

# **AGENDA**

Cumberland Town Council Meeting

Town Council Chambers

**MONDAY, May 23, 2016**

**6:30 P.M. Workshop**

**7:00 P.M. Call to Order**

**6:30 P.M. WORKSHOP** with Carolyn Small and Thomas Bennett re: Bicentennial Committee Charge

**I. CALL TO ORDER**

**II. APPROVAL OF MINUTES**

May 9, 2016

**III. MANAGER'S REPORT**

**IV. PUBLIC DISCUSSION**

**V. LEGISLATION AND POLICY**

- 16 – 067** To hold a Public Hearing to consider and act on amendments to Chapter 48 (Coastal Waters) of the Cumberland Code, as recommended by the Coastal Waters Commission.
- 16 – 068** To hold a Public Hearing to consider and act on a Wharfing Out Permit for the Town for floats located at Broad Cove Reserve, as recommended by the Coastal Waters Commission.
- 16 – 069** To request that the Ordinance Committee develop new standards for LED signage and recommend amendments to the Cumberland Code (including a review of each zoning district where amendments may be applicable).
- 16 – 070** To hold a Public Hearing to consider and act on amendments to Chapter 315 (Zoning), Section 61 (Street Construction) of the Cumberland Code, as recommended by the Planning Board.
- 16 – 071** To hold a Public Hearing to consider and act on amendments to the Contract Zone Agreement for Village Green Cumberland, LLC to add 4 additional lots on a portion of Tax Assessor Map U10/Lot 1B, as recommended by the Planning Board.
- 16 – 072** To appoint Charles Rumsey as Police Chief effective June 6, 2016.
- 16 – 073** To consider and act on moving the June 13<sup>th</sup> and 27<sup>th</sup> Town Council Meetings to June 6<sup>th</sup> and 20<sup>th</sup>.
- 16 – 074** To hold a Public Hearing to consider and act on a Liquor License for Doc's Café for Class III (Vinous & Malt in Café) and Class I (all alcohol with catering) for a period of May 28, 2016 to May 28, 2017.
- 16 – 075** To set a Public Hearing date of June 6<sup>th</sup> to consider and act on a Mass Gathering Permit for United Maine Craftsmen Cumberland Arts and Craft Show to be held at the Cumberland Fairgrounds August 11<sup>th</sup> through 14<sup>th</sup>.

**VI. NEW BUSINESS**

**VII. ADJOURNMENT**

# MOTIONS

# MOTIONS

- 16 – 067 I move to amend** Chapter 48 (Coastal Waters) of the Cumberland Code, as recommended by the Coastal Waters Commission.
- 16 – 068 I move to approve** the Wharfing Out Permit for the Town for floats located at Broad Cove Reserve, as recommended by the Coastal Waters Commission.
- 16 – 069 I move to request** that the Ordinance Committee develop new standards for LED signage and recommend amendments to the Cumberland Code (including a review of each zoning district where amendments may be applicable).
- 16 – 070 I move to amend** Chapter 315 (Zoning), Section 61 (Street Construction) of the Cumberland Code, as recommended by the Planning Board.
- 16 – 071 I move to amend** the Contract Zone Agreement for Village Green Cumberland, LLC to add 4 additional lots, and the existing home, on a portion of Tax Assessor Map U10/Lot 1B, as recommended by the Planning Board.
- 16 – 072 I move to appoint** Charles Rumsey as Police Chief effective June 6, 2016.
- 16 – 073 I move to reschedule** the June 13<sup>th</sup> and 27<sup>th</sup> Town Council Meetings to June 6<sup>th</sup> and 20<sup>th</sup>.
- 16 – 074 I move to set** a Public Hearing date of June 6<sup>th</sup> to consider and act on a Mass Gathering Permit for United Maine Craftsmen Cumberland Arts and Craft Show to be held at the Cumberland Fairgrounds August 11<sup>th</sup> through 14<sup>th</sup>.
- 16 – 075 I move to set** a Public Hearing date of June 6<sup>th</sup> to consider and act on a Liquor License for Doc's Café for Class III (Vinous & Malt in Café) and Class I (all alcohol with catering) for a period of May 28, 2016 to May 28, 2017.

# MINUTES

## 05-09-16

# MINUTES

Cumberland Town Council Meeting

Town Council Chambers

**MONDAY, May 9, 2016**

**6:00 P.M. WORKSHOP** with the Planning Board re: LED signs

## **7:00 P.M. CALL TO ORDER**

**Present:** Councilors Bingham, Copp, Edes, Gruber, Stiles, Storey-King and Turner

### **I. APPROVAL OF MINUTES**

Motion by Councilor Gruber, seconded by Councilor Stiles, to accept the April 25, 2016 meeting minutes as presented.

VOTE: 6-0-1 (Bingham abstained) MOTION PASSES

Motion by Councilor Copp, seconded by Councilor Storey-King, to accept the May 3, 2016 Special Meeting minutes as presented.

VOTE: 7-0 UNANIMOUS

### **II. MANAGER'S REPORT**

Town Manager Shane said that we have made an offer to Charles "Chip" Rumsey to be our next Police Chief, which he has accepted. He is currently the Deputy Police Chief in Waterville. He will start in Cumberland on June 6<sup>th</sup>.

### **III. PUBLIC DISCUSSION**

Brad Hilton of Blanchard Road said he has spent a lot of time attending school budget meetings and School Board meetings. He is impressed at the good things that the school is doing, but he does not like the 3% increase in the school budget year after year. The budget keeps going up while the student population is dropping. He is going to vote against the school budget, but feels conflicted because the school system does a good job.

### **IV. LEGISLATION AND POLICY**

**16 – 061 To hear a presentation from TRC Engineers re: a possible solar farm on the top of the existing land fill on Drowne Road. **TABLED****

Town Manager Shane explained that TRC Engineers requested that this item be tabled until they can get more information from the PUC, given the vote at the Legislature last week.

Motion by Councilor Stiles, seconded by Councilor Turner, to table.

VOTE: 7-0 UNANIMOUS

**16 – 062 To hold a Public Hearing to consider and act on a Mass Gathering Permit for Girls on the Run-Maine for a 5K race to be held on June 5<sup>th</sup> from 7:00 a.m. to 1:00 p.m. at the Cumberland Fairgrounds.**

Town Manager Shane said that this has been a successful event for the past 3 years. Staff is recommending approval.

Chairman Bingham opened the Public Hearing.  
Public discussion: None  
Chairman Bingham closed the Public Hearing

Motion by Councilor Gruber, seconded by Councilor Storey-King, to approve the Mass Gathering Permit for Girls on the Run-Maine for a 5K race to be held on June 5<sup>th</sup> from 7:00 a.m. to 1:00 p.m. at the Cumberland Fairgrounds.

VOTE: 7-0                      UNANIMOUS

**16 – 063    To set a Public Hearing date of May 23<sup>rd</sup> to consider and act on amendments to Chapter 48 (Coastal Waters) of the Cumberland Code, as recommended by the Coastal Waters Commission.**

Town Manager Shane explained that these amendments are minor and Chairman, Lew Incze of the Coastal Waters Commission will be present on May 23<sup>rd</sup> to explain.

Motion by Councilor Stiles, seconded by Councilor Gruber, to set a Public Hearing date of May 23<sup>rd</sup> to consider and act on amendments to Chapter 48 (Coastal Waters) of the Cumberland Code, as recommended by the Coastal Waters Commission.

VOTE: 7-0                      UNANIMOUS

**16 – 064    To set a Public Hearing date of May 23<sup>rd</sup> to consider and act on a Wharfing Out Permit for the Town for floats located at Broad Cove Reserve.**

Town Manager Shane explained that per our ordinance the Town Council and Coastal Waters Commission is required to hold a public hearing on Wharfing Out Permits. This is for the floats at Broad Cove Reserve.

Motion by Councilor Stiles, seconded by Councilor Copp, to set a Public Hearing date of May 23<sup>rd</sup> to consider and act on a Wharfing Out Permit for the Town for floats located at Broad Cove Reserve.

VOTE: 7-0                      UNANIMOUS

**16 – 065    To set a Public Hearing date of May 23<sup>rd</sup> to consider and act on amendments to the Contract Zone Agreement for Village Green Cumberland, LLC to add 4 additional lots on a portion of Tax Assessor Map U10/Lot 1B, as recommended by the Planning Board.**

Town Manager Shane explained that the original plan was for a 75 foot, undisturbed buffer. The developer explained to the Planning Board that it had to be cut back to 50 feet because of the height of some of the trees could be dangerous to remove. The Planning Board requested a 50 foot as is buffer plus a 25 foot planted and vegetative buffer. The developer agreed to this. Additionally, the setback at the road to the Russell's lot to the civic lot was pushed back 25 feet further away from the civic lot, making a 40 foot setback on that side.

Motion by Councilor Stiles, seconded by Councilor Copp, to set a Public Hearing date of May 23<sup>rd</sup> to consider and act on amendments to the Contract Zone Agreement for Village Green Cumberland, LLC to add 4 additional lots on a portion of Tax Assessor Map U10/Lot 1B, as recommended by the Planning Board.

VOTE: 7-0

UNANIMOUS

**16 – 066 To set a Public Hearing date of May 23<sup>rd</sup> to consider and act on amendments to Chapter 315 (Zoning), Section 61 (Street Construction) of the Cumberland Code, as recommended by the Planning Board.**

This will reduce the right-of-way from 50 feet down to 36 feet, and requires all future roads to be 18 feet in width.

Motion by Councilor Turner, seconded by Councilor Stiles, to set a Public Hearing date of May 23<sup>rd</sup> to consider and act on amendments to Chapter 315 (Zoning), Section 61 (Street Construction) of the Cumberland Code, as recommended by the Planning Board.

VOTE: 7-0

UNANIMOUS

**V. NEW BUSINESS**

**Councilor Edes** – the first volunteer project will take place soon at the Knight's Pond Reserve property. The bridge that crosses the pond will be replaced.

This Wednesday, the Cumberland/Falmouth Chamber of Commerce will hold a fundraiser for scholarships for a Greely High School student and a Falmouth High School student. The event will be held at the Tee Box at Val Halla. He encouraged everyone to stop by.

**Councilor Gruber** – The Lands and Conservation Commission continues to do great work.

The Aging in Place Committee will meet on Wednesday evening at 5:00 and the Ocean Access Committee will meet at 6:00 on Wednesday.

The Youth Ministry of Holy Martyrs Church did a food drive recently. Thank you for the huge amount of food that they delivered to the Food Pantry.

**Councilor Storey-King** – in regard to the brown tail moth spraying, she wants to be sure that there will be no spraying near the stream between Ledge Road and Town Landing. She is concerned about the runoff.

Town Manager Shane said that is in the no spray zone.

**Councilor Turner** – he asked the Manager for an update on the brown tail moth spraying on the Foreside.

Town Manager Shane said that the response has been very positive. We have had approximately 20 people opt out, mostly on private roads. There will be no spraying within 250 feet of the water and the organic material will be sprayed. All the information is posted on the Town website.

**Chairman Bingham** – None

**Councilor Stiles** – he reminded everyone that he continues to raise money for the 4-H auction to benefit the Food Pantry. There has been some problems with the online donation system. It should be fixed soon.

**Councilor Copp** – at the request of a resident, he asked why a resident senior citizen pays the same membership to Val Halla as a non-resident.

Councilor Stiles (Council liaison to the Val Halla Board of Trustees) said that residents do get a slightly discounted rate over non-residents.

**Town Manager Shane** – The Rotary Club of Yarmouth donated 4 benches that will be placed in the Town Forest.

**VI. ADJOURNMENT**

Motion by Councilor Gruber, seconded by Councilor Stiles, to adjourn.

VOTE: 7-0 UNANIMOUS

TIME: 7:37 P.M.

Respectfully submitted by,

Brenda L. Moore  
Council Secretary



# ITEM

# 16-067

To hold a Public Hearing to consider and act on amendments to  
Chapter 48 (Coastal Waters) of the Cumberland Code, as  
recommended by the Coastal Waters Commission



# M E M O R A N D U M

TOWN OF CUMBERLAND, MAINE  
290 TUTTLE ROAD  
CUMBERLAND, MAINE 04021  
TEL: 207-829-2205 FAX: 829-2224

**To:** Town Council  
**From:** William R. Shane, Town Manager  
**Date:** May 18, 2016  
**Re:** Coastal Waters Ordinance Amendments

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At their meeting on Wednesday, May 18, 2016, the Coastal Waters Commission voted to recommend to the Town Council amendments to Chapter 48 Coastal Waters of the Town Code.

