from your computer, tablet or smartphone** (allows participation in Public Comment):
  https://eugene-or-gov.zoom.us/j/91094571680
  - **To join by phone** (allows participation in Public Comment): Dial one of the below numbers and enter the **Webinar ID: 910 9457 1680**
    +1 833-548-0276 (Toll Free); or
    +1 833-548-0282 (Toll Free); or
    +1 877-853-5257 (Toll Free); or
    +1 888-475-4499 (Toll Free); or

    For higher quality, dial a number based on your current location. International numbers available: https://eugene-or-gov.zoom.us/u/acC72Kjejt

  To sign- up to speak for Public Comment:

  - For those viewing the meeting on a computer, laptop, or other device, click once on the blue “hand” icon
  - For those listening to the meeting on a phone, press *9 (Star-9)

AGENDA ITEM SUMMARY
July 28, 2020

To: Planning Commission

From: Jeff Gepper, Senior Planner, Planning Division

Subject: Public Hearing on Sheppard Motors Metro Plan Amendment, Refinement Plan Amendment, & Zone Change (City Files # MA 20-1 / RA 20-1 / Z 20-1)

ACTION REQUESTED:
Hold a public hearing on the applicant's proposed Metro Plan Amendment and Refinement Plan Amendment to change the plan designation from Campus Industrial to Light-Medium Industrial, with a concurrent Zone Change from E-1 Campus Employment to E-2 Mixed Use Employment, for the Sheppard Motors Eugene Audi property.

BRIEFING STATEMENT:
On July 28, 2020, the Planning Commission will hold a public hearing on a privately initiated, site-specific Metro Plan Amendment, Refinement Plan Amendment, and concurrent Zone Change for the Sheppard Motors Eugene Audi project. The subject property consists of five, undeveloped tax lots. It is adjacent to I-5 to the east, the Stonebridge apartment complex and commercial development to the west, and undeveloped county lands to the north across Game Farm Road. For a vicinity map showing the subject property and surrounding area, and the current zoning, see Attachments A and B.

Sheppard Motors - Metro Plan Amendment / Refinement Plan Amendment / Zone Change Assessor's Map/Tax Lot numbers: 17-03-16-41/201,300,400 & 17-09-16-44/400,800			
Application (file no.)	**Current**	**Proposed**	**acres**
Metro Plan Amendment (MA 20-1)	Campus Industrial	Light-Medium Industrial	16.72
Refinement Plan Amendment (RA 20-1)	Campus Industrial	Light-Medium Industrial	16.72
Zone Change (Z 20-1)	E-1 Campus Employment	E-2 Mixed Use Employment	16.72

Table 1: Proposed Plan Amendment and Zone Change Details

The proposed changes would allow the applicant's intended development of an Audi automobile sales and service center. The applicant states that, "Sheppard was chosen by Audi USA to be the dealer for the Eugene market. This move offers significant investment in the Eugene area and would provide many existing Lane County (and beyond) Audi owners with service and support. The next closest Audi dealership is in Wilsonville or Bend. To meet the

need for sales and service, Sheppard will need a new location for the Audi product line as their current location is not large enough to add a new car line and expand services."

The proposal also includes the development of electric vehicle (EV) charging stations that are accessory to the motor vehicle sales and service use. The applicant goes on to identify that the EV charging stations not only support Audi's commitment to EVs, but the location is "ideal" given its proximity to the I-5 corridor.

The subject property is currently zoned E-1 Campus Employment, which does not permit Motor Vehicle Sales/Rental/Service, whereas in the requested zone, E-2 Mixed Use Employment, it is permitted outright. However, because the Metro Plan's current Campus Industrial land use designation does not support a zone change to E-2, a site-specific amendment to the Metro Plan's land use diagram is also necessary to change the designation to Light Medium Industrial to facilitate the requested Zone Change and ultimately develop the property with their intended use. More application details can be found in Attachment C or in the Application Materials included in the application file.

PROCEDURAL SUMMARY

The Eugene Code allows lower level application types, such as a Type III Zone Changes, to be considered concurrently with higher level application types in a single public review process. In this particular set of applications, the inclusion of a Metro Plan, Type I Amendment means the other associated application can be reviewed concurrently under the Metro Plan Amendment procedures beginning at Eugene Code (EC) 9.7700. Therefore, in conjunction with the applicant's Metro Plan Amendment, the applicant has also requested a concurrent Zone Change as described above. The proposed changes also trigger the need for an amendment to the applicable refinement plan, the Willakenzie Area Plan, for consistency. According to the Type I Metro Plan Amendment procedures, the refinement plan designation would change automatically if the amendment to the Metro Plan land use designation is approved.

These land use applications are subject to quasi-judicial procedures (EC 9.7065 through EC 9.7095) for the upcoming public hearing, as well as the approval criteria from the Eugene Code (EC) for each application type. The applicant's written statement addresses the approval criteria from EC 9.7735 for the Metro Plan Amendment, EC 9.8424 for the Refinement Plan Amendment, and EC 9.8865 for the Zone Change. The Eugene Code requires City staff to prepare a written staff report, prior to the public hearing, for the Planning Commission's consideration concerning any Metro Plan Amendment and Zone Change request. This agenda item summary and the attached preliminary findings (Attachment C) addressing compliance with the applicable approval criteria constitute the initial staff report on this matter.

Following the Planning Commission's public hearing and close of the record, the Planning Commission will deliberate and ultimately make a recommendation to the City Council to either approve, approve with modifications, or deny the request, based on the required approval criteria. This may occur following the public hearing (time permitting), or at a later Planning Commission

meeting. The requests will be heard before the Eugene City Council in a subsequent public hearing with final action, following Planning Commission's action to make a recommendation.

APPLICABLE APPROVAL CRITERIA
As noted above, the Planning Commission must address the relevant approval criteria from EC 9.7735, 9.8424, and EC 9.8865 in making a recommendation to the City Council on the request. Staff's preliminary findings addressing these approval criteria are attached for the Planning Commission's consideration (see Attachment C).

PUBLIC NOTICE
Public notice of this request was provided in accordance with Eugene Code requirements.

Application Timeline	**Neighborhood Meeting**	December 19, 2019
	Application Submitted	January 17, 2020
	Application Complete	June 5, 2020
	DLCD Notice	June 23, 2020
	Public Notice	June 26, 2020

Table 2: Relevant Application Dates

PUBLIC COMMENT
The Planning Commission will also consider additional public testimony and other materials that may be presented at the public hearing, before making a recommendation on these applications. While a brief summary of the testimony is provided below, a full copy of the testimony received as of the date of this staff report can be seen in Attachment D.

Three pieces of written testimony were received for this application as of the date of this staff report. One piece of testimony generally supports the applicant's request. The other two oppose the proposal, asserting that the proposed use would be incongruous with surrounding uses based on the purpose statements for the E-1 zone and E-2 zone, located at EC 9.2400 and EC 9.2405 respectively.

STAFF EVALUATION
The attached preliminary findings conclude that this request is consistent with Statewide Planning Goals, the Metro Plan, and applicable approval criteria for the related application(s).

STAFF RECOMMENDATION
Based on the available information, including the applicant's materials and the attached preliminary findings, staff recommends that the Planning Commission recommend approval of the request by City Council, to change the subject property's designation from Campus Industrial to Light-Medium Industrial, and the zoning from E-1 Campus Employment to E-2 Mixed Use Employment.

NEXT STEPS
Following Planning Commission deliberations and recommendation, the City Council is scheduled to hold a public hearing on September 21, 2020, with City Council action tentatively scheduled on October 12, 2020.

ATTACHMENTS:
A. Vicinity Map
B. Existing Zoning Map
C. Overview and Preliminary Findings
D. Written Public Testimony received through July 21, 2020

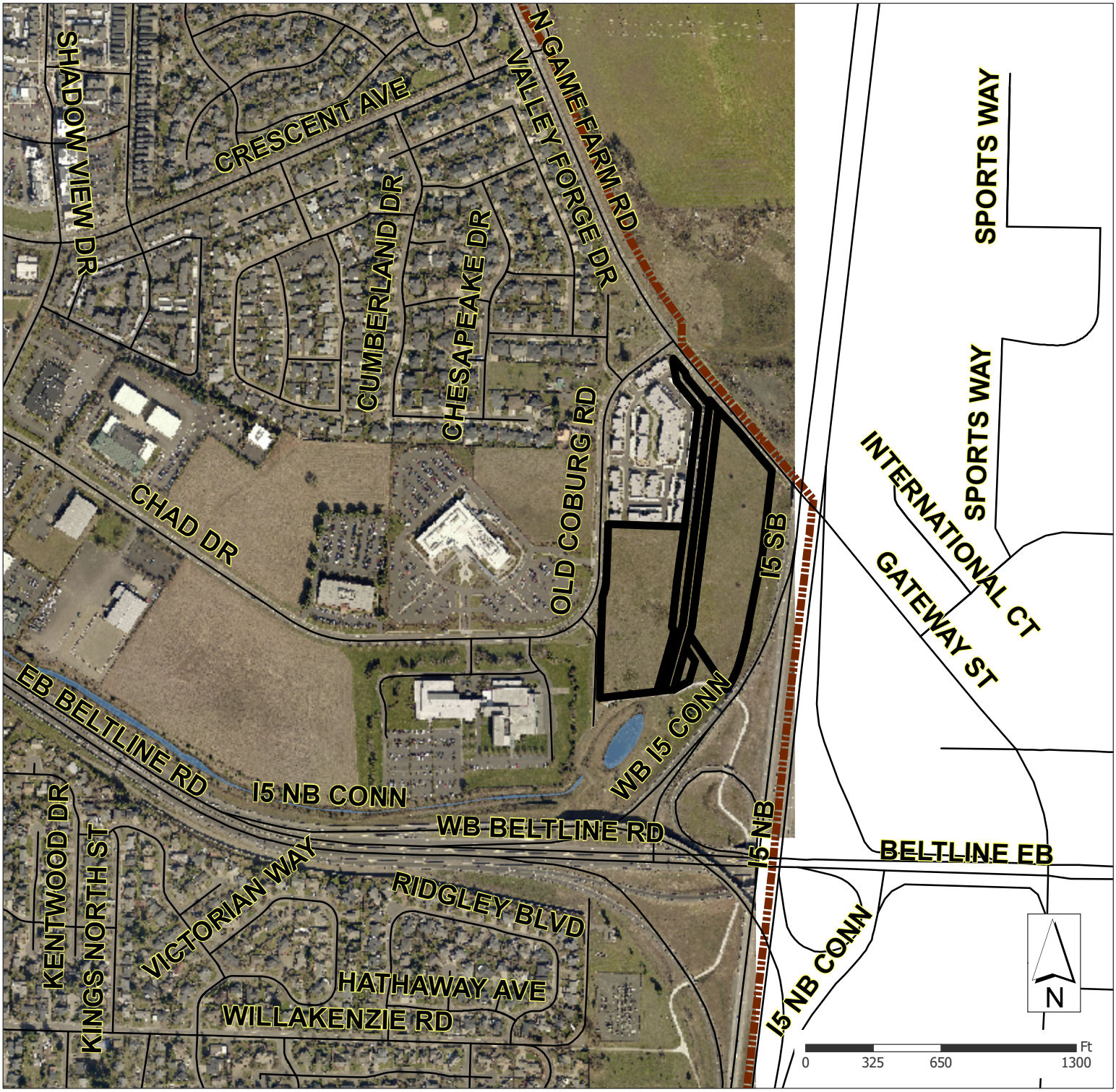
FOR MORE INFORMATION
Please contact Jeff Gepper, Senior Planner, at 541-682-5282 or JGepper@eugene-or.gov

As a courtesy, relevant application materials may also be viewed on the City's land use application website: https://pdd.eugene-or.gov/LandUse/ApplicationDetails?file=MA-20-0001

VICINITY MAP

Attachment A

Sheppard Motors [Eugene Audi]: Metro Plan Amendment,
Refinement Plan Amendment, & Zone Change (MA 20-1 / RA 20-1 / Z 20-1)



Legend

- Subject Property
- Eugene UGB
- Streets

07/14/2020

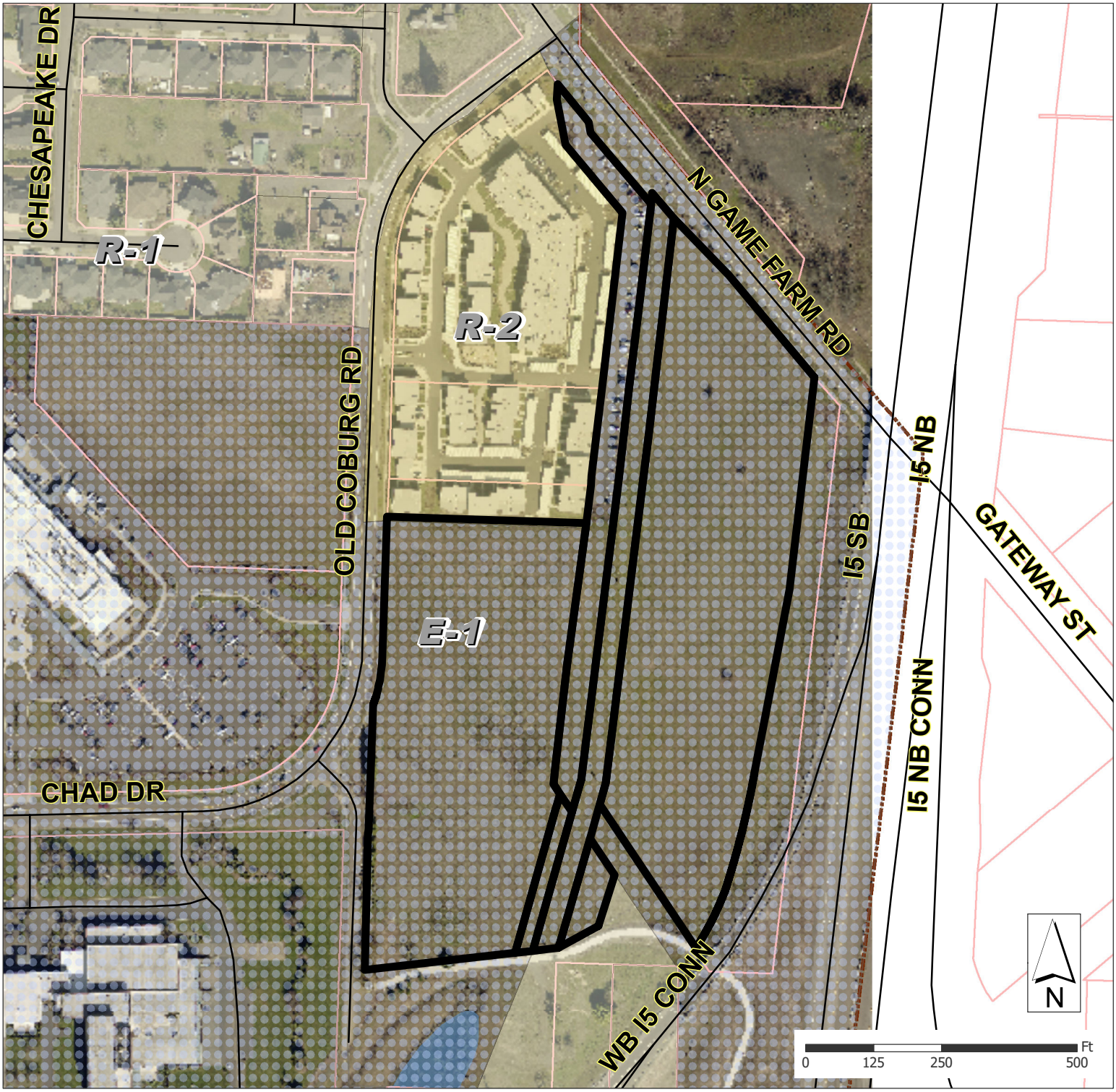
Caution:
This map is based on imprecise source data, subject to change, and for general reference only.

Eugene

ZONING MAP

Attachment B

Sheppard Motors [Eugene Audi]: Metro Plan Amendment,
Refinement Plan Amendment, & Zone Change (MA 20-1 / RA 20-1 / Z 20-1)



Legend

- Subject Property
- Eugene UGB
- Taxlots
- Streets
- E-1 Campus Employment
- R-1 Low-Density Residential
- R-2 Medium-Density Residential

07/14/2020

Caution:
This map is based on imprecise source data, subject to change, and for general reference only.

Eugene

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PRELIMINARY FINDINGS
Metro Plan Amendment / Refinement Plan Amendment / Zone Change

Name (File Numbers):	Sheppard Motors - Eugene Audi (MA 20-1 / RA 20-1 / Z 20-1)
Applicant:	Phil Speers, Sheppard Motors LLC
Applicant's Representative:	Tim Brunner, Axis Design Group
Lead City Staff:	Jeff Gepper, Senior Planner
Map No. / Tax Lots:	17-03-16-41/201,300,400 17-09-16-44/400,800
Metro Plan Diagram & Refinement Plan Diagram	
Existing:	Campus Industrial
Proposed:	Light Medium Industrial
Zoning	
Existing:	E-1 Campus Employment
Proposed:	E-2 Mixed Use Employment
Size:	Approximately 16.72 Acres
Location:	South of Game Farm Road, between I-5 and Old Coburg Road

APPLICATION OVERVIEW

The applicant is seeking an amendment to the Eugene-Springfield Metropolitan Area General Plan (Metro Plan) land use diagram, a refinement plan amendment to the Willakenzie Area Plan land use diagram for consistency, and concurrent zone change. The requested changes are outlined in Table 1.

Sheppard Motors [Eugene Audi] Metro Plan/Refinement Plan Amendment & Zone Change			
Application (file no.)	**Current**	**Proposed**	**Acres**
Metro Plan Amendment (MA 20-1)	Campus Industrial	Light Medium Industrial	16.72
Refinement Plan Amendment (RA 20-1)	Campus Industrial	Light Medium Industrial	16.72
Zone Change (Z 20-1)	E-1 Campus Employment	E-2 Mixed Use Employment	16.72

Table 1: Current/Proposed Plan Designations and Zoning

The applicant has applied for these changes in order to develop an Audi automobile sales and service center with accessory electric vehicle (EV) charging stations. The subject property is currently zoned E-1 Campus Employment, which does not permit Motor Vehicle Sales/Rental/Service, whereas in the requested zone, E-2 Mixed Use Employment, this use is permitted outright.

As described in the applicant's narrative, Sheppard Motors LLC was chosen by Audi USA to be the dealer for the Eugene market. Therefore, they have been seeking a location to site their business. As part of this proposal, the applicant would like to add an EV charging station facility near the new Audi location as Audi has a commitment to electric vehicles (EVs). The proposed location presents an opportunity to be an accessible location for EV owners to charge their electric vehicles. The requested changes would allow for this applicant's intended use.

The subject property is located between I-5 and Old Coburg Road, South of Game Farm Road. It consists of five separate tax lots with 5 different owners, who have all submitted their permission to proceed with this application. The total area of the subject property is approximately 16.72 acres. A summary of property ownership can be seen in Table 2.

Sheppard Motors [Eugene Audi] – Property Ownership		
Assessor's Map / Tax Lot	**Owner(s)**	**Size (Acres)**
17-03-16-41 / 00201	MML Properties & Oregon Department of Transportation	7.1
17-03-16-44 / 00800	Eugene Water and Electric Board (EWEB)	1.44
17-03-16-41 / 00300 17-03-16-44 / 00400	NW Pipeline LLC	1.73
17-03-16-41 / 00400	Guard Publishing	6.45

Additional details of the proposal are included in the applicant's written statement and supporting documentation, all of which are included as part of the public record and located in the application file for reference.

PRELIMINARY FINDINGS

This request for a Metro Plan Amendment (Type I) and concurrent applications is subject to the land use application procedures in the Eugene Code (EC) 9.7700-9.7735. The proposed Metro Plan Amendment also triggers the need for an amendment to the Willakenzie Area Plan (WAP), which is the applicable refinement plan for this area. Per EC 9.8005, the requested refinement plan amendment and zone change are being processed concurrently. The following preliminary findings address details of the proposal in the context of compliance with the applicable approval criteria at EC 9.7735, EC 9.8424, and EC 9.8865. Those criteria are provided below (in **bolded text**), including findings addressing compliance with each.

As a note, the applicant's narrative specifically demonstrates how their intended use of the site for an Audi automobile dealership and electric vehicle (EV) charging stations complies with the

applicable approval criteria. While it is helpful and relevant to know that the applicant intends to develop an Audi dealership and electric vehicle charging station, it is important to recognize that these findings will reflect how a change to the land use designation and zoning, and all potential uses resulting from said change, are consistent with the approval criteria. On occasion, the intended use of the site will be referenced as insight to how this specific use, as an example of what could be allowed, is supported or opposed by the applicable policies or relevant approval criteria.

METRO PLAN AMENDMENT

The applicant's requested Metro Plan Amendment proposes to change the land use designation of the subject property from Campus Industrial to Light Medium Industrial. It qualifies as a Type I amendment as it only involves a change to the land use diagram and no text amendments to the plan are proposed or required. The following findings address the applicable approval criteria for the Metro Plan Amendment request:

EC 9.7735 (1): The proposed amendment is consistent with the relevant Statewide Planning Goals.

> **Goal 1: Citizen Involvement - To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process.**

The City's provisions for citizen involvement ensure the opportunity for citizens to be involved in all phases of the planning process and set out requirements for such involvement. The proposal does not include any changes to the City's citizen involvement program.

The City's land use code implements Statewide Planning Goal 1 through its noticing requirements, which include:

- A pre-application neighborhood/applicant meeting
- Notice to the Oregon Department of Land Conservation and Development
- Referrals and notice sent to Lane County and the City of Springfield
- Public notice for the Planning Commission public hearing to consider the applications, which includes: mailing notice to interested parties and adjacent property owners; posting of the notice on-site; publishing the notice in a local newspaper.

All noticing was conducted in accordance with Eugene Code requirements. Consideration of the amendments begins with a Planning Commission public hearing on July 28, 2020. Following action by the Planning Commission, the Eugene City Council will hold a public hearing to consider the plan amendment and zone change, which will also be noticed in accordance with Eugene Code. Any written testimony received as part of this application is made available for review to the Planning Commission and City Council for their consideration.

Based on these findings, the proposed Metro Plan Amendment is consistent with Statewide Planning Goal 1.

Goal 2: Land Use Planning - To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

In accordance with Goal 2, the requested Metro Plan Amendment is being processed according to Eugene's land use code, which specifies the procedure and criteria for considering the request. This requested amendment to the Metro Plan diagram pertains to a parcel-specific property within the Eugene city limits and is initiated by a representative for the property owners, in compliance with EC 9.7705 and 9.7715(1) and (2).

The Goal 2 coordination requirement is met when the City engages in an exchange, or invites such an exchange, between the City and any affected governmental unit and when the City uses the information obtained in the exchange to balance the needs of its citizens. To comply with the Goal 2 coordination requirement, the City provided notice of the proposal and opportunity to comment to Lane County, Lane Council of Governments, City of Springfield, and the State of Oregon's Department of Transportation and Department of Land Conservation and Development.

There are no exceptions to Statewide Planning Goal 2 required for this amendment. Therefore, the amendments are consistent with Statewide Planning Goal 2.

The requested Metro Plan amendment qualifies as a Type I amendment as defined in EC 9.7705 because the request only requests a change to the Metro Plan's land use diagram, for lands within the City of Eugene. Per EC 9.7705, this amendment requires approval by City of Eugene only. The subject property is entirely within the Eugene City limits and there is no regional impact associated with this request to amend the Metro Plan land use designation.

As the application follows the procedural requirements established by Eugene's land use code, the amendment is consistent with Statewide Planning Goal 2.

Goal 3: Agricultural Lands - To preserve agricultural lands.

The amendment is for property located within the urban growth boundary and does not affect any land designated for agricultural use. Based on this finding, Statewide Planning Goal 3 does not apply.

Goal 4: Forest Lands - To preserve forest lands.

The amendment is for property located within the urban growth boundary and does not affect any land designated for forest use. Based on this finding, Statewide Planning Goal 4 does not apply.

Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces - To protect natural resources and conserve scenic and historic areas and open spaces.

There are no Goal 5 resources located on the subject property. This amendment does not create or amend the City's list of Goal 5 resources, does not amend a code provision adopted in

order to protect a significant Goal 5 resource or to address specific requirements of Goal 5, nor does it allow new uses that could be conflicting with a significant Goal 5 resource site. Therefore, Statewide Planning Goal 5 does not apply.

Goal 6: Air, Water and Land Resources Quality - To maintain and improve the quality of the air, water and land resources of the state.

The proposed change to the Metro Plan does not impact the existing regulations that implement the air, water, and land resources quality protections. Given this fact, any future development will be subject to City regulations and other state and federal requirements, ensuring that future developments will be consistent with this Goal. Based on these findings, the amendment is consistent with Statewide Planning Goal 6.

Goal 7: Areas Subject to Natural Hazards - To protect people and property from natural hazards.

Goal 7 requires that local government planning programs include provisions to protect people and property from the following natural hazards: floods, landslides, earthquakes and related hazards, tsunamis, coastal erosion and wildfires. The Goal prohibits a development in natural hazard areas without appropriate safeguards. The subject property is not located within known areas of natural disasters or hazards. The subject property is outside the flood zone and is not subject to hazards normally associated with wildfires or tsunamis. Other hazards can be mitigated at the time of development based on applicable land use code provisions, building codes and building techniques. The map amendment does not affect the City's restrictions on development in areas subject to natural disasters and hazards. Based on these findings, the amendment is consistent with Statewide Planning Goal 7.

Goal 8: Recreational Needs - To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

Goal 8 ensures the provision of recreational facilities to Oregon citizens and is primarily concerned with the provision of those facilities in non-urban areas of the state. The amendment does not affect the City's provisions for or access to recreation areas, facilities or recreational opportunities. Therefore, Statewide Planning Goal 8 does not apply.

Goal 9: Economic Development - To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Goal 9 requires cities to evaluate the supply and demand of commercial and industrial land relative to community economic objectives. This Metro Plan Amendment is only related to lands designated as industrial. The Administrative Rule for Statewide Planning Goal 9 (OAR 660 Division 9) requires that the City provide for at least an adequate supply of sites of suitable sizes, types, location, and service levels for a variety of industrial and commercial uses

consistent with plan policies. The Employment Lands Supply Study 2012-2032 (ELSS) is included as appendix B in the City's comprehensive plan, Envision Eugene, and complies with the requirements of Goal 9 and the corresponding Administrative Rule. The map amendments do not add or subtract any industrial land from the adopted inventories.

The proposed change to the Metro Plan designation does not have an impact on the City's availability of employment or industrial lands because all industrial land use land designations (Campus, Light Medium, and Heavy) are grouped together for the purposes of the City's ELSS. Based on this fact, properties within the broad category of industrial can be re-designated to another type of industrial. In this case, a re-designation from Campus Industrial to Light Medium Industrial can be sought by the applicant, as it results in no net change to the City's overall supply of industrially designated land.

OAR 660-009-010(4) has specific requirements for changes in plan designation that involve land in excess of two acres within an existing urban growth boundary from an industrial use designation to a non-industrial use designation, or another employment use designation to any other use designation. While the subject property is in excess of 2 acres, the proposed change is from one industrial designation (Campus) to another industrial designation (Light Medium). Therefore, this administrative rule requirement does not apply.

Given these facts, the requested Metro Plan Amendment will not adversely impact the ability to provide opportunities for a variety of economic activities. In the application materials, the applicant addresses the economic benefits of the proposed change, especially as it relates to their intended future development. They assert that the proposed change will "provide three types of economic benefits to the City; 1) a significant increase in property tax revenue which would not be collected in the absence of the rezone, since as noted above, the current zoning has failed to attract any development, 2) direct benefits in the form of wages paid to the 30+ employees at the proposed facility, and 3) induced or indirect benefits created by the multiplier effect of employees spending wages locally."

Based on these findings, the proposal is consistent with Statewide Planning Goal 9.

Goal 10: Housing - To provide for the housing needs of citizens of the state.

As the proposal does not include any lands designated in the City's Buildable Lands Inventory (BLI) for residential uses, the proposal does not include any changes that would impact the availability of residential lands for housing, nor does it impact the City's ability to provide for housing needs in the future. Based on these findings, Statewide Planning Goal 10 does not apply.

Goal 11: Public Facilities and Services - To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

The amendment does not affect the City's provision of public facilities and services. Based on this finding, Statewide Planning Goal 11 does not apply. However, as a note, all necessary public services exist or are readily available in close proximity to the subject site.

Goal 12: Transportation - To provide and encourage a safe, convenient and economic transportation system.

OAR 660-012-0060, the Transportation Planning Rule (TPR), implements Goal 12 for proposed amendments to the Metro Plan diagram, such as this application. The TPR contains the following requirement:

OAR 660-012-0060(1) If an amendment to a functional plan, an acknowledged comprehensive plan, or a land use regulation (including a zoning map) would significantly affect an existing or planned transportation facility, then the local government must put in place measures as provided in section (2) of this rule, unless the amendment is allowed under section (3), (9) or (10) of this rule. A plan or land use regulation amendment significantly affects a transportation facility if it would:

(a) Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan);

(b) Change standards implementing a functional classification system; or

(c) Result in any of the effects listed in paragraphs (A) through (C) of this subsection based on projected conditions measured at the end of the planning period identified in the adopted TSP. As part of evaluating projected conditions, the amount of traffic projected to be generated within the area of the amendment may be reduced if the amendment includes an enforceable, ongoing requirement that would demonstrably limit traffic generation, including, but not limited to, transportation demand management. This reduction may diminish or completely eliminate the significant effect of the amendment.

(A) Types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;

(B) Degrade the performance of an existing or planned transportation facility such that it would not meet the performance standards identified in the TSP or comprehensive plan; or

(C) Degrade the performance of an existing or planned transportation facility that is otherwise projected to not meet the performance standards identified in the TSP or comprehensive plan.

Goal 12 requires a determination of whether the proposed Metro Plan Amendment will significantly impact an existing or planned transportation facility.

In response to Goal 12, the applicant hired a Transportation Engineer, Chris Clemow, PE, PTOE, to prepare a TPR analysis to demonstrate consistency with the Goal 12 requirements. The analysis calculated an assumed "worst-case development" scenario to quantify potential transportation impacts. The assumption was based on the total site area, a rate of development based on nearby E-1 developed sites, and a high traffic impact use allowed in the E-1 zone (i.e. clinic and general office). The result of the Transportation Engineer's calculation is that development under the current designation and zoning would potentially generate 231 peak hour trips. City staff concurred with the scope of the study, and the analysis is consistent with the agreed upon scope of work.

Based on this assumed trip generation, the applicant proposed a condition to limit maximum site development to generate no more than 231 new PM peak hour vehicle trips as determined by the most current edition of the Institute of Transportation Engineers Trip Generation Manual. Based on their analysis, the following condition is warranted to ensure compliance with the Transportation Planning Rule:

> *<u>Trip Cap Condition of Approval</u>*
> *Site development shall be limited so as to generate no more than 231 PM peak hour vehicle trips as determined by the most current edition of the Institute of Transportation Engineers Trip Generation Manual. The City may allow development intensity beyond this maximum number of peak hour vehicle trips if the applicant submits to the appropriate approving agencies a transportation impact analysis demonstrating the proposed intensification of use is consistent with the Transportation Planning Rule (TPR) criteria outlined in Oregon Administrative Rule (OAR) 660 012-0060. The applicant shall seek, and the City shall consider such approval using the City's Type II land use application procedure.*

This trip cap condition cap provides an enforceable, ongoing requirement limiting traffic generation to a level consistent with the current Metro Plan designation, which was used as part of the land use assumptions in the 2035 Transportation System Plan (TSP). The 2035 TSP addresses the projects, programs, and policies needed to support growth in population and jobs within the Eugene UGB as well as the travel associated with regional and state economic growth between now and the year 2035. Therefore, the proposed Metro Plan designation (and zone change) will not increase trip generation, thereby demonstrating compliance with the requirements of the TPR.

Based on these findings, the proposal is consistent with Statewide Planning Goal 12.

Goal 13: Energy Conservation - To conserve energy.

The proposed change to the Metro Plan's land use diagram will not amend or otherwise involve any land use regulations that implement this Goal. Therefore, Statewide Planning Goal 13 does not apply.

That said, the accessory use of the property to provide EV charging stations demonstrates the applicant's intent in support of Goal 13. As an example, Goal 13 supports compact and high-density land uses because it reduces fossil fuel consumption. By providing EV charging stations available to public, the intended use makes having an EV more convenient and encourages more EV users. Further the applicant states that Audi has committed to supporting EV as an initiative to move away from traditional energy sources, such as fossil fuels.

Goal 14: Urbanization - To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

The amendments do not affect the City's provisions regarding the transition of land from rural to urban uses. Based on this finding, Statewide Planning Goal 14 does not apply.

Goal 15: Willamette River Greenway - To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

The amendments do not contain any changes that affect the Willamette River Greenway regulations, nor is the subject property located within the adopted Willamette Greenway boundary. Based on this finding, Statewide Planning Goal 15 does not apply.

Goals 16 – 19: Estuarine Resources; Coastal Shorelands; Beaches and Dunes; and Ocean Resources

There are no estuarine, beach and dune, coastal, or ocean resources related to the property affected by these amendments. Based on this finding, Statewide Planning Goals 16 through 19 do not apply.

Based on the findings above, and with the proposed trip cap condition of approval to ensure consistency with Goal 12 (TPR), the Metro Plan Amendment complies with Statewide Planning Goals and the approval criterion at EC 9.7735(1) is met.

EC 9.7735(2): The proposed amendment does not make the Metro Plan internally inconsistent.

No policies within the Metro Plan appear to serve as mandatory approval criteria, nor do any appear to be directly relevant to this site-specific amendment. Therefore, the proposed amendment does not present any conflict with Metro Plan policies nor make the Metro Plan internally inconsistent. Based on these findings, this criterion is met.

EC 9.7735(3) When the city-specific local comprehensive plan also applies, the proposed amendment is consistent with the city-specific local comprehensive plan.

The following policy from the Envision Eugene (EE) Comprehensive Plan provides relevant support for the applicant's request:

> *EE Policy 3.23: Flexible campus employment areas. Recognize changing market demands and accommodate land needs through flexible zoning for light industrial/campus employment areas, including Greenhill Technology Park, Willow Creek Circle and Chad Drive.*

This policy specifically recognizes the challenges presented by existing by zoning restrictions in the area of the subject property. The applicant contends that the existing E-1 zoning has not responded well to market conditions and has not provided opportunities to meet market demand. They note that the subject property has been designated Campus Industrial and zoned E-1 since 2013 and has remained vacant for 7 years since that time, as has most of the E-1 zoned land in the vicinity. While the policy specifically related to flexible *zoning*, the proposed Metro Plan diagram change is necessary to facilitate the zone change.

In addition to these findings, the applicant's written narrative goes further to illustrate how their intended land use specifically supports policies laid out in the Economic Development element of Envision Eugene.

The Transportation chapter of Envision Eugene states that the Eugene 2035 Transportation System Plan (TSP) serves as the transportation element for the comprehensive plan. As such it is necessary to note that the proposal is also consistent with the City's TSP, and therefore consistent with the transportation element. No transportation policies appear to be directly relevant to this site-specific Metro Plan Amendment, nor serve as mandatory approval criteria for the request.

Based on these findings, the proposed Metro Plan Amendment is consistent with Envision Eugene, the City's local comprehensive plan.

REFINEMENT PLAN AMENDMENT

The proposed Metro Plan Amendment also triggers the need for an amendment to the Willakenzie Area Plan (WAP), which is the applicable refinement plan for this area. The subject property is in the Crescent-Coburg Subarea in the North Region, as identified in the WAP. The WAP's land use diagram designates the property as Campus Industrial. Per EC 9.7730(5)(b), since no text amendment is required, the refinement plan designation would change automatically to Light Medium Industrial to remain consistent with the Metro Plan. This only occurs if the amendment to the Metro Plan land use designation is approved. The following findings address the applicable approval criteria for the related refinement plan amendment:

EC 9.8424(1) The refinement plan amendment is consistent with all of the following:

(a) Statewide planning goals.

The findings addressing consistency with the Statewide Planning Goals are included above under Metro Plan Amendment approval criterion EC 9.7735(1), incorporated herein by reference. Based on those findings, the proposal is consistent with the Statewide Planning Goals.

(b) Applicable provisions of the comprehensive plan.

Per the findings above under Metro Plan Amendment approval criteria EC 9.7735(2) and EC 9.7735(3), incorporated herein by reference, the proposal is consistent with the provisions of the comprehensive plan.

(c) Remaining portions of the refinement plan.

The proposed amendment to the refinement plan only includes the automatic amendment to the land use diagram through the procedures identified at EC 9.7730(5). No other amendments to the WAP are proposed. No polices listed in the WAP appear to serve as mandatory approval criteria for this amendment or require further analysis beyond that provided above for the requested Metro Plan Amendment.

EC 9.8424(2) The refinement plan amendment addresses one or more of the following:

(a) An error in the publication of the refinement plan.

(b) New inventory material which relates to a statewide planning goal.

(c) New or amended community policies.

(d) New or amended provisions in a federal law or regulation, state statute, state regulation, statewide planning goal, or state agency land use plan.

(e) A change of circumstances in a substantial manner that was not anticipated at the time the refinement plan was adopted.

An amendment to the plan designation on the Metro Plan diagram constitutes a "new or amended community policy." Per the findings pertaining to the Metro Plan diagram amendment at EC 9.7735, incorporated herein by reference, the designation change is consistent with all Statewide Planning Goals and the existing Metro Plan policies. Therefore, if the requested Metro Plan Amendment is approved, the refinement plan must respond to remain consistent. Based on these findings, this criterion is met.

ZONE CHANGE EVALUATION

The applicant's request includes a concurrent zone change request from E-1 Campus Employment to E-2 Mixed Use Employment, to bring the zoning into conformance with the

proposed Light Medium Industrial plan designation. The following findings address the applicable approval criteria for the related zone change request:

EC 9.8865(1) The proposed change is consistent with applicable provisions of the Metro Plan. The written text of the Metro Plan shall take precedence over the Metro Plan diagram where apparent conflicts or inconsistencies exist.

According to EC 9.2405, the requested E-2 zone implements the Metro Plan's Light Medium Industrial land use designation. Therefore, as the current Metro Plan designation is Campus Industrial, consistency with this provision is contingent upon the approval of the concurrent Metro Plan Amendment to amend land use designation from Campus Industrial to Light Medium Industrial. With regard to Metro Plan policies, staff does not find any polices that would serve as mandatory approval criteria for this zone change or require further analysis beyond that provided above for the requested plan amendment.

Based on these findings, and with approval of the proposed Metro Plan Amendment, this criterion is met.

EC 9.8865(2) The proposed zone change is consistent with applicable adopted refinement plans. In the event of inconsistencies between these plans and the Metro Plan, the Metro Plan controls.

The subject property is within the boundaries of the Willakenzie Area Plan (WAP), which is the applicable adopted refinement plan for the area of this request. The subject property is in the Crescent-Coburg Subarea in the North Region, as identified in the WAP.

The WAP identifies the subject property as being designated for Campus Industrial. However, according to the Metro Plan Amendment procedures at EC 9.7730(5)(b), if the requested plan diagram amendment is enacted and no text in the refinement needs to be amended, then the WAP's land use diagram is automatically amended to remain consistent with the Metro Plan. There are no text amendments proposed or otherwise required in this instance. Therefore, if the concurrent Metro Plan Amendment is approved, the WAP's land use diagram will automatically be amended and be consistent with the proposed zoning. No polices listed in the WAP appear to serve as mandatory approval criteria for this zone change or require further analysis beyond that provided above for the requested plan amendment.

Based on these findings, and with approval of the proposed plan amendment, this criterion is met.

EC 9.8865(3) The uses and density that will be allowed by the proposed zoning in the location of the proposed change can be served through the orderly extension of key urban facilities and services.

Key urban facilities and services are defined in the Metro Plan as: wastewater service, stormwater service, transportation, water service, fire and emergency medical services, police

protection, City-wide parks and recreation programs, electric service, land use controls, communication facilities, and public schools on a district-wide basis (see Metro Plan, page V-3). The following summary addresses the availability of these key urban services and facilities as required under this criterion.

Wastewater: Public wastewater service is currently available for the subject property from a wastewater line located in Old Coburg Road. Wastewater standards will be reviewed at the time of future development for any extension of service to the subject property.

Stormwater: Existing stormwater conveyance lines are located in both North Game Farm Road and Old Coburg Road, as well as to the south of the site. Stormwater standards will be reviewed at the time of future development for any extension of service to the subject property.

Streets: The subject property has frontage on Old Coburg Road and North Game Farm Road, which are classified as a Major Collector and Minor Arterial streets respectively, per Figure 60 of the Eugene 2035 Transportation System Plan (2035 TSP). Compliance with applicable street standards will be addressed at the time of future development.
Solid Waste: Collection service is provided by private entities. Regional disposal sites and the Short Mountain Landfill are operated by Lane County.

Water and Electric: Water and electrical services, operated by Eugene Water and Electric Board (EWEB) are available for extension to the property. Any future development will require coordination with EWEB staff to ensure that water and electric services comply with City standards and EWEB requirements.

Public Safety: Police protection for the subject property is consistent with service provision through the City. Fire protection will be provided by the Eugene/Springfield Fire Department. Emergency medical services are currently provided on a regional basis by the cities of Eugene and Springfield.

Transportation: The subject property is accessible to pedestrians, bicycles, and vehicles via the surrounding street network. Two public transit stops are located adjacent to the subject property. Sidewalks are present along all street frontages of the subject property.

Parks and Recreation: Parks and recreation programs are provided on a City-wide basis. The inclusion of the subject property in the City is sufficient evidence to demonstrate the minimum level of this key urban service is met.

Planning and Development Services: Planning and building permit services are provided for all properties located within the urban growth boundary by the City of Eugene. The Eugene Code, Chapter 9, will provide the required land use controls for future development of the subject property.

Communication: A variety of telecommunication providers offer communications services throughout the Eugene/Springfield area; therefore, these services are available, and this key urban service requirement is met.

Public Schools: The subject property is within Eugene School District 4J. As access to schools is evaluated on a district wide basis, the property's location within the school district is sufficient evidence to demonstrate the minimum level of this key urban service is met.

Based on these findings, this criterion is satisfied.

EC 9.8865(4) The proposed zone change is consistent with the applicable siting requirements set out for the specific zone in:

(b) EC 9.2430 Employment and Industrial Zone Siting Requirements.

The applicant has requested a change to the E-2 Mixed Use Employment zone. The specific siting standards for E-2 are listed under EC 9.2430(2) and provided for ease of reference below.

EC 9.2430(2) E-2 Mixed Use Employment. This zone is limited to areas designated Light Medium Industrial in the comprehensive plan and those that meet either (a) or (b) of the following minimum siting requirements:

(a) Property has frontage on an arterial street.

(b) Contiguous to parcels currently zoned E-2 or C-2 Community Commercial.

As the siting requirements state that E-2 is limited to areas designated Light Medium Industrial, compliance with this provision is contingent upon the approval of the concurrent plan amendment. The subject abuts North Game Farm Road, which is classified as a Minor Arterial street. Therefore, the proposal complies with EC 9.2430(2)(a).

Based on these findings, with approval of the proposed plan amendment, the siting requirements will be satisfied, and this criterion is met.

EC 9.8865(5) In cases where the NR zone is applied …

This criterion does not apply because the proposed zone change does not include the NR zone.

OAR 660-012-0060 - Transportation Planning Rule

Consistent with the findings and trip cap condition under the Statewide Planning Goal 12, incorporated herein by reference, the proposed zone change is consistent with the Transportation Planning Rule.

CONCLUSION

Based on the available information and evidence, and the preceding findings of compliance, the proposed Metro Plan Amendment, Refinement Plan Amendment, and Zone Change comply with the applicable approval criteria, subject to the following condition of approval:

> *Trip Cap Condition of Approval*
> *Site development shall be limited so as to generate no more than 231 PM peak hour vehicle trips as determined by the most current edition of the Institute of Transportation Engineers Trip Generation Manual. The City may allow development intensity beyond this maximum number of peak hour vehicle trips if the applicant submits to the appropriate approving agencies a transportation impact analysis demonstrating the proposed intensification of use is consistent with the Transportation Planning Rule (TPR) criteria outlined in Oregon Administrative Rule (OAR) 660 012-0060. The applicant shall seek, and the City shall consider such approval using the City's Type II land use application procedure.*

GEPPER Jeffrey A

From: Bill Austin <billaustin2000@yahoo.com>
Sent: Tuesday, June 16, 2020 12:24 PM
To: GEPPER Jeffrey A
Subject: Sheppard Motors

Follow Up Flag: Follow up
Flag Status: Flagged

[EXTERNAL ⚠]

👍. Good addition to the neighborhood.

GEPPER Jeffrey A

From: Joseph White <millenniumfish0011@gmail.com>
Sent: Monday, July 13, 2020 1:32 PM
To: GEPPER Jeffrey A
Subject: Notice of Public Hearing July 28, 2020 Sheppard Motors (MA 20-1 & Z 20-1)
Attachments: SheppardMotors.pdf

[EXTERNAL ⚠]

Mr. Gepper,

Attached is a pdf of our statement regarding the proposed zoning change per the Subject proposed changes to zoning of the properties between Game Farm Road and Old Coburg Road, Eugene.

Thank you for the opportunity to submit our comments, we look forward to participating in the virtual meeting.

Best regards,

Joe and Brenda White

FROM: Joseph and Brenda White, Residents
Stonebridge Apartments
Eugene, OR 97408

TO: Planning Commission, c/o Jeff Gepper
Planning Division
99 West 10th Avenue
Eugene, OR 97401

Dear Mr. Gepper:

Regarding the Notice of Public Hearing, Tuesday, July 28, 2020, 5:30 p.m. which will consider the rezoning of properties located between I-5 and Old Coburg Road, South of Game Farm Road, the change to enable the development of an auto dealership and accessory electric charging stations.

