VII. B.

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Planning Commission Staff Report

Project Type: Sign Package

Meeting Date: January 9th, 2017

From: Justin Wyse, AICP
Senior Planner

Location: Southwest of the intersection of South Woods Mills Road and Brookings Park Drive (18Q140361, 18Q140370, 18Q140352, 18Q140077).

Applicant: St. Andrews Resources for Seniors System

Description: **Brooking Park Village, Sign Package**: A request for a Sign Package to establish sign criteria for the Brooking Park Village development located southwest of the intersection of South Woods Mills Road and Brookings Park Drive.

PROPOSAL SUMMARY

St. Andrews Resources for Seniors System has submitted a request for a Sign Package for the Brooking Park Village development, which is 26.65 acres in size. In accordance with the Unified Development Code (UDC), if approved the proposed Sign Package would serve as the site specific sign regulations for the development. The Planning and Development Services Division has reviewed the request and submits the following report.

The purpose of a sign package is to provide comprehensive and complementary signage throughout a development. City Code states that "in order to encourage superior design, quality and character, comprehensive sign packages allow for specialized review of signs and flexibility from standard signage requirements." The Sign Package is being requested due to the large size of the site with multiple buildings and addresses.

LAND USE AND ZONING HISTORY OF SUBJECT SITE

A Conditional Use Permit (CUP) was approved on the property for the development of a nursing home and supplemental living quarters of varying levels of care by St. Louis County in 1987. In 1989, an amendment to the CUP was approved to allow for the development of cottages in the place of apartments for 28 of the self-care density units and to limit the number of apartment buildings to three. Structure, parking, and driveway setbacks were also amended at this time. In July of 2008, the City of Chesterfield approved an amendment to the CUP for a revision of the parking setbacks at the southeast corner of the development, and to revise the structure setbacks at the northwest corner of

the development. In May of 2010, the City Council approved a Boundary Adjustment Plat (BAP) to adjust an existing boundary line between Lot 1 and Lot 2. Over the years, the City has administratively reviewed and approved a number of petitions, the last being in May of 2016 for the 10th Amended Site Development Section Plan (ASDSP) for the addition of 27 new parking stalls.

SURROUNDING LAND USE AND ZONING

The land use and zoning for the properties surrounding this parcel are shown in the aerial image in Figure 1 and are described below:

North: North of the site is the St. Luke's Hospital which is currently zoned "MU" Medical-Use District.

South: The properties to the south are located within the Terrace at Woods Mill Cove subdivision, zoned "R-3" Residential District (10,000 square feet) with a "PEU" Planned Environmental Unit.

East: The parcels directly east of the subject site are zoned "R-1" Residence District (15,000 square feet).

West: The parcel to the west is zoned "FPR1A" Flood Plain Residence District which mostly consists of tree preservation areas.

Figure 1: Aerial

SUBMITTAL OVERVIEW

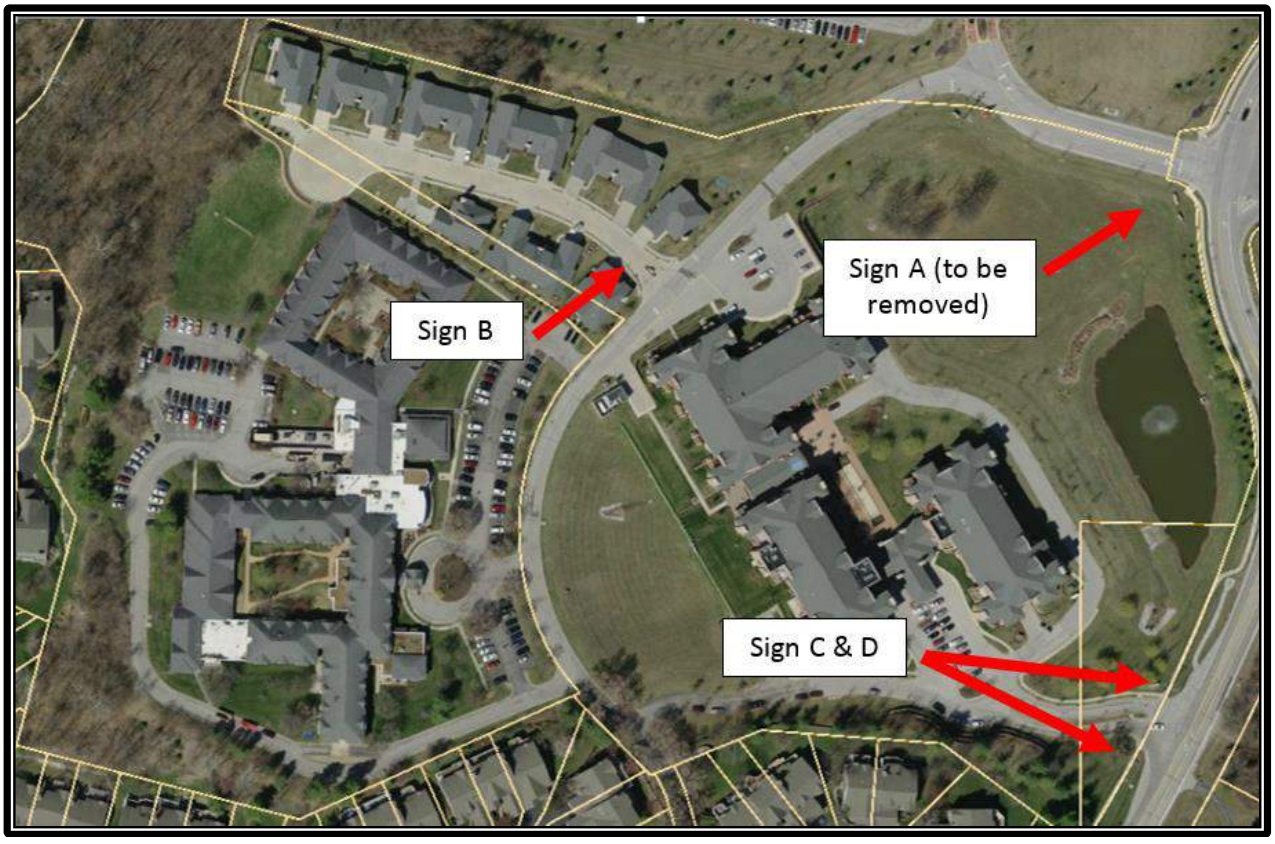
Existing Signs

The site currently has four monuments signs. Locations of the signs and pictures of the existing signs are shown on the next page. The proposal maintains three of the signs (see image on next page for location to be removed).

Sign A

Sign C & D

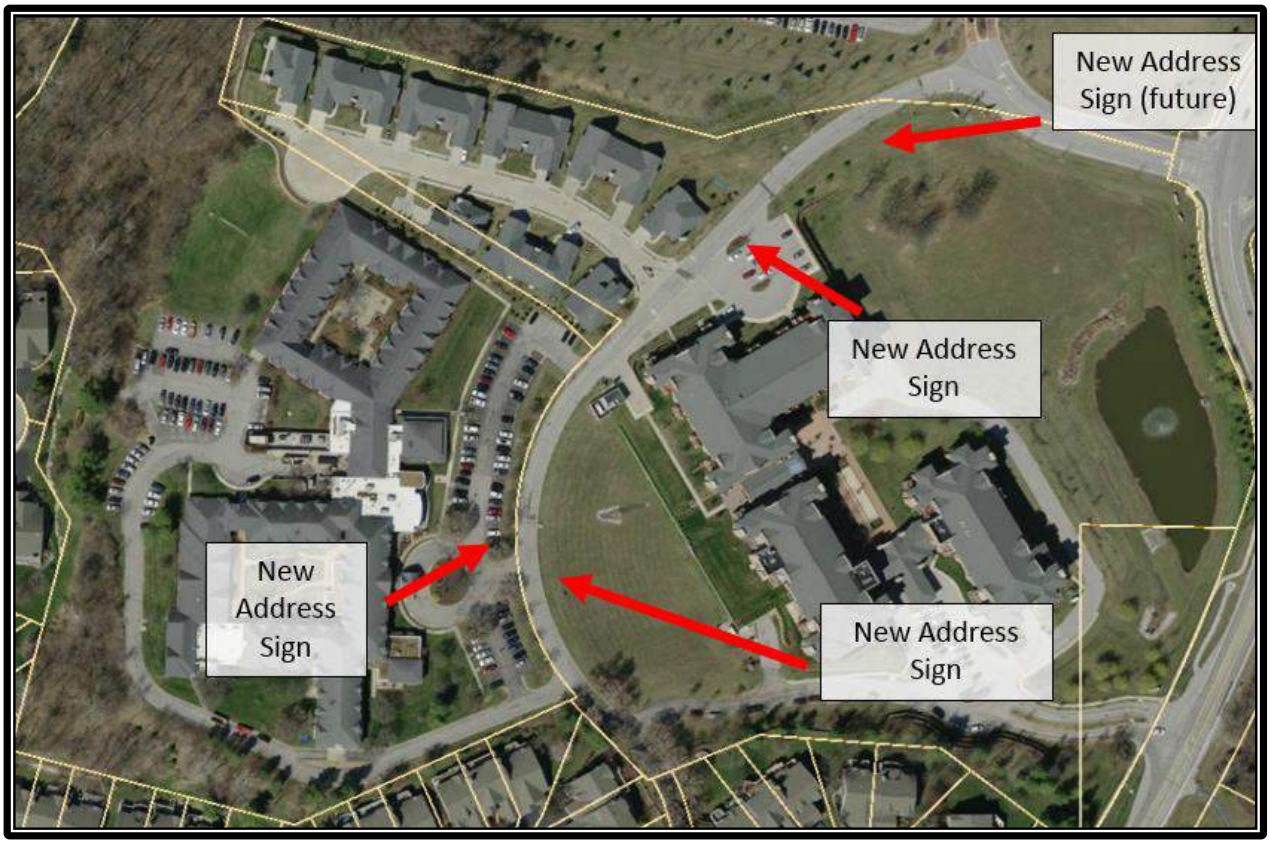
Sign B



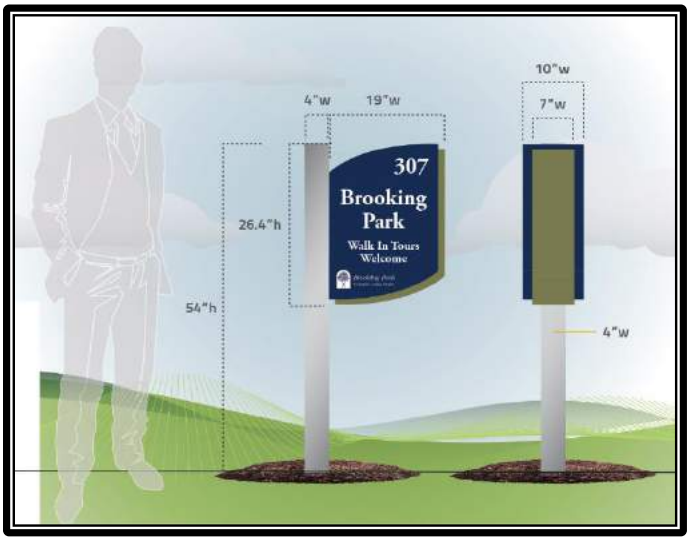
Existing Monument Sign Locations

Proposed Signs

The proposal includes seven new signs for the site. Address signs are proposed at four locations within the development. Three of the signs are for existing buildings. A fourth location is shown for a future building within the site (this building is allowed under the existing Conditional Use Permit). It should be noted that these signs are permitted under the UDC and do not require the flexibility of the sign package process.