Pg. 4.           **at least** 5 members.....  
Pg. 11          mooring hierarchy if a waiting list is established  
Pg. 12          Town can re-assign space.....  
                    And some minor housekeeping edits.

The attached document is highlighted in yellow to outline changes pending your approval.

## Chapter 48. Coastal Waters

[HISTORY: Adopted by the Town of Cumberland 10-10-1989, as amended through 12-14-2015 (tentative council meeting date). Subsequent amendments noted where applicable.]

Ordinance removed and replaced on December 14, 2015.

### § 48-1. General provisions.

#### A.

Purpose. The Coastal Waters Ordinance is hereby established regulating marine activities within the coastal and tidal waters of the Town, in order to ensure the safety of persons and property, promote availability and the safety of valuable public resources, and to create a fair and efficient framework for the administration of the same.

#### B.

Authority. This chapter is adopted pursuant to the authority granted by Title 38, Chapter 1, of the Maine Revised Statutes Annotated, as amended from time to time, and pursuant to the Town's home rule authority under the Constitution of Maine, Article VIII, Part 2, and 30-A M.R.S.A § 3002, as amended from time to time.

#### C.

Applicability. The provisions of this chapter shall apply to all coastal and tidal waters located within the boundaries of the Town.

#### D.

Conflict. Nothing contained herein shall be construed to conflict with the lawful jurisdiction of the United States government with respect to the enforcement of navigation, shipping, or anchorage and associated laws of the United States or any valid laws or regulations of the State of Maine.

## § 48-2. Definitions.

As used in this chapter, the following terms shall have the meanings indicated:

### COASTAL AND TIDAL WATERS PLAN

A plan adopted by the Town Council designating the coastal and tidal waters of the Town and describing and showing the locations of mooring areas and/or anchorages of watercraft and the locations of channels for the passage of watercraft. This plan may be amended by the Town Council and may include mooring plans.

### COMMERCIAL WATERCRAFT

Any type of watercraft used in a business or trade.

### DERELICT OR ABANDONED WATERCRAFT

A watercraft that is given up by its master or owner with the intent to never again claim a right or interest in it.

### MOORING

A fixed anchor to which a watercraft can be made fast.

### MOORING PLAN

A plan adopted by the Town Council as part of the Coastal and Tidal Waters Plan designating specific locations for moorings within a mooring area and establishing limits on the numbers of moorings allowed within a mooring area.

### PARCEL OF LAND

#### A.

For persons taking title to shorefront property on or after January 1, 1987, a lot the area of which is the larger of the minimum buildable lot size in the Town or 20,000 square feet, but in either case including 100 feet of shoreline frontage; or

B.

For persons who owned shore rights of at least 100 feet of frontage prior to January 1, 1987, a lot of any size.

PERMIT YEAR

The permit year shall be from May 1 through April 30.

PERSON

Includes the singular and plural, and shall also mean and include any individual, firm or corporation, association, club, partnership or society.

RESIDENT

A property owner or any person who occupies a dwelling within the Town for more than 180 days in a calendar year.

RIPARIAN OWNER

A person who owns the shore rights to a parcel of land abutting the coastal or tidal waters of the Town.

TOWN

The Town of Cumberland, Maine.

WATERCRAFT

Any type of vessel, boat, barge, float or craft used or capable of being used as a means of transportation on water, other than a seaplane.

## § 48-3. Coastal Waters Commission.

### A.

Establishing policy. The Cumberland Coastal Waters Commission exists for the general purpose of evaluating public usage of and access to the coastal and tidal waters under the jurisdiction of the Town and planning for the future use of those waters; to advise the Town Council on policy matters and proposed regulations concerning the Town's coastal and tidal waters; to plan and implement improvements in conjunction with state and federal authorities; to supervise the enforcement of Town rules and regulations by the Harbormaster; and to sit as a board of appeals to hear appeals as provided by this chapter from any person aggrieved by a decision, act, or failure to act of the Harbormaster. The Commission may recommend to the Town Council a mooring plan for any area in which moorings are allowed under this chapter. The Commission shall regularly inform the Town Council and such other boards, committees, or officials of the Town as are appropriate of its activities.

### B.

Organization.

#### (1)

The Coastal Waters Commission shall consist of **at least** five members appointed by the Town Council. Each Commissioner shall be a resident of the Town and shall serve without compensation.

#### (2)

Neither a Town Councilor nor his/her spouse may be a member of the Commission.

#### (3)

Any question of whether a particular issue involves a conflict of interest sufficient to disqualify a member from voting on that issue shall be decided by a majority vote of the members, excluding the member who is being challenged; in the event of a tie in the vote on the question

of whether a member should be disqualified from voting on the issue, the member shall be disqualified from voting on the issue.

(4)

The Town Council may dismiss a member of the Commission for cause before the member's term expires. A Commissioner shall forfeit his/her membership on the Commission if he/she fails to attend three consecutive regular meetings of the Commission without being excused by the Commission. The Chairman of the Commission shall notify the Town Council Chairman of the forfeiture of office by a Commissioner.

(5)

The term of office of a member shall be three years, except the initial appointments which shall be as follows: two members for three-year terms, two members for two-year terms, and one member for a one-year term.

(6)

The Commission shall annually elect a Chairman and Vice Chairman from its membership and may create and fill such other offices as it may determine. Officers shall serve one-year terms and shall be eligible for re-election.

C.

Procedure.

(1)

The Chairman or designee shall call meetings of the Commission as required. The Chairman or designee shall also call meetings of the Commission when requested to do so by a majority of the members or by the Town Council. A quorum of the Commission necessary to conduct an official Commission meeting shall consist of at least three members. The Chairman or designee shall preside at all meetings of the Commission and shall be the official spokesman of the Commission.

(2)

The Commission shall maintain a permanent record of all Commission meetings and all correspondence of the Commission. The Commission shall be responsible for maintaining those records which are required as a part of the various proceedings which may be brought before the Commission. All records to be maintained or prepared by the Commission are public records and shall be filed in the Town Clerk's office and may be inspected at reasonable times.

(3)

In any appeal under § 48-8A, the following procedures apply:

(a)

The Commission may receive any oral or documentary evidence but shall provide as a matter of policy for the exclusion of irrelevant, immaterial, or unduly repetitious evidence. Every party shall have the right to present the party's case or defense by oral or documentary evidence, to submit rebuttal evidence and to conduct any cross-examination that is required for a full and true disclosure of the facts;

(b)

The transcript of testimony, if any, and exhibits, together with all papers and requests filed in the proceeding, shall constitute the record. All decisions become a part of the record and must include a statement of findings and conclusions, as well as the reasons or basis therefor, upon all the material issues of fact, law, or discretion presented in the appropriate order, relief or denial of relief. Notice of any decision shall be mailed or hand-delivered to the petitioner, his/her representative or agent, and the Town Council within seven days of the Commission's decision;

(c)

The Commission may reconsider any decision reached under this section within 30 days of its prior decision. The Commission may conduct additional hearings and receive additional evidence and testimony as provided in this section; and



(d)

An appeal may be taken from any order, relief or denial of the Coastal Waters Commission by procedure as outlined in § 48-8 of this chapter.

D.

Jurisdiction. The Coastal Waters Commission shall hear appeals as provided for by § 48-8 of this chapter. For purposes of 38 M.R.S.A. § 9, as amended from time to time, the Coastal Waters Commission is entrusted with harbor management.

#### § 48-4. Harbormaster.

A.

The Harbormaster shall be appointed by the Town Manager annually. The Harbormaster's duties and responsibilities shall be as prescribed by 38 M.R.S.A. § 1 et seq. and by the provisions of this chapter. The Town Council may establish the Harbormaster's compensation, and the Harbormaster may be removed for cause in accordance with 38 M.R.S.A. § 1.

B.

The Harbormaster shall regularly attend the meetings of the Coastal Waters Commission and inform the Commission of his/her activities as well as provide such information available to him/her as may be requested by the Commission in the execution of its duties.

#### § 48-5. Moorings.

A. General.

No person shall place or establish a mooring in the coastal and tidal waters of the Town except within designated mooring areas as described in and shown on the Coastal and Tidal Waters Plan; provided, however, that:

(1)

A riparian owner who is the master or owner of a watercraft may be assigned a mooring fronting his/her land even though the mooring is not within a mooring area shown on the Coastal and Tidal Waters Plan, so long as said mooring does not encroach upon the natural channel or channels established in said Coastal and Tidal Waters Plan and provided that the riparian owner shall annually register the mooring as provided in Subsection B of this section.

(2)

A riparian owner using a mooring or moorings fronting his/her land but not located within the mooring areas shown and described in the Coastal and Tidal Waters Plan of the Town as of the effective date of this chapter and said plan shall be allowed to continue to use up to three such moorings at the same location, so long as said moorings do not encroach upon the natural channel or channels established in said plan and provided that such person informs the Harbormaster of the location of said moorings within one year from the effective date of this chapter and annually registers the moorings as provided by Subsection B of this section.

(3) A property owner with a right of way (ROW) to the water is accorded the same rights and restrictions accorded to a riparian owner under (1) and (2) above, except that the mooring(s) shall be placed as conveniently as possible in front of the ROW and shall not interfere with the reasonable placement or moorings allowed for riparian owners. Furthermore, should space be insufficient to meet demands, the number of moorings allowed for a ROW property owner in front of the ROW may be reduced to one.

B. Assignment and location of moorings.

(1)

No person shall moor his/her watercraft in any part of the coastal and tidal waters of the Town without first annually registering said watercraft with the Town and obtaining a mooring assignment specifying the location of the mooring. The mooring registration number and the name of the watercraft owner or master must be affixed to the mooring float.

(2)

No owner or master of any watercraft, shall permit or suffer his/her watercraft to be docked or moored in such a manner as to obstruct the free passage of other watercraft going to or from any wharf or pier in the Town.

(3)

Any mooring assignment in the coastal and tidal waters of the Town shall be governed by the following guidelines:

(a)

Application for a mooring must be made by May 1 of each year unless an applicant shows good cause why he/she could not apply before May 1,(as for example, a person who acquires a boat or becomes a resident after May 1). A mooring assignment shall be valid until the next April 30<sup>th</sup>.

(b)

All persons applying for and receiving a mooring assignment must pay to the Town a fee as established by order of the Town Council.

(c)

If a person with an assigned mooring changes watercraft during the permit year, a new mooring application shall be submitted as soon as possible describing the new watercraft. If the characteristics of the mooring (block, chain, pennant) must be changed to accommodate the new watercraft, the application should be made in advance of the changes. If the mooring location needs to change, the application and approval MUST precede any changes. No new fees will be charged. The Harbormaster should be consulted if there are any questions.

(d)

Each mooring application shall be fully completed.

(e)

Notwithstanding any provision of this chapter to the contrary, any person using a mooring located within the mooring areas shown and described in the Coastal and Tidal Waters Plan of the Town as of the effective date of this chapter and said plan shall be allowed to continue to use that mooring at the same location, so long as said mooring does not encroach upon the natural channel or channels established in said plan, and provided that such person informs the Harbormaster of the location of said mooring within one year from the effective date of this chapter and annually registers the mooring as provided by this Subsection B.

(4)

In the event that more mooring applications are received than there are available spaces, the Harbormaster shall maintain a waiting list of all applicants who have not been assigned a mooring. Further, if a plan is amended and that revised plan provides for fewer moorings, the moorings available under the revised plan shall be assigned to persons who had registered moorings at the time of amendment of the plan under this allocation system, except as otherwise provided by this chapter. Persons may add their names to the waiting list at the Town Clerk's office during normal business hours. This procedure shall be posted in the Town Hall, and the waiting list shall be a public document under the Freedom of Access Law.<sup>[1]</sup> The waiting list shall be maintained in chronological order of application, and any vacant space shall be assigned to the first person on the waiting list, in accordance with the following priorities:

(a)

A riparian owner who is the owner or master of a watercraft and who is applying for a mooring assignment shall receive the first vacancy available and the mooring shall be located fronting his/her property, provided that such location does not encroach upon the natural channel or channels established by municipal officers. No more than one mooring may be assigned to any shorefront parcel of land under this priority, but this limitation shall not prevent a riparian owner from receiving additional mooring assignments under this allocation system.

(b)

A Home Owners Association member who has recorded rights to the shore through a deed, subdivision plan, or Home Owners Association document.

(c)

A property owner with a right of way (ROW) to the water is accorded the same rights and restrictions accorded to a riparian owner, except that the mooring(s) shall be placed as conveniently as possible in front of the ROW and shall not interfere with the reasonable placement ~~or of~~ moorings allowed for riparian owners.

(d)

Any other resident or property owner of the Town.