Reference definitions of E-1 and E-2 property zoning definitions from the website:
www.eugene.municipal.codes/EC/09_EmploymentindustrialZone

We currently live in the Stonebridge apartment complex between Old Coburg Road and Game Farm Road, immediately adjacent to the subject property. We have enjoyed being residents since 2017.

This letter is to request that the Planning Commission and the City Council seriously consider to NOT rezone the subject property from E1 to E2 for the following reasons:

Quoting from the definition of E-1:
E-1: Quote- "The activities of such firms do not generate offensive external impacts and usually do not tolerate substantial noise, pollution, or vibration from surrounding uses.

The "campus" setting is characterized by enhanced landscaping, pedestrian amenities, and unique architectural design.

Provision is also made for small-scale complementary commercial uses that primarily serve employees in the area and are preferably part of a mixed-use development." -Unquote

The purpose and intent of the existing E-1 zoning is in keeping with the current atmosphere of the business and residential area as it exists today, which is adjacent to a currently comfortable and livable environment.

A. E-1… NOISE, POLLUTION OR VIBRATION:

Currently, there is no substantial noise, pollution or vibration from existing surrounding businesses, the VA Hospital and the adjacent residential neighborhood of Hawthorne Estates, Eugene.

Under E-2, an automobile dealership, with its associated support activities would most likely create additional "noise, pollution and vibration" from the movement of cars, customers and delivery trucks bringing vehicle stock to the site.

B. E-1… PROVISION MADE FOR SMALL-SCALE COMPLEMENTARY COMMERICAL USES THAT SERVE EMPLOYEES IN THE AREA"

One interpretation of this would assuredly mean eating establishments, coffee shops and mini-markets to serve nearby industrial and commercial business. These would also be a complement to the residents of Stonebridge Apartments, as well as existing businesses, enhancing the livability of all nearby.

An E-2 designation, and particularly an automobile dealership would, by practical application, exclude these socially and economically beneficial types of services.

C. E-1… ENHANCED LANDSCAPING, PEDESTRIAN AMENITIES AND UNIQUE ARCHITECTURAL DESIGN:

In observing automobile dealerships, they are rarely characterized by "enhanced landscaping, pedestrian amenities and a unique architectural design".

An E-2 designation would allow a dealership, which by their very nature, are merely large, imposing showrooms and shop buildings, accompanied by large parking lots full of a sea of automobiles and trucks awaiting new owners.

D. ZONING UNDER E-2 calls for a MIXTURE OF COMPATIBLE EMPLOYMENT OPPORTUNITIES – INDUSTRIAL, OFFICE AND COMMERCIAL.

We fail to see how an automobile dealership would fall in the classification of "mixture of compatible employment opportunities". A dealership would provide merely a rather thin "mixture" of mechanics, salesmen and administrative staff which do not seem in keeping with the spirit of this definition.

E. Zoned E-2… BENEFIT FROM MULTI-MODAL TRANSPORTATION…

By definition, "multi-modal" transportation includes many types of transportation, including rail service. Immediate access to this location would be solely by arterial and collector roads. An automobile dealership would present a potentially continuous routine of semi-truck traffic and customer automobiles requiring access to the already regularly congested thoroughfares of Game Farm Road and Old Coburg Road.

Additionally, the bus-transit system would most likely not serve the clients of the dealership, and minimally serve the employees of a solely automobile centered business.

F. NUISANCE LIGHT POLLUTION:

The need for night-time lighting of commercial/advertising signage, and multiple lot-lights required for security of the space will create a substantial amount of light pollution, insulting to the residents of Stonebridge and, again, out-of-character with the neighboring businesses, which includes the VA Hospital which utilizes minimal and tasteful and parking-lot evening lighting.

G. VEHICLE CHARGING STATIONS:

A search on the internet yields at least a dozen existing vehicle charging locations, including LRAPA, in NE Eugene and Springfield; why is one more charging station required in this light-industrial/residential area?

We feel that development under zoning E-1 will maintain, and even contribute, to the the livability at Stonebridge Apartments and the environment in the immediate business area. A change to E-2 with the intrusion of an automobile dealership will predictably accomplish the opposite.

Please seriously consider NOT changing the zoning of these properties in order to maintain the character of the area as it is already; professional office buildings and a classical residential environment.

Sincerely,

[signed]
Joseph White
Brenda White

GEPPER Jeffrey A

From: shawn doherty <myillustrator@comcast.net>
Sent: Thursday, July 16, 2020 7:59 PM
To: GEPPER Jeffrey A
Subject: Auto dealership letter opposing the proposed development
Attachments: Audi dealership copy.doc

[EXTERNAL ⚠]

Hi Jeff this is Shawn Doherty. live in the Stonebridge apartments and will be negatively impacted by the proposed development.
I have attached a signed letter opposing the project.
I hope this is the correct address to do so.

Thanks.
Shawn

FROM: Shawn Doherty Resident
Stonebridge Apartments
Eugene, OR 97408

TO: Planning Commission, c/o Jeff Gepper
Planning Division
99 West 10th Avenue
Eugene, OR 97401

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Page 2: Joseph & Brenda White, Stonebridge Apartments

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Please seriously consider NOT changing the zoning of these properties in order to

maintain the character of the area as it is already; professional office buildings and a classical residential environment.

Sincerely,

Shawn Doherty

AGENDA ITEM SUMMARY
July 28, 2020

To: Planning Commission

From: Mike McKerrow, Associate Planner and Jenessa Dragovich, Senior Planner, Building and Permit Services Division

Subject: Public Hearing on Digital Sign Code Amendments (City File # CA 20-2)

ACTION REQUESTED:
Hold a public hearing on a proposed land use code amendment to modify existing sign standards to allow various digital signs.

BRIEFING STATEMENT:
On July 28, 2020, the Planning Commission will hold a public hearing on a land use code amendment initiated by City Council. The Eugene sign code applies City-wide to all properties based on zoning and location, which determines which sign district and associated standards apply. The goal of the proposed land use code amendments is to modify existing sign code standards to allow and regulate digital billboards and digital reader boards. The proposed amendments focus on how best to allow conversion of existing billboards to new digital technology with specific standards for maximum size, message change intervals, brightness, location and separation. The proposed amendments also include digital signage allowances for institutional uses and gas stations, and minor changes to the existing sign code suggested by staff to add clarity.

Eugene's sign code (which is part of the Eugene land use code, Chapter 9) was originally adopted in 1968. The last major change to the sign code occurred in the late 1980's and minor amendments were passed in 2001 and 2013. Electronic sign technology has changed significantly in that period and the sign code has not been changed to accommodate the new technology. Digital signs use an electronic display system, such as a light-emitting diode (LED) screen, to deliver multiple messages at a single location. Images are often static and held for a specified amount of time.

Eugene's current sign code prohibits flashing signs and most digital or electronic signs except for electronic message centers, which are limited in size and location. Most existing electronic message centers in Eugene are digital time and temperature displays (three square feet in area and five display characters) except for a few cases where variances were approved to allow larger digital signs.

Eugene has few examples of existing digital signs. They include signs for the Lane County Fairgrounds, the Hult Center, Matthew Knight Arena, and The Shedd which were allowed either as public signs or through sign variances as mentioned above.

Proponents assert several benefits from the technology, including reduced waste compared with traditional copy materials, lower energy consumption, the ability to serve the advertising needs of more businesses, making advertising less expensive for small businesses and non-profits, and allowing for usage by law enforcement agencies to provide public warnings such as Amber Alerts.

Billboard industry representatives contacted City Councilor Chris Pryor to request a modification to the sign code standards to allow for electronic (digital) billboards. Councilor Pryor polled the council and in response, a work session to discuss the proposal was held on September 18, 2019. For additional background, the agenda item summary for that Council meeting is provided as Attachment A. Please note that the original date of the work session was September 9, 2019; however, due to time constraints, the work session was bumped to the following week. After staff presented information about what would be needed to allow digital signs, the City Council initiated the current code amendment process with the following motion:

> **MOTION AND VOTE:** *Move to initiate land use code amendments to allow digital billboards and digital reader boards within the city and to implement changes to the sign regulations identified by staff that are legally required or necessary to clarify the current regulations.* (The motion passed 4:2, with Councilors Taylor and Semple voting in opposition.)

The proposed modifications to the existing sign code are primarily focused on allowing digital billboards as well as limited digital signage for drive-through signs, service stations and institutional uses. The other proposed changes in the draft code are clarifications recommended by staff. The draft land use code language is provided in Attachment B and the following is a summary of the proposed changes:

- Provides new definitions for digital billboards, cutouts and digital signs and modifies existing definitions for electronic message centers and flashing signs.
- Provides ability to convert existing billboards into digital billboards when proposed standards are met:
    - Minimum spacing of 1,200 feet (4 blocks) between digital billboards
    - Minimum 10 seconds between messages
    - No video, animations, scrolling, or other similar effects.
    - Auto-dimming to prevent glare, especially at night
- Allows one digital sign (maximum 20 square feet) for each institutional use such as schools, religious institutions and community centers.

- Allows up to six small digital sign components (totaling not more than 20 square feet) for service stations.
- Allows up to two digital signs (maximum 7-foot high and not more than 40 square feet) for each drive-through use.

PROCEDURAL SUMMARY

This proposed code amendment is subject to Type V application procedures (EC 9.7500 through EC 9.7560) for the upcoming public hearing, as well as the applicable approval criteria from EC 9.8065. Type V applications provide for a legislative review of changes to the land use code. The Type V process includes public notice and hearing before the Planning commission, which forwards a recommendation to the City Council for a final public hearing and action. Attachment C provides preliminary findings addressing compliance with the applicable approval criteria for the proposed changes.

Following the Planning Commission's public hearing and close of the record, the Planning Commission will deliberate and ultimately make a recommendation to the City Council to either approve, approve with modifications, or deny the request, based on the required approval criteria. This may occur following the public hearing (time permitting), or at a later Planning Commission meeting.

APPLICABLE APPROVAL CRITERIA

As noted above, the Planning Commission must address the relevant approval criteria from EC 9.8065 in making a recommendation to the City Council on the request. Staff's preliminary findings addressing these approval criteria are attached for the Planning Commission's consideration (see Attachment C).

PUBLIC NOTICE

Public notice of the proposed code amendment was provided in accordance with Eugene Code requirements.

Application Timeline	**City Council Initiation**	September 18, 2019
	DLCD Notice	June 15, 2020
	Public Notice	June 26, 2020
	Legal Notice in Register Guard	July 6, 2020

Table 1: Relevant Application Dates

PUBLIC COMMENT

The Planning Commission will also consider additional public testimony and other materials that may be presented at the public hearing, before making a recommendation on the proposed amendments. Four pieces of written testimony were received for this application as of the date of this staff report. A local sign contractor expressed concern that the amendments could make the sign code more restrictive; an attorney representing a billboard company provided suggested changes to the draft language; an advertising company submitted slides for a short presentation with support and suggested changes; and comments and recommendations from a representative

of the Northwest Sign Council and the International Sign Association. Full copies of the testimony are included as Attachment D.

STAFF RECOMMENDATION / NEXT STEPS

Staff recommends that the Planning Commission hold a public hearing and review the public testimony related to the proposed land use code amendment. Following the public hearing, the Planning Commission will deliberate on the proposed code amendment and provide a recommendation to the City Council. Following Planning Commission deliberations and recommendation, the City Council will hold a public hearing on September 21, 2020, with City Council action tentatively scheduled on October 12, 2020.

ATTACHMENTS:

A. City Council Work Session Agenda Item Summary, September 9, 2019
B. Draft Land Use Code Language
C. Preliminary Findings
D. Testimony Received as of July 21, 2020

FOR MORE INFORMATION

Please contact Mike McKerrow, Associate Planner, at 541-682-5288 or MMckerrow@eugene-or.gov or Jenessa Dragovich, Senior Planner, at 541-682-8385 or JDragovich@eugene-or.gov

As a courtesy, relevant application materials may also be viewed on the City's land use application website: https://pdd.eugene-or.gov/LandUse/ApplicationDetails?file=CA-20-0002

Attachment A

EUGENE CITY COUNCIL AGENDA ITEM SUMMARY

Work Session: Digital Signs

Meeting Date: September 9, 2019
Department: Planning and Development
www.eugene-or.gov

Agenda Item Number: 3
Staff Contact: Jenessa Dragovich
Contact Telephone Number: 541-682-8385

ISSUE STATEMENT

At this work session, City Council will be provided with an overview of Eugene sign code regulations pertaining to digital signs. This work session is in response to Councilor Pryor's request and was initiated through a poll, provided as Attachment A. This is an informational item and no council action is requested.

BACKGROUND

Eugene's sign code (which is part of the Eugene land use code) was originally adopted in 1968. Minor amendments to the sign code were passed in 2001 and 2013, however, the last major change occurred in the late 1980s. Electronic sign technology has changed significantly in that period. Digital signs use an electronic display system, such as an LED screen, to deliver multiple signs at a single location. Images are often static and held for a specified amount of time; however, the technology is capable of slide presentation effects, including frame transitions, scrolling, animation and videos. With a push to convert traditional billboards to digital, many communities are being asked to allow electronic signage.

At this work session, council will be presented with an overview of:

- Eugene's existing sign code pertaining to digital signs
- Digital sign information
- Common concerns related to digital signs
- Examples of how other communities regulate digital signage

Eugene's current sign code prohibits flashing signs, except electronic message centers (which are considered digital signs). However, because electronic message centers are limited to three square feet in area and five display characters, they are effectively prohibited with the exception of small displays that show time and temperature. A 2007 Land Use Board of Appeals decision affirmed the City's interpretation that LED displays meet the City's definition of electronic message centers and are subject to the size, character and message interval limits prescribed by the sign code. To allow digital signage in Eugene, the sign code would need to be amended to remove prohibitive language and add specific regulations to address common concerns associated with digital signage. Excerpts from the sign code are provided as Attachment B.

There are only a few existing examples of digital signs in Eugene—the Lane County Fairgrounds, the Hult Center, Matthew Knight Arena, and The Shedd. The Eugene land use code generally does not allow digital signs. The examples listed were allowed because two are public signs that are exempt from sign standards and two, Matthew Knight Arena and The Shedd's electronic message centers, received a variance to the sign code standards.

Proponents of digital signage assert several benefits from the technology, including reduced waste compared with traditional copy materials, lower energy consumption, the ability to serve the advertising needs of more businesses, and usage by law enforcement agencies to push public warnings such as Amber alerts.

Concerns over the use of digital signage are primarily focused on driver distraction and visual pollution. Several factors that contribute to these concerns include: flashing effects, moving images, or videos; frequency of image changes; size and location; and brightness/glare.

Digital sign technology has been operating in Portland, Salem, and Springfield for several years. At the work session, staff will provide some examples of how these cities and others regulate such signage.

Allowing digital signs in Eugene would require an amendment to Eugene's land use code. Such changes would require the City Council to initiate the process. The formal adoption process for an amendment to the land use code includes notice to the state and interested parties, a public hearing before the Planning Commission who provides a recommendation to City Council, a public hearing before the City Council, and action by the City Council. In some cases, notice must also be sent to affected property owners. Prior to the formal adoption process, the Building Permit Services Division would engage stakeholders in a public process to identify key issues and possible solutions, and to review draft code language.

In addition to the work session request regarding digital signs, there have been two other questions asked by councilors related to sign standards. One question was about signs that advertise off-premise businesses and whether the City can require that signs be for on-premise, or "proximate" businesses, or limited to businesses located within the city. The City cannot require that signs only advertise proximate businesses or businesses located in the city. Such a requirement would violate the Oregon Constitution because it would prohibit certain speech based on the content of that speech. *See Outdoor Media Dimensions, Inc. v. Department of Transportation*, 340 Or 275 (2006).

The second question is related to mobile advertising signs (e.g., a sign on the flat bed of a truck that is driven around town). The current sign code already prohibits any sign placed on a motor vehicle with the primary purpose of providing a sign not otherwise allowed by the sign standards. See land use code section 9.6615(2) on page 1 of Attachment B.

PREVIOUS COUNCIL DIRECTION

This is the first work session on this topic.

COUNCIL OPTIONS
Informational item. No action requested.

CITY MANAGER'S RECOMMENDATION
No recommended action.

SUGGESTED MOTION
No recommended action.

ATTACHMENTS
A. Work Session Request
B. Eugene Sign Standards Excerpts

FOR MORE INFORMATION
Staff Contact: Jenessa Dragovich
Telephone: 541-682-8685
Staff E-Mail: JDragovich@eugene-or.gov

Attachment B

Digital Sign Amendments Ordinance

Proposed Land Use Code Changes
DRAFT – June 9, 2020

Language to be added is shown in ***bold italics***.
Language to be removed is show by ~~strikeout.~~

Definitions:

Cutout. A supplemental design element attached to or superimposed upon a billboard.

Digital Billboard. Any billboard that changes messages by any electronic process.

Digital Sign. Any sign with a sign face of 20 or fewer square feet in surface area that changes messages by any electronic process.

Electronic Message Center. ~~A sign, or portion of a sign, that conveys information through a periodic automatic change of message on a lampbank, through the use of fiber optics, or through mechanical means. A sign on which any portion less than an entire sign rotates shall be considered an electronic message center.~~ ***A sign component that utilizes a computer or other electronic means to change the digital message displayed.***

Flashing Sign. A sign or sign structure ***that is not a digital billboard, digital sign, or electronic message center,*** where some part of the display is provided by light-emitting elements which abruptly change color or intensity of illumination, including intermittent periods of illumination and non-illumination, or where the effect of flashing is achieved through mechanical means, including rotation.

Sign Standards:

9.6610 **<u>Exemptions to Sign Standards</u>.**

*** * ***

(2) Except as provided in subsection (3) of this section, the following signs are exempt from the requirements of EC 9.6600 through 9.6680, and are exempt from the requirement to obtain a sign permit if they are located on private property outside of vision clearance areas:

* * *

<u>Building Directories</u>. For buildings with multiple tenants, one wall-mounted sign up to 12 square feet in area for the purpose of communicating to persons already on the development site.

* * *

~~Message Boards~~***Drive-through Signs***. ~~One sign per business for the purpose of communicating to persons on the development site, such as a drive through menu sign or building directory. Such a sign may be up to 6 feet in height and up to 40 square feet in area.~~
Two drive-through signs for each drive-through lane. Each drive-through sign may be up to 7 feet in height and up to 40 square feet in area. Drive-through signs may be digital signs if the sign display is static and the copy is not changed more than once per hour, except for a portion of the digital display not to exceed 2 square feet may change copy more frequently.

* * *

Residential Property Signs. Two signs for each development site used primarily for a single family dwelling or duplex. The signs are limited to the following types: freestanding sign or banner. A freestanding sign may not exceed 12 square feet in size per face, with a maximum of two faces; a banner may not exceed 15 square feet in size. The maximum height of a freestanding sign under this exemption is ~~6~~ ***5*** feet (from grade), and it must be separated by at least 8 feet from any other freestanding sign on the same development site.

* * *

9.6615 **Prohibited Signs.** Except where qualified as a nonconforming sign, the following signs are unlawful and are declared to be nuisances:

* * *

(5) Decorative laser signs, search lights, and flashing signs~~, except electronic message centers~~;

9.6620 **Nonconforming Signs.**

* * *

(3) ***Except as provided in EC 9.6675(7) or*** ~~Except~~ where only a change in display copy is made, any nonconforming sign which is structurally altered or has illumination installed shall be brought into compliance with all applicable provisions of the sign standards within 90 days and shall thereafter be kept in compliance with the sign standards.

* * *

(5) The provisions ~~of subsection (6) of this section and~~ subsection (2) of EC 9.6635 Approval of Permit Application do not apply to signs in existence pursuant to a validly issued sign permit as of July 1, 1990, along Goodpasture Island Road from a point 300 feet north of the intersection with Valley River Way to a point 1400 feet north of the intersection. The provisions of subsection (2) of this section shall apply except that restoration of a damaged

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sign shall be allowed where a sign is damaged to the extent of 100 percent of its value. All other provisions of this section shall apply.

~~**(6)** All signs with a surface area of 200 square feet or greater shall be removed or brought into compliance with this land use code by April 1, 2003.~~

9.6630 Permit Application.

(1) An application and related information shall be submitted by the applicant, in a manner prescribed by the city, together with a fee established by the city manager as provided by EC 2.020 City Manager - Authority to Set Fees and Charges. ~~When a person begins construction of a sign requiring a sign permit before the permit is issued, the permit fee shall be doubled. Payment of a double permit fee shall not otherwise exempt the person from liability for other penalties prescribed for a violation of the sign standards.~~

* * *

9.6635 Approval of Permit Application.

* * *

(8) A decision granting or denying a sign permit may be appealed to a hearings official. Appeals are processed according to ~~other~~ Type II applications beginning at EC 9.7200 General Overview of Type II Application Procedures. The decision of the hearings official is final.

9.6640 General Provisions.

* * *

(4) Location Standards.

(a) Setbacks. All signs shall comply with the setback requirements beginning at EC 9.2000 through EC 9.3980 and EC 9.6745 Setbacks - Intrusions Permitted. ~~Signs may be installed up to 5 feet into the required front yard setback except that freestanding signs up to 5 feet in height in the E-1 zone may be installed at least 5 feet from the front property line.~~

* * *

Projecting Over the Public ***Right-of-***Way. Except as specified in EC 9.6670 Central Commercial Sign Standards, no privately owned sign may project over any public right-of-way.

* * *

(5) Construction Standards.

* * *

(f) Wall Signs. Wall signs ~~shall~~ ***may*** project ***up to*** ~~a maximum of~~ 12 inches ***from the wall, except that wall signs shall project no more than 4 inches from the wall when the sign is less than 8 feet above a sidewalk or public way.*** ~~when the wall sign is more than 8 feet above~~

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~~grade and a maximum of 4 inches when the wall sign is less than 8 feet above grade~~.

(6) Illumination Standards.

* * *

(d) Illumination From Signs on Residentially Zoned Property. ~~No internally illuminated sign shall be allowed on property in a residential zone.~~ Lighting from all light sources operated for the purposes of sign illumination on property in a residential zone shall ~~be shielded from other property in the residential zone and shall~~ not be more than 2 foot candles at ***any point along*** the ***boundary of the development site*** ~~closest street or property line~~. ***Externally illuminated signs shall be shielded.***

* * *

(9) Electronic Message Centers. Except electronic message centers operated as public signs by governmental agencies, ~~no~~ electronic message center***s are subject to the following limitations:***~~, or~~

(a) ***Except as provided in subsection (b) of this section, that*** portion of a***ny*** sign used as an electronic message center shall be ~~larger than~~***limited to*** 3 square feet in area, ***may*** display ~~a message containing~~ no more than 5 characters, ~~or~~***and must not*** change the displayed message at intervals of less than once every 3 seconds. No electronic message center, except for temporary construction use, shall exceed a maximum one-hour equivalent A-weighted sound pressure level of 50 dBa at the receiving property line when the receiving property is occupied by a dwelling, hospital, school, library or assisted care center.

(b) ***Each service station may include up to 6 rectangular digital signs, constructed a minimum of 3 inches from each other, limited to 20 square feet in area cumulatively, and must not change the displayed message at intervals of less than once every 24 hours.***

(10) Digital Signs. One digital sign up to 20 square feet in area is permitted per institutional use on a development site. Digital signs must be located a minimum of 50 feet from the property line of any residentially zoned property.

All digital signs shall be subject to the following standards:

(a) The change from one message to another message shall be no more frequent than once every 10 seconds.

(b) The change from one message to another message shall be instantaneous.

(c) Animation, scrolling or other perceived movement is not allowed.

(d) The digital sign shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 45 feet perpendicular to the sign face

(e) The digital sign shall be equipped with a light sensor that automatically adjusts the intensity of the digital display according to the amount of ambient light.

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9.6645 <u>Applicability of Sign Standards</u>.

(1) No sign permit shall be issued for any sign unless specifically identified as an allowed sign use under the terms of the applicable sign standards or otherwise allowed a permit under EC 9.6620 <u>Nonconforming Signs</u> or ***exempted from the requirement for a permit under EC*** 9.6610 <u>Exemptions to Sign Standards</u>.

(2) Except as otherwise specified, signs located on property zoned S Special Zone shall be subject to the provisions of:

* * *

(b) EC 9.6680 <u>Employment and Industrial Sign Standards</u>, if employment or industrial, ~~or~~

(c) EC 9.6660 <u>General Commercial Sign Standards</u>~~.~~***, or***

(d) EC 9.3970(11) if the property is zoned S-WS Walnut Station Special Area Zone.

* * *

9.6650 <u>Residential Sign Standards</u>. The residential sign standards are hereby created and applied to all land zoned as set forth below. Signage is limited to preserve the character of the area by allowing signs only for residential purposes and for non-residential uses allowed in the applicable zone.

* * *

(2) Permitted Sign Types. Signs allowed under residential sign standards are limited to the following types:

(a) Awning signs;

(b) Digital signs;

(~~b~~c) Freestanding signs;

(~~c~~d) Readerboards; and

(~~d~~e) Wall signs.

* * *

9.6655 <u>General Office Sign Standards</u>. The general office sign standards are hereby created and applied to all land as set forth below. Signs are regulated to accommodate the office buildings and other public uses that are commonly located within these zones and because of the proximity of residential areas.

* * *

(2) Permitted Sign Types. Signs allowed under general office sign standards shall be limited to the following types:

(a) Awning signs;

(b) Digital signs;

(~~b~~c) Electronic message centers;

(~~c~~d) Freestanding signs;

(~~d~~e) Marquee signs;

(~~e~~f) Readerboards;

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(~~f~~g) Under-marquee signs; and
(~~g~~h) Wall signs.

* * *

9.6660 **<u>General Commercial Sign Standards</u>.** The general commercial sign standards are hereby created and applied to all land as set forth below. Sign limitations reflect the commercial nature of the area and the amount of vehicular traffic.

* * *

(2) Permitted Sign Types. Signs allowed under these standards shall be limited to the following types:
(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Readerboards;
(~~f~~g) Roof signs;
(~~g~~h) Under-marquee signs; and
(~~h~~i) Wall signs.

* * *

9.6665 **<u>Shopping Center Sign Standards</u>.** The shopping center sign standards are hereby created and applied to all land as set forth below. Sign limitations in these standards accommodate the special commercial character of these areas and the residential areas which are close to most shopping centers.

* * *

(2) Permitted Sign Types. Signs allowed under the shopping center sign standards shall be limited to the following types:
(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Readerboards;
(~~f~~g) Roof signs;
(~~g~~h) Under-marquee signs; and
(~~h~~i) Wall signs.

* * *

9.6670 **<u>Central Commercial Sign Standards</u>.** The central commercial sign standards are hereby created and applied to all property within the central commercial zones as set forth below. Signs are restricted in recognition of the high density usage of these areas, where pedestrian traffic is heavy and vehicular traffic is commonly limited.

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* * *

(2) Permitted Sign Types. Signs allowed under the central commercial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Projecting signs;
(~~f~~g) Readerboards;
(~~g~~h) Roof signs;
(~~h~~i) Under-marquee signs; and
(~~i~~j) Wall signs.

(3) Maximum Number of Signs. The number of signs central commercial sign standards allow shall be limited to no more than 1 electronic message center, freestanding, ~~projecting sign,~~ readerboard, or roof sign per development site street frontage ***and 1 projecting sign per business occupant***. The number of allowed awning, marque, under-marque and wall signs is not limited.

* * *

9.6675 **<u>Highway Commercial Sign Standards</u>.** The highway commercial sign standards are hereby created and applied to all land as set forth below. Signs in this area are regulated to accommodate the mixed uses of the areas and the presence of major streets with high traffic volumes.

(1) Corresponding Zones. The provisions of this section apply to that property within the S-RP Riverfront Park Special Zone located within 200 feet of the Franklin Boulevard center line and to property within the C-1, C-2, C-3, or any employment and industrial zone with frontage along the following named streets:

(a) Beltline Road from 11th Avenue to Roosevelt Boulevard;
(b) Broadway from Mill Street to Franklin Boulevard;
(c) Coburg Road from 6th Avenue to 200 feet north of Frontier Drive;
(d) Franklin Boulevard east from Broadway, including the north-south segment;
(e) Garfield Street from 11th Avenue to 5th Avenue;
(f) Goodpasture Island Road from Valley River Drive to 1,700 feet north;
(g) Highway 99 North;
(h) I-5 ***on the south side only*** from Henderson Avenue to 300 feet north of Laurel Hill Drive;
~~(i) I-5 on the north side only, from 720 feet east of Henderson Avenue to 1,330 feet east of Henderson Avenue;~~
(~~j~~i) I-105 from the Coburg interchange to Scout Access Road;
(~~k~~j) Mill Street from Broadway to Coburg Road;
(~~l~~k) Railroad Boulevard;
(~~m~~l) 6th Avenue east of conjunction with Highway 99 North;
(~~n~~m) 7th Avenue east of conjunction with Highway 99 North; and
(~~o~~n) 11th Avenue from 200 feet east of the centerline of Chambers Street to Terry Street.

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(2) Permitted Sign Types. Signs allowed under the highway commercial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Billboards;
(c) Digital Billboards;
(d) Digital Signs;
(~~c~~e) Electronic message centers;
(~~d~~f) Freestanding signs;
(~~e~~g) Marquee signs;
(~~f~~h) Projecting signs;
(~~g~~i) Readerboards;
(~~h~~j) Roof signs;
(~~i~~k) Under-marquee signs; and
(~~j~~l) Wall signs.

* * *

(6) Billboards. Billboards shall be subject to the following standards:

(a) Billboards located along the streets named in subsection (1)(b) through (1)(g) and (1)(***j***~~k~~) through 1(***n***~~o~~) of this section shall not exceed 250 square feet in surface area.
(b) Billboards located on developed property along streets named in subsection 1(a)***,*** ~~and~~ (1)(h) ***and*** ~~through~~ (1)(***i***~~j~~) of this section shall not exceed 300 square feet in surface area.

* * *

(7) Digital Billboards. In addition to the standards in EC 9.6675(6), Digital Billboards shall be subject to the following standards. Where standards conflict, the standards for Digital Billboards in this subsection (7) shall control:

(a) Minimum spacing between digital billboards shall be 1200 feet. The distance between digital billboards shall be measured along the centerline of the street designated to be a location for digital billboards.
(b) The change from one message to another message shall be no more frequent than once every 10 seconds.
(c) The change from one message to another message shall be instantaneous.
(d) Animation is not allowed.
(e) The digital billboard shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 150 feet perpendicular to the sign face.
(f) The digital billboard shall be equipped with a light sensor that automatically adjusts the intensity of the billboard according to the amount of ambient light.
(g) The digital billboard shall be designed to either freeze the display in one static position, display a full black screen or turn off in the event of a malfunction.
(h) Cutouts are not allowed.

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(i) Notwithstanding EC 9.1230, legal nonconforming billboards may be removed and replaced by digital billboards if the location, area and height of the sign do not change and if the building permit is issued within 365 days of the 1st day of demolition. However, no digital billboard shall be larger than 300 square feet and all other standards in this section must be met.

(j) Digital billboards are allowed at the locations identified at EC 9.6675(1) except for (b), (e), (f), (j) and (k).

9.6680 **<u>Employment and Industrial Sign Standards</u>.** The employment and industrial sign standards are hereby created and applied to all property zoned for employment and industrial use as set forth below. Signs are regulated to accommodate the minimal street frontage of most parcels and the general proximity to highways and arterial streets.

* * *

(2) Permitted Sign Types. Signs allowed under the industrial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Billboards;
(c) Digital Billboards;
(d) Digital signs;
(~~c~~e) Electronic message centers;
(~~d~~f) Freestanding signs;
(~~e~~g) Marquee signs;
(~~f~~h) Projecting signs;
(~~g~~i) Readerboards;
(~~h~~j) Roof signs;
(~~i~~k) Under-marquee signs; and
(~~j~~l) Wall signs.

* * *

(5) Maximum Height. All billboards, freestanding signs and roof signs shall be no more than 30 feet in height except freestanding signs~~up to 5 feet in height are allowed in the E-1 zone at a minimum of 5 feet from the front property line~~.

(6) Billboards. Billboards regulated by the employment and industrial sign standards shall be subject to the following:

(a) Billboards shall be permitted only along property which abuts the following named streets:
1. Garfield Street north of 5th Avenue to the intersection of Roosevelt Boulevard.
2. Seneca Street north of 11th Avenue to the intersection of Roosevelt Boulevard.
3. Bertelsen Road north of 11th Avenue to the intersection of Roosevelt Boulevard.
4. Obie Street north of 11th Avenue to the end of the street, but no further north than the intersection of Stewart Road.
5. West 11th Avenue from 200 feet east of the centerline of Chambers Street to Terry Street.

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(b) No billboard shall exceed 250 square feet in area.

(c) Notwithstanding the required connection between perimeter wall size and billboard size established in (4)(b) of this section, a billboard not to exceed 200 square feet may be located on an otherwise vacant lot abutting any street designated in this section.

(d) The provisions of EC 9.6675(6)(d) to (i) shall apply to all billboards in areas regulated by the employment and industrial sign standards.

(7) Digital Billboards. In addition to the standards in EC 9.6680(6), Digital Billboards shall be subject to the following standards. Where standards conflict, the standards for Digital Billboards in this subsection (7) shall control:

(a) Minimum spacing between digital billboards shall be 1200 feet. The distance between digital billboards shall be measured along the centerline of the street designated to be a location for digital billboards.

(b) The change from one message to another message shall be no more frequent than once every 10 seconds.

(c) The change from one message to another message shall be instantaneous.

(d) Animation is not allowed.

(e) The digital billboard shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 150 feet perpendicular to the sign face.

(f) The digital billboard shall be equipped with a light sensor that automatically adjusts the intensity of the billboard according to the amount of ambient light.

(g) The digital billboard shall be designed to either freeze the display in one static position, display a full black screen or turn off in the event of a malfunction.

(h) Cutouts are not allowed.

(i) Notwithstanding EC 9.1230, legal nonconforming billboards may be removed and replaced by digital billboards if the location, area and height of the sign do not change and if the building permit is issued within 365 days of the 1st day of demolition. However, no digital billboard shall be larger than 300 square feet and all other standards in this section must be met.

(j) Digital billboards are only allowed at the location described in EC 9.6680(6)(a)5.

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Attachment C

Preliminary Findings:
Digital Sign Code Amendments (City File # CA 20-2)

Overview

The goal of the proposed land use code amendments is to modify existing sign code standards to allow and regulate digital billboards and digital reader boards. The proposed amendments focus on how best to allow conversion of existing billboards to new digital technology with specific standards for maximum size, message change intervals, brightness, location and separation. The proposed amendments also include digital allowances for institutional uses and gas stations and minor changes to the existing sign code suggested by staff to add clarity.

Findings

Eugene Code Section 9.8065 requires that the following approval criteria (in ***bold italics***) be applied to a code amendment:

(1) The amendment is consistent with applicable statewide planning goals adopted by the Land Conservation and Development Commission.

Goal 1 - Citizen Involvement. To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

The City has acknowledged provisions for community involvement which insure the opportunity for citizens to be involved in all phases of the planning process and set out requirements for such involvement. The code amendment does not amend the citizen involvement program. The process for adopting this amendment complied with Goal 1 because it is consistent with the City's acknowledged citizen involvement provisions.

A Notice of Proposed Amendment was filed with the Oregon Department of Land Conservation and Development on June 15, 2020. A public hearing was scheduled before the Planning Commission on July 28, 2020. A public hearing is scheduled before the City Council for September 21, 2020. Consistent with land use code requirements, the Planning Commission public hearing on the proposal was duly noticed to all neighborhood organizations in Eugene, as well as community groups and individuals who requested notice. In addition, notice of the public hearing was also published in the Register Guard on July 6, 2020. Information concerning the amendment, including the dates of the public hearings was posted on the City of Eugene website.

These processes afford ample opportunity for citizen involvement consistent with Goal 1. Therefore, the ordinance is consistent with Statewide Planning Goal 1.

Goal 2 - Land Use Planning. To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual basis for such decisions and actions.

Eugene's land use code specifies the procedure and criteria that were used in considering this amendment. The record shows that there is an adequate factual basis for the amendment. The Goal 2 coordination requirement is met when the City engages in an exchange, or invites such an exchange, between the City and any affected governmental unit and when the City uses the information obtained in the exchange to balance the needs of the citizens.

To comply with the Goal 2 coordination requirement, the City engaged in an exchange about the subject of this amendment with all of the affected governmental units. Specifically, the City provided notice of the proposed action and opportunity to comment to the Oregon Department of Land Conservation and Development, as well as to Lane County and the City of Springfield. There are no exceptions to Statewide Planning Goal 2 required for this amendment. Therefore, the amendment is consistent with Statewide Planning Goal 2.

Goal 3 - Agricultural Lands. *To preserve agricultural lands.*

The amendment is for property located within the urban growth boundary and does not affect any land designated for agricultural use. Therefore, Statewide Planning Goal 3 does not apply.

Goal 4 - Forest Lands. *To conserve forest lands.*

The amendment is for property located within the urban growth boundary and does not affect any land designated for forest use. Therefore, Statewide Planning Goal 4 does not apply.

Goal 5 - Open Spaces, Scenic and Historic Areas, and Natural Resources. *To conserve open space and protect natural and scenic resources.*

OAR 660-023-0250(3) provides: Local governments are not required to apply Goal 5 in consideration of a PAPA unless the PAPA affects a Goal 5 resource. For purposes of this section, a PAPA would affect a Goal 5 resource only if:

(a) The PAPA creates or amends a resource list or a portion of an acknowledged plan or land use regulation adopted in order to protect a significant Goal 5 resource or to address specific requirements of Goal 5;

(b) The PAPA allows new uses that could be conflicting uses with a particular significant Goal 5 resource site on an acknowledged resource list; or

(c) The PAPA amends an acknowledged UGB and factual information is submitted demonstrating that a resource site, or the impact areas of such a site, is included in the amended UGB area.

This amendment does not create or amend the City's list of Goal 5 resources, do not amend a code provision adopted in order to protect a significant Goal 5 resource or to address specific requirements of Goal 5, does not allow new uses that could be conflicting uses with a significant Goal 5 resource site and does not amend the acknowledged urban growth boundary. Therefore, Statewide Planning Goal 5 does not apply.

Goal 6 - Air, Water and land Resource Quality. *To maintain and improve the quality of the air, water and land resources of the state.*

Goal 6 addresses waste and process discharges from development, and is aimed at protecting air, water and land from impacts from those discharges. The amendment does not affect the City's ability to provide for clean air, water or land resources. Therefore, Statewide Planning Goal 6 does not apply.

Goal 7 - Areas Subject to Natural Disasters and Hazards. To protect life and property from natural disasters and hazards.

Goal 7 requires that local government planning programs include provisions to protect people and property from natural hazards such as floods, landslides, earthquakes and related hazards, tsunamis and wildfires. The Goal prohibits a development in natural hazard areas without appropriate safeguards. The amendment does not affect the City's restrictions on development in areas subject to natural disasters and hazards. Further, the amendment does not allow for new development that could result in a natural hazard. Therefore, Statewide Planning Goal 7 does not apply.

Goal 8 - Recreational Needs. To satisfy the recreational needs of the citizens of the state and visitors, and where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

Goal 8 ensures the provision of recreational facilities to Oregon citizens and is primarily concerned with the provision of those facilities in non-urban areas of the state. The amendment does not affect the City's provisions for or access to recreation areas, facilities or recreational opportunities. Therefore, Statewide Planning Goal 8 does not apply.

Goal 9 - Economic Development. To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Goal 9 requires cities to evaluate the supply and demand of commercial land relative to community economic objectives. The amendment does not impact the supply of industrial or commercial lands. Therefore, the amendment is consistent with Statewide Planning Goal 9.

Goal 10 - Housing. To provide for the housing needs of citizens of the state.

Goal 10 requires communities to provide an adequate supply of residential buildable land to accommodate estimated housing needs for a 20-year planning period. The amendment does not impact the supply of residential lands. Therefore, the amendment is consistent with Statewide Planning Goal 10.

Goal 11- Public Facilities and Services. To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

The amendment does not affect the City's provision of public facilities and services. Therefore, Statewide Planning Goal 11 does not apply.

Goal 12- Transportation. To provide and encourage a safe, convenient and economic transportation

system.

The Transportation Planning Rule (OAR 660-012-0060) contains the following requirement:

> *(1) If an amendment to a functional plan, an acknowledged comprehensive plan, or a land use regulation (including a zoning map) would significantly affect an existing or planned transportation facility, then the local government must put in place measures as provided in section (2) of this rule, unless the amendment is allowed under section (3), (9) or (10) of this rule. A plan or land use regulation amendment significantly affects a transportation facility if it would:*
>
> *(a) Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan);*
>
> *(b) Change standards implementing a functional classification system; or*
>
> *(c) Result in any of the effects listed in paragraphs (A) through (C) of this subsection based on projected conditions measured at the end of the planning period identified in the adopted TSP. As part of evaluating projected conditions, the amount of traffic projected to be generated within the area of the amendment may be reduced if the amendment includes an enforceable, ongoing requirement that would demonstrably limit traffic generation, including, but not limited to, transportation demand management. This reduction may diminish or completely eliminate the significant effect of the amendment.*
>
> > *(A) Types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;*
> >
> > *(B) Degrade the performance of an existing or planned transportation facility such that it would not meet the performance standards identified in the TSP or comprehensive plan; or*
> >
> > *(C) Degrade the performance of an existing or planned transportation facility that is otherwise projected to not meet the performance standards identified in the TSP or comprehensive plan.*

The amendment does not change the functional classification of a transportation facility, change the standards implementing a functional classification system or degrade the performance of a facility otherwise projected to not meet performance standards. Therefore, the amendment does not have a significant effect under (a), (b) or (c). Therefore, the amendment does not significantly affect any existing or future transportation facilities. Based on the above findings, the amendment is consistent with Statewide Planning Goal 12.

<u>Goal 13 - Energy Conservation</u>. To conserve energy.

The amendment does not impact energy conservation. Therefore, Statewide Planning Goal 13 does not apply.

<u>Goal 14 - Urbanization</u>. To provide for an orderly and efficient transition from rural to urban land use.

The amendment does not affect the City's provisions regarding the transition of land from rural to urban uses. Therefore, Statewide Planning Goal 14 does not apply.

Goal 15 - Willamette River Greenway. *To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.*

The amendment does not contain any changes that affect the Willamette River Greenway regulations, therefore, Statewide Planning Goal 15 does not apply.

Goal 16 through 19 - Estuarine Resources, Coastal Shorelands, Beaches and Dunes, and Ocean Resources.

There are no coastal, ocean, estuarine, or beach and dune resources related to the property effected by this amendment. Therefore, these goals are not relevant and the amendment will not affect compliance with Statewide Planning Goals 16 through 19.

(2) The amendment is consistent with applicable provisions of the comprehensive plan and applicable adopted refinement plans.

Metro Plan
The Metro Plan does not contain any policies directly relevant to this amendment.

Envision Eugene Comprehensive Plan
The Envision Eugene Comprehensive Plan does not contain any policies relevant to this amendment.

Applicable Refinement Plans
No relevant policies were found in the City's adopted refinement plans.

(3) The amendment is consistent with EC 9.3020 Criteria for Establishment of an S Special Area Zone, in the case of establishment of a special area zone.

The amendments do not establish a special area zone. Therefore, this criterion does not apply.

Attachment D

From: MCKERROW Mike J
Sent: Thursday, July 16, 2020 10:37 AM
To: steven Rudnick <steve@rudnickelectricsigns.com>
Subject: RE: Eugene to Modify Sign Standards Related to Billboards and some Digital Signs

Steven,

Thanks for your timely response. We appreciate your input on trying to make sign codes less complicated. The bulk of this proposed code amendment allows traditional billboards to transition to digital billboards. While the draft includes some compatibility standards based on industry and ODOT parameters it allows more electronic signage than the current code. The proposed changes provide new allowances and do not further restrict signage compared to existing standards.

If you have time to look into it in more detail your electrical sign expertise would be helpful if you see any glitches or unintended consequences. Again, thanks for taking the time to comment.

Mike McKerrow
Land Use Analyst

Building and Permit Services
99 West 10th Avenue
Eugene OR 97401
Phone 541.682.5288

From: steven Rudnick <steve@rudnickelectricsigns.com>
Sent: Tuesday, July 14, 2020 5:35 PM
To: MCKERROW Mike J <MMcKerrow@eugene-or.gov>; dan@imagekingsigns.com; cgoodman@esasigns.com; 2133@fastsigns.com; dennis@fabcosigns.com; neal@neonsigns.com; info@salemsign.com; larry@nomadsign.com; info@oregonsignworks.com; pat.giani@gigr.com; dakstats@daktronics.com; curtis@rosecitysigns.com; Hoobler, Rob <rob.hoobler@outfrontmedia.com>; Valencia, Mary <mary.valencia@outfrontmedia.com>; Aaron Noteboom <aaron@noteboomlaw.com>; Chris Zukin <czukin@meadowoutdoor.com>; tjtorrey@comcast.net; John Fitzmaurice <jfitzmaurice@lamar.com>; John Lehman <jlehman@meadowoutdoor.com>; Mike Zukin <MZukin@meadowoutdoor.com>; Hill, Christie D <christie.hill@outfrontmedia.com>
Cc: DRAGOVICH Jenessa L <JDragovich@eugene-or.gov>
Subject: RE: Eugene to Modify Sign Standards Related to Billboards and some Digital Signs

[EXTERNAL ⚠]

I am sick and tired of restrictive sign codes that are constantly making it impossible for business to obtain signage they need, hurting out businesses and making it very expensive, to the point we can't charge enough, to make a good living.