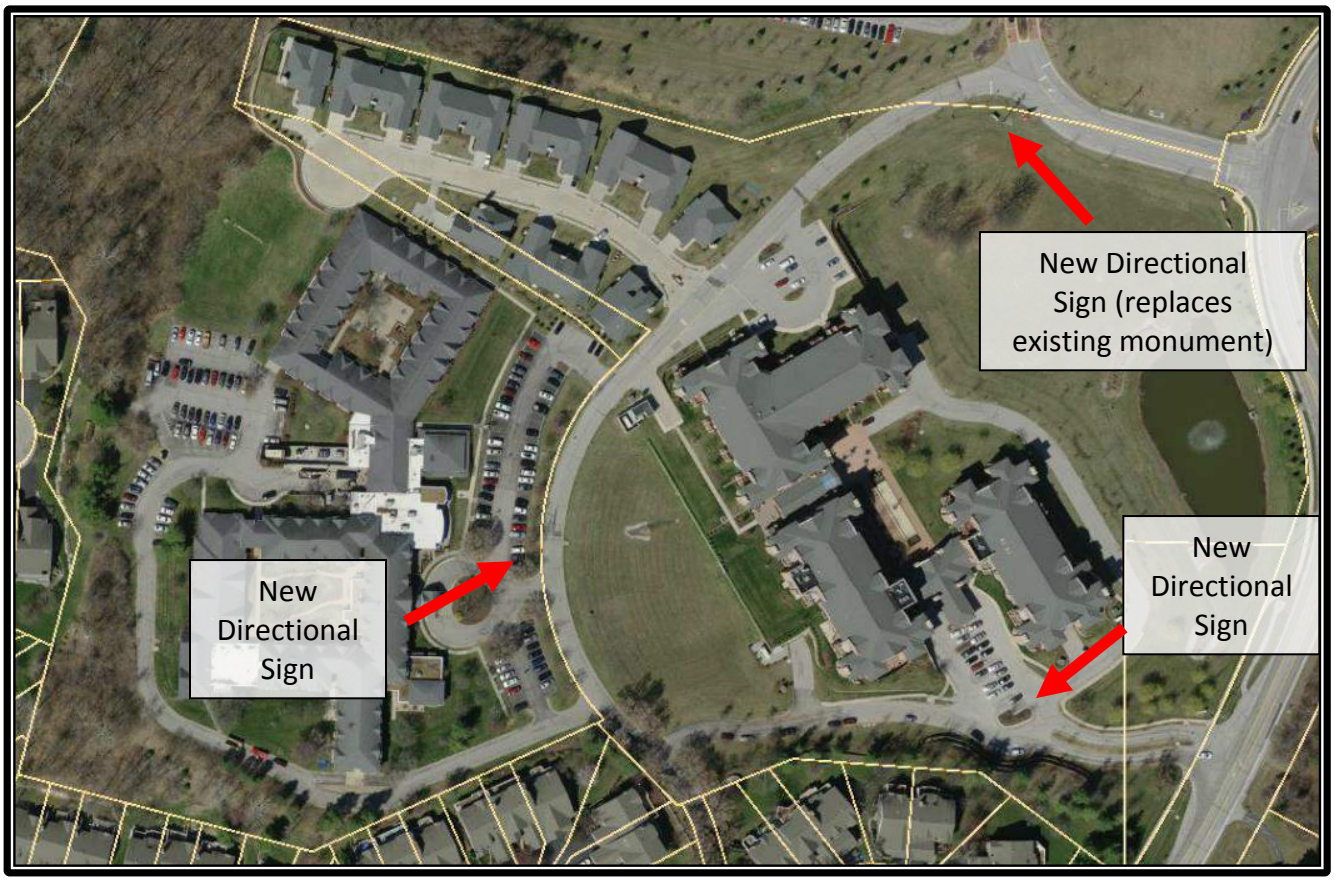


Proposed Address Sign Locations



Proposed Address Signs

The proposal also includes three directional signs. These signs exceed both the maximum height and sign area permitted by the UDC and require the flexibility of the sign package process.

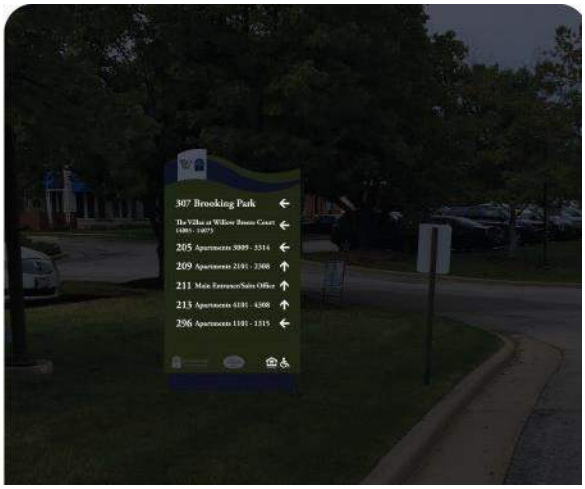


Proposed Directional Sign Locations

Proposed Directional Signs

Proposed Lighting

Both proposed sign types are proposed as internally illuminated lights. This lighting is compliant with the City's UDC.



Renderings of nightime view of new signage

STAFF ANALYSIS

The stated purpose of a sign package is to provide comprehensive and complementary signage throughout a development. City Code states "in order to encourage superior design, quality and character, comprehensive sign packages allow for specialized review of signs and flexibility from standard signage requirements."

The purpose listed above, along with the stated purpose of the sign regulations and policies of the Comprehensive Plan, creates the foundation of the review of the submittal. As listed in the UDC, the purpose of the sign requirements is as follows:

> "The purpose of the sign regulations provided herein are to encourage excellence in design of signs, fostering economic viability of the community, and provide safe and concise directional information designed to facilitate traffic flow. Signs shall be designed so as to protect motorists, bicyclists, and pedestrians from distractions that may cause accidents or other detrimental impacts.
>
> Signs shall not overload the public's capacity to receive information, or cause visual confusion by interfering with pedestrian or vehicular traffic. Signs shall conform to the character of the community, enhance the visual harmony of development, and preserve the public health, convenience, welfare and/or safety within the City of Chesterfield by maintaining the high aesthetic quality of the community. "

In addition to the areas within the code above, there are two specific Plan Policies that have been adopted as part of the Comprehensive Plan.

- **Plan Policy 3.4 Signage Considerations:** Signage along the I-64/US 40 corridor and State Highways should be evaluated in terms of height, size and location while recognizing individual uses' need for identity and visibility.

Brooking Park Village is not required by the Conditional Use Permit to submit a Sign Package; the process is optimal for this large campus. The campus relies on directional signage to help direct various people to the correct location as efficiently as possible. The increased size of the directional signage on a large campus assists emergency personnel when responding to calls.

The signs are all considered directional signs under the City's UDC and are limited to six (6) feet in height and ten (10) square feet in outline area. In order to justify the proposed size of the signs, the applicant has supplied information regarding commonly accepted sign / text signs for legibility. The proposed signs are smaller than the recommended values but the applicant is comfortable with the size given the low speed limit in the area.

STAFF RECOMMENDATION

The Sign Package includes seven (7) new freestanding signs to the site. Under the proposal, no wall signs are included. Staff has reviewed the Sign Package and found the proposal to be consistent with the purpose and intent of the UDC sign regulations and the City of Chesterfield Comprehensive Plan. Staff recommends approval of the proposed Sign Package for Brooking Park Village. Please note, any amendments to the provisions of the approved Sign Package would require Staff review and approval by the Planning Commission.

MOTION

The following options are provided to the Planning Commission for consideration relative to this application:

1) "I move to approve (or deny) the Sign Package for Brooking Park Village.

2) "I move to approve the Sign Package for Brooking Park Village with the following conditions..." (Conditions may be added, eliminated, altered or modified)

Attachments: Proposed Sign Package

CC: Aimee Nassif, Planning and Development Services Director

St. Andrew's Resources for Seniors
The Willows/ The Willows @ Brooking Park
Sign Package Application

Introduction:

St. Andrews's vision is a society where all elders are respected, productive, secure, and fulfilled. Where their mission is to empower elders and their caregivers through choices and options that foster a vital life. Additionally, the core philosophy is to honor each person's uniqueness and dignity and believe our mission will bring vitality throughout the life of elders.

St. Andrews understands our society's elder service system is complex and remains committed to our skill of providing the most appropriate choices and options in service and support that will bring confidence and peace of mind to those they serve. With a commitment of being on the "cutting edge" in innovative, holistic programs and services that are quality driven, ethical, cost-efficient and elder centered.

St. Andrew's is committed to their faith based tradition of service which inspires them to honor commitments and to the best ability serve regardless of religious affiliation or ability to pay. St Andrew's Brooking Park campus offers residential care to meet the needs of every individual resident. The underlying business or mission of the Willows is a part of St. Andrew's and began with Brooking Park. As our community needs evolved in regards to our age, St. Andrew's created facilities to accommodate these needs.

The Willows at Brooking Park is sponsored by St. Andrew's Resources for Seniors System, a not for profit, faith-based organization dedicated to making life easier *senior* adults and their families. Brooking Park is a premier senior community, offering Assisted Living, Memory Care, Skilled Nursing Care, and Medicare Rehabilitation Services. Brooking Park is renowned for its gracious environment, person-centered care and exemplary amenities and services

In response to community needs, The Willows at Brooking Park developed several unique and separate communities on property that include individual Villas and apartment homes.

The Villas provide a prestigious, independent lifestyle for some retirees that wish to independently live in their own home. These Villas offer a choice between a single-story or a story-and-a-half home, designed for the comforts of "aging in place" - with wider doorways and hallways, lower countertops, lever door handles, and maintenance-free exterior and landscaping. Homes are pre-wired for Internet and designed for excellent lighting throughout the living areas, storage areas, and two-car garage.

Also on campus are several buildings that provide Apartment Homes with luxury living for retirees. The Willows currently has apartment homes, featuring a variety of beautiful styles and floor plans. These varieties of apartment sizes and styles are purposefully designed to provide quest options for each lifestyle. Apartments have terraces and walk-outs for relaxation or entertaining, which includes shared campus faculties for relaxation and exercise.

Sign Package Submittal

Over time Brooking Park has developed new communities on their property which in turn had evolved into a well landscaped campus comprising of three distinct communities. The first and oldest is Brooking Park, second are the Villas and last are multi-storied apartment buildings. Each community and buildings within the communities have unique postal addresses and entries separate from the others. The overall architectural theme of the Villas and apartment buildings is to create a humble and residential feel. This style and approach to building design creates private entries located away from public access roads which in turns fosters a sense of privacy and community. Because the architectural design fosters a sense of privacy, many quest and visitors have difficulties locating their destinations and often enter into the wrong buildings or are forced to drive around until they find their destinations.

Additionally, the campus provides sidewalks and garden areas for residences and adjoining property owners to freely enjoy while exercising. The combination of people walking and driver confusion is creating unsafe conditions. In addition, public emergency services may have difficulties locating their destination, which is also a safety concern.

The intent and purpose of the proposed signs are to provide elegant and comprehensive directions to buildings and administrative offices for visitors, community guest and public safety services. Proposed signs shall be located to provide visual assistance and then integrated into site architecture with landscaping.

All tenants, businesses, owners within the development shall receive a copy of the Comprehensive Sign Package from the owner at the time of sale / lease. All signage within the development shall be in conformance with this Comprehensive Sign Package. Additionally, any signage not specifically identified in the Comprehensive Sign Package shall conform to Section 04-05 of the Unified Development Code.

Two complementary signs types and designs are proposed. The first type is a directional sign which will provide clear and consistent directions. Two directional signs are located at entry points into the Willows while a third sign is located within the property nearest main office.

The second type of sign proposed are smaller address signs mounted on a small pole that identify building entries and addresses. Additionally, these signs are smaller, more intimate in scale so that the design is consistent with the architecture. Four address signs are currently proposed along the interior private drive while a future address sign is identified on the site plan.

Detailed information of each proposed sign type is provided by Summit Signs + Graphics. These details include elevations, graphic design, colors and proposed wording for review. In respects to the font or lettering size, Summit Signs + Graphics used standards established by United States Sign Council, which are included in this package for your review. Additionally each sign shall be internally luminated and will conform to Section 04.03 of the UDC

City of Chesterfield UDC/ Zoning Requirements

The City of Chesterfield UDC that is applicable to the proposed signs is Sec. 04-05. SIGN REQUIREMENTS, E. Sign Regulations -Area and Height Computations, sub-section 4.4a which reads: "Directional signs shall not exceed ten (10) square feet in outline area per facing. Freestanding directional signs shall not extend more than six (6) feet above the elevation of the adjacent street or elevation of the average existing finished grade at the base of the sign, whichever is higher"

Proposed Directional Sign

The directional signs are designed in size and shape as a 'Free Standing Business Sign," however the purpose of the signs is to provide direction to each community instead of advertisement. Because of the unique shape the property and surrounding public roadways, the proposed signs are located at major entry points or intersections into the Willows.

Directional Signs are designed with public safety as first concern while accommodating each unique community. The font of each number and address is sized according to the United States Sign Council (USSC) and Gemini Incorporated. These standards better insure legibility while operating vehicles at specified speeds to better reduce driver distractions. The letter sized was determined to be 2.5 inches, which is smaller than what the industry recommends, however, Summit Signs feel confident that the copy will be legible from a driving speed of 20 MPH or less. Copy of this standards is included for your review.

Reduction of the proposed signs will have an adverse impact on the community because the directional signs are proposed to reduce driver confusion and assist first responders. Directional signs are not used for general business advertisement.

Two Directional Signs are located along a public street and located at major intersections. The first is located at Old Woods Mill Road and Brooking Park Drive and the second nearest St. Luke's Hospital entry Brooking Park Drive. The first sign serves to provide general directions to each community while the second serves to provide distinction from St. Luke's hospital and the Willow.

A third Direction Sign is located along Brooking Park Drive, on private property and +/-200 feet from the Old Woods Mill Road. This sign serves to accommodate the visual needs of drivers while on campus.

Directional Signs design integrates the overall theme or community brand image through repetition of community logos, lettering fonts, colors and landscape. In order to eliminate visual confusion and maintain the aesthetic integrity of Chesterfield each directional sign is located to best serve community visitors while respecting views from public areas. For example, the signs are located at key entry points and major sections to assist drivers in reaching their destinations. Then each sign is landscaped to enhance the aesthetic value and provide seasonal color.