~~Any person who does not meet the requirements of a-d above; non-residents.~~

(e) Any person who does not meet the requirements of a-d above; however, if a waiting list is created, the next vacant space shall be assigned to the first nonresident on the waiting list in accordance with the following priority:

1. If the principal use of the vessel is noncommercial and less than 10% of the assigned moorings in the mooring area are currently assigned to persons fitting this description, then to the first such person on the waiting list.
2. If the principal use of the vessel is commercial and less than 10% of the assigned moorings in the mooring area are currently assigned to persons fitting this description, then to the first such person on the waiting list.

- ~~1.~~ If both nonresident noncommercial and nonresident commercial assignments are below 10% of the moorings and there are both types of applicants on the waiting list, the available space shall be assigned to the first applicant in the category that is farthest below 10%.

(5)

The Harbormaster shall maintain a record of each mooring assignment, including the location of assignment as well as the application information required by this chapter.

(6)

Mooring assignments shall not be transferred, and such assignments shall not be rented unless the provision for rental was made known to the Harbormaster.

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(7)

The Town reserves the right to re-assign moorings each year to better use available space.

C. Moorings

Moorings shall consists of appropriately-sized mushroom anchors, granite blocks, or helix moorings, connected to a surface buoy by chain of appropriate size and length for the vessel, depth of water, and exposure to weather. Concrete blocks, engine blocks, and other “objects of convenience” are not allowed. The surface float shall **consists** of a white mooring ball on which the mooring registration is painted with at least 3” tall numbers in a contrasting color. A pennant of suitable diameter and length completes the mooring assembly. Guidance for selecting the sizes of materials can be obtained from the Town website and/or from qualified mooring specialists who are also listed on the Town website.

D. Inspections

Each mooring must be inspected every two years by a qualified mooring specialist. The inspection results must be reported to the Harbormaster and all deficiencies repaired within 30 days.

E. Winter Spars

Winter spars cannot be installed before 9/15 and are required to be attached by 12/31 each year. They must be removed and replaced with the white ball by 6/1.

F. Removal of moorings.

An owner who wishes to discontinue maintenance and use of a mooring is responsible for removing the mooring from the marine environment. The Town has the right to remove any mooring that has not been registered at the owner’s expense.

§ 48-6. Abandonment of watercraft.

No person may bring into or maintain in the coastal and tidal waters of the Town derelict watercraft for salvage or abandon any watercraft in the coastal and tidal waters of the Town without a permit from the Harbormaster. The Harbormaster shall notify the master or owner of a watercraft determined by the Cumberland Coastal Waters Commission to be a derelict or abandoned watercraft, when said watercraft lacks a permit, that said watercraft must be removed within seven days, except that in the event that the Harbormaster determines that said watercraft causes or threatens to cause property damage, then removal shall be by the fastest means available. In this case, if contact with the master or owner of the watercraft or, corrective action cannot be made within 24 hours after such notice, the Harbormaster is authorized to remove said watercraft at the master's or owner's expense. If the master or owner of said watercraft has not removed it after the expiration of the seven days, the Harbormaster is authorized to remove said watercraft at the master's or owner's expense.



## § 48-7. Enforcement; violations and penalties.

### A.

It shall be the primary duty of the Harbormaster to enforce the provisions of this chapter and of Title 38, Chapter 1, of the Maine Revised Statutes Annotated, as amended from time to time. If the Harbormaster shall find any provisions of this chapter or statute being violated, he/she shall notify the person responsible for said violation, either verbally or in writing, indicating the nature of the violation or ordering the action necessary to correct it. The Harbormaster shall maintain a written record of such notices. In the event the violation causes or threatens to cause property damage, then notification of the violation shall be by the fastest means available. In this case, if contact with the mooring or boat owner or corrective action cannot be made within 24 hours after such notice, the Harbormaster is authorized to take whatever corrective action is necessary, the expense and risk for which shall be borne by the boat owner.

### B.

Violation of any provisions of this chapter shall be deemed a civil violation. This chapter is enforceable by the Harbormaster or any law enforcement officer of the Town, County of Cumberland, or State of Maine with jurisdiction in the Town. This chapter shall be enforced through a civil action in the District Court, and the Town may seek one or more of the following: injunctive relief, money damages not exceeding the sum of \$200 for each violation and attorney fees and costs pursuant to 30-A M.R.S.A § 4452, as amended from time to time. Each day such violation exists shall constitute a separate violation.

### C.

The Harbormaster shall suspend for the remainder of the permit year the mooring assignments of any person who violates this chapter two or more times within that permit year.

## § 48-8. Appeals.

### A.

Any and all persons aggrieved directly or indirectly by an action or failure to act of the Harbormaster may appeal such action or failure to act to the Coastal Waters Commission. In deciding any appeal, the Commission shall hear and approve, with modifications or conditions, or disapprove the action or failure from which the appeal is made.

### B.

Such appeals shall be made by application in writing to the Coastal Waters Commission within five calendar days of the action or failure to act from which the appeal is taken. The application must state with specificity the action or failure to act from which the appeal is taken and the reason for the appeal. The appeal shall be considered by the Coastal Waters Commission at its next regular meeting.

### C.

Any action or failure to act by the Harbormaster concerning the location of moorings or boats, as a result of which location there is immediate danger to lives or property, shall not be stayed pending appeal.

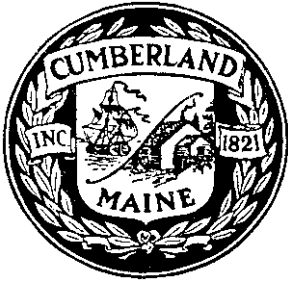
### D.

An appeal may be taken by any party from any order, relief or denial by the Coastal Waters Commission under Subsection A above, within 30 days after the decision is rendered, to the Superior Court in accordance with Rule 80B of the Maine Rules of Civil Procedure.

# ITEM

## 16-068

To hold a Public Hearing to consider and act on a Wharfing Out Permit for the Town for floats located at Broad Cove Reserve, as recommended by the Coastal Waters Commission



# M E M O R A N D U M

TOWN OF CUMBERLAND, MAINE  
290 TUTTLE ROAD  
CUMBERLAND, MAINE 04021  
TEL: 207-829-2205 FAX: 829-2224

**To:** Town Council  
**From:** William R. Shane, Town Manager  
**Date:** May 18, 2016  
**Re:** Coastal Waters – BCR Wharfing Out Permit

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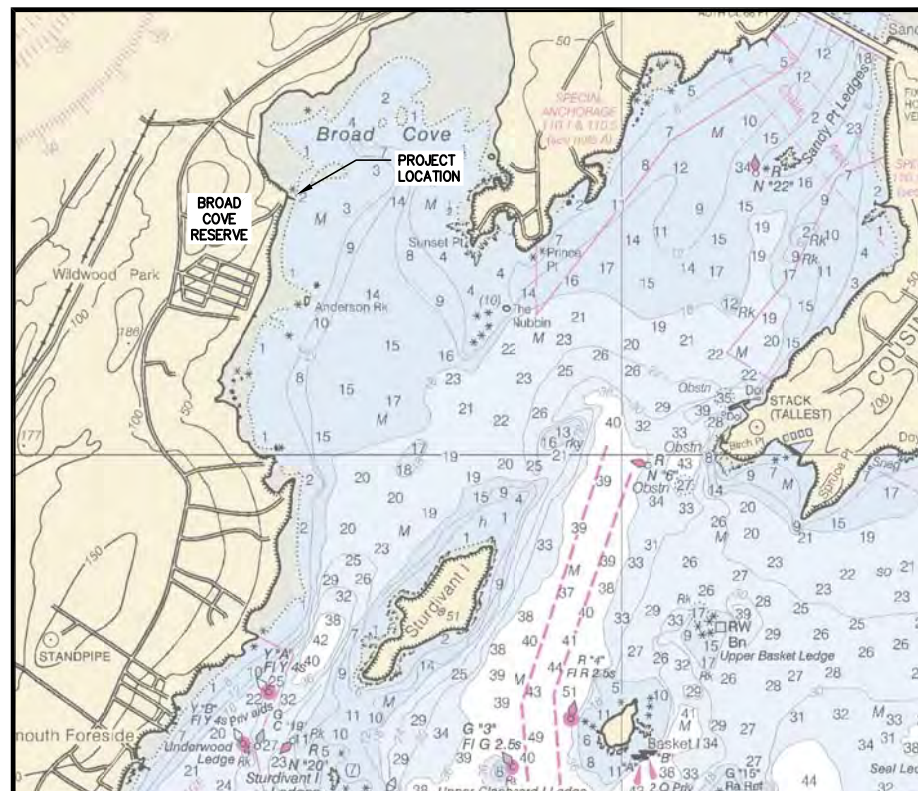
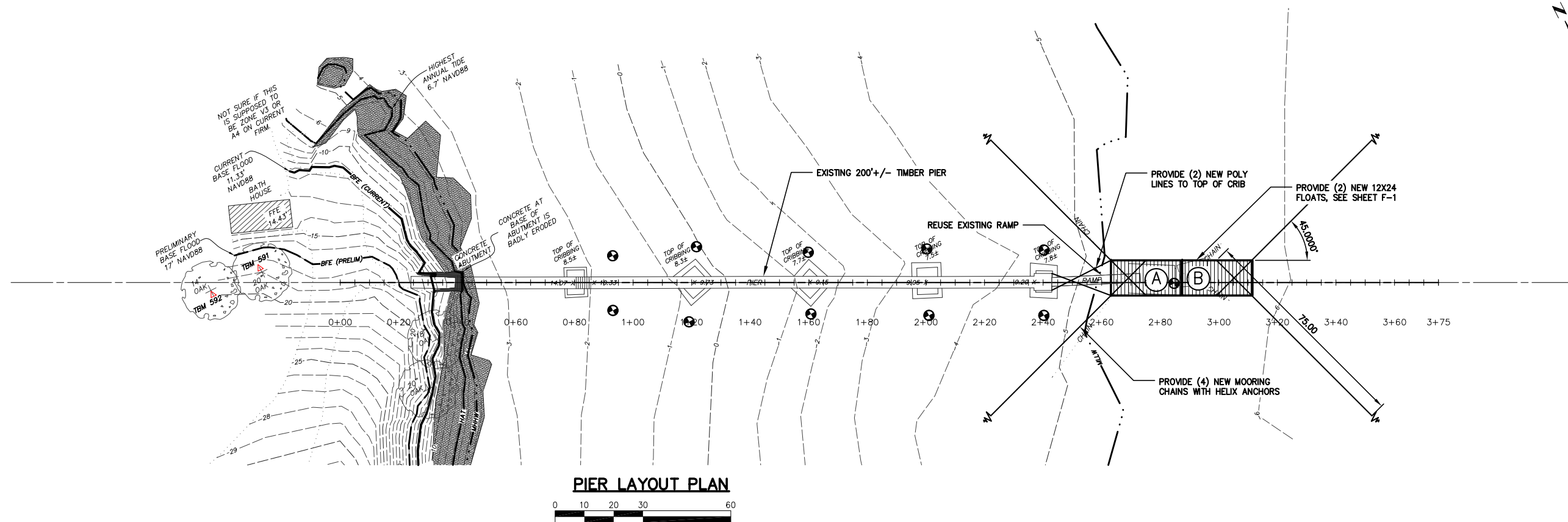
At their meeting on Wednesday, May 18, 2016, the Coastal Waters Commission voted to recommend to the Town Council a Wharfing Out permit be issued for the additional Town Float at Broad Cove Reserve. The Commission held a Public Hearing and accepted public comment.

The Permit is only for the additional float. The existing float was replaced, this would add one new float to the facility.



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*Civil, Marine, and Structural Engineering*

7 Spruce Road • Freeport • Maine • 04032 • 207-846-9724 • [info@bakerdesignconsultants.com](mailto:info@bakerdesignconsultants.com)



## SCOPE OF WORK

1. SUPPLY AND INSTALL OF EXPANDED FLOAT SYSTEM, INCLUDING:
  - a. (2) NEW 12X24 FLOATS
  - b. (4) NEW FLOAT MOORINGS WITH HELIX ANCHORS AND TACKLE.
  - c. (2) NEW FLOAT RESTRAINT LINES ATTACHED TO EXISTING CRIB.
2. REMOVAL AND DISPOSAL OF EXISTING 8X16 FLOAT, EXISTING FLOAT MOORING LINES, AND ANY ASSOCIATED DEMOLITION MATERIALS/DEBRIS.
3. MONITORING OF INSTALLATION THROUGH TIDE CYCLE AND FINAL ADJUSTMENT TO ENSURE OPERATION AS INTENDED.
4. ALL WORK TO BE COORDINATED WITH TOWN STAFF AS REQUIRED.

