City of Lake Elmo
3800 Laverne Avenue North
Lake Elmo, Minnesota 55042

(651) 777-5510 Fax: (651) 777-9615
Www.LakeElmo.Org

File

NOTICE OF MEETING

The City of Lake Elmo
Planning Commission will conduct a meeting on
Monday, August 27, 2007, at 7:00 p.m.

AGENDA

1. Pledge of Allegiance
2. Approve Agenda
3. Approve Minutes
   a. July 23, 2007
4. Public Hearings:
   a. ZONING CODE TEXT AMENDMENT: Review of an ordinance to permit pool covers as an acceptable safety alternative to fencing.
   b. VARIANCE: Application from Paul Mencke for lakeshore and side yard setback variances to allow construction of a second story addition on a legally nonconforming home at 8838 Lake Jane Trail – R1 zoning –.PID 09-029-21-41-0015.
5. Business Items:
   a. ZONING CODE TEXT AMENDMENT: Initial review of information on LCD Billboard signs and options for regulating this new technology.
6. Informational Items:
   a. City Council Verbal Updates
      i. August 21 – Site disposal options from the PCA
      ii. August 21 – Sexually Oriented Businesses Ordinance approved
      iii. August 21 – New website
7. Adjourn

City of Lake Elmo
Planning Commission Meeting
Minutes of July 23, 2007

Vice Chairman Pelletier called to order the meeting of the Lake Elmo Planning Commission at 7:00 p.m. COMMISSIONERS PRESENT: Pelletier, Lyzenga, Van Zandt, Helwig, Schneider, Deziel, Armstrong, and McGinnis (7:05). STAFF PRESENT: Senior Planner Gozola and Planner Matzek.

Agenda
Vice Chair Pelletier added "6E – Ensure Commissioners have copies of the Comprehensive Plan."

M/S/P, Helwig/Armstrong to accept the Agenda as amended. Vote: 7:0.

Minutes
July 9, 2007
M/S/P, Deziel/Van Zandt to accept the Minutes of July 9, 2007 as presented. Vote: 6:0. Abstain: Helwig

Public Hearings: None.

Business Items: Direction to Examine Pool Covers
McGinnis arrived at 7:05.

Senior Planner Gozola said that staff and the council have received requests asking the city to review the existing ordinance requiring fences around pools. The request would be to allow pool covers in lieu of fences. The Council placed this on the 2007 work plan. The two main arguments for pool covers are that they provide a complete barrier to the water and that fences may not be kept up and would then not prevent access to the water. The argument for fences is that they are a permanent fixture whereas a pool cover can be removed.

Commissioner Deziel asked for a source to the comment of pool covers as a viable option as listed on the third to the last page. He also asked for a source on the comment saying no death has occurred at a pool with a cover.

Senior Planner Gozola said staff will be researching standards and the information was provided by those interested in installing pool covers.

Commissioner Van Zandt said there is an automatic latch on a gate. He asked what controls whether a pool cover is actually reinstalled.

Senior Planner Gozola said there may not be anything requiring the covers to be put back over the pools. Some covers have a key system and the hope would be an adult would

open and close it. One option would be to require an alarm system so if someone falls into the pool, an alarm would go off.

Commissioner Armstrong said if the ASTM standard has a universal code for covers, there should be a reference to that in the code. He suggested staff look at surrounding cities ordinances. He is hesitant to take out the fence requirement.

Commissioner Lyzenga suggested larger portable pools should be required to have something as well.

M/S/P, Armstrong/Lyzenga, to direct staff to hold off on the ordinance as the burden should be on the person interested in changing the ordinance.

Senior Planner Gozola stated that there was no application, but direction by the Council to look at the ordinance.

Commissioner Helwig asked how the staff enforcing a pool cover code would know what is allowable. He suggested requiring both a fence and a pool cover.

Senior Planner Gozola said it would be specifically identified in the code. The expenses for requiring both a fence and a cover would be a deterrent for those wanting to put in a pool due to the expense.

Vote: 5:3 (opposed: Deziel, Schneider, McGinnis)

Sexually Oriented Uses

Senior Planner Gozola said that this issue was brought up last fall, but due to staff turnover has been postponed until now. By not having a code restricting sexually oriented uses, the city leaves itself open. In February a moratorium was put in place regarding these uses. In the packet provided studies were provided regarding the negative impacts of sexually oriented uses. The League of Minnesota Cities has recently shifted the way cities can regulate some of the uses. If there is a live performance place within 50 miles of the city that type of use can be prohibited. The ordinance can be drafted to have buffers from certain types of land uses. The uses can not be precluded entirely due to freedom of speech.

Commissioner Deziel said it is important to ensure to cover all areas the city finds inappropriate for this use.

Informational Items

a. City Council Updates

Planner Matzek stated that someone from the Metropolitan Airport Commission (MAC) talked to the Council on July 10th and received Council input on a proposed extension to the existing runway.

Commissioner Deziel asked if MAC has any requirements to compensate owners.

Planner Matzek said MAC stated at this time they were not going to buy out properties.

Senior Planner Gozola said at the July 17th Council meeting, TKDA explained the options reviewed for street infrastructure project from I-94 to 30th Street.

Senior Planner Gozola stated that the rezoning/holding districts for the Village Area and South of 10th Street were approved.

Senior Planner Gozola said the Council authorized staff to submit an application for a $20,000 grant for comprehensive planning.

b. Work Plan
Senior Planner Gozola identified items on the approved work plan which have been accomplished and which are in progress.

c. Planning Director Position Posted
Senior Planner Gozola stated that the city has begun advertising for a new Planning Director position.

d. Volunteer Recognition Event
Planner Matzek stated that the city has annually held a volunteer recognition event. Although it is usually held in the winter, this year a picnic will happen on September 21st.

e. Ensure Commissioners have copies of the Comprehensive Plan
Vice Chair Pelletier questioned the commissioners if there were concerns regarding outdated copies of the Comprehensive Plan. If the plans are outdated, updated versions should be obtained.

Commissioner Schneider asked if it was possible to get quarterly information about building permits or building starts.

Senior Planner Gozola said he will check to see if that information if available.

Adjourned at 7:50 p.m.

Respectfully submitted,

Kelli Matzek
Planner

Planning Commission
Date: 8/27/07
Public hearing
Item: 4A

ITEM: **Pool Covers**

REQUESTED BY: City Council

SUBMITTED BY: Ben Gozola, Senior Planner

REVIEWED BY: Susan Hoyt, City Administrator
Kelli Matzek, Assistant City Planner

SUMMARY AND ACTION REQUESTED:

The planning commission is asked to consider an ordinance that would accept certain swimming pool covers as a safety device for private pools. A public hearing on the proposed ordinance is scheduled for 8/27/07. The ordinance was prepared at the request of City Council in response to residents seeking greater safety options for their pools.

BACKGROUND INFORMATION:

Staff canvassed sixteen communities of similar size or near to Lake Elmo to provide an idea of how other communities are approaching private pool safety. Some communities (Corcoran, Oak Grove, and Orono) have no requirements, while most require fence. Three communities (Grant, Minnetrista, and Stillwater) allow pool covers as an alternative to fencing. Irrespective of local requirements, insurance carriers many times will require a fence in order to provide a competitive rate.

After reviewing information on various pool covers and safety standards, staff would recommend that any ordinance allowing pool covers as a safety alternative include the following:

- Must be certified by the American Society for Testing Materials (ASTM document F1346-91) – these standards would ensure that any such cover would meet strict specifications for safety and weight bearing.
- Covers must be automatic. Manually installed covers will not be replaced during quick jaunts into the home during a swim.

Please refer to the full staff report for greater analysis on all issues surrounding safety covers.

RECOMMENDATION:

Consider the provided information and determine whether or not pool covers are a viable safety alternative (or supplement) to fences for private pools, and make a recommendation on the proposed ordinance for Council consideration.

ORDER OF BUSINESS:

- Introduction ..... Ben Gozola, Senior Planner
- Report by staff ..... Ben Gozola, Senior Planner
- Questions from the Commission ..... Chair & Commission Members

- Open the Public Hearing ..... Chair
- Close the Public Hearing ..... Chair
- Call for a motion ..... Chair Facilitates
- Discussion of Commission on the motion ..... Chair Facilitates
- Action by the Planning Commission ..... Chair & Commission Members

ATTACHMENTS (2):

1. Detailed staff report analyzing information on automatic pool covers
2. Draft ordinance to allow pool covers as a safety alternative to fencing

Planning Commission
Date: 8/27/07
Public hearing
Item: ____

ITEM: **Pool Covers (Report)**

REQUESTED BY: City Council

SUBMITTED BY: Ben Gozola, Senior Planner

REVIEWED BY: Susan Hoyt, City Administrator
Kelli Matzek, Assistant City Planner

PURPOSE:

The planning commission is asked to conduct a public hearing on a proposed ordinance to allow pool covers as a safety alternative to fencing. The ordinance was prepared at the request of City Council in response to residents seeking greater safety options for their pools.

BACKGROUND:

Minnesota cities **individually** determine what, if any, fencing or other safety standards are required for private pools. Consider the differences found between metro area communities similar or near to Lake Elmo:

CITY (population):	***POOL BARRIER REQUIREMENT(S):***
Afton (2,923)	Minimum five (5) foot high fence required
Circle Pines (5,153)	Minimum five (5) foot high fence required
Corcoran (5,800)	Does not require a barrier
Dayton (5,013)	Minimum six (6) foot high fence required
Forest Lake (17,474)	Minimum four (4) foot high fence required
Grant (4,236)	Minimum five (5) foot high fence **OR** ATSM Certified Pool Cover
Hugo (8,357)	Minimum four (4) foot high fence required
Minnetrista (5,902)	Minimum four (4) foot high fence **OR** ATSM Certified Pool Cover
Oak Grove (8,249)	Does not require a barrier
Oak Park Heights (4,676)	Minimum four (4) foot high fence required
Oakdale (27,249)	Minimum four (4) foot high fence required
Orono (7,842)	Does not require a barrier
Rogers (6,570)	Minimum five (5) foot high fence required
St. Francis (7,201)	Minimum four (4) foot high fence required
Stillwater (17,929)	Minimum four (4) foot high fence **OR** ATSM Certified Pool Cover
Woodbury (55,395)	Minimum four (4) foot high fence required

Currently the City of Lake Elmo requires that all private pools be enclosed by a four (4) foot high fence with a self-closing and self-latching gate. The specific language governing private pool safety devises can be found on the next page.

Section 525.01. Swimming Pools.

Subdivision 12. Fences.

All swimming pools shall be completely enclosed by a non-climbable type fence. All fence openings or points of entry into the pool area shall be equipped with gates. The fence and gates shall be at least four (4) feet in height and shall be constructed of a minimum number eleven gauge woven wire mesh corrosion-resistant material or other material approved by the building official. All gates shall be equipped with self-closing and self-latching devices placed at the top of the gate or otherwise be inaccessible to small children. All fence posts shall be decay or corrosion resistant and shall be set in concrete bases or other suitable protection. The openings between the bottom of the fence and the ground or other surface shall not b e more than four (4) inches.

During our study of the issue, staff came across research conducted in Medina in April of 2006 that included contacting major national insurance companies regarding covers. According to the findings in Medina, the general consensus was that fences are required in order to get insurance (regardless of the municipalities local requirements). Underwriters for policies may allow a pool cover in lieu of a fence on larger sized parcels, but that depended largely on the facts surrounding the subject parcel. Building officials we spoke to during our research also indicated that people would typically build a fence for insurance purposes even when it was not required by the City.

POOL COVER ANALYSIS:

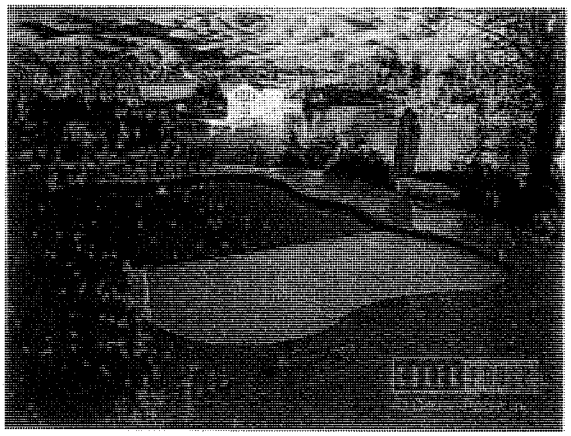
Clearly there is no consensus on how cities should approach private pool safety. If Lake Elmo chooses to allow pool covers as an option, though, staff would suggest the following be considered:

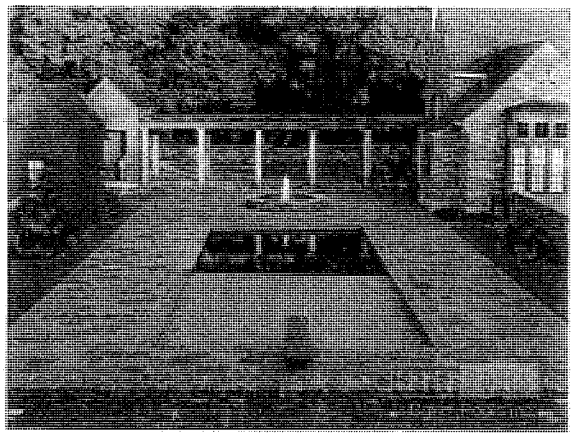
- **American Society for Testing Material (ASTM) Certification should be required.** ASTM is a highly respected organization whose origins date back to the late 1800's. The organization has a record of excellence in the formation of standards for a number of industries, and operates through an extensive consensus-building process utilizing numerous committees often with substantial memberships. They are widely considered as the trusted source for technical standards, and their pool cover requirements are universally referred to in local ordinances accepting covers as a safety device.

  The specific standards for pool covers are found in the ASTM document F1346-91 (2003): *Standard Performance Specifications for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas, and Hot Tubs.* Staff did not provide a copy of these standards prior to the public hearing as they are only available for purchase though the ASTM website. However, these specification would be extremely detailed and technical, and would not be important in writing the proposed ordinance. The critical component of the ordinance would be to require that all ASTM standards be met. As such, an applicant would be required to provide proof of ASTM certification for the proposed cover along with the application for a pool building permit.

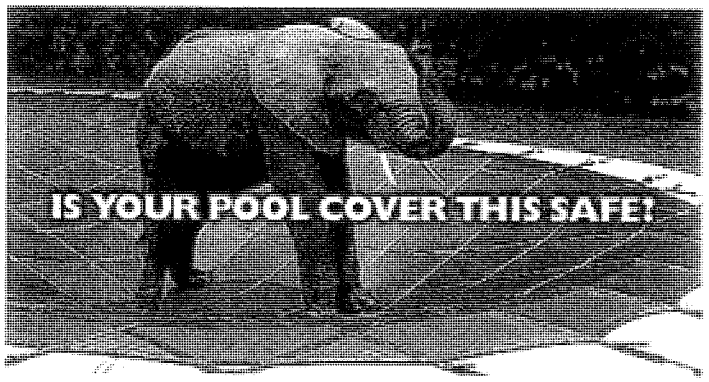
- **Not all ASTM certified covers are equal when it comes to installation.** Requiring that covers meet ASTM requirements will address the City's concerns with regards to safety of a property installed cover. Safety requirements include that the cover must be able to hold a weight of 485 lbs (2 adults and one child) to permit rescue operation; be able to demonstrate that any opening in the cover is sufficiently small and strong enough to prevent a test object from passing through; and the cover must meet proper labeling requirements. The ASTM requirements on their own, however, do not speak to the ease of installation of the cover. Upon researching different cover types, staff found examples of ASTM covers that were automatic (which install at the push of a button), and others that need to be manually assembled between uses. Staff does not believe the manually assembled covers, while safe,

could provide the same degree of safety as a required fence. As such, if an ordinance were to be passed, staff would recommend limiting acceptable covers to those that are automatic.





Here are two examples of automatic swimming pool covers. The left picture shows a cover on an irregular pool, while the right shows a cover on a standard rectangular pool. Both covers run on tracks built into the top edge of the pool. The covers are operated at the push of a button that is located a minimum 5 feet from the ground to prevent easy access.



Here is an example of a manual pool cover. It is arguably safe, but not the type of barrier that will be replaced every time a swimmer retires into the home for a quick minute.

Further investigation revealed that ASTM recommends that only power operated safety covers as an adequate pool barrier. Manual safety covers can meet ASTM safety standards, but they are not considered a permanent layer of protection for pools to prevent drowning.

- **Water can accumulate on top of safety pool covers.** During any rain event, there is the possibility of water accumulating on top of a pool safety cover. While we do not have a copy of the full ASTM safety standards, we did find in the literature a reference to automatic pumps being required to remove this type of water. Such a pump is designed to automatically turn itself on when water is present and shut off once the water has been removed. Given this requirement, staff's concerns about this possible safety hazard are addressed by ASTM certification.

- **ASTM standards are not yet established for temporary barrier fencing.** According to the attached article entitled *Safety Standards for Swimming Pools*, ASTM is working on a national standard for removable barrier fencing. At the time of writing this report, staff could not find any indication that such standards had yet been approved.

This picture, taken from the website www.poolsafetyfences.com/, Provides an example of "temporary" protective fencing. Staff would not recommend approving this type of fencing as a safety device until national standards for this system are adopted. Even then, such fencing should likely only be considered as one layer of a required safety system.

GENERAL ARGUMENTS FOR AND AGAINST:

Clearly this issue is not black and white and is viewed differently from jurisdiction to jurisdiction. The following are general questions/facts that are generally considered when approaching this type of ordinance:

1) Covers are the only safety barrier that creates a complete barrier to the water for the safety of people *on and off* the premises. Given that the ASTM standards require a pump to remove any surface water on the cover, this safety device (if used properly) can be very effective.
2) People can forget to close covers, while fences are a permanent barrier. Covers are only an effective safety device when closed.
3) Fences are not a cure-all to prevent unwanted access to pools as they can be climbed and latches on gates can fail over time if not properly maintained.
4) Fencing is viewed by some as out-of-character for larger lots and rural areas.

SUMMARY:

Clearly there is no standard answer when it comes to the question of mandatory private pool safety. Most cities elect to require protective fencing at a minimum, and in recent years some cities have also allowed pool covers as an option. The only "right" answer is what safety device (or devices) does Lake Elmo feel are necessary to protect public safety.

RECOMMENDATION:

Attached you will find a proposed ordinance that would permit specific types of pool safety covers as a permissible safety device for private pools.

CITY OF LAKE ELMO
COUNTY OF WASHINGTON
STATE OF MINNESOTA

ORDINANCE NO. 97-___

AN ORDINANCE AMENDING SECTION 525.01 SUBDIVSION 12 OF THE LAKE ELMO CITY CODE TO ALLOW AUTOMATIC PROTECTIVE POOL COVERS TO BE USED AS AN ALTERNATIVE SAFETY DEVICE IN LIEU OF A FENCE

The City Council of the City of Lake Elmo hereby ordains that Sections 525.01, subd. 12 is hereby amended to read as follows:

SECTION 525.01 – Swimming Pools

Subd. 12. ~~Fences~~Pool Barrier Required.

All noncommercial swimming pools constructed in Lake Elmo shall include one of the following safety barriers:

1. A safety fence.

   The swimming pool ~~All swimming pools~~ shall be completely enclosed by a non-climbable type fence. All fence openings or points of entry into the pool area shall be equipped with gates. The fence and gates shall be at least four (4) feet in height and shall be constructed of a minimum number eleven gauge woven wire mesh corrosion-resistant material or other material approved by the building official. All gates shall be equipped with self-closing and self-latching devices placed at the top of the gate or otherwise be inaccessible to small children. All fence posts shall be decay or corrosion resistant and shall be set in concrete bases or other suitable protection. The openings between the bottom of the fence and the ground or other surface shall not b e more than four (4) inches. Fences shall be identified on the survey or site plan submitted with the building permit application.