Proposed sign is 87" tall (7'-3") x 48" (4'-0") wide, double sides free standing sign with landscape. Sign area on both sides is 29 square feet. As you know the proposed signs are fifteen inches taller than allowed by the UDC and there are multiple reasons for these deviations between the permitted and proposed sign area.

First, as you know, is the Willows evolved from Brooking Park into a campus with multiple retirement and housing communities as a response to changes in needs for senior housing. This in turn complicated and created multiple addresses. The development of multiple communities created corresponding postal addresses. This in turn is causing quest and visitors, who are not familiar with the campus, to become confused and disorientated while driving and then, creating unsafe conditions. These unsafe conditions can be contributed to driver confusion as they are distracted from the road while searching for building address. With many residences walking about the campus including adjoining neighborhoods, driver confusion can have an adverse affect on pedestrian and public safety.

- Currently, the newly developed campus lacks building signage on each building façade for identification. The exceptions to this statement are address numbers above each building entrance required by US Postal services. Additionally, each building entrance is recessed into the buildings as a function of architectural design. Due to the lack of signage, it is difficult for guest and visitors to locate their destination.

- Proposed Direction Signs will better identify the Willow's communities from adjoining developments while providing clear and simple way-finding. These communities and or buildings are:
-
    - 307 Brooking Park (Main Entrance/ Tours Welcomed)
    - 211 Willows (Main Entrance/ Tours Welcomed)
    - The Villas at Willows Breeze Court
    - 205 , 207 South Woods Mill Road
    - 207, 213 South Woods Mill Road
    - Future building (not shown on sign)

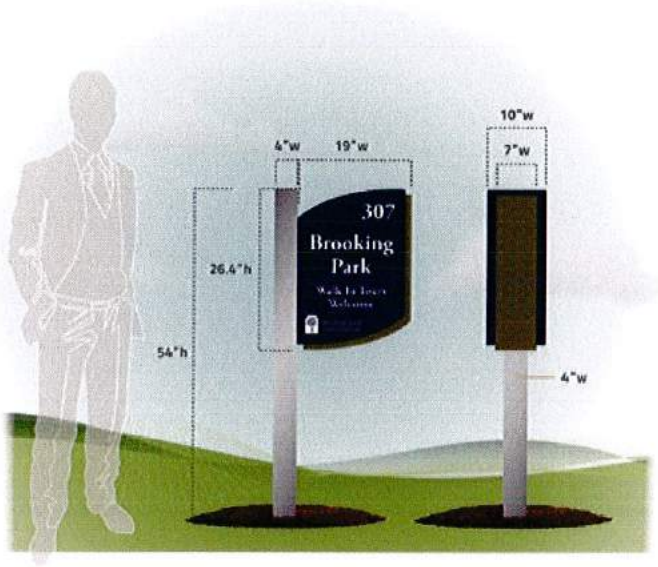
- Each directional sign letter height for The Willows at Brooking Park campus has been designed by Summit Signs according to the United States Sign Council (USSC) and Gemini Incorporated. The minimum required letter height from a viewing distance of 100 feet is 4 inches. The letter height on the directionals is 2.5 inches, which is smaller than what the industry recommends, however Summit Signs feel confident that the copy will be legible from a driving speed of 20 MPH or less. Due to the complexity of the campus, all of the information on the directional signs is necessary to provide clear and accurate directions for visitors. Motorists will then be able to navigate through the campus safely while driving the proper speed limit.

- The proposed directions assist EMS or first responders in providing medical attention when needed.

Address Signs:

Address signs are not specifically identified in the current UDC, however are consistent with other signs permissible in the UDC such as identification signs. The primary difference is that these signs are located to be viewed from the interior private drive (Brooking Park Drive) and identify specific building address and entries. Proposed address sign is 54" (4'-6") 4" square post. Attached address marker is 19" (1'-7") wide by 26.4" (2'-3")

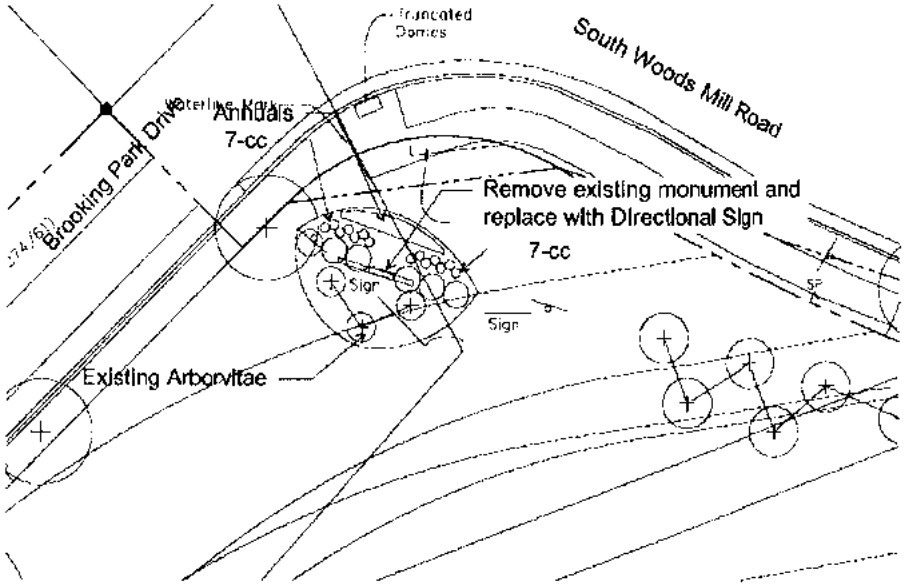
Address signs are designed to maintain residential character of the Willows, mimic the directional design character and consistency the architectural design influences. Each address sign is situated within existing landscape gardens and will receive additional plantings to enhance the landscape.



Address Sign

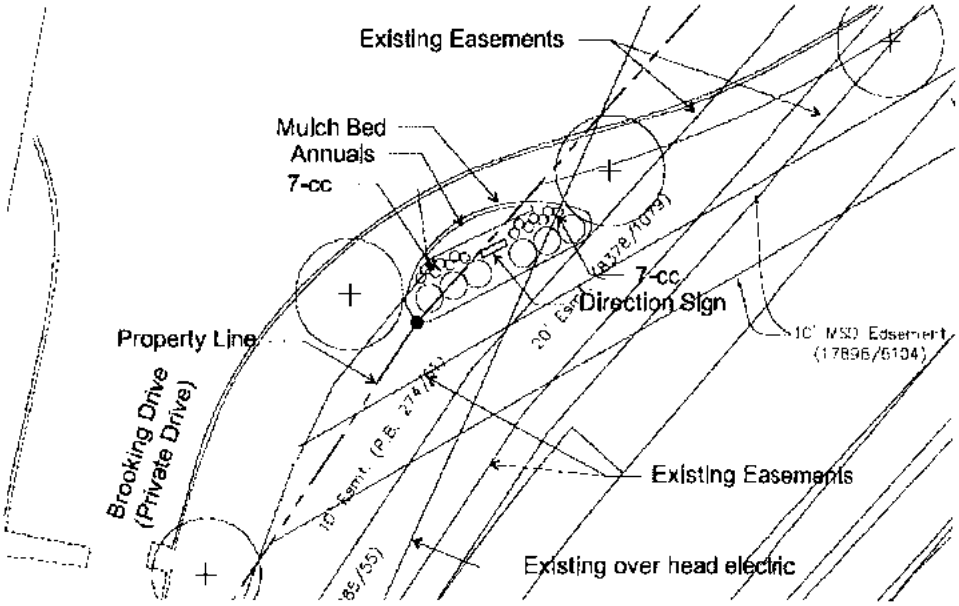
Landscape Plantings

Each new monument will be landscaped. The following landscape plans detail each monument's proposed planting plans.



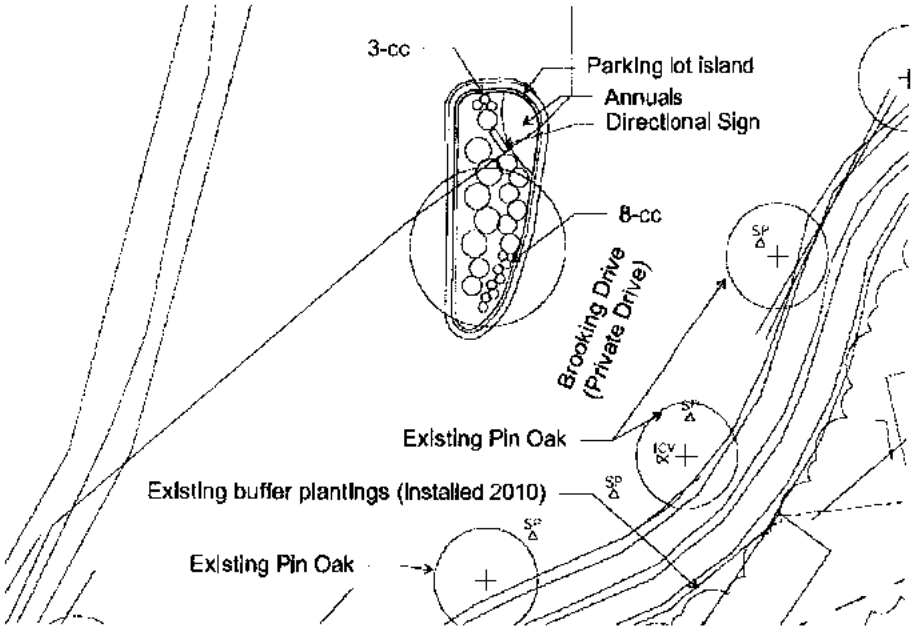
A Proposed Direction Sign
South Woods Mill Road

0 20' 40'
Scale: 1:20



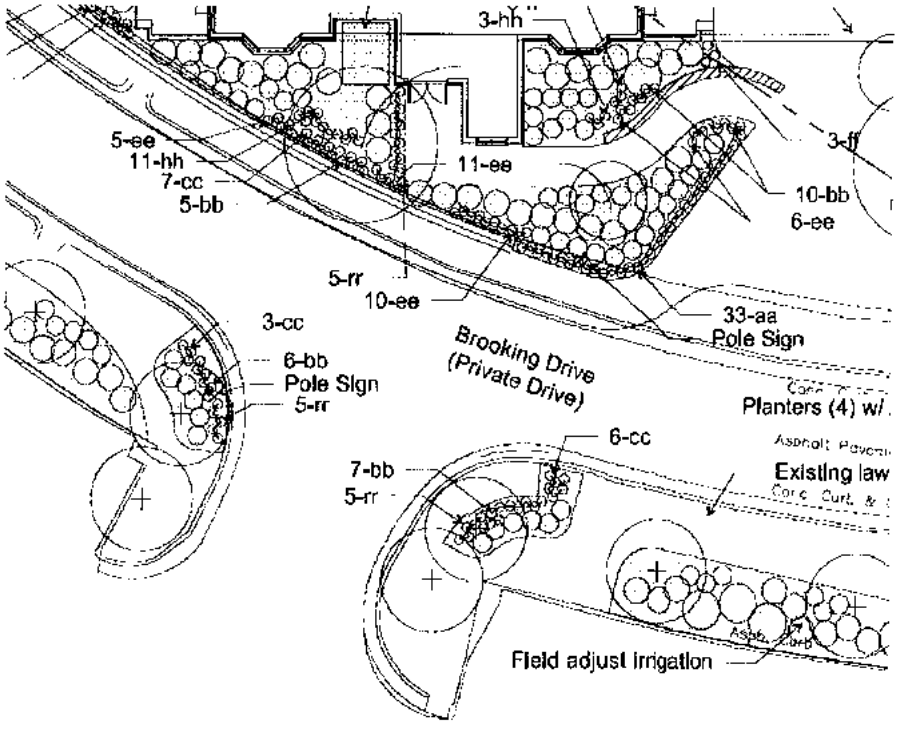
B Proposed Direction Sign @
Brooking Park Drive

0 20' 40'
Scale: 1:20



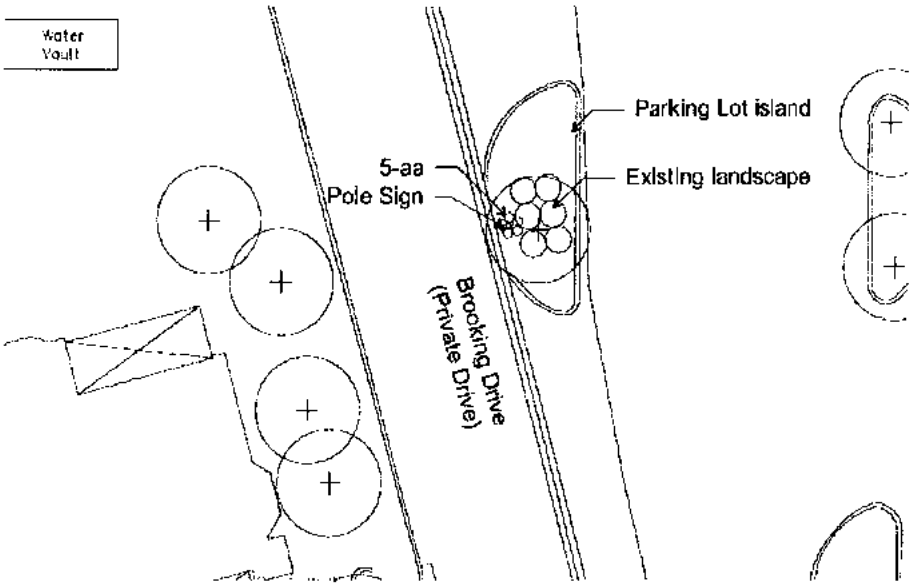
C Proposed Direction Sign @ Main Entry Parking Lot