## SURVEY &amp; DATUM NOTES

1. BASE SURVEY, TOPOGRAPHY, SITE DATUM CONTROL, AND PROJECT BENCHMARKS ARE FROM A FIELD SURVEY WITH DOCUMENTING PLAN BY LITTLE RIVER LAND SURVEYING DATED 10/19/15.
2. ALL TOPOGRAPHIC INFORMATION PROVIDED IS REFERENCED TO NAVD88 VERTICAL DATUM UNLESS OTHERWISE NOTED.
3. BASE FLOOD/TIDAL INFORMATION TAKEN FROM MEDEP, FEMA, AND NOAA PUBLISHED DATA, REFER TO THE TABLE BELOW.

PROJECT ELEVATIONS (BY DATUM)				
ELEVATION	CHART (ft)	NGVD29 (ft)	NAVD88 (ft)	Notes
FEMA Base Flood	22.3	17.7	17.0	Prelim FEMA Zone VE
FEMA Base Flood	19.5	15.0	14.3	Effective FEMA Zone V2
Highest Annual Tide	11.9	7.4	6.7	2013 MEDEP Predictions
MHHW	9.9	5.4	4.7	BASED ON TIDAL BM "PORTLAND"
MHW	9.5	5.0	4.2	
NAVD88	5.3		0.0	
NGVD29	4.5	0.0		
MLW	0.3	-4.2	-4.9	
MLLW	0.0	-4.5	-5.3	

## FLOAT SCHEDULE

Mark	Width FT	Length FT	Area SF	Tie-Up (See note)		Notes/ Connection Hardware	Ref Drawing
				North Face	South Face		
A	12	24	288	4-Type A	4-Type A	2 MOORING LINES	SHEET F-1 TYPICAL 12X24 FLOAT DETAILS
B	12	24	288	4-Type A	4-Type A	2 MOORING LINES	
Total			576				

## Notes

1. Vessel Tie-up on Float: Type A = 12 in SPC 190 Ship Cleats

## PROPERTY INFORMATION

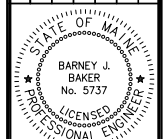
OWNER: TOWN OF CUMBERLAND, MAINE

ADDRESS: 179 FORESIDE ROAD  
CUMBERLAND, MAINE 04021

MAP/LOT: R1-02

**ZONING:** LOW DENSITY RESIDENTIAL (LDR); SHORELAND OVERLAY

**SETBACKS: NO CHANGE**



DESIGNED BY:	DJB
DRAWN BY:	JJC
CHECKED BY:	BJB
SCALE:	AS SHOWN

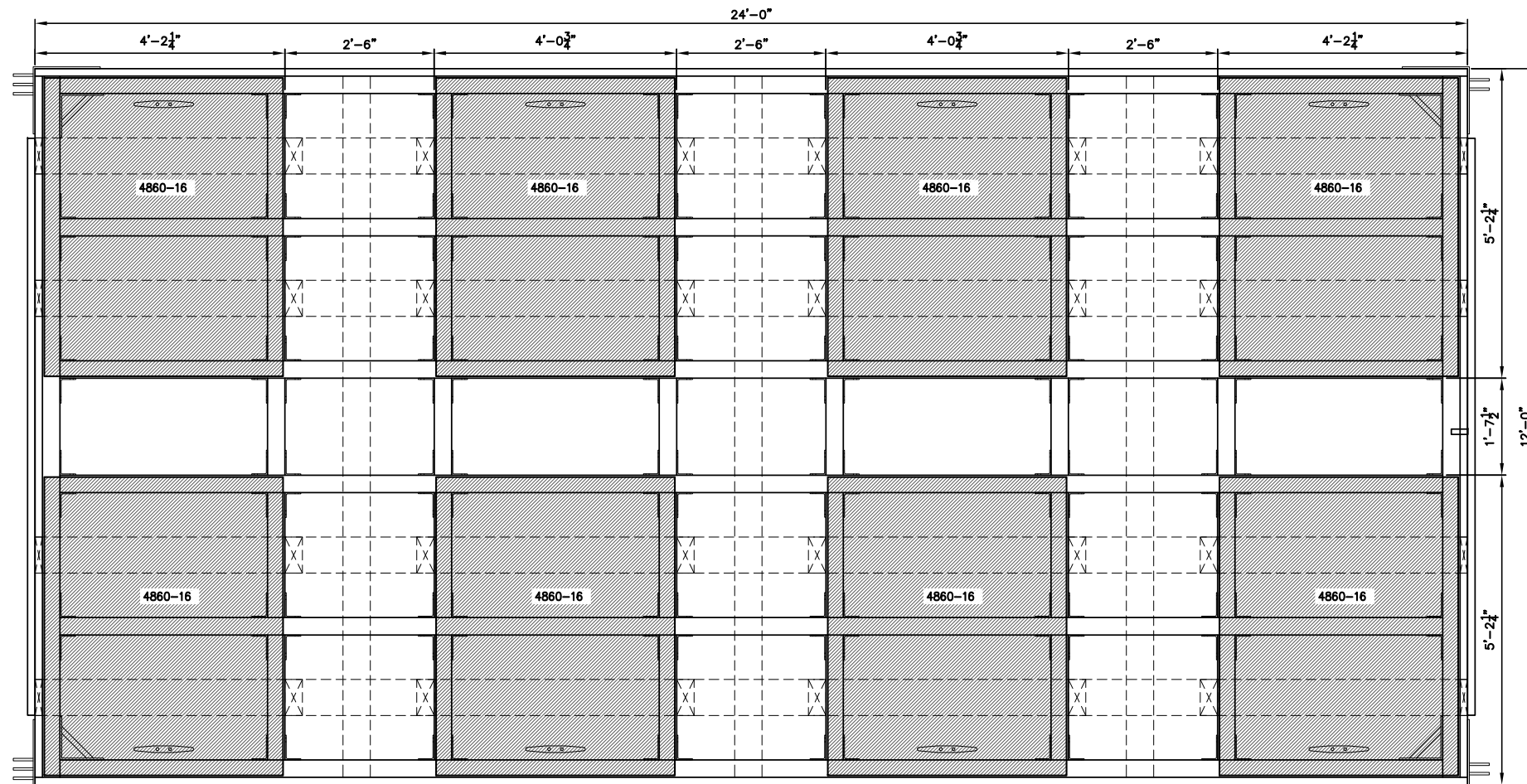
SHEET TITLE: SUMMER 2016 FLOAT LAYOUT  
PROJECT: BROAD COVE RESERVE  
PAYSON PIER REPLACEMENT  
CUMBERLAND, MAINE

DATE FEB 2016	
CONTRACT NO. 15-05	
SHEET NO. F-0	REV. A

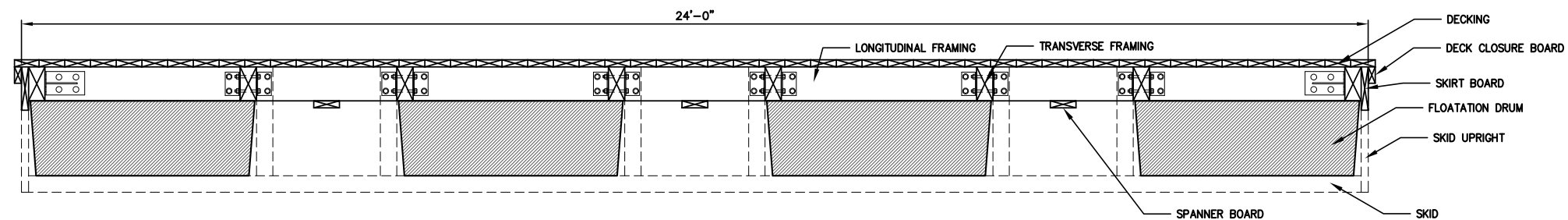


DRAFT FOR REVIEW

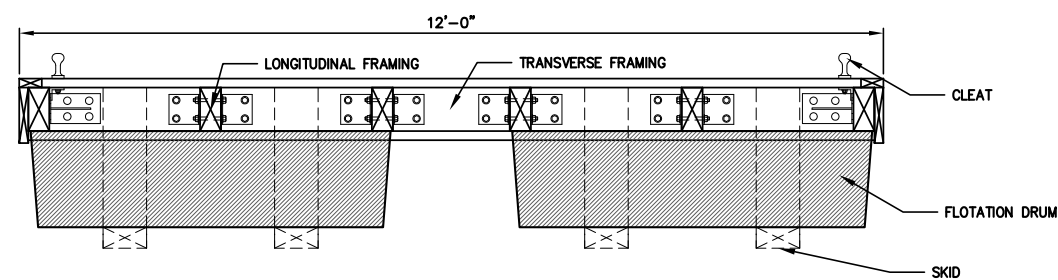
TIMBER SCHEDULE						
Timber Size	Location	% Moisture at Treatment	Treatment		Grading to SPIB	Surface Finishing
			Type	pcf		
FLOATS						
2 X 6	DECKING	19%	ACQ	0.6	No. 1	S4S
4 X 8	LONGITUDINAL FRAMING	25%	CCA	1.0	No. 1	S4S
4 X 8	TRANSVERSE FRAMING	25%	CCA	1.0	No. 1	S4S
2 X 6	SPANNER BOARD	25%	CCA	1.0	No. 1	S4S
4 X 8	SKIDS	25%	CCA	1.0	No. 2	R
4 X 8	SKID UPRIGHT - INTERIOR	25%	CCA	1.0	No. 2	R
2 X 8	SKID UPRIGHT - END	25%	CCA	1.0	No. 2	R
2 X 4	DECK CLOSURE BOARD	19%	ACQ	0.6	No. 1	S4S
2 X 10	SKIRT BOARD	19%	ACQ	0.6	No. 1	S4S



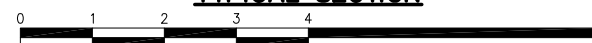
## PLAN



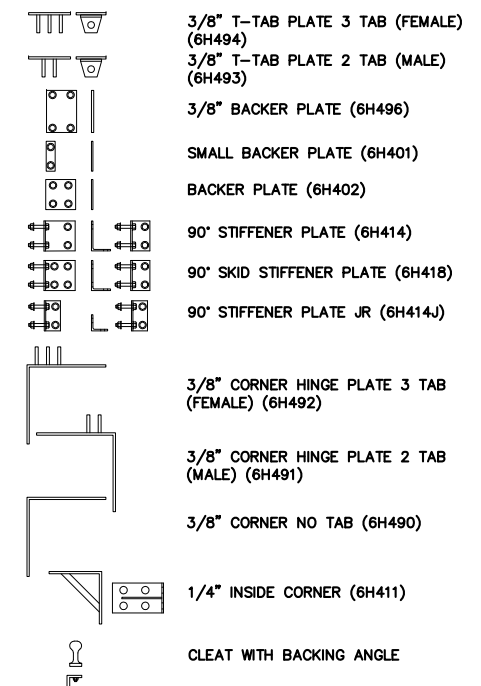
**TYPICAL SECTION**



**TYPICAL SECTION**



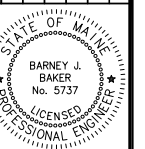
## FLOAT HARDWARE



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7 Spruce Road • Freeport • Maine • 04032 • 207-846-9724 • [info@bakerdesignconsultants.com](mailto:info@bakerdesignconsultants.com)

	C	FLOAT BID PACKAGE	2-4-16	DJB
	B	PERMIT SET	1-21-16	BUB
	A	PRELIMINARY FLOAT DESIGN	12-30-15	BUB
NO.		SUBMISSION	DATE	INT.



DJB
DRAWN BY: JJC
CHECKED BY: BJB
SCALE: AS SHOWN

TYPICAL 12X24 FLOAT DETAILS

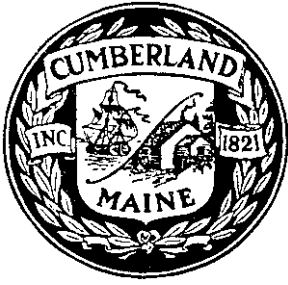
PAYSON PIER REPLACEMENT  
CUMBERLAND, MAINE

DATE DEC 2015	
CONTRACT NO. 15-05	
SHEET NO. F-1	REV. C

# ITEM

## 16-069

To request that the Ordinance Committee develop new standards for LED signage and recommend amendments to the Cumberland Code (including a review of each zoning district where amendments may be applicable)



# M E M O R A N D U M

TOWN OF CUMBERLAND, MAINE  
290 TUTTLE ROAD  
CUMBERLAND, MAINE 04021  
TEL: 207-829-2205 FAX: 829-2224

**To:** Town Council  
**From:** William R. Shane, Town Manager  
**Date:** May 18, 2016  
**Re:** 16-069 LED Signs

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Pursuant to the direction from your last Council Meeting and Workshop with the Congregational Church members on Monday, May 9, 2017 it appears you wish to send this to the Ordinance Committee.