2. An automatic (powered) safety pool cover.

   Automatic pool covers shall meet the standards of F1346-91 of the American Society of Testing and Materials (ASTM), as such standards may be modified, superseded or replaced by ASTM. Manually assembled or positioned safety pool covers shall not suffice as a required pool barrier. It shall be the responsibility of the building permit applicant and property owner to submit materials ensuring compliance with the ASTM standards for an automatic pool cover prior to the issuance of a building permit. Compliance with the ASTM standards shall be shown with the building permit application for the pool.

Effective Date
This ordinance shall become effective immediately upon adoption and publication in the official newspaper of the City of Lake Elmo.

Adoption Date
This Ordinance No. 97-1___ was adopted on this _____ day of _____, 20___, by a vote of __ Ayes and __ Nays.

_____
Mayor Dean Johnston

ATTEST:

_____
Susan Hoyt
Administrator

This Ordinance No. 97-___ was published on the ___ day of _____, 2007.

Planning Commission
Date: 8/27/07
Item: 4B
Public Hearing

ITEM: **VARIANCE – Application from Paul Mencke for lakeshore and side yard setback variances to allow construction of a second story addition on a legally nonconforming home at 8838 Lake Jane Trail – R1 zoning – PID 09-029-21-41-0015**

SUBMITTED BY: Ben Gozola, Senior Planner

REVIEWED BY: Susan Hoyt, City Administrator
Kelli Matzek, Assistant City Planner

SUMMARY AND ACTION REQUESTED:

Paul Mencke, the property owner at 8838 Lake Jane Trail, is seeking the ability to construct a second story addition on an existing home. The proposed addition will need variances as the existing home is nonconforming to lakeshore and side yard setbacks. The two variances are as follows:

1. A **29-foot variance** from the required 100' lakeshore setback from Lake Jane;

   and

2. A **0.1-foot variance** from the required 10-foot side yard setback from the western property line.

Note that the proposed addition will not expand either of the existing nonconformities towards the lake or the side yard. The second story will be completely above the existing structure.

By city code, a variance can only be granted when the City determines that strict enforcement of the code would cause undue hardship on a property owner. "Hardship" is broken down into the following three components:

a. *The proposed use of the property and associated structures in question cannot be established under the conditions allowed by the city's zoning regulations and no other reasonable alternative use exists;*

b. *The plight of the landowner is due to the physical conditions unique to the land, structure, or building involved and are not applicable to other lands, structures, or buildings in the same zoning district; and*

c. *The unique conditions of the site were not caused or accepted by the landowner after the effective date of the city's zoning regulations.*

Both requests were determined to meet the variance criteria outlined by Lake Elmo City Code as the legally nonconforming structure predates current regulations, and the current property owner did not create the nonconformities. The requests are also reasonable as the existing nonconformities will not be increased and will have no impact on adjacent properties.

At this time, the planning commission is asked to conduct a public hearing for the variance requests to allow construction of the proposed second story addition. Upon conclusion of the hearing, the commission is asked to make a recommendation to the City Council on these requests.

ADDITIONAL INFORMATION:

- The actual water level for Lake Jane is generally around an elevation of 922 and is rarely near the identified OHW of 924. In fact, monthly water level readings dating back to the 1960's show that except for a period of five years (approximately '83 to '87), water levels have consistently been at 922 or less. If the required setback were measured from the typical water's edge, the home would be conforming to the required 100' lakeshore setback.
- The requested side yard setback variance for 0.1 feet is a nominal request based likely on surveyor error. When originally constructed, the existing garage addition was required to meet the 10 foot setback. The dimensions as constructed were determined to meet setbacks and so a permit was issued. The fact that the current survey shows a 9.9 foot setback for the garage indicates that one of the surveyors calculations are off (either the original surveyor or the current surveyor). Given that the applicant sought to be compliant with code and was authorized to construct the current garage, staff finds the current side yard variance request is reasonable.

RECOMMENDATION:

Recommend that Council approve the proposed variances for Paul Mencke at 8838 Lake Jane Trail.

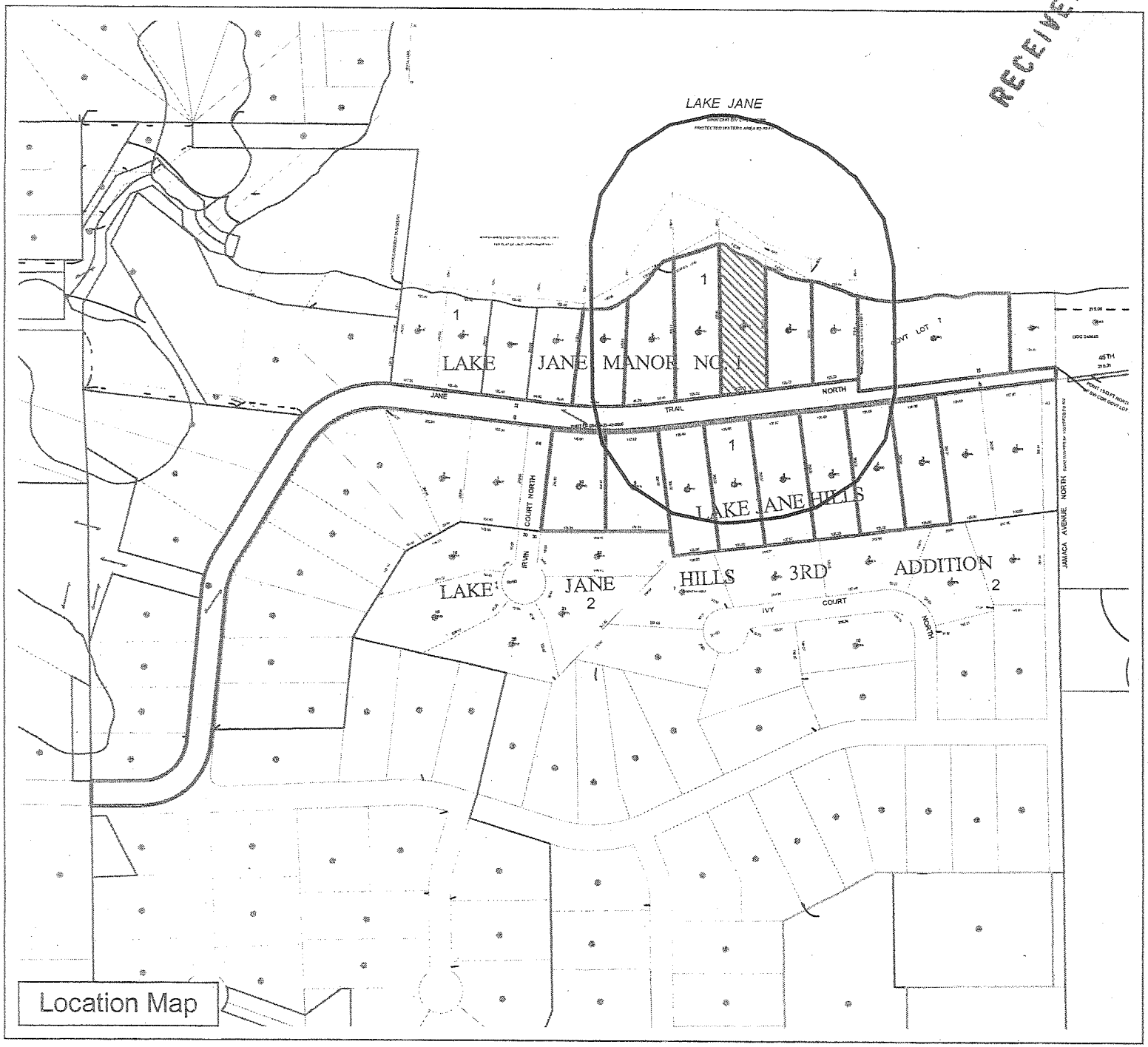
ORDER OF BUSINESS:

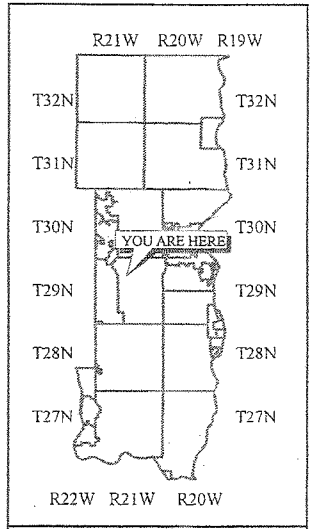
- Introduction ..... Ben Gozola, Senior Planner
- Report by staff ..... Ben Gozola, Senior Planner
- Questions from the Commission ..... Chair & Commission Members
- Applicant Comments ..... Chair facilitates
- Questions of the Applicant ..... Chair & Commission Members
- Open the Public Hearing ..... Chair
- Close the Public Hearing ..... Chair

- Call for a motion ..... Chair Facilitates
- Discussion of Commission on the motion ..... Chair Facilitates
- Action by the Planning Commission ..... Chair & Commission Members

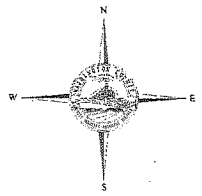
ATTACHMENTS (5):

1. Area Map identifying the location of the property
2. Detailed staff report analyzing the request
3. Survey of 8838 Lake Jane Trail identifying the location of the existing house
4. Elevation drawing showing the proposed upper story addition
5. Floor plans for the proposed addition





Vicinity Map



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Scale in Feet

This drawing is the result of a compilation and reproduction of land records as they appear in various Washington County offices. The drawing should be used for reference purposes only. Washington County is not responsible for any inaccuracies.

Source: Washington County Surveyor's Office. Phone (651) 430-6875

Parcel data based on AS400 information current through: May 31, 2007
Map printed: July 31, 2007

City of Lake Elmo Planning Department

Variance Report

To: **Planning Commission**

From: Ben Gozola, City Planner

Meeting Date: **8-27-07**

Applicant: **Paul Mencke**

Owner: Same

Location: **8838 Lake Jane Trail N.**

Zoning: R-1

Introductory Information

Proposed Project: The applicant is seeking to construct a second story over an existing legal nonconforming dwelling at 8838 Lake Jane Trail.

Variance Request(s): The existing home is legally nonconforming to lakeshore and side yard setbacks. As such, the proposed second story addition will require the following variances:

1. A **29-foot variance** from the required 100' lakeshore setback from Lake Jane;

   and

2. A **0.1-foot variance** from the required 10-foot side yard setback from the western property line.

Applicable Codes:

Section 300.07 Zoning Districts.

Subd. 4(c). R-1 – One Family Residential (Medium Density). *Subd 3. Minimum District Requirements.* Requires that all structures be setback a minimum of 10 feet from an interior side lot line.

Section 325.06 Shoreland Standards.

Subd. 4(a). Placement. Requires that structures on recreational development lakes be a minimum of 100 feet from the OHW of the Lake

Findings & General Site Overview

Site Data:

Lot Size: 1.18 acres (50,222 square feet)

Existing Use: Single Family Dwelling

Existing Zoning: R-1

Property Identification Number (PID): 09-029-21-41-0015

Legal Description: Lot 3, Block 1, Lake Jane Manor No. 1, Washington County, Minnesota

Application Review:

Applicable Definitions:

BUILDING LINE. A line parallel to a lot line or the ordinary high water level at the required setback beyond which a structure may not extend.

BUILDING SETBACK LINE. A line within a lot parallel to a public right-of-way line, a side or rear lot line, a bluff line, or a high water mark or line, behind which buildings or structures must be placed.

DWELLING, SINGLE-FAMILY. A residential structure designed for or used exclusively as 1 dwelling unit of permanent occupancy.

HARDSHIP. The proposed use of the property and associated structures in question cannot be established under the conditions allowed by the city's zoning regulations and no other reasonable alternative use exists; that the plight of the landowner is due to the physical conditions unique to the land, structure, or building involved and are not applicable to other lands, structures, or buildings in the same zoning district; and that these unique conditions of the site were not caused or accepted by the landowner after the effective date of the city's zoning regulations.

LOT, RIPARIAN. A separate parcel of land within a designated shoreland area having frontage along a lake or tributary stream.

ORDINARY HIGH WATER MARK OR ELEVATION (O.H.W.). The boundary of public waters and wetlands, and shall be an elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For water courses, the ordinary high water level is the elevation of the top of the bank of the channel. For reservoirs and flowages, the ordinary high water level is the operating elevation of the normal summer pool.

SHORE IMPACT ZONE. Land located between the ordinary high water level of a public water and a line parallel to it at a setback of 50% of the structure setback.

(cont.)

SHORELAND. Land located within the following distances from public waters: 1,000 feet from the ordinary high water level of a lake, pond, or foliage; and 300 feet from a river or stream, or the landward extend of a flood plain designated by ordinance on a river or stream; whichever is greater. The limits of shorelands may be reduced whenever the waters involved are bounded by topographic divides which extend landward from the waters for lesser distances and when approved by the Commissioner.

Variance Criteria:

An applicant must establish and demonstrate compliance with the variance criteria set forth in Lake Elmo City Code Section 300.06 Subd. 3. before an exception or modification to city code requirements can be granted. For ease of review, staff provides a three-part breakdown of the definition of "hardship" in Lake Elmo City code to ensure the requests are meeting the spirit and intent of the ordinance.

1. *The proposed use of the property and associated structures in question cannot be established under the conditions allowed by the city's zoning regulations and no other reasonable alternative use exists;*

   Staff finds the proposed addition of a second story on an existing legal nonconforming dwelling is a reasonable request. Without the variances, the applicant could not build up over the northeastern ½ of the home due to its location within the lakeshore setback. Requiring the applicant to build into the conforming area of the front yard would unnecessarily increase hardcover on this lakeshore lot. **Staff finds this criterion is met for both requests.**

2. *The plight of the landowner is due to the physical conditions unique to the land, structure, or building involved and are not applicable to other lands, structures, or buildings in the same zoning district;*

   The situation on this lot is unique in two ways:

   a. The legally nonconforming home was built in 1965 and predates existing shoreland district setback regulations.

   b. The dimensions of the garage addition (constructed in approximately 1997) were determined to result in a 10-foot setback from the side property line at the time of construction. The updated survey shows the southwestern corner of the garage is actually 0.1 feet (1.2 inches) within the setback. Because of the angle of the legally nonconforming dwelling though, nearly all of the garage (except the southwest corner) meets the required setback. This discrepancy seems to have resulted from surveyor error (either in 1997 or on the current survey).

   The physical location of the legally nonconforming dwelling creates the hardship facing this property owner, and staff does not find these circumstances are generally applicable to other structures in the R1 zoning district. As such, **staff finds this criterion is met for both requests.**

(cont.) *D. The unique conditions of the site were not caused or accepted by the landowner after the effective date of the city's zoning regulations.*

Staff does not believe the current property owner caused or accepted any of the existing nonconformities. Clearly the nonconformity towards the lakeshore existed well before the adoption of shoreland district codes in the City of Lake Elmo. With regards to the nonconforming southwest corner of the garage, both the applicant and City believed the proposed location was conforming to code at the time of construction. **Staff finds this criterion is met for both requests.**

Variance Conclusions: Based on our analysis of the review criteria in City Code, staff would recommend **approval** of the variance requests to allow construction of a second story addition over the existing home at 8838 Lake Jane Trail North based on the following:

Resident Concerns: Staff is not aware of any resident concerns surrounding the requested variances. According to the applicant, the neighbors are all supportive of the proposed changes.

Additional Information:

- Neither the watershed district nor the DNR provided comment in support or in opposition to the proposed variances.

Conclusion:

The applicants are seeking approval of the following two variances:

1. A **29-foot variance** from the required 100' lakeshore setback from Lake Jane; and
2. A **0.1-foot variance** from the required 10-foot side yard setback from the western property line.

Commission Options: The Planning Commission has the following options:

A) Recommend approval of the variance requests;

B) Recommend denial of the variance requests;

C) Table the item and request additional information.

The 60-day review period for this application expires on 9-30-07, but can be extended an additional 60 days if more time is needed.

Staff Rec: **Staff is recommending approval** of the variance requests to allow construction of a second story addition over the existing home at 8838 Lake Jane Trail North based on the following:

- The request is reasonable as the applicant was not responsible for creating the existing nonconformities;

(cont.)

- None of the existing nonconformities will be expanded as a result of the second story addition;
- The circumstances surrounding the existing nonconformities are not generally applicable to other structures in the R1 zoning district.

Denial Motion Template: To deny one or both of the requests, you may use the following motion as a guide:

I move we recommend that Council deny the requested variance(s) based on the following findings of fact...*(please site reasons for the recommendation)*

Approval Motion Template: To approve both requests or one of the requests, you may use the following motion as a guide:

I move we recommend that Council approves the requested variance(s) based on the following findings of fact...*(use staff's findings provided above or cite your own)*

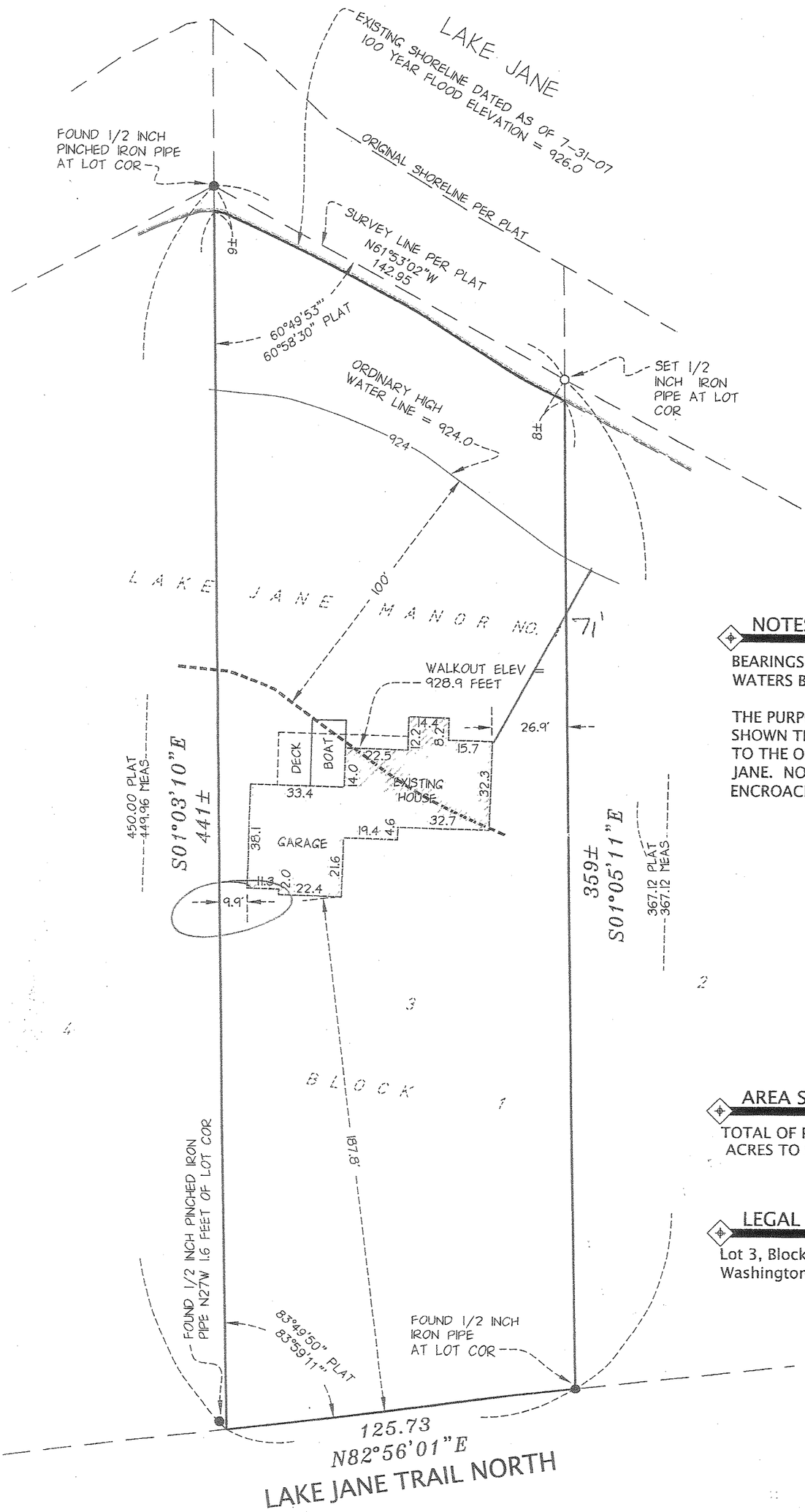
...with the following conditions:

1. **The applicant shall obtain all necessary permits and approvals from the City and other applicable entities with jurisdiction prior to any future construction or activity on the land.**
2. **The applicant shall comply with all septic regulations if a system upgrade is required along with the proposed improvements.**
3. **The variance shall expire one year from the date of resolution if not acted upon; City Council approval will be required for any subsequent extension.**

cc: Paul Mencke, Applicant

CERTIFICATE OF SURVEY
FOR: PAUL MENCKE

PROJECT LOCATION:
8838 LAKE JANE TRAIL N
LAKE ELMO, MN



NORTH

0 40 80

SCALE: 1 INCH = 40 FEET

NOTES:
BEARINGS ARE BASED ON THE PLAT OF WATERS BAY.