0 20' 40'
Scale: 1:20

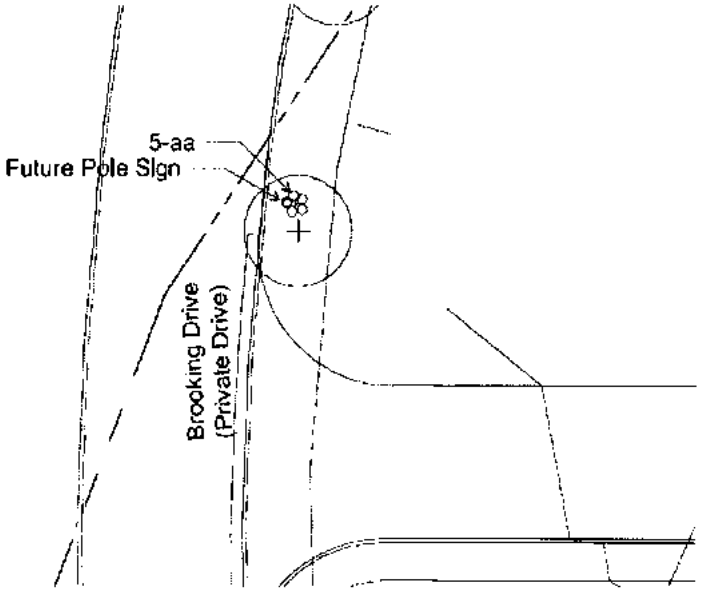


D Pole sign @ Building A and Brooking Park

0 20' 40'
Scale: 1:20



E Pole Sign @ Building C



F Future Pole sign

Plantings at the signs will be consistent with the existing landscape gardens at the Willows. Proposed plantings will consist of the following:

Landscape Planting Schedule -Partial		
Key	Common Name	Botanical Name
A	Red Maple	Acer rubrum 'Red Sunset'
B	Sugar Maple	Acer saccharum 'October Glory'
C	Redbud	Cercis canadensis
D	Arborvitae	Thuja occidentalis 'Green Giant'
E	Upright Hornbeam	Carpinus betulus 'Fastigiata
F	Weeping Dwarf Cherry	Prunus sp. (to be determined)
L	Honey Locust	to match exisitng
a	Boxwood	Buxus 'Winter Gem'
d	Hydrangea	Hydrangea paniculata 'Little Lamb'
e	Spirea	Spiraea x bumalda 'Anthony Waterer'
g	Amethyst	Callicarpa dichotoma 'Early Amethyst'
h	Hibiscus	Hibiscus 'Kopper King'
m	Lilac	Syringa vulgaris 'Miss Kim'
n	Drift Rose	Rosa spp. 'Coral Drift'
r	Drop Seed	Sporobolus heterolepis
s	Red Switch Grass	Panicum virgatum 'Shenandoah'
t	Reed Grass	Calamagrostis x acutiflora 'Overdam'
u	Golden Euonymus	Euonymus japonicus 'Aureo-marginatus'
aa	Variegated Liriope	Liriope muscari 'Variegata'
bb	White Veronica	Veronica spicata 'Icicle'
cc	Purple Veronica	Veronica 'Sunny Border Blue'
ee	Purple Cone Flower	Echinacea purpurea 'Kim's Knee High'
hh	Iris	Iris ensata 'Royal Robes'
rr	Aster	Symphyotrichum novae-angliae 'Purple Dome'

Existing Monuments:

The Willows community currently has four brick monuments with raised lettering. Two are located at entry points into the site along Brooking Park Drive from South Woods Mill Road. A smaller monument sign is located at the entry to the 'Villas' along Brooking Park Drive and not visible from the public right of way. The community also has a monument sign located at South Woods Mill Road and Brooking Park Drive which will be removed and replaced with a direction sign. See below for images of each existing monument sign.

Monument A (to be removed)
Monument @ South Woods Mill Road and Brooking Park Drive
(Monument Size +/-5'-2" x 12'-0")

FRONT

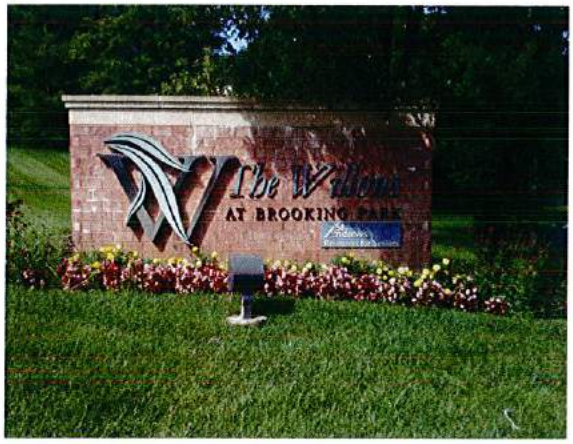
REAR

Monument B
Entry located along @ Brooking Park Drive (North)
(Monument Size +/-5'-10" x 12'-0")

FRONT

REAR

Monument C
Entry located along @ Brooking Park Drive (South)
(Monument Size +/-5'-10" x 12'-0")



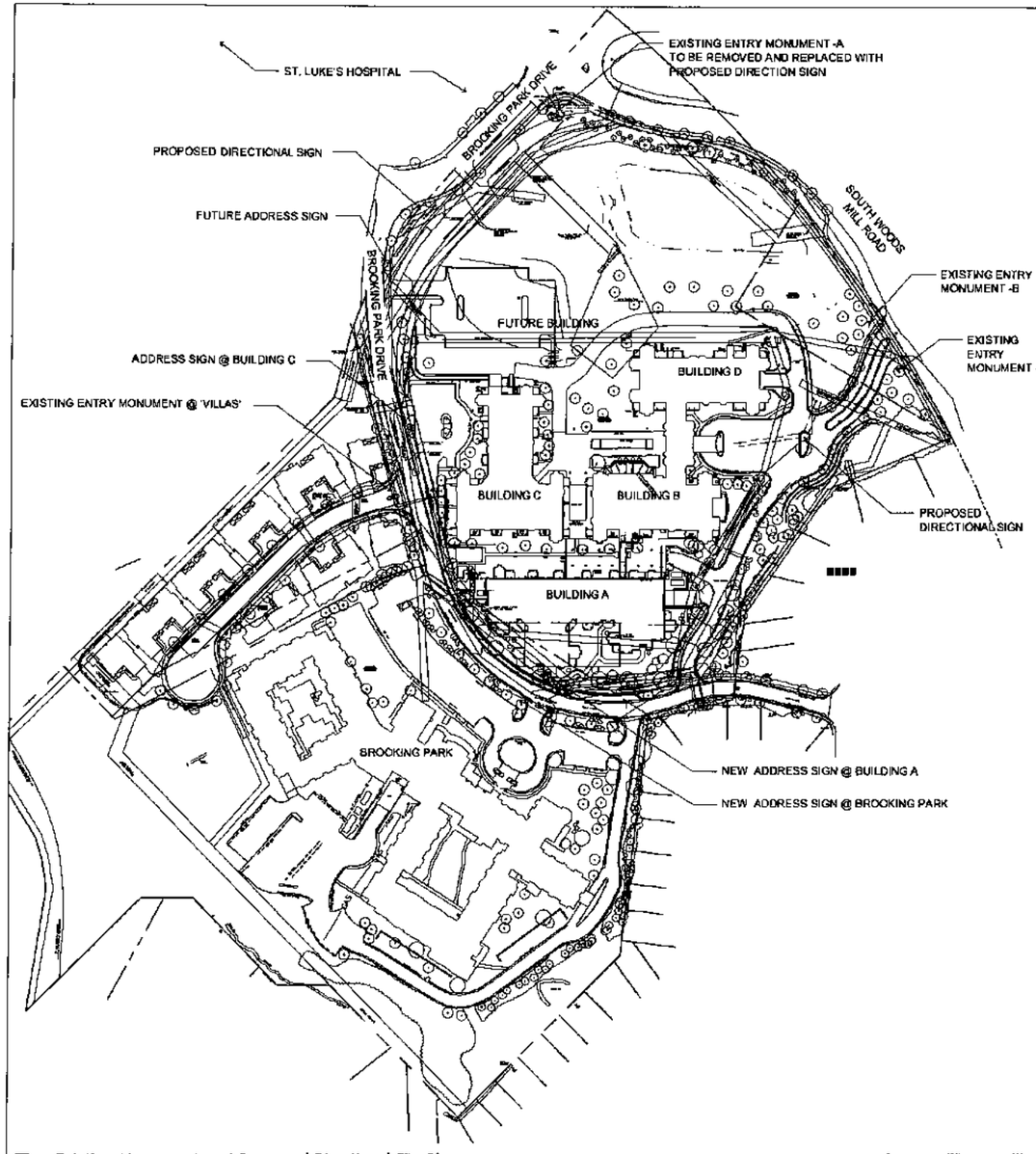
FRONT

REAR

Monument D
Entry Monument at Brooking Park Drive into the 'Villas'
(Monument Size: +/-6'-0" x 4'-8")

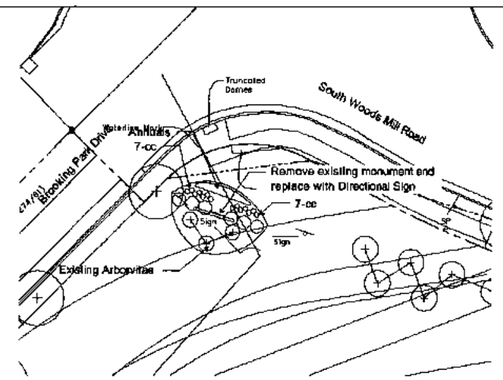
FRONT

REAR



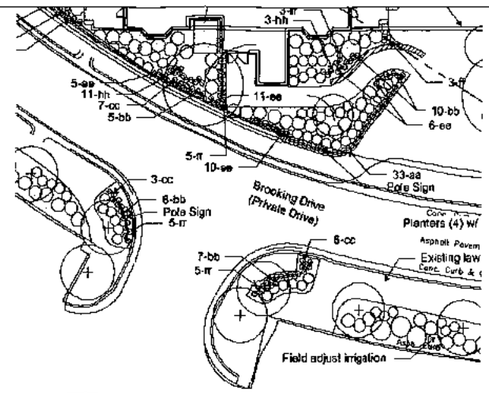
1 Existing Monument and Proposed Directional Site Plan

Scale: 1:100



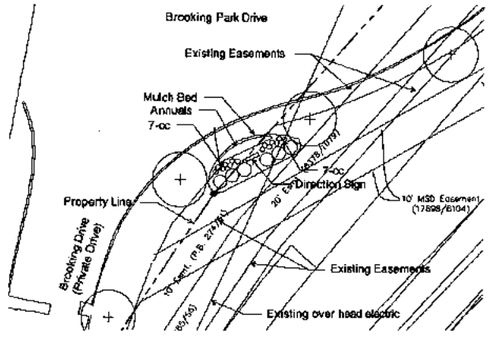
A Proposed Direction Sign
South Woods Mill Road

Scale: 1:20



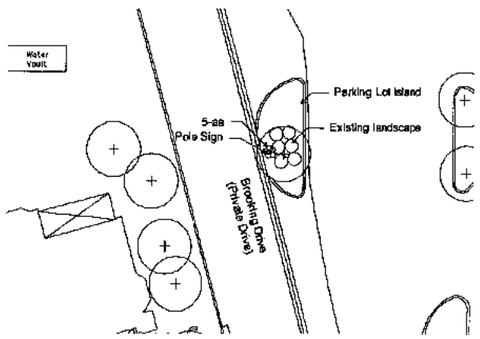
D Pole sign @ Building A and
Brooking Park

Scale: 1:20



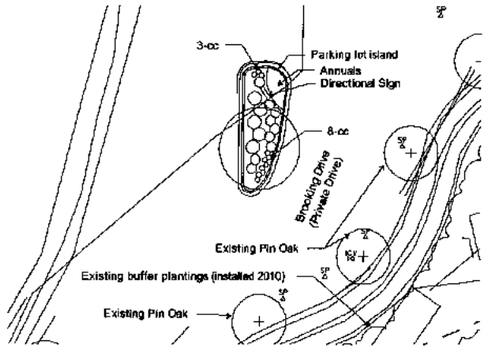
B Proposed Direction Sign @
Brooking Park Drive

Scale: 1:20



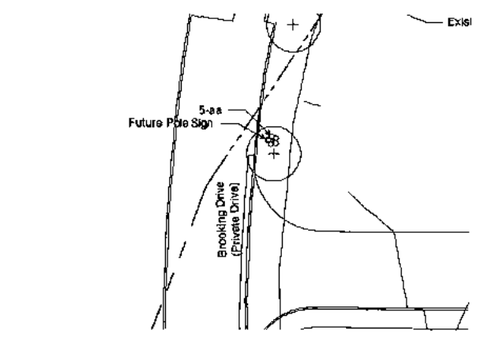
E Pole Sign @ Building C

Scale: 1:20



C Proposed Direction Sign @
Main Entry Parking Lot

Scale: 1:20



F Future Pole sign

Scale: 1:20

DERMODY & ASSOCIATES
LANDSCAPE ARCHITECTS
ph: 314.205.8871
Missouri Certificate of Authority
#2009002208

Architect:
etegra
Envision. Enhance. Evolve.