I would recommend you consider having the Ordinance Committee develop language and amend existing ordinances if this is something you wish to pursue. I have attached multiple documents for the Ordinance Committee's review including model ordinances and crash analysis from State and Federal highway organizations. I would further recommend you ask the Ordinance Committee to include the Planning Board and possibly the MSAD in their meetings and possible future workshops.

I believe you should be prepared that this may go to referendum if approved.



ZONE \_\_\_\_\_

CHECK # \_\_\_\_\_

RECEIPT# \_\_\_\_\_



PERMIT # \_\_\_\_\_

FEE \$ \_\_\_\_\_

**APPLICATION FOR SIGN PERMIT**

**45 BEACON STREET EAST**

**LACONIA, NH 03246**

**(603) 527-1264**

**\$30.00 PER SIGN**

**(Fees also apply to modifications to existing signs)**

**Name of Business:** \_\_\_\_\_

**Address of Sign Location:** \_\_\_\_\_ **Map** \_\_\_\_\_ **Street** \_\_\_\_\_ **Lot** \_\_\_\_\_

**Applicant:** \_\_\_\_\_ **Address:** \_\_\_\_\_ **Phone** \_\_\_\_\_

**Prop. Owner:** \_\_\_\_\_ **Address:** \_\_\_\_\_ **Phone** \_\_\_\_\_

**Sign Erector:** \_\_\_\_\_ **Phone** \_\_\_\_\_

**NOTE: FOR SIGN RESTRICTIONS, CONSULT ARTICLE IX OF ZONING ORDINANCE**

**Please submit the following with your application:**

1. A **scale plot plan (master sign plan)** showing the location of all signs on site, setbacks from property lines (label distances on plan), and direction from which photographs were taken. Check here if you know a master sign plan is already on file for this property. \_\_\_\_ You will be asked to update the existing plan with new information. ➡
2. **Photographs** of all **existing** signs and **new** signage. (if a master sign plan was previously submitted, photos of only scaled graphics of proposed signs are needed). Check here if you know that photos of existing signs were submitted previously. \_\_\_\_ ➡
3. **Scale drawings of all signs**, giving dimensions, including height when installed.
4. Please **calculate the "sign frontage"** for your property. The definition of Sign Frontage, per *Zoning §235-13* is: **"The length along the primary floor of a building front or portion of building front, having access on a street."** Please indicate sign frontage here \_\_\_\_ Ft. Show the sign frontage on your master sign plan. ➡
5. **Identify the types of signs**, dimensions, and all other requested data, both of existing and proposed signs, in the tables on the following page:

### EXISTING SIGNS

Sign Type*	Dimensions (length & width)	Sq. Ft. of Existing Sign	Height of Sign (from ground)	Illumination Source	Materials of Sign and Surface	Colors Used

Total # of Signs \_\_\_\_\_ Total Existing Sq. Ft. \_\_\_\_\_

### PROPOSED SIGNS

Sign Type*	Dimensions (length & width)	Sq. Ft. of Proposed Sign	Height of Sign (from ground)	Illumination Source	Materials of Sign and Surface	Colors Used

Total # of Proposed Signs \_\_\_\_\_ Total Proposed Sq. Ft. \_\_\_\_\_

\* Choose from these categories: **Portable, Wall, Suspended, Banner, Canopy, Window, Roof Integral, Projecting, Freestanding, Changeable Copy, Marquee, Animated.** (see Article IX, Table IV).

It is the responsibility of the owner or his agent to notify the Planning Dept. when the sign is erected and ready for inspections. The undersigned agrees that all work shall be performed in compliance with foregoing statements and all applicable City and State laws. The owner of the property by signing this application declares that all existing signs have been lawfully permitted by the City of Laconia to the best of his/her knowledge.

\_\_\_\_\_  
APPLICANT/AGENT (signature & print) DATE

\_\_\_\_\_  
PROPERTY OWNER (signature & print) DATE

Permit Approved By: \_\_\_\_\_ Date: \_\_\_\_\_  
Picture Taken: \_\_\_\_\_ Date: \_\_\_\_\_

**Table VI**  
**Table of Sign Regulations**  
**City of Laconia**

**[Amended 10-14-1997 by Ord. No. 10.97.10; 5-22-2000 by Ord. No. 05.2000.05; by 5-27-14 by Ord. No. 03.2014.03]**

Zoning Districts															
RR1	RR2	RS	SFR	RG	RA		P	BC	BCI	C	CR	DR	IP	I	AI
2	2	2	2	2	2	<b>Total Sign No.</b>	2	2	2	3	3	2	2	2	2
42sf	42sf	42sf	42sf	42sf	42sf	<b>Maximum Sign Area</b>	42sf	96sf	96sf	216sf	216sf	96sf	96sf	96sf	96sf
<b>Note: Total sign number for each business. Maximum sign area for lot excluding development</b>															
RR1	RR2	RS	SFR	RG	RA	Sign Type	P	BC	BCI	C	CR	DR	IP	I	AI
P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	Portable	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)	P(1)
P(2)	P(2)	P(2)	P(2)	P(2)	P(2)	Wall	P(2)	P(3)	P(3)	P(4)	P(4)	P(2)	P(3)	P(3)	P(3)
P(5)	P(5)	P(5)	P(5)	P(5)	P(5)	Suspended	P(5)	P(6)	P(6)	P(5)	P(5)	P(13)	P(5)	P(5)	P(5)
P(7)	P(7)	P(7)	P(7)	P(7)	P(7)	Banner	P(7)	P(8)	P(8)	P(8)	P(8)	P(2)	P(8)	P(8)	P(8)
P(9)	P(9)	P(9)	P(9)	P(9)	P(9)	Canopy	P(9)	P(9)	P(9)	P(9)	P(9)	P(9)	P(9)	P(9)	P(9)
N	N	N	N	N	N	Window	P(5)	P(5)	P(5)	P(5)	P(5)	P(13)	N	N	N
N	N	N	N	N	N	Roof Integral	P(5)	P(5)	P(5)	P(5)	P(5)	N	N	N	N
P(5)	P(5)	P(5)	P(5)	P(5)	P(5)	Projecting	P(5)	P(5)	P(5)	P(5)	P(5)	P(13)	P(5)	P(5)	P(5)
N	N	N	N	N	N	Freestanding	P(10)	P(10)	P(10)	P(11)	P(11)	P(10)	P(10)	P(10)	P(10)
N	N	N	N	N	N	Changeable Copy	P(12)	P(12)	P(12)	P(12)	P(12)	P(12)	P(12)	P(12)	P(12)
N	N	N	N	N	N	Marquee	N	P	P	P	P	P(9)	N	N	N
N	N	N	N	N	N	Animated	N	N	N	N	E(12)	N	N	N	N
N	N	N	N	N	N	EMC – Static Display	E(10)	E(10)	E(10)	E(11)	E(11)	N	E(10)	E(10)	E(10)
N	N	N	N	N	N	EMC – Dynamic Display	N	N	N	N	E(11)	N	N	N	N
RR1	RR2	RS	SFR	RG	RA	Sign Type	P	BC	BCI	C	CR	DR	IP	I	AI

KEY: N - Not Permitted      P - Permitted      sf - square feet

NOTES:

1. Maximum size: 16 square feet, including all faces. Sandwich boards are permitted through the Dept of Public Works, provided that they are removed daily. See Chapters 109 and 201 of the Public Ordinances for signs in the public right-of-way.
2. Maximum size: 24 square feet.
3. Maximum size: 48 square feet.
4. Maximum size: 72 square feet.
5. Maximum size: 18 square feet.
6. Maximum size: 24 square feet. Signs may not project into public ROW where buildings are located 4 feet or closer to the front of lot line.
7. Maximum size: 12 square feet.
8. Maximum size: 32 square feet.
9. Maximum size of signs are to be calculated as the face of a wall sign.
10. Maximum size of one face shall not exceed 50% of the maximum sign area permitted or the maximum size of a wall sign as permitted in the district, whichever is less, Height limit is 12 feet.
11. Maximum size of one face shall not exceed 50% of the maximum sign area permitted or the maximum size of a wall sign as permitted in the district, whichever is less. Height limit is 20 feet.
12. May be incorporated into wall, freestanding, marquee, roof integral, suspended, projected, directory signs, and EMC's where otherwise allowed.
13. Maximum size: 6 square feet.

## Definitions

**SIGN** - Any device, fixture, placard, landscaping or structure that uses any color, form, graphic, illumination, symbol or writing to advertise, announce the purpose of or identify the purpose of a person or entity or to communicate information of any kind to the public.

**SIGN, ANIMATED** - A sign, or part of a sign, employing actual motion or the appearance of motion, that does not employ the use of a panel of lights to create the copy or images themselves, including;

- (a) Tracer or chase sequence lights that turn on and off quickly and in succession;
- (b) Flashing, where either words, lights, or images change or intermittently flash on and off, or give the appearance of changing, blinking or flashing;
- (c) Any sign or part of a sign that changes physical position. [Amended 5-27-14 by Ord. No. 03.2014.03]

**SIGN AREA**-The area of a sign shall include all of the surface area on which the letters, pictures, designs and symbols appear, together with the background, on which they are displayed, whether open or closed, and all beveled, rounded, angled or bordering surfaces intended or designed to enhance the visual impact of the sign. The area of a sign does not include its sides, or any supporting framework and bracing that is incidental to the display itself and is not designed to attract attention. Where the sign consists of letters or symbols affixed to a surface or building, without any distinguishing border, panel or background, the area shall be considered to be the smallest rectangle or shape which encompasses all of the letters and symbols. [Added 5-27-14 by Ord. No. 03.2014.03]

**SIGN, BANNER** - Any sign of lightweight fabric or similar material that is permanently or temporarily mounted at one or more edges. National flags, state or municipal flags shall not be considered "banners."

**SIGN, BUILDING MARKER** - Any sign indicating the name, date of construction or incidental information about a building, which sign is cut into a masonry surface or made of bronze or other permanent material.

**SIGN, CANOPY** - Any sign that is part of or attached to an awning, canopy or other fabric, plastic or structural protective cover over a door, entrance, window or outdoor service area. A marquee is not a "canopy."

**SIGN, CHANGEABLE COPY** - A non-digital sign or portion thereof with characters, letters or illustrations that can be changed or rearranged without altering the face of the surface of the sign. A sign on which the message automatically changes shall be considered an animated sign or Electronic Message Center and not a changeable copy sign for purposes of this chapter. A sign on which the only copy that changes is an electronic or mechanical indication of time or temperature shall be considered a time-and-temperature portion of a sign and not a changeable copy sign for purposes of this chapter. [Amended 5-27-14 by Ord. No. 03.2014.03]

**SIGN, ELECTRONIC MESSAGE CENTER (EMC)** - A sign, or any portion thereof, capable of displaying electronic text, symbols, figures, pictures, or images that can be electronically or mechanically changed by remote or automatic means. There are two subcategories:

- (a) **SIGN, ELECTRONIC MESSAGE CENTER (EMC), STATIC** - Copy and pictures may not change light intensity during the digital message; intensity may only change to comply with the light requirements discussed in section 235-60(C). Transition effects shall not be used between digital messages including, but not limited to fly in, fading, blinking, or rotation of images or words.

(b) SIGN, ELECTRONIC MESSAGE CENTER (EMC), DYNAMIC - Any characteristics of a sign that appear to have movement or that appear to change, that incorporates technology allowing the sign face to change the image without having to physically or mechanically replace the sign face or its components. This includes displays that incorporate LED, "digital ink", or any other method of technology that allows the sign face to present a series of images or displays, to include transition effects such as fly in, fading, blinking, or rotation of images or words, scrolling where, in total or in part, letters or images scroll across the face of the sign, flashing, and other animated sequences. [Amended 5-27-14 by Ord. No. 03.2014.03]

SIGN, DEVELOPMENT IDENTIFICATION - An on-site sign identifying, by logo, trademark, symbol, address, name or any combination thereof, of a building, premises or property. [Added 10-14-1997 by Ord. No. 10.97.10]

SIGN, FLAG - Any fabric, banner or bunting containing distinctive colors, patterns or symbols, used as a symbol of a government, political subdivision or other entity.