We do NOT make money on farting around with the city constantly because it would take years to grow big enough to have dedicated staff for permitting. Further more signs that are too small are heard to read and if a customer is proud enough to have a large sign why can't they have it and buy who's initiative is it to restrict them?

I hope everyone at the cities will back off on restrictive sign codes and involve us before making more uninformed decisions.
I hope this helps allow signage over not allowing as is currently being seen.
Steve Rudnick
P.S. I am a master sign electrician and licensed in both Oregon & Washington. I have been in business for over 11 years and it has never been harder to make a living until now.
Thanks for listening.

Rudnick Electric Signs LLC
1400 SE Township rd.
Canby, OR. 97013
Steven Rudnick – CEO
O: 503-263-4618
C: 503-997-8882
www.rudnickelectricsigns.com

From: MCKERROW Mike J <MMcKerrow@eugene-or.gov>
Sent: Tuesday, July 14, 2020 3:49 PM
To: dan@imagekingsigns.com; cgoodman@esasigns.com; 2133@fastsigns.com; dennis@fabcosigns.com; neal@neonsigns.com; info@salemsign.com; larry@nomadsign.com; info@oregonsignworks.com; pat.giani@gigr.com; dakstats@daktronics.com; curtis@rosecitysigns.com; steven Rudnick <steve@rudnickelectricsigns.com>; Hoobler, Rob <rob.hoobler@outfrontmedia.com>; Valencia, Mary <mary.valencia@outfrontmedia.com>; Aaron Noteboom <aaron@noteboomlaw.com>; Chris Zukin <czukin@meadowoutdoor.com>; tjtorrey@comcast.net; John Fitzmaurice <jfitzmaurice@lamar.com>; John Lehman <jlehman@meadowoutdoor.com>; Mike Zukin <MZukin@meadowoutdoor.com>; Hill, Christie D <christie.hill@outfrontmedia.com>
Cc: DRAGOVICH Jenessa L <JDragovich@eugene-or.gov>; MCKERROW Mike J <MMcKerrow@eugene-or.gov>
Subject: Eugene to Modify Sign Standards Related to Billboards and some Digital Signs

Greetings from the City of Eugene,

You are receiving this email as a company who submits sign permits to the City of Eugene. The Eugene City Council has initiated a land use code amendment process to modify the existing sign code. The main goal of the proposed changes is to allow and regulate digital billboards and digital readerboards. The proposed amendments focus on how best to allow conversion of existing billboards to new digital technology with specific standards for maximum size, message change intervals, brightness, location and separation. The proposed amendments also include digital allowances for institutional uses and service stations and minor changes to the existing sign code suggested by staff to add clarity. The Council direction provided a limited scope for changes, so general changes to the existing sign code are not being considered through this process.

Staff will be holding a work session for the Planning Commission next Tuesday, July 21, 2020. The meeting agenda and materials, including the draft amendments, are available online here: https://www.eugene-or.gov/AgendaCenter/ViewFile/Agenda/_07212020-1021. Then, on Tuesday, July 28, 2020, the Planning Commission will hold a virtual public hearing to receive feedback and testimony regarding the proposed amendments before they make a recommendation to City Council. The notice for the public hearing is attached with details on how to participate.

If you have any questions please feel free to contact me.

Mike McKerrow
Land Use Analyst

Building and Permit Services
99 West 10th Avenue
Eugene OR 97401
Phone 541.682.5288

From: Mike Reeder <mreeder@oregonlanduse.com>
Sent: Thursday, July 9, 2020 3:51 PM
To: MCKERROW Mike J <MMcKerrow@eugene-or.gov>
Cc: Hoobler, Rob <rob.hoobler@outfrontmedia.com>; Valencia, Mary <mary.valencia@outfrontmedia.com>; Aaron Noteboom <aaron@noteboomlaw.com>; Chris Zukin <czukin@meadowoutdoor.com>; tjtorrey@comcast.net; John Fitzmaurice <jfitzmaurice@lamar.com>; John Lehman <jlehman@meadowoutdoor.com>; Mike Zukin <MZukin@meadowoutdoor.com>; Hill, Christie D <christie.hill@outfrontmedia.com>
Subject: RE: Eugene Sign Code - Digital
Importance: High

[EXTERNAL ⚠]

Mike:

Please see the attached. We appreciate all of you work on this matter. I hope all is well with you.

Best,

Mike

Law Office of Mike Reeder
Oregon Land Use Law

Office: (458) 210-2845 | oregonlanduse.com
375 W. 4th Ave., Suite 205, Eugene, OR 97401

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Digital Sign Amendments Ordinance

Proposed Land Use Code Changes
DRAFT – June 9, 2020 (Including MMR Edits 7/9/2020)

Language to be added is shown in ***bold italics***.
Language to be removed is show by ~~strikeout.~~

Definitions:

Cutout. A supplemental design element attached to or superimposed upon a billboard.

Digital Billboard. Any billboard that changes messages by any electronic process.

Digital Sign. Any sign with a sign face of 20 or fewer square feet in surface area that changes messages by any electronic process.

Electronic Message Center. ~~A sign, or portion of a sign, that conveys information through a periodic automatic change of message on a lampbank, through the use of fiber optics, or through mechanical means. A sign on which any portion less than an entire sign rotates shall be considered an electronic message center.~~ ***A sign component that utilizes a computer or other electronic means to change the digital message displayed.***

Flashing Sign. A sign or sign structure ***that is not a digital billboard, digital sign, or electronic message center,*** where some part of the display is provided by light-emitting elements which abruptly change color or intensity of illumination, including intermittent periods of illumination and non-illumination, or where the effect of flashing is achieved through mechanical means, including rotation.

Sign Standards:

9.6610 **Exemptions to Sign Standards.**

* * *

(2) Except as provided in subsection (3) of this section, the following signs are exempt from the requirements of EC 9.6600 through 9.6680, and are exempt from the requirement to obtain a sign permit if they are located on private property outside of vision clearance areas:

* * *

Building Directories. For buildings with multiple tenants, one wall-mounted sign up to 12 square feet in area for the purpose of communicating to persons already on the development site.

* * *

~~Message Boards~~***Drive-through Signs***. ~~One sign per business for the purpose of communicating to persons on the development site, such as a drive through menu sign or building directory. Such a sign may be up to 6 feet in height and up to 40 square feet in area.~~
Two drive-through signs for each drive-through lane. Each drive-through sign may be up to 7 feet in height and up to 40 square feet in area. Drive-through signs may be digital signs if the sign display is static and the copy is not changed more than once per hour, except for a portion of the digital display not to exceed 2 square feet may change copy more frequently.

* * *

Residential Property Signs. Two signs for each development site used primarily for a single family dwelling or duplex. The signs are limited to the following types: freestanding sign or banner. A freestanding sign may not exceed 12 square feet in size per face, with a maximum of two faces; a banner may not exceed 15 square feet in size. The maximum height of a freestanding sign under this exemption is ~~6~~ ***5*** feet (from grade), and it must be separated by at least 8 feet from any other freestanding sign on the same development site.

* * *

9.6615 **Prohibited Signs.** Except where qualified as a nonconforming sign, the following signs are unlawful and are declared to be nuisances:

* * *

(5) Decorative laser signs, search lights, and flashing signs~~, except electronic message centers~~;

9.6620 **Nonconforming Signs.**

* * *

(3) ***Except as provided in EC 9.6675(7) and EC 9.6680(7) or*** ~~Except~~ where only a change in display copy is made, any nonconforming sign which is structurally altered or has illumination installed shall be brought into compliance with all applicable provisions of the sign standards within 90 days and shall thereafter be kept in compliance with the sign standards.

* * *

(5) The provisions ~~of subsection (6) of this section and~~ subsection (2) of EC 9.6635 Approval of Permit Application do not apply to signs in existence pursuant to a validly issued sign permit as of July 1, 1990, along Goodpasture Island Road from a point 300 feet north of the intersection with Valley River Way to a point 1400 feet north of the intersection. The provisions of subsection (2) of this section shall apply except that restoration of a damaged

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sign shall be allowed where a sign is damaged to the extent of 100 percent of its value. All other provisions of this section shall apply.

~~**(6)** All signs with a surface area of 200 square feet or greater shall be removed or brought into compliance with this land use code by April 1, 2003.~~

9.6630 Permit Application.

(1) An application and related information shall be submitted by the applicant, in a manner prescribed by the city, together with a fee established by the city manager as provided by EC 2.020 City Manager - Authority to Set Fees and Charges. ~~When a person begins construction of a sign requiring a sign permit before the permit is issued, the permit fee shall be doubled. Payment of a double permit fee shall not otherwise exempt the person from liability for other penalties prescribed for a violation of the sign standards.~~

* * *

9.6635 Approval of Permit Application.

* * *

(8) A decision granting or denying a sign permit may be appealed to a hearings official. Appeals are processed according to ~~other~~ Type II applications beginning at EC 9.7200 General Overview of Type II Application Procedures. The decision of the hearings official is final.

9.6640 General Provisions.

* * *

(4) Location Standards.

(a) Setbacks. All signs shall comply with the setback requirements beginning at EC 9.2000 through EC 9.3980 and EC 9.6745 Setbacks - Intrusions Permitted. ~~Signs may be installed up to 5 feet into the required front yard setback except that freestanding signs up to 5 feet in height in the E-1 zone may be installed at least 5 feet from the front property line.~~

* * *

Projecting Over the Public ***Right-of-***Way. Except as specified in EC 9.6670 Central Commercial Sign Standards, no privately owned sign may project over any public right-of-way.

* * *

(5) Construction Standards.

* * *

(f) Wall Signs. Wall signs ~~shall~~ ***may*** project ***up to*** ~~a maximum of~~ 12 inches ***from the wall, except that wall signs shall project no more than 4 inches from the wall when the sign is less than 8 feet above a sidewalk or public way.*** ~~when the wall sign is more than 8 feet above~~

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~~grade and a maximum of 4 inches when the wall sign is less than 8 feet above grade~~.

(6) Illumination Standards.

* * *

(d) Illumination From Signs on Residentially Zoned Property. ~~No internally illuminated sign shall be allowed on property in a residential zone.~~ Lighting from all light sources operated for the purposes of sign illumination on property in a residential zone shall ~~be shielded from other property in the residential zone and shall~~ not be more than 2 foot candles at ***any point along*** the ***boundary of the development site*** ~~closest street or property line~~. ***Externally illuminated signs shall be shielded.***

* * *

(9) Electronic Message Centers. Except electronic message centers operated as public signs by governmental agencies, ~~no~~ electronic message center***s are subject to the following limitations:***~~, or~~

(a) ***Except as provided in subsection (b) of this section, that*** portion of a***ny*** sign used as an electronic message center shall be ~~larger than~~***limited to*** 3 square feet in area, ***may*** display ~~a message containing~~ no more than 5 characters, ~~or~~***and must not*** change the displayed message at intervals of less than once every 3 seconds. No electronic message center, except for temporary construction use, shall exceed a maximum one-hour equivalent A-weighted sound pressure level of 50 dBa at the receiving property line when the receiving property is occupied by a dwelling, hospital, school, library or assisted care center.

(b) ***Each service station may include up to 6 rectangular digital signs, constructed a minimum of 3 inches from each other, limited to 20 square feet in area cumulatively, and must not change the displayed message at intervals of less than once every 24 hours.***

(10) Digital Signs. One digital sign up to 20 square feet in area is permitted per institutional use on a development site. Digital signs must be located a minimum of 50 feet from the property line of any residentially zoned property.

All digital signs shall be subject to the following standards:

(a) The change from one message to another message shall be no more frequent than once every 10 seconds.

(b) The change from one message to another message shall be instantaneous.

(c) Animation, scrolling or other perceived movement is not allowed.

(d) The digital sign shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 45 feet perpendicular to the sign face

(e) The digital sign shall be equipped with a light sensor that automatically adjusts the intensity of the digital display according to the amount of ambient light.

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9.6645 Applicability of Sign Standards.

(1) No sign permit shall be issued for any sign unless specifically identified as an allowed sign use under the terms of the applicable sign standards or otherwise allowed a permit under EC 9.6620 Nonconforming Signs or ***exempted from the requirement for a permit under EC*** 9.6610 Exemptions to Sign Standards.

(2) Except as otherwise specified, signs located on property zoned S Special Zone shall be subject to the provisions of:

* * *

(b) EC 9.6680 Employment and Industrial Sign Standards, if employment or industrial, ~~or~~

(c) EC 9.6660 General Commercial Sign Standards~~.~~***, or***

(d) EC 9.3970(11) if the property is zoned S-WS Walnut Station Special Area Zone.

* * *

9.6650 Residential Sign Standards. The residential sign standards are hereby created and applied to all land zoned as set forth below. Signage is limited to preserve the character of the area by allowing signs only for residential purposes and for non-residential uses allowed in the applicable zone.

* * *

(2) Permitted Sign Types. Signs allowed under residential sign standards are limited to the following types:

(a) Awning signs;

(b) Digital signs;

(~~b~~c) Freestanding signs;

(~~c~~d) Readerboards; and

(~~d~~e) Wall signs.

* * *

9.6655 General Office Sign Standards. The general office sign standards are hereby created and applied to all land as set forth below. Signs are regulated to accommodate the office buildings and other public uses that are commonly located within these zones and because of the proximity of residential areas.

* * *

(2) Permitted Sign Types. Signs allowed under general office sign standards shall be limited to the following types:

(a) Awning signs;

(b) Digital signs;

(~~b~~c) Electronic message centers;

(~~c~~d) Freestanding signs;

(~~d~~e) Marquee signs;

(~~e~~f) Readerboards;

(~~f~~g) Under-marquee signs; and
(~~g~~h) Wall signs.

* * *

9.6660 **<u>General Commercial Sign Standards</u>.** The general commercial sign standards are hereby created and applied to all land as set forth below. Sign limitations reflect the commercial nature of the area and the amount of vehicular traffic.

* * *

(2) Permitted Sign Types. Signs allowed under these standards shall be limited to the following types:
(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Readerboards;
(~~f~~g) Roof signs;
(~~g~~h) Under-marquee signs; and
(~~h~~i) Wall signs.

* * *

9.6665 **<u>Shopping Center Sign Standards</u>.** The shopping center sign standards are hereby created and applied to all land as set forth below. Sign limitations in these standards accommodate the special commercial character of these areas and the residential areas which are close to most shopping centers.

* * *

(2) Permitted Sign Types. Signs allowed under the shopping center sign standards shall be limited to the following types:
(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Readerboards;
(~~f~~g) Roof signs;
(~~g~~h) Under-marquee signs; and
(~~h~~i) Wall signs.

* * *

9.6670 **<u>Central Commercial Sign Standards</u>.** The central commercial sign standards are hereby created and applied to all property within the central commercial zones as set forth below. Signs are restricted in recognition of the high density usage of these areas, where pedestrian traffic is heavy and vehicular traffic is commonly limited.

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* * *

(2) Permitted Sign Types. Signs allowed under the central commercial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Projecting signs;
(~~f~~g) Readerboards;
(~~g~~h) Roof signs;
(~~h~~i) Under-marquee signs; and
(~~i~~j) Wall signs.

(3) Maximum Number of Signs. The number of signs central commercial sign standards allow shall be limited to no more than 1 electronic message center, freestanding, ~~projecting sign,~~ readerboard, or roof sign per development site street frontage ***and 1 projecting sign per business occupant***. The number of allowed awning, marque, under-marque and wall signs is not limited.

* * *

9.6675 **<u>Highway Commercial Sign Standards</u>.** The highway commercial sign standards are hereby created and applied to all land as set forth below. Signs in this area are regulated to accommodate the mixed uses of the areas and the presence of major streets with high traffic volumes.

(1) Corresponding Zones. The provisions of this section apply to that property within the S-RP Riverfront Park Special Zone located within 200 feet of the Franklin Boulevard center line and to property within the C-1, C-2, C-3, or any employment and industrial zone with frontage along the following named streets:

(a) Beltline Road from 11th Avenue to Roosevelt Boulevard;
(b) Broadway from Mill Street to Franklin Boulevard;
(c) Coburg Road from 6th Avenue to 200 feet north of Frontier Drive;
(d) Franklin Boulevard east from Broadway, including the north-south segment;
(e) Garfield Street from 11th Avenue to 5th Avenue;
(f) Goodpasture Island Road from Valley River Drive to 1,700 feet north;
(g) Highway 99 North;
(h) I-5 ***on the south side only*** from Henderson Avenue to 300 feet north of Laurel Hill Drive;
~~(i) I-5 on the north side only, from 720 feet east of Henderson Avenue to 1,330 feet east of Henderson Avenue;~~
(~~j~~i) I-105 from the Coburg interchange to Scout Access Road;
(~~k~~j) Mill Street from Broadway to Coburg Road;
(~~l~~k) Railroad Boulevard;
(~~m~~l) 6th Avenue east of conjunction with Highway 99 North;
(~~n~~m) 7th Avenue east of conjunction with Highway 99 North; and
(~~o~~n) 11th Avenue from 200 feet east of the centerline of Chambers Street to Terry Street.

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(2) Permitted Sign Types. Signs allowed under the highway commercial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Billboards;
(c) Digital Billboards;
(d) Digital Signs;
(~~c~~e) Electronic message centers;
(~~d~~f) Freestanding signs;
(~~e~~g) Marquee signs;
(~~f~~h) Projecting signs;
(~~g~~i) Readerboards;
(~~h~~j) Roof signs;
(~~i~~k) Under-marquee signs; and
(~~j~~l) Wall signs.

* * *

(6) Billboards. Billboards shall be subject to the following standards:

(a) Billboards located along the streets named in subsection (1)(b) through (1)(g) and (1)(***j***~~k~~) through 1(***n***~~e~~) of this section shall not exceed 250 square feet in surface area.
(b) Billboards located on developed property along streets named in subsection 1(a)***,*** ~~and~~ (1)(h) ***and*** ~~through~~ (1)(***i***~~j~~) of this section shall not exceed 300 square feet in surface area.

* * *

(7) Digital Billboards. In addition to the standards in EC 9.6675(6), Digital Billboards shall be subject to the following standards. Where standards conflict, the standards for Digital Billboards in this subsection (7) shall control:

(a) Minimum spacing between digital billboards facing the same direction shall be 1200 feet. The distance between digital billboards shall be measured along the centerline of the street designated to be a location for digital billboards.
(b) The change from one message to another message shall be no more frequent than once every ~~10~~8 seconds.
(c) The change from one message to another message shall be instantaneous.
(d) Animation is not allowed.
(e) The digital billboard shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 150 feet perpendicular to the sign face.
(f) The digital billboard shall be equipped with a light sensor that automatically adjusts the intensity of the billboard according to the amount of ambient light.
(g) The digital billboard shall be designed to either freeze the display in one static position, display a full black screen or turn off in the event of a malfunction.
(h) Cutouts are not allowed.

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(i) ***Notwithstanding EC 9.1230, legal nonconforming billboards may be removed and replaced by digital billboards if the location, area and height of the sign do not change and if the building permit is issued within 365 days of the 1st day of demolition. However, no digital billboard shall be larger than 300 square feet and all other standards in this section must be met.***

(j) ***Digital billboards must have a permit from the Oregon Department of Transportation issued pursuant to ORS 377.725 ~~are allowed at the locations identified at EC 9.6675(1) except for (b), (e), (f), (j) and (k)~~.***

(k) ***During the five year period following [enactment date], the City shall approve a permit for a digital billboard at the locations stated in this EC 9.6675(7)(k) notwithstanding any spacing standards which may otherwise prohibit the digital billboard, and the City shall not approve a permit for a digital billboard, other than those listed in this EC 9.6675(7)(k), that would violate any spacing standards with respect to the digital billboard locations identified and allowed herein. Except as specifically provided herein, this provision shall not act to prohibit or restrict digital billboards otherwise allowed by the code. This provision shall not apply to digital billboard permit applications submitted after the expiration of the five year period and will not act as a basis to approve or deny such applications.***

E. Broadway North Line 200' W/O Hilyard. East Face
Franklin Blvd North Line 230' E/O Hilyard St. West Face
Coburg Rd West Line 190' N/O Frontier Drive. South Face
Coburg Rd East Line 270' N/O Oakmont. North Face
Coburg Rd East Line 350' S/O MLK. North Face
6th Ave North Line 150' E/O High St East Face
W. 7th South Line 100' E/O Jefferson. West Face
W 7th North Line 20' W/O Blair Blvd West Face
Chambers East Line 133' S/O 6th Ave. South Face
W 7th South Line 250' E/O W 5th West Face

9.6680 **Employment and Industrial Sign Standards.** The employment and industrial sign standards are hereby created and applied to all property zoned for employment and industrial use as set forth below. Signs are regulated to accommodate the minimal

street frontage of most parcels and the general proximity to highways and arterial streets.

* * *

(2) **Permitted Sign Types.** Signs allowed under the industrial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Billboards;
(c) Digital Billboards;
(d) Digital signs;
(~~c~~e) Electronic message centers;
(~~d~~f) Freestanding signs;
(~~e~~g) Marquee signs;
(~~f~~h) Projecting signs;
(~~g~~i) Readerboards;
(~~h~~j) Roof signs;
(~~i~~k) Under-marquee signs; and
(~~j~~l) Wall signs.

* * *

(5) **Maximum Height.** All billboards, freestanding signs and roof signs shall be no more than 30 feet in height except freestanding signs~~up to 5 feet in height are allowed in the E-1 zone at a minimum of 5 feet from the front property line~~.

(6) **Billboards.** Billboards regulated by the employment and industrial sign standards shall be subject to the following:

(a) Billboards shall be permitted only along property which abuts the following named streets:
1. Garfield Street north of 5th Avenue to the intersection of Roosevelt Boulevard.
2. Seneca Street north of 11th Avenue to the intersection of Roosevelt Boulevard.
3. Bertelsen Road north of 11th Avenue to the intersection of Roosevelt Boulevard.
4. Obie Street north of 11th Avenue to the end of the street, but no further north than the intersection of Stewart Road.
5. West 11th Avenue from 200 feet east of the centerline of Chambers Street to Terry Street.

(b) No billboard shall exceed 250 square feet in area.
(c) Notwithstanding the required connection between perimeter wall size and billboard size established in (4)(b) of this section, a billboard not to exceed 200 square feet may be located on an otherwise vacant lot abutting any street designated in this section.
(d) The provisions of EC 9.6675(6)(d) to (i) shall apply to all billboards in areas regulated by the employment and industrial sign standards.

(7) Digital Billboards. In addition to the standards in EC 9.6680(6), Digital Billboards shall be subject to the following standards. Where standards conflict, the standards for Digital Billboards in this subsection (7) shall control:

(a) Minimum spacing between digital billboards facing the same

direction ***shall be 1200 feet. The distance between digital billboards shall be measured along the centerline of the street designated to be a location for digital billboards.***

(b) The change from one message to another message shall be no more frequent than once every ~~10~~ 8 seconds.

(c) The change from one message to another message shall be instantaneous.

(d) Animation is not allowed.

(e) The digital billboard shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 150 feet perpendicular to the sign face.

(f) The digital billboard shall be equipped with a light sensor that automatically adjusts the intensity of the billboard according to the amount of ambient light.

(g) The digital billboard shall be designed to either freeze the display in one static position, display a full black screen or turn off in the event of a malfunction.

(h) Cutouts are not allowed.

(i) Notwithstanding EC 9.1230, legal nonconforming billboards may be removed and replaced by digital billboards if the location, area and height of the sign do not change and if the building permit is issued within 365 days of the 1st day of demolition. However, no digital billboard shall be larger than 300 square feet and all other standards in this section must be met.

(j) Digital billboards must have a permit from the Oregon Department of Transportation issued pursuant to ORS 377.725~~are only allowed at the location described in EC 9.6680(6)(a)5.~~

DRAFT

DRAGOVICH Jenessa L

From: Brian Casady <BCasady@meadowoutdoor.com>
Sent: Monday, July 20, 2020 4:59 PM
To: DRAGOVICH Jenessa L
Cc: Aaron Noteboom; Mike Reeder; MCKERROW Mike J; Chris Zukin
Subject: A submission of a Powerpoint for Planning Commission Meeting on 7/28
Attachments: Eugene Digitil Powerpoint.PC.7.28.2020.pptx

[EXTERNAL ⚠]

Dear Jenessa,

Please find attached a brief power point that the billboard industry would like to present at the Planning Commission meeting on July 28th. Please let me know if you need any additional information from me on this.

Thanks,

Brian Casady
Real Estate Manager
Meadow Outdoor Advertising

Office: 541.296.9684
Cell: 541.993.4839
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bcasady@meadowoutdoor.com
www.meadowoutdoor.com

DIGITAL SIGNS FOR EUGENE

The Billboard Industry's input

Digital Billboards in Oregon:

A quick background

In 2011 the Oregon State Legislature approved digital billboards for Oregon.

SIZE:	No larger than 672 sq ft
LOCATION:	Commercial & Industrial land
BRIGHTNESS:	Not more than 0.3 foot-candles over ambient light
DWELL TIME:	No less than 8 seconds
SPACING:	Same as conventional billboards (100’ inside city)
PERMIT:	On signs with state permit

Eugene Considers Digital Signs:

2018

Billboard industry, city manager and city council began discussing digital signs for Eugene.

2019

City Council directed staff to draft code amendments to allow digital signs in Eugene

2020

Staff researched and drafted code amendments to allow and regulate digital signs in Eugene

Present

Planning Commission to Consider Draft Digital code

Eugene's Draft Code:

SIZE:	No larger than 300 sq ft
LOCATION:	On some major arterials
BRIGHTNESS:	Not more than 0.3 foot-candles over ambient light
DWELL TIME:	No less than 10 seconds
SPACING:	1200 ft
PERMIT:	Only on legally placed signs

Billboard Industry Comments

We appreciate Staff's process and engagement with stakeholders

We are in agreement with Staff on ***most*** of the proposed code elements

A few changes the industry proposes and has discussed with Staff:

- **LOCATION:** On ***ALL*** major arterials
- **DWELL TIME:** No less than ***8 seconds*** (national standard)
- **SPACING:** Clarify 1200 ft spacing is for signs ***facing the same***
- **PERMIT:** City-managed permit process for even distribution of signs

Supplemental Information for the Record:

- FHWA Publication No. FHWA-HRT-09-18. "The Effects of Commercial Electronic Variable Signs (CEVMS) on Driver Attention and Distraction: An update."
- FHWA HEP. September 2012. "Driver Visual Behavior in the Presence of Commercial Electronic Variable Message Signs (CEVMS)"
- OAAA Summary of FHWA 2012 Study
- Albuquerque, NM & Richmond, VA. Safety Studies. Tantala Associates. March & November 2010.
- News Article. The Hill. "DOT Study finds digital billboards don't distract drivers." January 7, 2014.
  https://thehill.com/policy/transportation/194654-dot-study-finds-digital-billboard-dont
- News Article. Recycling Today. "Lights Out." January 16, 2012 (on reduced waste and recycling of LEDs)
  https://www.recyclingtoday.com/article/rt0112-recycling-led-billboards/
- Digital Billboard Lighting Explanation Video
  https://www.youtube.com/watch?v=SP4jEmA1ncY

DRAGOVICH Jenessa L

From: James Carpentier <James.Carpentier@signs.org>
Sent: Tuesday, July 21, 2020 9:23 AM
To: MCKERROW Mike J; DRAGOVICH Jenessa L; Eugene Planning Commission
Cc: pking@nwsigncouncil.org; David Hickey
Subject: Comments and Recommendations Eugene Draft Sign Code
Attachments: Economic_Value_of_Signage_ES_SRF.pdf; Economic Value Of Signs - Univeristy of Cincinnati.pdf; NWSC ISA comments Draft Digital Sign Code 7.21.20.pdf; Texas A & M Traffic Safety & EMCs.pdf; Agenda PC 07.21.20.pdf Final.pdf

[EXTERNAL ⚠]

Honorable Eugene Planning Commission; Ms. Dragovich; Mr. McKerrow:

I am contacting you on behalf of the Northwest Sign Council and the International Sign Association. Both associations work with jurisdictions to assist in the creation of beneficial and enforceable sign regulations. Here are a number of resources at this link that includes informative resources including studies on regulating electronic message centers, content neutrality and wayfinding.

We have some attached comments and recommendations and reference documents cited, in regards to the draft sign code for your consideration.

Please include Patti King (Executive Director of the Northwest Sign Council and copied on this email) and I as stakeholders and let us know of any future meetings and or sign code drafts.

Do not hesitate to contact me with any questions.

Thanks

James B Carpentier AICP
Director State & Local Government Affairs

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July 21, 2020 Sent via email

To: Eugene Planning Commission; Jenessa Dragovich, Senior Planner; Mike McKerrow, Associate Planner

From: James Carpentier AICP, Director State & Local Government Affairs

Re: Digital Sign Code Amendments (City File #CA 20-2)

Honorable Eugene Planning Commission:

I am contacting you on behalf of the Northwest Sign Council and the International Sign Association. Both associations work with jurisdictions to assist in the creation of beneficial and enforceable sign regulations.

We appreciate the additional allowances that are being proposed for digital or electronic message centers (EMCs).

Policy/Community Considerations When Regulating EMCs

Community/Public Safety

We believe that EMCs will be beneficial for the community and end users that can avail themselves of this technology. EMCs can convey much more information than static signs so they are very effective. In addition, EMCs can be utilized to provide information for Public Service Announcements (PSAs), disasters, and Amber Alerts.

Economic Impacts

EMCs have been demonstrated to enhance and support local business as indicated in the attached University of Cincinnati's, *The Economic Value of Signs* case study, pages 37-39 and page 3 of the Executive Summary. This case study states the following on page 3 of the Executive Summary: "The car dealership case study found that the addition of a video sign board was associated with large increases in both service department revenue and customer count." The proposed code only allows for EMCs in the commercial and industrial up to 3 sq. ft. and 5 characters. This restrictive regulation is equivalent to a prohibition on EMCs in commercial and industrial districts. Therefore, we recommend that the City consider standards similar to those stated for Institutional uses be allowed for commercial and industrial zones. These standards can be tailored and balanced for each district so as to be compatible with the area aesthetics and also meet the needs of the business community. Also, to allow digital billboards up to 300 sq. ft. and limit EMCs to only 3 sq. ft. in commercial districts

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and 20 sq. ft. for institutional uses is not equitable nor supportive of the local business community.

Traffic Safety

Texas A & M conducted a study, *Statistical Analysis of the Relationship between On-Premise Digital Signage and Traffic Safety* (attached). This study covered 4 states and 135 sign locations. This study states in the executive summary on pg. viii the following: "The results of this study provide scientifically based data that indicate that the installation of digital on-premise signs does not lead to a statistically significant increase in crashes on major roads."

We do have the following recommendations for your consideration. Our comments and recommendations are in ***bold, italics and underlined.***

9.6620 Nonconforming Signs.

(3) Except as provided in EC 9.6675(7) or Except where only a change in display copy is made, any nonconforming sign which is structurally altered or has illumination installed shall be brought into compliance with all applicable provisions of the sign standards within 90 days and shall thereafter be kept in compliance with the sign standards.

We recommend that change in display copy be changed to face change. Face change is a term that is typically utilized in the industry.

A sign that is retrofitted with LED illumination should be allowed since that does not constitute a structural change and provides for enhanced energy efficiency.

9.6640 General Provisions.
(4) Location Standards.

(a) Setbacks. All signs shall comply with the setback requirements beginning at EC 9.2000 through EC 9.3980 and EC 9.6745 Setbacks - Intrusions Permitted. ~~Signs may be installed up to 5 feet into the required front yard setback except that freestanding signs up to 5 feet in height in the E-1 zone may be installed at least 5 feet from the front property line.~~

The setbacks vary from 0' in the C-2 and C-3 zones to 30' in the E-1-3 zones. The 5' setback in the E-1 zone and no setback in the C-2/C-3 zones is reasonable. Setbacks of 20' and 30' may require a sign to be located outside of the 20 degree "cone of vision," therefore making the sign less detectable and may not be safely seen be the intended viewer. See page 22 in the attached Evidence Based Model Code for more discussion on the cone of vision. As stated in the model code, "A driver's ability to observe and react to a sign outside the cone of vision drops rapidly outside this limit."

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9.6640 General Provisions.

(9) Electronic Message Centers. Except electronic message centers operated as public signs by governmental agencies, no electronic message center***s are subject to the following limitations:*** or

(a) ***Except as provided in subsection (b) of this section, that*** portion of a***ny*** sign used as an electronic message center shall be larger than ***limited to*** 3 square feet in area, ***may*** display a message containing no more than 5 characters, or ***and must not*** change the displayed message at intervals of less than once every 3 seconds. No electronic message center, except for temporary construction use, shall exceed a maximum one-hour equivalent A-weighted sound pressure level of 50 dBa at the receiving property line when the receiving property is occupied by a dwelling, hospital, school, library or assisted care center.

(b) Each service station may include up to 6 rectangular digital signs, constructed a minimum of 3 inches from each other, limited to 20 square feet in area cumulatively, and must not change the displayed message at intervals of less than once every 24 hours

(10) Digital Signs. One digital sign up to 20 square feet in area is permitted per institutional use on a development site. Digital signs must be located a minimum of 50 feet from the property line of any residentially zoned property.
All digital signs shall be subject to the following standards:
(a) The change from one message to another message shall be no more frequent than once every 10 seconds.
(b) The change from one message to another message shall be instantaneous.
(c) Animation, scrolling or other perceived movement is not allowed.
(d) The digital sign shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 45 feet perpendicular to the sign face
(e) The digital sign shall be equipped with a light sensor that automatically adjusts the intensity of the digital display according to the amount of ambient light.

An electronic message center and digital sign are the same technology. We suggest that one term be utilized, preferably electronic message centers.

Although it may be legal to allow an exception for electronic message centers that are operated by government agencies, this is not sound policy.

The 3 square foot allowance and 5 character limitation is not reasonable. This size will render EMCs not safely viewable and or legible. We suggest that standards be developed for each district with reasonable time place and manner restrictions.

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We have not seen a regulation of this nature for EMCs that deals with sound pressure. What is the basis for this section and what issues is this regulation intended to address?

We are supportive to allow service stations to utilize EMCs. Limiting the hold time to 24 hours is not reasonable since pricing can change often. We suggest that allowances for EMCs not be stated by use such as service stations. EMCs should be regulated by district so as to avoid any content regulation.

We are supportive of the allowances for digital signs for institutional uses. We recommend that digital signs be allowed in other districts other than just institutional uses. Given these challenging economic times additional flexibility in messaging for customers has taken on a heightened importance. In these unprecedented times small businesses need options such as EMCs to enable effective and immediate communication to customers. In addition this technology can provide PSAs for disasters, emergencies and Amber Alerts, as previously noted. Therefore, we recommend that the City consider standards similar to those stated for Institutional uses be allowed for commercial and industrial zones. These standards can be tailored and balanced for each district so as to be compatible with the area aesthetics and also meet the needs of the business community. Also, to allow digital billboards up to 300 sq. ft. and limit EMCs to only 3 sq. ft. in commercial districts and 20 sq. ft. for institutional uses is not equitable nor supportive of the local business community.

General Comment applicable to several District Standards

Digital signs are listed as only allowed for institutional uses. This comment applies to all the digital signs that are listed as allowed for the other uses/districts. It is not clear what is being proposed since "digital signs" is intended to only apply to institutional uses yet the draft lists digital signs allowed for Highway Commercial, Office, Central Commercial, General Commercial and Shopping Centers.

We appreciate your consideration of our suggestions. Do not hesitate to contact me with any questions at james.carpentier@signs.org or 480-773-3756.

Sincerely,

James Carpentier

James Carpentier, AICP

SIGN RESEARCH FOUNDATION
EXECUTIVE SUMMARY

THE ECONOMIC VALUE OF ON-PREMISE SIGNAGE

SIGN RESEARCH FOUNDATION™

In 1997, the University of San Diego released a landmark study for the sign industry. It was the first time statistical analysis was used to determine the economic impact of on-premise signage to a business. The research used data from three case studies—a large fast food chain, a national home décor retailer and auto dealers in a metropolitan city—and the results are still widely quoted today.

In 2012, the University of Cincinnati's Economics Center deepened the examination. Leaning heavily on the original work, the University of Cincinnati's updates included numerous additional case studies: a national lodging chain, a national banking business, a specialty store small business and a car dealership.
Both reports are called "The Economic Value of On-Premise Signage." They show how signs act as "silent salespersons"—branding businesses, providing information about products and services, and pointing customers to exact locations. In short, an on-premise sign's economic impact on businesses—directly and indirectly—is significant.

Researchers tackled the topic by exploring how changes in on-premise signage affect business performance. Also part of the studies was the impact on consumers and the surrounding community.

Researchers

University of San Diego (1997):
Seth R. Ellis, Ph.D.
Robert Johnson, Ph.D.
Robin Murphy, M.B.A.

University of Cincinnati (2012):
Jeff Rexhausen, Principal Investigator
Henry Hildebrandt, Co-Investigator
Christopher Auffrey, Ph.D., Co-Investigator

KEY TAKEAWAYS

SIGNS POSITIVELY IMPACT CONSUMERS AND COMMUNITIES BY MAKING IT EASIER FOR SHOPPERS TO OBTAIN THE INFORMATION THEY NEED TO MAKE A PURCHASE.

1

- Sign visibility and conspicuity are especially important. In the case study of eight San Diego auto dealers, for example, 68 percent of people surveyed said that the sign had been an important factor in finding the dealer's location. In addition, 18 percent reported being aware of the service department because of the dealer's sign. And when one of the dealers was forced to move a sign to comply with a new code, 21 percent of that dealer's customer base reported that the business was hard to locate without the sign.
- Researchers determined that the addition of one sign at every fast-food outlet in Los Angeles would raise business revenues by $132 million; those businesses would in turn pay an additional $10 million in sales tax revenue to the local municipality.

50%

American consumers who have driven by a desired business without finding it due to insufficient signage

2

CHANGES TO SIGNS DIRECTLY IMPACT BUSINESS PERFORMANCE.

- The studies proved that changes such as adding signs or replacing outdated or inoperable signs had positive effects on sales, number of transactions and profits. Roughly 60 percent of businesses studied reported average sales increases of 10 percent.
- Just one additional sign yielded sales increases of 4.75 percent, an impact greater than that brought on by a larger building, longer hours of operation or location longevity.
- Lower-performing stores benefitted the most from changes to signage, such as the addition of a sign to a building that previously didn't have one.
- Updates and improvements to existing signs led to a 5 percent weekly sales increase for many stores; underperforming stores saw weekly sales increase by 15 percent.

3

POSITIVE BUSINESS PERFORMANCE IS ASSOCIATED WITH EFFECTIVE SIGN DESIGN, PLACEMENT, AND DIVERSITY OF MEDIA.

- In the 2012 study, the car dealership found that adding a digital sign board increased not only service department revenue and customer traffic; it also created goodwill as a place for community-related public service messages.
- A key aspect of effective signage is proper regulation. Ideally, sign regulations balance community design objectives with full knowledge of how sign design and location impact business success. When sign codes are overly restrictive, businesses can be directly affected—as can consumers who have trouble finding those businesses due to inadequate/ineffective signage.

WHAT'S A SIGN WORTH?

36%

Decrease in occupancy rates when one hotel chain moved its highly visible sign to a less conspicuous location

34%

North American shoppers who associate sign quality with store and product quality

29%

North American shoppers who make store choices based on the information communicated by store signs

16%

Increase in weekly sales for one business that combined a major building sign modification with two additional minor changes

Read the Full Reports: The Economic Value of On-Premise Signage (University of Cincinnati, 2012), **www.signresearch.org/EVOS2012**, The Economic Value of On-Premise Signage (University of San Diego, 1997), **www.signresearch.org/EVOS1997**

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UNIVERSITY OF Cincinnati

The Economic Value of On-Premise Signage

Prepared for the Signage Foundation, Inc.

Prepared by the Economics Center, University of Cincinnati

August 2012

Principal Investigator
Jeff Rexhausen

Co-Investigator
Henry Hildebrandt

Co-Investigator
Christopher Auffrey, PhD

Research Economist
Jennifer Shand Pitzer, PhD

Research Economist
Benjamin Passty, PhD

August 2012

Executive Summary

Businesses of all sizes and types use on-premise signs to communicate with their customers. It has been suggested that on-premise signs and the regulations that limit them can significantly impact the performance of some types of businesses, yet there has been limited recent research to inform decisions about sign investment or regulation.

To provide more current insight, researchers at the University of Cincinnati conducted a national survey of businesses and a series of case studies. The purpose was to assess how changes in on-premise signage affect business performance. This report provides details about that research's approach and results. Business owners responding to the national survey reported that additional and improved signs are associated with increases in their revenues and profits. The case studies suggest that signage visibility and conspicuousness are especially important, and that signage plays an important role in a business' overall branding and marketing strategy. This research indicates that appropriately designed and located on-premise signage can be an important factor for retail business success. The implication of these results is that on-premise signage indirectly influences the vitality of a community and the quality of life of consumers by providing information about the availability of goods and services.

Examination of one field of economic theory – search theory – and application of this concept to the subject of signage presents a new explanation for why on-premise signs have positive economic impacts, not only for businesses, but also for consumers and communities: namely, signs make it easier for shoppers to obtain the information they need to make a purchase.

A national survey asked businesses about sign changes and the impact of those changes on business performance. In addition, detailed questions inquired about the nature of the business and the use of signs. The survey produced some significant findings regarding both economic impacts and sign preferences.

- Sign changes generally had significant, positive impacts on sales, number of transactions and profits. Roughly 60 percent of businesses reported increases averaging about 10 percent.

- Sign changes also led to small positive impacts on employment. Nearly a quarter of respondents reported hiring more people.
- While most single establishments and small firms have either wall signs or pole signs, most large companies have both. In general, larger companies tend to have more types of signs.
- Helping customers find their location was the most important purpose for respondents. Legibility is the most important characteristic of signs across all sizes of companies.
- Business logos and the size and location of the signs were more important for companies with more establishments, for whom branding is presumably more important, compared with single establishment companies.

Among the case studies, positive business performance was generally associated with greater use of on-premise signage and better quality signs, as the following results indicate.

- The national lodging chain case study found that the use of a digital electronic sign to display pricing was associated with increased average occupancy rates. The impact appeared to be especially strong for properties with lower occupancy rates.
- The national retail banking business case study found that pylon signs were strongly associated with high visibility, monument signs were moderately associated with high visibility, and wall signs contributed to identity but not visibility. In addition, pylon signs were associated with significantly more teller transactions.
- The specialty store small business case study demonstrated the need for signage to reaffirm the value offered by a niche retailer. Sign design must be sensitive to community and customer expectations, and able to reinforce the brand of a small business. The signage should communicate a "promise" of value for a product and/or service that is not commonly found elsewhere.
- The car dealership small business case study found that the addition of a video sign board was associated with increases in both service department revenue and customer traffic. An added benefit was the "goodwill" and reputational gain associated with using the video board for community-related public service messages.

Given the economic importance of signs, regulations should balance community design objectives with full knowledge of how sign design and location impact businesses success. Business success is important because of its impact on a community's tax base, and it ultimately leads to the availability of greater fiscal resources to provide needed community services.

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I. Introduction

Communication is perhaps the single most important activity for the success of human societies (Richmond & McCroskey, 2009). Signs are among the most important elements of visual communication. The visual communication provided by signs on our streets and highways is essential for an effective transportation system to aid in getting us where we want to go. Similarly, the visual communication provided by on-premise business signage is essential for the efficient function of our system of commerce and the success of many businesses. Effective signage can drive job creation, generate tax revenues, and provide quality access to goods and services.

Communities depend on clear, legible and conspicuous signs for direction, safety and information. Businesses have a long established history of using signs to announce their products and services. On-premise business signs are especially important within the context of our highly mobile society where we frequently venture to unfamiliar areas. On-premise signage allows a business to cost-effectively communicate with potential customers who are moving through its trade area. The wayfinding, identification and marketing information provided by on-premise signage is essential for assisting existing and potential customers in finding the goods and services they seek. This connection between customers and businesses is crucial for business success, and the local governments that depend on the employment and tax revenues which businesses generate.

On-premise signs are a potentially powerful medium for commercial communication. Frequently, on-premise signage is a key element, which is often used with other media, to develop and maintain a business brand. The more consistently that brand is communicated, the greater the likelihood that existing and potential customers will associate it with specific expectations for price, product brand, or service quality at specific locations.

On-premise signs that are designed well and properly located are especially important for generating impulse sales. While some goods and services are primarily purchased on the basis of careful consideration and forethought, many others are impulse purchases. Indeed, impulse sales generate an important part of revenue for a wide variety of retail businesses. One study (Conroy 2004) found 68 percent of purchases during major shopping trips were unplanned, and 54 percent on smaller shopping trips. In these cases, on-premise signage is critical.

This study provides current analysis of how on-premise signage is linked to business success. A California study from the 1990s indicated that changes to the number and location of on-premise signage can have a direct impact on business performance (Ellis, Johnson & Murphy, 1997). That study – which used statistical analysis of signage, business performance and location-specific data for two business chains – found that an increase in the number of on-premise signs at a particular site had a significant and positive impact on sales, number of customer transactions, and the amount of the average transaction. Case studies also have been used extensively in the small business and signage trade literature to document the impact of signage on the economic performance of businesses. For example, the New York State Small Business Development Center (Conroy 2004) details a number of case studies. One case, based on the experience of a car wash, documents the association of improved sign legibility and visibility with higher sales, as well as suggesting that the introduction of message boards can lead to increased sales. Another case, based on the experience of a small restaurant, documents the association of improved sign visibility and conspicuousness with increased sales. While these case studies do not provide conclusive evidence of the economic value of on-premise signage, they do provide insight to specific causal mechanisms that may be useful for interpreting the statistical analyses of the survey data.