Civil Engineer:
CEDC
CIVIL ENGINEERING
DESIGN CONSULTANTS

BROOKING PARK
SIGNAGE SITE PLAN

The Willows
at Brookings Park
207 S. Woods Mill Rd.
Chesterfield, MO

Revisions:

No	Description	Date
1	City Comments	11/2/2016
2	City Comments	12/12/2016

Issue Date: September 13, 2016
Drawn by: EMD
Checked By: RM

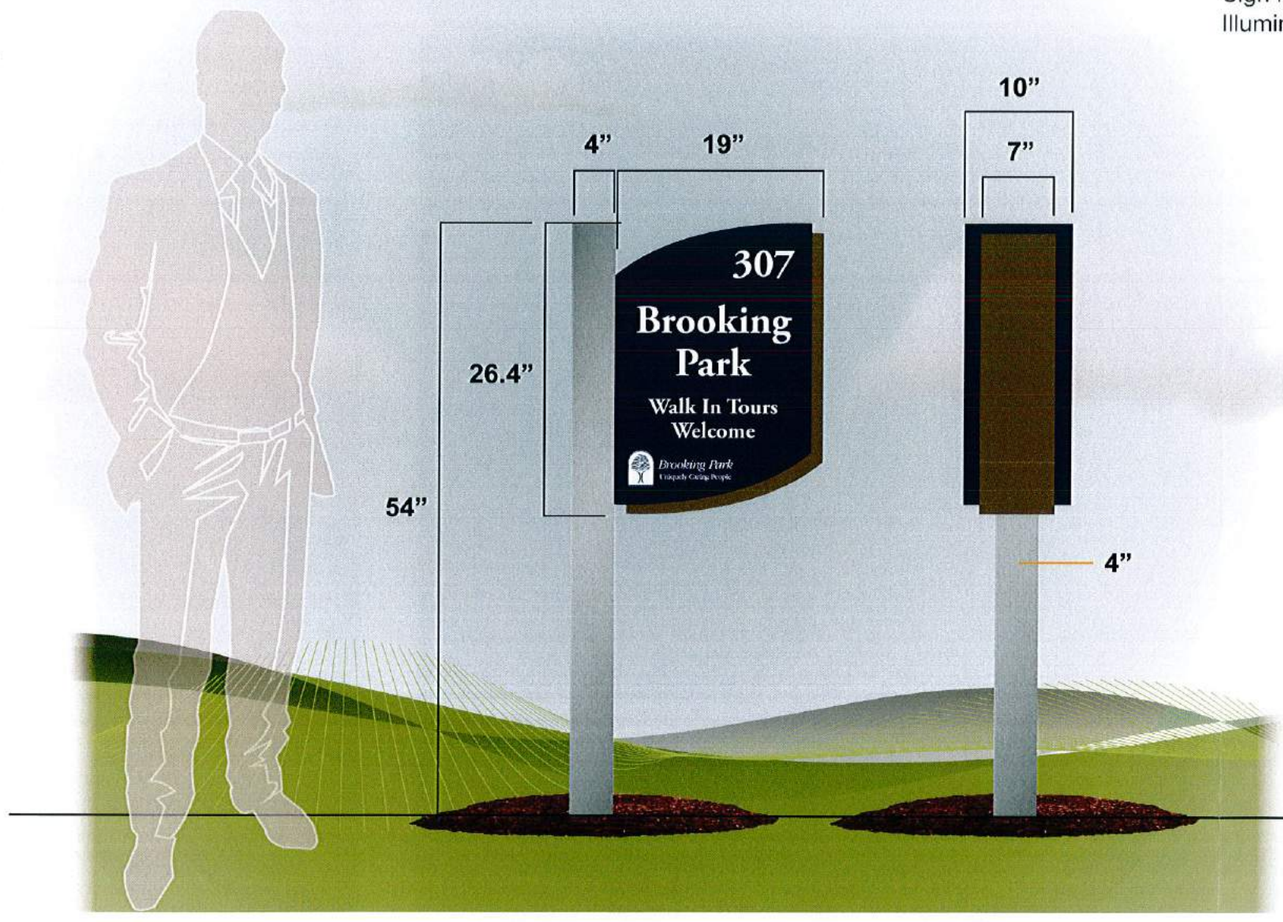
Sheet Title
Sign Package Plan

Project Number: 552.001-01

SP-1.0

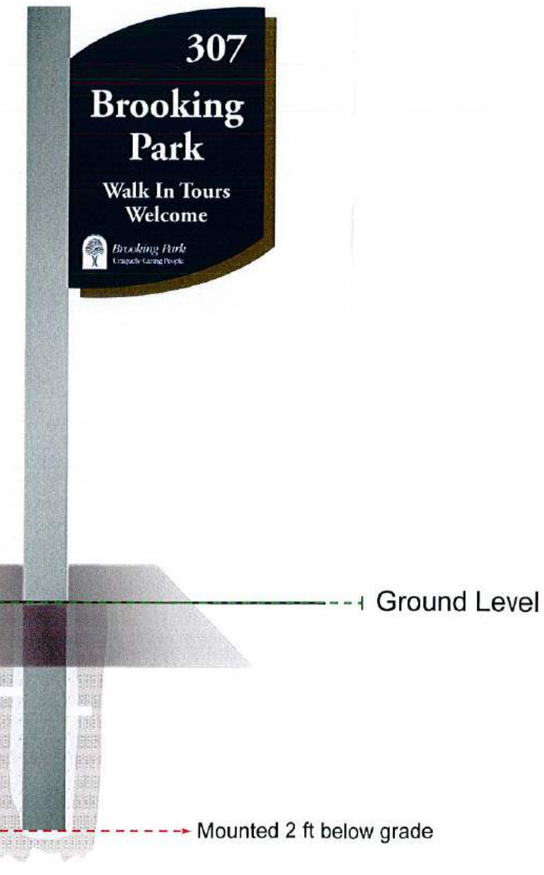
Address Sign

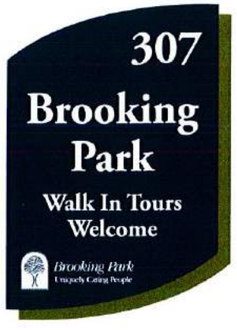
Internally Illuminated Signs, Double-Sided

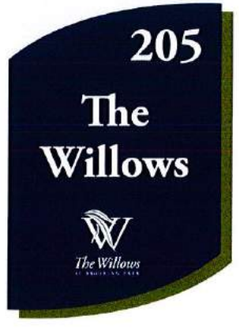


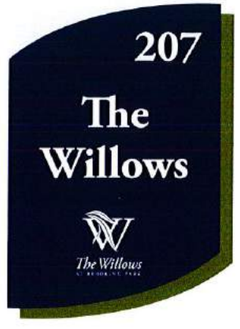
Material Specifications

Internally Illuminated Signage, Double-sided
Aluminum cabinet, 2 dimensions, painted to match PMS colors
Faces are custom routed, text routed & removed, backed with white acrylic
Logos at bottom of sign will be masked & painted or RTA white vinyl
Sign is connected to an aluminum square pole, 4" width x 5.5" depth
Illuminated with white LEDs, sign is mounted approx. 2 ft below grade









Color Details

SUMMIT SIGN + GRAPHICS
330 Southport Drive I Columbia, IL 62236
P 618.281.2639 | F 618.281.8703
summitsignandgraphics.com

Contacts
andy@summitsignandgraphics.com
jillian@summitsignandgraphics.com

Drawn by: Jillian Woosley

Sign Package

Project: Sign Package-Permit Drawing
Client: The Willows
Contact: Heather Finkelston
Date: 11/2/16
Revision: 11/17/16

ATTENTION:

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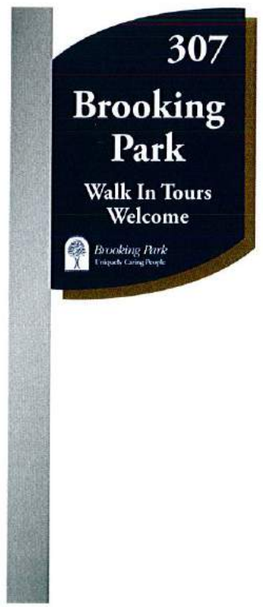
Address Sign



Sign Placement

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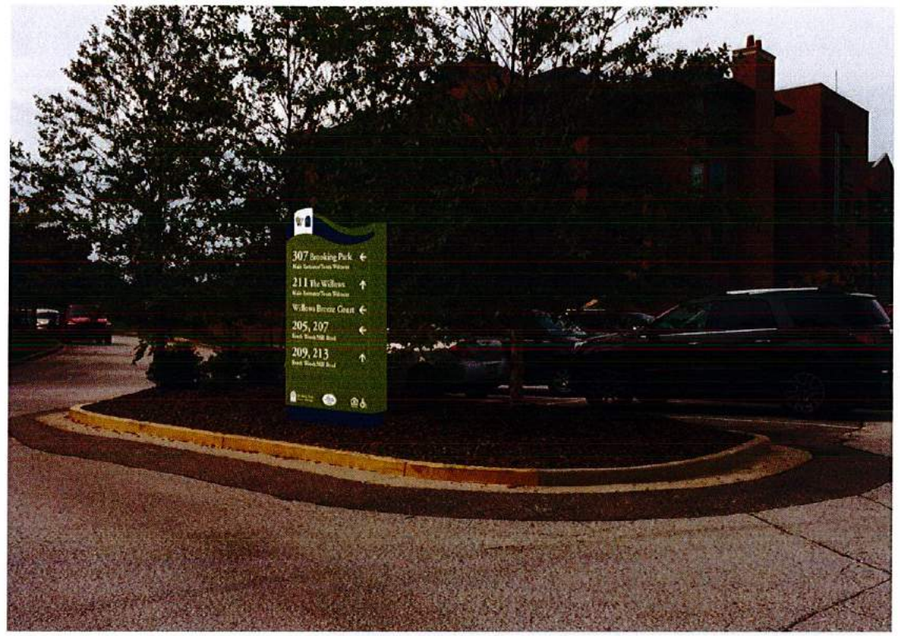
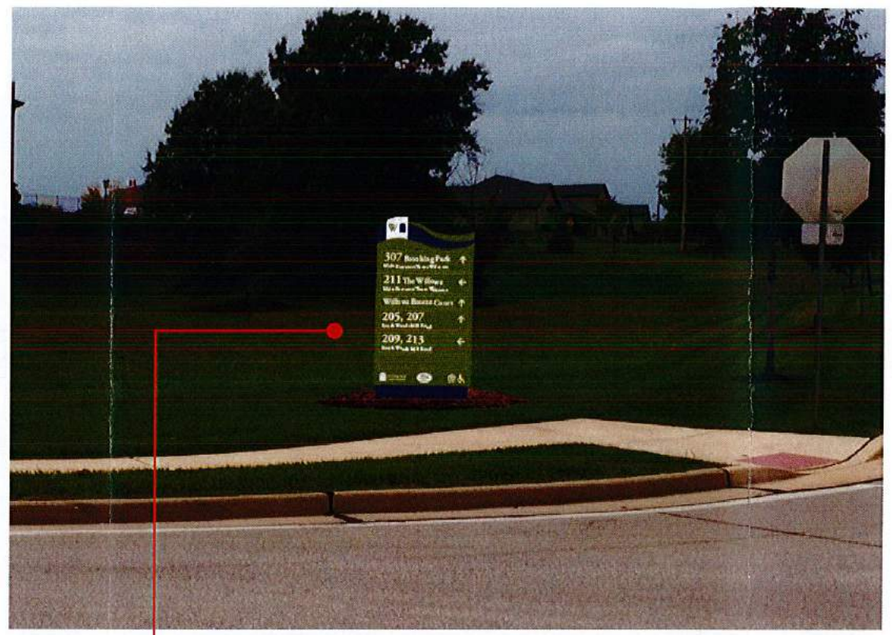
Directional Sign

Sign Locations

Sign 1



Sign 2



Sign 3

To replace existing monument sign

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Directional Sign

Sign Placement

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Directional Sign

Illuminated Directional Signs, Double-Sided

Material Specifications

Custom Aluminum Cabinet, Double-Sided, painted to match PMS colors
Aluminum panels mounted to cabinet face, backed with White Translucent Acrylic
Illuminated with White LED lights, sign is pole mounted into the ground