SIGN, FREESTANDING - Any sign supported by structures or supports that are placed on or anchored in the ground and that are independent from any building or other structure.

SIGN FRONTAGE - The length along the primary floor of a building front or portion of building front, having access on a street.

SIGN, INCIDENTAL - A sign, generally informational, that has a purpose secondary to the use of the lot on which it is located, such as "no parking," "entrance," "loading only," "telephone" and the like, including pricing of fuels.

SIGN, MARQUEE - Any sign attached to or in any manner made part of a permanent rooflike structure projecting beyond the wall of a building, generally designed and constructed to provide protection from the weather.

SIGN, NAMEPLATE - A sign, giving the name or address, or both, of the owner or occupant of a residential building or premises.

SIGN, OFF-PREMISE - A sign that is located on property that is not the premises, property, or site of the use identified or advertised in the sign. [Amended 5-27-14 by Ord. No. 03.2014.03]

SIGN, ON-SITE PREMISE - A sign relating in its subject matter to the lot on which it is located or to an activity conducted on the lot. [Amended 5-27-14 by Ord. No. 03.2014.03]

SIGN, PENNANT - Any lightweight plastic, fabric or other material, whether or not containing a message of any kind, suspended from a rope, wire or string, usually in series, designed to move in the wind.

SIGN, PORTABLE - Any sign not permanently attached to the ground or other permanent structure or a sign designed to be transported. "Portable signs" may include but are not limited to signs designed to be transported by wheels; signs with A- or T-frames; menu and sandwich boards; balloons or other inflated devices used as signs; umbrellas used for advertising; beacons; and signs attached to or painted on vehicles

parked and visible from the public right-of-way, unless said vehicle is used in the normal day-to-day operations of the business.

**SIGN, PROJECTING** - Any sign affixed to a building or wall in such a manner that its leading edge extends more than six inches beyond the surface of and is not essentially parallel to such building or wall.

**SIGN, ROOF INTEGRAL** - Any sign erected or constructed as an integral or essentially integral part of a normal roof structure or visual vertical cap or terminus of any design, such that no part of the sign extends vertically above the highest portion of the roof, cap or terminus and such that no part of the sign is separated from the rest of the roof by a space of more than six inches. [Amended 10-14-1997 by Ord. No. 10.97.10]

**SIGN, SANDWICH BOARD** - A sign, utilizing an A-frame or easel-type frame, which is not permanently attached to the ground or a building. This sign may have changeable copy. [Amended 10-14-1997 by Ord. No. 10.97.10]

**SIGN, SUSPENDED** - A sign that is suspended from the underside of a horizontal plane surface and is supported by such surface.

**SIGN, VEHICLE** - Any sign exceeding four 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 discernible 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-premise business or supplying directional information to an off-premise 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 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 upon 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;
- (c) The vehicle is parked for extended periods of time, both during business hours and when the business is closed and the land and vegetation surrounding the vehicle shows signs that the vehicle has not often moved;
- (d) The vehicle remains parked on the premises after normal business hours when customers and employees are not normally present on the premises.
- (e) Vehicle signs are prohibited in all districts. [Amended 5-27-14 by Ord. No. 03.2014.03]

**SIGN, WALL** - A sign attached to, painted on or erected against the wall of a building with the face in a parallel plane to the plane of the building wall, and projecting no more than 14 inches from the building wall.

**SIGN, WINDOW** - Any sign, pictures, symbol, or combination thereof, designed to communicate information about an activity, business, commodity, event, sale or service, that is placed inside or upon glass and is visible from the exterior of a building or structure. Such signs shall be permitted as long as they do not cover more than 75% of the total visible widow casing area. [Amended 5-27-14 by Ord. No. 03.2014.03]

## ARTICLE IX

### Signs

#### §235-51. Purposes.

The purposes of these sign regulations are to:

- A. Encourage the effective use of signs as a means of communication in the City of Laconia.
- B. Maintain and enhance the aesthetic environment of the City while retaining the city's ability to attract and encourage economic development and growth.
- C. Improve pedestrian and traffic safety.
- D. Minimize possible adverse effects of signs on nearby public and private property.
- E. Enable fair and consistent enforcement of these sign regulations.

#### §235-52 permit required. [Amended 8-14-2000 by Ord. No. 07.2000.07]

Except as otherwise provided in - 235-53, Signs allowed and exempted from permit requirements, no sign may be erected, placed, replaced, moved, enlarged, illuminated, or substantially altered in the City of Laconia without a permit in accordance with the provisions of this chapter. No permit shall be issued until a Master Signage Plan is filed with the City of Laconia for the parcel on which a permit is being sought. A permit application and fee shall be submitted to the Director of Planning and Community Development or his or her designee and include a set of plans to an appropriate scale showing the location, size, method of illumination and materials proposed for said sign. If required for development of the parcel, site plan approval from the Planning Board must be received prior to issuance of a permit.

#### §235-53. Signs allowed and exempted from permit requirements.

The following signs, excluding those prohibited under - 235-57, Prohibited signs, are exempt from the permit requirements of 235-52, Permit required. The failure to comply with any provisions of this section is considered a violation of this chapter:

- A. Permanent signs. Permanent signs are as follows:
  - (a) Nameplate signs giving property identification names or numbers or names of occupants.
  - (b) Signs on mailboxes or newspaper tubes.
  - (c) Signs posted on private property relating to private parking or
- (1) Signs not exceeding four square feet in area that are customarily associated with residential use and that are not of a commercial nature, such as:



warning the public against trespassing or danger from animals.

(2) Signs erected by or on behalf of or pursuant to the authorization of a governmental body, including legal notices, identification and informational signs, and traffic, directional or regulatory signs.

(3) Official signs of a noncommercial nature erected by public utilities.

(4) Flags of any governmental organization when not displayed in connection with a commercial promotion or as an advertising device. No flag shall exceed 60 square feet in area or be flown from a pole which is more than 40 feet in height from ground level.

(5) Incidental signs directing and guiding traffic on private property that do not exceed four square feet each and that bear no advertising matter.

(6) Building marker signs that do not exceed four square feet in area.

B. Temporary signs. Temporary signs are as follows:

(1) [Amended 5-27-14 by Ord. No. 03.2014.03] On-premise signs containing the message that the real estate on which the sign is located [including building(s)] is for sale, lease or rent, together with information identifying the owner or agent.

(a) Individual lots. Such signs may not exceed six square feet in area in residential districts or 32 square feet in area in nonresidential districts and shall be removed within 14 days after the sale, lease or rental of the property. For lots of less than five acres, a single sign on each street frontage may be erected. For lots of five acres or more in area and having a street frontage in excess of 400 feet, a second sign not exceeding six square feet in area may be erected.

(b) Subdivision developments. Where multiple lots within a single subdivision are being marketed for sale, one on-premise sign, up to 32 square feet in area, may be erected. Provided it is maintained in good repair, as determined by the Director of Planning and Community Development or his or her designee, it may remain in place for no longer than two years with one two-year extension as may be issued by the Director of Planning and Community Development or his or her designee. [Amended 8-14-2000 by Ord. No. 07.2000.07]

(2) Construction site identification signs. Such on-premise signs may identify the project, the owner or developer, architect, engineer, contractor and subcontractors, funding sources, and may contain related information including but not limited to sale or leasing information. Not more than one such sign may be erected per site, and it may not exceed 32 square feet in area. Such signs shall not be erected prior to the issuance of a building permit and shall be removed within 30 days after the issuance of the final occupancy permit.

(3) Signs attached temporarily to the interior of a building window or glass door. Such signs, individually or collectively, may not cover more than 75% of the surface area of the transparent portion of the window or door to which they are attached. Such signs shall be removed within 30 days after placement.

(4) Displays, including lighting, erected in connection with the observance of holidays. Such signs shall be removed within 10 days following the holidays.

(5) Political signs erected in connection with elections or political campaigns pursuant to RSA 664:17, Placement and Removal of Political Advertising. Such signs shall be removed by the candidate no later than the second Friday following the election unless the election is a primary and the advertising concerns a candidate who is a winner in the primary. No such sign may exceed 16 square feet in area.

(6) Signs, including pennant signs, indicating that a special event such as a grand opening, fair, carnival, circus, festival, or similar event is to take place on the lot where the sign is located. Such signs may be erected not sooner than three weeks before the event and must be removed not later than five days after the event.

(7) Temporary on-premise signs not covered in the foregoing categories. Such signs must meet the following restrictions:

(a) Not more than one such sign may be located on any lot.

(b) Such a sign may not be displayed for longer than seven consecutive days nor more than 14 days out of any one-year period.

(c) No such sign may exceed four square feet in area.

#### §235-54. Design, construction and maintenance.

A. All signs shall be designed, constructed and maintained in accordance with this chapter, the Building Code and the Electrical Code.' Except for portable signs, all signs shall be constructed of permanent materials and shall be permanently attached to the ground, a building or other structure. All signs shall be maintained in good structural condition in compliance with the Building and Electrical Codes and with this chapter at all times.

B. Downtown Riverfront District. Signs within the DR shall be constructed of natural materials, including wood, masonry, stone, metal or other material that resembles a natural material. Sign design shall be complimentary to the architectural style of the building and be similar to signage that respects the historical period of the structure. [Added 5-22-2000 by Ord. No. 05.2000.05]

Editor's Note: See Ch. 119, Building Construction, and Ch. 135, Electrical Standards.

#### §235-55. Master Signage Plan.

No permit shall be issued for an individual sign requiring a permit unless and until a Master Signage Plan for the lot on which the sign will be erected has been submitted. No sign permit shall be issued if the Master Signage Plan reveals that the total existing sign area on a lot, or the total existing sign area for an individual principal use on a lot is in excess of the sign area standards contained in this chapter. If the total existing sign area on a lot or for an individual principal use on a lot is reduced so as to comply with the sign area standards, then additional sign permits may be issued, provided that the lot or the individual principal use on a lot remains in compliance with the sign area standards at all times. The Master Signage Plan shall contain the following:

- A. An accurate plan of the lot, to scale, showing the location of buildings, parking lots, driveways and landscaped areas.
- B. The location of all existing signs.
- C. A description of each existing sign including type, size, height above ground, materials and method of illumination. If located on a building, the location shall be described.
- D. A photograph of each existing sign shall be included.
- E. The location of each proposed or future sign for which applications for permits will be submitted.

#### §235-56. Computations.

A. Computation of area of individual signs. The area of a sign shall include all of the surface area on which the letters, pictures, designs and symbols appear, together with the background, on which they are displayed, whether open or closed, and all beveled, rounded, angled or bordering surfaces intended or designed to enhance the visual impact of the sign. The area of a sign does not include its sides, or any supporting framework and bracing that is incidental to the display itself and is not designed to attract attention. Where the sign consists of letters or symbols affixed to a surface or building, without any distinguishing border, panel or background, the area shall be considered to be the smallest rectangle or shape which encompasses all of the letters and symbols. The area of one face of a double-faced sign, even if the two faces are not identical in message, shall be regarded as the total area of the sign, provided that such sign faces are part of the same sign structure and are not more than 42 inches apart.

B. Computation of height of a freestanding sign. The height of a sign shall be computed as the distance from the base of the sign at normal grade to the top of the highest attached component of the sign. Normal grade shall be construed to be the lower of the existing grades before construction, or the newly established grade after construction exclusive of any filling, berming, mounding, or excavating solely for the purpose of locating the sign.

C. Signs Properties bisected by District boundaries shall abide by the most restrictive zone's sign regulations.

#### §235-57. Prohibited signs.

All signs not expressly permitted under this chapter or exempt from permit requirements hereunder are prohibited in the City of Laconia. Such signs include, but are not limited to, the following:

A. On corner lots, signs of a height between 21/2 and eight feet above street grade in an area bounded by the adjacent street right-of-way lines and a straight line joining points along said right-of-way lines 20 feet from the point of their intersection.

B. Signs, or any point in a sign, higher than the roof ridge, the plate of a flat roof or the highest point of the roof.

C. Wall signs installed in such a way that windows on any story of a building are blocked.

D. Projecting signs that are lower than eight feet above grade or protrude above the sills of the windows above the first story.

E. Pennant signs except as specified in - 235-53B, Temporary signs.

F. No sign shall contain any flashing lights, except such portion of a sign which consists solely of indicators of time and temperature or is part of an animated sign. [Added 1014-1997 by Ord. No. 10.97.10]

G. Off-premise signs, except for temporary signs permitted, shall meet zoning standards, and may be allowed by Special Exception by the Zoning Board of Adjustment if the Board determines:

(1) Circumstances, unique to the structure, use or access, and the area in which the structure, use or access is located, exist, and

(2) The additional sign or sign area is necessary or desirable for public information and safety, and

(3) The additional sign or sign area is compatible with the area in which the sign will be located.