THE PURPOSE OF THIS SURVEY WAS TO SHOWN THE EXISTING HOUSE IN RELATION TO THE ORDINARY HIGH WATER LINE OF LAKE JANE. NO OTHER IMPROVMENTS OR ENCROACHMENTS WERE LOCATED OR SHOWN

AREA SUMMARY:
TOTAL OF PARCEL = 50,222 SQ. FT. OR 1.18 ACRES TO SHORE LINE

LEGAL DESCRIPTION
Lot 3, Block 1, LAKE JANE MANOR NO. 1, Washington County, Minnesota.

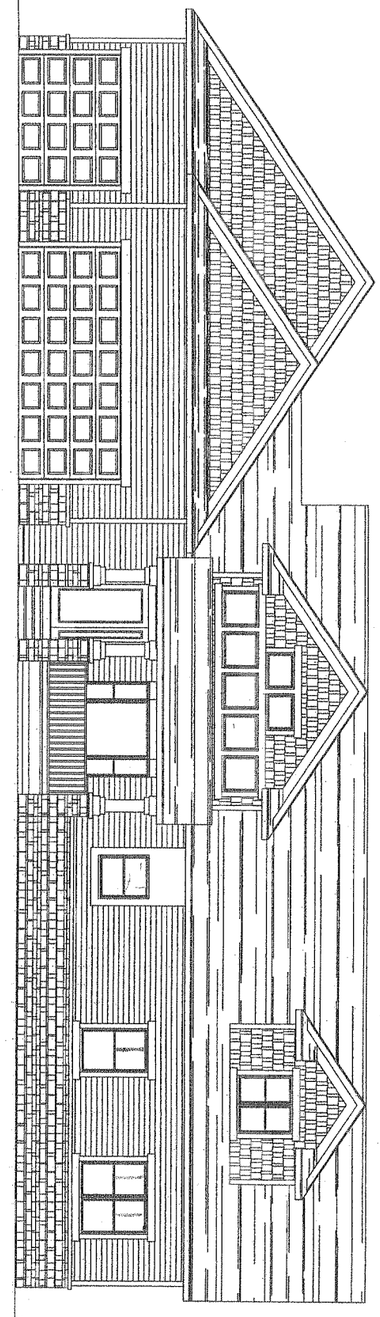
CERTIFICATION:
I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly licensed Land Surveyor under the laws of the State of MINNESOTA.

DANIEL L. THURMES
License. No. 25718 Date 7-31-07

SYMBOLS	DESCRIPTION
——o——	PROPERTY LINE
— — —	EASEMENT LINE
o	DENOTES IRON MON. FOUND
●	DENOTES IRON MON. SET

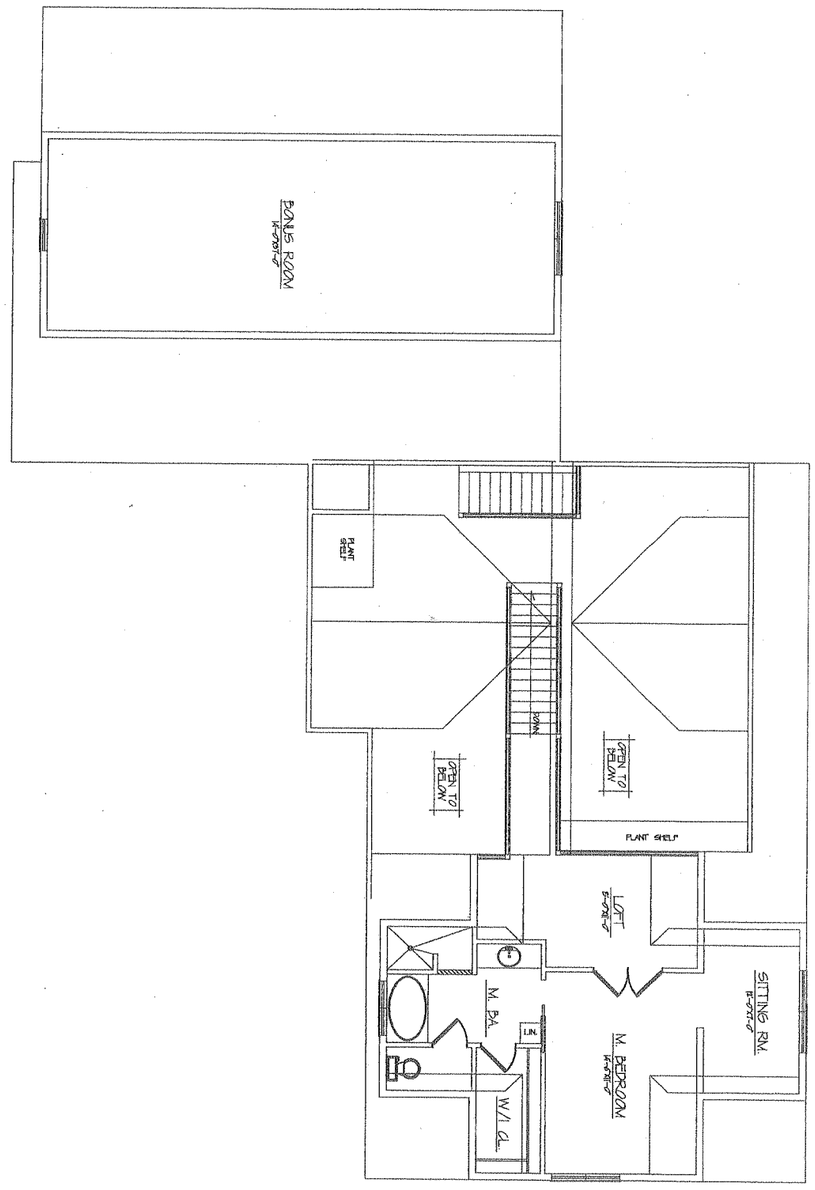
Suite #B100
200 East Chestnut Street
Stillwater, MN 55082
Phone 651.275.8969
Fax 651.275.8976
dlt-csls@
mcleodusa
.net

CORNERSTONE
LAND SURVEYING, INC



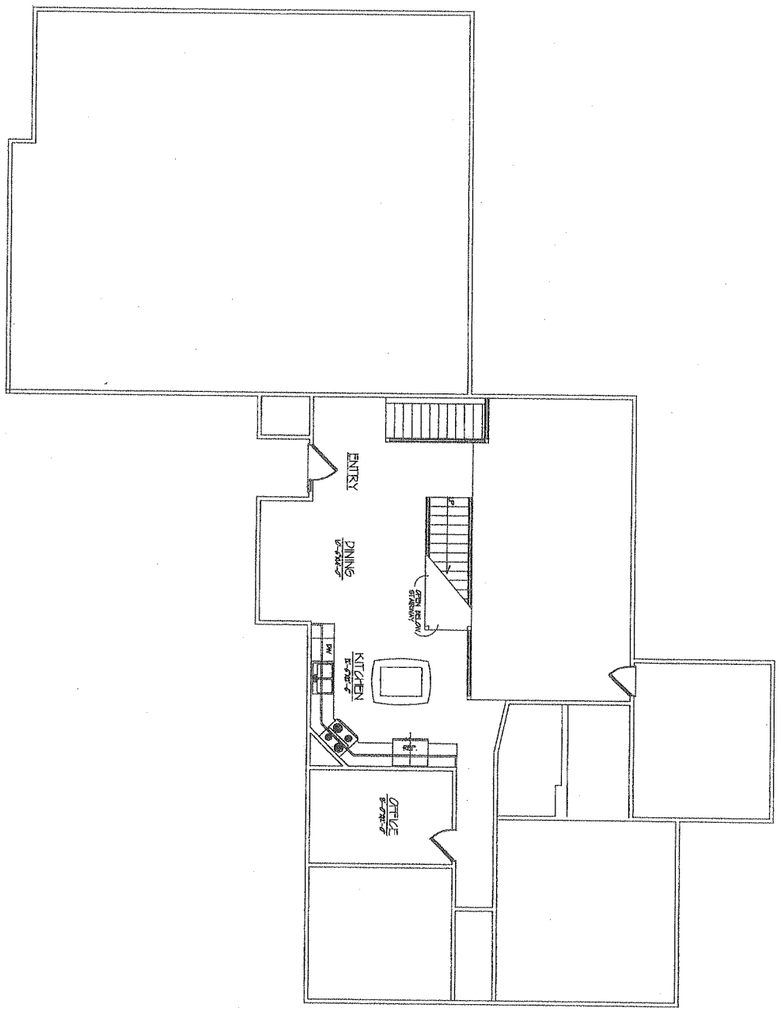
OSCEOLA LUMBER CO. 657 ST. RD. 35 OSCEOLA, WI 54020 (715) 294-2000	DATE: 6/6/07	ELEVATIONS
	REV.: -	MIENKE REMODEL
	NO SCALE	NOT FOR CONST. USE

2ND STORY ADDITION



TOLZMAN DESIGN 2637 10TH AVE. OSCEOLA, WI 54020 (715) 755-3343	DATE: 6/6/07	UPPER FLOOR PLAN
	REV.: -	MIENKE REMODEL
	NO SCALE	NOT FOR CONST. USE

1ST. FLOOR
REMODEL



TOLZMAN DESIGN 2637 10TH AVE. OSCEOLA, WI 54020 (715) 755-3343	DATE: 6/6/07	FLOOR PLAN
	REV.: -	MIENKE REMODEL
	NO SCALE	NOT FOR CONST. USE

Planning Commission
Date: 8/27/07
Public hearing
Item: 5

ITEM: **LCD Billboards**

REQUESTED BY: City Council

SUBMITTED BY: Ben Gozola, Senior Planner

REVIEWED BY: Susan Hoyt, City Administrator
Kelli Matzek, Assistant City Planner

SUMMARY AND ACTION REQUESTED:

In the coming weeks, the planning commission will be asked to consider an ordinance to govern the use of LCD billboard screens within the City of Lake Elmo. A moratorium on such installations was approved last February. We are using this time to orient the planning commission on the issues surrounding these billboards, and will return in the future with a proposed ordinance for consideration. No action is requested at this meeting.

BACKGROUND INFORMATION:

An initial review of city code indicates that the advent of LCD billboards is not a pending problem for the City. Section 535.06 of Lake Elmo City code **prohibits** the following:

- New Billboards
- Moving or rotating signs (this includes electronic reader board signs
- Illuminated or Flashing lights on signs.

Based on this language alone, it appears as if the City's current regulations may restrict the use of LCD screens as part of new signage within the City. However, if such screens are a concern, staff would recommend clarifying current code to specifically address LCDs.

Because billboards are no longer an allowed sign within the City, the locations for LCD billboards are limited to current legal nonconforming sign locations. According to the City Attorney, there are three such signs in the City of Lake Elmo. Two of these existing billboards are not of the size necessary to support the LCD screens being used elsewhere in the metro. The third site—at Link Recreational—is a standard size billboard that could host an LCD screen, but this sign is believed to be privately owned. Staff will continue to research these signs to ensure our findings to date are accurate.

Finally, staff has begun some initial research to see how other communities within the metro are addressing the new issue of LCD signage. The following is a summary of the responses we've received to date:

- City of Rosemount – does not allow electronic signs except those that display public non-commercial message, time, or temperature.
- City of Plymouth – allows electronic signs, but restricts messages from changing more than four times per hour.

- City of Winona – does not have any specific code language regulating LCD signs and they are therefore allowed. The only restrictions on such would be those imposed by state regulations for signage on state rights-of-way.
- City of Rochester – currently does not have an requirements for LCD signs.
- Fergus Falls – indicated that they would rely on their language governing "flashing and rotating signs" which are conditionally permitted in commercial and industrial zones.
- Inver Grove Heights – allows LED signs, but does not have any specific regulations or restrictions except for their general size requirements.
- City of Golden Valley – permits "electronic signs" provided the message does not change more than once during any 24 hour period.
- City of Minnetonka – the first city in the metro to staff's knowledge to adopt a "dynamic" sign ordinance. The ordinance is available on-line at www.eminnetonka.com and will be reviewed by staff prior to crafting an ordinance for Lake Elmo.
- City of Minneapolis – current ordinance does not address LCD signs except for in the downtown area where they are allowed provided the changeable message is limited to time and temperature only. It is expected that the ordinance will be changed to allow greater use of changing "static" images on LCD displays downtown (likely with a minimum 8 to 10 second delay between messages).
- City of Maplewood -- allows electronic readerboards only when used "primarily" for public service messaging. Primarily has been interpreted to mean at least 31 minutes out of every hour the sign must display a public service such as time and temperature.
- City of Coon Rapids – Permits "electronic variable message signs" which provide public service information or advertise activities conducted on the premises on which the sign is located. The city will likely be updating their codes once the league of MN Cities finishes their study on the matter.
- City of Bloomington – prohibits scrolling but allows for electronic signs which meet a number of specific standards which can be found at: http://www.ci.bloomington.mn.us/cityhall/dept/commdev/planning/regs/zoneproject/electrosign/electrosign.htm
- City of New Prague – permits "electronic variable message signs" a number of zoning districts provided the message on such signs do not change more than once per five (5) seconds.
- City of Mounds View – like Lake Elmo, currently has a moratorium on such signs and is looking to study the issue.

RECOMMENDATION:

The League of Minnesota Cities is currently conducting a study specific to LCD advertising, and staff would suggest holding off on further action in hopes that it will be completed in the near future. There is no pending deadline for completion of this ordinance as the current moratorium on LCD signs runs through February of 2008.

ORDER OF BUSINESS:

- Introduction ..... Ben Gozola, Senior Planner
- Report by staff ..... Ben Gozola, Senior Planner
- Questions from the Commission ..... Chair & Commission Members

ATTACHMENTS (4):

1. Sauk Rapids ordinance to address LED signage
2. City of Champlin ordinance to address "electronic messaging" signs
3. City of Bloomington Ordinance on Electronic Video Displays
4. SRF Report to the City of Minnetonka entitled, "Dynamic" Signage: Research Related to Driver Distraction and Ordinance Recommendations.

ATTACHMENT 1

Ordinance No._____

AN ORDINANCE AMENDING SECTIONS 10.12, 10.12A, 10.12B TO INCLUDE LANGUAGE REGULATING THE USE OF LIGHT EMITTING DIODES (LEDs) IN THE CITY OF SAUK RAPIDS.

WHEREAS, the Sauk Rapids City Council has determined that Light Emitting Diodes (LEDs) are appropriate uses in the City's Commercial and Downtown Districts when regulated; and

NOW THEREFORE, The Sauk Rapids City Council ordains as follows:

Section 1: In accordance with Minnesota Statute 462.3597, Ordinance No._____ is hereby amended to add the following language to regulate the use of Light Emitting Diodes (LEDS) to the City Of Sauk Rapids Ordinance Code.

SECTION 10.12 COMMERCIAL DISTRICT, C-2
Subdivision 10. LEDs. Light Emitting Diodes (LEDs) may be used as building edge lighting in this district. This LED edge lighting shall be prohibited on any portion of a building facing residentially zoned property. Acceptable edge lighting will be determined by the Community Development Director. The LEDs on a building will not count against the calculated sign square footage unless configured as a logo, symbol, trademark, or words as determined by the Community Development Director.

SECTION 10.12A: "D-1" DOWNTOWN BUSINESS DISTRICT
Subdivision 10: LIGHTING
3. LEDs. Light Emitting Diodes (LEDs) may be used as building edge lighting in this district. This LED edge lighting shall be prohibited on any portion of a building facing residentially zoned property. Acceptable edge lighting will be determined by the Community Development Director. The LEDs on a building will not count against the calculated sign square footage unless configured as a logo, symbol, trademark, or words as determined by the Community Development Director.

Section 10.12B Highway Commercial District, C-3
Subdivision 9. Exterior Lighting.
F. LEDs. Light Emitting Diodes (LEDs) may be used as building edge lighting in this district. This LED edge lighting shall be prohibited on any portion of a building facing residentially zoned property. Acceptable edge lighting will be determined by the Community Development Director. The LEDs on a building will not count against the calculated sign square footage unless configured as a logo, symbol, trademark, or words as determined by the Community Development Director.

Section 2: This Ordinance shall be effective immediately upon its passage.

Adopted this 9TH day of April 2007.

_____
Mark Campbell
Mayor

ATTEST:

_____
Ross Olson
City Administrator

13-116.4 Prohibited Signs - Applicable to All Zoning Districts.

D. ~~Illumination. Illuminated signs giving off intermittent, flashing or rotating beams shall not be permitted in any district.~~

~~The light from any illuminated sign shall be so shaded, shielded, or directed that the light intensity or brightness shall not impair surrounding or facing premises nor adversely affect safe vision of operators of vehicles moving on public or private roads, highways, or parking areas. Sign light shall not shine or reflect on or into residential structures. When necessary to prevent a nuisance, the City shall specify the hours during which illuminated signs may be kept lighted.~~

Motion signs, flashing signs and rotating signs, except electronic message signs that comply with the following standards:

1. No electronic message sign may be erected that, by reason of position, shape, movement or color, interferes with the proper functioning of a traffic sign, signal or which otherwise constitutes a traffic hazard.
2. Electronic message signs must have minimum display duration of ten (10) seconds. Such displays shall contain static messages only, changed only through dissolve or fade transitions, or with the use of other subtle transitions that do not have the appearance of moving text or images.
3. All signs shall have installed ambient light monitors and shall at all times allow such monitors to automatically adjust the brightness level of the electronic sign based on ambient light conditions.
4. Electronic message signs shall not exceed 3,500 Nits (candelas per square meter) between the hours of civil sunrise and civil sunset and shall not exceed 500 Nits (candelas per square meter) between the hours of civil sunset and civil sunrise as measured from the signs face.
5. The lamp wattage and luminance level in Nits (candelas per square meter) shall be provided at the time of permit application. Electronic message sign permit applications must also include a certification from the owner or operator of the sign stating that the sign shall at all times be operated in accordance with City codes and that the owner or operator shall provide proof of such conformance upon request of the City.
6. The leading edge of the electronic message sign must be a minimum distance of 100 feet from any residential district boundary. When located within 250 feet of residentially zoned property, any part of an electronic message sign must be oriented

so that no portion of the sign face is visible from an existing or permitted principal structure on that property.

7. Electronic message signs shall not exceed 40 percent of the allowable sign area for a given sign.

This ordinance shall become effective following its passage and publication as required by law.