Color Details

PMS 2307 C

PMS 2119 C

White

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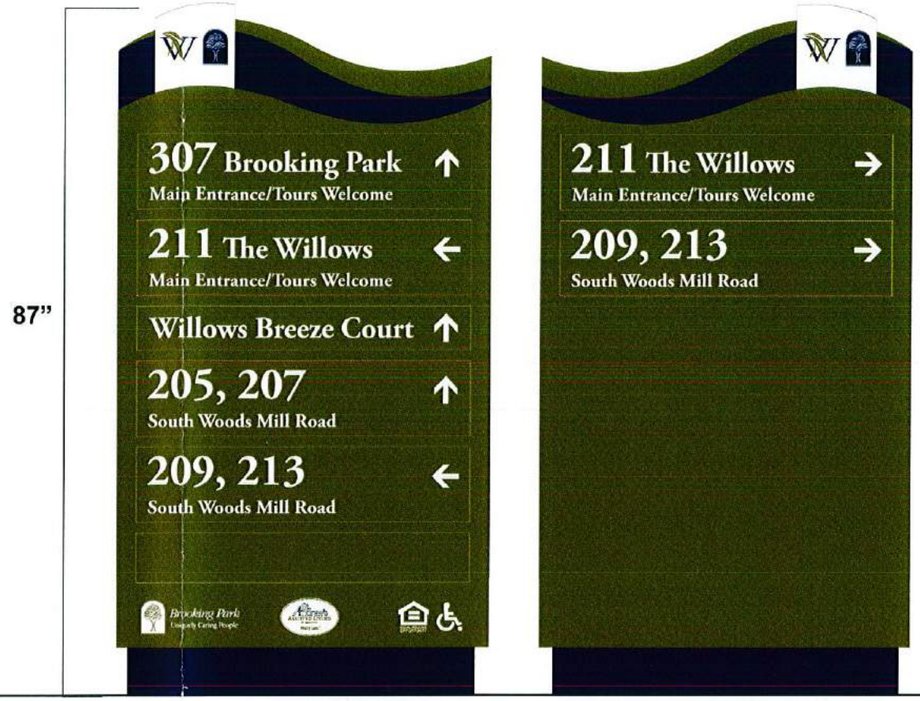
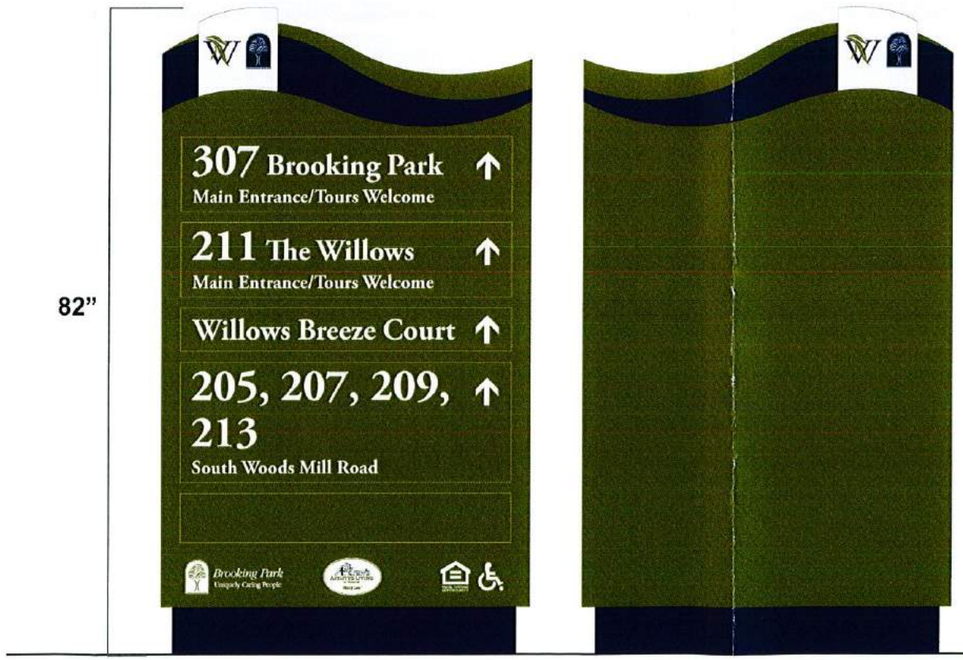
Directional Sign

Sign 1

Sign 2



Sign 3



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Sign Legibility Rules Of Thumb

UNITED STATES SIGN COUNCIL

SIGN LEGIBILITY

By Andrew Bertucci, United States Sign Council

Since 1996, the United States Sign Council (USSC) and its research arm, the United States Sign Council Foundation (USSCF) have funded an extensive array of studies into the legibility of on-premise signs and the manner in which motorists react to these signs in various roadside environments. Because of these ground breaking studies, it is now possible to determine, with a degree of certainty, the size of letters as well as the size of signs necessary to ensure motorist legibility. Most of this work has been synthesized in the current USSC publication entitled ***USSC Best Practices Standards for On-Premise Signs***, which details methods for ascertaining sign size, legibility, and height for on-premise signs that are directly in view of a motorist approaching the sign. In addition, a study completed in 2006 and entitled ***On-Premise Signs, Determination of Parallel Sign Legibility and Letter Heights*** now provides similar methods for ascertaining legibility factors for signs not directly in view, such as wall mount building signs usually parallel to a motorist's viewpoint.

The USSC Best Practices Standards and the parallel sign study offer relatively detailed analysis of the legibility factors involved with on-premise signs, and certainly should be utilized whenever such analysis is warranted. A number of equally useful generalizations, or time-saving rules-of-thumb based on the studies, however, can be applied to arrive at results which reflect legibility values which can be used as a general average applicable to most conditions. These are detailed below.

On Premise Sign Legibility Simplified Rules Of Thumb

How Motorists React To Signs In The Roadside Environment

Detecting and reading a roadside on-premise sign by a motorist involves a complex series of sequentially occurring events, both mental and physical. They include message detection and processing, intervals of eye and/or head movement alternating between the sign and the road environment, and finally, active maneuvering of the vehicle (such as lane changes, deceleration, and turning into a destination) as required in response to the stimulus provided by the sign.

Complicating this process is the dynamic of the viewing task, itself, involving the detection of a sign through the relatively constricted view provided by the windshield of a rapidly moving vehicle, with the distance between the motorist and the sign quickly diminishing. At 40 miles per hour, for example, the rate at which the viewing distance decreases is 58

feet per second, and at 60 miles per hour, it becomes an impressive 88 feet per second. Further complicating the process is the relative position of the sign to the eye of the motorist, whether directly in his/her field of view (perpendicular orientation), or off to the side and turned essentially parallel to the motorist's field of view (parallel orientation).

Research has now been able to quantify the viewing process and set a viewing time frame or viewing window of opportunity for both types of sign orientation. In the case of signs perpendicular to the motorist, this time frame is measured as Viewer Reaction Time (VRT), or the time frame necessary for a motorist traveling at a specific rate of speed to detect, read, and react to a sign within his/her direct field of vision with an appropriate driving maneuver. The driving maneuver itself can entail a number of mental and physical reactions, usually involving signaling, lane changes, acceleration and/or deceleration, and finally, a turn into the site of the sign.

In the case of signs parallel to the motorist's view, detecting and reading a sign is generally restricted to quick sideways glances as the sign is approached and the angle of view becomes more constricted. Because of this, the VRT involving these signs is, at best, necessarily compromised. Compensation for this reduction in the time frame involved in detecting and reading parallel signs is made through increases in letter height and size designed to facilitate rapid glance legibility. It must be understood however, that the parallel orientation will always present legibility problems, and in many cases, even if the sign is detected and read, sufficient time for a motorist to complete a driving maneuver in response to the sign may not be available.

Perpendicular Signs

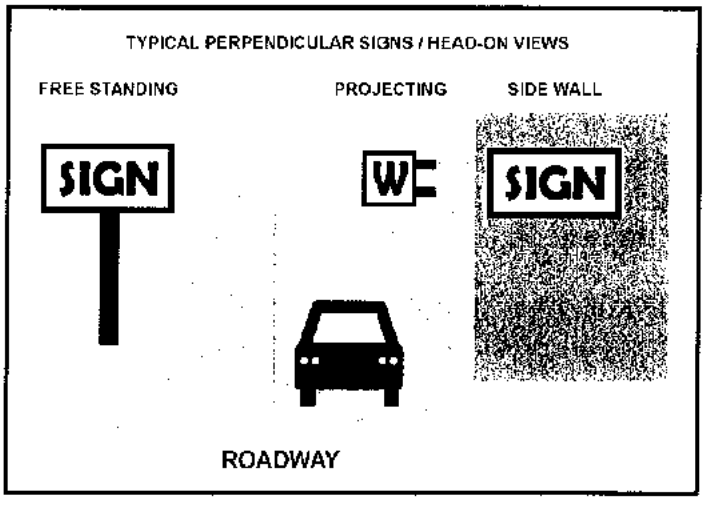


Figure 1. Perpendicular Sign Types

Perpendicular signs include most free standing signs, projecting signs, and, in some cases, flat wall signs placed on building walls that directly face on-coming traffic. (see figure 1). These signs are generally placed close to property lines and fall into the motorist's so-called "cone of vision", which is a view down the road encompassing ten degrees to the right or left of the eye, or twenty degrees total view angle. Signs falling within this cone can usually be viewed comfortably without excessive eye or head movement, and generally can be kept in the motorist's line-of-sight from the time they are first detected until they are passed. (see figure 2, cone of vision).

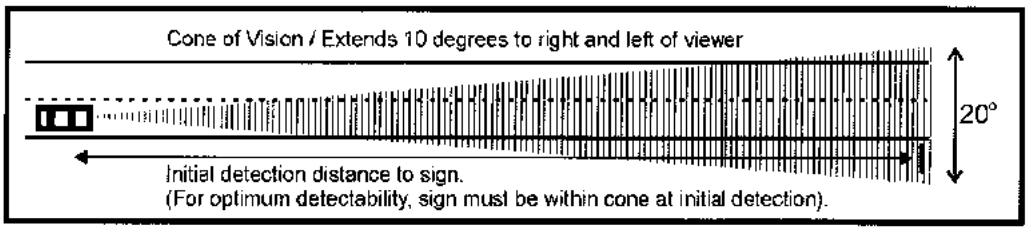


Figure 2. Cone of Vision

Because of this relatively constant view window, perpendicular signs can be designed and sized to provide for viewing time sufficient to allow for adequate detection, reading, and driving maneuvers. The key to providing adequate viewing time is an understanding of Viewer Reaction Time and Viewer Reaction Distance, and how these factors can be computed to provide for adequate letter heights and sign sizes under varied traffic conditions and vehicle speeds.

Viewer Reaction Time / Viewer Reaction Distance

Viewer Reaction Time is simply the time necessary for a motorist to detect, read, and react to the message displayed on an approaching on-premise sign that lies within his or her cone of vision. The USSC Guideline Standards offer precise mathematical procedures for calculating VRT for specific signs with specific copy located in varied locations of increasing traffic complexity and speed.

As a rule-of-thumb for average usage with signs displaying six words of copy (or 30 letters) or less however, VRT for vehicles traveling under 35 miles per hour in simple two to three lane environments can be estimated at eight (8) seconds; for vehicles traveling over 35 miles per hour in more complex four to five lane environments, at ten (10) seconds; and for vehicles traveling over 35 mph in high speed multi-lane environments at eleven to twelve (11-12) seconds.

These values include a maneuvering time of 4 seconds in the simple environment, 5 seconds in the complex environment, and 6 seconds in the high speed multi-lane environment. Although most roadside on-premise sign installations require a motorist to make the driving maneuver before the sign is passed and thus require the full VRT value, occasionally the maneuver can safely be made after the sign location has been passed. Where this is the case, the driving maneuver time of either 4, 5, or 6 seconds should not be included in computing Viewer Reaction Time.

Once VRT is ascertained, Viewer Reaction Distance for a given sign location, or the distance in feet which a vehicle travels during the VRT interval, can be calculated. It is necessary to know this distance because it determines the size of the letters and the size of the sign necessary for legibility to take place over that distance. It represents, in lineal feet, the distance between the motorist and the sign from the moment he or she has first detected it, and it rapidly diminishes as the motorist closes the distance at speed.

It is calculated by first converting travel speed in miles per hour (MPH) to feet per second (FPS) by using the multiplier 1.47, and then multiplying the feet per second by the Viewer Reaction Time. For example, a vehicle traveling at sixty miles per hour covers eighty-eight feet per second (60 x 1.47 = 88). Eighty-eight feet per second times a Viewer Reaction Time of ten seconds equals eight hundred eighty feet (880) of Viewer Reaction Distance. The computation can be expressed also as this equation:

VRD = (MPH) (VRT) 1.47

Determining Letter Height and Sign Size

The overall legibility of a sign is essentially determined by the height, color, and font characteristics of the letters making up its message component. To this end, the USSC has, through extensive research, developed standard legibility indices for typical letter types and color combinations (see table 1, USSC Standard Legibility Index).