(4) Off-premise temporary signs for the purposes of advertising special events shall be exempt from this section.

#### §235-58. Table of Sign Regulations.

The following table displays the number, area and type of signs permitted for nonresidential uses in each of the zoning districts, and subject to the following provisions:

35. Editor's note: Said table is included at the end of this chapter.

A. The total number of signs for each business is indicated in the table. The total sign area for each shall not exceed the lesser of the following:

(1) In the C and CR Districts, an area equal to 1.5 square foot per linear sign frontage, or the maximum sign area indicated in the table.

(2) In all other districts, an area equal to one square foot per linear sign frontage, or the maximum sign area indicated in the table.

B. Freestanding and portable signs are permitted on the basis of one per lot where the lot frontage is less than or equal to 500 feet. Where lot frontage is greater than 500 feet, a second freestanding and a second portable sign are permitted.

C. Where there is no sign frontage on a lot, freestanding and portable signs are permitted with sign areas that do not exceed the maximum sign area indicated in the table.

D. For uses located on upper and lower floors with no sign frontage, window signs are permitted in addition to identification on a directory sign affixed to the building at the ground floor entry door providing access to said use. Directory signs are limited to 12 square feet in size.

E. Portable signs shall be located so as not to inhibit, obstruct or be a safety hazard to pedestrian and vehicular circulation.

§235-59. Development identification signs. [Amended 10-14-1997 by Ord. No. 10.97.10]

Development identification signs shall not be considered in the calculation of any total square footage of sign area permitted on individual lots or for individual tenants or occupants. However, they shall meet the height requirement in the district in which they are located.

A. Residential. One freestanding sign of up to 20 square feet in area is permitted at the main entrance to a residential subdivision or development for the purpose of identifying such subdivision or development. Where such developments or subdivisions are further subdivided into distinct areas, an additional freestanding identification sign of up to 12 square feet in area may be erected at the access point to said area.

B. Nonresidential. For nonresidential developments, the property or building name may be displayed on one of the permitted signs. The maximum area of the single sign utilized for this purpose may be increased by 30% for the purpose of displaying this information as a development identification sign, in which case no separate development identification sign shall be permitted.

§235-60. Illumination of signs.

A. No sign in residential districts may be illuminated from within, but may be illuminated by a fully shielded external light source. For nonresidential uses in residential districts, signs may be illuminated during the hours that the use is open or in operation, or between the hours of 6:00 am and 11:00 pm.

B. Fixtures used to illuminate signs shall be located, aimed, and shielded so as to minimize glare perceptible to drivers, pedestrians, bicyclists, and other passersby within adjacent streets or rights-of-way. Light sources shall utilize energy efficient fixtures to the greatest extent practicable. Light fixtures including bulbs or tubes used for sign illumination shall be selected and positioned to achieve the desired brightness of the sign which ensuring compliance withal applicable requirements of this Chapter.

C. Illuminance of a sign face shall not exceed the following standards:

- (1) External illumination: Illumination suspended or located on the exterior of a sign, such as goose-neck fixtures shall be limited to 50 foot-candles as measured on the sign face.
- (2) Internal illumination: Illumination of signs from within, but with no graphic displays shall be limited to 10,000 nits (candelas per square meter measured perpendicular to the rays from the source) during daylight hours, and 500 nits between dusk and dawn, as measured at the sign's face.
- (3) Direct illumination: No more than 10,000 nits during daylight hours, and 500 nits between dusk and dawn, as measured at the sign's face.
- (4) All electronic changing signs shall be equipped with automatic dimming controls, so the brightness level will be highest during the day and lowest at night. Manufacturer specifications shall be submitted at the time of the sign permit specifying maximum sign brightness.

D. Electronic Message Center (EMC):

All permitted EMCs shall be equipped with a sensor or other device that automatically determines the ambient illumination and programmed to automatically dim according to ambient light conditions at all times of the day or night. Electronic changing signs may be freestanding or building mounted, one or two-sided, may be a component of a larger sign or billboard, and shall conform to the following minimum requirements along with all other requirements for signage within this ordinance

- (1) Electronic Message Center portion of the sign shall not make up more than 75% of the actual sign surface. In no case shall an electronic message center exceed 32 square feet.
- (2) Animation on Static EMCs shall be limited to the actual changing of the message. No flashing, blinking, or pulsating of lights shall be allowed. Electronic Message Centers must be equipped to freeze in one position or discontinue the display in the event that a malfunction occurs.
- (3) Minimum Display Time: All illumination elements on the face of Static electronic changing signs shall remain at a fixed level of illumination for a period of not less than five

minutes.

(4) No more than one EMC will be allowed per lot.

(5) Software for operating the EMC must be able to show current and factory brightness levels

upon request. The owner/installer of Electronic Message Displays shall certify as part of the

application that signs will not exceed the brightness levels specified in this section.

#### §235-61. Insurance requirements for nongovernmental signs in a public right-of-way.

Any applicant for a permit to locate a sign over the public right-of-way, in accordance with this chapter, shall file with the City a certificate of insurance indemnifying the City against any form of liability in the minimum amount of \$100,000. No permit shall be issued prior to the receipt of said certificate and the permit shall be valid only so long as the certificate remains in effect. The policy shall provide for advance notification to the City in the event of cancellation. Should the policy lapse or be cancelled, the applicant shall remove the sign immediately.

#### §235-62. Nonconforming signs.

A sign lawfully installed prior to the adoption of this chapter for which a permit has been previously issued, or if a permit is obtained for said sign within six months after the effective date of this chapter, shall be deemed a permitted nonconforming sign. Such a nonconforming sign shall, however, be subject to the following regulations:

A. No nonconforming sign shall be altered in any way in structure or material which makes the sign less in compliance with the requirements of this chapter than it was prior to the alteration.

B. No nonconforming sign shall be relocated to a position making it less in compliance with the requirements of this chapter.

C. If the nonconforming sign is removed, except for maintenance or seasonal storage, it shall be replaced only with a sign that is in conformance with the provisions of this chapter.

D. Should a nonconforming sign be destroyed by any means to an extent of more than 75% of its replacement cost at the time of its destruction, it shall not be reconstructed except in conformity with the provisions of this chapter.

# **Statistical Analysis of the Relationship between On-Premise Digital Signage and Traffic Safety**

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## ABBREVIATIONS

The abbreviations shown below are used in this report.

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AIC	Akaike Information Criterion
ANOVA	Analysis of Variance
BIC	Bayesian Information Criterion
CEVMS	Commercial Electronic Variable Message Signs
CG	Control Group
DF	Degrees of Freedom
EB	Empirical Bayes
EBB	Electronic Billboard
FHWA	Federal Highway Administration
HSIS	Highway Safety Information System
HSM	<i>Highway Safety Manual</i>
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
MS	Mean of Sum of Squares
MSE	Error Mean Square
MST	Treatment Mean Square
RTM	Regression to the Mean
SAR	Spatial Autoregressive Model
SEM	Spatial Error Model
SFI	Signage Foundation, Inc.
SPF	Safety Performance Function
SS	Sum of Squares
SSE	Sum of Squares for Error
SST	Total Sum of Squares
TTI	Texas A&M Transportation Institute

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## EXECUTIVE SUMMARY

The use of digital on-premise signs, which are typically business-related signs that have the ability to change the displayed message, has increased significantly in recent years. On-premise digital signs are located on the same property as the businesses they promote, and some part — or a significant part in some cases — of the sign contains a digital display that can be programmed to change the message at pre-set intervals. Because the use of these signs has increased, jurisdictions have used local sign codes or ordinances to regulate the manner in which digital messages are displayed. Jurisdictions typically justify these regulations by citing traffic safety impacts. However, no comprehensive and scientifically based research efforts have evaluated the relationship between on-premise digital signs and traffic safety.

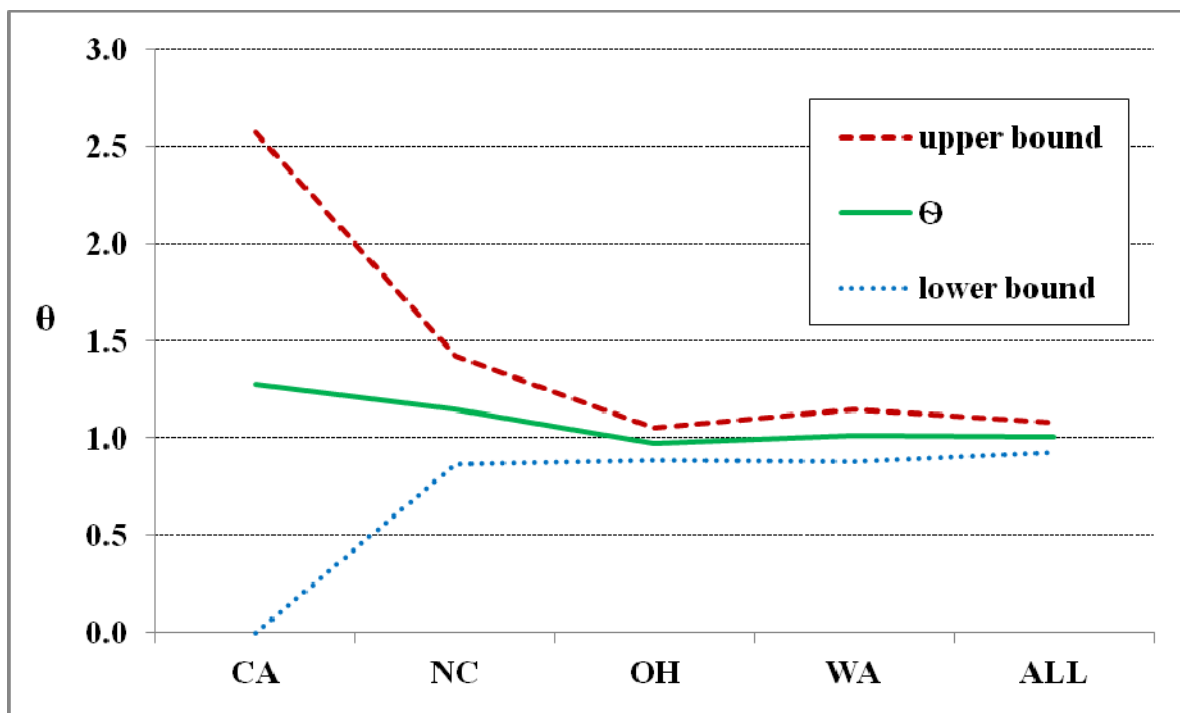
In this study, researchers collected large amounts of sign and crash data in order to conduct a robust statistical analysis of the safety impacts of on-premise digital signs. The statistical tools used the latest safety analysis theory developed for analyzing the impacts of highway safety improvements. The research team acquired the crash data from the Highway Safety Information System, which is a comprehensive database of crash records from several states. One of the advantages of these data is that they also include information about roadway characteristics, such as the number of lanes, speed limit, and other factors. The research team then acquired information about the location of on-premise digital signs from two sign manufacturing companies. Through significant effort by the researchers, these two datasets were merged into a single dataset that represented potential study locations in California, North Carolina, Ohio, and Washington. Of the initial set of over 3,000 possible sites, the research team was able to identify 135 sign locations that could be used for the safety analysis. Potential sites were eliminated from consideration due to any of the following factors:

- The sign location was not on a roadway that was included in the crash dataset; only major roads were represented in the crash data.
- The sign location provided by a sign manufacturing company could not be verified through online digital images of the location.
- Only signs installed in calendar years 2006 or 2007 could be included in order to have adequate amounts of crash data before and after the sign was installed.

The research team then used the empirical Bayes method to perform a before-after statistical analysis of the safety impacts of the on-premise digital signs. In a before-after study, the safety impact of a treatment (in this case, the installation of an on-premise digital sign) is defined by the change in crashes between the periods before and after the treatment was installed. However, simply comparing the crash frequencies (known as a naïve before-after analysis) is not adequate to account for factors such as regression to the mean (a statistical concept that explains why after data can be closer to the mean value than the before data) and to provide a means of controlling for external factors that can also cause a difference in crash frequencies. The empirical Bayes method represents the recommended procedure for evaluating the impacts of safety treatments because it overcomes the deficiencies of the naïve method. The safety impacts are represented by the safety index, which is indicated by the symbol  $\theta$ . In simple terms, the safety index represents a ratio of safety in the after period compared to safety in the before period, although it is not as

simple as dividing the crashes in the after period by the crashes in the before period. A safety index greater than 1.0 indicates an increase in crashes in the after period, and a value less than 1.0 indicates a reduction in crashes in the after period. However, because of the variability in the crash data, the analysis must have statistical validity. Statistical variability is established by defining the 95 percent confidence interval for the safety index, which is based on factors such as sample size and the variability of the data. If the 95 percent confidence interval includes the value of 1.0, then there is a 95 percent chance that there is no statistically significant change in crashes between the before and after periods.