Additions: Add
Deletions: ~~Delete~~

Mark Uglem, Mayor

ATTEST:

Roberta Colotti, City Clerk

First Reading: April 9, 2007
Second Reading: April 23, 2007
Published in the Champlin-Dayton Press on _____

ORDINANCE NO. 2006-

AN ORDINANCE ESTABLISHING NEW ELECTRONIC MESSAGE BOARD, VEHICLE SIGN, VIDEO DISPLAY SIGN, AND TIME AND TEMPERATURE SIGN STANDARDS THEREBY AMENDING CHAPTERS 14 AND 19 OF THE CITY CODE

The City Council of the City of Bloomington, Minnesota ordains:

Section 1. That Chapter 14 of the City Code is hereby amended by deleting those words that are contained in brackets [ ] and adding those words that are underlined, to read as follows:

***

CHAPTER 14

LICENSES AND PERMITS

***

ARTICLE IV. BUSINESS LICENSES AND REGULATIONS

***

SEC. 14.153. STANDARDS FOR LOCATION AND OPERATION.

***

(c) **Installation and Maintenance.**

***

(6) **Location of Advertising**. No advertising shall be displayed on any courtesy bench except upon the front and rear surfaces of the backrest. Newspaper racks shall display no advertising except a logo or other identification of the newspaper being dispensed on the front of the newspaper rack. No courtesy bench or newspaper rack advertising shall display the words, "Stop", "Look", "Danger" or any other word, phrase or symbol that might interfere with, or distract traffic. Courtesy benches and newspaper racks are not subject to the requirements of Sections 19.100 – 19.127 of this City Code.

***

Section 2. That Chapter 19 of the City Code is hereby amended by deleting those words that are contained in brackets [ ] and adding those words that are underlined, to read as follows:

***

CHAPTER 19

ZONING

***

ARTICLE X. SIGN REGULATIONS

***

Division A. Purpose and Application

***

SEC. 19.100. FINDINGS, [~~STATEMENT OF~~] PURPOSE AND INTENT.

The City Council finds it necessary for the promotion and preservation of the public health, safety, welfare and aesthetics of the community that the construction, location, size, conspicuity, brightness, legibility, operational characteristics and maintenance of signs be controlled. Signs have a direct and substantial impact on traffic safety, pedestrian safety, community aesthetics and property values. The City Council recognizes that a great percentage of signs that are blighted, unattractive, or provide an unsafe distraction to motorists can be corrected by sensible quality control through adequate maintenance, inspection and operational guidelines. The City Council also recognizes that signs provide a guide to the physical environment and, as such, serve an important function to the community and economy. With respect to electronic signs, including video display signs, the City Council finds that they are highly visible from long distances and at very wide viewing angles both day and night and are designed to catch the eye of persons in their vicinity and hold it for extended periods of time. If left uncontrolled, electronic signs, including video display signs, constitute a serious traffic safety threat. Studies conducted by the Federal Highway Administration (FHWA), Research Review of Potential Safety Effects of Electronic Billboards on Driver Attention and Distraction, Sept. 11, 2001 and The Role of Driver Inattention in Crashes: New Statistics from 1995; the University of North Carolina Highway Safety Research Center, Distractions in Everyday Driving, May 2003 and The Role of Driver Distraction in Traffic Crashes, May 2001; the Wisconsin Department of Transportation, Synthesis Report of Electronic Billboards and Highway Safety, June 10, 2003; the Municipal Research and Services Center of Washington, Sign Control Provisions, Jan. 2006; and the Veridan Group, Video Signs in Seattle, Gerald Wachtel, May 2001, reveal that electronic signs are highly distracting to drivers and that driver distraction continues to be a significant underlying cause of traffic accidents.

The City Council intends by [~~establishes~~] this Article of the City Code to establish a [~~as the~~] legal framework for sign regulation in the City. The regulations promulgated in this Article are intended to facilitate an easy and agreeable communication between people while protecting and promoting the public health, safety, welfare and aesthetics of the community. It is not the purpose or intent of this Article of the City Code to prefer or favor commercial messages or speech over non-commercial messages or speech or to discriminate between types of non-commercial speech or the viewpoints represented therein. [~~The City Council recognizes that signs provide a guide to the physical environment and, as such, serve an important function to the community and economy. The City Council also recognizes that a great percentage of signs that are blighted and unattractive can be eliminated by sensible quality control, through adequate maintenance and inspection, and by reasonable guidelines formulated to minimize sign clutter and blight.~~]

***

SEC. 19.101. APPLICATION OF REGULATIONS AND SUBSTITUTION CLAUSE.

This Article shall apply to the location, erection, and maintenance of signs in all zoning districts within the City of Bloomington, Minnesota. The owner of any sign which is otherwise allowed by this Article of City Code may substitute non-commercial copy or message in lieu of any other commercial or non-commercial sign copy or message without any additional approval or permitting subject to the operational standards set forth herein. The purpose of this provision is to prevent any inadvertent favoring of commercial speech or message over non-commercial speech or message. This provision prevails over any more specific provision to the contrary.

Division B. Construction of Language and Definitions

***

SEC. 19.104. DEFINITIONS.

The following words and terms when used in this Article shall have the following meanings unless the context clearly indicates otherwise:

***

Changeable copy sign - a sign or portion thereof which has a readerboard for the display of text information in which each alphanumeric character, graphic or symbol is defined by objects, not consisting of an

illumination device and may be changed or re-arranged manually or mechanically with characters, letters, or illustrations that can be changed or rearranged without altering the face or the surface of the sign.

Changeable copy sign, electronic - a sign or portion thereof that displays electronic, non-pictorial, text information in which each alphanumeric character, graphic, or symbol is defined by a small number of matrix elements using different combinations of light emitting diodes (LED's), fiber optics, light bulbs or other illumination devices within the display area. Electronic changeable copy signs include computer programmable, microprocessor controlled electronic displays. Electronic changeable copy signs do not include official or time and temperature signs. Electronic changeable copy signs include projected images or messages with these characteristics onto buildings or other objects.

***

Electronic graphic display sign - a sign or portion thereof that displays electronic, static images, static graphics or static pictures, with or without text information, defined by a small number of matrix elements using different combinations of light emitting diodes (LED's), fiber optics, light bulbs or other illumination devices within the display area where the message change sequence is accomplished immediately or by means of fade, re-pixalization or dissolve modes. Electronic graphic display signs include computer programmable, microprocessor controlled electronic or digital displays. Electronic graphic display signs include projected images or messages with these characteristics onto buildings or other objects.

***

Flashing sign - a directly or indirectly illuminated sign or portion thereof [~~which~~] that exhibits changing light or color effect by any means, so as to provide intermittent illumination [~~which~~] that changes light intensity in sudden transitory bursts and [~~includes~~] creates the illusion of intermittent flashing light by [~~means of animation.~~] streaming, graphic bursts showing movement, or [~~Also~~] any mode of lighting which resembles zooming, twinkling or sparkling.

***

Multi-vision sign - any sign composed in whole or in part of a series of vertical or horizontal slats or cylinders that are capable of being rotated at intervals so that partial rotation of the group of slats or cylinders produces a different image and when properly functioning allows on a single sign structure the display at any given time one of two or more images.

***

Official signs and notices - signs and notices erected and maintained by public officers or public agencies within their territorial jurisdiction and pursuant to and in accordance with direction or authorization contained in federal, state, or local law for the purposes of carrying out an official duty or responsibility. Historical markers authorized by state law and erected by state or local governmental agencies or nonprofit historical societies and star city signs erected under Section 173.085 may be considered official signs.

Off-premises sign – a sign that is located on property that is not the premises, property or site of the use identified or advertised in the sign.

On-premises sign – a sign that is located on property that is the premises, property or site of the use identified or advertised in the sign.

***

Pyrotechnics - fireworks or similar devices used to ignite a combustible substance or produce an explosion.

***

Rotating sign – a sign or portion of a sign which in any physical part or in total turns about on an axis, rotates, revolves or is otherwise in motion, including without limitation a multi-vision sign.

***

Time and temperature sign - any sign which displays exclusively current time and temperature information.

***

Vehicle sign - any sign exceeding ten square feet in area mounted, painted, placed on, attached or affixed to a trailer, watercraft, truck, automobile or other form of motor vehicle so parked or placed so that the sign thereon is discernable from a public street or right-of-way as a means of communication and which by its location, size, and manner of display is reasonably calculated to exhibit commercial advertising identifying an on-site business or supplying directional information to an off-site business. A vehicle sign may be defined as a vehicle that functions primarily as a sign rather than as a transportation device, as determined by consideration of any combination of the following factors:

(A) The absence of a current, lawful license plate affixed to the vehicle on which the sign is displayed;

(B) The vehicle on which the sign is displayed is inoperable as defined by this City Code;

(C) The vehicle on which the sign is displayed is not parked in a lawful or authorized location or is on blocks or other supports or is parked in a manner that is not in conformity with the identified parking space on the lot;

(D) The vehicle on which the sign is displayed is not regularly used for transportation associated with the use it advertises;

(E) The vehicle remains parked on the premises after normal business hours when customers and employees are not normally present on the premises; or

(F) The vehicle remains parked in the same vicinity on the property in a location which maximizes its visibility from the public street or right of way on a regular basis.

***

Video display sign - a sign that changes its message or background in a manner or method of display characterized by motion or pictorial imagery, which may or may not include text and depicts action or a special effect to imitate movement, the presentation of pictorials or graphics displayed in a progression of frames which give the illusion of motion, including but not limited to the illusion of moving objects, moving patterns or bands of light, or expanding or contracting shapes, not including electronic changeable copy signs. Video display signs include projected images or messages with these characteristics onto buildings or other objects.

***

Division C. General Regulations

***

SEC. 19.106. SIGNS PROHIBITED IN ALL DISTRICTS.

***

(b) **Prohibited Signs.**

***

(6) **Flashing Signs Prohibited.** Flashing signs [~~shall be~~] not falling under the definition of video display signs are prohibited.

***

(10) **Vehicle Signs Prohibited**. Vehicle signs are prohibited.

(11) **Video Display Signs Prohibited**. Video display signs are allowed only as provided in Section 19.108 (h) (5) of this City Code.

(12) **Electronic Changeable Copy Signs Prohibited**. Electronic changeable copy signs are allowed only as provided in Section 19.108 (h) (4) of this City Code.

(13) **Electronic Graphic Display Signs Prohibited**. Electronic graphic display signs are allowed only as provided in Section 19.108 (h) (6) of this City Code.

(14) **Signs with Fluctuating Illumination Prohibited**. Any type of sign that fluctuates in light intensity or uses intermittent, strobe or moving light or lights that does not fall under the definition of video display signs, electronic changeable copy signs or electronic graphic display signs is prohibited.

(15) **Multi-vision Signs Prohibited**. Multi-vision signs are allowed only as provided in Section 19.108 (h) (7) of this City Code.

***

SEC. 19.108. GENERAL PROVISIONS, INCLUDING BASIC DESIGN ELEMENTS.

(a) **Consent of Property Owner.**

(1) No person shall construct, erect, place, use or permit the use of any [~~No~~] permanent sign or sign structure [~~shall be placed~~] on private or public property without the express written consent of the property owner or his/ her representative.

(2) No person shall construct, erect, place, use or permit the use of any [~~No~~] temporary sign or sign structure [~~shall be placed~~] on private or public property without the express written consent of the property owner or his/ her representative.

***

(h) **Basic Design Elements for Specific [~~Identification~~] Signs.**

***

(4) **Electronic Changeable Copy Sign**. Electronic changeable copy signs must meet the following standards. When attached to walls, electronic changeable copy signs are classified as cabinet signs.

(A) Location. The sign must be located on the site of the use identified or advertised by the sign;

(B) District Limitations. The sign must not be located in a Conservation or Bluff Overlay (BP-1, BP-2) district;

(C) Setback from residential. The leading edge of the sign must be a minimum distance of 100 feet from an abutting residential district boundary;

(D) Setback from other electronic changeable copy, electronic graphic display or video display signs. Electronic changeable copy signs must be separated from other electronic changeable copy signs, electronic graphic display signs or video display signs by at least 35 feet;

(E) Orientation. When located within 150 feet of a residentially-used lot in a residential zone, all parts of the electronic changeable copy sign must be oriented so that no portion of the sign face is visible from an existing or permitted principal structure on that lot;

(F) Duration. In non-residential districts (B-1, B-2, B-3, B-4, C-1, C-2, C-3, C-4, C-5, CR-1, CB, CS-0.5, CS-1, CO-0.5, CO-1, CO-2, CX-2, HX-R, HX-2, I-1, I-2, I-3, IP, FD-1, FD-2) any portion of the message must have a minimum duration of eight seconds and must be a static display. In residential districts (R-1, R-1A, RS-1, R-4, RM-12, RM-24, RM-50, RO-24, RO-50) any portion of the message must have a minimum duration of one hour and must be a static display. In all districts, no portion of the message may flash, scroll, twirl, change color, fade in or out or in any manner imitate movement;

(G) Color. In residential districts (R-1, R-1A, RS-1, R-4, RM-12, RM-24, RM-50, RO-24, RO-50) any portion of the message must use an amber color;

(H) Limited Text. The text of the sign must be limited to ten words to allow passing motorists to read the entire copy with minimal distraction; and

(I) Audio or pyrotechnics. Audio speakers or any form of pyrotechnics are prohibited in association with an electronic changeable copy sign.

(5) **Video Display Sign**. Video display signs must meet the following standards. When attached to walls, video display signs are classified as cabinet signs.

(A) Location. The sign must be located on the site of the use identified or advertised by the sign;

(B) District Limitations. The sign must not be located in a Residential (R-1, R-1A, RS-1, R-4, RM-12, RM-24, RM-50, RO-24, RO-50), Conservation, or Bluff Overlay (BP-1, BP-2) district;

(C) Setback from residential. The leading edge of the sign must be a minimum distance of 100 feet from an abutting residential district boundary;

(D) Setback from other electronic graphic display, electronic changeable copy or video display signs. Video display signs must be separated from other electronic graphic display, electronic changeable copy signs or video display signs by at least 35 feet;

(E) Orientation. In all districts the video display sign must be oriented so that no portion of the sign face is visible from an existing or permitted principal structure on any residential lot; from any

traveled highway, street, driveway or internal access way; from any park; or from a conservation or bluff district;

(F) Brightness. The sign must not exceed a maximum illumination of 5000 nits (candelas per square meter) during daylight hours and a maximum illumination of 500 nits (candelas per square meter) between dusk to dawn as measured from the sign's face at maximum brightness;

(G) Dimmer control. Video display signs must have an automatic dimmer control to produce a distinct illumination change from a higher illumination level to a lower level for the time period between one half-hour before sunset and one half-hour after sunrise; and

(H) Audio or pyrotechnics. Audio speakers or any form of pyrotechnics are prohibited in association with a video display sign.

(6) **Electronic Graphic Display Sign**. Electronic graphic display signs must meet the following standards. When attached to walls, electronic graphic display signs are classified as cabinet signs.

(A) Location. The sign must be located on the site of the use identified or advertised by the sign;

(B) District Limitations. The sign must not be located in a Conservation, Bluff Overlay (BP-1, BP-2) district or Residential district (R-1, R-1A, RS-1, R-4, RM-12, RM-24, RM-50, RO-24, RO-50);

(C) Setback from residential. The leading edge of the sign must be a minimum distance of 100 feet from an abutting residential district boundary;

(D) Setback from other electronic graphic display, electronic changeable copy or video display signs. Electronic graphic display signs must be separated from other electronic graphic display, electronic changeable copy signs or video display signs by at least 35 feet;

(E) Orientation. When located within 150 feet of a residentially-used lot in a residential zone, any part of the electronic graphic display sign must be oriented so that no portion of the sign face is visible from an existing or permitted principal structure on that lot;

(F) Duration. In all districts any portion of the image must have a minimum duration of 20 minutes and must be a static display. No portion of the image may flash, scroll, twirl, change color, or in any manner imitate movement;

~~(G) Audio or pyrotechnics. Audio speakers or any form of pyrotechnics are prohibited in association with an electronic graphic display sign.~~

(G) Brightness. The sign must not exceed a maximum illumination of 5000 nits (candelas per square meter) during daylight hours and a maximum illumination of 500 nits (candelas per square meter) between dusk to dawn as measured from the sign's face at maximum brightness; and

(H) Dimmer control. Electronic graphic display signs must have an automatic dimmer control to produce a distinct illumination change from a higher illumination level to a lower level for the time period between one half-hour before sunset and one half-hour after sunrise.

(I) Audio or pyrotechnics. Audio speakers or any form of pyrotechnics are prohibited in association with an electronic graphic display sign.

(7) **Multi-vision Signs**. Multi-vision signs must meet the following standards. When attached to walls, multi-vision signs are classified as cabinet signs.

(A) Location. The sign must be located on the site of the use identified or advertised by the sign;

(B) District Limitations. The sign must not be located in a Conservation, Bluff Overlay (BP-1, BP-2) district or Residential district (R-1, R-1A, RS-1, R-4, RM-12, RM-24, RM-50, RO-24, RO-50);

(C) Setback from residential. The leading edge of the sign must be a minimum distance of 100 feet from an abutting residential district boundary;

(D) Setback from other multi-vision signs. Multi-vision signs must be separated from other multi-vision signs by at least 35 feet;

(E) Orientation. When located within 150 feet of a residentially-used lot in a residential zone, any part of the multi-vision sign must be oriented so that no portion of the sign face is visible from an existing or permitted principal structure on that lot;

(F) Duration. In all districts any image or message or portion thereof must have a minimum duration of eight seconds and must be a static display. Transition time must be no longer than 2 seconds; and

(G) Default mechanism. All multi-vision signs must be equipped with a properly functioning default mechanism that will stop the sign in one position should a malfunction occur

(H) Audio or pyrotechnics. Audio speakers or any form of pyrotechnics are prohibited in association with a multi-vision sign.

(8) **Time and Temperature Sign.** Time and temperature signs must meet the following standards. When attached to walls, time and temperature signs are classified as cabinet signs.

(A) Location. The sign must be located on the site of the use advertised or identified by the sign;

(B) District Limitations. The sign must not be located in a Residential (R-1, R-1A, RS-1, R-4, RM-12, RM-24, RM-50, RO-24, RO-50), Conservation or Bluff Overlay (BP-1, BP-2) district;

(C) Duration. Time and temperature signs must have a minimum display duration of two seconds that is static during each individual message. No portion of the message may flash, scroll, twirl, change color, fade in or out or in any manner imitate movement; and

(D) Audio or pyrotechnics. Audio speakers or any form of pyrotechnics are prohibited in association with a time and temperature sign.

(9) **Rotating Signs.**

(A) No sign shall have rotating or moving parts that revolve at a speed in excess of seven revolutions per minute.

***

Passed and adopted this _____day of _____, 2006.

_____
Mayor

ATTEST:

_____
Secretary to the Council

APPROVED:

_____
City Attorney

ATTACHMENT 4

"DYNAMIC" SIGNAGE:

RESEARCH RELATED TO DRIVER DISTRACTION AND ORDINANCE RECOMMENDATIONS

Submitted by

SRF Consulting Group, Inc.

Prepared for

City of Minnetonka

June 7, 2007

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

This study was precipitated by concerns raised by the City of Minnetonka, Minnesota in regard to the installation of two LED ("light emitting diode") billboards along Interstate 394 and Interstate 494. The LED function was applied to two existing "static" image billboards located adjacent to the interstate. Following installation of the LED function, the City turned off the power to the signs though a stop work order based on current city ordinance prohibiting flashing signs, which is broadly defined, as well as permitting requirements for the retrofitting of the signs to the upgraded technology. The billboard owner sued the City, and the court response to this legal action as of the writing of this study has been to allow limited use of the LED billboards. A moratorium on further signage of this type was established by the City to facilitate the study of issues related to driver distraction and safety and appropriate regulatory measures for LED and other types of changeable signage.