The Legibility Index (LI) is a numerical value representing the distance in feet at which a sign may be read for every inch of capital letter height. For example, a sign with a Legibility Index of 30 means that it should be legible at 30 feet with one inch capital letters, or legible at 300 feet with ten inch capital letters. The USSC Standard Legibility Index also reflects the 15 percent increase in letter height required when all upper case letters (all caps) are used instead of more legible upper and lower case letters with initial caps.

Table 1. The USSC Standard Legibility Index

ILLUMINATION	LETTER STYLE	LETTER COLOR	Background COLOR	LEGIBILITY INDEX	
				Upper & Lower Case	ALL CAPS
External	Helvetica	Black	White	**29**	**25**
External	Helvetica	Yellow	Green	**26**	**22**
External	Helvetica	White	Black	**26**	**22**
External	Clarendon	Black	White	**28**	**24**
External	Clarendon	Yellow	Green	**31**	**26**
External	Clarendon	White	Black	**24**	**20**
Internal Translucent	Helvetica	Black	White	**29**	**25**
Internal Translucent	Helvetica	Yellow	Green	**37**	**31**
Internal Translucent	Clarendon	Black	White	**31**	**26**
Internal Translucent	Clarendon	Yellow	Green	**37**	**31**
Internal Opaque	Helvetica	White	Black	**34**	**29**
Internal Opaque	Helvetica	Yellow	Green	**37**	**31**
Internal Opaque	Clarendon	White	Black	**36**	**30**
Internal Opaque	Clarendon	Yellow	Green	**37**	**28**
Neon	Helvetica	Red	Black	**29**	**25**
Neon	Helvetica	White	Black	**38**	**32**

Illumination Variations:

External light source
Internal light source with fully translucent background
Internal light source with translucent letters and opaque background
Exposed neon tube

To use the Legibility Index table to determine letter height for any given viewing distance, select the combination of font style, illumination, letter color, and background color that most closely approximates those features on the sign being evaluated. Then, divide the viewing distance (Viewer Reaction Distance) in feet by the appropriate Legibility Index value. The

result is the letter height in inches for the initial capital letter in upper and lower case configurations, or for every letter in an all caps configuration. For example, if the Viewer Reaction Distance is 600 feet, and the Legibility Index is 30, the capital letter height would be 20 inches (600'/30 = 20").

VRD (in feet) / LI = Letter Height (in inches)

The Legibility Index rule-of-thumb…30

In addition to the use of the Legibility Index chart, a simpler, rule-of-thumb Legibility Index of 30 is frequently used as an average to address most legibility requirements. Although generally acceptable, it should be understood that this is an average only, and it may fall short of meeting the legibility needs of any specific sign or environment. The USSC On-Premise Sign Standards provides a much more precise means of establishing this requirement, particularly for complex environments, and should be used whenever such precision is warranted.

Sign Copy Area and Negative Space – Computing Sign Size

The computation of overall sign size is of vital concern to anyone involved in designing or building on-premise signs, since it relates directly to both sign cost as well as to adherence to local building and zoning ordinances. It is for this reason that USSC has devoted so much research resources into developing methods for computing adequate sign sizes for varied environments, and into providing the industry with the means to compute the size of signs necessary to adequately transmit communicative messages to motorists traveling at different rates of speed. The use of the Legibility Index is the vital first step in this process, but there is frequently more involved than just letter height, especially in perpendicular signs involving the use of background panels. Clearly, in these instances, an understanding of how sign copy area and negative space interact to bring about optimum viewer legibility is critical.

In instances in which only letters comprise the total sign, such as channel letters on building walls, however, the computation of total sign size in square feet is relatively simple. In the case of these types of individual letter signs, overall size is frequently considered as the product of the height of the letters times the length of the line of letters. For example, if capital letter height is two feet, and the line of letters measures thirty feet horizontally, sign size would be calculated at sixty square feet (2 x 30 = 60). There is an important exception to this mode of calculation in which only the space actually taken up by the letters themselves in square feet, and not the space between letters, is considered. In these cases, overall size becomes simply the sum of all the individual letter areas, and is generally a fairer method of computation when the letters and or/symbols

are spread out over a large area of building wall. In any event, for individual letter signs, it is essentially the height of the letters which is the prime determinant of overall sign size, and as we observed above, this can be calculated with some precision through use of the Legibility Index.

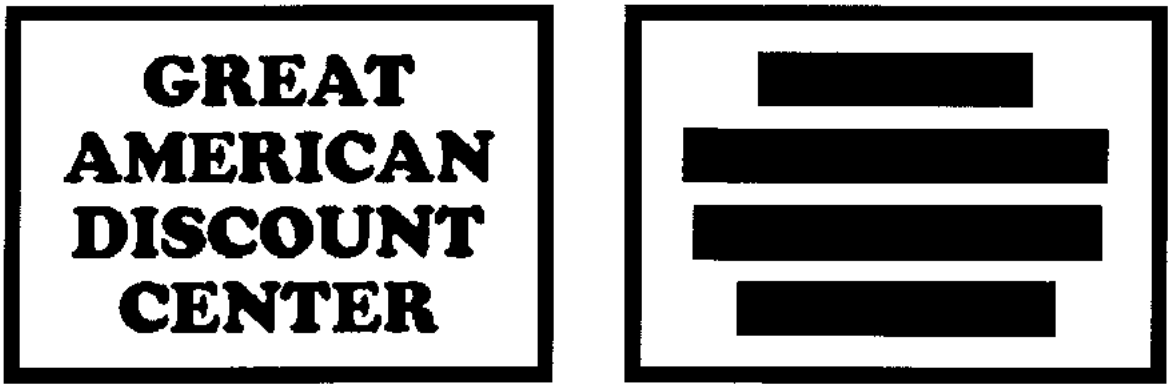
In this context, there is also another useful rule of thumb which can be used to give a working approximation of how much horizontal length a given number of letters would require once the letter height is established by simply multiplying capital letter height by the number of letters. For average fonts, this rule of thumb takes into account the space between letters in a line (usually 1/3 the width of an individual letter and referenced as letterspace) and can give a surprisingly close determination of the actual length of the line of letters.

In the case of signs utilizing background areas, however, computation of the amount of space occupied by the lettering, also called copy area, is only the first step in computing overall sign size. Of equal importance in signs of this type is the amount of negative space surrounding the letters or copy area. It is this negative space which provides the background for the letters, makes legibility possible, and which must be accounted for in any computation to determine overall sign size.

Copy Area

The copy area of a sign is that portion of the sign face encompassing the lettering and the space between the letters (letterspace), as well as any symbols, illustrations, or other graphic elements. It is a critical component of effective sign design because it establishes the relationship between the message and the negative space necessary to provide the sign with reasonable legibility over distance.

Figure 3. Copy Area

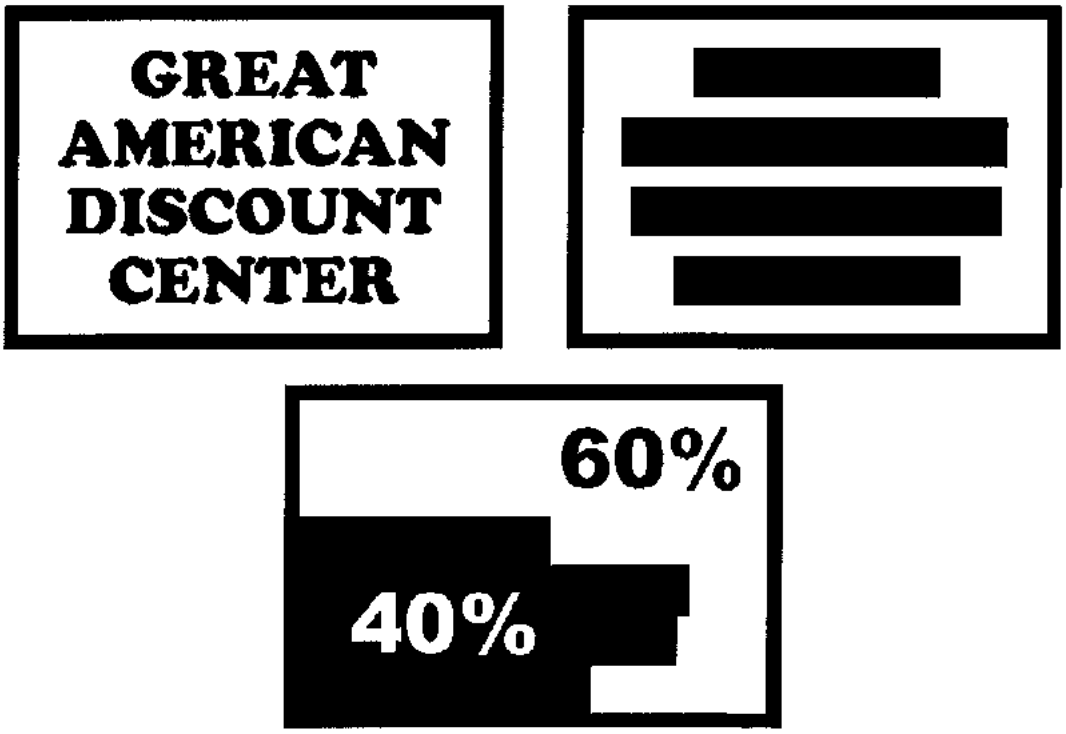


The illustration on the left depicts a typical on-premise sign face; while the one on the right, with black rectangles covering the copy area, affords a visual of the message layout

Negative Space

Negative space is the open space surrounding the copy area of a sign. It is essential to legibility, particularly in signs in which the copy is displayed within a background panel. Negative space ideally should not be less than 60 percent of the sign or background area. This requirement for a 40/60 relationship between the copy area and negative space is the minimum USSC standard. It is intended only to establish a measurable baseline for the negative space component of a sign, such that a reasonable expectation of legibility will exist.

Figure 4. Relationship Between Copy Area And Negative Space



The bottom sign panel illustrates how the aggregate copy area comprises 40 percent of the total sign panel area, with the remaining 60 percent forming the negative space area.

DETERMINING SIGN SIZE – Calculation Methodology

The size of a sign is determined by the size and length of the message and the time required to read and understand it. It can be calculated once the numerical values of the five size determinants –Viewer Reaction Time, Viewer Reaction Distance, Letter Height, Copy Area, and Negative Space – have been established.

The step-by-step process to determine sign size, which is explained below, is useful not only as a calculation method, but also as a means of understanding the elements involved in the calculation.

Area of Sign / Computation Process:

1. Determine speed of travel (MPH) in feet per second (FPS): (MPH x 1.47).
2. Determine Viewer Reaction Time (VRT).
3. Determine Viewer Reaction Distance (VRT x FPS).
4. Determine Letter Height in inches by reference to the Legibility Index (LI): (VRD/LI).
5. Determine Single Letter Area in square inches (square the letter height to obtain area occupied by single letter and its adjoining letterspace).
6. Determine Single Letter Area in square feet: Single Letter Area in square inches/144).
7. Determine Copy Area (Single Letter Area in square feet x total number of letters plus area of any symbols in square feet).
8. Determine Negative Space Area at 60% of Sign Area (Copy Area x 1.5).
9. Add Copy Area to Negative Space Area.
10. Result is Area of Sign in square feet.

Computation Process / Calculation Example

Figure 5. Calculation Example Sign

Location: Complex Driving Environment

Posted Traffic Speed of 40 MPH

Sign Background: White

Sign Copy: 23 Letters, Upper & Lower Case

Clarendon Style, Black

Internally Illuminated, Translucent Face

1. Determine speed of travel in feet per second; 40 MPH x 1.47 = 59 FPS
2. Determine Viewer Reaction Time – Complex Environment
   Detection and Message Scan..... 5 seconds
   Maneuver.....5 seconds
   Total Viewer Reaction Time = 10 seconds VRT
3. Determine Viewer Reaction Distance; 59 (FPS) x 10 (VRT) = 590 feet
4. Determine Letter Height in inches - Refer to Legibility Index, Table 1
   Black Clarendon letters on White background = Index of 31
   590 (VRD) / 31 (LI) = 19 inch letter height
5. Determine Single Letter Area in square inches
   19 x 19 = 361 square inches, single letter area
6. Determine Single Letter Area in square feet
   361 / 144 = 2.5 square feet, single letter area
7. Determine Copy Area; single letter area (sq. ft.) x number of letters
   2.5 x 23 = 57.5 square feet, copy area
8. Determine Negative Space @ 60% of sign area
   57.5 x 1.5 = 86.25 square feet, negative space
9. Add Copy Area to Negative Space
   57.5 + 86.25 = 143.75 square feet
10. Result is Area of Sign, 144 square feet

Area of Sign – Equation / Specific Usage

In addition to the computation method above, the USSC has developed an algebraic equation to determine the Area (A_{sign}) for signs containing letters only, which will provide the same result but will simplify the process. The equation allows for insertion of all of the size determinants, except for Negative Space, which is fixed at the standard 40/60 ratios. (Note: If numbers are rounded off in the computation process, a very slight difference in result may occur between the computation process and the equation).

$$A_{sign} = \frac{3n}{80}\left[\frac{(VRT)\,(MPH)}{LI}\right]^2$$

Fixed Value:
- 40/60 ratio, letters/negative space

Variable Values:
- Number of Letters (n)
- Viewer Reaction Time (VRT)
- Miles Per Hour (MPH)
- Legibility Index (LI)

Here's how to work the equation:

Start with the first portion of the equation which is three times the number of letters divided by 80. Three times 23 letters is 69; when divided by 80 the result is .8625. Keep this number ready for later use. Compute the second part of the equation in brackets by multiplying VRT (Viewer Reaction Time), which is 10 by the MPH (miles per hour), which is 40. The multiplication product is 400. Divide 400 by the LI (Legibility Index), which is 31, and the result is 12.90. Square the 12.90 by multiplying it by itself (12.90 x 12.90) for a product of 166. Finally, multiply the 166 by the .8625 obtained from the first part of the equation, and the resulting square footage is 143.