For decades, alancing the signage needs of individual businesses with the broader concerns of communities has been a concern of local officials, the sign industry, and planning and design professionals. Funding for essential local government services such as police, fire, roads, and education often depend on the success of local businesses. This linkage between on-premise signage, business success, and local government revenues (and the public services they fund) highlights the need for sign regulation process to be informed by research such as is being conducted here. Signs regulations can and should promote designs that promote business success while meeting appropriate local standards.

The impact of on-premise signage is dependent on visual elements that may interact with and complement a business' marketing and branding strategies. Visual characteristics and perceptual concepts related to signs, symbols, semiotics, and the built environment have been addressed in Berger's *Seeing is Believing* (2007) and the two groundbreaking treatises by Tufte (*Envisioning Information* (1990) and *Visual Explanations* (1997)). An appreciation for the layering of economic and marketing roles together with a visual identity program becomes important for understanding the contribution of on-premise signage within a comprehensive marketing strategy.

The research presented in this report provides an analysis of the economic effects of signage within a context of varied scales and types of business. The objective of the study is to provide an updated assessment of the impact of signage on businesses and communities. Several earlier publications have identified key issues and economic factors associated with on-premise signage, with "The Economic Value of On-Premise Signage", "The Signage Sourcebook", and" What's Your Signage" providing reference and guidance for much of the past two decades. Except for the recent work of Taylor (2010; Taylor, Sarkees & Bang, 2012), the value of signage has lacked recent rigorous analysis.

This study uses survey data and case studies to bring the economic impact of on-premise signage into a clearer focus within prescribed theoretical frameworks and a diversity of sign applications. Venturi and Brown in "Learning from Las Vegas" (1971) analyzed the Las Vegas strip, its sign/buildings relationships, and their impact within our urban / suburban environment. Their study systematically assessed the visual impact of signs within a concentrated market area with ever-changing views from the automobile. Venturi was the first to connect on-premise signage to commercial symbols that contained economic value in their meanings beyond the direct communication objective and architectural product. Berger, Tufte, and others have provided additional understanding to advance the symbolic meanings contained in signage and signs. It is within such a broader framework that this research utilizes case studies in combination with economic data to bring the value of on-premise signage into a clear focus. Case studies are used for illustrating the diverse sign typologies and as an analytical interface with communities, brand identity, and the "marketing functions" of signs (Taylor, 2010).

II. Context

A. The Problem

The success of local retail businesses is important for creating jobs, generating tax revenues, and providing access to goods and services in communities both large and small (Blakely & Leigh, 2010). For most businesses, but especially those that sell retail goods and services, on-premise signs can be an important mechanism for attracting new customers and providing wayfinding for returning customers. This is especially true for businesses such as fast food restaurants, convenience stores, and gas stations for which impulse sales represent a substantial proportion of their total revenue (Conroy, 2004). Consequently, for a variety of economic and quality-of-life reasons, it is critical for the signage industry, businesses, and government agencies to maintain a current and nuanced understanding of how on-premise signs contribute to business performance.

B. Research Challenge

The primary research challenge has been to gather sufficient signage and business performance data to be able to reach conclusions about the effectiveness of on-premise signage. The need to collect both signage and performance data from a wide range of businesses, and draw from businesses' own experiences became clear from understanding the strengths and limitations of previous studies. A two-stage online survey model was designed and implemented with an initial survey, coupled with an opportunity for approaching self-identifying businesses to participate in follow-up, in-depth case studies.

Despite the relatively large number of survey respondents that we contacted, few businesses were willing to share detailed information about their signage and business performance. Assurances were given that proprietary information would be kept confidential and, where requested, names of businesses would not be used in any study disclosures. Ultimately, after persistent pursuit of leads from a variety of sources, three national/regional businesses agreed to share the necessary signage and performance data.

C. Previous Research

Research assessing the impact of signage on business performance must begin with an understanding of the fundamental purpose of on-premise signage: communicating with potential customers about where the business is located and the nature of its product or service. As such, signs may serve to establish or fortify a consistent business brand or image (Conroy, 2004). For some businesses, multi-media branding strategies may involve static on- and off-premise (billboard) signs, as well as television, radio, newspapers and flyers. Few small businesses can afford or justify such strategies, and rely on their on-premise signs for much of their marketing, particularly if communicating with potential customers is simply about identifying their product or service and location. New technology is expanding the sign choices available to businesses for communicating with potential customers. Electronic messaging and video displays on signs are becoming increasingly common, especially for businesses whose brand or image requires that they are perceived as cutting-edge in the quality of their products or services (Post & Pfaff, 2007).

On-premise signage is one of the most basic and yet complex forms of visual communication. Signage serves as a multi-purpose media that can identify an organization, business or place while at the same time marketing an idea, service, or product. There are a number of factors that should be considered in choosing a design and location for an on-premise sign because of the different communication purposes and audiences. For example, businesses seeking to capture impulse sales along a major highway will need different types of signage to be successful than those located in a pedestrian-oriented business district (Conroy, 2004).

Previous research has established the importance of well-designed and appropriately-placed signage for generating business revenue and associated tax dollars (Ellis et al., 1997). The exhaustive literature review and annotated bibliography by Christadoulou (2009) is the most comprehensive assessment of the recent signage research literature, containing 227 citations. Edelman (2009), in his presentation of Christadoulou's work, organized the literature into six areas: Business & Marketing, Graphic Design & Architecture, Engineering & Technology, Planning & Urban Design, Law and Psychology. Among these he found extensive overlap that made it difficult for researchers to organize the literature in a meaningful way.

Local governments recognize that sales, property, and income tax revenue are closely linked to the success of their businesses. In part to fortify arguments that signs are important for business success, seminal research was conducted to assess the impact of on-premise signage on the performance of a Southern California fast food restaurant chain and a national specialty import retailer (Ellis et al., 1997). The research used cross-sectional and time-series regression analyses to predict the impact of sign changes on site performance. For the fast food chain, a cross-sectional analysis estimated the effect of sign characteristics and control variables on sales revenue, number of transactions, and average amount per transaction. Among the variables included in the models, various signage improvements were the best predictors for all three outcome variables. For the specialty import retailer, multiple regression and time-series analysis estimated that sign specific changes or addition were associated with significant increases in sales revenues.

While the Southern California studies focused on fast food and specialty import chains, it has been argued that on-premise signage is likely to be even more important for small non-chain businesses (Conroy, 2004). Many small businesses do not have the relatively large marketing budgets and shared electronic media buys of national franchises. These small businesses are more likely to be dependent on their signage for most of their communication with potential customers.

Because the seminal investigation of the economic impact of signage used data from two chains, additional research is needed to determine if similar results extend to a broader range of retail businesses. Subsequent studies have contributed important and useful research in this area, yet none have estimated the economic value of on-premise signs across diverse business and local government contexts (Conroy, 2004). Consequently, important decisions about signage by businesses and local governments are frequently based on limited or no research because the results of existing studies are not adequately disseminated or are simply inapplicable. Indeed, local governments may impose stringent signage regulations based on vague aesthetic concerns, making it difficult for businesses to be creative and effective with their signage as a means of communicating with potential customers and without appreciating the potential economic and fiscal impacts of the restrictions. When a business depends on potential customers from outside of their community, effective signage becomes especially important. In such cases, signage location, visibility, and design are particularly critical. Equally critical is that local sign regulators recognize the need for creative approaches to signage for both business and community success (Blakely and Leigh, 2010).

The idea of communicating a coordinated visual message is important for business performance. A consistent approach to visual communication supports the branding of place by giving it a consistent identity. Businesses are working to sell their image, and local communities are doing the same but on a much larger scale. The ability of a business to successfully market itself is critical for the local economy. Branding serves to establish a base of customers, whether for a business or a community. When a sign is serving a community to its highest potential, such that it is visually appealing and noticed, it also seems to brand the business or organization that it represents. Eventually this image will be a familiar element for its viewers and they may want to know more about it (Heather, 2003). For both businesses and local governments, effectively designed and located signage is an essential part of a branding strategy (Heather, 2003).

D. Research Approach

Given the limitations of the earlier work, there is a clear need for an updated, rigorous study of the economic value of on-premise signage to guide both business and public policy decision-making. The purpose of this research is to address that need.

At the beginning of this project, the research team developed a conceptual framework for identifying possible relationships between on-premise signs and various economic impacts. The left side of this figure illustrates the complexity of on-premise signage. Research must consider more than just the size, number, and placement of signs; other signage and site characteristics can also play significant roles. On the right side, the listing of possible economic impacts suggests that signs may generate economic benefits not only for businesses but also for customers and communities.

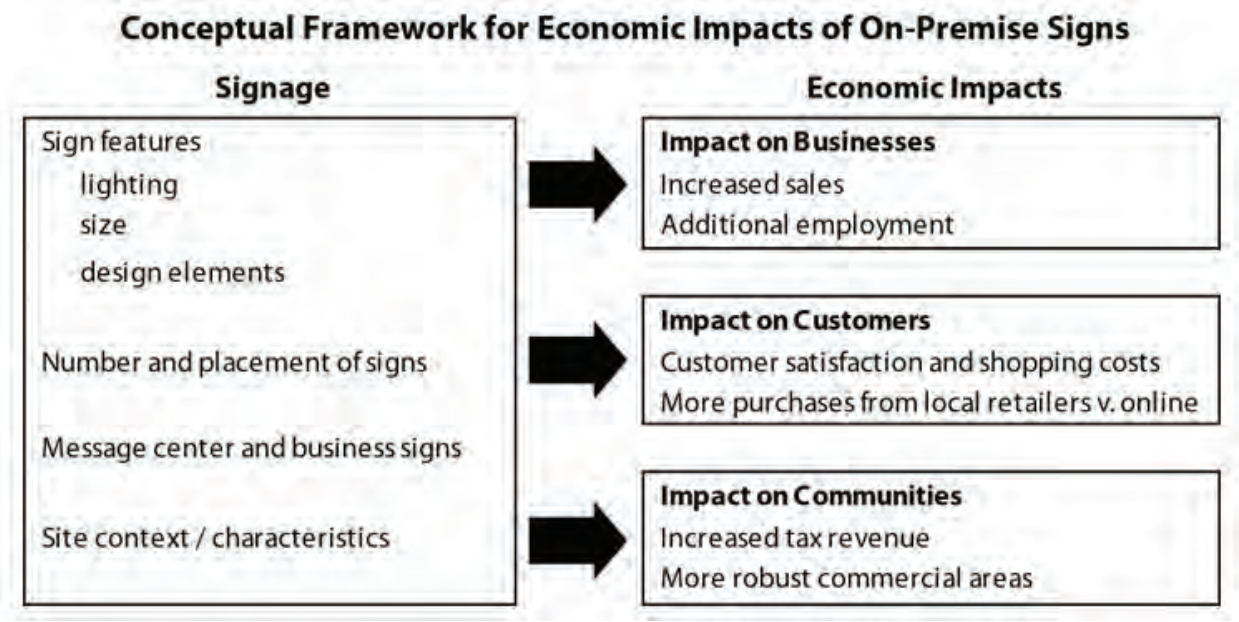

Figure 1: Conceptual Framework for Economic Impacts of On-Premise Signs

While no single research project can examine all of these elements and their interrelationships, this study attempts to move beyond the basic considerations that have characterized most previous research. Toward this end, a multi-faceted approach was selected, which includes applying elements of economic theory, developing and implementing a survey of sign users, and conducting case studies of a diverse set of businesses.

It is clear that on-premise signage is identified as a critical element for retail business and service industry providers for success, and it is also seen as indirectly influencing the vitality of the community. Therefore, this analysis takes a broad approach to considering the economic value of on-premise signage. This study is designed to appeal to a wide audience by attempting to use a common vocabulary to facilitate discussion of these findings among design professionals, regulatory professionals, and the sign industry.

III. Economic Theory and On-Premise Signs

Consideration of how signs benefit customers is an often overlooked, but a highly important dimension of the impact of on-premise signs. The recipients of the 2010 Nobel Prize in Economics were recognized for work in the area of search theory – a field that recognizes that information is not perfectly available, and obtaining it often requires time and other resources. Consequently, buyers often cannot purchase what or as much as they would like, nor can sellers meet these market demands efficiently. This research has implications for the sign industry because the principal purpose of on-premise signs – to provide information to potential buyers – is an area where this theory can be applied effectively.

The most fundamental sign message is typically about a) the existence of willing sellers and b) the types and prices of the items for sale, thus providing the most significant information that customers typically want. To the extent that signs effectively communicate the information sought by prospective customers, they reduce costs for consumers; conversely, when signs fail to communicate this information, they fail to reduce search costs of the consumers, businesses and communities. For businesses, a sign is often the primary way for the consumer to learn that the business even exists (Taylor, 2010). Significant economic research in this field continues today.

Customers' search costs include the value of the additional time spent searching for goods and services that match their wants. The consumer must make a decision—informed by any available signage—about the shopping potential of the store versus the option of continuing to search for other potential opportunities. For this section, we use this well-developed search theory to explain the process of a consumer evaluating prospective stores. This theory can help researchers better understand the effect of information on consumer behavior, such as the impact of a more visible sign on "downstream" businesses. The theory can also help researchers better understand how quality signage can lead to less total driving, increasing safety and reducing travel costs.

This figure provides an overview of the implications of applying search theory to the field of business signage. Just as good signage has a series of three consequences that produce positive economic impacts, impaired signage has a comparable series of three adverse consequences that produce negative economic impacts.

Impacts and Economic Theory: What Search Theory Tells Us	
Good Signage	Impaired Signage
1. Proper signage yields information to potential buyers, reduces transaction costs, improves well-being.	1. Inadequate information has costs for both sellers and buyers.
2. Better information allows buyers and sellers to find each other for a transaction.	2. Consumers are less well-off because of higher search costs.
3. Sign information moves markets toward an efficient outcome.	3. Internet sellers gain at the expense of other sellers and the communities where those sellers are located.

Figure 2: Impacts and Economic Theory: What Search Theory Tells Us

A. Origins of Search Theory

Most students of economics are taught the basic model in which consumers enter a market, a price is determined, and then a subset of these consumers will complete transactions with producers if that price jointly suits them. This outcome depends on a set of assumptions that lead us to a familiar conclusion: that a single price will be established, allowing potential buyers and sellers to choose whether they will take part in a transaction, and leading to determination of how much of the product will be sold. One of these simplifying assumptions – that information is freely available to everyone –does not reflect the realities of imperfect and costly information that business owners and consumers face on a daily basis. In reality, perfect information rarely exists, which often leads to many different prices for the same product.

Economists in the middle of the 20th Century sought to reconcile the theoretical prediction of the basic model with the variation in prices observed all around us. It became clear that adjustments to the basic model would be necessary to gain understanding of a world in which transactions for the same good were being completed at quite different prices, or in which inferior goods were bought and sold for the same price as superior ones.

B. Relevance of Search Theory to On-Premise Signage

Toward this goal, search theory, which examines how people make choices with limited information was pursued most famously by economists George Stigler and John McCall. In order to properly study information, its costly[1] nature had to be recognized. Search theory was originally applied to labor markets in the 1970s by Dale Mortenson and Christopher Pissarides. In 2010 the Royal Bank of Sweden chose to honor Professors Mortenson and Pissarides with a Nobel Memorial Prize in Economic Sciences[2]. In recent years, mainstream circles are recognizing the work that had already been scrutinized and affirmed by numerous scholars and graduate students for a generation.

In the work of Mortenson and Pissarides, search theory considers the employment decision of a job-seeker comparing an offer in hand against the "shadow of the future." The certainty of the offer on the table must be balanced against the prospect of continuing his job search into the future to seek potentially an even greater wage. Continuing the search is risky, and takes time. Because any other offer would begin at a later time, it would have to be at a more lucrative wage to match the value of the offer in hand; and there is always the possibility that future job offers might be at lower wages, not higher.

A well-known finding from search theory is that more uncertainty about the future causes a delay in the searcher's commitment. In other words, an offer in the present may be less attractive compared to a better offer that might occur if the search should continue. The job-seeker balances that potential upside gain by preparing to decline offers that are seen as unfavorable in comparison to anticipated future options.

Thus, in search theory, the searcher – whether a job seeker or a shopper – compares the value of the known alternative against the potential costs and benefits of continuing to search. It is clear that better information about these options makes it easier for searchers to form expectations about the unknown alternatives and whether or not to continue searching, assisting in producing a better match.
In order to connect search theory with signage, suppose that the person is a prospective buyer driving down the street in search of a gift for a friend. She encounters a series of stores that may or may not sell an acceptable item. If business signage is inadequate, learning about a price and other qualities of a potential purchase may involve a costly decision to enter a store, requiring expenditures of both time and travel. It is in this situation that information -- not just about pricing but also about the quality and nature of the goods on sale -- will be useful in sharpening the perception of the future that enables a purchase to take place. In such a situation, higher quality signage reduces these information costs, making buyers and sellers better off.

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[1] Economists use the term "scarce" to recognize something that is inherently limited in quantity, and therefore deserving of a price; information represents different tiers of cost, with some of it being readily available and easily processed, and some being only one of those or neither.

[2] Peter Diamond also shared in the Nobel Memorial Prize in Economics in 2010.

Signs provide signals to consumers. A store's sign may signal price, quality, convenience, and/or reliability. This signaling is illustrated by competing gas stations that post their prices immediately next to each other. Other information on their signs may help them to compete on other factors, all of which assist the purchaser by providing information that reduces consumer uncertainty. This sign information not only helps stores compete with each other but also with internet retailers, who generally have a large advantage over store retailers in providing information to consumers.

Search theory also provides insights about businesses that are trying to complete a transaction with a searcher. In the labor market application of search theory, making a job offer is costly to the employer because he must invest time, first in finding and screening job candidates and then in training a new employee. Because of these costs (and the risk of entrusting key business elements to a new employee whose competence is uncertain), the employer is highly motivated to find effective means in searching for prospective employees. This is comparable to the circumstances in which business owners compete for customers. Although stores and other businesses are searching for customers and clients rather than employees, many forms of advertising -- television, radio, celebrity endorsements -- represent costly signals because advertising space is scarce. Among these, outdoor signage ranks favorably in terms of effectiveness according to surveys of consumers (Kellaris, 2011).

James Kellaris, who holds the Gemini Chair of Signage and Visual Communications in the University of Cincinnati's Carl H. Lindner College of Business has illustrated how good signs reduce search costs by making information more available to consumers. Utilizing data collected in a 2011 survey of over 100,000 North American shoppers, Kellaris found that:

- Shoppers associate sign quality with store and product quality (34%); and
- Shoppers make store choices based on the information communicated by store signs (29%).

Potential customers often lack significant pieces of information. Even when businesses attempt to convey this information through their on-premise signage, characteristics of those signs and the surrounding environment, as well as other impediments, often inhibit the communication of this information. Kellaris also found that nearly half (49.7%) of American consumers have driven by a desired business without finding it because of insufficient signage.

There are significant anecdotal examples where the loss of good signage caused measurable decreases in the value of businesses. When one motel that had a highly visible sign moved to a less conspicuous location, it found that occupancy rates decreased 36 percent, which reduced its $960,000 value by 42 percent (Bass, 2010). Furthermore, the loss of a sign can have consequences that extend to surrounding businesses and the larger community. Real estate appraiser Richard Bass documented the case of a business on the back side of a Florida mall that lost the pylon sign that gave it visibility. The loss of customers eventually led to closing the store. Because surrounding mall businesses relied on the traffic generated by that store, they also closed.

Search theory has explained the role of information and how higher costs of obtaining information reduces the welfare of both the consumer and the producer. For job seekers, lower search costs allow them to be more selective, implying greater productivity shared between worker, firm, and (ultimately) the consumer. For consumers, improving information through better signage will decrease the time and resources needed to investigate another vendor. Reducing information costs effectively makes everyone better off.

By facilitating less costly sales, better information through signage can positively affect the broader community through economic growth (especially through increased employment and wages) and a stronger base for sales, income and property taxes. While others may focus on the intangible impacts on communities of quality signage, such as their contributions to a sense of place and identity, as well as building social capital and community pride, we emphasize that search theory explains the economic benefit of signage.

IV. National Survey

A. Survey Approach

To gain a broad perspective about a variety of on-premise signage considerations, a survey was prepared and distributed to all types of businesses in the US that use signs. The survey provided businesses the option of responding either online or by a mailed response. Questions were asked about sign changes and the impact of those changes on business performance. In addition, detailed questions inquired about the nature of the business and the use of signs (number, size, location, type).

Respondents were initially solicited by email, post cards and personal contacts. Also, newspaper and newsletter articles about the survey included information about the survey's Internet address and asked businesses to complete the survey online. An effort was made to gain responses from a geographically diverse cross section of the different types of large and small businesses that use signs to attract and retain customers. This approach was used in order to collect responses from a wide range of such businesses rather than to produce a random national sample. While the objective of employing this method was to collect data from respondents who have greater awareness of on-premise signage issues, responses did not indicate a response bias toward heavy signage users; in fact, one third of respondents reported no sign changes in recent years.

B. Survey Results

A total of 225 businesses responded to the nationwide survey of business sign users. Of these, 213 were usable responses. Of these respondents, 70 percent had a single establishment, while the remaining 30 percent were classified as either small (2-10 establishments) or large companies (more than 10 establishments). Single establishment businesses are more common among retail trade respondents (84%), and comprise about half of respondents in the accommodation and food service industry (52%).

The following table shows that, as large as these proportions are among survey respondents, single establishment businesses are even more common nationally, based on a census of U.S. businesses. However, these proportions are sufficiently comparable to be able to draw conclusions from the survey about general use of business signage.

Table 1: Single-Establishment Businesses as a Proportion of All

	Survey Respondents	2008 National Data[3]
All businesses	70%	90%
Retail trade	84%	90%
Accommodation and food services	52%	70%

In order to understand whether having multiple signs was important for their perceived impact on business performance, respondents were asked about the number of signs at a typical establishment. As shown in Table 2, over two-thirds of respondents had only one or two signs, a little more than a quarter had three to five signs, and only 4 percent reported 6 or more signs. Larger companies (10+ establishments) were far more likely to have more than 2 signs, with over half reporting 3 or more signs at a typical establishment.

Table 2: Number of Signs at a Typical Establishment by Size of Company

	All (n=213)	Single (n=150)	Small (n=35)	Large (n=28)
1-2 signs	69%	72%	71%	46%
3-5 signs	26%	23%	26%	43%
6+ signs	5%	5%	3%	11%

(Small companies have <10 establishments, Large companies have 10 or more establishments)

Left: Oakley Pub & Grill; Right: Buca di Beppo

[3] These national figures come from the 2008 Statistics of U.S. Businesses (SUSB). The SUSB is an annual series of national economic data by enterprise size and industry. SUSB covers most of the country's economic activity. The series excludes data on non-employer businesses, private households, railroads, agricultural production, and most government entities.

Questions about the types of signs were also included in the survey because this is frequently an issue addressed as part of sign regulations. As shown in Table 3, among the types of signs at a typical location, wall and pole signs were most common. While most single establishments and small firms have either wall signs or pole signs, most large companies have both. In general, larger companies tend to have more types of signs.

Table 3: Types of Signs at a Typical Establishment by Size of Company

	All (n=213)	Single (n=150)	Small (n=28)	Large (n=28)
Wall sign/s	60%	53%	54%	89%
Pole sign/s	53%	46%	49%	86%
Wall & pole signs	27%	19%	23%	75%
Monument sign/s	25%	15%	29%	71%
Other sign/s	30%	28%	31%	39%

(Small companies have <10 establishments, Large companies have 10 or more establishments)

Some of this variation in the amount of signage may be due to the different industry mix among large companies, but even when restaurants are the only category considered, large companies use more signs. This may be the result of a number of factors, such as differences in types of location and different customer markets.

As part of the survey, respondents were asked to rate on a 0 (zero) to 3 scale -- with 0 being not at all important and 3 being extremely important -- the relative importance of their signage for several common purposes of signs. Overall, the two sign purposes with the highest scores are: 1) making their business stand out; 2) helping potential customers find their location. These two purposes received generally high scores across all business size categories.

As shown in Table 4, the size of the company (and presumably access to multiple marketing modes to facilitate "branding") did make a difference. Companies with more establishments perceived 'brand reinforcement' as relatively more important compared to companies with a single establishment ($\gamma = 0.73$)[4]. This was reinforced when businesses were asked which purpose is the most important: 38 percent of large companies identified branding/image, compared to 14 percent of small firms and just 3 percent of single establishments. Other sign purposes showed measurable but weaker association with company size: compared to large companies, single establishments tended to give slightly more weight to using signs to inform about goods/services, and small companies generally use signs a bit more to inform about promotions ($\gamma = 0.16, 0.25$).

[4] A commonly-used statistical test for measuring the strength of association between two variables such as those used in this survey is Goodman and Kruskal's gamma (γ). Gamma measures the proportional reduction in error; it identifies how much the error in predicting variable "y" is reduced by taking variable "x" into account. In general, if $\gamma = 0.60$ or greater, the association is very strong, while a figure of 0.30 reflects a moderate association; if $\gamma = 0.20$, the association is weak.

Table 4: Mean Scores for Perceived Importance of Signs for Common Purposes, by Company Size (n = Number of Respondents)				
	All (n=213)	Single (n=150)	Small (n=35)	Large (n=28)
Help customers find location	2.73	2.75	2.63	2.79
Make business stand out	2.68	2.67	2.68	2.75
Reinforce branding/image	2.42	2.30	2.57	2.86
Inform about goods/services	2.23	2.28	2.17	2.04
Inform about promotions	1.76	1.71	2.03	1.64

(0=Not at all important, 1=Slightly important, 2=Moderately important, 3=Extremely important)

When data on sign types and purposes are compared, those reporting that the sign purposes of "making their business stand out" and "reinforcing their branding/ image" are extremely important were slightly more likely to have pole signs $\gamma = 0.20$, 0.31). Some of the survey's findings about sign quality, number, and readability have been replicated in a more recent survey (FedEx Office, 2012), which found that:

- About three fourths of consumers have entered a store or referred a friend because of a sign that made the business stand out, and two thirds have made a purchase as a result.
- Conversely, most consumers indicate that bad or no signage deters them from entering a store.
- Sign readability is the most important sign factor in causing consumers to try a store's product or service.

Respondents also were asked to rate various signage characteristics in order to determine which specific characteristics were perceived to be most important. As shown in Table 5, among all companies, "being clearly readable" was the most important characteristic. This was true across all sizes of companies. However, again, the size of the companies did make a difference. Among companies with more establishments, and for whom branding is presumably more important, including their business logo was reported as more important compared with single establishment companies ($\gamma = 0.72$). Compared to other businesses, large companies also gave somewhat greater weight to "size / location" ($\gamma = 0.51$). Among small businesses, including single establishments, "conspicuousness" was the second most important characteristic, rated considerably higher than 'size and location' and "logo or branding" ($\gamma = 0.49$, 0.31).

Table 5: Mean Scores for Perceived Importance of Sign Characteristics, by Company Size				
	All (n=213)	Single (n=150)	Small (n=35)	Large (n=28)
Clearly readable	2.90	2.91	2.79	2.96
Conspicuousness	2.75	2.78	2.62	2.75
Size and location	2.64	2.65	2.43	2.86
Illumination	2.56	2.57	2.46	2.61
Logo or branding	2.43	2.30	2.60	2.86

(0=Not at all important, 1=Slightly important, 2=Moderately important, 3=Extremely important

Two of these sign elements were associated with signage types. Those businesses reporting that the sign elements of being 'clearly readable' and 'size/location' are "extremely important" were somewhat more likely to have pole signs (γ = 0.48, 0.44).

In order to assess how actual changes in signage might be related to the perception of the importance of signs, businesses were asked if they had made improvements in their signage over the past five years and their perceptions of the impact the sign changes had on four measures of business performance: (1) sales, (2) number of transactions, (3) profits and (4) staffing. About two thirds (66%) of all respondents reported one or more types of changes. Among the changes, as shown in Table 6, seven in ten of these companies reported making changes in their sign design. More than half (52%) improved sign visibility, while nearly half (47%) increased the number of signs, and three in ten made the signs larger. Because almost all changes consisted of more than one of these types of change, it was not possible to determine whether one change produces greater impacts than another.

Table 6: Types of Changes Made to Signs Over the Past 5 Years

Changed the design of signs	70%
Enhanced the visibility of signs	52%
Increased the number of signs	47%
Increased the size of signs	30%

Most of the companies reporting sign changes indicated that these sign changes had large, positive impacts across three of the four measures of business performance, with smaller but still positive impacts on the fourth measure. As shown in Table 7, between 59 percent and 65 percent of the companies making sign changes reported increases in profts, transactions and sales, with average increases of 9, 11, and 12 percent, respectively. These findings about the impact of enhancing on-premise signage are consistent with findings recently reported by Dr. Charles R. Taylor, John A. Murphy Professor of Marketing, and his colleagues at Villanova University (Taylor, Sarkees & Bang, 2012).

Increases in staffing were reported by a smaller proportion of the companies (23%), with an average increase of 6 percent. Employment growth may have been tempered by the national economic downturn rather than representing a different type of relationship with signage changes compared to sales, transactions and profits.

Table 7: Perceived Impact of Sign Changes on Business Performance

Performance Measure	% Reporting Increase	Average Increase
Sales	65%	12%
Transactions	62%	11%
Profits	59%	9%
Staffing	23%	6%

Additional analysis of the relationship between business performance and various signage factors revealed a number of sign characteristics that correlated with positive economic impacts.

- Businesses emphasizing 'conspicuousness' as a sign element were somewhat more likely to report larger increases in store sales ($\gamma = 0.45$), and those giving a high priority to size/location were slightly more likely to report larger increases in store sales ($\gamma = 0.28$).
- Businesses with pole signs were somewhat more likely to report larger sales gains ($\gamma = 0.42$).
- Those that experienced gains in sales, customers, and profits were much more likely to attribute those gains at least partially to their sign changes ($\gamma = 0.80, 0.74, 0.75$).

Some survey respondents included contact information with their surveys for additional follow-up. Researchers were able to reach roughly one third of those who provided this information (13 of 38), and they provided additional responses to questions during a brief interview. Most of these businesses surveyed were single establishments in free-standing structures or storefronts in a main business district . They were located on a site either having 45-50 mph speed limits and far from curb, or 25-30 mph and within 20ft of curb. Most interviewees indicated that 60 percent or more of their revenues were obtained from regular/repeat customers.

Most of these interviewed businesses added electronic message signs, and they indicated that their new signs had positive business impacts, but the results are skewed by what they characterized as poor general economic conditions. All affirmed that they had experienced an increase in business since they added new signs, but most were not very significant. Three or four contacts reported vast improvements (increases of over 40%) compared to business revenue prior to new signs. When questioned about use of their new signs, these businesses generally indicated that they had become more involved with sign "activities." They referenced very active updating information (a couple times a week), constant design change, and posting community "reputation boosting" information. Illumination at night was mentioned by customers as a great attention-getting advertisement while closed. When asked what they would do differently or what they would do for their next sign update, many said they wanted more electronic messaging capabilities, having already witnessed the impact on business performance. Some wished for a video board, feeling this would dramatically boost business, but couldn't be justified with current revenues and budget. These types of dialogues can serve as yet another foundation for future research.

This survey has generated numerous insights into how on-premise signage affects the business performance of retailers, hotels and eating places in order to inform important decisions about private signage investments as well as public discussions about signage restrictions. This research would have been much easier, and perhaps already completed, if the required data was available as part of public secondary datasets. Unfortunately, this is not the case, and this research has been required to rely on the cooperation of businesses to share proprietary data. Businesses agree to share data, usually on the condition that the results are shared with them, because they appreciate the need for this research for their own benefit as well as that of the communities where they operate.

Given that this survey captured self-reported information about individual businesses, questions may arise about its objectivity and validity. Fortunately, a body of marketing research has established that the self-reports of business owners about the factors that influence the performance of their business are highly correlated with those factors that could be identified using independent, objective data (see Robinson & Pearce, 1988; Venkatraman & Ramanuiam, 1986). Consequently, the results here can be reasonably considered to reflect the role of on-premise signage for a broad range of retail businesses.

V. Case Studies

Four case studies, drawn from a wide range of business sizes and types, offer detailed insights about the economic impacts that on-premise signage can have. Among the case studies, positive business performance was generally associated with greater use of on-premise signage and better quality signs.

A. National Lodging Chain – Value Place

Value Place is the largest economy extended-stay franchise in the country. Founded in 2002, it opened its 100th location in 2008, and its 175th in 2010. All properties have about 120 suites and are newly constructed.

According to the company's website, its properties combine hotel convenience and apartment essentials. Its business model is designed to appeal particularly to small and mid-sized business owners and families who are relocating to a new community.

The company has specific signage standards. The primary sign requirements consist of a wall sign with the company's logo on at least one side of the building, and a pole sign that displays its logo and pricing information.

The company also has several location criteria for its properties. The primary criteria are: interstate visibility, or at least a location along a primary arterial; a middle- to moderate-income area; and strong population density within a five-mile radius. These characteristics made it a useful case study.

Value Place Sign Configurations: Benefit of an Electronic Sign

Value Place has developed a number of pole sign configurations to help it communicate its message to potential customers. Its preferred arrangement utilizes an LED-lit changeable electronic sign. Changeable electronic signs are preferred because they can more effectively communicate multiple messages and because they are considered to be better at attracting attention.
In those locations where sign regulations prevent the use of such signs, Value Place uses signs with large plastic numerals, similar to those that gasoline stations post to advertise their prices. Approximately 73 percent of all properties have changeable electronic signs, while 26 percent use signs with plastic numerals, and the remaining one percent lack any pricing signage.

How does the type of signage affect the performance of various properties? For those with changeable electronic signs, 2010 occupancy averaged 11.2 percentage points above breakeven, while those with plastic signs averaged 9.5 points above this threshold. However, further analysis of this data shows that the advantage attributable to changeable electronic signs is predominately realized by properties in the bottom performance quartile.

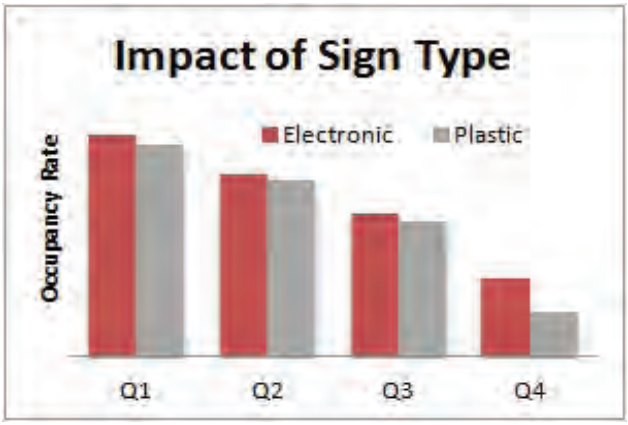

Figure 3: Impact of Sign Type

To perform this analysis, properties were first divided according to the type of sign they use to advertise their pricing. Next, each of these two groups was divided into four quartiles, based on their occupancy rates, and each group was compared with the other on a quartile-by-quartile basis.

As shown in the figure 3, in each quartile, electronic sign properties had a higher average occupancy rate than properties with plastic signs, but the difference was small, except in the lowest-performing quartile (Q4). This graph omits the scale for occupancy rate figure to protect the confidentiality of performance data provided by the company.

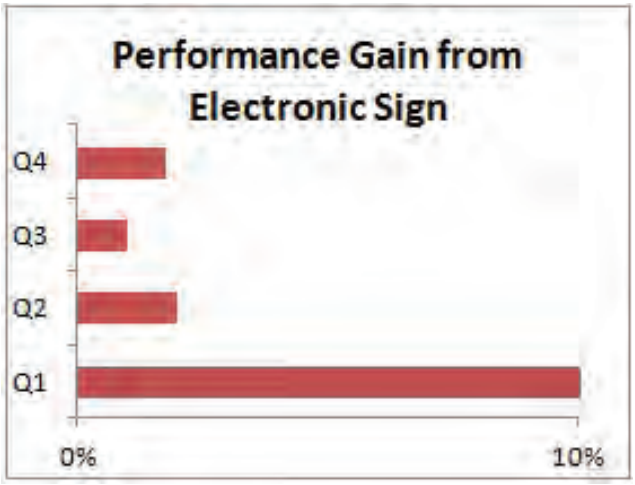

Figure 4: Performance Gain from Electronic Sign

Specifically, the performance gain from the use of electronic signs was in the range of one to two percent in the top three quartiles, but it jumps up to a ten percent advantage in the lowest quartile, as shown in figure 4. This suggests that those locations that are already performing well and have plastic signs are likely to experience limited benefit from the installation of an electronic sign. On the

other hand, such a sign change is likely to produce a substantial boost to the occupancy rates of properties that are currently struggling. This finding about economic benefits is consistent with other research on changeable electronic signs (van Bulck, 2011).

Signage with Price Information: Story of One Property

A second component of this case study involved a signage change at one property. At one Value Place location where local officials prohibited any pricing data on the property's sign, occupancy rates were so low that it was, at best, breaking even. After an extended period of discussions and negotiation, the company reached a compromise with local officials that provided for a multi-tenant sign that included space for Value Place, as the lead tenant in the development, to post its pricing. The new sign was erected in late October of 2010, nearly three years after the property opened.

For this analysis, information provided by the company consisted primarily of three years of monthly data on occupancy rates. Monthly data on posted and actual charged weekly rates were also provided in order to demonstrate that only negligible changes had occurred in prices.

The impact of the new sign has been significant. In the first nine months after its installation, the property has experienced an average occupancy rate that is 19 percentage points higher than the same nine-month period for the two preceding years. As a result, the property has now become consistently profitable, even in traditionally slower months. In addition, the property is now projected to generate an additional $30,000 a year in hotel tax revenues.

B. National Retail Banking Business

A bank with more than 500 branches nationally, which we will call Secure Savings, agreed to provide data about the use of signage as it pertains to Secure Savings' branch characteristics and performance. Secure Savings requested that its identity not be disclosed in the presentation of this case study.

The banking industry uses on-premise signage extensively and spends a great deal of money on branding, design, placement, purchase, and maintenance of its signs. Retail banking is a highly competitive industry, and branch visibility receives much attention and investment.

Some of the operating characteristics in retail banking are similar to those in the retail trade and accommodation/ food service industries. For example, in resource materials prepared for its members, the Bank Marketing Association advises: "Banks need to think more like retailers. Convenience retailers such as restaurants or gas stations know the value of good visibility. If your customers can't see your sign or find your building, they won't visit your branch" (Beery, 2002).

Signage concerns begin at the site selection stage. Selection criteria for Secure National Bank include visibility and convenience of access, along with population density and size. "We need to be visible so that, when people need us, in their minds, they know where we are," stated one of the bank's real estate executives.

Case Study Approach and Data

Secure Savings has extensive data on its branches, which permit a more extensive analysis that explores issues beyond the basic signage considerations that have dominated previous research. As with the previous case study, this analysis focused on 47 locations within a single metropolitan area, which serves to eliminate many non-signage factors that would otherwise be difficult or impossible to control for.

The dataset for this analysis includes details about:

- Standard sign factors: number, type, size, height, design;
- Unique data on visibility and placement;
- Assessments of market factors for each branch location; and
- Business performance metrics.

Two types of analysis are described here. The first examines the relationship between the sign packages for individual branches and an independently-conducted evaluation of branch visibility. The second analysis examines the impact of both of these dimensions on branch performance.

Comparing Signage to Banking Center Visibility

Using the data on these individual banking locations, it is possible to examine the relationship between the visibility score assigned to the banks and their on-premise signage characteristics. These scores were part of a broader six-factor assessment of banking center conditions that was performed by an outside consultant. To illustrate how scores were assigned to banking centers on these characteristics, the description of the visibility categories is presented. For more detail on the remaining categories please see the technical appendix.

The other five characteristics on which bank branches received a score from one to five (with 5 being the best score) were: location, accessibility, and parking for the banking center; and land use pattern (land use mix and density, traffic flow) and life cycle (age and economic vitality) of the surrounding area.

Table 8. Banking Center Visibility Score Categories

5	4	3	2	1
Location is immediately visible from a great deal of distance and is easily found.	Location is immediately visible and can be seen in the traffic patterns with little difficulty.	Is visible but no more or less than surrounding competitors or retailers.	Is partially visible from the surrounding roadway although obscured by impediment like landscaping or other building.	Building is easily missed when driving by and is likely wholly or partially obscured.

Table 12 contains information on the proportion of banking centers in each score category for the factors mentioned above. The great majority of banking centers (nearly 80%) received a visibility score of 4 or better. On the other three banking center characteristics – their location, accessibility and parking – the banking centers showed greater variation. The surrounding areas tended to receive average to strong scores for land use patterns, indicating they generally would be expected to give reasonable support to the bank branches, while life cycle showed greater variation.

Table 9. Banking Center Condition Scores

Score	Banking Center Characteristics				Surrounding Area Characteristics	
	Visibility	Location	Accessibility	Parking	Land Use Pattern	Life Cycle
5	36.2%	23.4%	17.0%	4.3%	40.4%	14.9%
4	48.9%	46.8%	38.3%	34.0%	25.5%	14.9%
3	12.8%	25.5%	40.4%	46.8%	27.7%	44.7%
2	2.1%	4.3%	4.3%	10.6%	6.4%	25.5%
1	0.0%	0.0%	0.0%	4.3%	0.0%	0.0%

The primary question is the extent to which sign characteristics of the banking centers are related to the independently assigned visibility score. The table below contains summary statistics on the sign characteristics of the banking centers, grouped according to the visibility score. Generally speaking, banking centers with higher visibility scores also tend to have more signage. In particular, pylon (or pole) and wall letter signs are more prevalent among locations with the highest visibility score. Across the 17 locations with a visibility rating of 5, there are 0.94 pylon signs, on average. These locations also have substantially more square footage of signage, 226 square feet on average, than lower scoring locations.

Table 10. Banking Center Sign Characteristics by Visibility Score

Visibility Score	Number of Banking Centers	Average Number of Signs				Average Square Feet
		Pylon	Monument	Wall Letters (Vertical)	Wall Letters (Other)	
5	17	0.94	0.29	0.71	1.29	226
4	23	0.30	0.52	0.61	1.17	165
3	6	0.17	0.50	0.67	1.17	108
2	1	0.00	1.00	1.00	1.00	105

The amount and type of signage are not the only factors that contribute to a banking center's visibility score; the characteristics of the physical location and surrounding area also play a role. To examine this relationship, the Economics Center analyzed a statistical model predicting the probability that a banking center would have the highest visibility rating. The model calculated the probability that a banking center location received a visibility level of 5 as a result of the following:

- the number of signs by type (pylon, monument, wall letters);

- the total square footage of signage;
- other banking center characteristic scores (location, accessibility, parking);
- surrounding area characteristic scores (land use pattern, life cycle).

The modeling technique allows for estimating the impact that each included variable contributes to the outcome of interest. Thus, by taking into account what is known about the banking centers and the surrounding areas (condition scores), the model permits an assessment of the added value of the included sign characteristics on the visibility score. The table below contains the results.[5]

Table 11. Probability of Having the Highest Visibility Score

Explanatory Variable	Impact on Probability	Statistically Different From Zero
Number of Signs, by Type		
Pylon	0.91	Yes
Monument	0.38	Yes
Wall Letters Vertical	0.08	No
Wall Letters Other	0.12	No
Total Square Footage of Signage	-0.003	Yes
Banking Center Characteristics		
Location	0.43	Yes
Accessibility	0.08	No
Parking	-0.08	No
Surrounding Area Characteristics		
Land Use Pattern	-0.06	No
Life Cycle	0.12	No

[5] See the technical appendix for a table containing the full regression results.

Factors That Affect Bank Visibility

The statistical analysis indicates that three factors have effects of much greater magnitude than the others. These three –location, pylon signs, and monument signs – are illustrated in the figures 5 and 6.

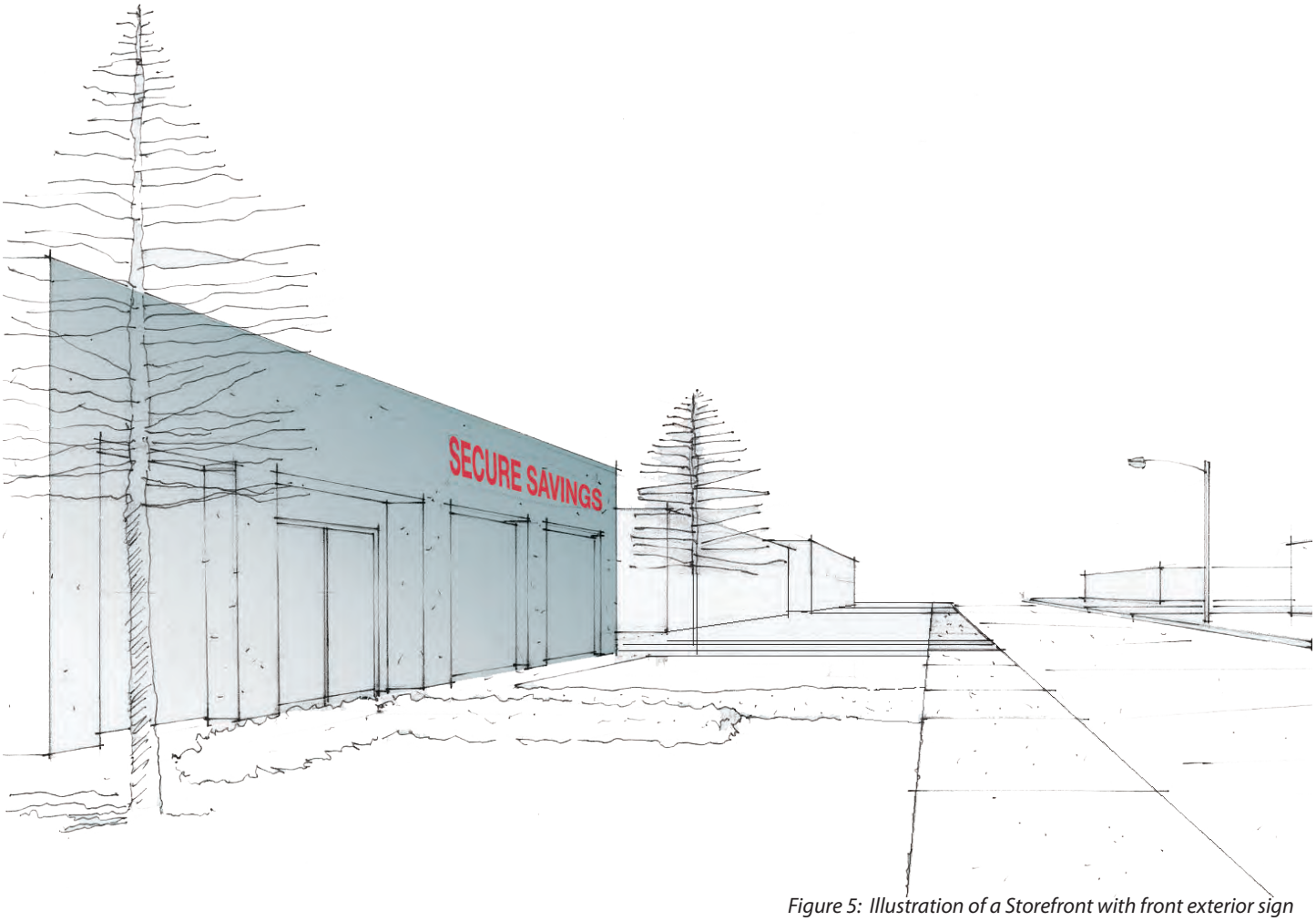

Figure 5: Illustration of a Storefront with front exterior sign

Having the prime location in the market results in a 43% greater likelihood of receiving the highest visibility score, compared to just a good and visible location.