This study was undertaken on behalf of the City of Minnetonka to examine these issues. While the concerns were precipitated by LED billboards in particular, this report examines more broadly "dynamic" display signage which is defined as any characteristics of a sign that appear to have movement or that appear to change, caused by any method other than physically removing and replacing the sign or its components, whether the apparent movement or change is in the display, the sign structure itself, or any other component of the sign. This includes a display that incorporates a technology or method allowing the sign face to change the image without having to physically or mechanically replace the sign face or its components. This also includes any rotating, revolving, moving, flashing, blinking, or animated display and any display that incorporates rotating panels, LED lights manipulated through digital input, "digital ink" or any other method or technology that allows the sign face to present a series of images or displays. These capabilities may be provided by a variety of technologies which are discussed later in this report.

As the study progressed, additional communities within the Twin Cities Metropolitan Area, as well as the League of Minnesota Cities, expressed interest in these issues. However, it is not the intention of this report to provide a comprehensive study of all issues raised by dynamic signage, or other types of billboards, but rather to focus narrowly on the issues of concern to the City of Minnetonka.

2.0 PURPOSE OF STUDY AND METHODOLOGY

Driving a motor vehicle is a complex task that requires the ability to divide one's attention. Simultaneously maintaining a steady and legal speed, changing lanes, navigating traffic and intersections, reading and interpreting street signs, drivers are often challenged by conditions that can change in the blink of an eye. Internal and external physical conditions can affect how safely the driving task is accomplished. Drug or alcohol intoxication, fatigue and/or distractions in the driving environment all can play a role in motor vehicle crashes. However, these conditions are rarely the sole reason for a crash. Rather, these conditions serve to exacerbate an already-complex driving environment and subsequent mistakes in judgment can lead to crashes.

Increasingly complex traffic and roadway environments require greater attention to and focus on the driving task.

The purpose of this study is to understand what existing transportation research tells us about the effects of dynamic signs on motorists. This study also explores regulatory measures enacted in other jurisdictions to address concerns related to driver distraction. Due to time and scope constraints, this report is not comprehensive, but rather addresses the most frequently cited and easily accessible information available. The report concludes with a discussion of regulatory options for the City of Minnetonka to consider in their formulation of policies to address dynamic signage.

Information collected for this report draws from a variety of sources including interviews with subject matter experts, government and academic research, and policies developed to regulate various types of signage.

Several city and county sign ordinances were used as references for policy and regulatory research. In some cases, ordinances were brought to our attention by planners and others following the sign ordinance issue. In others, Internet searches were conducted using words and references that apply specifically to dynamic signs.

Several sign manufacturers and sign companies provided an industry perspective through a workshop with the SRF Consulting Group and the City of Minnetonka staff on February 27, 2007. This meeting yielded information about sign characteristics that can be addressed through policy and regulatory measures. Daktronics, a company that manufactures and markets LED signs, was also helpful in this regard, providing informational materials about characteristics of signs that can be regulated and examples of city sign ordinances with which they are familiar.

3.0 SELECTED RESEARCH FINDINGS

This following section presents a summary of expert opinions and selected driver distraction research conducted by government and academic researchers examining roadside signage and its effects on the driving task. Studies are organized around critical questions with serious research ramifications.

- *Is there reason to believe that billboards are a source of distraction?*
- *Is there reason to believe that "dynamic" billboards are an additional source of distraction?*
- *How much distraction is a problem?*
- *How does "brightness" affect driver safety concerns?*
- *How should billboards and other signage be regulated from a driver safety perspective?*

3.1 Expert Opinions

A combination of researchers and public policy experts were interviewed for this study. Individuals were identified while conducting background research into driver distraction and were interviewed because of their credibility in the field.

Kathleen Harder, a researcher at the University of Minnesota, has conducted driver distraction research for a variety of applications, including research for Mn/DOT. She is an expert in the field of human factors and psychology. She indicated that electronic billboards pose a driver distraction threat because of their ability to display high resolution color images, their ability to change images, and their placement in relationship to the roadway, particularly in areas where the road curves, exits and entrances are present, merges, lane drops, weaving areas, key locations of official signs, and/or areas where roadways divide.

Greg Davis, a researcher with the FHWA Office of Safety Research and Development, in Washington, DC was involved in the 2001 FHWA study on electronic billboards. He was interviewed to gain a deeper understanding of this critical study and to learn of recent research in this area. Davis stated that while no research has established a direct cause and effect relationship between electronic outdoor advertising signs and crash rates, the lack of such a research finding does not preclude a causal relationship between electronic billboards and crashes. He advocated for a new study that can control all variables and determine if a cause and effect relationship exists.

Scott Robinson, an outdoor advertising regulator for Mn/DOT, wrote the 2003 technical memorandum that addresses allowable changes for outdoor advertising devices. Mr. Robinson indicated that the memo was originally written in 1998 to establish a permitted rate of change for tri-vision signs and that the application to electronic billboards was not considered. The minimum change rate of 4.9 seconds for 70 mph roadways and 6.2 seconds for 55 mph roadways was based on the travel time between static signs spaced at the minimum allowed distance apart. Mr. Robinson also indicated that the memo is not a Mn/DOT policy, statute or rule, but rather it was written to provide internal guidance.

Jerry Wachtel, an Engineering Psychologist and highway safety expert in private practice, was the lead author for the FHWA's original (1980) study on electronic billboards. He has continued his active involvement in this field, and advises Government agencies as well as the outdoor advertising industry on sign ordinances, sign operations, and the implications of the latest research on road safety. Mr. Wachtel believes that it is neither feasible from the perspective of research design and methodology, nor necessary from a regulatory perspective, to demonstrate a causal relationship between digital billboards and road safety. Rather, he believes that we have a strong understanding, based on many years of research, of driver information processing capabilities and limitations, and of the contributions to, and consequences of, driver distraction, on crash risk; and that this understanding is sufficient to support development of guidelines and ordinances for the design, placement, and operation of digital billboards so as to lessen their potentially adverse impact on road safety and traffic operations.

Wachtel also offered comments on drafts of this report. In later conversations related to his review, Wachtel stated his belief that even though visual fixations on roadway signs decrease as route familiarity increases, a strength of the new digital billboards is that they can present messages *that are always new.* Thus, the conclusion from the 1980 FHWA study is another argument against these billboards; namely, drivers spend more time looking at the unfamiliar signs than at familiar ones, suggesting digital billboards are more dangerous than traditional fixed billboards. Wachtel also suggested his preference for a goal to have any given driver experience only one, or a maximum of two, messages from an individual roadside sign.

3.2 Billboards: a Source of Driver Distraction? [1]

The purpose of a sign is to attract the attention of passersby so that a message is conveyed. To the degree signs attract the attention of vehicle drivers, they may distract them from the activity of driving. While this report primarily examines the impact of *dynamic* roadside advertising, the role traditional *static* advertising plays in driver distraction is discussed below.

The relationship between roadside advertising and crash rates has been the subject of several studies. The majority of this research was conducted in the 1950s, 60s and 70s. While some of the earliest studies have been subsequently criticized for flawed methodologies and improper statistical techniques, some findings emerge when the totality of the studies are examined. One of these findings is that the correlation between crash rates and roadside advertising is strongest in complex driving environments. For example, higher crash rates were found at intersections (generally considered a complex environment) that have advertising than those intersections that do not have advertising. A few of the studies that are important in this field are summarized below.

Minnesota Department of Transportation Field Study (1951) and Michigan State Highway Department Field Study (1952) [2]

These two studies from the early 1950s used similar methods but came to significantly different conclusions. Recognized as the more scientifically rigorous study, the Minnesota study found that increases in the number of advertising signs per mile are correlated with increases in motor vehicle crash rates. It also found that intersections with at least four advertising signs experienced three times more crashes than intersections with no advertising signs. Conversely, the less rigorous Michigan study found the presence of advertising signs had no effect on the number of crashes.

Iowa State College, Do Road Signs Affect Accidents? (Lauer & McMonagle, 1955)[3]

A laboratory test was created to determine the effect of advertising signs on driver behavior. The results of this study found removing all advertising signs from the driver's field of vision did not improve driver performance. When signs were included, driver performance was slightly better. Note that laboratory methods used in this study are considered to be dated by today's standards.

Faustman (California Route 40) Field Study (1961)[4] and Federal Highway Administration, Reanalysis of Faustman Field Study (1973)[5]

Two studies that appear to have stood the test of time are Faustman's original analysis of California Route 40 and its re-examination by FHWA more than a decade later. The original analysis tried to improve upon previous research by limiting variables, such as roadway geometric design and roadway access controls. The FHWA reanalysis focused on disaggregating the data and converting actual crashes to expected crash rates on specific roadway sections. Each of the sections was given a value based on the number of billboards on the section. A linear regression was performed to determine the expected crash rates. An analysis of variance of the regression coefficients found that the number of billboards on a section was statistically significant. The reanalysis found a strong correlation between the number of billboards and crash rates as shown in Table 1.

Table 1. FHWA Reanalysis of Faustman's Findings.

No. of Billboards	Expected No. of Accidents in a 5-year Period	Cumulative Increase in Accident Rate
0	5.92	
1	6.65	12.3
2	7.38	24.2
3	8.11	37.0
4	8.84	49.3
5	9.57	61.7

Federal Highway Administration
***Safety and Environmental Design Considerations in the Use of Commercial Electronic Variable-Message Signage* (Wachtel & Netherton, 1980)[6]**

This extensive review provides a comprehensive discussion of roadside advertising research as of 1980. The study authors noted "attempts to quantify the impact of roadside advertising on traffic safety have not yielded conclusive results." The authors found that courts typically rule on the side of disallowing billboards because of the "readily understood logic that a driver cannot be expected to give full attention to his driving tasks when he is reading a billboard." Because the distraction evidence is not conclusive, these decisions were generally not based on empirical evidence.

The research review noted that accident reports often cite "driver distraction" as a default category used by uncertain law enforcement officers who must identify the cause of a crash. As a result, the authors believe crashes due to driver distraction are not always properly identified. In addition, law enforcement officers often fail to indicate the precise crash locations on crash reports, making it difficult to establish relationships between crashes and roadside features.

Accident Research Unit, School of Psychology, University of Nottingham
***Attraction and distraction of attention with roadside advertisements* (Crundall et al., 2005)** [7]

This research used eye movement tracking to measure the difference between street-level advertisements and raised advertisements in terms of how they held drivers' attention at times when attention should have been devoted to driving tasks. The study found that street-level advertising signs are more distracting than raised signs.

3.3 "Dynamic" Billboards: an Additional Source of Distraction?

Signage owners or leasers want to incorporate dynamic features into their signage for a number of reasons: to enhance the sign's ability to attract attention, to facilitate display of larger amounts of information within the same sign area, to conveniently change message content, and to enhance profitability. As mentioned earlier, this report uses the term "dynamic" signs to refer to non-static signs capable of displaying multiple messages. Several studies documented the ability of a sign to accomplish the first of these goals.

University of Toronto
***Observed Driver Glance Behavior at Roadside Advertising Signs* (Beijer & Smiley, 2004)** [8]

Research done at the University of Toronto compared driver behavior subject to passive (static) and active (dynamic) signs. The study found that about twice as many glances were made toward the active signs than passive signs. A disproportionately larger number of long glances (greater than 0.75 seconds) taken were toward the active signs. The duration of 0.75 seconds is important because it is close to the minimum perception-reaction time required for a driver to react to a slowing vehicle. For vehicles with close following distances, or under unusually complex driving conditions, a perception delay of this length could increase the chance of a crash. The following findings were reported in this study:

- 88% of the subjects made long glances (greater than 0.75 seconds).
- 22% of all glances made at all signs were long glances (greater than 0.75 seconds).
- 20% of all the subjects made long glances of over two seconds.
- As compared to static and scrolling text signs, video and tri-vision signs attracted more long glances.
- Video and scrolling text signs received the longest average maximum glance duration.
- All three of the moving sign types (video, scrolling text and tri-vision) attracted more than twice as many glances as static signs.

University of Toronto
***Impact of Video Advertising on Driver Fixation Patterns* (Smiley et al., 2001)** [9]

Another study completed at the University of Toronto used similar eye fixation information in urban locations to show that drivers made roughly the same number of glances at traffic signals and street signs with and without full-motion video billboards present. This may be interpreted to mean that while electronic billboards may be distracting, they do not appear to distract drivers from noticing traffic signs. This study also found that video signs entering the driver's line of sight directly in front of the vehicle (e.g., when the sign is situated at a curve) are very distracting.

City of Seattle Report (Wachtel, 2001) [10]

The City of Seattle commissioned a report in 2001 to examine the relationship between electronic signs with moving/flashing images and driver distraction. The report found that electronic signs with moving images contribute to driver distraction for longer intervals than electronic signs with no movement. Following are major points made in the report:

- New video display technologies produce images of higher quality than previously available technologies. These signs have improved color, image quality and brightness.
- New video display technologies use LEDs with higher viewing angles. Drivers can read the sign from very close distances when they are at a large angle from the face of the sign.
- Signs with a visual story or message that carries for two or more frames are particularly distracting because drivers tend to focus on the message until it is completed rather than the driving task at hand.
- Research has shown that drivers expend about 80 percent of their attention on driving related tasks, leaving 20% of their attention for non-essential tasks.
- The Seattle consultant suggests a "10 second rule" as the maximum display time for a video message.

The expanded content of a dynamic sign also contributes to extended distraction from the driving task. The Seattle Report examined how this may be due in part to the *Zeigarnik effect* which describes the psychological need to follow a task to its conclusion. People's attention is limited by the ability to only focus on a small number of tasks at a time, and by the tendency to choose to complete one task before beginning another. In a driving environment, drivers' attention might be drawn to the sign rather than the task of driving because they are waiting to see a change in the message. This loss of attention could lead to unsafe driving behaviors, such as prolonged glances away from the roadway, slowing, or even lane departure.

While the Zeigarnik effect may be present in a wide variety of driving situations, possible scenarios that could affect drivers include:

- A scrolling message requires the viewer to concentrate as the message is revealed. Based on the size and resolution of the sign, and the length of the message, this could range from less than one second to many seconds.
- A sequence of images or messages that tell a story, during which the driver's attention may be captured for the entire duration that the sign is visible. Instead of merely glancing at the sign and then returning concentration to the driving task, more attention may be given to the message.
- Anticipation of a new image appearing, even if the expected new image is not related to the first image. In this case, the driver may be distracted while waiting for the change.

Federal Highway Administration
***Safety and Environmental Design Considerations in the Use of Commercial Electronic Variable-Message Signage* (Wachtel & Netherton, 1980)** [11]

This research provides information on the use of on-premise Commercial Electronic Variable-Message Signs (CEVMS) that display public service information (i.e,. time and temperature) and advertising messages along the Interstate highway system. The research found the following major considerations:

- Highway Safety Considerations

  The link between changing messages that attract drivers' attention and crashes has been an issue of concern since the earliest forms of electronic signage became available. This study thoroughly reviewed the literature seeking information regarding a potential link between CEVMS and crashes:

  > *"Although a trend in recent findings has begun to point to a demonstrable relationship between CEVMS and accidents, the available evidence remains statistically insufficient to scientifically support this relationship."*

  The study also noted that studies have not documented information about "such occurrences as 'near misses' or traffic impedances that are widely recognized as relevant to safety, and which may or may not be attributable to the presence of roadside advertising."

- Human Factors Considerations

  Human factors relate to all the elements that explain driver behavior, such as eye glances and driver responses to a variety of driving-related stimuli. The study makes the point that simple driving-related tasks consume relatively little information processing capacity. However, when other conditions, such as congestion, complicated roadway geometries, or weather are also considered, the marginal extra

amount of attention required to read roadside advertisements could lead to driving errors that could cause crashes.

> *"The enormous flexibility of display possessed by CEVMS makes it possible to use them in ways that can attract drivers' attention at greater distances, hold their attention longer, and deliver a wider variety of information and image stimuli than is possible by the use of conventional advertising signs."*

Texas Transportation Institute for FHWA, Impacts of Using Dynamic Features to Display Messages on Changeable Message Signs (Dudek et al., 2005) [12]

This study examined the comprehension times for three different scenarios for DOT-operated changeable message signs. The scenarios evaluated were:

- Flashing an entire one-phase message
- Flashing one line of a one-phase message while two other lines of the message remain constant
- Alternating text on one line of a three-line CMS while keeping the other two lines of text constant on the second phase of the message

The findings of this study were:

- Flashing messages did not produce faster reading times.
- Flashing messages may have an adverse effect on message comprehension for unfamiliar drivers.
- Average reading times for flashing line messages and two-phase messages were significantly longer than for alternating messages.
- Message comprehension was negatively affected by flashing line messages.

While this research did not evaluate advertising-related signs, it does demonstrate that flashing signs require more of the driver's time and attention to comprehend the message. In the case of electronic billboards, this suggests that billboards that flash may require more time and attention to read than static ones.

3.3.1 OTHER INFORMATION

NHTSA Driver Distraction Internet Forum (2000) [13]

The National Highway Traffic Safety Administration held an internet forum to gather research and public comment related to driver distraction with an emphasis on the use of cell phones, navigation systems, wireless Internet and other in-vehicle devices. During this forum, participants were invited to take a poll to determine the most prominent driver

distraction issues. Electronic billboards were identified as one of six noted sources of distraction.

Parliament of Victoria, Australia, Report of the Road Safety Committee on the Inquiry into Driver Distraction (2006) [14]

This report identified road signs and advertising as one of the largest sources of driver distraction. At least three billboards near Melbourne, Australia display moving images.

> *"The Committee considers these screens to be at the high end of potential visual distraction and accordingly, present a risk to drivers."*

The study also included a quote from the Manager of the Road User Behaviour group at VicRoads (the State's road and traffic authority) from a December 2005 hearing:

> *What we do know is when there is movement involved, such as flicker or movement in the visual periphery, that this is more likely to capture a driver's attention. We actually are hard-wired as human beings to movement, so particularly moving screens and information that scrolls at intersections and in highly complex driving situations – these are risky, and in particular researchers have been most concerned about those sort of advertising materials.*

This opinion would suggest that electronic signs can present a distraction to drivers.

3.4 How Much Distraction Is a Problem?

A number of studies were identified that discussed concerns with driver distraction generally. It should be noted that some of the studies cited use specific crash data that is ten or more years old. Direct comparison of distraction sources to influences of today may not be completely valid due to increased technological sophistication of distracting influences. These could include in-vehicle technology (e.g., navigation systems, MP3 players, DVD players, CD players, computer systems, etc.) as well as other potentially distracting influences (e.g., cell phones, text messaging, dynamic signage, other roadway elements, etc.) that were not commonplace when the data for these studies was collected:

Australian Road Research Board
***Investigations of Distraction by Irrelevant Information* (Johnston & Cole, 1976)** [15]

This research used five experiments to test whether drivers could maintain efficient performance in their driving tasks while being subjected to content that was information rich, but irrelevant to driving. The findings were that a small, but statistically significant amount of performance degradation was observed when the participant was under a critical load of stimuli.

National Highway Traffic Safety Administration/ Virginia Tech Transportation Institute
***Impact of Driver Inattention on Near-Crash/Crash Risk: An Analysis Using the 100-Car Naturalistic Driving Study Data* (Klauer et al., 2006)** [16]

This study analyzed the data from a driving database developed by the National Highway Traffic Safety Administration. This database contained exhaustive data recorded by instrumented vehicles that measured glance position, impairment, drowsiness, risk taking and many other parameters potentially involved in crash causation. Vehicles were instrumented so that an observer did not need to be in the vehicle to collect data. Automated data collection reduced the problem of an observer influencing driver behavior. The study found that glances of two seconds or greater doubled the risk of crashes or near-crashes. The study also found that 22 percent of crashes are accompanied by "secondary-task" distraction whether inside or outside the vehicle.