Area of Sign – Equation / Broad Usage

To allow for a broader scientific evaluation of sign size and satisfy the minimal legibility requirements across a full range of reaction times and speed zones, USSC has also developed a second more simplified equation shown below. This formula fixes the average sign size determinants, leaving only Viewer Reaction Time (VRT) and the speed of travel (MPH) as the sole variables. It can be used effectively as a broad rule-of-thumb to ascertain the general size of signs necessary to adequately and safely convey roadside information to motorists traveling at a given rate of speed as well as to establish size parameters for signs across an entire community and/or road system. Table 2 below provides a handy look-up reference of the use of the equation.

$$A_{sign} = \frac{[(VRT)(MPH)]^2}{800}$$

Fixed Values:
- 30 Letters
- Legibility Index (LI) of 30
- 40/60 ratio, letters/negative space

Variable Values:
- Viewer Reaction Time (VRT)
- Miles Per Hour (MPH)

Here's how to work the equation,
assuming Viewer Reaction Time of 10 seconds and speed at 50 miles per hour:

Compute the values in the brackets by multiplying the VRT (Viewer Reaction Time) of 10 seconds by the MPH (miles per Hour), which is 50. The multiplication product is 500. Square the 500 by multiplying it by itself (500 x 500) for a product of 250,000. Divide 250,000 by 800 for the resulting square footage of 312.

Table 2. Freestanding Sign Sizes

Freestanding Sign Size in Square Feet

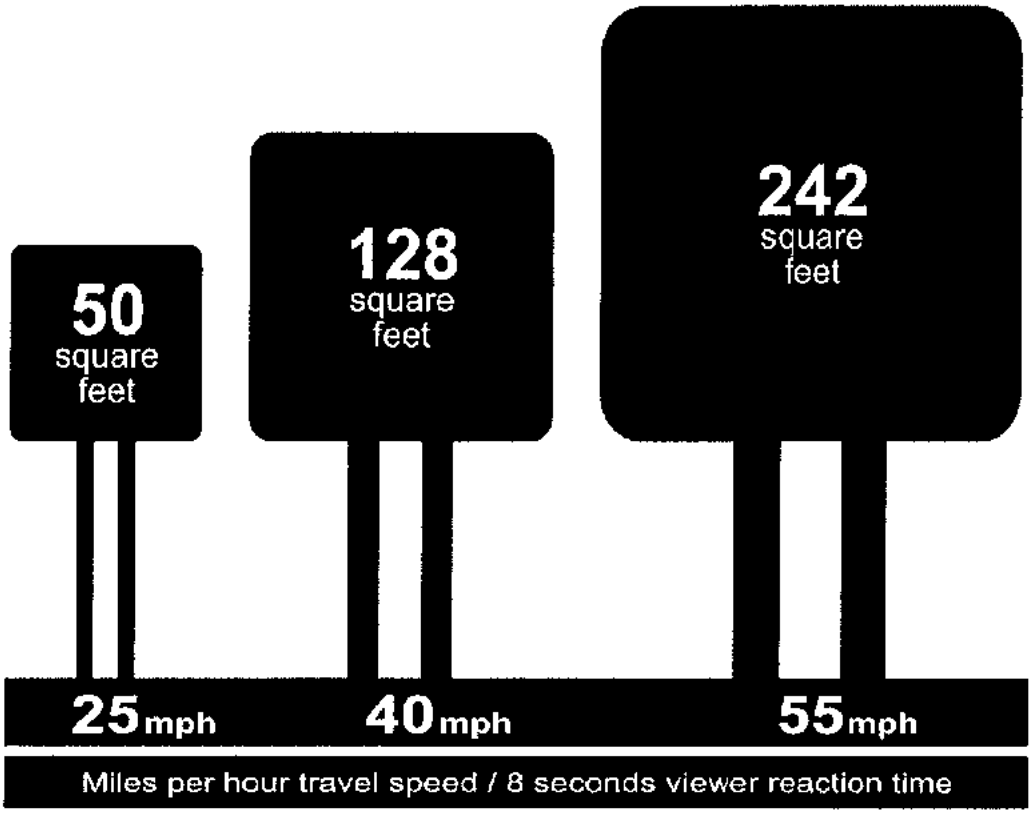
Sign Size (Square Feet) = $[(VRT)(MPH)]^2 / 800$

VRT = Viewer Reaction Time MPH = Miles Per Hour

VRT varies with roadside complexity:

simple or 2 lane = 8 seconds / complex or 4 lane = 10 seconds / multi lane = 11 seconds

MPH	Road Complexity	VRT	Sign Size
25	simple / 2 lane	8	50
25	complex / 4 lane	10	78
30	simple / 2 lane	8	72
30	complex / 4 lane	10	112
35	simple / 2 lane	8	98
35	complex / 4 lane	10	153
40	simple / 2 lane	8	128
40	complex / 4 lane	10	200
45	simple / 2 lane	8	162
45	complex / 4 lane	10	253
50	simple / 2 lane	8	200
50	complex / 4 lane	10	312
55	complex / 4 lane	10	378
60	complex / 4 lane	10	450
65	multi lane	11	639
70	multi lane	11	741
75	multi lane	11	850



Average sign size related to speed of travel and reaction time

Illustration from *Street Graphics and the Law*,
American Planning Association, 2004

Parallel Signs

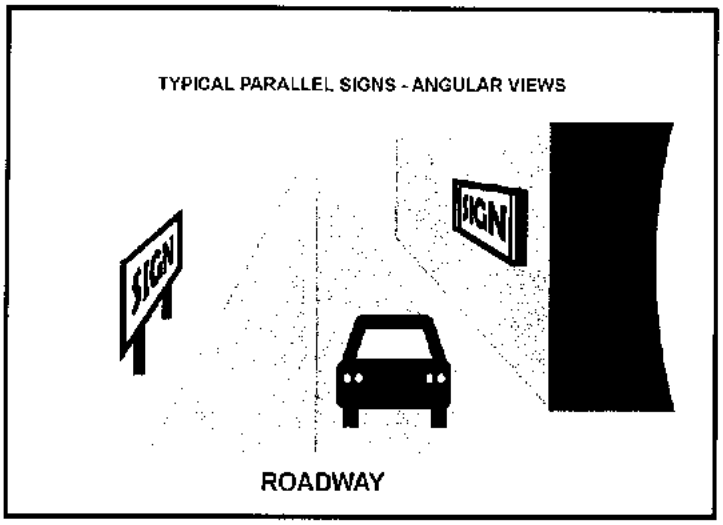


Figure 6. Parallel Sign Types

Everyday experience teaches us that parallel signs are more difficult to read than perpendicular signs simply because their orientation to the eye of any observer is at an acute angle. Now USSC research has corroborated this subjective impression with scientific evidence, and has made it possible to construct a mathematical model and attendant equations to account for the size increases necessary to allow parallel oriented signs to achieve at least some measure of the legibility quotient of perpendicular signs in a motorist oriented environment.

Parallel signs are harder to read because their orientation, or tilt, with respect to the driver makes it impossible to see the sign face at certain distances and offsets. When the driver can see the sign face, the content is often foreshortened and distorted. The driver must get close to the sign in order to increase the viewing angle to the point where the sign becomes legible. However, as drivers approach the sign, the time they have to read it gets shorter, while the sign moves further into their peripheral vision.

This condition places parallel signs at a threefold disadvantage relative to perpendicular signs. First, they are inherently more difficult to read because of the foreshortening of the message content caused by the angle of view. Second, because they become legible only after the angle of view exceeds 30 degrees, the time frame during which legibility can take place is compressed, and third, because they are usually placed back from the roadside well outside a driver's cone of vision, they are viewed by drivers only during short sideway glance durations, usually measured in fractions of seconds.

In many cases, their orientation causes not only severely compromised legibility compared to perpendicular signs, but results in the sign not being seen at all. In the USSC study, *Real World On-Premise Sign Visibility,* in which people were asked to drive through typical suburban shopping areas and locate specific signs, perpendicular signs were almost never missed while the subjects drove past 30 percent of the parallel signs, even though the parallel signs were two and three times larger than the perpendicular signs and the drivers were actively looking for them.

Parallel signs, therefore, must be read using a series of very quick glances at large visual angles during small windows of opportunity. Because of this, letter heights developed for perpendicular signs, where drivers have more time and can take longer straight ahead glances, cannot provide for adequate parallel sign legibility.

As we have noted in the case of perpendicular signs, the minimum distance at which a sign must become legible is a function of the time it takes to read the sign and the decisions and maneuvers required to comply with the sign. This is the Viewer Reaction time (VRT), which when combined with the speed of travel, becomes the Viewer Reaction Distance (VRD). Given the VRD, a perpendicular sign's letter height can be calculated using the Legibility Index.

The legibility of parallel signs, however, depends not on a driver's line of sight to a sign down the road, but rather when the sign becomes visible to the driver at a sight angle sufficient to allow at least some glance legibility to take place. A significant amount of research has now determined that this angle should be no less than 30 degrees to the driver's line of sight, and it is the visual restriction imposed by this angle, along with the number of lanes of travel, and the sign's offset from the curb, which determines the Maximum Available Legibility Distance, (or MALD) for a given parallel sign

While traversing this distance, however, a driver cannot be expected to register much more than a few quick glances at the sign without adversely affecting his/her view of the road. Thus it is essential to optimize reading speed for parallel signs in order to minimize the duration and frequency of glances that drivers must make to read the sign. Research has shown that reading speed increases to its maximum as letters are enlarged by a factor of three, and then tends to level off; and to ensure adequate letter height for parallel signs, a multiplier of three is used in the mathematical model to determine the letter heights and the legibility index for parallel signs.

Using this multiplier of three as a benchmark or rule of thumb, the Legibility Index for parallel signs falls to 10, instead of the Legibility Index of 30 we have shown as a rule of thumb for perpendicular signs. Thus a

parallel sign with a MALD of 500 feet, for example, would require a capital letter size of 50" (500/10=50). Conversely, a perpendicular sign at the same location, but directly viewable 500 feet down the road, would require a capital letter size of 17" (500/30=17)

Equations and Lookup Table

The following equations can be used to determine appropriate letter heights for parallel mounted signs given the number of lanes of travel and the lateral offset of the sign from the curb. Equation #1 uses an average LI of 10, while Equation #2 allows users to input the LI that most closely matches their sign conditions from the USSC Legibility Index table (Table 1) and applies the three times threshold constant to that LI. A parallel sign letter height lookup table is also provided for typical roadway cross-sections and lateral sign offsets (Table 3).

When using the equations or the lookup table always use the maximum number of lanes on the primary target road.

Parallel Letter Height Model Equations

Equation #1: LH = (LN x 10 + LO) / 5

Equation #2: LH = (LN x 10 + LO) / (LI / 6)

where:

LH is letter height in inches.

LN is the number of lanes of traffic.

LO is the lateral offset from curb in feet.

LI is the legibility index from Table 1

Examples of how to work the equations

2-Lane Roadway
Lateral offset is 37 feet from the curb.
User does not know the letter style.

Equation #1: LH = (LN x 10 + LO) / 5

LH = (2 x 10 + 37) / 5
LH = 57 / 5
LH = 11.4 inches

Same scenario, but user knows the sign is: Externally Illuminated, Helvetica, all Caps, Light Letters on Dark Background
(USSC LI = 22 ft/in)

Equation #2: LH = (LN x 10 + LO) / (LI / 6)

LH = (2 x 10 + 37) / (22 / 6)

LH = 57 / 3.67
LH = 15.5 inches

Table 3. Parallel sign letter height lookup table.

	Letter Height in Inches				
	Number of Lanes				
Offset from Curb (ft)	1	2	3	4	5
10	4	6	8	10	12
20	6	8	10	12	14
40	10	12	14	16	18
60	14	16	18	20	22
80	18	20	22	24	26
100	22	24	26	28	30
125	27	29	31	33	35
150	32	34	36	38	40
175	37	39	41	43	45
200	42	44	46	48	50
225	47	49	51	53	55
250	52	54	56	58	60
275	57	59	61	63	65
300	62	64	66	68	70
325	67	69	71	73	75
350	72	74	76	78	80
375	77	79	81	83	85
400	82	84	86	88	90