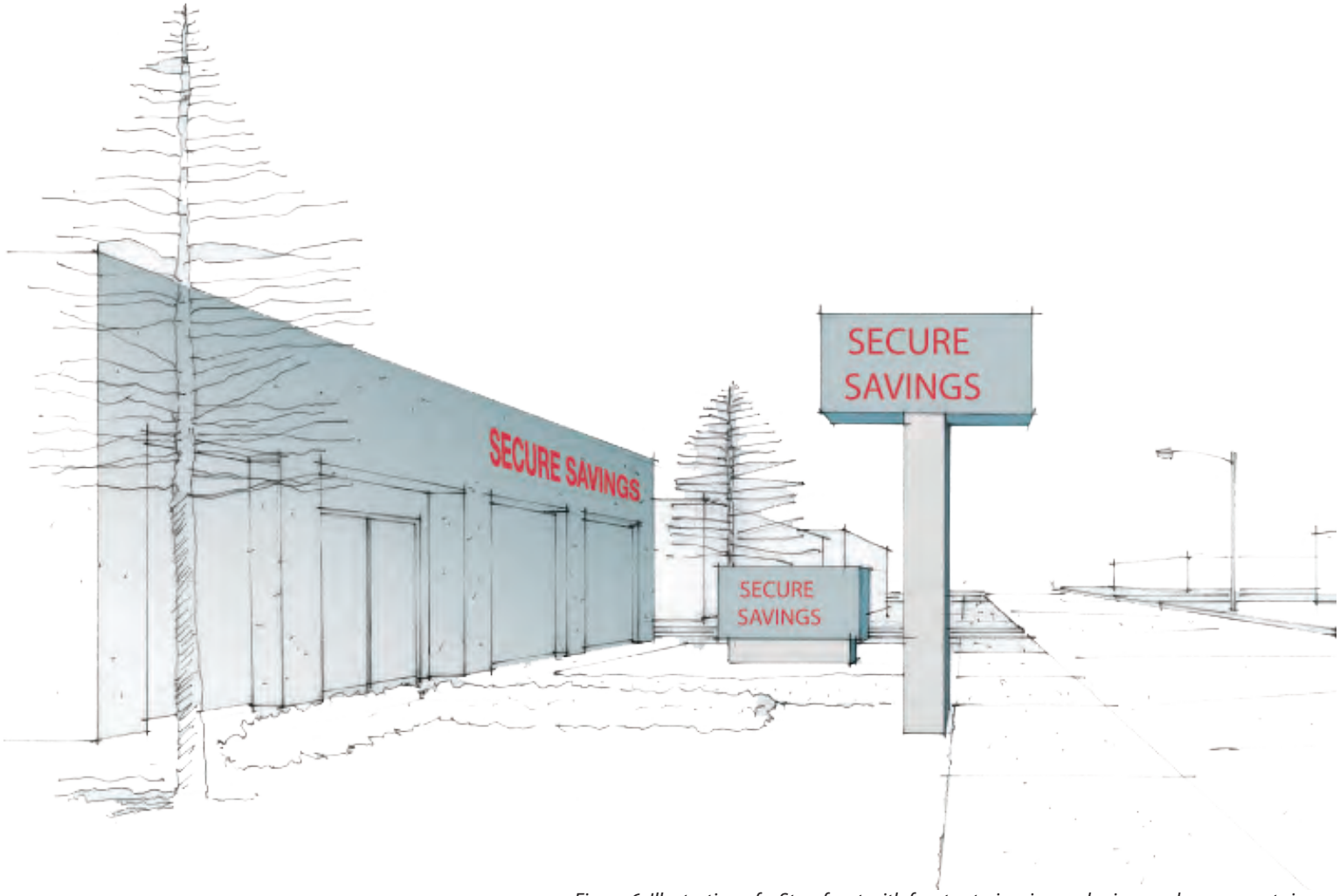

Figure 6: Illustration of a Storefront with front exterior sign, pole sign, and monument sign

The monument sign increases the probability of a maximum visibility score by 38%; the pylon sign increases the probability by 91%.

As shown above, certain on-premise signage has the greatest impact on bank visibility. The presence of pylon and monument signs increases the probability that a banking center has the highest visibility rating, even after taking into account other characteristics of the banking center and surrounding area. Specifically, each pylon sign is estimated to nearly double the probability (91% increase) of a visibility rating of 5, while a monument sign increases the probability by a little more than one-third (38%). According to one bank executive, "Pylon is the first choice because it can be seen from farther away." Acknowledging that mature trees occasionally block views of the signs, he observed that a pylon sign stands out more, which helps customers locate and drive to the bank more easily and safely.

Among the factors included in the model, the only other one that appears to have a significantly positive impact on visibility is one of the banking center characteristics – location – which produces a 43 percent increase in the probability of a top visibility score. The total square footage of signage is estimated to have a weak, negative

relationship to the probability of having the highest visibility rating. Each additional square foot of signage on premise is associated with a decrease of 0.3 percent in the likelihood of the location having the highest visibility rating. This result may occur because banking centers in poorer quality locations are compensating with more signage.

Comparing Signage to Banking Center Performance

The second part of the analysis examines the impact of signage and other condition characteristics on branch performance. The sample consisted of the same 47 banking locations previously analyzed. The outcome of interest was average monthly teller transactions in 2011. This component of the analysis modeled the incremental impacts of on-premise signage and condition characteristics on the number of average monthly teller transactions. The model analyzed teller transactions as a function of:

- the number of signs by type (pylon, monument, wall letters);
- other banking center condition scores (location, accessibility, parking); and
- surrounding area condition scores (land use characteristics, life cycle).

Table 16 contains the results of the model.[6] The results indicate that, when taking into account the other variables, a pylon sign is associated with 1.15 times the average monthly number of teller transactions. The statistical significance of this result is relatively weak, but the magnitude is roughly the difference between a bank having 375 daily teller transactions and 325 transactions. This difference is a considerable impact on monthly transactions, and no other signage characteristics exert a statistically significant impact on the outcome of interest.

Not surprisingly, the rating given to banking center parking is the only other variable that has an impact on teller transactions. As these transactions occur on-site, it is reasonable that banking centers with more available and more easily accessed parking would also tend to have more transactions.

[6] See the technical appendix for a table containing the full regression results.

Table 12. Average Monthly Number of Teller Transactions		
Explanatory Variable	Impact on Monthly Transactions	Statistically Different From Zero
Number of Signs		
Pylon	1.15	Yes
Monument	1.03	No
Wall Letters Vertical	1.09	No
Wall Letters Other	1.00	No
Banking Center Conditions		
Location	0.93	No
Access	1.09	No
Parking	1.15	Yes
Surrounding Area Conditions		
Land Use Characteristics	1.08	No
Life Cycle	1.03	No

C. Specialty Retail Small Business – Bob Roncker's Running Spot

This case study addresses a small business retail establishment in its expansion from one store to four stores in a major Midwestern city. The study examines a local specialty store chain of four small stores specializing in running and walking shoes, accessories, and apparel. These niche specialty retail stores provide an ideal case study for the effectiveness of signage and branding. The four retail outlets have a single owner. The original store has been in business for 30 years, adding three stores over the past several years. A program to refresh store signage in the context of an expanded branding strategy has paralleled the company's bricks-and- mortar growth.

The first Bob Roncker's was established in 1981, offering industry-specific advice and high quality running/walking products. This first store was located in an older streetcar suburb business strip on a busy commuter artery that leads to both the downtown and a major university within the region. The regional trade area has about 1.2 million residents. Early in 2008, a second store was added in a similar, well-established commuter suburb near the outer interstate beltway, a substantial distance from the city core..Later in that year, a third store was opened in an historic suburb located alongside a popular bike / running path. A fourth store opened in 2009 near

a successful riverfront commercial development. All four stores are devoted to retail sales of quality specialty running / walking lifestyle products.

This small specialty retail store case study offers insight into the role of on-premise signs at several levels: as an element of communication within the context of a specific streetscape; as an element of a comprehensive branding strategy within a niche market; and as reaffirming the stores' commitment to quality goods and services. This study also demonstrates how a small retailer can use signage to target a specific, narrow market within an upscale residential community with strict sign regulations. The small retailer has fewer options for communicating with its existing and potential customers. This requires that signage and branding strategies be an integrated package that is consistently applied.

Each of the four stores' building configurations, architectural styles and signage regulations present unique challenges for on-premise signage. Each requires site-specific signage design while maintaining consistency in graphic communication. Graphic composition and sign 'appropriateness' need to be balanced while maintaining conspicuity and legibility.

Store One: The original store location

This two-story brick structure sits close to a major busy street in a small suburban commercial district outside the urban core of a major river city. The modest face-mounted sign has a distinctive logo and san serif calligraphic style typeface. The clarity of the sign itself is due to the careful composition of elements – logo and graphically-stylized business name. The clean design and signature-styled font letters reflect the owner's desire for straightforward business dealings, personal service, and quality products. The well-designed painted sign is constructed and composed to reflect the commitment to customer satisfaction and product quality rather than conspicuity and over -powering visibility. Modesty and visual restraint set the theme for all of the four store signs, allowing consumers to focus on quality and service of their brand over expediency and budget.

Store One has four on-premise signs: a face-mounted building sign on the second floor façade, a small face-mounted door sign providing store hour information, a very small bayonet mounted sign, and a sandwich curb sign for special events and sale announcements. Because of the 10-foot sidewalk set back distance of the building and the parallel curb parking, the two small face-mounted signs are only readable from directly across the street. It is a direct

view perpendicular to the building's brick façade. This doesn't allow visual access to the sign from moving traffic in either direction. A moveable sidewalk sandwich sign provides an opportunity to announce specials, but the curb parking and small sidewalk trees obscure any chance for good readability to the fast moving traffic. The bayonet sign is so small (approximately 9" x 20") and placed under the awning as to obscure the communication value to all but pedestrians within 10 to 20 feet of the store entry.

The store has updated its awning and added a distinctive brand graphic logo and descriptive stylized text that is located on the front of the awning's sloped surface and fascia. The new awning design strategically plays off the color palette of the city's dominant university to reinforce the store's local commitment to its customer base. The awning is the best choice for added signage because regulatory codes allow only limited signage development and is restrictive to face-mount signs. The new awing signage has added a distinctive branding presence to the façade and a new communication identity that the building's other signs are unable to provide. This signage addition also adds a 'freshness' to the façade and provides a point of location for the fast moving traffic. Personal interviews with customers noted that the new signage graphics have helped identify the store from the street and have contributed to their interest in visiting.

Store Two: Expansion store 1999

The first addition to the store chain occurred in 1999. Following the precedent of the original store, modest signs are placed more for communication with pedestrian and slow moving traffic. This attitude and restraint is a response to the context of the small historic commercial district located within a quaint suburban neighborhood. A tenuous free-standing sign and a small, stylized, bayonet sign identify the store entry. Because of the building's setbacks, curb parking, and adjacent buildings, the store window displays and entry are hidden from street traffic. A sandwich sign is also used to announce sales and events. The low-key signage attitude fits with the community's desire for residential scale and historic references to maintain the upscale historic suburban lifestyle. Signage here is only a reminder for the entry and is not intended to take on much of a leadership role in expanding the consumer base. Other branding means are utilized. Signage is down-played with the bayonet-style sign, adding to the traditional small town atmosphere.

Store Three: Expansion store 2009

The established logo and stylized type of the original store helps the on-premise signs take a more prominent role at the third location. Located in a refurbished suburban train station, the signage must reach out to the community to pinpoint the store's location and attract new customers. The abandoned railroad tracks are now a popular biking and running / walking route that generates many retail opportunities. This location allows and requires the signs to pull away from the building and be located for vehicular traffic, bicyclists, runners and walkers. A prominent sign gives motorists good viewing from adequate distances, and a temporary sandwich sign adds to the attractiveness of a quaint business. The ambiance of the park-like setting with generous entry distances allows the building's face sign to be larger and out of balance to the station's low roof profile and large overhangs. This location tolerates stronger on-premise signage with an increased scale. Conspicuity and readability are balanced within the established sign composition that contains the store brand. Impulse purchases happen often as the bike / running path attracts many consumers that require replacement of their specialized running / walking appeal, or are attracted to the new product availability.

Store Four: Expansion store 2009

The last expansion store is located within a revitalized urban setting near the downtown area. A renovated building awning and logo bayonet sign announce the store to pedestrians and vehicular traffic. Located in a popular evening entertainment district, this running store attracts persons that would not be visiting the suburban locations. A large wall sign that faces the active evening retail and entertainment area also helps attract customers to the store for impulse and special sales buying.

The building integration is successful in attracting retail sales in its entertainment district location, with the store offering expanded evening shopping hours. The signs are well-organized and the design quality supports the clean, well-manicured building. At this location the signage supports an image and message of quality retail products, and presents a comfortable 'fit' with the adjacent

businesses. As such, it demonstrates an inviting quality that supports its brand identity. Signage in this location has an opportunity to impact sales. Sales are reported to be increasing, and this store and the original store generate the highest sales per month of the four store chain. It is also important to note that other branding activities are utilized less in this location than in the other stores. It can be inferred that the on-premise signage is a major contributing factor to the store's solid sale performance. On–premise signage is the most developed in this location, with the most signs in number and size as compared to the other three locations.

Overall Assessment

At first glance, small specialty businesses such as Bob Roncker's may not seem to offer much in on-premise signage impact. Closer examination provides a greater understanding of the complex variables in on-premise signage and provides a view of a strategic approach to expansion and signage updating, which could be applied to future research involving the analysis of chain retailers. This case study provides a good illustration of how implementation of a branding plan and retail expansion plan that includes on-premise signage can positively impact business performance. According to the Bob Roncker's business manager, Verne Johnson:
"One of our primary goals, since converting our Glendale shop from a New Balance Concept store in 2008, has been on branding the Bob Roncker's Running Spot name. It continued to be a key element in our marketing and advertising programs as we added stores in Loveland, later on in 2008, and Newport in 2009.

"Store signage has no doubt helped us in achieving that goal; improving the image of the Running Spot brand / identity in the greater Cincinnati marketplace. That, along with our continued focus on customer service and quality solution in footwear, apparel, fitness training programs, and other associated running / walking gear has helped us improve our sales performance at all store locations. This target branding strategy has helped make the Running Spot a successful and profitable business for over 30 years and has allowed the brand to expand into four complete stores."

These comments are consistent with the results of a recent national consumer survey that indicates that potential buyers take note of business signage, and make decisions based on it. Nearly three-quarters of respondents reported that they entered a business because signage caught their attention. Similarly almost 80 percent said that they remembered a business later because of the signs. Seventy-five percent of respondents also referred someone else to a business because of notable signage. (FedEx Office, 2012).

Small businesses like the Running Spot depend upon on-premise signage because of the communication value with potential customers. Better economic performance was reported in stores having the most complete and prominent signage. All stores are on healthy economic footing, with the original store and the store in the urban entertainment district showing the best performance. These two stores have the most complete signage package with fresh, legible signs placed in visible locations. While location and signage differences among the four stores preclude a rigorous statistical analysis of the role of on-premise signage in business performance, there

does appear to be a general correlation between superior signage and superior performance. This is also consistent with the business managers' assessment that their signage has resulted in positive performance because it is able to effectively communicate with large numbers of potential customers.

D. Small Business – Chuck Anderson Ford

Chuck Anderson Ford is located in Excelsior Springs MO, which is part of the Kansas City metro area. The business is located within a typical commercial strip on an arterial highway.

In March of 2011, owner Mike Anderson added a new pylon video board to the existing dealership signage, which includes a traditional Ford-logo pylon sign and other business signage. This sign was added primarily as part of an effort to increase the dealership's service business. The new 30-foot pylon sign has a 96-square-foot full-animation, electronic message center. Previously, that portion of the dealership was identified by a 22-square-foot sign that read "Body Shop."

The new sign was not only larger, but it offered better illumination and design, in addition to its messaging capabilities. The electronic sign draws much more attention to Anderson's business.

For example, in 2011, Anderson used the new sign to advertise a corporate tire sale, and even though a Goodyear Tire Center is located directly across the street, Anderson Ford had the fourth-highest tire sales figure among US Ford dealers.

Case Study Approach

To assess the economic impact of the new sign, Anderson Ford provided monthly data on service department customers and sales for 2010 and 2011. To smooth out monthly fluctuations, the chart below presents the data as two-month averages. Using a base of 100 for the average monthly customer count during 2010, customer figures during 2011 increased from an index of 90 in January and February (the two months prior to adding the new sign) to 108 in the first two months after the new sign and 119 at the end of 2011, showing an average gain of 4.5 percent every two months.

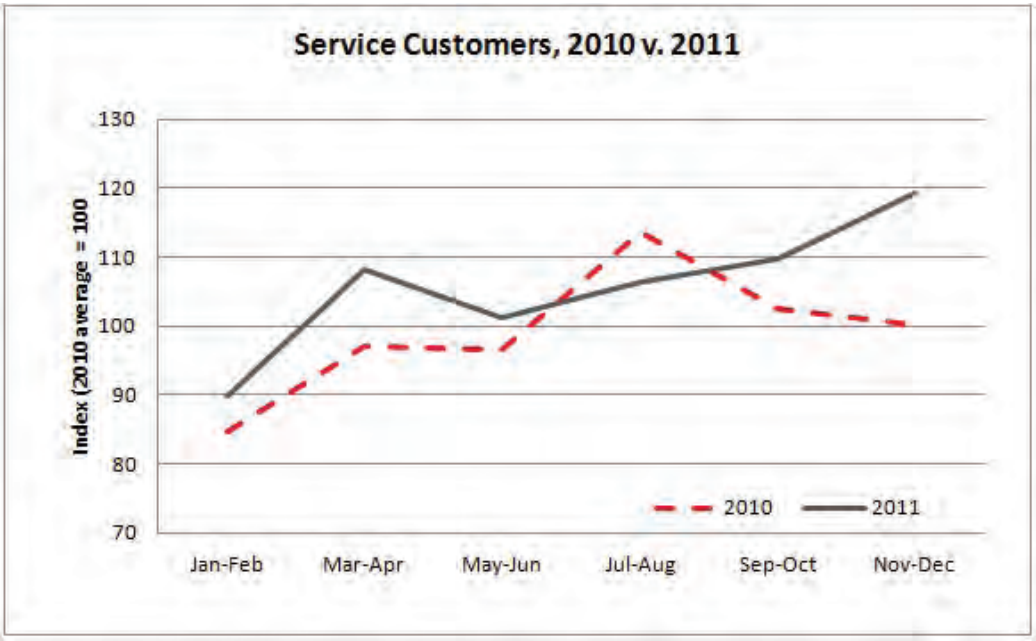

Figure 7: Service Customers, 2010 v. 2011

In figure 7, note that 2011 showed an average year-over-year increase in the number of service customers of 6.5 percent during the ten months after the installation of the new sign.

Mike Anderson indicates that his current service clientele can be identified as 34 percent first-time/new customers and 66 percent regular/repeat customers. This suggests that more customers are learning about his business, and it is reasonable to assume that at least a portion of this new business is coming as a result of the new sign.

A similar analysis was performed on the sales figures, but these numbers were tracked against national auto parts store sales to account for the generally improving national economy. This analysis avoided figures for the winter months (December, January, February) because of the potential for weather-related distortions. Year-over-year figures were compared for the March-to-November periods of 2010 and 2011. This also corresponded well to the introduction of the new sign at Anderson Ford. While US auto parts sales for March-November 2011 were up 5.5 percent over the previous year, Anderson Ford service revenue increased by 10.8 percent in this nine-month period of 2011, compared to 2010. Overall, given the increase in busi-

ness since the sign was installed, Mike has hired three new salespeople, two service technicians and one body-shop person, increasing his employees from 28 to 34, and his business is still growing.

As important as these sales figures are for the dealership, revenue doesn't tell the whole story. The new sign has directly contributed to other positive impacts – on the reputation/brand and visibility of the business. An estimated 30 percent of the new sign's message time is focused on community announcements and public service messages. Examples include:

- Tornado-watch notices,
- The community's annual Oktoberfest,
- A cancer walk-a-thon, and
- Local student recognitions.

These messages generate attention and positive feedback for the business. According to Anderson, "It's about goodwill and being a member of the community. The sign has had a big impact on how we're perceived." When the company first decided to add the new sign, it was seen as an innovative idea that would help to set it apart for its competitors. Now, Anderson says, "The attention I've received has endorsed my decision. The sign has helped us to communicate with the customer on a continual basis. We would for sure do it again!"

VI. Summary of Research Findings

The research shown in this report indicates that appropriately designed and located on-premise signage can be an important factor for retail business success. The implication of these results is that on-premise signage indirectly influences the vitality of a community though the availability of goods and services, jobs and public services. Sign regulations should balance community design objectives with full knowledge of how sign design and location impact businesses success. Business success is important because of its impact on a community's tax base and ultimately leads to the availability of fiscal resources to provide needed services.

We began by providing an intellectual underpinning that uses economic theory to present a new explanation for why on-premise signs have positive economic impacts, not only for businesses, but also for consumers and communities. This explanation can foster more well-informed discussions between sign vendors and users and between sign users and regulators.

The following summarizes this study's findings, based on a national business survey and business cases studies assessing the impact of on-premise signage on business performance.

The national business survey found:

- Legibility is the most important characteristic of signs across all sizes of companies;
- Use of business logos, and the size and location of the signs were more important for companies with more establishments, compared with single establishment companies;
- Sign changes generally had significant, positive impacts on sales, number of transactions, and profits;
- Sign changes had smaller positive impacts on employment.

Among the case studies, positive business performance was generally associated

with on-premise signage changes as the following indicates:

- The national lodging chain case found that the use of a digital electronic sign to display pricing was associated with higher average occupancy rates. The impact appeared to be especially strong for properties with lower occupancy rates;
- The national banking case study found that pylon signs were strongly associated with high visibility; monument signs were moderately associated with high visibility; wall signs contributed to identity but not visibility. In addition, pylon signs were associated with significantly more teller transactions;
- The small specialty store case study demonstrated the need for signage to reaffirm the value offered by a niche retailer. Sign design must be sensitive to community and customer expectations, and able to reinforce the limited brand of a small business. The signage should communicate a "promise" of value for a product and/or service that is not commonly found elsewhere;
- The car dealership case study found that the addition of a video sign board was associated with large increases in both service department revenue and customer count. An added benefit was the "goodwill" and reputational gains associated with using the video board for community-related public service messages.

While many of these findings are statistically significant, larger sample sizes in surveys and case studies should be sought in future research. It is always appropriate to exercise caution when interpreting case study findings because results do not necessarily transfer from one industry or geographic setting to another. While these case study findings about particular individual businesses are not necessarily generalizable, they are important, particularly because the subject is so complex that a comprehensive analysis covering all business types and signage considerations is unlikely to be undertaken. Furthermore, the similarity of some case study findings with survey results suggests that this study deserves careful consideration by researchers, practitioners, and local officials.

VII. Conclusion

The research presented in this report provides current information for better understanding the economic impact of on-premise signage. The national business survey results provide insight to how different types and sizes of businesses use and value their signage. The survey results also provide details about the specific aspects of signs that different types of businesses consider most important. The case study results have reinforced the survey results and provide detailed examples of improved business performance resulting from specific changes in signage.
The ultimate goal of this research has been to provide the signage stakeholders with timely, relevant information to inform their decisions about using on-premise signs to jointly serve the needs of both individual businesses and communities where they are located. As we have attempted to convey, the impact of signage on an individual business location is complicated by a number of factors related to the specific physical, social, and regulatory context of that location, as well as the specific customer base and product offered by the business. Our results suggest that careful identification and consideration of those factors is likely to result in more effective signage. The implication is that with respect to on-premise signage, one size does not fit all, and that to maximize their effectiveness, different types and sizes of business need tailor their signs to their specific needs. Most reputable sign companies already know and appreciate this, though this may be new insight for some businesses. Perhaps the stakeholders that can most benefit from our analyses are some of the sign regulators.

Our work should not be interpreted to suggest that all sign regulations hinder business performance. While this research has emphasized the important role of successful businesses in a community's overall quality of life, we recognize that thoughtful signage design standards can accommodate both the needs of businesses and communities. Indeed, it is clear from our work that sign regulation incentivizing legible, visible, and conspicuous signs can boost business performance, especially for the small businesses that can catalyze growth.

A. Implications for Businesses

Businesses make decisions about their signage within the context of their available financial resources, target customer base, and location characteristics. The results

presented in this report emphasize the importance of carefully assessing the role signage plays in a business' overall marketing and branding strategy given the specific characteristics of a particular location. The specific sign designs and types used to achieve these objectives will depend on multiple factors related to the business location, including view distance, street/road curvature, number of traffic lanes, speed limits, landscaping, building setback, and sightline obstructions from other signs, buildings, poles and berms, and potentially many other factors. The case studies reinforce the idea that particular signs may be effective for one type of business but not be well-suited for another. Clearly the digital electronic signs that work so well for the hotel chain would be ineffective for the specialty shoe store. Likewise, the video sign that works well to enhance sales and community relations for a single-establishment car dealer may be difficult for a banking chain to use at neighborhood branches and integrate into their national branding strategy.

B. Implications for Communities

Both private and public decisions about signs can have important implications for communities. As previously indicated, the results of this study show that signs that are legible, visible, and conspicuous are important for retail businesses. The implication is that sign regulations should balance community design standards with site-specific technical requirements for promoting business success. The alternative is that businesses are less successful and governments have less revenue to support their services. Second, it is important for planners and local officials to understand how the purposes and uses of signs differ for single establishments, small companies, and larger companies. Sign regulations that constrain one purpose may disadvantage the businesses that depend on it. This may be the case especially for smaller, single establishments, which are frequently more dependent on signs as a primary means of communicating their location and products or services to potential customers. On the other hand, regulations that encourage quality signage that communicates effectively at low cost may help small businesses. Given that such small businesses frequently serve as engines of job growth, such policies can be especially appropriate as part of neighborhood economic growth strategies.

C. Implications for Future Research

Taken together, the results of this research have significant implications for businesses and communities, and they suggest important considerations to guide future research in this area. Much of the work reported here is based on data collected directly from businesses, which are an irreplaceable source of information for signage research. Those who attempt to replicate this research will find that most businesses, regardless of size, are hesitant to share such detailed data about individual locations despite extensive assurances of confidentiality. Because research in this field is important for informing business investments as well as public policy, future research will benefit from efforts that would enable business signage and performance data to be made more accessible to researchers. Associations within the signage industry might be able to establish mechanisms or protocols to facilitate data availability while ensuring confidentiality.

This study can serve as a foundation and guide for practitioners and researchers who want to contribute to the development of more effective signs and improved signage practices. For those who are committed to this collaborative venture, new questions will arise from their application of these research findings, and future research will play a key role in the success of their efforts.

Appendicies

1. Survey Instruments

UC Sign Survey

1. Introduction

The University of Cincinnati is examining how differences or changes in on-premise signs affect businesses.

We are using this brief survey, which you can complete in about 5 minutes, to obtain information about the views and experiences of sign users.

If you have any questions or want to contact us regarding this research, please call or email me.

Jeff Rexhausen, Associate Director of Research 513-556-3047
Economics Center, University of Cincinnati jeff.rexhausen@uc.edu

2. Purposes of Signs

Signs play an important role in contributing to business success. Their economic value comes from the impacts they have on business activity. To produce these effects, signs serve a variety of functions.

A. How important is each of these purposes for your on-premise signs?

Importance *(Check one box in each row)*	Extremely	Moderately	Slightly	Not at all
Make your business stand out from others				
Reinforce branding/image				
Help potential customers find your location				
Inform about available goods/services				
Inform about promotions (sales, etc.)				
Other *(describe below)*				

B. What do you consider the most important purpose of your on-premise signs? *(Check one)*

Provide visual identity and uniqueness	
Reinforce brand familiarity	
Show location to potential customers	
Provide information about available goods and services	

3. How important are each of these elements in your sign?

Importance *(Check one box in each row)*	Extremely	Moderately	Slightly	Not at all
Conspicuous ("stands out")				
Clearly readable				
Logo or branding				
Illumination (lighting/brightness)				
Size and location				

3. Your Business

If you have more than one type of business, please limit your responses to the one type for which signs are most important. You may also complete an additional survey for a separate type of business.
To make it easier for you to respond, we encourage you to base answers on estimates or your best recollections, if you don't have specific data at hand.

A. Which of these best describes your business? *(Check one)*

Small business - independent	
Small business - franchise of a chain	
Large retailer (incl. food service and retail banking)	
Other type of business *(describe below)*	

B. How many establishments (business locations) do you have? ☐

C. At a typical business location, which of these types of exterior signs do you use? *(check all that apply)*

Wall sign	
Pole sign	
Monument sign	
Other signs *(describe below)*	

D. At a typical business location, how many exterior signs do you have? *(Check one)* 1-2 ☐ 3-5 ☐ 6 or more ☐

E. Please give a brief description and/or the NAICS or IRS Business Activity Code for your type of business.

4. Sign Changes and Impacts

A. Do you have any business locations at which there have been any of these types of changes to one or more signs in the past 5 years? *(check all that apply)*

Increase in number of signs	
Increase in sign size	
Enhancement of sign visibility (higher, closer to street, placement on building, etc.)	
Change in sign design (refresh look, new type, illumination)	

B. In connection with these sign changes, what business impacts did you experience, and how large were they?

(Check direction and amount of change)	Increase	Decrease	No change	<2.0%	2-4.9%	5-9.9%	10-14.9%	15-19.9%	20% or more	unknown
Total sales volume										
Number of transactions										
Staffing (employment)										
Profits										

C. If sales, staffing, and/or profits increased, what were the top 2 reasons for growth? *(check two)*

New or refreshed signs	
Increased number of signs	
Increased other advertising/marketing	
Increased product/service offerings	
Facilities renovated, refreshed, or expanded	
External factors (the economy, competition, traffic/accessibility, or temporary circumstances) *(describe below)*	

D. Do you have any business locations at which there have been any of these reductions in signs in the past 5 years? *(check all that apply)*

Temporary loss of a sign	
Permanent loss of a sign	
Reduction in sign size	
Loss of sign visibility (obstructed, lowered, farther from street)	

E. In connection with these sign changes, what business impacts did you experience?

(Check direction and amount of change)	Increase	Decrease	No change	<2.0%	2-4.9%	5-9.9%	10-14.9%	15-19.9%	20% or more	unknown
Total sales volume										
Number of transactions										
Other *(describe below)*										

5. Other Information and Interest in Research Findings

A. Please indicate what types of information you might be willing to share about your sign changes. *(check all that apply)*

Details/stories about types of sign changes	
Data on business impacts (data to be kept confidential; no reference to your business in the study)	
Data on business impacts (data to be kept confidential, but naming your business in the study)	

If so, please provide your phone number and/or email for us to contact you.

B. Would you like to receive a brief summary of the findings of this research project? *(If "yes," please provide email or other address.)*

Yes		
No		

Thank you for contributing to this research. Please invite your business colleagues to also participate.
The more information we receive, the better the insights we will be able to provide in our report. We also welcome your comments and suggestions.

Return survey to: Jeff Rexhausen, Economics Center, Box 0223, University of Cincinnati, Cincinnati, OH 45217-0223

Impact of On-Premise Signs

2. What do you consider the most important purpose of your on-premise signs?

- Provide visual identity and uniqueness
- Reinforce brand familiarity
- Show location to potential customers
- Provide information about available goods and services

Impact of On-Premise Signs

1. Introduction

The University of Cincinnati is examining how differences or changes in on-premise signs affect businesses.

We are using this brief survey, which you can complete in about 5 minutes, to obtain information about the views and experiences of sign users.

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2. Purposes of Signs

Signs play an important role in contributing to business success. Their economic value comes from the impacts they have on business activity. To produce these effects, signs serve a variety of functions.

1. How important is each of these purposes for your on-premise signs?

	Extremely important	Moderately important	Slightly important	Not at all important
Make your business stand out from others				
Reinforce branding/image				
Help potential customers find your location				
Inform about available goods/services				
Inform about promotions (sales, etc.)				
Other (describe)				

Other:

Impact of On-Premise Signs

2. What do you consider the most important purpose of your on-premise signs?

- Provide visual identity and uniqueness
- Reinforce brand familiarity
- Show location to potential customers
- Provide information about available goods and services

3. How important are each of these elements in your sign?

	Extremely important	Moderately important	Slightly important	Not at all important
Conspicuous ("stands out")				
Clearly readable				
Logo or branding				
Illumination (lighting/brightness)				
Size and location				

3. Your Business

If you have more than one type of business, please limit your responses to the one type for which signs are most important. You may also complete an additional survey for a separate type of business.

To make it easier for you to respond, we encourage you to base answers on estimates or your best recollections, if you do not have specific data at hand.

1. Which of these best describes your business?

- Small business - independent
- Small business - franchise of a chain
- Large retailer (incl. food service and retail banking)
- Other type of business

If other, please specify

2. How many establishments (business locations) do you have?

(number)

Impact of On-Premise Signs

2. What do you consider the most important purpose of your on-premise signs?

- Provide visual identity and uniqueness
- Reinforce brand familiarity
- Show location to potential customers
- Provide information about available goods and services

Impact of On-Premise Signs

3. If sales, staffing, and/or profits increased, what were the top 2 reasons for growth?

- New or refreshed signs
- Increased number of signs
- Increased other advertising/marketing
- Increased product/service offerings
- Facilities renovated, refreshed, or expanded
- External factors (the economy, competition, traffic/accessibility, or temporary circumstances)

If "external factors," please specify

4. Do you have any business locations at which there have been any of these reductions in signs in the past 5 years? (check all that apply)

- Temporary loss of a sign
- Permanent loss of a sign
- Reduction in sign size
- Loss of sign visibility (obstructed, lowered, farther from street, etc.)

5. In connection with these sign changes, what business impacts did you experience?

	Change	% change
Total sales volume		
Number of transactions		
Other		

If other, please specify:

5. Other Information and Interest in Research Findings

Impact of On-Premise Signs

2. What do you consider the most important purpose of your on-premise signs?

- Provide visual identity and uniqueness
- Reinforce brand familiarity
- Show location to potential customers
- Provide information about available goods and services

Impact of On-Premise Signs

1. Please indicate what types of information you might be willing to share about your sign changes. (check all that apply)

- Details/stories about types of sign changes
- Data on business impacts (data to be kept confidential; no reference to your business in the study)
- Data on business impacts (data to be kept confidential, but naming your business in the study)

If you have information, please provide your phone number and/or email so that we may contact you.

2. Would you like to receive a brief summary of the findings of this research project?

- Yes
- No

If "yes," please provide email address.

3. Thank you for contributing to this research. Please invite your business colleagues to also participate. The more information we receive, the better the insights we will be able to provide in our report.

Please go to "http://business.uc.edu/uc-sign-survey-extra" to answer a few more questions about sign impacts.

We also welcome your comments and suggestions.

2. Retail Banking Technical Appendix

To examine the impact of signage and location characteristics on the visibility score, a binary variable taking on a value of 1 if the location received the highest score, and 0 otherwise, was constructed. Assuming that the probability of the outcome of interest is normally distributed gives rise to a standard probit model. As the coefficients from a probit model are not directly interpretable they have been transformed into marginal effects. The marginal effects displayed in the table below give the change in the predicted probability of having the highest visibility rating for a given one-unit change in the explanatory variable.

Dependent Variable: Visibility Score of 5			
Explanatory Variable	Marginal Effect	Coefficient Estimate	z-value of Coefficient Estimate
Number of Signs, by Type			
Pylon	0.91	14.411**	1.99
Monument	0.38	6.010**	1.96
Wall Letters Vertical	0.08	1.314	1.01
Wall Letters Other	0.12	1.959	1.42
Total Square Footage of Signage	-0.003	-0.053*	-1.79
Banking Center Characteristics			
Location	0.43	6.777**	2.09
Accessibility	0.08	1.318	1.15
Parking	-0.08	-1.236	-1.09
Surrounding Area Characteristics			
Land Use Pattern	-0.06	-0.929	-0.95
Life Cycle	0.12	1.822	1.43
Intercept		-35.011**	-1.97
Pseudo R^2		0.7952	

*** significant at the 1% level
** significant at the 5% level
* significant at the 10% level

The measure of banking center performance selected for analysis was the number of average monthly teller transactions in 2011. Because the outcome of interest is a quantity that takes on discrete, nonnegative values, a count regression assuming a negative binomial distribution was used. The functional form assumed that the variance of the outcome was a linear function of the mean. The coefficient estimates are not easily, directly interpretable. The transformed impacts are the estimated change in the number of teller transactions for a one unit change in the corresponding explanatory variable. The estimate for "alpha" appearing in the table below is statistically significant, indicating that the conditional variance of the dependent variable is over-dispersed relative to the conditional mean, confirming the use of a negative binomial distribution as opposed to a Poisson distribution.

Dependent Variable: Number of Average Monthly Teller Transactions

Explanatory Variable	Impact on Monthly Transactions	Coefficient	t-value
Number of Signs, by Type			
Pylon	1.15	0.144*	1.73
Monument	1.03	0.027	0.27
Wall Letters Vertical	1.09	0.084	1.08
Wall Letters Other	1.00	-0.004	-0.09
Banking Center Characteristics			
Location	0.93	-0.071	-1.03
Access	1.09	0.086	1.54
Parking	1.15	0.138**	2.1
Surrounding Area Characteristics			
Land Use Pattern	1.08	0.081	1.25
Life Cycle	1.03	0.03	0.6
Alpha		0.101***	4.91
Intercept		7.981***	21.02
Log-Likelihood		-429.52	

*** significant at the 1% level
** significant at the 5% level
* significant at the 10% level

There are several important potential sources of biases that impact the reliability of the results. As mentioned previously, the datasets analyzed were small and also focused on a single type of business in one industry. The small number of observations may render the point estimates themselves inaccurate. Additionally, there may be important variables that have been omitted from the analyses due to lack of data. These omitted variables may be another source of inaccuracy. It is possible that, where data available, inclusion of these variables would change the sign, magnitude or significance of the remaining variables. Finally, as the data were not a random sample of businesses the results are not necessarily applicable to other industries or indicative of the impacts of business signage generally.

Banking Center Condition Analysis Scorecard

	Score Descriptions				
	5	**4**	**3**	**2**	**1**
Visibility	Location is immediately visible from a great deal of distance and is easily found.	Location is immediately visible and can be seen in the traffic patterns with little difficulty.	Is visible but no more or less than surrounding competitors or retailers.	Is partially visible from the surrounding roadway although obscured by impediment like landscaping or other building.	Building is easily missed when driving by and is likely wholly or partially obscured.
Location	Banking Center is in the prime location within the immediate submarket or trade area. Easily accessible.	Banking Center is in good and visible location within the trade area, although it is not on the prime corner.	Banking Center is serviceable. Its location is generally acceptable and would be easily found by those looking for it.	Banking Center location is flawed in some way (i.e. poor traffic patterns, development moving traffic away from site).	Immediate trade area has moved away from this location or deteriorated in that it is not servicing the customer base.
Access	BC is immediately accessible from either direction from the roadway for both entry and exit. Traffic signal at access. Easy left, in & out.	BC is accessible from either direction although may have shared easement with contiguous retailer. Easy to modestly easy left, in or out.	Is generally accessible, however is susceptible to traffic issues at peak times. Tough to moderately tough left, in or out.	Has some consistent access issues attributable to traffic or easement points. Tough left, in or out.	Access is poor due to constant traffic issues or shared egress points that are far away from BC location. No left, in or out.
Parking	Immediate parking around the banking center is abundant. Plenty of parking even at peak times.	Parking is plentiful. As long as employees park in designated spaces, there is typically enough spaces.	Parking is generally good, however at peak times customers pay have to use surrounding retail for overflow parking.	Parking is tight and at peak times it is likely customers have to wait on spaces.	Inadequate or no designated parking.
Land Use Pattern	Trade area is strong mix of residential, retail and business. Marked by density and high traffic. Compact.	High density and good traffic flows, however, is either retail heavy or residential heavy.	Trade area has strong commuter traffic but is not buoyed by a strong retail cluster. Sprawling.	Trade area is retail destination location. Sometimes termed "On an Island".	Trade area is spread out and not buoyed by a dominant strong traffic path or retail destination.
Life Cycle	Trade area is growing quickly. Expectations for considerable amount of population and retail growth in the immediate area.	Strong trade area. Expectation for modest growth and improving surrounding development.	Mature trade area. Growth has plateaued due to lack of space that constrain further development.	Declining trade area. Demographics are declining and surrounding retail vacancy is increasing.	Trade area is marked with high vacancy of both retail and residential.

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Statistical Analysis of the Relationship between On-Premise Digital Signage and Traffic Safety

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ABBREVIATIONS

The abbreviations shown below are used in this report.

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AIC	Akaike Information Criterion
ANOVA	Analysis of Variance
BIC	Bayesian Information Criterion
CEVMS	Commercial Electronic Variable Message Signs
CG	Control Group
DF	Degrees of Freedom
EB	Empirical Bayes
EBB	Electronic Billboard
FHWA	Federal Highway Administration
HSIS	Highway Safety Information System
HSM	*Highway Safety Manual*
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
MS	Mean of Sum of Squares
MSE	Error Mean Square
MST	Treatment Mean Square
RTM	Regression to the Mean
SAR	Spatial Autoregressive Model
SEM	Spatial Error Model
SFI	Signage Foundation, Inc.
SPF	Safety Performance Function
SS	Sum of Squares
SSE	Sum of Squares for Error
SST	Total Sum of Squares
TTI	Texas A&M Transportation Institute

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EXECUTIVE SUMMARY

The use of digital on-premise signs, which are typically business-related signs that have the ability to change the displayed message, has increased significantly in recent years. On-premise digital signs are located on the same property as the businesses they promote, and some part — or a significant part in some cases — of the sign contains a digital display that can be programmed to change the message at pre-set intervals. Because the use of these signs has increased, jurisdictions have used local sign codes or ordinances to regulate the manner in which digital messages are displayed. Jurisdictions typically justify these regulations by citing traffic safety impacts. However, no comprehensive and scientifically based research efforts have evaluated the relationship between on-premise digital signs and traffic safety.

In this study, researchers collected large amounts of sign and crash data in order to conduct a robust statistical analysis of the safety impacts of on-premise digital signs. The statistical tools used the latest safety analysis theory developed for analyzing the impacts of highway safety improvements. The research team acquired the crash data from the Highway Safety Information System, which is a comprehensive database of crash records from several states. One of the advantages of these data is that they also include information about roadway characteristics, such as the number of lanes, speed limit, and other factors. The research team then acquired information about the location of on-premise digital signs from two sign manufacturing companies. Through significant effort by the researchers, these two datasets were merged into a single dataset that represented potential study locations in California, North Carolina, Ohio, and Washington. Of the initial set of over 3,000 possible sites, the research team was able to identify 135 sign locations that could be used for the safety analysis. Potential sites were eliminated from consideration due to any of the following factors:

- The sign location was not on a roadway that was included in the crash dataset; only major roads were represented in the crash data.
- The sign location provided by a sign manufacturing company could not be verified through online digital images of the location.
- Only signs installed in calendar years 2006 or 2007 could be included in order to have adequate amounts of crash data before and after the sign was installed.

The research team then used the empirical Bayes method to perform a before-after statistical analysis of the safety impacts of the on-premise digital signs. In a before-after study, the safety impact of a treatment (in this case, the installation of an on-premise digital sign) is defined by the change in crashes between the periods before and after the treatment was installed. However, simply comparing the crash frequencies (known as a naïve before-after analysis) is not adequate to account for factors such as regression to the mean (a statistical concept that explains why after data can be closer to the mean value than the before data) and to provide a means of controlling for external factors that can also cause a difference in crash frequencies. The empirical Bayes method represents the recommended procedure for evaluating the impacts of safety treatments because it overcomes the deficiencies of the naïve method. The safety impacts are represented by the safety index, which is indicated by the symbol θ. In simple terms, the safety index represents a ratio of safety in the after period compared to safety in the before period, although it is not as

simple as dividing the crashes in the after period by the crashes in the before period. A safety index greater than 1.0 indicates an increase in crashes in the after period, and a value less than 1.0 indicates a reduction in crashes in the after period. However, because of the variability in the crash data, the analysis must have statistical validity. Statistical variability is established by defining the 95 percent confidence interval for the safety index, which is based on factors such as sample size and the variability of the data. If the 95 percent confidence interval includes the value of 1.0, then there is a 95 percent chance that there is no statistically significant change in crashes between the before and after periods.