National Highway Traffic Safety Administration/ Virginia Tech Transportation Institute
***Driver Inattention is a Major Factor in Serious Traffic Crashes* (2001)** [17]

The National Highway Traffic Safety Administration commissioned a study to examine the causes of crashes. The study gathered information from four areas throughout the country and used data from the National Automotive Sampling System (NASS) from April 1996-April 1997 for analysis. The geographic areas were selected because they had good crash investigation practices and high interview completion rates. The results of this study are summarized in Table 2.

Table 2. Crash Causation Summary

Causal Category	Percentage of Drivers Contributing to Causation
Driver Inattention	22.7
Vehicle Speed	18.7
Alcohol Impairment	18.2
Perceptual Errors	15.1
Decision Errors	10.1
Incapacitation	6.4
Other	8.8

Association for the Advancement of Automotive Medicine
***The Role of Driver Inattention in Crashes; New Statistics from the 1995 Crashworthiness Data System* (Wang, 1996)** [18]

This report analyzed the NHTSA 1995 Crash Worthiness Data System (CDS). It found that the greatest source of driver distraction (3.2 percent) was due to a specified person, object or event outside the vehicle. The full results of the study are presented in Table 3.

Table 3. Percentage of CDS Crashes Involving Inattention-Distraction Related Crash Causes

Data Element	% of Drivers	% of Crashes
Attentive or not distracted	46.6%	28.4%
Looked but did not see	5.6%	9.7%
Distracted by other occupant [specified]	0.9%	1.6%
Distracted by moving object in vehicle [specified]	0.3%	0.5%
Distracted while dialing, talking, or listening to cellular phone [location and type of phone specified]	0.1%@	0.1%@
Distracted while adjusting climate controls	0.2%@	0.3%@
Distracted while adjusting radio, cassette, CD [specified]	1.2%	2.1%
Distracted while using other device/object in vehicle [specified]	0.1%	0.2%
Sleepy or fell asleep	1.5%	2.6%
Distracted by outside person, object, or event [specified]	2.0%	3.2%
Eating or drinking	0.1%	0.2%
Smoking-related	0.1%	0.2%
Distracted/inattentive, details unknown	1.5%	2.6%
Other distraction [specified]	1.3%	2.2%
Unknown/No Driver	38.5%	46.0%

Weighted driver N = 4,627,000 (7,943, unweighted); weighted crash N = 2,619,000 (4,536);
In order for a *crash* to classified "attentive," all involved drivers had to be classified "attentive."
@ - estimate based on 5-9 cases.

University of North Carolina Highway Safety Research Center
The Role of Driver Distraction in Traffic Crashes (Stutts et al., 2001) [19]

A study prepared by the University of North Carolina Highway Safety Research Center for the AAA Foundation for Traffic Safety examined the sources of driver distraction in traffic crashes. The data came from the CDS from 1995-1999. Of the thirteen specific sources of distraction tracked by the study, the greatest source of distraction was an outside person, object or event. While the study does not break down the sources of outside distraction, it does show that distractions outside the vehicle are the largest factor in distraction-related crashes. The results of this study are presented in Table 4.

Table 4. Specific Sources of Distraction Among Drivers in Distraction–Related Crashes

Specific Distraction	Percentage of Drivers
Outside person, object or event	29.4
Adjusting radio, cassette, CD	11.4
Other occupant in vehicle	10.9
Moving object in vehicle	4.3
Other device/object brought into vehicle	2.9
Adjusting vehicle/climate controls	2.8
Eating or drinking	1.7
Using/dialing cell phone	1.5
Smoking related	0.9
Other distraction	25.6
Unknown distraction	8.6
Total	100.0

Three studies were found which attempted to measure driver behavior specifically in response to dynamic signage. Two of these studies demonstrated a potential relationship between dynamic signage and crash rates:

Minnesota Department of Transportation, The Effectiveness and Safety of Traffic and Non-Traffic Related Messages Presented on Changeable Message Signs (CMS) (Harder, 2004) [20]

This study used a driving simulator to measure the effect of Department of Transportation changeable message signs on traffic flow. The two messages evaluated were a "crash ahead" warning and an AMBER Alert (child abduction information). The research found that just over half of the participants used the "crash ahead" message and 60 percent could recall the AMBER Alert with scores of Good or Better. Over one fifth of the participants slowed down by at least 2 mph upon seeing the AMBER Alert, demonstrating that messages relevant to drivers are associated with changes in at least some drivers' travel speed .

***Decision of the Outdoor Advertising Board in the Matter of John Donnelly & Sons, Permitee, Telespot of New England, Inc., Intervenor, and Department of Public Works, Intervenor, with Respect to Permit Numbered 19260 as Amended* (1976)** [21]

This proceeding documents the Commonwealth of Massachusetts Outdoor Advertising Board's ruling regarding one of the first changeable signs. This sign was located near an arterial road in Boston and used magnetic discs to portray a message that changed every 30 seconds. The original sign permit was rejected based on four criteria, one of which was safety. Upon appeal, the Massachusetts Department of Public Works allowed the permit based on the fact that the sign would give the public a benefit. However, they ultimately determined that the sign was a safety hazard based on crash rates before and after the sign was installed. Tables 5 and 6 show the change in crash rates.

Table 5. Telespot Sign Crash Rates - Expressway Southbound

	Average per year (1/1/1970-12/31/1972)	Average per year (1/1/1973-3/31/1975)	Average Percent Change
Crashes where the sign was viewable (north of sign)	29.0	20.0	-31.0
Crashes where the sign was not viewable (south of sign)	39.0	15.6	-60.0

Table 6. Telespot Sign Crash Rates - Expressway Northbound

	Average per year (1/1/1970-12/31/1972)	Average per year (1/1/1973-3/31/1975)	Average Percent Change
Crashes where the sign was viewable (south of sign)	46.3	42.7	-7.8
Crashes where the sign was not viewable (north of sign)	8.0	1.8	-77.5

This analysis shows that while crash rates decreased on comparable sections in the years after the sign was installed, the sections where the sign was visible experienced smaller crash rate decreases. Due to these arguments, the Board ruled that the operation of the sign must be terminated.

Wisconsin Department of Transportation
***Milwaukee County Stadium Variable Message* Sign Study – Impacts of an Advertising Variable Message Sign on Freeway Traffic (1994)** [22]

A study prepared by the Wisconsin Department of Transportation (WisDOT) examined crash rates before and after an advertising variable message sign was installed in 1984 on the Milwaukee County Stadium, home of the Milwaukee Brewers professional baseball team. Crash statistics were analyzed for the three years before and the one and three years after the sign was installed. As they are often associated with driver distraction, side-swipe and rear-end crashes, as well as total crashes, were examined for both the eastbound and westbound directions. The sign was much more visible to eastbound traffic due to the stadium's proximity to the roadway and the amount of visual obstructions for westbound traffic.

The analysis found an increase in crash rates for all crash types in the eastbound direction after the sign was installed. Most pronounced was an 80 percent increase in side-swipe crashes after the first year of installation. Results in the westbound direction were mixed, with a 29 percent decrease in crashes the first year the sign was in place and a 35 percent increase in the three years the sign was in place. Although no control roadway sections were studied, an interview with the study author revealed that the introduction of a sign on a high volume curving roadway may have introduced enough distraction to an already demanding driving environment to explain the higher crash rate in the eastbound direction. The study author also stated that the study was not able to establish a causal relationship between the sign and the crash rates.[23]

Federal Highway Administration
***Research Review of Potential Safety Effects of Electronic Billboards on Driver Attention and Distraction* (2001)** [24]

The Federal Highway Administration published a comprehensive report in 2001 that consisted of a literature search, literature review and a description of research needs for

the topic of electronic billboards (EBBs). While the study did not conduct any new research, it does provide an excellent summary of the role electronic billboards play in traffic safety and includes good descriptions of the terminology related to electronic billboards. Selected findings from that synthesis are provided below:

> *"In most instances, researchers were not able to verify that an EBB was a major factor in causing a crash. Only one study since the 1980 review and one lawsuit were identified."*
>
> *"Studies were identified that verified that: an increase in distraction, a decrease in conspicuity, or a decrease in legibility may cause an increase in the crash rate."*
>
> *"Commercial EBBs are designed to 'catch the eye' of drivers. Their presence may distract drivers from concentrating on the driving task and visual surrounds."*
>
> *"There is indication that individual differences in age and driving experience may be important considerations in driver distraction, and are relevant to understanding driver responses to the external environment. Furthermore, research regarding driver familiarity of their route demonstrated that visual fixations on roadway signs decreases as route familiarity increases. This research may show that there is a difference between commuter and visiting drivers."*

Based on these findings, the FHWA recommended additional research to further demonstrate how roadway characteristics, sign characteristics and legibility, driver characteristics and other potential driver distractions affect traffic safety. FHWA was contacted to see if any new information was available. Greg Davis, a Research Psychologist with the FHWA Office of Safety R&D, indicated that the FHWA has not performed additional studies on the topic since the report was published. He stated that there is "no direct correlation between electronic outdoor advertising signs and crash rates". He referred to a before/after study of electronic signs installed along a freeway in Las Vegas that found no change in crash rates. He went on to say that the lack of a research finding that links signs with crash rates does not mean that a causal relationship does not exist. He indicated that he has been contacted by several law enforcement agencies regarding the link between driver distraction and dynamic message signs/electronic billboards. He indicated that this is a timely and pertinent topic for many states due to the increasing popularity and capabilities of electronic outdoor advertising devices, and he expects further research to be forthcoming. He advocates for a new study that can control for all variables and determine if a cause and effect relationship exists.[25]

3.5 How Does "Brightness" Affect Driver Safety Concerns?

The brightness of any sign, static or dynamic, raises concerns with discomfort or disability glare to the driver that may arise when viewing any lighted object. *Disability Glare* occurs when a

driver is exposed to a light source so bright that it temporarily blinds the driver, impairing their ability to perform driving tasks. This temporary blindness is brief, but can be dangerous. *Discomfort Glare* occurs when a light source is bright enough to distract or encourage the driver to look away from the light, but is not blinding. Discomfort glare is of particular concern in cases where a bright sign is located in the same line of sight as a traffic sign, signal or another vehicle.

While concerns about glare are not unique to dynamic signs, newer sign technologies, which often include dynamic components, have the technical capability to emit more light and/or respond to ambient light conditions, raising additional concerns about sign brightness in areas where signs compete with regulatory traffic signs or signals.

3.6 Billboards and Other Signage Regulation: a Minnesota Perspective

Roadside signage is governed by policies and laws at the federal, state and local levels. Minnesota Statute, Chapter 173 seeks to "reasonably and effectively regulate and control the erection or maintenance of advertising devices on land adjacent to such highways." The statute requires adherence to federal statutes with respect to interstate and primary systems of highways.

Minnesota Statute Ch. 173.16 Subd. 3. regulates lighting of signs. Signs which are "illuminated by any flashing light or lights, except those giving public service information" (time, date, temperature, weather or news) are prohibited. This section also states:

> (b) Advertising devices shall not be erected or maintained which are not effectively shielded so as to prevent beams or rays of light from being directed at any portion of the traveled way of an interstate or primary highway, of such intensity or brilliance as to cause glare or impair the vision of the operator of any motor vehicle; or which otherwise interfere with any driver's operation of a motor vehicle are prohibited.
>
> and
>
> (c) Outdoor advertising devices shall not be erected or maintained which shall be so illuminated that they interfere with the effectiveness of or obscure any official traffic sign, device or signal.

3.7 Billboard and Other Signage Regulation: Other Perspectives

During the course of this study, several articles were found which summarize regulation of dynamic signage in other states:

Wisconsin Department of Transportation
***Electronic Billboards and Highway Safety* (2003)** [26]

The Wisconsin Department of Transportation also published a literature review report to further explain the current state of EBB research. Although much of the information is

mentioned in other sections of this report, the Wisconsin review did summarize Wisconsin's regulations for electronic billboards.

- No message may be displayed for less than one-half second;
- No message may be repeated at intervals of less than two seconds;
- No segmented message may last longer than 10 seconds;
- No traveling message may travel at a rate slower than 16 light columns per second or faster than 32 columns per second (light column defined as pixel column);
- No variable message sign lamp may be illuminated to a degree of brightness that is greater than necessary for adequate visibility.

National Alliance of Highway Beautification Agencies (1999) [27]

Although this survey is eight years old, it generated the following information related to electronic billboards:

- Nine states had specific regulations governing signs,
- Nine states had regulations on tri-vision signs that were either being drafted or in pending legislation,
- Fifteen states had regulations regarding moving parts and/or lights,
- Nine state had no regulations on tri-vision signs, and
- Six states and Washington, DC, prohibited tri-vision signs.

An investigation into state outdoor advertising regulations was also conducted.

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

Parliament of Victoria, Australia, Report of the Road Safety Committee on the Inquiry into Driver Distraction (2006) [28]

This report, cited earlier for its driver distraction opinions, identifies road signs and advertising as one of the largest sources of driver distraction. VicRoads, the state's road and traffic authority, has implemented the following regulations.

Figure 1. VicRoads' Ten Point Road Safety Checklist

An advertisement, or any structure, device or hoarding for the exhibition of an advertisement, is considered to be a road safety hazard if it:

1. obstructs a driver's line of sight at an intersection, curve or point of egress from an adjacent property; or
2. obstructs a driver's view of a traffic control device, or is likely to create a confusing or dominating background which might reduce the clarity or effectiveness of a traffic control device; or
3. could dazzle or distract drivers due to its size, design or colouring, or it being illuminated, reflective, animated or flashing; or
4. is at a location where particular concentration is required (eg. high pedestrian volume intersection); or
5. is likely to be mistaken for a traffic control device, for example, because it contains red, green or yellow lighting, or has red circles, octagons, crosses or triangles, or arrows; or
6. requires close study from a moving or stationary vehicle in a location where the vehicle would be unprotected from passing traffic; or
7. invites drivers to turn where there is fast moving traffic or the sign is so close to the turning point that there is no time to signal and turn safely; or
8. is within 100 metres of a rural railway crossing; or
9. has insufficient clearance from vehicles on the carriageway; or
10. could mislead drivers or be mistaken as an instruction to drivers.

VicRoads also gives operational requirements for electronic advertising message signs. Signage must:

- not display animated or moving images, or flashing or intermittent lights;
- remain unchanged for a minimum of 30 seconds;
- not be visible from a freeway; and
- satisfy the ten-point checklist.

4.0 SUGGESTED REGULATORY APPROACH

Local governments regulate electronic outdoor advertising devices in widely varying degrees. Some cities completely prohibit the use of all electronic signs (sometimes specifying LED signs), while others have no regulations specific to electronic signs. Between those two extremes, there are many levels and types of control that can be applied.

The primary concerns to keep in mind when considering sign regulations are 1) First Amendment rights, which can be affected by regulations that affect the content of a sign's message, and therefore should be avoided, and 2) changing technology, which can quickly make a sign ordinance no longer applicable if the ordinance has been specifically written to address a certain type of sign technology. Performance based measures may therefore be preferable as they remain viable even as sign technology advances.

4.1 Definitions

Signage discussions often include a number of different words or phrases used to describe the technical characteristics of signage devices or their components (such as LEDs). For the purpose of zoning, some additional terms are also used to describe sign characteristics. Any regulatory efforts should take care to precisely define terminology. One possible resource in this effort is "Street Graphics and the Law," published by the American Planning Association (APA) Planning Advisory Service[29].

4.2 Types of Regulatory Measures

4.2.1 Complete or Partial Prohibition of Electronic Signs

Some cities have completely prohibited the use of electronic outdoor advertising devices. For example, the City of Maple Valley, WA prohibits all types of electronic outdoor advertising devices including animated signs, electronic changeable message signs, flashing signs or displays, moving signs, scrolling displays, and traveling displays. This applies to both on-premise and off-premise signs.

Other cities are very selective about where electronic signs are allowed, allowing them only in certain zoning districts. There are very few "standard" approaches. For the most part, each local

government tailors their regulations to their own situation. One approach adopted by cities is to prohibit electronic outdoor advertising devices in residential zoning districts, and for a certain distance away from residential zoning districts, similar to the zoning limitations placed on illuminated signs. Some ordinances require that electronic signs be situated such that the sign face is not visible from nearby residences.

4.2.2 Size Limitations on Electronic Signs

Another way of regulating electronic signs is to limit their size. Again, there is no set standard for this. One ordinance reviewed for the purpose of this study limits the electronic portion of a sign to no more than 50 percent of the sign face with the overall size determined by whatever the sign ordinance allows for a particular zoning district. Other examples of electronic sign size limitations include five square feet, 1,000 square inches, 20 square feet, and so forth. In other ordinances, there is no differentiation made between the size of electronic signs and other signs.

According to input from representatives of the sign industry, the smaller the size of the electronic sign, the more desirable it is for businesses to use frequent message changes, or sequenced messages, where more than one screen of text is used to convey an entire message.

4.2.3 Rate-of-Change Limitations on Electronic Signs

Many communities that allow electronic signs also regulate the rate at which the messages on the signs can be changed. Research on sign codes has shown this to range from as little as four seconds to as long as 24 hours.

The Interstate 394 sign between Ridgedale Drive and Plymouth Road is visible for approximately 45 seconds at free flow traffic speeds. Depending on text size, the message may not be readable by drivers during this entire duration, but the message changes can attract attention from long distances. Depending on how often the message changes occur and the speed of traffic, drivers on this segment could see a varying number of discrete messages. Table 7 provides the number of message changes a driver would see at different change durations and traffic speeds.

Table 7. Number of New Messages Seen at Various Driver Speeds and Time Intervals Between Messages

		Number of Messages Seen					
		Message Display Time (seconds)					
Speed (mph)	**Time sign is clearly visible* (seconds)**	**6**	**8**	**10**	**60**	**1800 (30 minutes)**	**3600 (1 hour)**
30	60	11	9	7	2	1	1
45	40	8	6	5	2	1	1
55	33	7	5	4	2	1	1

*Assuming the sign is clearly visible from one-half mile away.

Prohibiting displays from changing quickly can minimize potential driver distraction, but it would significantly limit the message owner's ability to convey information that does not fit on one screen of the sign. Using two or more successive screens to convey a message is referred to as sequencing. Based on the studies summarized in part 3 of this Report, including the glance duration studies performed by Klaur for the FHWA in 2006 and by Beijer & Smiley in 2004, and Wachtel's analysis for Seattle of the Zeigarnik effect, a message delivery system such as sequencing that requires or induces a driver to watch the sign for several seconds increases the likelihood of driver distraction. Based on information from the sign industry, for sequencing to be effective in a marketing sense, a brief rate-of-change (1-2 seconds) is generally used before transitioning into the next screen.

Some codes specify how an image changes, while other codes prohibit the use of transitions. The change from one image to another can be accomplished by various techniques: no transition – simply a change from one screen to another, or fading or dissolving one image into the next. Flashing, spinning, revolving, or other more distracting transition methods can be prohibited, allowing businesses to use sequencing in an effective manner without making the signs overly distracting. Another way of regulating distracting transitions is to require a very short time of a dark or empty screen between images.

4.2.4 Motion, Animation, or Video Limitations on Electronic Signs

Motion on a sign can consist of everything from special text effects (spinning, revolving, shaking, flashing, etc.) to simple graphics, such as balloons or bubbles rising across the screen, to more realistic moving images that have the appearance of a television screen. According to sign industry representatives, video imagery on a sign is referred to as "animation" if the sign is limited to the capability of 10 frames per second. Fewer frames per second make the moving image look more like animation. Imagery produced by signs that have the capability of processing up to 30 frames per second is accurately referred to as "video" imaging.

Many communities that allow dynamic signs do not allow the application of any type of motion, animation, or video on the signs. However, Seattle was obliged to allow video imagery on their signs after earlier signage code regulating certain types of signs was not strictly enforced. In addition to requiring a dark period between successive messages to overcome the Zeigarnik effect, Seattle also limits the duration of the video message to a minimum of two seconds and a

maximum of 10 seconds. This time frame was established based upon careful calculations of the streets from which these signs could be seen, speed limits and traffic volumes in addition to the community's concern over the extent to which moving images could distract drivers. However, Seattle also limits the size of their electronic signs to a maximum of 1,000 square inches, with no single dimension greater than three feet, thus minimizing the effect of video images.