The results of the statistical analysis are presented in Figure 1. This figure shows that the safety index for all of the states was 1.0 with a 95 percent confidence interval that ranged from 0.93 to 1.07. This indicates that, for the 135 sites included in the analysis, there was no statistically significant change in crashes due to the installation of on-premise digital signs. The same can also be said about the results for each of the four states on an individual basis because the confidence interval for safety index for each state includes 1.0. The larger confidence intervals for some of the states are due to greater variability in the data and/or smaller sample sizes. The researchers also analyzed single-vehicle and multi-vehicle crashes and found the same result of no statistically significant change in crashes. Finally, the researchers performed an analysis of variance for the sign factors of color, size, and type of business and found no statistically significant differences in the mean safety index values for individual factors.

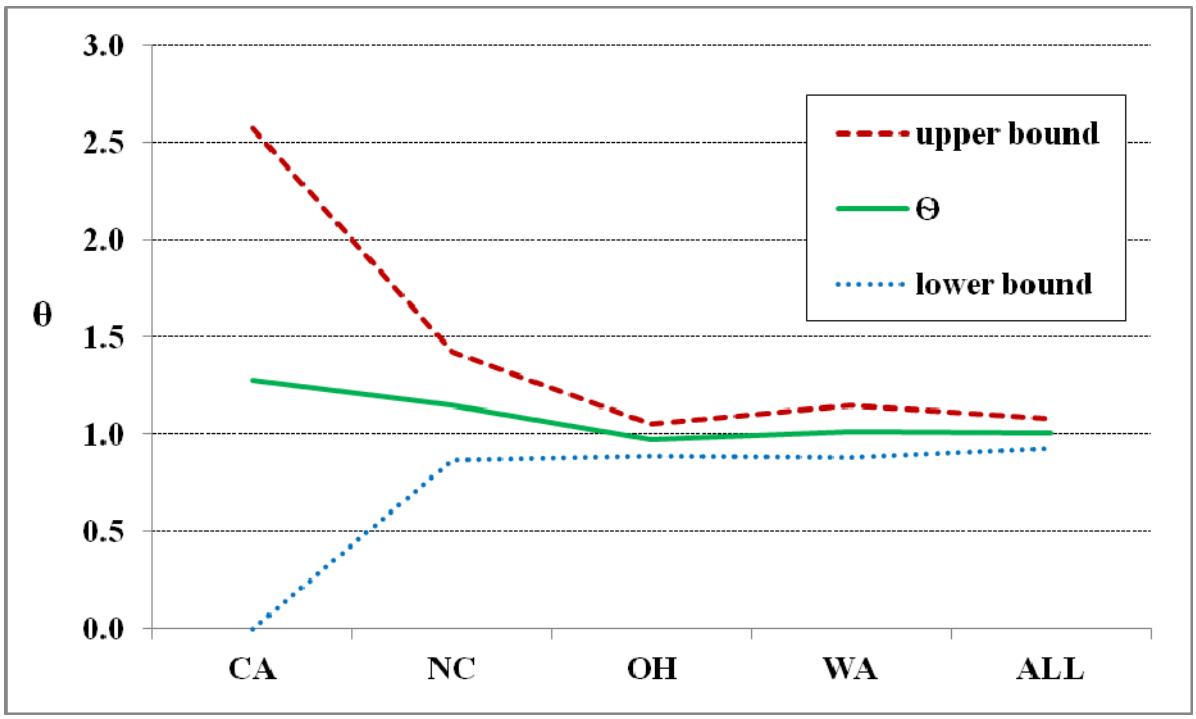

Figure 1. Summary of study results

The results of this study provide scientifically based data that indicate that the installation of digital on-premise signs does not lead to a statistically significant increase in crashes on major roads.

CHAPTER 1:
INTRODUCTION

For many generations, most signs — including both traffic and business signs — were static. They displayed only one message that did not change with time. Advances in information display technologies in recent years have led to an increase in the use of many types of digital signs, particularly in the area of on-premise and off-premise business signs. On-premise digital signs provide the ability to communicate a wide variety of messages and to change the manner in which the message is presented over time. As such, these digital signs represent a significant advancement in communication technologies and the ability to deliver valuable marketing information to potential customers. However, some groups have raised questions related to the traffic safety aspects of business signs that change messages on a frequent basis. The traffic safety concerns are often related to issues of potential driver distraction from the roadway due to the dynamic nature of these signs. These safety concerns are sometimes addressed through local regulation of these types of signs, which may prohibit or limit the use of on-premise digital signs. These regulations tend to be developed at the local level and do not have a significant level of scientific, nationally based research supporting the regulations.

The traffic safety concerns associated with on-premise digital signs have existed for some time, but there has been little research, particularly on a national level, that directly addresses the safety impacts of on-premise digital signs. In part, this is due to the fact that the use of such signs has grown only in the last 5–10 years. The research described in this report was conducted to provide a scientifically based, national analysis of on-premise digital signs so that the traffic safety impacts of such signs can be better understood.

RESEARCH APPROACH

The basic research method used in this study is a before-after statistical analysis of the change in traffic crashes at locations where digital signs were installed. The research team used digital sign installation information provided by sign manufacturers to identify locations in selected states where digital signs had been installed in the 2006–2007 time frame (this time frame was selected to provide adequate numbers of crashes in both the before and after periods). The analysis locations were limited to California, North Carolina, Ohio, and Washington because these states are part of the Federal Highway Administration (FHWA) Highway Safety Information System (HSIS). The HSIS is a database of crash records that includes detailed information about the roadway and crashes, including such factors as the number of lanes, the speed limit, crash severity, and other factors. The researchers then mapped the sign sites to the crash datasets to identify locations with crashes. These locations were then analyzed to compare the crashes before installation of the digital sign to the crashes after installation of the sign using statistical analysis procedures.

DESCRIPTION OF A DIGITAL SIGN

For the purposes of this study, a digital sign is defined as a sign that uses an electrical display, such as a liquid crystal display (LCD) or light-emitting diode (LED), to provide changeable

messages or graphics. There are several types of digital signs, including digital billboards, indoor video advertisements, and street-level advertisements (such as LED signs on bus shelters). For this study, the researchers focused only on on-premise digital signs, which are signs located on the same property as the business with which they are associated. The research effort did not include or address off-premise signs or billboards.

RESEARCH ACTIVITIES AND REPORT ORGANIZATION

There were five major activities associated with this research effort. The study began by reviewing and evaluating previous research on the safety aspects of digital signs and the statistical methods that other researchers have used to evaluate the safety aspects of signs. Chapter 2 describes the results of the review of background information. The researchers then began to collect information related to digital signs and crash data in the selected states. The sign information included the location and date of installation, and the crash data included the location and date. The researchers then devoted extensive effort to matching the locations and dates of the signs and crash datasets. Chapter 3 describes the sign and crash data and how the two datasets were merged together. Once this was accomplished, the next step was to develop a valid and scientifically based statistical analysis procedure to determine if there were any statistically significant changes in crashes after installation of digital signs. Chapter 4 describes the development of a statistical methodology, including a comparison of the advantages of the different options for conducting the statistical analysis. Finally, the research team used the results of the statistical analysis to define the key study findings, which are described in Chapter 5. Chapter 6 presents the conclusions and recommendations for the research study.

CHAPTER 2:
BACKGROUND INFORMATION

This chapter provides a review of the literature related to on-premise digital signs and their impacts on traffic safety. The review also includes a summary of statistical methods that can be used for evaluating the safety effects for these types of signs. Although the majority of the work has been related to off-premise digital signs, key studies associated with off-premise signs are nonetheless briefly discussed here. It should be pointed out that compared to other types of roadway-related operational and design features, such as access point density on urban arterials or on-street parking designs, the number of documents that are related to either on- or off-premise signs is relatively small.

On-premise signs are signs that are located on the same property as the activity described in the sign, while off-premise signs are located away from the activity identified in the sign. Off-premise signs are also known as third-party signs or outdoor advertising, and the most common example is a billboard. In general, off-premise signs have a larger visible area, which is attributed to the fact that these signs usually have greater surface areas and have higher mounting heights than on-premise signs. Furthermore, off-premise signs have a larger viewership because they are usually located adjacent to freeways and major highways with higher traffic volume. On the other hand, on-premise signs are installed on private property where a company conducts its business, and most are located along urban streets or local roadways. According to *The Signage Sourcebook* (U.S. Small Business Administration, 2003), the viewing opportunities for outdoor advertising (typically 333,350 cars per day) are much greater than those for an on-premise sign (30,000 cars per day).

The literature review is divided into two sections. The first section summarizes studies related to on-premise digital signs. The second section presents the summary of two key studies associated with off-premise digital signs.

ON-PREMISE DIGITAL SIGNS

This section describes the characteristics of the studies that have examined the relationship between safety and on-premise digital signs. To the knowledge of the authors, only two studies have investigated this relationship. It should be pointed out that the safety relationships identified in these research documents were not based on crash data but more on opinions and hypotheses, which limits their value as a direct measure of on-premise sign safety. The first study was conducted by Mace (2001). This author performed a literature review and listed two hypotheses about how on-premise signs can influence crash risk. The first hypothesis states that on-premise business signs distract drivers' attention from their primary driving tasks, resulting in higher crash risks. The second hypothesis asserts that on-premise business signs may mask the visibility of regulatory and warning road signs, which also can negatively influence crash risk.

On the other hand, Mace (2001) noted positive effects associated with commercial signs. He reported that commercial signs could reduce unnecessary traffic exposure by providing adequate navigation information for drivers, such as providing restaurant information for hungry drivers.

However, only measuring the frequency and duration of drivers' distraction may not represent the safety impacts of on-premise signs because a study published earlier showed that half of the objects that drivers see are not related to driving tasks (Hughes and Cole, 1986). In other words, besides on-premise signs, other roadside features may also distract drivers. The possible solution to minimize the negative effects of an on-premise sign, but still keep its positive effects, is to separate the sign's content to primary (navigation) and secondary (commercial) information.

Although, in the past, on-premise signs and off-premise signs were treated as distinct signage, they are becoming more homogeneous in terms of characteristics. In the second study, Wachtel (2009) mentioned that more roadside businesses, especially those with multiple users (e.g., shopping centers, auto malls, sports complexes, and entertainment places), now install larger-sized on-premise digital signs because of the lower cost and better performance of the LED display. Wachtel indicated that the largest digital advertising sign in the world is an on-premise sign in New York City. This sign is 90 ft tall and 65 ft wide, and is mounted on a 165-ft-tall steel post on the roof of the warehouse. The visible distance is over 2 miles. Wachtel also suggested that some on-premise signs affect traffic safety more than some off-premise digital signs because the locations and elevations of on-premise signs might be closer to the road users. In addition, the angles of on-premise signs may be out of the cone of vision and require extreme head movements to read.

In summary, these two studies showed more research is needed for understanding the relationship between on-premise digital signs and crash risk.

OFF-PREMISE DIGITAL SIGNS

This section is divided into two parts. The first part describes two key studies that have examined the safety effects of off-premise digital signs. The second part covers methodologies that have been used for estimating these effects.

Safety Effects

There are two reports that provide reviews of the findings, methods, and key factors related to the safety effects of off-premise digital signs. The first systematic study related to the impacts of off-premise signs was conducted 11 years ago by Farbry et al. (2001). Their study reviewed earlier reports and analyses (including those about electronic billboards and tri-vision signs) and provided the foundation for the second study written by Molino et al. (2009). In the second report, Molino et al. (2009) reviewed 32 related studies, which included those initially reviewed by Farbry et al. (2001), and noted that the majority of studies reported a negative effect between digital billboards and traffic safety. Although the number of studies that showed harmful impacts is five times more than the number of studies that showed no harmful impacts, the authors suggested that this ratio may not be strong evidence to prove the negative effects linked to electronic billboards (EBBs). The individual studies considered by these researchers had very different study methods and statistical powers, which can have a significant effect on the quality and results of the research.

Another important finding in the Molino et al. (2009) report is that drivers usually have spare attention capacities, and they can be distracted from their driving tasks by roadside objects (such as EBBs). However, these distractions may be riskier when the driving demands increase, such as in fixed hazard areas (e.g., intersections, interchanges, and sharp curves), in transient risky conditions (e.g., adverse weather, vehicle path intrusions, and slow traffic), or when other important information is processed at the same time (e.g., an official traffic sign). In other words, not only will the sign's internal characteristics (overall size, legend size, color, contrast, luminance level, etc.) affect crash risk, but so will external environmental factors (type of road, speed, weather conditions, time of day, etc.). Hence, Molino et al. list all possible key factors and suggest further studies to examine how they could influence safety. These factors are categorized into two groups: independent and dependent variables. The independent variables are separated by subject into five subgroups: billboard, roadway, vehicle, driver, and environment. It should be noted that the relationship between EBBs and on-premise signs is discussed in the environment subgroup, and dynamic factors of on-premise signs, such as change rate, motion, video, and sound, are listed as extremely important. The dependent variables are separated into vehicle behavior, driver/vehicle interaction, driver attention/distraction, and crash categories. Since there are hundreds of related key factors, the authors claimed that "No single experiment can provide the solution" and suggested future research programs to address the following topics: (1) determining when distraction caused by commercial electronic variable message signs (CEVMSs) affects safe driving, (2) investigating the relationship between distraction and various CVEMS parameters, and (3) examining the relationship between distraction and safety surrogate measures, such as eye glance and traffic conflicts.

Table 1 summarizes the literature review results from these two reports. This table shows that the results of crash studies are not consistent, and most studies have some important weaknesses, such as neglecting biases related to the regression to the mean (RTM) (discussed below) and site-selection effects (using the naïve method), low statistical power, and analysis results based on erroneous assumptions. It should be noted that only post-hoc crash studies are listed here because this study focuses on the change of crash rate caused by on-premise digital signs.

As mentioned, Table 1 shows that the results related to the safety effects of off-premise signs are inconsistent. The inconsistencies can be fully or partly attributed to various study limitations. For instance, the studies in the Wachtel and Netherton report (1980) and Wisconsin Department of Transportation report (1994) both used a naïve before-after study methodology (methodology approaches are described in Chapter 4), and they did not account for the RTM bias, which may change their estimates of crash rate and safety effects of signs. The general idea of RTM is that when observations are characterized by very high (or low) values in a given time period and for a specific site (or several sites), it is anticipated that observations occurring in a subsequent time period are more likely to regress toward the long-term mean of a site (Hauer and Persaud, 1983). Also, these studies should provide the variance of estimators (that is the uncertainty associated with the estimator) for judging the statistical significance of their results. Moreover, grouping studies where the objectives or types of signs are different is not appropriate. For example, the goal of the report prepared by Tantala and Tantala (2007) was to study the safety impacts caused by converting traditional billboards to digital billboards, while other studies focused on the safety impacts after installation of new digital billboards. Those are two distinct effects that are examined and should not be grouped together to evaluate the safety effects of on-premise digital

signs. Wachtel (2009) also noted other limitations in Tantala and Tantala's study, such as a lack of adequate before-after and comparison group data; no clear definition and reasonable calculation of the visual range and legibility range of EBBs; and no crash data related to adverse weather, impaired drivers, and interchanges.

Table 1. Safety effects of off-premise digital signs

Study	Methods	Data Type	Results	Location	Sample Size
Wachtel and Netherton (1980)	Naïve before-after study	Crash frequency	The crash reduction of target area was 10% less than the overall reduction (after the installation of the signs)	Tele-Spot sign, Boston	Not provided
Wisconsin Department of Transportation (1994)	Naïve before-after study	Crash frequency, Average daily traffic (ADT)	Crash rate (eastbound): all crashes increased 36%, sideswipe crashes increased 8%, and rear-end crashes increased 21%	Milwaukee, Wisconsin	2
			Crash rate (westbound): all crashes increased 21%, sideswipe crashes increased 35%, and rear-end crashes increased 35%		
Smiley et al. (2005)	Before-after study (empirical Bayes)	Crash frequency, ADT, safety performance function	Downtown intersection sites: no significant change in crash rate (all crashes increased 0.6%, injury crashes increased 43%, and rear-end crashes increased 13%)	Toronto, Canada	3
	Before-after study (control group)	Crash frequency, ADT, control group	Rural sites: no significant change in crash rate based on most compared sites	Toronto, Canada	1
Tantala and Tantala (2007)	Naïve before-after study	Crash frequency, control group, ADT	No significant change in crash rate	Cuyahoga, Ohio	7
Tantala and Tantala (2009)	No description of the method		No significant change in crash rate	Cuyahoga, Ohio	7

The second shortcoming in Tantala and Tantala (2007) is that they used a simple correlation analysis between sign density and crash rate to examine safety effects of billboards. Using this approach, they found that the correlation coefficients among the scenarios analyzed were very low (around 0.20), indicating that the installation of billboards did not increase the number of crashes. This may well be true, but they did not use the right analysis tool. For investigating the relationship between sign density and the number of crashes, it is more appropriate to develop one or several regression models since the safety analyst can have a better control over other factors that can influence the number and severity of crashes (Lord and Mannering, 2010). In a regression model, several independent variables can be included, which is better to estimate the variable of interest (such as the installation of digital signs). However, it should be pointed out that the before-after study, as performed in this study, still remains the best methodological approach for estimating the safety effects of an intervention.

Among all studies in Table 1, Smiley et al. (2005) provides the more reliable results since they used a before-after method using a control group (CG) and empirical Bayes (EB) approach. The

only limitation is related to the small sample size. The authors of the study only evaluated three sites. Even with a small sample size, the EB method can still be successfully used to evaluate the safety effects of an intervention, as was done by Ye et al. (2011). Ye et al. (2011) used the EB method to estimate the safety impacts of gateway monument signs, which can be categorized as one type of off-premise sign. Gateway monuments are roadside structures used to introduce a city or town. These monuments usually have the name of the city or town and are located at the city limits.

According to Wachtel et al. (2009) and Farbry, (2001), using crash data might not be a precise method because crashes usually have multiple causal events, which are difficult to extract from crash datasets. For example, they noted that sign internal variables (such as size, brightness, viewing angle, etc.) might play main roles in drivers' distraction or ignoring of official traffic signs, while other external factors affect conflicts and crash risk. Although those reasons may be legitimate, utilizing crash data is still the best approach for evaluating the safety effects of interventions as well as those associated with operational and design features (Hauer 1997). As stated by Hauer, "*It follows that, in the final account, to preserve the ordinary meaning of words, the concept of safety must be linked to accidents.*" Furthermore, using crash data have other advantages: lower cost and fewer artificial errors. Firstly, the cost of conducting a before-after crash study is much lower than human-centered methods because the researchers do not need to purchase equipment and hire participants for conducting driving tests. Secondly, crash data are based on crash reports, which can provide a more accurate measure of safety than surrogate measures such as speed, driver behavior, or other measures. Only by conducting a before-after crash study can one provide results that combine multiple casual variables in the real world. Other methods cannot displace the above advantages, which explain why the research team selected the before-after methodology for estimating the safety effects of digital signs.

Characteristics of the Evaluation Methods Used in Previous Studies

This section describes the characteristics of other methods used in previous studies for examining the safety effects of off-premise digital signs. In addition to a crash before-after study approach, the most common study methods that have been used for examining the safety impacts of off-premise signs include eye fixations, traffic conflicts, headways and speeds, and public surveys. Most studies used one or more of the above methods to examine the impacts of off-premise signs (Molino et al., 2009). For instance, Smiley et al. (2005) used four different methods (eye fixation, conflict study, before-after crash study, and public survey) for examining a video sign located in Toronto. On the other hand, Lee et al. (2007) used eye fixations and a questionnaire for their study. It should be noted that the results from multiple measurements are usually inconsistent.

Briefly, the eye fixation study method uses an eye-tracking system to record drivers' eye movements. The results (e.g., eye glances and durations) can provide direct evidence of where drivers are looking while driving, leading to assumptions as to whether drivers are distracted when they are driving near or toward a sign (or at other roadside features). Traffic conflicts, often referred to as surrogate measures of safety, can be used for identifying risky driving behaviors, such as braking without good reason, inappropriate lateral lane displacement, and delays at the start of the green traffic signal phase. Headways and vehicle speed can be used to

assess distracted drivers since those drivers tend to have shorter headways and higher speed variances.

Most details about experiment design, such as the participant number, study site size, driving route length, and experiment duration can be found in Appendix B of the report prepared by Molino et al. (2009). In the current study, the researchers focus the discussion on the before-after crash data study method for two reasons. First, Molino et al. (2009) did not provide a detailed experimental design for using crash data, and some studies were criticized for inappropriate methodology (Tantala and Tantala, 2007; 2009). Second, the costs associated with other experimental methods are significant and are greater than the resources that were allocated for the current research study. According to Molino et al. (2009), the budgetary costs to conduct research using other experimental methods vary between $0.4 million and $0.8 million for using on-road instrumented vehicles, $2 million and $4 million for conducting a naturalistic driving study, and $1 million and $3 million for using an unobtrusive observation approach.

CHAPTER 3:
STUDY DATA

To conduct the safety analysis, the research team had to develop plans for collecting the necessary data, manipulating the data into a format that could be used for the safety analyses, and then conducting the statistical analysis to identify the safety impacts of on-premise digital signs. The success of this project relied upon the ability to acquire two distinct sets of data and the robustness of the individual datasets. The two datasets needed for the analysis included (1) information regarding the location and installation dates for on-premise digital signs, and (2) data regarding crash histories on the roadways in the vicinity of the on-premise digital signs. The latter also included information about operational (e.g., traffic flow and speed limit) and geometric (e.g., functional class and lane width) design features located at and adjacent to the on-premise digital signs. From the beginning of the project, the research team expected to use the HSIS crash data for the crash history dataset. The real challenge of this project was identifying specific information about on-premise digital signs for the states represented in the HSIS, and the researchers encountered numerous challenges in acquiring this information. Once the data for both groups were acquired, the researchers had to overcome differences in the datasets so that the data could be merged into a single dataset for analysis. The activities associated with the acquisition of the crash data, acquisition of the sign data, and the merging of the two datasets are described in this chapter.

CRASH DATA

The HSIS is operated and maintained by the FHWA, and is widely used for safety research programs that provide input for public policy decisions. The HSIS is a multistate relational database that contains crash, roadway, and vehicle information. Crash information/files contain basic crash information, such as location (based on reference location or mile-point), time of day, lighting condition (e.g., daylight, dark and no lighting, dark and roadway lighting, etc.), weather conditions, crash severity, the number of related vehicles, and the type of crash (e.g., head-on, right angle, sideswipe, etc.). Each row in the spreadsheet file contains crash information for individual crashes and a unique ID number, and each column represents a variable. The roadway information/files provide traffic and geographic information for each roadway segment, such as annual average daily traffic (AADT), speed limit, beginning mile-point, end mile-point, number of lanes, lane and median width, shoulder width and type, rural or urban designation, and functional classification. The vehicle information/files contain driver and vehicle information, such as a crash identification number, driver gender, driver age, contributing factor (possible casual factor), vehicle type, and others. These individual file types can be linked together as a whole dataset. For example, crash files and road files can be linked by their location information (route number and mileage), or crash files and vehicle files can be linked together by their crash identification number.

Currently, there are seven states that actively participate in the HSIS: California, Illinois, Maine, Minnesota, North Carolina, Ohio, and Washington. However, the HSIS has an upper limit on the amount of data that can be requested by researchers (including the number of states, the request area, and total variables). To maximize the value of the crash data that they could request, the

research team held discussions with the research advisory panel to identify the states (from the list of seven HSIS participating states) where there would be higher concentrations of on-premise digital signs. Based on this input, the research team requested HSIS data for California, North Carolina, Ohio, and Washington in order to get a maximum number of study sites. All crash datasets were downloaded from the HSIS website and stored in a spreadsheet format. The definitions for the variables in a state's crash data were found in the HSIS guidebooks. It should be noted that each state has its own guidebook and data record format. In other words, one specific variable might be available for some states, but this variable may have different meanings or category types, or even be unavailable for other states. The inconsistent definitions among different states' crash datasets can affect the quality of analysis and results when selecting specific variables for identifying target crashes (such as rear-end crash) needed for more advanced analysis. The differences between states also create challenges when trying to merge data into a single dataset for analysis.

Although the HSIS dataset provides the most comprehensive crash data from different states, the HSIS has some limitations. First, the HSIS only includes crashes that occur on major roads, such as interstate highways, U.S. highways, and state highways. The HSIS dataset may not include crash-related data for secondary roads in rural areas or city streets in urban areas, including arterial streets that are major roads in a city but are not on the state highway system. Table 2 identifies the level of crash coverage and roadway length for each state selected for the analysis.

Table 2. HSIS crash coverage and roadway length by state

California	1. More than 500,000 crashes occur each year; HSIS includes about 38% of those crashes. 2. HSIS includes 15,500 miles of mainline (non-ramp) roadways.
North Carolina	1. About 230,000 crashes occur each year; HSIS includes 70% of those crashes. 2. Of the 77,000 miles of roadway on the North Carolina state system, approximately 62,000 miles are included in the database.
Ohio	1. About 380,000 crashes occur each year; HSIS includes 40% of those crashes. 2. In Ohio, about 116,000 miles of highway in total; HSIS includes approximately 19,500 miles of roadway.
Washington	1. 130,000 crashes occur each year; HSIS includes 37% of those crashes. 2. HSIS contains 7,000 miles of mainline (non-ramp) roadway.

Another limitation of the HSIS data is that the dataset is not continuously updated. The HSIS data represent the final crash datasets from each state after the state has processed the crash data. As a result, the HSIS dataset may not include the last several months or more of crash data from a state. Currently, the most updated HSIS crash data are through 2009 (California is updated to 2008), so the most recent one or two years of crashes are not included in the HSIS data. Also, the oldest HSIS crash data extend back only through 2004. Limiting crash data to the period from 2004 to 2009 was a significant consideration in this research project because the large growth of on-premise digital signs is relatively recent, having mostly grown since the mid- to late 2000s. The lack of data for the last two to three years created challenges with respect to developing a robust statistical analysis procedure. For a comparison of safety impacts of a treatment (such as installation of a digital sign) to be meaningful, both the before and after analysis periods need to be about equal and as long as possible. This meant that, to have two-year analysis periods (two years before and two years after) in the safety analysis, on-premise digital signs needed to be

installed in either 2006 or 2007. In order to focus the safety analysis on the long-term impacts of on-premise digital signs, the researchers did not include the calendar year of installation of a sign in the analysis. For example, if a sign was installed in 2006, the before period was calendar years 2004 and 2005, and the after period was calendar years 2007 and 2008.

An additional limitation of the HSIS crash data is that the crash location within the HSIS is identified to the nearest 0.1 mile (528 ft) on the roadway. This required the safety analysis to be conducted for the tenth of a mile length of roadway that a sign was located within. The level of accuracy is the primary reason that 0.1 miles was chosen as the effective area of the sign.

The researchers viewed the limitations mentioned above as minor and ones that had minimal impact on the study results. There are no comparable crash datasets available to researchers that could be used for a similar type of analysis of crashes. The only alternative available to the researchers would have been to try and obtain crash data from individual agencies where on-premise digital signs have been installed. Such an approach may have provided more specific data about individual signs and site characteristics, but would have resulted in an extremely small dataset. The researchers felt that such small sample sizes would not provide sufficient robustness for statistical analysis and that the approach using the HSIS data provided greater scientific validity and robustness, as discussed in the previous chapter.

SIGN DATA

With the acquisition of the HSIS data, the research team had information to analyze crashes but had no idea about where to conduct the analysis. Determining the location for the crash analysis required information regarding the location of on-premise digital signs. Furthermore, due to the date limitations of the HSIS data, only sign sites where the sign was installed in 2006 or 2007 could be used for the crash analysis. So the research team began the process of identifying locations in California, North Carolina, Ohio, and Washington where on-premise digital signs had been installed on major roads in 2006 or 2007.

Initial attempts to identify sign locations focused upon getting information from the Signage Foundation, Inc., (SFI) research advisory panel. However, the results did not provide a large enough sample size for a robust statistical analysis. The research team began to contact sign installation companies but encountered challenges in acquiring the large amount of data needed to conduct the research. The primary challenge associated with contacting sign installation companies (which are the same companies that market the signs to individual businesses) was the proprietary nature of the business information the research team was requesting. Another challenge was the large number of individual companies that needed to be contacted to develop a robust sample size.

Because of the challenges of working with sign installation companies, the research team shifted the focus to sign-manufacturing companies. Eventually, the research team was able to work with two electronic sign-manufacturing companies to get a list of on-premise digital signs installed in any of the four study states during 2006 or 2007. Each of the two lists was converted into datasets for use in the research effort. The first dataset (dataset #1) contained 2,953 sign sites and 27 variables, which included the characteristics of signs and roads, such as sign order date, sign

address (road, county, and state), the nearest cross street and its distance from the sign, the nearby cross street with the highest volume and its distance from the subject intersection, and traffic volume on the subject road. The research team did not use the road information from dataset #1, relying instead upon the road data in the HSIS crash dataset. This ensured consistency in the approach with the different sign datasets. Also, the sign installation date was considered to be the sign order date plus two weeks. This assumption was based on input from the sign-manufacturing company. Since the entire year that the sign was installed was excluded from the analysis, this was considered not to be a critical issue.

The second dataset (dataset #2) had 63 site addresses and 10 variables. Unlike the first dataset, most variables in dataset #2 were related to product information, such as installation data, sales representative, product name, matrix, color, customer ID (address), and status of signs.

For the analysis, these two datasets were combined as one for use in analyzing the crashes by individual state. The combined dataset was further refined by removing all sign locations that were not installed in either 2006 or 2007. The calendar year that a sign was installed was treated as the construction year, and the crashes that occurred in that year were removed from the analysis. The entire calendar year was removed from the analysis due to uncertainty over the actual installation date of the sign since the data provided only the order date for the sign. Removing the entire calendar year associated with installation also eliminated the novelty effect associated with implementing a new feature. The second variable, the sign installation address, was used to select related crashes by the sign's location and default sign-effective areas. For example, the researchers defined the crashes located within 0.1 miles from the target signs as related crashes. In reality, the effective area could be larger or smaller depending upon the sign size. The procedure used for this analysis did not adjust the effective area based on sign size or other factors. Overall, significant effort was put into ensuring the accuracy of the sign datasets because the quality of the data had a huge impact on the precision and accuracy of the analysis.

DATA-MERGING PROCEDURE

The previous sections explain how the researchers obtained their study data (the sign dataset and the crash dataset) and the characteristics of each dataset. This section gives more details about the dataset-merging procedure. Several steps were involved in merging the crash and sign location datasets into a single dataset that could be used for statistical analysis. The early steps focused on confirming that the digital sign was still in place and near the road that it is related to. This was needed because a site could have an address on one road but have the sign facing traffic on another road bordering the site property. The later steps focused upon converting the street address of the sign location to a route and milepost value that could be used with the crash dataset. This complex effort was necessary due to the fact that the sign and crash datasets used different location methods. The sign dataset was based on the site address, while the crash database was based on route number and milepost. For example, a location in the sign dataset would record a location with "1234 North Highway 101, Anytown, WA 98584," but the HSIS would show the same location as "route number = 23101" and "mile post = 335.72." In order to define the related crashes that were adjusted to the target signs, the researchers needed to transfer sign locations into the HSIS location system. The basic steps are described below and illustrated in Figure 2.

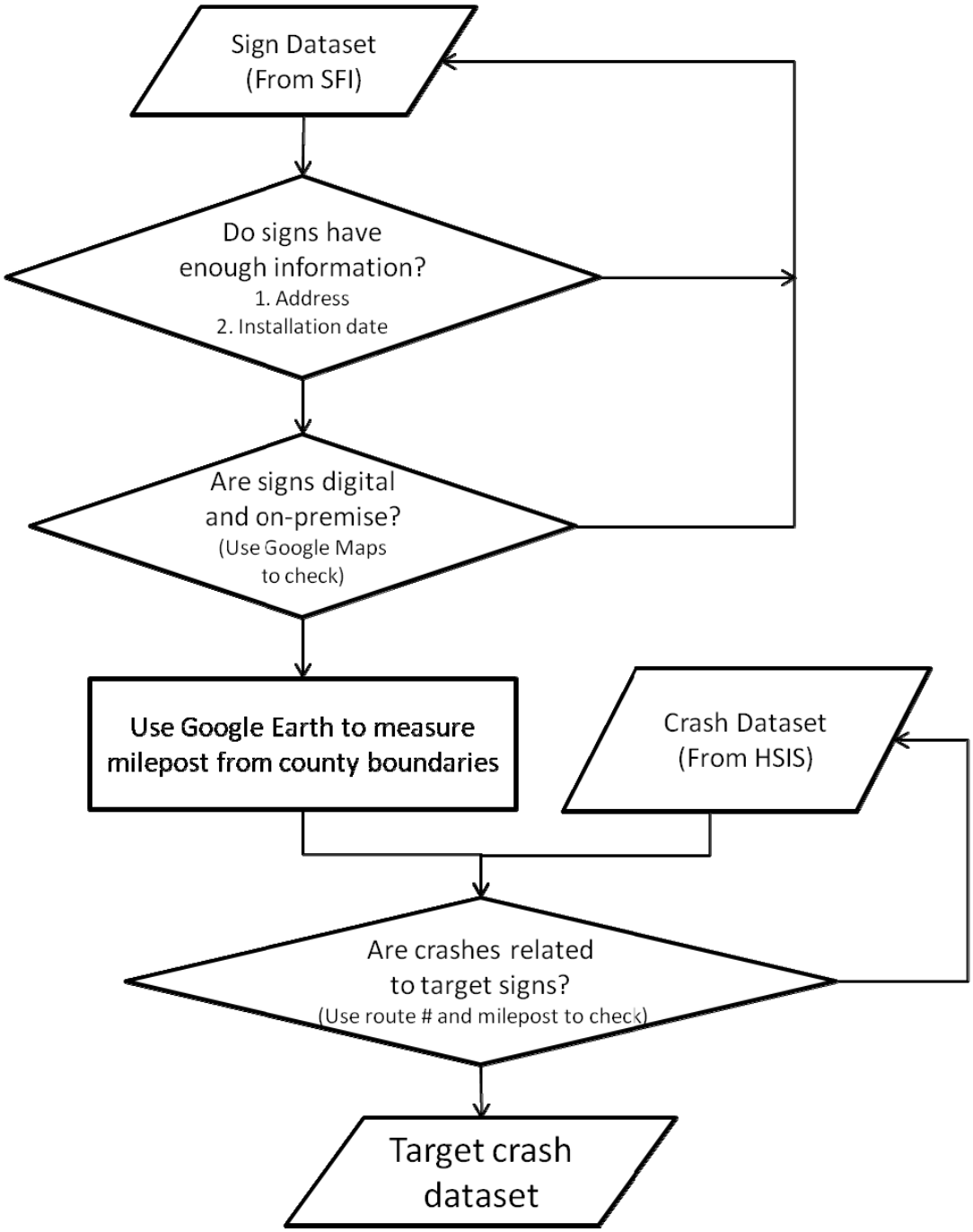

Figure 2. The flow chart for data collection and merging procedure

1. For each record of the combined sign dataset (3,016 total records), the research team evaluated the location information (typically a street address) and the sign order date. Records with missing or incomplete location information or with assumed sign installation dates that were not in 2006 or 2007 were deleted from the dataset.

2. Research team members then verified the location of the sign using the site address in the sign dataset and taking the steps listed below. Figure 3 shows an example table that the researchers used for the above data collection, including screenshots of Google Maps and Google Earth (Google Earth, 2008). Columns 1–3 are the address information given by the sign companies. Columns 4–7 are determined through Google Maps, and Columns 8–11 are determined through Google Earth.
    a. The sign was located in Google Maps using the site address.
    b. Using the Street View feature of Google Maps, a member of the research team identified the sign on the site or deleted the record with a note that the on-premise digital sign could not be identified. There were some challenges associated with finding digital signs using the Street View pictures from Google Maps, including fuzzy pictures with low resolution, which made it difficult to evaluate some signs, and digital signs that were not obvious during the daytime (Street View provides only daytime pictures).
    c. The screen image of the subject sign was saved, and basic sign characteristics were identified and/or estimated. Examples include sign color, size, and business type.
    d. An initial determination was made as to whether the sign was located on a major road that would be part of the HSIS crash dataset. If the road was not expected to be a major road, the record was deleted from the dataset.
3. The sign location was entered into Google Earth to determine the county in which the sign was located and the mileage from the county border. This included identifying the county identification code in the appropriate HSIS manual for a given state. This provided the milepost location information needed to relate the sign location to the location information in the crash dataset. Defining the milepost information required doing the following:
    a. Identifying the neighboring county, which was used to determine in which direction the mileposts were increasing.
    b. If the county had mileposts restarting at zero at the county borders, determining in which direction they were increasing, based on the number of lanes at the borders. If the direction could not be determined, a general rule of increasing from west to east or south to north was used.
    c. Using the path tool in Google Earth to measure the distance from the county border to the sign. This distance and the beginning milepost at the county border established the milepost of the sign.

An example (using the above procedure) can be founded in Appendix A. After target sign locations were transferred into the HSIS locating system, a statistics software package, “R,” was used to select the related crashes among the whole HSIS dataset.

Sign ID	Address	Installation date	Google Map				Google Earth				Note
			Picture	Color (Single/ Multi.)	Dimension	Business Type	County ID	Route #	Distance	Mile post	

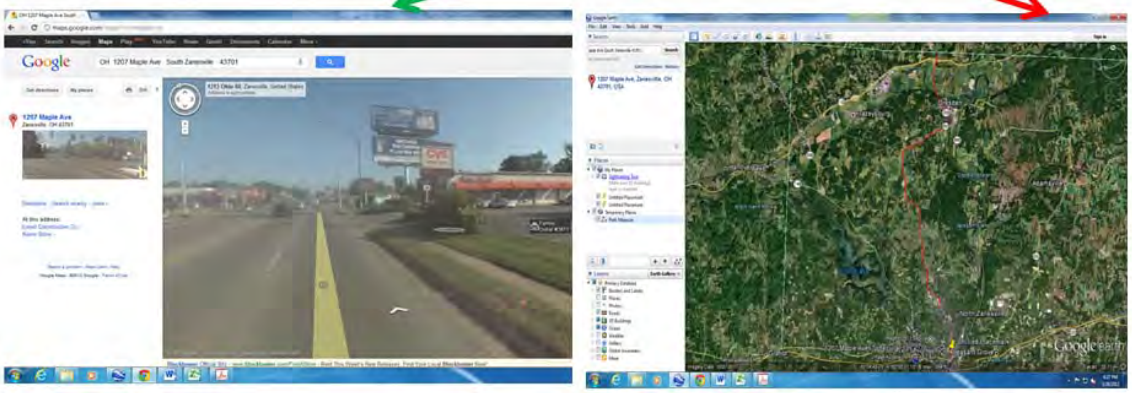

Figure 3. Example work table of site data collection

CHAPTER 4:
STUDY METHODOLOGY

Evaluating the effects of treatment on the number and severity of crashes is a very important topic in highway safety. For the last 30 years, various methods have been proposed for evaluating safety treatments (Abbess et al., 1981; Danielsson, 1986; Davis, 2000; Hauer, 1980a; Hauer, 1980b; Hauer et al., 1983; Maher and Mountain, 2009; Miranda-Moreno, 2006; Wright et al., 1988). The methods are classified under two categories: the before-after study and the cross-sectional study. In a before-after study, the safety impacts of an improvement or treatment at a given location are determined by comparing the change in crashes before and after the improvement/treatment was installed. In a cross-sectional study, crashes or crash rates on two different facilities with similar characteristics except for the improvement of interest are compared. The before-after study is typically more desirable because it provides a more direct evaluation of the safety impacts. Although they have been used by some researchers (Noland, 2003; Tarko et al., 1998), cross-sectional studies are more difficult to conduct because different facilities are rarely identical in all features except the one of interest. Hence, the cross-sectional approach was not used in this research. The before-after type of study can be further divided into several types:

- naïve before-after study,
- before-after study with control group,
- before-after study using the EB method, and
- before-after study using the full Bayes approach.

The before-after study using the full Bayes approach is a more recent development in statistical safety analysis, developed and used by several noted safety researchers (Hauer and Persaud, 1983; Hauer et al., 1983; Hauer, 1997; Li et al., 2008; Persaud and Lyon, 2007). The advantages and disadvantages for each of the above before-after methods are described in more detail in this chapter.

A BEFORE-AFTER STUDY AND A CROSS-SECTIONAL STUDY

As mentioned previously, observational crash studies can be grouped into two types: the before-after study and the cross-sectional study. The selection of the study type is based on the availability of historical crash data, traffic volume, or the comparison group. The following sections provide details about the before-after methodology.

The Before-After Study

The before-after study is a commonly used method for measuring the safety effects of a single treatment or a combination of treatments in highway safety (Hauer, 1997). Short of a controlled and full randomized study design, this type of study is deemed superior to cross-sectional studies since many attributes linked to the converted sites where the treatment (or change) was implemented remain unchanged. Although not perfect, the before-after study approach offers a

better control for estimating the effects of a treatment. In fact, as the name suggests, it implies that a change actually occurred between the "before" and "after" conditions (Hauer, 2005).

As described by Hauer (1997), the traditional before-after study can be accomplished using two tasks. The first task consists of predicting the expected number of target crashes for a specific entity (i.e., intersection, segment where an on-premise sign was installed, etc.) or series of entities in the after period, had the safety treatment not been implemented. In other words, the before-after approach described by Hauer compares the expected number of crashes in the after period with the treatment installed to the expected number of crashes in the after period had the treatment not been installed. The calculation for each expected number of crashes is based on numerous factors, including the actual number of crashes in the before condition, the actual number of crashes in the after period, and incorporation of site-specific and statistical considerations. The symbol π is used to represent the expected number of crashes in the after period (a summary of all statistical symbols used in this report are presented in Appendix B). The second task consists of estimating the number of target crashes (represented by the symbol λ) for the specific entity in the after period. The estimates of π and λ are $\hat{\pi}$ and $\hat{\lambda}$ (the caret or hat represents the estimate of an unknown value). Here, the term "after" means the time period after the implementation of a treatment; correspondingly, the term "before" refers to the time before the implementation of this treatment (an on-premise digital sign in this study). In most practical cases, either $\hat{\pi}$ or $\hat{\lambda}$ can be applied to a composite series of locations (the sum of *i*'s below) where a similar treatment was implemented at each location.

Hauer (1997) proposed a four-step process for estimating the safety effects of a treatment. The process is described as follows (see also Ye and Lord, 2009):

- Step 1: For $i = 1,\ 2,\ ...,\ \mathrm{n}$, estimate $\lambda(i)$ and $\pi(i)$. Then, compute the summation of the estimated and predicted values for each site i, such that $\hat{\lambda} = \sum \hat{\lambda}(i)$ and $\hat{\pi} = \sum \hat{\pi}(i)$.
- Step 2: For $i = 1,\ 2,\ ...,\ \mathrm{n}$, estimate the variance for each, $Var\{\hat{\lambda}(i)\}$ and $Var\{\hat{\pi}(i)\}$. For each single location, it is assumed that observed data (e.g., annual crash counts over a long time frame) are Poisson distributed and $\hat{\lambda}(i)$ can be approximated by the observed value in the before period. On the other hand, the calculation of $Var\{\hat{\pi}(i)\}$ will depend on the statistical methods adopted for the study (e.g., observed data in naïve studies, method of moments, regression models, or EB technique). Assuming that crash data in the before and after periods are mutually independent, then $Var\{\hat{\lambda}\} = \sum Var\{\hat{\lambda}(i)\}$ and $Var\{\hat{\pi}\} = \sum Var\{\hat{\pi}(i)\}$.
- Step 3: Estimate the parameters δ and θ, where $\hat{\delta} = \hat{\pi} - \hat{\lambda}$ (again, referring to estimated values) is defined as the reduction (or increase) in the number of target crashes between the predicted and estimated values, and $\hat{\theta} = \hat{\lambda} / \hat{\pi}$ is the ratio between these two values. When θ is less than one, the treatment results in an improvement in traffic safety, and when it is larger than one, the treatment has a negative effect on traffic safety. The term θ has also been referred to in the literature as the index of effectiveness (Persaud et al., 2001). Hauer (1997) suggests that when less than 500 crashes are used in the before-after study, θ should be corrected to remove the bias caused by the small sample size using

the following adjustment factor: $1/[1+Var\{\hat{\pi}\}/\hat{\pi}^2]$. The total number of crashes was over 500, but the adjustment factor had to be applied when subsets of the data, such as single- or multi-vehicle crashes, were analyzed.

- Step 4: Estimate the variances $Var\{\hat{\delta}\}$ and $Var\{\hat{\theta}\}$. These two variances are calculated using the following equations (note: $Var\{\hat{\theta}\}$ is also adjusted for the small sample size):
  - $Var\{\hat{\delta}\} = Var\{\hat{\lambda}\} + Var\{\hat{\pi}\}$ (Eq. 1)
  - $Var\{\hat{\theta}\} = \dfrac{\hat{\theta}^2[(Var\{\hat{\lambda}\}/\hat{\lambda}^2) + (Var\{\hat{\pi}\}/\hat{\pi}^2)]}{[1+(Var\{\hat{\pi}\}/\hat{\pi}^2)]^2}$ (Eq. 2)

The four-step process provides a simple way for conducting before-after studies. Three common before-after methods will be introduced in the following sections. All three methods use the same four-step process.