4.2.5 Sign Placement and Spacing

Regulating the number of dynamic sign potentially visible to a driver at any one time as well as the position of the sign in relationship to the roadway may reduce distraction to drivers. Spacing requirements should consider the speed, width and horizontal and vertical alignment of the roadway.

Some communities have established minimum distances between electronic signs. Establishing an adequate distance between these types of devices seems particularly important if a fairly fast rate of change is allowed for the purpose of facilitating sequenced messages or if animation and video imaging is allowed. Closely spaced signs attempting to convey sequenced messages may simply create visual overload and an over-stimulated driving environment. Research conducted to date has not yielded information about optimal electronic sign spacing. Seattle adopted a 35-foot spacing requirement for their electronic signs based upon multiple levels of analysis of the downtown city environment in which these signs are present.

Due to the varying characteristics of individual roadways in this regard, overlay districts allowing dynamic signage with conditions specific to that area could be considered. Overlay districts could also take into account other locational factors such as offset from the roadway and conspicuity. Determining appropriate offsets from the roadway must consider roadway clear zone requirements as well as spacing of frontage roads and access points, while also considering the signage too far outside the driver's line of sight may be a further distraction. Conspicuity, a sign's ability to stand out from its surroundings, should also be considered.

4.2.6 Text Size

Legibility is another important property of signage. The preferred approach used within highway signing is that drivers can read text that is 1 inch high from 30 feet away. Larger text is needed for signs to be legible at greater distances. Large, legible text allows the driver to read the billboard from varying distances and focus on the driving task. Conversely, with small text, the driver is more likely to focus on the sign for a longer period of time and possibly be more adversely distracted. However, the size or type of text or the amount of text due is rarely regulated.

4.2.7 Brightness Limitations on Electronic Signs

One of the main concerns about the use of electronic signs, regardless of whether they consist of changeable text, animation, or video, is the brightness of the image. The brightness of an object can be characterized in two ways. *Iluminance* is the total brightness of all the light at a point of measurement. Illuminance often describes ambient light and can be measured with a standard light meter such as is used in photography. *Luminance* is the measure of the light emanating from an object with respect to its size and is the term is used to quantify electronic sign brightness. The unit of measurement for luminance is nits, which is the total amount of light emitted from a sign divided by the surface area of the sign (candelas per square meter).

Many, but not all, LED-type signage can be time-programmed to respond to day and nighttime light levels. Higher-end signage types are equipped with photo cells to respond to ambient light conditions. Despite these controls, LED signs have been observed that are considered to be excessively bright. Sign industry representatives indicate that excessive brightness can be the result of 1) sign malfunction or improper wiring, 2) lack of photo cell and/or dimming mechanism, or 3) operator error or lack of understanding that brightness is not necessarily an advantage, especially if it makes a sign unreadable or unpleasant to look at. They also maintain that the intent of the electronic sign industry is to establish a brightness level that is similar to a traditional internally or externally lit sign. Recent observations of sign technicians calibrating the Interstate 394 LED billboard noted that the brightness controls are not calibrated to specific nit levels, but rather vary in proportion to a set maximum level, like a volume control dial on a typical car radio.

To control the extent to which electronic signs are a distraction or the extent to which they are readable, many local governments have adopted regulations that limit nit levels. At this time, ordinances that use nit level limitations typically differentiate between day time and night time nit levels. A common daytime nit limitation ranges from 5,000 to 7,000 nits. A common nighttime limitation is 500 nits, although in areas that are extremely dark at night, with very little in the way of ambient light levels, less than 500 nits may be appropriate. Other communities have taken this farther, such as Lincoln, Nebraska, whose sign code incorporates a graph of varying ambient light levels ranging from night time to a bright sunny day and all conditions between those two extremes, and has correlating nit limitations for the various ambient light levels.

Enforcement of these types of regulations is challenging as luminance of electronic signs is very difficult to measure in the field. Typically, sign luminance is measured and calibrated in a controlled factory setting using a spectral photometer to measure the light output. This calibration setting is then used in conjunction with a photo cell to control the brightness of the sign. The higher the ambient light levels, the brighter the sign. There are different nit thresholds for various colors. White is most often used to set dimming levels because at a constant nit level, white has the most intensity as perceived by the human eye.

Lincoln uses a light meter to conduct testing on electronic signs and found a wide range of luminance levels. One small electronic sign had luminance levels of 13,000 nits. The process that Lincoln uses to check luminance levels is to hold a luminance meter close to the face of the sign so that it captures only the light emitted from the sign. They have not had any requests to

measure the brightness of LED billboards, so the viability of using this approach on billboards has not been explored.

In Seattle, sign luminance was found too difficult to measure, so signs are visually inspected when complaints from the public are received. Sign owners are then contacted and asked to adjust sign luminance accordingly.

Both Mesa, Arizona and Lincoln, Nebraska have included a requirement for written certification from the sign manufacturer that the light intensity has been preset not to exceed the illumination levels established by their code, and the preset intensity level is protected from end user manipulation by password protected software or other method approved by the appropriate city official. This language appears to offer the advantage of ensuring that electronic signs, at a minimum, cannot exceed a certain established level of brightness.

At a minimum, it is important for communities to require all electronic signs to be equipped with a dimmer control. A requirement for both a dimmer control and a photo cell, which constantly keeps track of ambient light conditions and adjusts sign brightness accordingly, is optimal.

Over time, the LEDs used in electronic signs have a tendency to lose some of their intensity, and an owner may choose to have the sign adjusted and calibrated, which involves adjusting the level of electrical current in a manner that affects the brightness of the sign. This occurs over the course of two or three years. Having maximum nit levels established would ensure that the sign company has upper limits to work with as far as adjusting the sign is concerned.

4.3 Public Review

Most communities establish rules within their sign code and do not create opportunities for electronic signs to be approved through conditional use permits or special use permits. Some communities with special overlay districts, or areas that are oriented toward entertainment and night life, have established a review process for electronic signs, or for various functions of electronic signs such as animation and video.

Other communities take the opposite approach, where they allow electronic signs with no controls whatsoever, except in certain special areas, such as a historic overlay district, or a historic downtown district, where the signs are prohibited. Each community needs to tailor their application of electronic signs to meet their needs.

As of the writing of this report, no ordinances have been discovered that have a special review committee just for the purpose of electronic signs. Typically, sign regulations established in the zoning ordinance would be reviewed in accordance with existing review and approval processes. As with other development features, dynamic signage should be either prohibited, permitted, or conditional depending upon the zoning district and/or the specific features of the sign as established within the city's regulations (i.e. size, specific location with respect to the adjacent roadway, zoning district, proximity of sensitive uses). The recommended review process for permitted dynamic signs should be the same as procedures already in place for administrative

review. For dynamic signs requiring a Conditional Use Permit (CUP), the standard process for public notification and a public hearing before the planning commission should apply.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Driver distraction plays a significant role in traffic safety. Driver distraction is a factor in one in four crashes, and of those crashes involving driver distraction, one in four involves distractions outside the vehicle. The extent to which dynamic signage contributes to traffic safety has been examined in this study. Following are some of the major findings from a review of available research.

- Drivers that are subjected to information-rich content that is irrelevant to the driving task (such as digital advertising) may be temporarily distracted enough to cause a degradation in their driving performance. This degradation could lead to a crash.
- The unlimited variety of changing content allows dynamic signage to attract drivers' attention at greater distances and hold their attention longer than traditional static billboards.
- Several studies have found a correlation between crashes and the complexity of the driving environment. For example, crash rates are higher at intersections because the difficulty of the driving task is increased by the roadway's complexity. Complex driving environments place a high demand on drivers' attention. Introducing a source of distraction in an already demanding driving environment is more likely to result in crashes. This is illustrated by the 1994 Wisconsin DOT study that examined crash rates before and after installation of an electronic sign on a high-volume curving roadway. Introduction of this sign was identified as a likely factor of the 80 percent increase in side-swipe crashes that was experienced.
- Many studies have noted a correlation between outdoor advertising signs and crash rates, but have not established a *causal* relationship between the signs and crash rates. Driving is a complex task influenced by multiple factors. It is not necessary to establish a direct causal relationship between outdoor advertising signs and crash rates to show that they can make the driving task less safe. While the research shows that driver distraction is a key factor in many motor vehicle crashes, this often includes many interacting factors that distract drivers. The specific driver distraction danger that advertising signs contribute is difficult to quantify. A study that could control for multiple variables (human factors, vehicle, enforcement and the roadway environment) would be needed to provide a definitive statement on the level of driver distraction that signs produce. Such a study would likely find that not all advertising signs cause distraction that would lead to crashes, but some signs in some situations are more likely to contribute to crashes than others.

Overall, the literature review conducted for the purpose of this study identifies a relationship between driver distraction and electronic outdoor advertising devices. As indicated, driver distraction is a significant factor in crashes. The purpose of dynamic signage is to attract the attention of people in vehicles, so a natural conclusion from that knowledge is that drivers may be distracted by them. Professional traffic engineering judgment concludes that driver distraction generally contributes to a reduction in safe driving characteristics.

For this reason, state departments of transportation have carefully studied the design and location of dynamic signs within the highway right-of-way. Their goal is to convey a message to the traveling public in a manner that is as straight-forward and readable as possible without being a visual "attraction". The goal of the outdoor advertising sign is to be a visual attraction outside the right-of-way, possibly making it a source of driver distraction. Nevertheless, the actual change in crash rates influenced by the presence of any specific device has not been quantified in a manner that fully isolates the impacts of an electronic sign. Recent studies conducted by FHWA and others have cited the need for further research.

In the interest of promoting public safety, this report recommends that electronic signs be viewed as a form of driver distraction and a public safety issue. Therefore, the ordinance recommendations identified here should be considered. These recommendations should be reviewed in the future as additional research becomes available.
With respect to regulatory measures for electronic outdoor advertising signs, it is important that local governments take a thorough approach to updating their ordinances to address this issue. For example, an ordinance that addresses sign motion, but does not address brightness and intensity levels may leave the door open for further controversy. This report seeks to identify all of the aspects of electronic outdoor advertising devices that are subject to regulation. It does not specifically state what those regulations should be (e.g. the size of electronic signs), since these are all things that policy makers and staff must take into careful consideration. Further, as driver distraction and resulting influences on safety do not, in a practical sense, distinguish between on-premise and off-premise signage, this distinction is not highlighted in the recommendations below.

Regulatory Measures recommended for consideration

To properly address the issue of dynamic signage, it is recommended that the sign code address the following:

1. Identify specific areas where dynamic signs are prohibited. This would typically be done by specifying certain zoning districts where they are not allowed under any circumstances. If dynamic signs are to be allowed in specific areas, this could be done by zoning district (only higher level commercial districts are recommended for consideration) or by zoning overlay related to specific purposes (e.g. entertainment or sports facility district) or to specific roadway types.

2. Determine the acceptable level of operational modes in conjunction with such zoning districts or overlays. The various levels include:

    a. Static display only, with no transitions between messages,

    b. Static display with fade or dissolve transitions, or transitions that do not have the effect of moving text or images,

    c. Static display with scrolling, traveling, spinning, zooming in, or similar special effects that have the appearance of movement, animation, or changing in size, or get revealed sequentially rather than all at once (e.g. letters dropping into place, etc.), and

d. Full animation and video.

3. If one of the forms of static display is identified as the preferred operational mode, a minimum display time should be established. This display time should correspond to the operation roadway speed (rather than posted speed limit), allowing at most one image transition during the time that the sign if visible to a driver traveling at the operational speed.

   If a shorter minimum display time is considered, the effects of message sequencing should be considered. Wait intervals of more than 1-2 seconds between sequenced messages have the potential to become more of a distraction as viewers wait impatiently for the next screen, in an effort to view the complete message.

4. If the community wishes to accommodate animation or video in some or all locations where dynamic are permitted, a minimum and maximum duration of a video image should be established. The purpose for establishing a time limit is to ensure that the message is conveyed in a short, concise time frame that does not cause slowing of traffic to allow drivers to see the entire message. Given the creativity of advertising, these video images may be seen as a form of entertainment, and people typically like to see an entertaining message through to the end.

   Differentiate between zoning districts where dynamic signs are permitted by right, and zoning districts, overlay districts, or special districts where they should only be allowed through the approval of a Conditional Use Permit. A CUP would involve public notification and review and approval by the Planning Commission. Other options would include a design review board or other dispute resolution process.

5. Consider the establishment of minimum distance requirements between electronic outdoor advertising devices in relation to the zoning district or roadway context in which the signs are allowed.

6. Consider size limitations on dynamic signs for zoning districts where they are allowed. This may vary from one district to another.

7. Consider if dynamic signs are allowed independently, or if they must be incorporated into the body of another sign, and therefore become a limited percentage of the overall sign face.

8. Establish a requirement for that all dynamic signs that emit light be equipped with mechanisms that allow brightness to be set at specific nit levels and respond accurately to changing light conditions. The City must establish the authority to disable or turn the device off if it malfunctions in a manner that creates excessive glare or intensity that causes visual interference or blind spots, and require that the device remain inoperable until such time that the owner demonstrates to the appropriate city official that the device is in satisfactory working condition. If such technology is not available, consideration should be give to banning dynamic signs that emit light until such time as the technology allows brightness levels to be precisely controlled.

9. Consider maximum brightness levels that correlate to ambient (day or night condition, lighting of surrounding context) light levels. A maximum daytime and separate nighttime nit/footcandle level should be established. Consider wording that requires the sign to automatically adjust its nit level based on ambient light conditions.

10. Consider a requirement for a written certification from the sign manufacturer that the individual sign's maximum light intensity has been preset not to exceed the maximum daytime illumination levels established by the code, and that the maximum intensity level is protected from end user manipulation by password protected software or other method approved by the appropriate city official.

11. Require sign owners to provide an accurate field method of ensuring that maximum light levels are not exceeded. If such a method cannot technically be provided, consider banning dynamic signs that emit light until such time as the technology is available.

PRELIMINARY DRAFT FOR REVIEW BY CITY OF MINNETONKA
Further changes are anticipated following Signage Workshop

Preliminary Report is specific to City of Minnetonka issues and may not be sufficient to address concerns in other communities

APPENDICES

PRELIMINARY DRAFT FOR REVIEW BY CITY OF MINNETONKA
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Appendix A

Current Sign Technologies

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Appendix A – Current Sign Technologies

Roadside signage has long been used to alert and direct travelers to retail businesses, lodging, attractions and other destinations. Until the 20th century much of this image was "static" in nature, presenting a single image that could only be altered by repainting or otherwise removing an image and replacing it with another. With the advent of motorized travel, signage became more "dynamic" or active in its efforts to attract the traveler's attention as they moved at ever increasing speeds. Initially, motion was created by flashing bulbs or alternating sets of neon tubes.

Today's technologies allow for an increasingly sophisticated display of images that can be manipulated by a few strokes of a keyboard. Simpler forms of signs capable of displaying multiple images include "tri-vision" signs which present a series of images through mechanical rotation of multi-sided vertical strips. The rotation occurs at regular intervals presenting a series of static images. Other forms are electronically produced, allowing for a wide range of colors, messages and images depending on the level of technology, and typically produced by light emitted by the sign face. Basic levels of technology present letters or numbers in a single color of light, such as "time and temperature" signs or gas pricing signs. Many of these signs can present longer images in a scrolling fashion, or can provide simple animations.

Recent advances have introduced a variety of technologies to the outdoor advertising arena. The largest impact has been made with LED signs which offer an inexpensive yet powerful approach that combines full motion, brilliant colors and a readable display. Other technologies are in development, including "digital ink" signs that offer a changeable medium on a surface that looks like a normal vinyl billboard. These signs manipulate ink on the surface, allowing for a dynamic presentation of images without being internally illuminated.

The various sign technologies are referenced by a wide array of terms: "changeable message signs," "electronic billboards," "animated signs." In general, this report focuses on the broad range of signage types which are capable of displaying multiple images through electronic manipulation, which we will refer to as "dynamic" signing. Reference to specific signage types is made when necessary to discussion of specific issues (e.g. the brightness of LED signage).

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Appendix B

Outdoor Advertising Sign Brightness Definitions

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Appendix B – Outdoor Advertising Sign Brightness Definitions

This appendix defines various technical terms that are used to describe the operational aspects of electronic billboards.

Billboard Illuminance

Billboard illumination is typically discussed using two terms: illuminance and luminance. Because this section includes some technical jargon, a glossary that further defines terms used in outdoor advertising is provided in Appendix C.

Illuminance: The amount of light that is incident to the surface of an object. This is the method for describing ambient light levels or the amount of light that is projected onto a front-lit sign. This parameter is typically measured in lux (footcandles x meters). For the purposes of dimming, illuminance is discussed to describe the ambient light that hits the photocell.

Luminance: The amount of light that emanates from an internally illuminated sign. This parameter is measured in nits. The nit levels necessary for the sign to be legible vary with the ambient light conditions. On a sunny day, the nit levels must be very high, while at night, the levels must be very low to prevent the image from distorting and to prevent glare.

Billboard Luminance (Brightness)

Luminance is measured in nits (candelas/square meter) and describes how bright the image is. In essence, it is the amount of light that is radiated from the sign divided by the amount of surface area of the sign. No matter how big the sign is, the luminance of the sign is consistent. For example, the brightness of computer monitors is also measured in nits.

The European standard "EN 12966" specifies that at certain ambient light levels, the sign should output a given number of nits. There are different tables for each color due to the properties of how the human eye interprets each color. The color that is most often used to set dimming levels is white.

The FHWA has developed recommended practices for dynamic message signs installed within the roadway right-of-way. The standard is NEMA's TS-4 "Hardware Standards for Dynamic Message Signs (DMS) With NTCIP Requirements." Note that these standards were prepared for message signs deployed within the roadway right-of-way and should not be taken as recommended luminance levels for advertising signs. Table A-1 provides a simplified version of the NEMA TS-4 standard for the color white.

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Table A-1 - Luminance Standards

Ambient Light (lux)	Approximate Light	Minimum Luminance (nits)	Maximum Luminance (nits)
40,000	Sunlight	12,400	62,000
10,000	Cloudy	12,400	-
4,000	Overcast	2,200	11,000
400	Sunrise/Sunset	600	3,000
40	Candlelight	250	1,250
less than 4	Moonlight	75	375

Source: NEMA TS-4 (2005)

Billboard Resolution

Billboards require far less resolution than print advertisements. For example, Clear Channel's LED "Digital Outdoor Network" LED bulletin-size (14' x 48') billboards require dimensions of only 208 pixels high by 720 pixels wide. If this image were to be printed at 300 dots per inch (dpi), a typical print resolution, the entire image would be less than 1.7 square inches. Therefore, it is ideal to keep the message on these signs simple and clear because they do not currently allow resolutions similar to printed images.

Dimming

To maintain readability, the brightness of a sign must be adjusted to match ambient light conditions. If this is not done, the image will appear too bright and can even degrade the image quality through a phenomenon called "blooming." If the image blooms, the brightest areas of the image bleed over into darker parts and the image clarity is degraded.

Dimming is typically controlled by a photocell, which measures the ambient light conditions and varies the light output of the sign based on preconfigured settings. As ambient light conditions darken, the photocell senses the decrease and lowers the light output of the sign. Some sign manufacturers do not incorporate photocells in their electronic signs.

Electronic billboard dimming can also be controlled by scheduled dimming according to time of day or manual dimming. On-premise signs may use any of these methods, but most, if not all, off-premise standard size electronic billboards are auto dimmed by photocell. Some signs include user-defined dimming curve capability allowing total control over sign brightness and adjustability to accommodate local brightness ordinances.