COMMON METHODS FOR CONDUCTING A BEFORE-AFTER STUDY

Having selected the before-after study approach, the research team then needed to decide which specific before-after method would be the most appropriate for analyzing the safety impacts of on-premise digital signs. This section of the report describes the methodologies and data needs associated with three before-after study types: naïve before-after studies, before-after studies with a CG, and the EB method.

Naïve Method

Among all the before-after methods, the naïve method is the simplest. The estimation of θ is simply equal to the ratio between the number of crashes in the after period and the number of crashes in the before period (which is used to predict the number of crashes in the after period if the treatment was not implemented). Equation 3 illustrates how the index of safety effectiveness is calculated. This method is very straightforward, but it is seldom used in the current safety study because it does not account for the RTM bias. Not including the RTM bias could overestimate the effects of the treatment or underestimate the safety impacts. The naïve method does not account for external factors that occur at the local or regional level, such as changes in weather patterns or economic conditions.

$$\hat{\theta}_{naive} = \frac{\hat{\lambda}}{\hat{\pi}} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{t} N_{ij2}^{T}}{\sum_{i=1}^{n}\sum_{j=1}^{t} N_{ij1}^{T}} \quad \text{(Eq. 3)}$$

Where

$\hat{\theta}_{naive}$ = the estimate of safety effectiveness by using the naïve method,

$\hat{\pi}$ = the predicted number of crashes for the treatment group in the after period,

$\hat{\lambda}$ = the estimated number of crashes for the treatment group in the after period,

n = the sample size,

t = the time period,

N_{ij1}^{T} = the observed response for site i (T = treatment group) and year j (in the before period), and

N_{ij2}^{T} = the observed response for site i (T = treatment group) and year j (in the after period).

The result can be adjusted when the traffic flow and time interval are different between the before and after periods. It is adjusted by modifying the predicted number of crashes as shown in Equation 4:

$$\pi = r_d r_f \sum_{i=1}^{n} \sum_{j=1}^{t} N_{ij1}^{T} \qquad \text{(Eq. 4)}$$

Where

r_d = the ratio of the duration between the after and before periods, and

r_f = the ratio of the traffic flow between the after and before periods.

Control Group Method

The CG method can be used to help control for external factors. The number of crashes collected at the control sites is defined as μ (before) and ν (after). The adjusting factor, the ratio of ν to μ, is used to remove the effects caused by other external factors from π in the theorem. Equation 5 illustrates how to adjust the naïve estimate. It should be pointed out that the RTM could technically be removed if the characteristics of the control group are exactly the same as those of the treatment group. However, getting control group data with the exact same characteristics may not be possible in practice, as discussed in Kuo and Lord (2012). Collecting control group data usually adds extra cost and time compared to the naïve method since more data needs to be collected.

$$\hat{\theta}_{CG} = \frac{\hat{\lambda}}{\hat{\pi} \times \frac{\hat{\nu}}{\hat{\mu}}} = \frac{\sum_{i=1}^{n} \sum_{j=1}^{t} N_{ij2}^{T}}{\sum_{i=1}^{n} \sum_{j=1}^{t} N_{ij1}^{T} \times \sum_{i=1}^{n} \sum_{j=1}^{t} \frac{N_{ij2}^{C}}{N_{ij1}^{C}}} \qquad \text{(Eq. 5)}$$

Where

$\hat{\theta}_{CG}$ = the estimate of safety effectiveness by using the control group method,

$\hat{\lambda}$ = the estimated number of crashes for the treatment group in the after period,

$\hat{\pi}$ = the predicted number of crashes for the treatment group in the after period,

$\hat{\nu}$ = the estimated number of crashes for the control group in the after period,

$\hat{\mu}$ = the estimated number of crashes for the control group in the before period,

N_{ij1}^{T}, N_{ij1}^{C} = the observed responses for site i (T = treatment group and C = control group) and year j (in the before period), and

N_{ij2}^{T}, N_{ij2}^{C} = the observed responses for site i (T = treatment group and C = control group) and year j (in the after period).

Empirical Bayes Method

The EB method is recommended in the *Highway Safety Manual* (HSM), published by the American Association of State Highway and Transportation Officials (AASHTO) and approved for use by the FHWA (AASHTO, 2010). The HSM is a recent document that defines standardized procedures for conducting safety analyses of highway safety improvements. The EB method combines short-term observed crash numbers with crash prediction model data in order to get a more accurate estimation of long-term crash mean. The EB method is used to refine the predicted value by combining information from the site under investigation and the information from sites that have the same characteristics, such as range of traffic flow, number of lanes, lane width, etc.

As an illustration, Hauer et al. (2002) use a fictional "Mr. Smith" to illustrate use of the EB method: Mr. Smith is a new driver in a city. He has no crash records during his first year of driving. Based on past crash histories for the city, a new driver in that city has 0.08 accidents per year. Based only on Mr. Smith's record, it is not reasonable to say that he will have zero accidents or have 0.08 accidents for the next year (based on the average of all new drivers but disregarding Smith's accident record). A reasonable estimate should be a mixture of these two values. Therefore, when estimating the safety of a specific road segment, the accident counts for this segment and the typical accident frequency of such roads are used together.

The index of safety effectiveness is illustrated in Equation 6. With the EB method, the analyst first estimates a regression model or safety performance function (SPF) using the data collected with the control group. Then, the model is applied to the sites where the treatment was implemented to get a preliminary predicted value for the after period. The EB method is then used to refine the estimate to account for the RTM bias and the external factors. It is possible for the EB method to be biased if the characteristics of the treatment and control groups are not the same (Lord and Kuo, 2012).

$$\hat{\theta}_{EB} = \frac{\hat{\lambda}}{\hat{\pi}} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{t} N_{ij2}^{T}}{\sum_{i=1}^{n}\sum_{j=1}^{t} M_{ij1}^{T}} \qquad \text{(Eq. 6)}$$

Where

$\hat{\theta}_{EB}$ = the estimate of safety effectiveness based on the EB method;

$\hat{\pi}$ = the predicted number of crashes for the treatment group in the after period;

$\hat{\lambda}$ = the estimated number of crashes for the treatment group in the after period;

M_{ij1} = the expected responses for site i for the EB method,

$$\mathrm{M_{ij1}} = \mathrm{W} \times (\hat{\Lambda}_1) + (1 - \mathrm{W}) \times (\sum_{\mathrm{j=1}}^{\mathrm{t}} N_{\mathrm{ij1}});$$

W = the weight for sites for the EB method, $W = \dfrac{1}{1 + \hat{\Lambda}_1 \times \hat{\alpha}}$;

$\hat{\Lambda}_1$ = the estimate for the average number of crashes of all sites in the before period; and

$\hat{\alpha}$ = the estimate of the dispersion parameter.

$\hat{\Lambda}_1$ and $\hat{\alpha}$ can be estimated using two different approaches (Hauer, 1997). They can be estimated based on a regression model or the method of moment. Both are calculated using data collected as part of the control group. For this research, the average number of crashes and dispersion parameter were estimated using a regression model.

CALCULATION PROCEDURES AND EXAMPLES

The EB before-after method was applied to this study with the regression models or SPFs selected from the HSM (AASHTO, 2010), which includes road types from two to five lanes. As for sites located on wider roads (six lanes and eight lanes, which are not covered in the HSM), the researchers used the SPFs from a Texas A&M Transportation Institute (TTI) study (Bonneson and Pratt, 2009). The number of crashes in each year during the before period (Λ_i) was estimated using the regression model shown in Equation 7:

$$\Lambda_i = \exp(a + bLn(AADT_i) + Ln(L_i)) \qquad \text{(Eq. 7)}$$

Where
Λ_i = the estimator for the average number of crashes per year for site i,
a, b = the coefficients in the regression model,
$AADT_i$ = the average daily traffic volume for site i,
L_i = the road length for site i, and
Ln = natural logarithm.

Table 3 shows the regression coefficients (a, b) used in Equation 7 for multi- and single-vehicle crashes.

One of the sign sites in Ohio provides an example of the detailed calculation of $M_{i,EB}$. This site is on an urban 4-lane divided highway segment in Allen County. As shown in Table 3, its intercept is -12.34 for multi-vehicle crashes and -5.05 for single-vehicle crashes, while the coefficients for the AADT are 1.36 and 0.47, respectively. For the analysis used in this report, a multi-vehicle crash is one involving two or more vehicles in the same collision.

Using the EB method, the analysis procedure to get the expected number of crashes in the before period has the following steps:

1. Identify the route number and milepost by the site's address. More specifically, the address of the example site is "1234 ABC St, Name of City, Allen County, OH." Follow the data analysis procedures discussed in Chapter 3 to identify that the route number is 657676309 and the milepost is 7.58.

Table 3. Coefficients for multi and single-vehicle crash regression model

Crash Type	Road Type*	Regression Coefficients		Dispersion Parameter (α)
		Intercept (a)	AADT (b)	
Multi-vehicle	2U	−15.22	1.68	0.84
	3T	−12.4	1.41	0.66
	4U	−11.63	1.33	1.01
	4D	−12.34	1.36	1.32
	5T	−9.7	1.17	0.81
Single-vehicle	2U	−5.47	0.56	0.81
	3T	−5.74	0.54	1.37
	4U	−7.99	0.81	0.91
	4D	−5.05	0.47	0.86
	5T	−4.82	0.54	0.52

Note: *U = undivided road, T = road with two-way left turn lane, D = divided road.

2. Based on the route number and milepost obtained above, use R statistical software to select the related crashes and road files from the HSIS dataset, which includes (1) the observed crashes near the target sign site, (2) the observed crashes in the control group sites (10 sites, which are adjusted to the target sign site on the same road), and (3) the target road file, such as traffic volume, the number of lanes, and median type. For example, the number of observed crashes at the example site is 1 in 2004, and the crash counts of the related 10 control group sites are 0, 0, 1, 1, 0, 0, 0, 0, 1, and 1. The AADT of the site is 19,753 (vehicles/day), and it has four lanes.
3. Use Equation 9 to predict the crash number of the example site:

   $$\hat{\Lambda}_{2004} = \exp(a + b(Ln(AADT)) + Ln(L)$$

   $$\hat{\Lambda}_{2004,\text{multi}} = \exp(-12.34 + 1.36 \times Ln(19753) + Ln(0.2)) = 0.61$$

   $$\hat{\Lambda}_{2004,\text{single}} = \exp(-5.05 + 0.47 \times Ln(19753) + Ln(0.2)) = 0.13$$

   $$\hat{\Lambda}_{2004} = \hat{\Lambda}_{2004,\text{multi}} + \hat{\Lambda}_{2004,\text{single}} = 0.74 \text{ (crashes/year)}$$

   The estimated crash counts of the site and its control group sites are 0.74 and 6.64, respectively (the estimated multi-and single crash counts of its control group are 5.36 and 1.28).
4. Due to using the SPFs from the HSM instead of the local SPFs from any existing studies conducted in the same study area, it is necessary to multiply the results by a calibration factor to adjust the prediction value (refer to Appendix A in the HSM for more details). The calibration factor of single-vehicle crashes at the example site in 2004 is 3.13, which is equal to the ratio of observed crashes in the control group divided by the predicted crash number in the control group (3.13 = (1×4+0×6)/1.28). By multiplying the above calibration factor, the final crash number estimation for the example site in 2004 should be 0.42 (=0.13×3.13). A calibration factor was calculated for each site and each year included in the study.

5. Repeat steps 3 and 4 to get the final prediction crash number for the example site for each year in the before period. By doing so, the estimated multi- and single-vehicle crash counts of the site in 2005 are 4.65 and 0.21, respectively. Using the summary of this prediction crash number and dispersion parameter (obtained from Table 3) results in the weights (*W*) for this site for the multi- and single-vehicle crashes, which are 0.07 and 0.65, respectively:

$$W = \frac{1}{1+\hat{\Lambda}_1 \times \hat{\alpha}}$$

$$W_{multi} = \frac{1}{1+(5.43+4.65)\times 1.32} = \frac{1}{1+10.08\times 1.32} = 0.07,$$

$$W_{\text{single}} = \frac{1}{1+(0.42+0.21)\times 0.86} = \frac{1}{1+0.63\times 0.86} = 0.65$$

6. Because traffic volume and other explanatory variables may change between the before and after periods, the researchers used one factor to account for this difference. The crash counts of the example site in 2007 and 2008 can be estimated by repeating steps 3 and 4. The estimated multi- and single-vehicle crash counts of the site in the after period are 0.84 and 0.67, respectively. Factors are estimated by:

$$r = \hat{\Lambda}_{after} \big/ \hat{\Lambda}_{before}$$

$$r_{i,multi} = (12.76/3)/(10.08/2) = 0.84$$

$$r_{\text{i,single}} = (0.63/3)\big/(0.63/2) = 0.67$$

Also, if the time periods (*Y*) of the before and after periods are different, one factor is needed to adjusted it. Here, the before and after period are both two years:

$$t_i = Y_{i,after} \big/ Y_{i,before} = 3/2 = 1.5$$

7. Using the EB method, the expected total number of crashes that would occur during the after period had the on-premise digital sign not been installed was 2.63:

$$\mathrm{M}_{\text{i,EB}} = \left[\mathrm{W} \times (\hat{\Lambda}_1) + (1-\mathrm{W}) \times (\sum_{\text{j=1}}^{\text{t}} N_{\text{ij1}}) \right] \times r_i \times t_i$$

$$\mathrm{M}_{\text{i,multi,EB}} = \left[0.07\times 10.08 + (1-0.07)\times 0\right] \times 0.84 \times 1.5 = 1.14$$

$$\mathrm{M}_{\text{i,single,EB}} = \left[0.65\times 0.63 + (1-0.65)\times 3\right] \times 0.67 \times 1.5 = 1.49$$

$$\mathrm{M}_{\text{i,all,EB}} = 1.14 + 1.49 = 2.63$$

8. The variance of the EB estimate at the example site is calculated by:

$$\mathrm{Var}(\mathrm{M}_{\text{1,EB}}) = (1-\mathrm{W}) \times \mathrm{M}_{1,EB} \times r_i \times t_i$$

$$\mathrm{Var}(\mathrm{M}_{\text{1,multi,EB}}) = (1-0.07) \times 1.14 \times 0.84 \times 1.5 = 1.31$$

$$\mathrm{Var}(\mathrm{M}_{\text{1,single,EB}}) = (1-0.65) \times 1.49 \times 0.67 \times 1.5 = 0.54$$

$$\mathrm{Var}(\mathrm{M}_{\text{1,all,EB}}) = 1.31 + 0.54 = 1.85$$

9. The safety index of the example site is:

$$\hat{\theta}_{EB} = \frac{\hat{\lambda}}{\hat{\pi}} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{t} N_{ij2}^{T}}{\sum_{i=1}^{n}\sum_{j=1}^{t} M_{ij1}^{T}} = \frac{9}{2.63} = 3.43$$

10. The 95 percent confidence interval of the example site is given as.

$$\hat{\theta} \pm Z_{0.25}\sqrt{Var\left(M_{1,EB}\right)} = \left[3.43 \pm 1.96 \times \sqrt{1.85}\right] = \left[0.76, 6.10\right]$$

The same method was applied to other locations using the appropriate SPFs. The next chapter provides the final results of the completed safety analysis.

CHAPTER 5:
RESULTS

The previous chapter explained why the research team chose to use the EB analysis procedure and provided an example of how the EB analysis was conducted. The first section of this chapter provides the results of the before-after study for each state and all the states combined. The second section provides more details about how digital on-premise signs impact traffic safety for multi-vehicle and single-vehicle crashes. The third section provides a description of an analysis of variance of the means of the safety index (θ) among the different sign characteristics such as sign color, sign size, and type of business.

INDIVIDUAL AND COMBINED RESULTS

As described in Chapter 3, the research team acquired the sign dataset from sign manufacturers. However, many signs were excluded from the analysis because of missing information in the dataset provided by the sign manufacturers or limitations in the HSIS crash dataset. The researchers retained only sign sites satisfying the following conditions:

1. the sign was located in Washington, North Carolina, Ohio, or California;
2. the sign was installed in 2006 or 2007 in order to have adequate time in both the before and after analysis periods to compare crash histories; and
3. the sign was located on a major road because the HSIS crash dataset usually does not include crashes that are located on minor roads or private driveways.

Table 4 shows the progression in sample sizes based on sites meeting the conditions identified above. For example, the original dataset for Washington included 413 site addresses that might have an on-premise digital sign. In order to make sure there was an adequate before-after crash data period for further analysis, the researchers had to filter these site addresses. The first filter excluded sites where the sign was not installed in 2006 or 2007, which was needed so that there was adequate time before and after the sign was installed to perform the safety analysis. About 40 percent of the Washington sites (159 sites) met this criterion. Then, the research team used the Street View function in Google Maps to double-check whether a digital sign was present at the given addresses and whether the sign was on a major road since the HSIS crash dataset only included crashes on major roads. Only 33 sites fit this criterion. The result was that in Washington, the research team was able to use about 33 of the 400 original sites, giving an 8.0 percent yield on the raw data.

Chapter 3 mentions that the main advantage of this study is the large sample size of data and advanced statistical methods that provide more accurate results than in similar studies. Figure 4 shows the sample size of this study in relation to other published papers and reports. This study has 135 sites from four states, a number much higher than the sample size of other similar studies. Hence, the results of this study are more robust and accurate.

Table 4. Sign site sample size yield

Number of Sites	California	North Carolina	Ohio	Washington	All States
Included in original list from sign manufacturers	86	249	372	413	1,120
Sign installation time between 2006–2007	27	94	178	159	458
Digital signs & located on major roads	6	40	73	34	153
With HSIS crash data (all crashes)	6	33	63	33	135
Data yield rate	7.0%	13.3%	16.9%	8.0%	12.1%
With HSIS crash data (multiple-vehicle crashes)	6	31	61	33	131
With HSIS crash data (single-vehicle crashes)	6	32	63	33	134

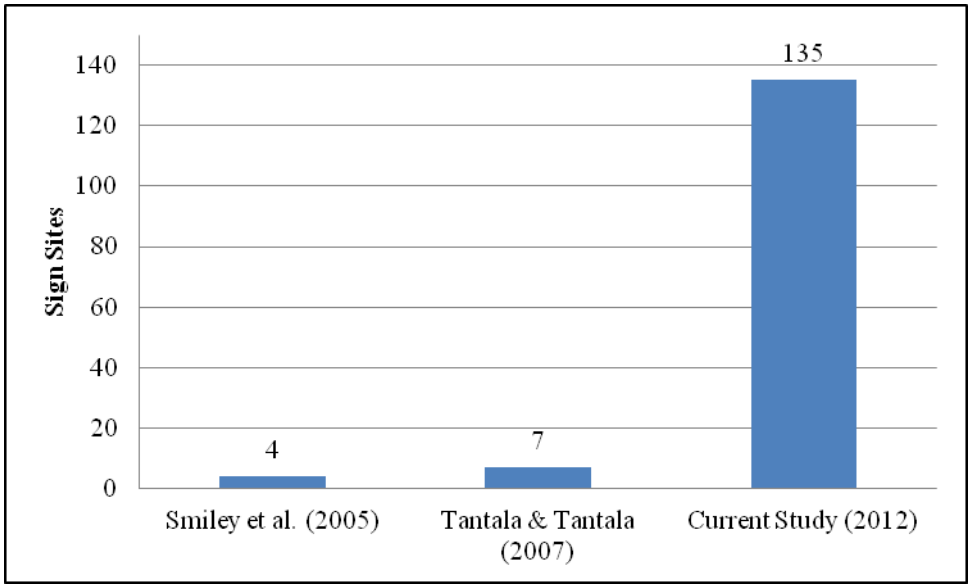

Figure 4. A comparison of sample sizes from similar studies

Table 5 presents the before-after results from the EB and the naïve statistical analysis methods. The naïve method results are provided only for comparison purposes as the naïve analysis method does not provide as meaningful results as the EB method. The results are also presented graphically in Figure 5. A safety effectiveness index (θ) of 1.0 indicates that there was no change in crashes between the before and after conditions. An index greater than 1.00 indicates that there was an increase in crash frequency in the after condition, while a value less than 1.00 indicates a decrease in crash frequency. The upper and lower bounds indicate the limits of statistical significance. If the value for θ is between the upper and lower bounds, then the change in crashes is not statistically significant at a 95 percent confidence level. A larger sample size usually leads to a smaller difference between the upper and lower bounds, but this may not always be the case since it is also governed by the variability observed in the data.

Table 5. Results of statistical analysis of before-after crash condition

State	EB Method			Naïve Method		
	Lower Bound	θ	Upper Bound	Lower Bound	θ	Upper Bound
California	0.00	1.25	2.53	0.28	0.85	1.41
North Carolina	0.87	1.14	1.41	0.88	1.13	1.39
Ohio	0.89	0.97	1.05	0.95	1.05	1.15
Washington	0.88	1.01	1.15	0.79	0.90	1.01
All states*	0.93	1.00	1.07	0.93	1.00	1.07

Notes: *"All states" represents the combined data of the four states.
Naïve method values provided for comparison purposes only.

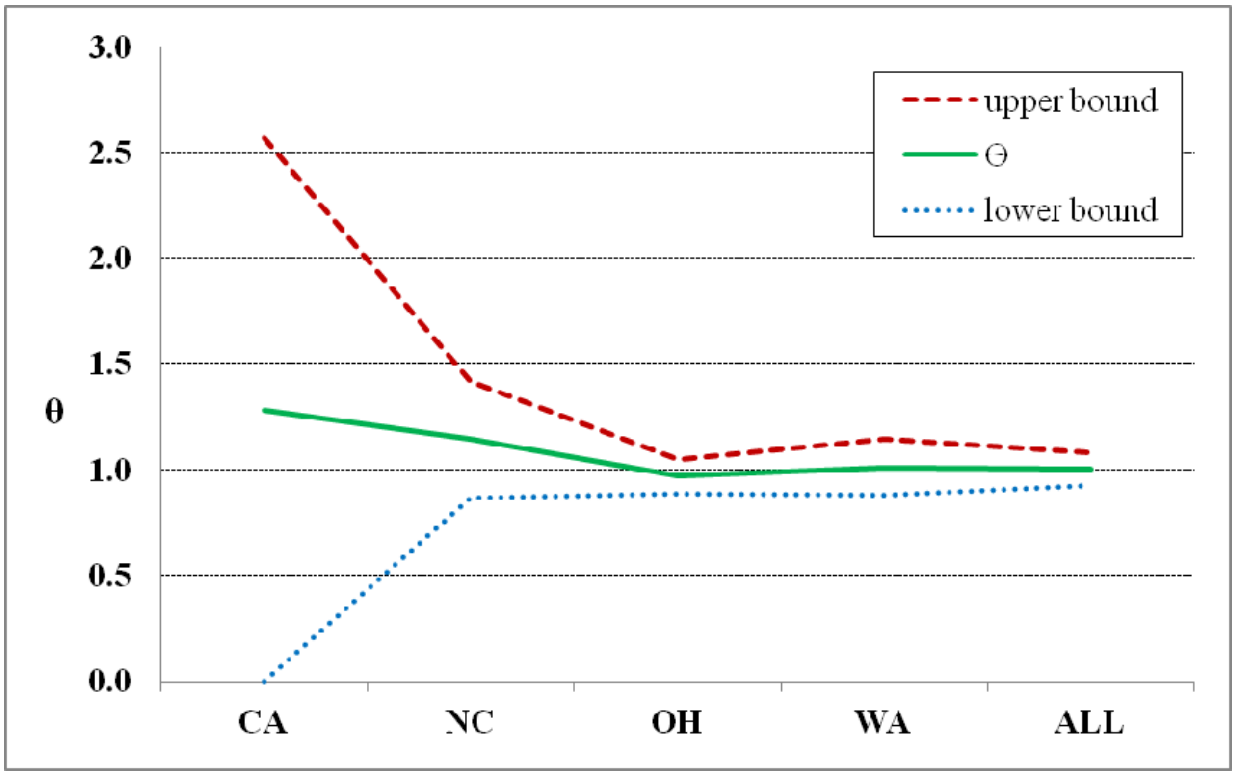

Figure 5. The safety effectiveness index and the 95 percent confidence interval for each state (all crash types)

The overall results show that there is no statistically significant increase in crash frequency after installing the on-premise digital sign because the safety effectiveness index (θ) for the entire dataset (all states) is 1.00, and the 95 percent confidence interval is 0.93–1.07 (which includes the index value of 1.00). The results for individual states are similar: no statistically significant safety impacts were observed after the installation of digital signs. In addition, one can see the width of the 95 percent confidence interval is largest for the California data. This is due to the variability of the California data and the small size of the sample set (only 6 sites). Comparing the width of the confidence intervals, from the widest to narrowest, the order is California > North Carolina > Washington > Ohio > All States.

RESULTS FOR CRASHES RELATED TO MULTIPLE AND SINGLE VEHICLES

The next analysis effort evaluated the possible safety impacts of on-premise digital signs on different types of crashes. There are several common methods to group crashes into different categories, such as the number of related vehicles, the injury levels, the collision types, and so on. Such groupings may provide some insight into the safety impacts of specific crash types, but the estimated impacts might not be precise because of a smaller sample size.

The additional analysis separated crashes into two subgroups: single- and multi-vehicle crashes. All calculations and notations were the same as used previously. By using the EB method to analyze crash data related to multiple vehicles, the researchers determined that the safety effectiveness index is equal to 1.00 for all states, and the 95 percent confidence interval varies between 0.96 and 1.21. Because the confidence interval of the safety effectiveness includes 1.00, there is no statistically significant change in crash frequency after installing the on-premise digital sign. Figure 6 graphically illustrates the results for multi-vehicle crashes. The 95 percent confidence intervals are slightly larger in this figure than in Figure 5.

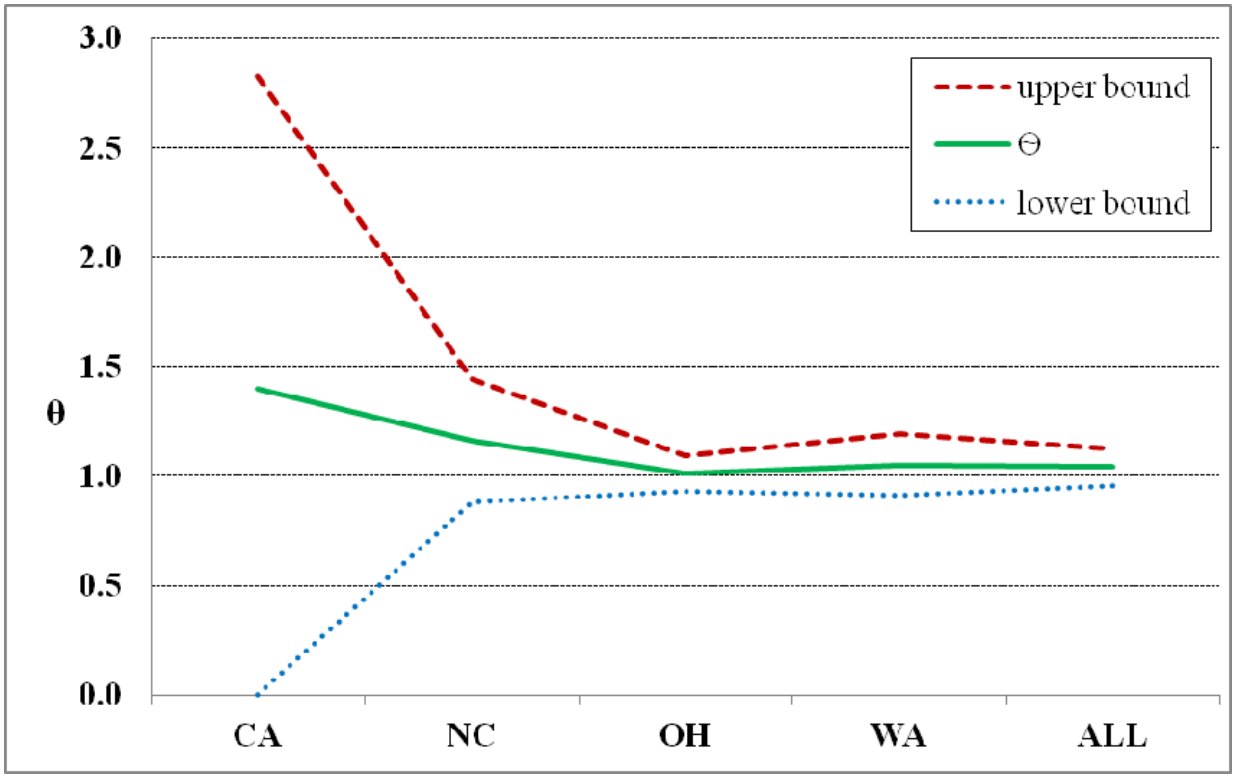

Figure 6. The safety effectiveness index and the 95 percent confidence interval for each state (multi-vehicle crashes)

The results for single-vehicle crashes are presented in Figure 7. The overall results are the similar: there are no statistically significant safety impacts from digital signs, except for California. The California results for single-vehicle crashes indicate a statistically significant decrease in crash frequency in the after period. Although the before-after results of California show a decrease in the after period, it does not affect the overall result because the low sample

size (6 sites) makes it more difficult to establish statistical significance in the analysis results. It is also worth noting that the North Carolina data has the largest confidence interval, due to the variability in the North Carolina single-vehicle crash data.

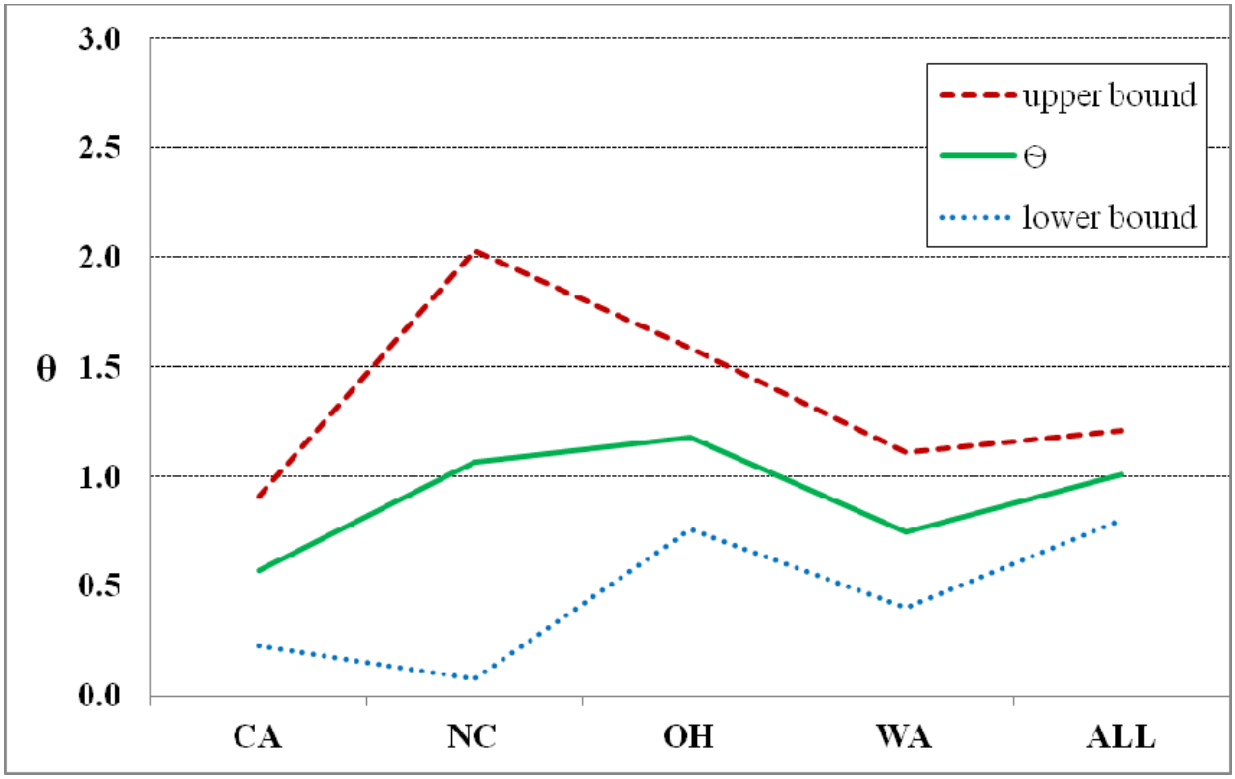

Figure 7. The safety effectiveness index and the 95 percent confidence interval for each state (single-vehicle crashes)

RESULTS FOR CRASHES RELATED TO DIFFERENT TYPES OF SIGNS

The research team also conducted an analysis to investigate the impacts of specific on-premise digital sign characteristics on the safety impacts of those signs. Specific sign characteristics that the research team evaluated included color (single or multi-color), size (small, medium, or large), and type of business. The research team used the analysis of variance (ANOVA) analysis method to evaluate whether the means of the safety index (θ) among the different characteristics of signs are equal.

An ANOVA is one of the most common statistical methods used to compare two or more means in the analysis of experimental data. In short, ANOVA provides a statistical test of whether or not the means of multiple groups are all equal, while a t-test is suitable only for the two-group case because doing multiple two-sample t-tests would increase the risk of a Type I error (for datasets containing more than 30 observations). In addition, when there are only two means to compare, the t-test and the ANOVA are equivalent. As a result, the research team chose the one-way ANOVA as the study tool to simplify the methodology, although some digital sign characteristics, such as sign color, have only two subgroups (i.e., single color and multi-color).

The theory of an ANOVA test is to separate the total variation in the data into a portion due to random error (sum of squares for error [SSE]) and portions due to the treatment (total sum of squares [SST]). Table 6 shows the typical form of a one-way ANOVA table. If the calculated F value (= treatment mean square [MST] / error mean square [MSE]) is significantly larger than F (k-1, N-k), the null hypothesis is rejected. F (k-1, N-k) is the critical value when the means of each group are equal. Most statistic software will also provide the corresponding p-value for researchers making their decisions in different confidence intervals.

Table 6. The typical form of a one-way ANOVA table

Source	**SS**	**DF**	**MS**	**F**	**P(>F)**
Treatments	SST	k-1	SST / (k-1)	MST/MSE	
Error	SSE	N-k	SSE / (N-k)		
Total (corrected)	SS	N-1			

Notes: *SS* = sum of squares, *DF* = degrees of freedom, *MS* = mean of sum of squares, *F* = F-distribution (because the test statistic is the ratio of two scaled sums of squares, each of which follows a scaled chi-squared distribution), *P(>F)* = the p-value when the F value (= MST/MSE) is larger than F (k-1, N-k), *k* = number of treatments, and *N* = total number of cases.

There are three data assumptions for applying the ANOVA method:

1. Independence: The study data are independently, identically, and normally distributed.
2. Normality: The distributions of the data or the residuals are normal. This assumption is true when the sample size is larger than 30.
3. Homogeneity of variability: Equality of variances — the variance of data between groups — should be the same.

If the above conditions do not exist, the ANOVA results may not be reliable. However, if the sample size of each group is similar, one can usually ignore independence and homogeneity problems. Or statisticians may transform data (such as into the logarithmic form) to satisfy these assumptions of the ANOVA.

Based on the existing sign dataset, the research team focused on three digital sign characteristics: color (single color or multi-color), sign dimension (small, medium, or large), and business type (restaurants, pharmacies and retail stores, hotels, gas stations, auto shops, or others). The definitions of sign dimension level are based on the balance principle (making the sample size of each group equal). Figure 8 shows the distribution of signs as a function of different dimensions, and the research team defined signs with an area less than 10 ft^2 as small signs. The medium sign size had an area of at least 10 ft^2 but no more than 15 ft^2, and the large sign size had an area greater than 15 ft^2. The sign size represents the area of the electronic display, not the overall size of the complete sign. It was estimated from the Street View image in Google Maps and may not be an accurate assessment of the sign dimensions.

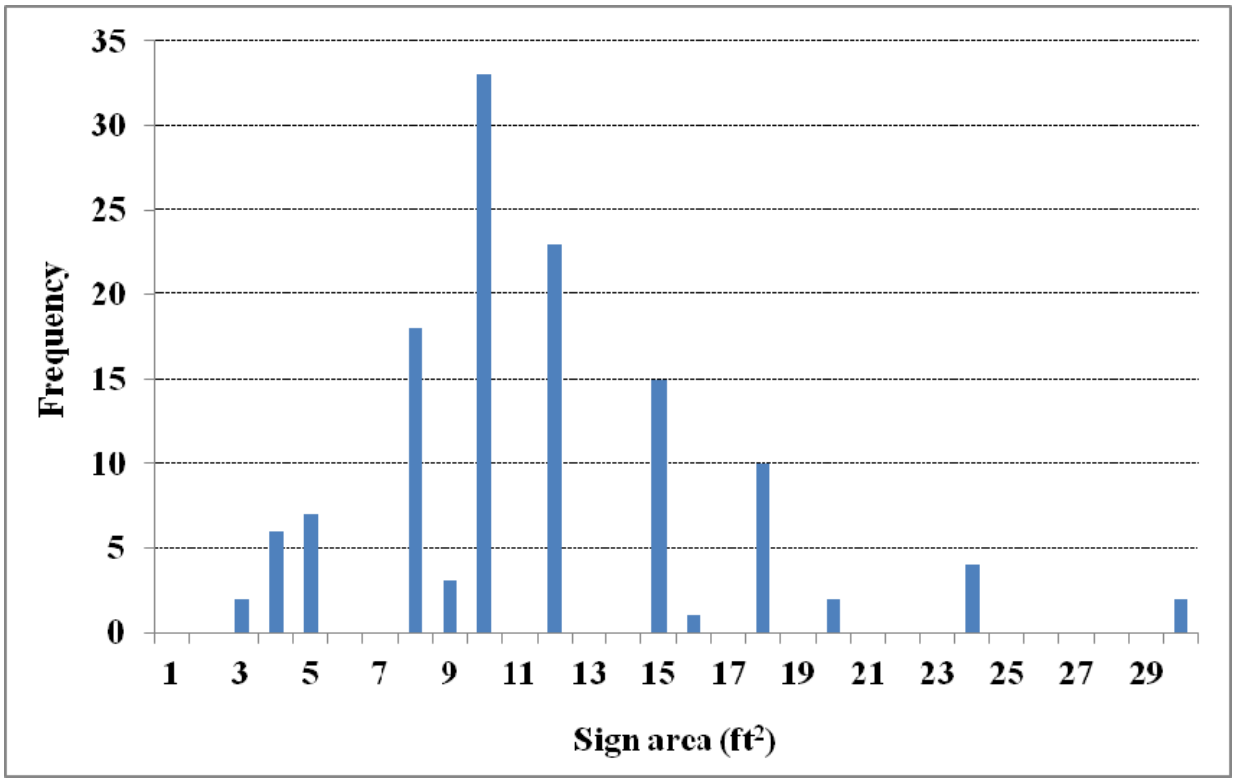

Figure 8. The histogram of digital signs for each sign dimension

Using the ANOVA method to analyze crash data related to specific design characteristics of the sign led to the conclusion that there is no statistically significant difference among the population means of the safety effectiveness index. The following descriptions provide more detail for each of the digital sign characteristics:

- **Color:** According to images obtained from the Street View feature of Google Maps, 89 signs are single-color signs, and 37 signs are multi-colored signs. Table 7 shows the ANOVA results. The test statistic (F value) is 2.07, and its p-value is 0.1527. Because the probability is larger than the critical value (0.05 for 95 percent confidence interval), the null hypothesis of equal population means cannot be rejected. In other words, the ANOVA table shows no significant difference between the mean of safety index (θ_{EB} = crash mean in the before period/crash mean in the after period) among signs having a single color or multiple colors.
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Table 7. Analysis of variance table (color)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	1	4.464	4.4640	2.0704	0.1527
Residuals	124	267.352	2.1561		

- **Sign dimensions:** In the final sign dataset, 36 signs have a sign area less than 10 ft^2, 56 signs have a sign area 10–15 ft^2, and 34 signs have a sign area greater than 15 ft^2. In Table 8, the F value is 0.7767, and its p-value is 0.4622. Because the probability is larger

than the critical value (0.05 for 95 percent confidence interval), the null hypothesis of equal population means cannot be rejected. Accordingly, researchers conclude that there is no (statistically) significant difference among the population means.

Table 8. Analysis of variance table (sign dimension)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	2	3.39	1.6950	0.7767	0.4622
Residuals	123	268.43	2.1823		

- **Business type:** In the final sign dataset, 7 signs are for restaurants, 18 for pharmacies and retail stores, 3 for hotels, 3 for gas stations, 7 for auto shops, and 84 for other business types. Based on Table 9, the F value is 0.5401, and its p-value is 0.7455. As with the above types, the null hypothesis of equal population means cannot be rejected because the p-value is much larger than the critical value (0.05). The sample size of some business type groups is less than 30, so the research team combined all categories of business types with less than 20 samples into one large group, the "other" category. The resulting ANOVA analysis (Table 10) provides similar results: there is no significant difference among the population means.

Table 9. Analysis of variance table (six business types)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	5	5.983	1.1966	0.5401	0.7455
Residuals	120	265.833	2.2153		

Table 10. Analysis of variance table (two business types)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	1	0.728	0.7289	0.333	0.5649
Residuals	123	271.088	2.18619		

IMPACT OF SIGN HOLD TIME

As an additional effort for this research effort, the research team worked with members of the SFI advisory panel to identify the potential impact of hold time on the relationship between on-premise digital signs and traffic safety. One of the advantages of digital signs is the ability to change the displayed message. The minimum length of time that a message must be displayed is often an element of local sign codes because some believe that frequent changing of sign messages can increase driver distraction and lead to increased crashes. Because the researchers were working with a large number of individual sites and crash records for the after period that spanned two years, it was not possible within the available resources of this project to determine what message(s) were displayed at the time of a crash or the hold time used at a particular site at the time of a crash.

As a surrogate for including hold times as part of the individual site characteristics, the research team acquired information for the hold time regulations in the jurisdictions where the signs were

located. The 135 sign sites were located in 108 jurisdictions. A member of the SFI advisory panel contacted these jurisdictions and was able to identify hold time regulations for 66 of them. The hold time regulations of these 66 jurisdictions are summarized in Table 11. Input from the advisory panel indicated that when a jurisdiction has no statutory language regarding digital sign hold times, it most often means that sign users are able to program their sign to change messages as often as they see fit. In some cases, it could mean that the state standard for digital signs applies, which ranges from 6 to 8 seconds in the four states included in the analysis.

Table 11. Summary of sign hold times

Minimum Hold Time	Number of Jurisdictions
2–6 seconds	14
7–10 seconds	12
20 seconds	3
1–60 minutes	2
24 hours	2
Variance required*	4
No specific restriction	29
Total	66

* Hold times were established by variance on a case-by-case basis.

CHAPTER 6:
SUMMARY AND CONCLUSIONS

While there have been significant amounts of research devoted to the safety impacts of geometric design features and other aspects of the publicly owned transportation infrastructure, the same cannot be said about research on the safety impacts of privately owned signs that are directed to users of public roads. This research effort focused on addressing the safety impacts of on-premise digital signs. Previous research by others has documented the safety effects of on- and off-premise digital signs and their potential influence on crash risk to some extent. However, the results of recent crash studies are not consistent, and most studies have some important weaknesses, such as neglecting biases related to the regression-to-the-mean effects, low statistical power, and analysis results based on erroneous assumptions. In addition, Molino et al. (2009) report that the results from these studies are not comparable because of their different study methods, statistical powers, and cares of execution, which affected the quality of the research.

The research effort described in this report examined the safety impacts of on-premise digital signs using a large sample size of data and advanced statistical methods that provide more accurate results than previous studies. With the help of sign data provided by sign-manufacturing companies and crash data obtained from the Federal Highway Administration Highway Safety Information System, the research team obtained extensive datasets for signs and crashes in four states. The research team began the safety analysis with 1,120 potential study sites, but only 135 sites were usable due to limitations related to the individual signs or the related crash data. Although the yield of usable data was only 11.3 percent, the final sample size of 135 sites was much higher than the sample size of other published papers and reports related to on- and off-premise signs, indicating the results of this research are more robust and accurate.

The research team used the empirical Bayes (EB) statistical analysis method, which is the method recommended in the *Highway Safety Manual*, to conduct the safety analysis described in this report. The *Highway Safety Manual* is a recently published document that is recognized within the transportation profession as the authoritative document for analyzing the safety impacts of various transportation improvements or treatments. The EB analysis procedure uses a before-after approach, with the before and after values modified to address local safety characteristics, regression to the mean, and other factors. The EB method reports the safety impacts through the use of a safety index indicator (represented by θ). A value greater than 1 indicates an increase in crashes, and a value less than 1 indicates a decrease in crashes from the before to the after period. However, for the results to be statistically significant, the θ value must be outside the limits of the 95 percentile confidence interval.

For the entire sample size of 135 sites, the results from the EB method show that there is no statistically significant change in crash frequency associated with installing on-premise digital signs because the safety effectiveness index (θ) is determined to be 1.00, and the 95 percent confidence interval is equal to 0.93 to 1.07 (which includes 1.00, indicating no statistically significant change). The research team also conducted the analysis for each of the four individual states and obtained the same results: there are no statistically significant safety impacts from

installing on-premise digital signs. In addition, the researchers analyzed the safety impacts related to both single- and multi-vehicle crashes. The results for these analyses were also the same: there is no statistically significant increase in crashes associated with the installation of on-premise digital signs. Chapter 5 includes plots that illustrate the safety index values and confidence intervals for all of these results. As a final analysis, the research team performed an ANOVA to evaluate whether the means of the safety index (θ) varied as a function of sign factors (color, size, and type of business). The color analysis evaluated whether there was a difference in the means of the safety index for single- and multi-colored signs, and the results did not find a difference. The size analysis divided the signs in the study into three categories (<10 ft^2, 10–15 ft^2, and >15 ft^2), and the results did not find a difference. Signs were also categorized by the type of business (restaurants, pharmacies and retail stores, hotels, gas stations, auto shops, and others). Once again, there were no differences in the means. Overall, the ANOVA analysis did not identify any factor that led to an increase or decrease in traffic safety for the subcategories evaluated in the ANOVA.

Based on the analysis performed for this research effort, the authors are able to conclude that there is no statistically significant evidence that the installation of on-premise signs at the locations evaluated in this research led to an increase in crashes.

CHAPTER 7:
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APPENDIX A:
STEP-BY-STEP INSTRUCTIONS FOR STUDENTS TO RECORD SIGN DATA

1. Open one SFI sign dataset (e.g., "Washington_2006-2007.xls"). This dataset includes about 150 signs located in the state of Washington during 2006–2007.
2. Input the address information (such as Primary Street Address, City, ZIP Code, County Name, and State) of each sign in Google Maps and use the Street View function to identify the target signs. Please see this link, http://maps.google.com/help/maps/starthere/index.html#streetview&utm_campaign=en&utm_medium=et&utm_source=en-et-na-us-gns-svn&utm_term=gallery, for a demo about how to use the Street View. If you did not find any on-premise digital signs near this site, please make a note in Table 12. Check the characteristics of each sign (including colors, dimensions, and business types) and fill out Table 12. Then, use the "Print Screen" button to copy each sign's picture, and paste it in this document (such as Figure 9). The different business types are classified as (1) Restaurant, (2) Pharmacy and Retail Store, (3) Hotel, (4) Gas Station, (5) Auto Shop, and (6) Other.

Table 12. Example work table of site data collection procedure

Sign ID	Address	Installation Date	Google Maps				Google Earth				Note
			Picture	Color (Single/ Multi.)	Dimension (Estimated)	Business Type	County ID	Route #	Distance	Mile-post	
79016	19330 N US HIGHWAY 101 Shelton 98584 Mason County, WA	2006/9/15	Fig 2	S	3 ft × 6 ft	6	Mason (23)	101	19.3	335.72	

3. Then, use Google Earth to determine the county and route number, and to measure the distance between the closet county boundaries and sign location along the route (recorded in the distance column). The corresponding ID for county and route number is based on the HSIS data manual (file name: guidebook_WA[1].pdf). Then, estimate the milepost value of the sign by the distance and the milepost of the route in the boundaries (based on the HSIS road file, such as wa04road.xls). Take Figure 10; for example, the end mile point of Highway 101 in the county boundary is 355.18, and the distance between the sign and the county boundary is 19.3; so, the milepost of our sign is 335.72. Generally, the milepost value increases from south to north and from west to east. However, the best way to check it is to compare the value of the milepost of adjusted counties. For example, the milepost of US 101 in Mason County is 313.96~355.18, and the milepost of US 101 in Thurston County (located south of Mason) is 355.18~365.56. So, it is known that the mileposts increase from north to south in Mason County. The above variables will be used in the R software to select target crashes from HSIS crash datasets.
4. Write down any questions or comments in the note column. Feel free to ask us if you have any questions.

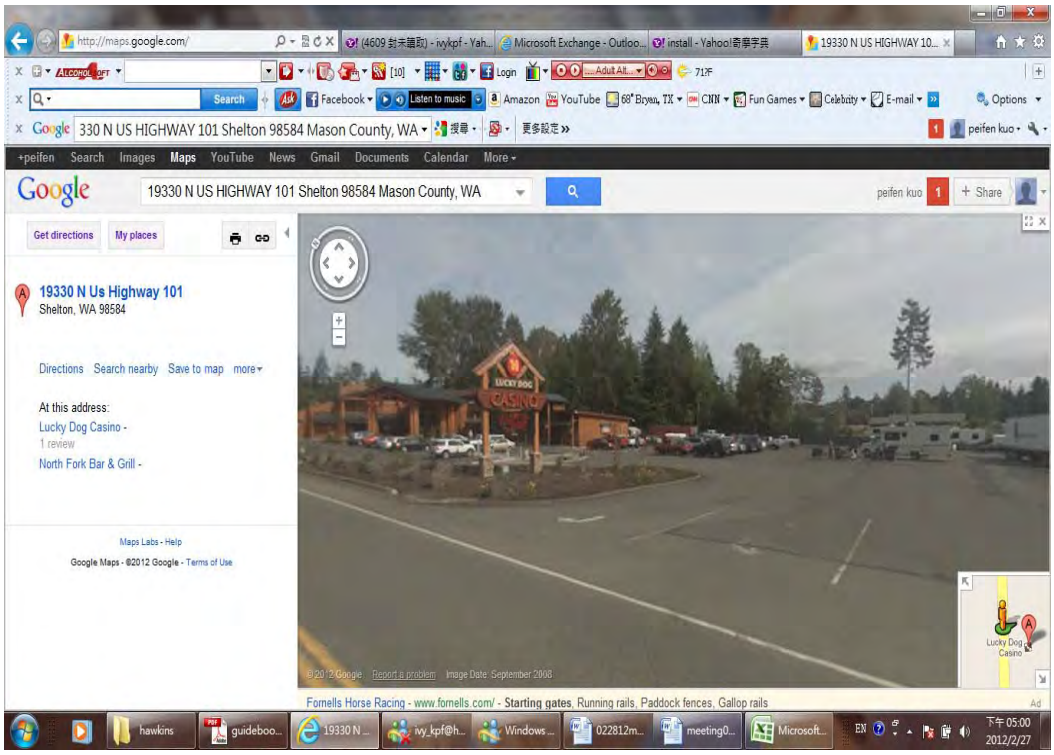

Figure 9. Example screenshot of Google Maps

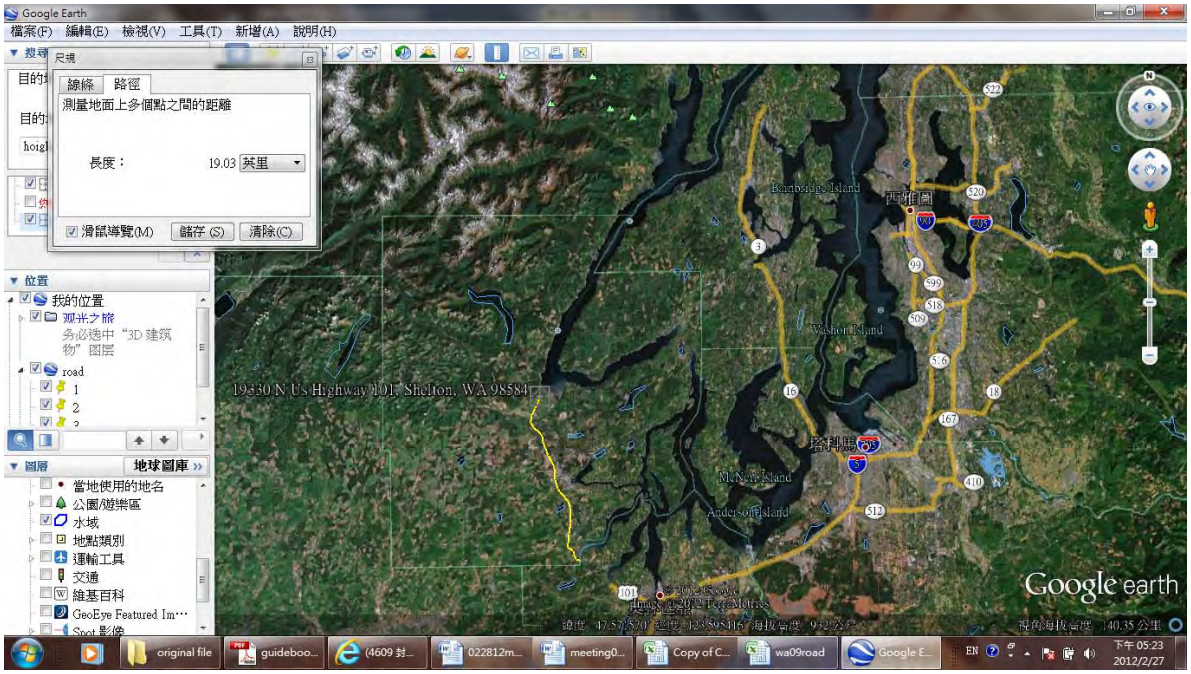

Figure 10. Example screenshot of Google Earth

APPENDIX B:
STATISTICAL SYMBOLS

The following statistical symbols are used throughout this report.

θ = the safety effectiveness, $0 < \theta \leq 1$ (can be theoretically higher, but not in this study).
n = the sample size.
α = the dispersion parameter (of the negative binomial model).
t = the time period.
$\hat{\theta}_{CS}$ = the estimate of safety effectiveness by using the CS method.
$\hat{\theta}_{naive}$ = the estimate of safety effectiveness by using the naïve method.
$\hat{\theta}_{CG}$ = the estimate of safety effectiveness by using the control group method.
$\hat{\theta}_{EB}$ = the estimate of safety effectiveness by using the EB method.
$\hat{\lambda}$ = the estimated number of crashes for the treatment group in the after period.
$\hat{\pi}$ = the estimated number of crashes for the treatment group in the before period.
$\hat{\nu}$ = the estimated number of crashes for the control group in the after period.
$\hat{\mu}$ = the estimated number of crashes for the control group in the before period.
N_{ij1}^{T}, N_{ij1}^{C} = the observed responses for site i (T = treatment group and C = control group) and year j (in the before period).
N_{ij2}^{T}, N_{ij2}^{C} = the observed responses for site i (T = treatment group and C = control group) and year j (in the after period).
M_{ij1} = the expected responses for site i for the EB method,

$$\mathrm{M}_{\mathrm{ij1}} = \mathrm{W} \times (\hat{\Lambda}_1) + (1 - \mathrm{W}) \times (\sum_{\mathrm{j=1}}^{\mathrm{t}} N_{\mathrm{ij1}}) .$$

W = the weight for sites for the EB method, $W = \dfrac{1}{1 + \hat{\Lambda}_1 \times \hat{\alpha}}$.

$\hat{\Lambda}_1$ = the estimate for the average crash rate of all sites in the before period.
$\hat{\alpha}$ = the estimate of the dispersion parameter (from the negative binomial model).

Eugene Planning Commission

AGENDA

Meeting Location:
Virtual Meeting (via Zoom)

Phone: 541-682-5481
www.eugene-or.gov/pc

The Eugene Planning Commission welcomes your interest in these agenda items. Feel free to come and go as you please at any of the virtual meetings. For the hearing impaired, FM assistive-listening devices are available, or an interpreter can be provided with 48-hour notice prior to the meeting. Spanish-language interpretation will also be provided with 48-hour notice. To arrange for these services, contact the Planning Division at 541-682-5675.

**Due to Governor Kate Brown's Stay Home, Save Lives Executive Order to combat the spread of Covid-19, this meeting will be held remotely using virtual meeting technology. Information about online or other options for access and participation is available on the reserve side of this agenda. **

TUESDAY, JULY 21, 2020 – REGULAR MEETING (5:30 p.m. to 7:30 p.m.)

A. PUBLIC COMMENT

The Planning Commission reserves 10 minutes at the beginning of this meeting for public comment. The public may comment on any matter, except for items scheduled for public hearing or public hearing items for which the record has already closed. Generally, the time limit for public comment is three minutes; however, the Planning Commission reserves the option to reduce the time allowed each speaker based on the number of people requesting to speak.

B. WORK SESSION: Digital Sign Code Amendment (CA 20-2)

Staff: Mike McKerrow, MMckerrow@eugene-or.gov, 541-682-5288
Jenessa Dragovich, JDragovich@eugene-or.gov, 541-682-8385

C. ITEMS FROM COMMISSION AND STAFF

a. Other Items from Staff
b. Other Items from Commission
c. Learning: How are we doing?

Commissioners: John Barofsky; Ken Beeson; Tiffany Edwards (Chair); Lisa Fragala (Vice Chair); Dan Isaacson; Chris Ramey; Kristen Taylor

HOW TO ACCESS THE MEETING

- **To watch the meeting live (non-participant):** Visit https://www.eugene-or.gov/2109/Planning-Commission-Webcasts to view the live webcast or tune in to Local Comcast Chanel 21

- **To join/watch the meeting from your computer, tablet or smartphone** (allows participation in Public Comment):
  https://eugene-or-gov.zoom.us/j/93513516584

- **To join by phone** (allows participation in Public Comment): Dial one of the below numbers and enter the **Webinar ID:. 935-135-16584**
  +1 971 247 1195
  +1 669 219 2599
  +1 669 900 6833
  +1 720 928 9299
  +1 206 337 9723
  +1 213 338 8477
  For higher quality, dial a number based on your current location.
  International numbers available: https://eugene-or-gov.zoom.us/u/acwmw8uOfC

To sign-up to speak for Public Comment:

- For those viewing the meeting on a computer, laptop, or other device, click once on the blue "hand" icon
- For those listening to the meeting on a phone, press *9 (Star-9)

AGENDA ITEM SUMMARY
July 21, 2020

To: Eugene Planning Commission

From: Mike McKerrow, Associate Planner and Jenessa Dragovich, Senior Planner, Building and Permit Services Division

Subject: Work Session: Digital Sign Code Amendments (City File #CA 20-2)

ACTION REQUESTED

This work session is an opportunity for the Planning Commission to receive an overview of and ask questions about a proposed land use code amendment to modify existing sign standards to allow various digital signs, in advance of the July 28, 2020 public hearing.

BACKGROUND

Eugene's Sign Code (which is part of the Eugene land use code, Chapter 9) was originally adopted in 1968. The last major change to the sign code occurred in the late 1980's and minor amendments were passed in 2001 and 2013. Electronic sign technology has changed significantly in that period and the sign code has not been changed to accommodate the new technology. Digital signs use an electronic display system, such as a light-emitting diode (LED) screen, to deliver multiple messages at a single location. Images are often static and held for a specified amount of time.

Eugene's current sign code prohibits flashing signs and most digital or electronic signs except for electronic message centers, which are limited in size and location. Most existing electronic message centers in Eugene are digital time and temperature displays (three square feet in area and five display characters) except for a few cases where variances were approved to allow larger digital signs.

Eugene has few examples of existing digital signs. They include signs for the Lane County Fairgrounds, the Hult Center, Matthew Knight Arena, and The Shedd which were allowed either as public signs or through sign variances as mentioned above.

Proponents assert several benefits from the technology, including reduced waste compared with traditional copy materials, lower energy consumption, the ability to serve the advertising needs of more businesses, making advertising less expensive for small businesses and non-profits, and allowing for usage by law enforcement agencies to provide public warnings such as Amber Alerts.

Billboard industry representatives contacted City Councilor Chris Pryor to request a

modification to the sign code standards to allow for electronic (digital) billboards. Councilor Pryor polled the council and in response, a work session to discuss the proposal was held on September 18, 2019. The meeting agenda is provided as Attachment A. Please note that the original date of the work session was September 9, 2019; however, due to time constraints, the work session was bumped to the following week. After staff presented information about what would be needed to allow digital signs, the City Council initiated the current code amendment process with the following motion:

> **MOTION AND VOTE:** *Move to initiate land use code amendments to allow digital billboards and digital readerboards within the city and to implement changes to the sign regulations identified by staff that are legally required or necessary to clarify the current regulations.* The motion passed 4:2, with Councilors Taylor and Semple voting in opposition.

DRAFT LAND USE CODE LANGUAGE

The proposed modifications to the existing sign code are primarily focused on allowing digital billboards as well as limited digital signage for drive-through signs, service stations and institutional uses. The other proposed changes in the draft are clarifications recommended by staff. The draft land use code language is provided in Attachment B and the following is a summary of the proposed changes:

- Provides new definitions for digital billboards, cutouts and digital signs and modifies existing definitions for electronic message centers and flashing signs.
- Provides ability to convert existing billboards into digital billboards when proposed standards are met:
    - Minimum spacing of 1,200 feet (4 blocks) between digital billboards
    - Minimum 10 seconds between messages
    - No video, animations, scrolling, or other similar effects.
    - Auto-dimming to prevent glare, especially at night
- Allows one digital sign (maximum 20 square feet) for each institutional use such as schools, religious institutions and community centers.
- Allows up to six small digital sign components (totaling not more than 20 square feet) for service stations.
- Allows up to two digital signs (maximum 7-foot high and not more than 40 square feet) for each drive-through use.

Eugene's sign code defines a billboard as any sign with a sign face of 200 square feet or greater in surface area. The sign code limits billboards to certain areas in Eugene (such as along portions of Beltline Road, Franklin Boulevard, Coburg Road, 7th and 11th Avenues, and I-105). City Councilors have expressed concern in the past about smaller "billboards" on commercial properties that have non-premise advertising messages (such as the one located at 18th Avenue and Willamette Street).

These are not true billboards (because of their size and location) and can only be approved at locations if they otherwise meet the sign standards. Since sign codes must be content neutral by law, signs standards cannot distinguish between on-premise and off-premise advertising. The proposed code amendments would only allow digital billboards and allow digital signs with a maximum size of 20 square feet for institutional uses. This approach is responsive to Council direction to allow some of the existing "traditional" billboards to be converted to digital billboards without causing a proliferation of digital signage throughout the City.

Today, there are approximately 120 billboards within Eugene's jurisdiction. About 40 percent are on major or minor arterials that are also regulated by Oregon Department of Transportation (ODOT). Nearly 20 percent have legal nonconforming status for at least one billboard standard such as sign area, sign height or proximity to other billboards. Digital sign technology has been operating in Hillsboro, Milwaukee, Salem, Springfield and Medford for some time. Staff researched the digital sign standards for these jurisdictions prior to creating the proposed draft standards. Attachment C includes a summary of that research for reference – the column headings indicate common areas of concern related to digital signs.

PUBLIC OUTREACH

Consistent with Eugene Code requirements, notice of the public hearing was mailed to Springfield, Lane County, and all active Eugene neighborhood groups on June 26, 2020 and a legal ad ran in the Register Guard on July 6, 2020. In addition, staff also notified sign companies that regularly obtain sign permits in the City of Eugene on July 14, 2020. Staff have also met with billboard industry representatives regarding the proposed regulations. The City's Land Use Code Amendments website is updated regularly with information about where we are in the process as well as available resources: https://www.eugene-or.gov/764/Land-Use-Code-Amendments. To date, no written testimony has been received. Any testimony received in advance of the public hearing will be forwarded to the Planning Commission for their consideration.

NEXT STEPS

A public hearing before the Planning Commission regarding the proposed Digital Sign Code Amendments is scheduled for July 28, 2020. Following the public hearing, the Planning Commission will deliberate on the proposed code amendments and provide a recommendation to the City Council. Deliberations are scheduled for August 11, 2020. Planning Commission will make a recommendation to City Council at that time, and then City Council will hold a public hearing on September 21, 2020, with City Council action scheduled for October 12, 2020.

ATTACHMENTS

A. City Council Work Session Agenda Item Summary, September 9, 2019
B. Draft Land Use Code Language
C. Digital Sign Standards Research Summary

FOR MORE INFORMATION

Staff Contact: Mike McKerrow, Associate Planner
Telephone: 541-682-5288
Email: MMckerrow@eugene-or.gov

Staff Contact: Jenessa Dragovich, Senior Planner
Telephone: 541-682-8385
Email: JDragovich@eugene-or.gov

Attachment A

EUGENE CITY COUNCIL AGENDA ITEM SUMMARY

Work Session: Digital Signs

Meeting Date: September 9, 2019
Department: Planning and Development
www.eugene-or.gov

Agenda Item Number: 3
Staff Contact: Jenessa Dragovich
Contact Telephone Number: 541-682-8385

ISSUE STATEMENT

At this work session, City Council will be provided with an overview of Eugene sign code regulations pertaining to digital signs. This work session is in response to Councilor Pryor's request and was initiated through a poll, provided as Attachment A. This is an informational item and no council action is requested.

BACKGROUND

Eugene's sign code (which is part of the Eugene land use code) was originally adopted in 1968. Minor amendments to the sign code were passed in 2001 and 2013, however, the last major change occurred in the late 1980s. Electronic sign technology has changed significantly in that period. Digital signs use an electronic display system, such as an LED screen, to deliver multiple signs at a single location. Images are often static and held for a specified amount of time; however, the technology is capable of slide presentation effects, including frame transitions, scrolling, animation and videos. With a push to convert traditional billboards to digital, many communities are being asked to allow electronic signage.

At this work session, council will be presented with an overview of:

- Eugene's existing sign code pertaining to digital signs
- Digital sign information
- Common concerns related to digital signs
- Examples of how other communities regulate digital signage

Eugene's current sign code prohibits flashing signs, except electronic message centers (which are considered digital signs). However, because electronic message centers are limited to three square feet in area and five display characters, they are effectively prohibited with the exception of small displays that show time and temperature. A 2007 Land Use Board of Appeals decision affirmed the City's interpretation that LED displays meet the City's definition of electronic message centers and are subject to the size, character and message interval limits prescribed by the sign code. To allow digital signage in Eugene, the sign code would need to be amended to remove prohibitive language and add specific regulations to address common concerns associated with digital signage. Excerpts from the sign code are provided as Attachment B.

There are only a few existing examples of digital signs in Eugene—the Lane County Fairgrounds, the Hult Center, Matthew Knight Arena, and The Shedd. The Eugene land use code generally does not allow digital signs. The examples listed were allowed because two are public signs that are exempt from sign standards and two, Matthew Knight Arena and The Shedd's electronic message centers, received a variance to the sign code standards.

Proponents of digital signage assert several benefits from the technology, including reduced waste compared with traditional copy materials, lower energy consumption, the ability to serve the advertising needs of more businesses, and usage by law enforcement agencies to push public warnings such as Amber alerts.

Concerns over the use of digital signage are primarily focused on driver distraction and visual pollution. Several factors that contribute to these concerns include: flashing effects, moving images, or videos; frequency of image changes; size and location; and brightness/glare.

Digital sign technology has been operating in Portland, Salem, and Springfield for several years. At the work session, staff will provide some examples of how these cities and others regulate such signage.

Allowing digital signs in Eugene would require an amendment to Eugene's land use code. Such changes would require the City Council to initiate the process. The formal adoption process for an amendment to the land use code includes notice to the state and interested parties, a public hearing before the Planning Commission who provides a recommendation to City Council, a public hearing before the City Council, and action by the City Council. In some cases, notice must also be sent to affected property owners. Prior to the formal adoption process, the Building Permit Services Division would engage stakeholders in a public process to identify key issues and possible solutions, and to review draft code language.

In addition to the work session request regarding digital signs, there have been two other questions asked by councilors related to sign standards. One question was about signs that advertise off-premise businesses and whether the City can require that signs be for on-premise, or "proximate" businesses, or limited to businesses located within the city. The City cannot require that signs only advertise proximate businesses or businesses located in the city. Such a requirement would violate the Oregon Constitution because it would prohibit certain speech based on the content of that speech. *See Outdoor Media Dimensions, Inc. v. Department of Transportation*, 340 Or 275 (2006).

The second question is related to mobile advertising signs (e.g., a sign on the flat bed of a truck that is driven around town). The current sign code already prohibits any sign placed on a motor vehicle with the primary purpose of providing a sign not otherwise allowed by the sign standards. See land use code section 9.6615(2) on page 1 of Attachment B.

PREVIOUS COUNCIL DIRECTION

This is the first work session on this topic.

COUNCIL OPTIONS
Informational item. No action requested.

CITY MANAGER'S RECOMMENDATION
No recommended action.

SUGGESTED MOTION
No recommended action.

ATTACHMENTS
A. Work Session Request
B. Eugene Sign Standards Excerpts

FOR MORE INFORMATION
Staff Contact: Jenessa Dragovich
Telephone: 541-682-8685
Staff E-Mail: JDragovich@eugene-or.gov

Attachment B

Digital Sign Amendments Ordinance

Proposed Land Use Code Changes
DRAFT – June 9, 2020

Language to be added is shown in ***bold italics***.
Language to be removed is show by ~~strikeout.~~

Definitions:

Cutout. A supplemental design element attached to or superimposed upon a billboard.

Digital Billboard. Any billboard that changes messages by any electronic process.

Digital Sign. Any sign with a sign face of 20 or fewer square feet in surface area that changes messages by any electronic process.

Electronic Message Center. ~~A sign, or portion of a sign, that conveys information through a periodic automatic change of message on a lampbank, through the use of fiber optics, or through mechanical means. A sign on which any portion less than an entire sign rotates shall be considered an electronic message center.~~ ***A sign component that utilizes a computer or other electronic means to change the digital message displayed.***

Flashing Sign. A sign or sign structure ***that is not a digital billboard, digital sign, or electronic message center,*** where some part of the display is provided by light-emitting elements which abruptly change color or intensity of illumination, including intermittent periods of illumination and non-illumination, or where the effect of flashing is achieved through mechanical means, including rotation.

Sign Standards:

9.6610 **<u>Exemptions to Sign Standards</u>.**

*** * ***

(2) Except as provided in subsection (3) of this section, the following signs are exempt from the requirements of EC 9.6600 through 9.6680, and are exempt from the requirement to obtain a sign permit if they are located on private property outside of vision clearance areas:

* * *

<u>Building Directories</u>. For buildings with multiple tenants, one wall-mounted sign up to 12 square feet in area for the purpose of communicating to persons already on the development site.

* * *

~~Message Boards~~***Drive-through Signs***. ~~One sign per business for the purpose of communicating to persons on the development site, such as a drive through menu sign or building directory. Such a sign may be up to 6 feet in height and up to 40 square feet in area.~~
Two drive-through signs for each drive-through lane. Each drive-through sign may be up to 7 feet in height and up to 40 square feet in area. Drive-through signs may be digital signs if the sign display is static and the copy is not changed more than once per hour, except for a portion of the digital display not to exceed 2 square feet may change copy more frequently.

* * *

Residential Property Signs. Two signs for each development site used primarily for a single family dwelling or duplex. The signs are limited to the following types: freestanding sign or banner. A freestanding sign may not exceed 12 square feet in size per face, with a maximum of two faces; a banner may not exceed 15 square feet in size. The maximum height of a freestanding sign under this exemption is ~~6~~ ***5*** feet (from grade), and it must be separated by at least 8 feet from any other freestanding sign on the same development site.

* * *

9.6615 **Prohibited Signs.** Except where qualified as a nonconforming sign, the following signs are unlawful and are declared to be nuisances:

* * *

(5) Decorative laser signs, search lights, and flashing signs~~, except electronic message centers~~;

9.6620 **Nonconforming Signs.**

* * *

(3) ***Except as provided in EC 9.6675(7) or*** ~~Except~~ where only a change in display copy is made, any nonconforming sign which is structurally altered or has illumination installed shall be brought into compliance with all applicable provisions of the sign standards within 90 days and shall thereafter be kept in compliance with the sign standards.

* * *

(5) The provisions ~~of subsection (6) of this section and~~ subsection (2) of EC 9.6635 Approval of Permit Application do not apply to signs in existence pursuant to a validly issued sign permit as of July 1, 1990, along Goodpasture Island Road from a point 300 feet north of the intersection with Valley River Way to a point 1400 feet north of the intersection. The provisions of subsection (2) of this section shall apply except that restoration of a damaged

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sign shall be allowed where a sign is damaged to the extent of 100 percent of its value. All other provisions of this section shall apply.

~~**(6)** All signs with a surface area of 200 square feet or greater shall be removed or brought into compliance with this land use code by April 1, 2003.~~

9.6630 Permit Application.

(1) An application and related information shall be submitted by the applicant, in a manner prescribed by the city, together with a fee established by the city manager as provided by EC 2.020 City Manager - Authority to Set Fees and Charges. ~~When a person begins construction of a sign requiring a sign permit before the permit is issued, the permit fee shall be doubled. Payment of a double permit fee shall not otherwise exempt the person from liability for other penalties prescribed for a violation of the sign standards.~~

* * *

9.6635 Approval of Permit Application.

* * *

(8) A decision granting or denying a sign permit may be appealed to a hearings official. Appeals are processed according to ~~other~~ Type II applications beginning at EC 9.7200 General Overview of Type II Application Procedures. The decision of the hearings official is final.

9.6640 General Provisions.

* * *

(4) Location Standards.

(a) Setbacks. All signs shall comply with the setback requirements beginning at EC 9.2000 through EC 9.3980 and EC 9.6745 Setbacks - Intrusions Permitted. ~~Signs may be installed up to 5 feet into the required front yard setback except that freestanding signs up to 5 feet in height in the E-1 zone may be installed at least 5 feet from the front property line.~~

* * *

Projecting Over the Public ***Right-of-***Way. Except as specified in EC 9.6670 Central Commercial Sign Standards, no privately owned sign may project over any public right-of-way.

* * *

(5) Construction Standards.

* * *

(f) Wall Signs. Wall signs ~~shall~~ ***may*** project ***up to*** ~~a maximum of~~ 12 inches ***from the wall, except that wall signs shall project no more than 4 inches from the wall when the sign is less than 8 feet above a sidewalk or public way.*** ~~when the wall sign is more than 8 feet above~~

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~~grade and a maximum of 4 inches when the wall sign is less than 8 feet above grade~~.

(6) Illumination Standards.

* * *

(d) Illumination From Signs on Residentially Zoned Property. ~~No internally illuminated sign shall be allowed on property in a residential zone.~~ Lighting from all light sources operated for the purposes of sign illumination on property in a residential zone shall ~~be shielded from other property in the residential zone and shall~~ not be more than 2 foot candles at ***any point along*** the ***boundary of the development site*** ~~closest street or property line~~. ***Externally illuminated signs shall be shielded.***

* * *

(9) Electronic Message Centers. Except electronic message centers operated as public signs by governmental agencies, ~~no~~ electronic message center***s are subject to the following limitations:***~~, or~~

(a) ***Except as provided in subsection (b) of this section, that*** portion of a***ny*** sign used as an electronic message center shall be ~~larger than~~***limited to*** 3 square feet in area, ***may*** display ~~a message containing~~ no more than 5 characters, ~~or~~***and must not*** change the displayed message at intervals of less than once every 3 seconds. No electronic message center, except for temporary construction use, shall exceed a maximum one-hour equivalent A-weighted sound pressure level of 50 dBa at the receiving property line when the receiving property is occupied by a dwelling, hospital, school, library or assisted care center.

(b) ***Each service station may include up to 6 rectangular digital signs, constructed a minimum of 3 inches from each other, limited to 20 square feet in area cumulatively, and must not change the displayed message at intervals of less than once every 24 hours.***

(10) Digital Signs. One digital sign up to 20 square feet in area is permitted per institutional use on a development site. Digital signs must be located a minimum of 50 feet from the property line of any residentially zoned property.

All digital signs shall be subject to the following standards:

(a) The change from one message to another message shall be no more frequent than once every 10 seconds.

(b) The change from one message to another message shall be instantaneous.

(c) Animation, scrolling or other perceived movement is not allowed.

(d) The digital sign shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 45 feet perpendicular to the sign face

(e) The digital sign shall be equipped with a light sensor that automatically adjusts the intensity of the digital display according to the amount of ambient light.

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9.6645 <u>Applicability of Sign Standards</u>.

(1) No sign permit shall be issued for any sign unless specifically identified as an allowed sign use under the terms of the applicable sign standards or otherwise allowed a permit under EC 9.6620 <u>Nonconforming Signs</u> or ***exempted from the requirement for a permit under EC*** 9.6610 <u>Exemptions to Sign Standards</u>.

(2) Except as otherwise specified, signs located on property zoned S Special Zone shall be subject to the provisions of:

* * *

(b) EC 9.6680 <u>Employment and Industrial Sign Standards</u>, if employment or industrial, ~~or~~

(c) EC 9.6660 <u>General Commercial Sign Standards</u>~~.~~***, or***

(d) EC 9.3970(11) if the property is zoned S-WS Walnut Station Special Area Zone.

* * *

9.6650 <u>Residential Sign Standards</u>. The residential sign standards are hereby created and applied to all land zoned as set forth below. Signage is limited to preserve the character of the area by allowing signs only for residential purposes and for non-residential uses allowed in the applicable zone.

* * *

(2) Permitted Sign Types. Signs allowed under residential sign standards are limited to the following types:

(a) Awning signs;

(b) Digital signs;

(~~b~~c) Freestanding signs;

(~~c~~d) Readerboards; and

(~~d~~e) Wall signs.

* * *

9.6655 <u>General Office Sign Standards</u>. The general office sign standards are hereby created and applied to all land as set forth below. Signs are regulated to accommodate the office buildings and other public uses that are commonly located within these zones and because of the proximity of residential areas.

* * *

(2) Permitted Sign Types. Signs allowed under general office sign standards shall be limited to the following types:

(a) Awning signs;

(b) Digital signs;

(~~b~~c) Electronic message centers;

(~~c~~d) Freestanding signs;

(~~d~~e) Marquee signs;

(~~e~~f) Readerboards;

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(~~f~~g) Under-marquee signs; and
(~~g~~h) Wall signs.

* * *

9.6660 **<u>General Commercial Sign Standards</u>.** The general commercial sign standards are hereby created and applied to all land as set forth below. Sign limitations reflect the commercial nature of the area and the amount of vehicular traffic.

* * *

(2) Permitted Sign Types. Signs allowed under these standards shall be limited to the following types:
(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Readerboards;
(~~f~~g) Roof signs;
(~~g~~h) Under-marquee signs; and
(~~h~~i) Wall signs.

* * *

9.6665 **<u>Shopping Center Sign Standards</u>.** The shopping center sign standards are hereby created and applied to all land as set forth below. Sign limitations in these standards accommodate the special commercial character of these areas and the residential areas which are close to most shopping centers.

* * *

(2) Permitted Sign Types. Signs allowed under the shopping center sign standards shall be limited to the following types:
(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Readerboards;
(~~f~~g) Roof signs;
(~~g~~h) Under-marquee signs; and
(~~h~~i) Wall signs.

* * *

9.6670 **<u>Central Commercial Sign Standards</u>.** The central commercial sign standards are hereby created and applied to all property within the central commercial zones as set forth below. Signs are restricted in recognition of the high density usage of these areas, where pedestrian traffic is heavy and vehicular traffic is commonly limited.

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* * *

(2) Permitted Sign Types. Signs allowed under the central commercial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Digital signs;
(~~b~~c) Electronic message centers;
(~~c~~d) Freestanding signs;
(~~d~~e) Marquee signs;
(~~e~~f) Projecting signs;
(~~f~~g) Readerboards;
(~~g~~h) Roof signs;
(~~h~~i) Under-marquee signs; and
(~~i~~j) Wall signs.

(3) Maximum Number of Signs. The number of signs central commercial sign standards allow shall be limited to no more than 1 electronic message center, freestanding, ~~projecting sign,~~ readerboard, or roof sign per development site street frontage ***and 1 projecting sign per business occupant***. The number of allowed awning, marque, under-marque and wall signs is not limited.

* * *

9.6675 **<u>Highway Commercial Sign Standards</u>.** The highway commercial sign standards are hereby created and applied to all land as set forth below. Signs in this area are regulated to accommodate the mixed uses of the areas and the presence of major streets with high traffic volumes.

(1) Corresponding Zones. The provisions of this section apply to that property within the S-RP Riverfront Park Special Zone located within 200 feet of the Franklin Boulevard center line and to property within the C-1, C-2, C-3, or any employment and industrial zone with frontage along the following named streets:

(a) Beltline Road from 11th Avenue to Roosevelt Boulevard;
(b) Broadway from Mill Street to Franklin Boulevard;
(c) Coburg Road from 6th Avenue to 200 feet north of Frontier Drive;
(d) Franklin Boulevard east from Broadway, including the north-south segment;
(e) Garfield Street from 11th Avenue to 5th Avenue;
(f) Goodpasture Island Road from Valley River Drive to 1,700 feet north;
(g) Highway 99 North;
(h) I-5 ***on the south side only*** from Henderson Avenue to 300 feet north of Laurel Hill Drive;
~~(i) I-5 on the north side only, from 720 feet east of Henderson Avenue to 1,330 feet east of Henderson Avenue;~~
(~~j~~i) I-105 from the Coburg interchange to Scout Access Road;
(~~k~~j) Mill Street from Broadway to Coburg Road;
(~~l~~k) Railroad Boulevard;
(~~m~~l) 6th Avenue east of conjunction with Highway 99 North;
(~~n~~m) 7th Avenue east of conjunction with Highway 99 North; and
(~~o~~n) 11th Avenue from 200 feet east of the centerline of Chambers Street to Terry Street.

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(2) Permitted Sign Types. Signs allowed under the highway commercial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Billboards;
(c) Digital Billboards;
(d) Digital Signs;
(~~c~~e) Electronic message centers;
(~~d~~f) Freestanding signs;
(~~e~~g) Marquee signs;
(~~f~~h) Projecting signs;
(~~g~~i) Readerboards;
(~~h~~j) Roof signs;
(~~i~~k) Under-marquee signs; and
(~~j~~l) Wall signs.

* * *

(6) Billboards. Billboards shall be subject to the following standards:

(a) Billboards located along the streets named in subsection (1)(b) through (1)(g) and (1)(***j***~~k~~) through 1(***n***~~o~~) of this section shall not exceed 250 square feet in surface area.
(b) Billboards located on developed property along streets named in subsection 1(a)***,*** ~~and~~ (1)(h) ***and*** ~~through~~ (1)(***i***~~j~~) of this section shall not exceed 300 square feet in surface area.

* * *

(7) Digital Billboards. In addition to the standards in EC 9.6675(6), Digital Billboards shall be subject to the following standards. Where standards conflict, the standards for Digital Billboards in this subsection (7) shall control:

(a) Minimum spacing between digital billboards shall be 1200 feet. The distance between digital billboards shall be measured along the centerline of the street designated to be a location for digital billboards.
(b) The change from one message to another message shall be no more frequent than once every 10 seconds.
(c) The change from one message to another message shall be instantaneous.
(d) Animation is not allowed.
(e) The digital billboard shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 150 feet perpendicular to the sign face.
(f) The digital billboard shall be equipped with a light sensor that automatically adjusts the intensity of the billboard according to the amount of ambient light.
(g) The digital billboard shall be designed to either freeze the display in one static position, display a full black screen or turn off in the event of a malfunction.
(h) Cutouts are not allowed.

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(i) Notwithstanding EC 9.1230, legal nonconforming billboards may be removed and replaced by digital billboards if the location, area and height of the sign do not change and if the building permit is issued within 365 days of the 1st day of demolition. However, no digital billboard shall be larger than 300 square feet and all other standards in this section must be met.

(j) Digital billboards are allowed at the locations identified at EC 9.6675(1) except for (b), (e), (f), (j) and (k).

9.6680 **<u>Employment and Industrial Sign Standards</u>.** The employment and industrial sign standards are hereby created and applied to all property zoned for employment and industrial use as set forth below. Signs are regulated to accommodate the minimal street frontage of most parcels and the general proximity to highways and arterial streets.

* * *

(2) Permitted Sign Types. Signs allowed under the industrial sign standards shall be limited to the following types:

(a) Awning signs;
(b) Billboards;
(c) Digital Billboards;
(d) Digital signs;
(~~c~~e) Electronic message centers;
(~~d~~f) Freestanding signs;
(~~e~~g) Marquee signs;
(~~f~~h) Projecting signs;
(~~g~~i) Readerboards;
(~~h~~j) Roof signs;
(~~i~~k) Under-marquee signs; and
(~~j~~l) Wall signs.

* * *

(5) Maximum Height. All billboards, freestanding signs and roof signs shall be no more than 30 feet in height except freestanding signs~~up to 5 feet in height are allowed in the E-1 zone at a minimum of 5 feet from the front property line~~.

(6) Billboards. Billboards regulated by the employment and industrial sign standards shall be subject to the following:

(a) Billboards shall be permitted only along property which abuts the following named streets:
1. Garfield Street north of 5th Avenue to the intersection of Roosevelt Boulevard.
2. Seneca Street north of 11th Avenue to the intersection of Roosevelt Boulevard.
3. Bertelsen Road north of 11th Avenue to the intersection of Roosevelt Boulevard.
4. Obie Street north of 11th Avenue to the end of the street, but no further north than the intersection of Stewart Road.
5. West 11th Avenue from 200 feet east of the centerline of Chambers Street to Terry Street.

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(b) No billboard shall exceed 250 square feet in area.

(c) Notwithstanding the required connection between perimeter wall size and billboard size established in (4)(b) of this section, a billboard not to exceed 200 square feet may be located on an otherwise vacant lot abutting any street designated in this section.

(d) The provisions of EC 9.6675(6)(d) to (i) shall apply to all billboards in areas regulated by the employment and industrial sign standards.

(7) Digital Billboards. In addition to the standards in EC 9.6680(6), Digital Billboards shall be subject to the following standards. Where standards conflict, the standards for Digital Billboards in this subsection (7) shall control:

(a) Minimum spacing between digital billboards shall be 1200 feet. The distance between digital billboards shall be measured along the centerline of the street designated to be a location for digital billboards.

(b) The change from one message to another message shall be no more frequent than once every 10 seconds.

(c) The change from one message to another message shall be instantaneous.

(d) Animation is not allowed.

(e) The digital billboard shall operate at an internal illumination intensity level of not more than 0.3 foot-candles over ambient light levels as measured from a distance of 150 feet perpendicular to the sign face.

(f) The digital billboard shall be equipped with a light sensor that automatically adjusts the intensity of the billboard according to the amount of ambient light.

(g) The digital billboard shall be designed to either freeze the display in one static position, display a full black screen or turn off in the event of a malfunction.

(h) Cutouts are not allowed.

(i) Notwithstanding EC 9.1230, legal nonconforming billboards may be removed and replaced by digital billboards if the location, area and height of the sign do not change and if the building permit is issued within 365 days of the 1st day of demolition. However, no digital billboard shall be larger than 300 square feet and all other standards in this section must be met.

(j) Digital billboards are only allowed at the location described in EC 9.6680(6)(a)5.

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Attachment C

Digital Sign Code Amendment Research

Sign Attribute	Animation	Auto Shut Off	Auto-dimming	Brightness	Conversions	Dwell Time	Height	Legal Nonconforming (LNC)	Locations	Max Size	Min Size	Mitigation	Spacing (between billboards)	Transitions	Fuel Prices	Readerboards /EMCs in R-1	Drive-Thru Boards
APA	Promotes static images	None found	Use photocell for auto dimming	Max .3 foot candles over ambient light (Use FC over nits.)	Strategy of trading in 2 static boards for one digital.	Typ. 6-8 seconds. Use longer so only one message seen	Varies	No draft code found	Usually major arterials	Varies	No examples found	strategy of "trading in" 2-3 static boards for one digital boards	Varies	Max. 2 seconds	no info found	no info found	no info found
Hillsboro	11.32.150 Boards 11.32.230 EMCs No animation except 4 sec. scroll	None	None	8000 nits or equiv. for daylight, 1000 nits or equiv. dusk to dawn	None	8 seconds min.	45' in industrial	Consolodations: 2 under 300 sq. ft. into one less than 700 sq. ft.	Board-Hwy 26 and Tualitin Valley Highway	300 sq. ft. EMCs- 25% or 50%	None	None	Min. 150' from Res. Zoned property	4 seconds max. - Horizontal or vertical scroll allowed	Allowed by Use	In Res. Use traditional readerboard	Com. 50% ground mounted can be EMC
Medford	10.1700ff Com. No text scrolling. Animated movement allowed	example of glitch - 1/2 screen showing	Required to match ambient light at all times	Glare standard	None	5 secs min. Billb. 10 secs EMCs	20' (50' for freeway)	Prohibits Legal Nonconforming conversion to digital sign	Com and Man.	150 sq. ft. Com and 20' height. 250 sq. ft. and 50' height Freeway	None	None	Min. 150' from Res. Zoned property	None	EMC standards	EMC - denied since facing freeway	Max 1, 32 sq. ft., max 6' high
Milwaukee	14.24.020g.2.b. Not Allowed	None	None	14.24.020 Digital signs	None	10	25'	Must comply with existing standards	Major Arterials	250 sq. ft.	None	None	Min. 150' from Res. Zoned property	Max. 2 seconds	Per Electronic Display Standards	In Res. Zones must obtain Sign Adjustment (tough standards)	
ODOT	No motion whatsoever - including scrolling etc. static only	Requirement ability to shut down if awry. Emergency shut off.	No distinction on day/night brightness - enforce if glare issue	foot candles standard to be emailed	None	5 sec. min.	Doesn't regulate. Local jurisdictions	All new must conform with new standards. No wood to steel.	ODOT commercial and industrial designated streets	672 sq. ft. (14x48)	None	relocation credits program - remove some static boards to get digital sign	100' if in city limits.	Max. 2 seconds	Meets standards if no video board with movement	Meets standards if no movement.	
Salem	900.090 Elec. displ 900.155 Out. Adver None, static only	None	Yes ***	Max. # of nits day with lesser max. at night.	No provisions	min. 8 seconds Time/Temp min 3 seconds	35'	Has to meet existing standards	Major Arterials where billboards are currenlty allowed	300 sq. ft.	None	None	500'	2 seconds max. (ODOT)			
Springfield	Section 8.260 None	None	None	ODOT	No provisions	5 sec. ODOT	I-5 and I-105=45' to bottom of sign	Has to meet existing standards	I-5 and I-105	672 (14' x 48' max)	200'	None	500'	2 seconds (ODOT)	Treat as static sign. No special standards. If issue will enforce	Treat as static sign. No special standards. If issue will enforce	2 exempt signs per drive-up, each 40 sq. ft., 8' High.
Eugene (Proposed)	None	No regulation recommended	Yes	Max .3 foot candles over ambient light (N1) (Use FC over nits.) ODOT Standard	No provisions	Min. 10 seconds	30' (existing limit) consider exception for exising LNC	Recommend some exceptions vs. a blanket allowance to replace LNC	Major Arterials where billboards are currenlty allowed	Same as for billboards except that LNC reduce to 300 sq. ft.	200 sq. ft.	Not Required	Keep existing (6(f)) limits and 1200' between any two digital billboards (Stanard Arterial block is 400')	Instantaneous	ID by use and select average community standard	ID by use and select average community standard	Allow two per drive through lane