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Appendix C

Electronic Outdoor Advertising Device Visual Performance Definitions

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Appendix C – Electronic Outdoor Advertising Device Visual Performance Definitions

Conspicuity

Conspicuity is the property that related to the contrast between a sign and its background and its ability to stand out from its surroundings. This is a subjective property that depends on many factors of both the environment and the viewer.

Contrast

Contrast is the property that defines the relationship between the brightness of the brightest color possible to the darkest color possible on a sign. In times when ambient conditions are very bright, such as a sunny day, the darkest color may still be very bright due to the sun's reflection off the sign. In these cases, the lighter colored areas of the billboard's image must be much brighter than the contrasting dark areas.

Legibility

The ability of the driver to read a sign is related to its legibility. Large, legible text allows the driver to read the billboard from varying distances and focus on the driving task. Conversely, with small text the driver is more likely to focus on the sign for a longer period of time and possibly wait until the sign is very close.

State departments of transportation use NEMA's TS-4 document for this criterion. This document specifies many characteristics related to legibility including character height, resolution and color.

Glare

Disability Glare

The first form of glare is disability glare. This occurs when a driver is exposed to a light source so bright that it temporarily blinds the driver, impairing their ability to perform driving tasks. This temporary blindness is brief, but can be dangerous.

Discomfort Glare

Discomfort glare is when a light source is bright enough to distract or encourage the driver to look away from the light, but is not blinding. Discomfort glare is of particular concern in cases where a bright sign is located in the same line of sight as a traffic sign, signal or another vehicle.

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Frequency of Change

The frequency of change is determined by the interval of time between sign image changes. The rate of change can usually be adjusted by the owner and operator of the sign. Frequency of change is highly variable, with some on-premise signs changing faster than once per second. While no standard is generally accepted, local government agencies have used ordinances to limit the frequency to anywhere from 5 seconds to 24 hours.

Interactive signs

Interactive signs change their message based on the person viewing it. For example, the carmaker MINI has installed variable message signs that display a customized message to car owners who have special key dongles containing a radio frequency identification (RFID) chips when the dongle is in close proximity to the sign.

Another example is a microphone system that identifies the radio stations passing drivers are listening to and displays a specific message for that station.

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ORDINANCE NO. 2007-21

AN ORDINANCE AMENDING CITY CODE SECTION 300.30 REGARDING DYNAMIC SIGNS

The City of Minnetonka Ordains:

Section 1. City code §300.30, subd. 1 is amended as follows:

1. Purpose and Findings.

The purpose and findings of the sign ordinance are as follows:

a) Purpose: the sign ordinance is intended to establish a comprehensive and balanced system of sign control that accommodates the need for a well-maintained, safe, and attractive community, and the need for effective communications including business identification. It is the intent of this section, to promote the health, safety, general welfare, aesthetics, and image of the community by regulating signs that are intended to communicate to the public, and to use signs which meet the city's goals by authorizing:

1) permanent signs which establish a high standard of aesthetics;

2) signs which are compatible with their surroundings;

3) signs which are designed, constructed, installed and maintained in a manner that does not adversely impact public safety or unduly distract motorists;

4) signs which are large enough to convey the intended message and to help citizens find their way to intended destinations;

5) signs that are proportioned to the scale of, and are architecturally compatible with, principal structures;

6) permanent signs which give preference to the on-premise owner or occupant; and

7) temporary commercial signs and advertising displays which provide an opportunity for grand openings and occasional sales events while restricting signs which create continuous visual clutter and hazards at public right-of-way intersections.

b) Findings: the city of Minnetonka finds it is necessary for the promotion and preservation of the public health, safety, welfare and aesthetics of the community that the construction, location, size and maintenance of signs be controlled. Further, the city

finds:

1) permanent and temporary signs have a direct impact on and relationship to the image of the community;

2) the manner of installation, location and maintenance of signs affects the public health, safety, welfare and aesthetics of the community;

3) an opportunity for viable identification of community businesses and institutions must be established;

4) the safety of motorists, cyclists, pedestrians and other users of public streets and property is affected by the number, size, location and appearance of signs that unduly divert the attention of drivers;

5) installation of signs suspended from, projecting over, or placed on the tops of buildings, walks or other structures may constitute a hazard during periods of high winds and an obstacle to effective fire-fighting and other emergency service;

6) uncontrolled and unlimited signs adversely impact the image and aesthetic attractiveness of the community and thereby undermine economic value and growth;

7) uncontrolled and unlimited signs, particularly temporary signs which are commonly located within or adjacent to public right-of-way or are located at driveway/street intersections, result in roadside clutter and obstruction of views of oncoming traffic. This creates a hazard to drivers and pedestrians and also adversely impacts a logical flow of information;

8) commercial signs are generally incompatible with residential uses and should be strictly limited in residential zoning districts; and

9) the right to express noncommercial opinions in any zoning district must be protected, subject to reasonable restrictions on size, height, location and number.

Section 2. City code §300.02, subd. 2, is amended by the deletion of the following definitions and the re-numbering of the remaining clauses consecutively.

~~"Message center/time and temperature display" - a sign having electrically changing copy which displays current time, temperature, and/or public service announcements.~~

~~"Public service announcement" - any sign display intended primarily to promote~~

~~items of general interest to the community such as time, temperature, date, atmospheric conditions, Dow Jones industrial average, news, etc. This does not include any information which would be related to commercial products or services located at the display site.~~

~~"Readerboard sign" - any sign having a message not permanently affixed to the sign face and the copy is manually changed.~~

Section 3. City code §300.30, subd. 2, is amended by the addition of the following definition which is to be inserted alphabetically and the following clauses renumbered consecutively:

"Dynamic display" –any characteristics of a sign that appear to have movement or that appear to change, caused by any method other than physically removing and replacing the sign or its components, whether the apparent movement or change is in the display, the sign structure itself, or any other component of the sign. This includes a display that incorporates a technology or method allowing the sign face to change the image without having to physically or mechanically replace the sign face or its components. This also includes any rotating, revolving, moving, flashing, blinking, or animated display and any display that incorporates rotating panels, LED lights manipulated through digital input, "digital ink" or any other method or technology that allows the sign face to present a series of images or displays.

Section 4. City code §300.30, subd 4(a) is amended as follows:

a) Monument identification signs:

1) one sign per development;

2) maximum copy and graphic area as follows:

width of adjacent right-of-way	copy and graphic area
less than 100 feet	36 square feet
100 feet or greater	50 square feet

3) maximum monument area is two times the potential copy and graphic area;

4) copy and graphic display limited to three items of information; (Figure 30-16)

Figure 30-16

5) 15 foot maximum height; and

6) signs which are not internally illuminated shall have light fixtures and sources screened from view~~; and~~

~~7) message centers/time and temperature displays permitted but the maximum area for display is 50 percent of the potential copy and graphic area of the monument identification sign~~.

Section 5. City Code §300.30, subd. 10 is amended as follows:

10. Prohibited Signs.

The following types of signs are expressly prohibited in all districts:

a) roof signs including signs mounted on a roof surface or projecting above the roof line of a structure if either attached to the structure or cantilevered over the structure;

~~b) revolving and moving signs except electronic message center/time and temperature display signs according to subdivision 4 and search lights according to subdivision 8;~~

~~c~~b) ~~flashing, blinking or animated signs including but not limited to traveling lights or any other means not providing constant illumination except electronic message center/time and temperature display signs according to subdivision 4 and search lights according to subdivision 8~~signs with dynamic displays except search lights under subdivision 8 and those allowed under subdivision 14;

~~d~~c) portable signs, except temporary signs that are specifically permitted in section 300.30;

~~e~~d) projecting signs. Wall signs shall be mounted parallel to the building and shall not project more than 18 inches from the face of the building;

~~f~~e) painted wall signs including signs painted on the face of a structure. Works of art

which are not commercial messages are exempt;

~~g~~f) signs attached to trees and utility poles;

~~h~~g) signs within public right-of-way except for official traffic signs and those specified in subparagraph 9(k) and (l);

~~i~~h) signs which are designed to resemble official traffic signs except signs which are used to control traffic on private property;

~~j~~i) abandoned signs or signs other than outdoor advertising structures that advertise an activity, business, product or service no longer available on the premises on which the sign is located;

~~k~~j) signs attached to fences except athletic field fence panels according to subdivision 1;

~~l~~k) illuminated signs which exhibit any of the following:

1) external illumination that is determined to interfere with safe traffic operations;

2) the sign is directly oriented to any residential district;~~ or~~

3) illumination of a commercial sign in a residential district, except a sign used for a conditionally permitted use; or

4) the level of illumination exceed standards specified in section 300.28, subd. 2.

~~m~~l) signs that obstruct the vision of pedestrians, cyclists, or motorists traveling on or entering public streets;

~~n~~m) exterior signs that obstruct any window, door, fire escape, stairway or opening intended to provide light, air, ingress or egress for any structure;

~~o~~n) signs that are in violation of the building code or the electrical code adopted by the city;

~~p~~o) blank signs;

~~q~~p) merchandise boxes or signs not affixed to a principal structure excluding signs

permitted in subdivision 8(d);

~~f~~g) outdoor advertising signs are not permitted in any zoning district, except that the provisions of this paragraph do not apply to temporary outdoor advertising signs permitted under Subd. 9 (k) above. Outdoor advertising signs which exist on the effective date of this section shall be considered as nonconforming signs and are subject to standards contained in section 300.29. An outdoor advertising sign is a principal use of property. No permitted or conditionally permitted use or any part of such use may be located on the same parcel of property as such a sign. The parcel on which such a sign is located may not be subdivided to segregate the sign from the remaining property. For the purposes of this paragraph, "parcel of property" means any property for which one property identification number has been issued by the county, or all contiguous property in common ownership as of October 15, 1997, whichever is greater; and

~~s~~r) any sign not expressly permitted by the provisions in section 300.30.

Section 6. City code §300.30 is amended by the addition of a new subdivision 14 to read as follows:

14. **Dynamic Displays.**

a) **Findings.** Studies show that there is a correlation between dynamic displays on signs and the distraction of highway drivers. Distraction can lead to traffic accidents. Drivers can be distracted not only by a changing message, but also by knowing that the sign has a changing message. Drivers may watch a sign waiting for the next change to occur. Drivers are also distracted by messages that do not tell the full story in one look. People have a natural desire to see the end of the story and will continue to look at the sign in order to wait for the end. Additionally, drivers are more distracted by special effects used to change the message, such as fade-ins and fade-outs. Finally, drivers are generally more distracted by messages that are too small to be clearly seen or that contain more than a simple message. Time and temperature signs appear to be an exception to these concerns because the messages are short, easily absorbed, and become inaccurate without frequent changes.

Despite these public safety concerns, there is merit to allowing new technologies to easily update messages. Except as prohibited by state or federal law, sign owners should have the opportunity to use these technologies with certain restrictions. The restrictions are intended to minimize potential driver distraction and to minimize proliferation in residential districts where signs can adversely impact residential character.

Local spacing requirements could interfere with the equal opportunity to use such technologies and are not included. Without those requirements, however, there is the potential for numerous dynamic displays to exist along any roadway. if more than one dynamic display can be seen from a given location on a road, the minimum display time becomes critical. If the display time is too short, a driver could be subjected to a view that appears to have constant movement. This impact would obviously be compounded in a corridor with multiple signs. If dynamic displays become pervasive and there are no meaningful limitations on each sign's ability to change frequently, drivers may be subjected to an unsafe degree of distraction and sensory overload. Therefore, a longer display time is appropriate.

A constant message is typically needed on a sign so that the public can use it to identify and find an intended destination. Changing messages detract from this way-finding purpose and could adversely affect driving conduct through last-second lane changes, stops, or turns, which could result in traffic accidents. Accordingly, dynamic displays generally should not be allowed to occupy the entire copy and graphic area of a sign.

In conclusion, the city finds that dynamic displays should be allowed on signs but with significant controls to minimize their proliferation and their potential threats to public safety.

b) **Regulations.** Dynamic displays on signs are allowed subject to the following conditions:

1) Dynamic displays are allowed only on monument and pylon signs for conditionally permitted uses in residential districts and for all uses in other districts. Dynamic displays may occupy no more than 35 percent of the actual copy and graphic area. The remainder of the sign must not have the capability to have dynamic displays even if not used. Only one, contiguous dynamic display area is allowed on a sign face;

2) A dynamic display may not change or move more often than once every 20 minutes, except one for which changes are necessary to correct hour-and-minute, date, or temperature information. Time, date, or temperature information is considered one dynamic display and may not be included as a component of any other dynamic display. A display of time, date, or temperature must remain for at least 20 minutes before changing to a different display, but the time, date, or temperature information itself may change no more often than once every three seconds;

3) The images and messages displayed must be static, and the transition

from one static display to another must be instantaneous without any special effects;

4) The images and messages displayed must be complete in themselves, without continuation in content to the next image or message or to any other sign;

5) Every line of copy and graphics in a dynamic display must be at least seven inches in height on a road with a speed limit of 25 to 34 miles per hour, nine inches on a road with a speed limit of 35 to 44 miles per hour, 12 inches on a road with a speed limit of 45 to 54 miles per hour, and 15 inches on a road with a speed limit of 55 miles per hour or more. If there is insufficient room for copy and graphics of this size in the area allowed under clause 1 above, then no dynamic display is allowed;

6) Dynamic displays must be designed and equipped to freeze the device in one position if a malfunction occurs. The displays must also be equipped with a means to immediately discontinue the display if it malfunctions, and the sign owner must immediately stop the dynamic display when notified by the city that it is not complying with the standards of this ordinance;

7) Dynamic displays must comply with the brightness standards contained in subdivision 15;

8) Dynamic displays existing on (insert the effective date of this ordinance) must comply with the operational standards listed above. An existing dynamic display that does not meet the structural requirements in clause 1 may continue as a non-conforming development subject to section 300.29. An existing dynamic display that cannot meet the minimum size requirement in clause 5 must use the largest size possible for one line of copy to fit in the available space.

c) **Incentives.** Outdoor advertising signs do not need to serve the same way-finding function as do on-premises signs. Further, outdoor advertising signs are no longer allowed in the city, and there is no potential that they will proliferate. Finally, outdoor advertising signs are in themselves distracting and their removal serves public safety. The city is extremely limited in its ability to cause the removal of those signs. This clause is intended to provide incentives for the voluntary and uncompensated removal of outdoor advertising signs in certain settings. This removal results in an overall advancement of one or more of the goals set forth in this section that should more than offset any additional burden caused by the incentives. These provisions are also based on the recognition that the incentives create an opportunity to consolidate outdoor advertising services that would otherwise remain distributed throughout the community.

1) A person may obtain a permit for an enhanced dynamic display on one face of an outdoor advertising sign if the following requirements are met:

(a) The applicant agrees in writing to permanently remove, within 15 days after issuance of the permit, at least two other faces of an outdoor advertising sign in the city that are owned or leased by the applicant, each of which must satisfy the criteria of parts (b) through (d) of this subsection. This removal must include the complete removal of the structure and foundation supporting each sign face. The applicant must agree that the city may remove the sign if the applicant does not timely do so, and the application must be accompanied by a cash deposit or letter of credit acceptable to the city attorney sufficient to pay the city's costs for that removal. The applicant must also agree that it is removing the sign voluntarily and that it has no right to compensation for the removed sign under any law.

(b) The city has not previously issued an enhanced dynamic display permit based on the removal of the particular faces relied upon in this permit application.

(c) Each removed sign has a copy and graphic area of at least 288 square feet and satisfies two or more of the following additional criteria:

(1) The removed sign is located adjacent to a highway with more than two regular lanes and with a general speed limit of 45 miles per hour or greater, but that does not have restrictions on access equivalent to those of an interstate highway;

(2) All or a substantial portion of the structure for the removed sign was constructed before 1975 and has not been substantially improved;

(3) The removed sign is located in a noncommercial zoning district;

(4) The removed sign is located in a special planning area designated in the 1999 comprehensive plan; or

(5) The removed copy and graphic area is equal to or or greater than the area of the copy and graphic area for which the enhanced dynamic display permit is sought.

(d) If the removed sign face is one for which a state permit is required by state law, the applicant must surrendered its permit to the state upon removal of the sign. The sign that is the subject of the enhanced dynamic display permit cannot begin

to operate until proof is provided to the city that the state permit has been surrendered.

(e) The applicant must agree in writing that no dynamic displays will ever be used on one additional outdoor advertising sign that has a copy and graphic area of at least 288 square feet in size. This agreement will be binding on the applicant and all future owners of the sign. If the sign is subsequently removed or destroyed and not replaced, the holder of the enhanced dynamic display permit is not required to substitute a different sign for the one that no longer exists.

2) If the applicant complies with the permit requirements noted above, the city will issue an enhanced dynamic display permit for the designated outdoor advertising sign. This permit will allow a dynamic display to occupy 100 percent of the potential copy and graphic area and to change no more frequently than once every eight seconds. The designated sign must meet all other requirements of this ordinance.

Section 7. City code §300.30 is amended by the addition of a new subdivision 15 to read as follows:

15. **Brightness Standards.**

a) All signs must meet the following brightness standards in addition to those in subdivision 10:

1) No sign may be brighter than is necessary for clear and adequate visibility.

2) No sign may be of such intensity or brilliance as to impair the vision of a motor vehicle driver with average eyesight or to otherwise interfere with the driver's operation of a motor vehicle.

3) No sign may be of such intensity or brilliance that it interferes with the effectiveness of an official traffic sign, device or signal.

b) The person owning or controlling the sign must adjust the sign to meet the brightness standards in accordance with the city's instructions. The adjustment must be made immediately upon notice of non-compliance from the city. The person owning or controlling the sign may appeal the city's determination through the following appeal procedure:

1) After making the adjustment required by the city, the person owning or controlling the sign may appeal the city's determination by delivering a written appeal to the city clerk within 10 days after the city's non-compliance notice. The written appeal

must include the name of a person unrelated to the person and business making the appeal, who will serve on the appeal panel.

2) Within five business days after receiving the appeal, the city must name a person who is not an official or employee of the city to serve on the appeal panel. Within five business days after the city names its representative, the city's representative must contact the sign owner's representative, and the two of them must appoint a third member to the panel, who has no relationship to either party.

3) The appeal panel may develop its own rules of procedure, but it must hold a hearing within five business days after the third member is appointed. The city and the sign owner must be given the opportunity to present testimony, and the panel may hold the hearing, or a portion of it, at the sign location. The panel must issue its decision on what level of brightness is needed to meet the brightness standards within five business days after the hearing commences. The decision will be binding on both parties.

c) All signs installed after (insert the effective date of this ordinance) that will have illumination by a means other than natural light must be equipped with a mechanism that automatically adjusts the brightness in response to ambient conditions. These signs must also be equipped with a means to immediately turn off the display or lighting if it malfunctions, and the sign owner or operator must immediately turn off the sign or lighting when notified by the city that it is not complying with the standards in this section.

Section 8. A violation of this ordinance is subject to the penalties and provisions of Chapter XIII of the city code.

Section 9. This ordinance is effective upon adoption.

Adopted by the city council of the City of Minnetonka, Minnesota, on June 25, 2007.

Janis A. Callison, Mayor

The ~~stricken~~ language is deleted; the underlined language is inserted.

ATTEST:

David E. Maeda, City Clerk

ACTION ON THIS ORDINANCE:

Date of introduction: June 4, 2007
Date of adoption: June 25, 2007
Motion for adoption: Schneider
Seconded by: Wiersum
Voted in favor of: Allendorf, Callison, Ellingson, Schneider, Thomas, Wagner, Wiersum

Voted against:
Abstained:
Absent:
Ordinance adopted.

Date of publication:

CERTIFIED COPY:

I certify that the foregoing is a correct copy of an ordinance adopted by the city council of the City of Minnetonka, Minnesota, at a meeting held on June 25, 2007.

David E. Maeda, City Clerk