The results of the statistical analysis are presented in Figure 1. This figure shows that the safety index for all of the states was 1.0 with a 95 percent confidence interval that ranged from 0.93 to 1.07. This indicates that, for the 135 sites included in the analysis, there was no statistically significant change in crashes due to the installation of on-premise digital signs. The same can also be said about the results for each of the four states on an individual basis because the confidence interval for safety index for each state includes 1.0. The larger confidence intervals for some of the states are due to greater variability in the data and/or smaller sample sizes. The researchers also analyzed single-vehicle and multi-vehicle crashes and found the same result of no statistically significant change in crashes. Finally, the researchers performed an analysis of variance for the sign factors of color, size, and type of business and found no statistically significant differences in the mean safety index values for individual factors.



**Figure 1. Summary of study results**

The results of this study provide scientifically based data that indicate that the installation of digital on-premise signs does not lead to a statistically significant increase in crashes on major roads.

## **CHAPTER 1: INTRODUCTION**

For many generations, most signs — including both traffic and business signs — were static. They displayed only one message that did not change with time. Advances in information display technologies in recent years have led to an increase in the use of many types of digital signs, particularly in the area of on-premise and off-premise business signs. On-premise digital signs provide the ability to communicate a wide variety of messages and to change the manner in which the message is presented over time. As such, these digital signs represent a significant advancement in communication technologies and the ability to deliver valuable marketing information to potential customers. However, some groups have raised questions related to the traffic safety aspects of business signs that change messages on a frequent basis. The traffic safety concerns are often related to issues of potential driver distraction from the roadway due to the dynamic nature of these signs. These safety concerns are sometimes addressed through local regulation of these types of signs, which may prohibit or limit the use of on-premise digital signs. These regulations tend to be developed at the local level and do not have a significant level of scientific, nationally based research supporting the regulations.

The traffic safety concerns associated with on-premise digital signs have existed for some time, but there has been little research, particularly on a national level, that directly addresses the safety impacts of on-premise digital signs. In part, this is due to the fact that the use of such signs has grown only in the last 5–10 years. The research described in this report was conducted to provide a scientifically based, national analysis of on-premise digital signs so that the traffic safety impacts of such signs can be better understood.

### **RESEARCH APPROACH**

The basic research method used in this study is a before-after statistical analysis of the change in traffic crashes at locations where digital signs were installed. The research team used digital sign installation information provided by sign manufacturers to identify locations in selected states where digital signs had been installed in the 2006–2007 time frame (this time frame was selected to provide adequate numbers of crashes in both the before and after periods). The analysis locations were limited to California, North Carolina, Ohio, and Washington because these states are part of the Federal Highway Administration (FHWA) Highway Safety Information System (HSIS). The HSIS is a database of crash records that includes detailed information about the roadway and crashes, including such factors as the number of lanes, the speed limit, crash severity, and other factors. The researchers then mapped the sign sites to the crash datasets to identify locations with crashes. These locations were then analyzed to compare the crashes before installation of the digital sign to the crashes after installation of the sign using statistical analysis procedures.

### **DESCRIPTION OF A DIGITAL SIGN**

For the purposes of this study, a digital sign is defined as a sign that uses an electrical display, such as a liquid crystal display (LCD) or light-emitting diode (LED), to provide changeable



messages or graphics. There are several types of digital signs, including digital billboards, indoor video advertisements, and street-level advertisements (such as LED signs on bus shelters). For this study, the researchers focused only on on-premise digital signs, which are signs located on the same property as the business with which they are associated. The research effort did not include or address off-premise signs or billboards.

## **RESEARCH ACTIVITIES AND REPORT ORGANIZATION**

There were five major activities associated with this research effort. The study began by reviewing and evaluating previous research on the safety aspects of digital signs and the statistical methods that other researchers have used to evaluate the safety aspects of signs. Chapter 2 describes the results of the review of background information. The researchers then began to collect information related to digital signs and crash data in the selected states. The sign information included the location and date of installation, and the crash data included the location and date. The researchers then devoted extensive effort to matching the locations and dates of the signs and crash datasets. Chapter 3 describes the sign and crash data and how the two datasets were merged together. Once this was accomplished, the next step was to develop a valid and scientifically based statistical analysis procedure to determine if there were any statistically significant changes in crashes after installation of digital signs. Chapter 4 describes the development of a statistical methodology, including a comparison of the advantages of the different options for conducting the statistical analysis. Finally, the research team used the results of the statistical analysis to define the key study findings, which are described in Chapter 5. Chapter 6 presents the conclusions and recommendations for the research study.

## **CHAPTER 2: BACKGROUND INFORMATION**

This chapter provides a review of the literature related to on-premise digital signs and their impacts on traffic safety. The review also includes a summary of statistical methods that can be used for evaluating the safety effects for these types of signs. Although the majority of the work has been related to off-premise digital signs, key studies associated with off-premise signs are nonetheless briefly discussed here. It should be pointed out that compared to other types of roadway-related operational and design features, such as access point density on urban arterials or on-street parking designs, the number of documents that are related to either on- or off-premise signs is relatively small.

On-premise signs are signs that are located on the same property as the activity described in the sign, while off-premise signs are located away from the activity identified in the sign. Off-premise signs are also known as third-party signs or outdoor advertising, and the most common example is a billboard. In general, off-premise signs have a larger visible area, which is attributed to the fact that these signs usually have greater surface areas and have higher mounting heights than on-premise signs. Furthermore, off-premise signs have a larger viewership because they are usually located adjacent to freeways and major highways with higher traffic volume. On the other hand, on-premise signs are installed on private property where a company conducts its business, and most are located along urban streets or local roadways. According to *The Signage Sourcebook* (U.S. Small Business Administration, 2003), the viewing opportunities for outdoor advertising (typically 333,350 cars per day) are much greater than those for an on-premise sign (30,000 cars per day).

The literature review is divided into two sections. The first section summarizes studies related to on-premise digital signs. The second section presents the summary of two key studies associated with off-premise digital signs.

### **ON-PREMISE DIGITAL SIGNS**

This section describes the characteristics of the studies that have examined the relationship between safety and on-premise digital signs. To the knowledge of the authors, only two studies have investigated this relationship. It should be pointed out that the safety relationships identified in these research documents were not based on crash data but more on opinions and hypotheses, which limits their value as a direct measure of on-premise sign safety. The first study was conducted by Mace (2001). This author performed a literature review and listed two hypotheses about how on-premise signs can influence crash risk. The first hypothesis states that on-premise business signs distract drivers' attention from their primary driving tasks, resulting in higher crash risks. The second hypothesis asserts that on-premise business signs may mask the visibility of regulatory and warning road signs, which also can negatively influence crash risk.

On the other hand, Mace (2001) noted positive effects associated with commercial signs. He reported that commercial signs could reduce unnecessary traffic exposure by providing adequate navigation information for drivers, such as providing restaurant information for hungry drivers.

However, only measuring the frequency and duration of drivers' distraction may not represent the safety impacts of on-premise signs because a study published earlier showed that half of the objects that drivers see are not related to driving tasks (Hughes and Cole, 1986). In other words, besides on-premise signs, other roadside features may also distract drivers. The possible solution to minimize the negative effects of an on-premise sign, but still keep its positive effects, is to separate the sign's content to primary (navigation) and secondary (commercial) information.

Although, in the past, on-premise signs and off-premise signs were treated as distinct signage, they are becoming more homogeneous in terms of characteristics. In the second study, Wachtel (2009) mentioned that more roadside businesses, especially those with multiple users (e.g., shopping centers, auto malls, sports complexes, and entertainment places), now install larger-sized on-premise digital signs because of the lower cost and better performance of the LED display. Wachtel indicated that the largest digital advertising sign in the world is an on-premise sign in New York City. This sign is 90 ft tall and 65 ft wide, and is mounted on a 165-ft-tall steel post on the roof of the warehouse. The visible distance is over 2 miles. Wachtel also suggested that some on-premise signs affect traffic safety more than some off-premise digital signs because the locations and elevations of on-premise signs might be closer to the road users. In addition, the angles of on-premise signs may be out of the cone of vision and require extreme head movements to read.

In summary, these two studies showed more research is needed for understanding the relationship between on-premise digital signs and crash risk.

## **OFF-PREMISE DIGITAL SIGNS**

This section is divided into two parts. The first part describes two key studies that have examined the safety effects of off-premise digital signs. The second part covers methodologies that have been used for estimating these effects.

### **Safety Effects**

There are two reports that provide reviews of the findings, methods, and key factors related to the safety effects of off-premise digital signs. The first systematic study related to the impacts of off-premise signs was conducted 11 years ago by Farbry et al. (2001). Their study reviewed earlier reports and analyses (including those about electronic billboards and tri-vision signs) and provided the foundation for the second study written by Molino et al. (2009). In the second report, Molino et al. (2009) reviewed 32 related studies, which included those initially reviewed by Farbry et al. (2001), and noted that the majority of studies reported a negative effect between digital billboards and traffic safety. Although the number of studies that showed harmful impacts is five times more than the number of studies that showed no harmful impacts, the authors suggested that this ratio may not be strong evidence to prove the negative effects linked to electronic billboards (EBBs). The individual studies considered by these researchers had very different study methods and statistical powers, which can have a significant effect on the quality and results of the research.

Another important finding in the Molino et al. (2009) report is that drivers usually have spare attention capacities, and they can be distracted from their driving tasks by roadside objects (such as EBBs). However, these distractions may be riskier when the driving demands increase, such as in fixed hazard areas (e.g., intersections, interchanges, and sharp curves), in transient risky conditions (e.g., adverse weather, vehicle path intrusions, and slow traffic), or when other important information is processed at the same time (e.g., an official traffic sign). In other words, not only will the sign's internal characteristics (overall size, legend size, color, contrast, luminance level, etc.) affect crash risk, but so will external environmental factors (type of road, speed, weather conditions, time of day, etc.). Hence, Molino et al. list all possible key factors and suggest further studies to examine how they could influence safety. These factors are categorized into two groups: independent and dependent variables. The independent variables are separated by subject into five subgroups: billboard, roadway, vehicle, driver, and environment. It should be noted that the relationship between EBBs and on-premise signs is discussed in the environment subgroup, and dynamic factors of on-premise signs, such as change rate, motion, video, and sound, are listed as extremely important. The dependent variables are separated into vehicle behavior, driver/vehicle interaction, driver attention/distraction, and crash categories. Since there are hundreds of related key factors, the authors claimed that "No single experiment can provide the solution" and suggested future research programs to address the following topics: (1) determining when distraction caused by commercial electronic variable message signs (CEVMSs) affects safe driving, (2) investigating the relationship between distraction and various CEVMS parameters, and (3) examining the relationship between distraction and safety surrogate measures, such as eye glance and traffic conflicts.

Table 1 summarizes the literature review results from these two reports. This table shows that the results of crash studies are not consistent, and most studies have some important weaknesses, such as neglecting biases related to the regression to the mean (RTM) (discussed below) and site-selection effects (using the naïve method), low statistical power, and analysis results based on erroneous assumptions. It should be noted that only post-hoc crash studies are listed here because this study focuses on the change of crash rate caused by on-premise digital signs.

As mentioned, Table 1 shows that the results related to the safety effects of off-premise signs are inconsistent. The inconsistencies can be fully or partly attributed to various study limitations. For instance, the studies in the Wachtel and Netherton report (1980) and Wisconsin Department of Transportation report (1994) both used a naïve before-after study methodology (methodology approaches are described in Chapter 4), and they did not account for the RTM bias, which may change their estimates of crash rate and safety effects of signs. The general idea of RTM is that when observations are characterized by very high (or low) values in a given time period and for a specific site (or several sites), it is anticipated that observations occurring in a subsequent time period are more likely to regress toward the long-term mean of a site (Hauer and Persaud, 1983). Also, these studies should provide the variance of estimators (that is the uncertainty associated with the estimator) for judging the statistical significance of their results. Moreover, grouping studies where the objectives or types of signs are different is not appropriate. For example, the goal of the report prepared by Tantala and Tantala (2007) was to study the safety impacts caused by converting traditional billboards to digital billboards, while other studies focused on the safety impacts after installation of new digital billboards. Those are two distinct effects that are examined and should not be grouped together to evaluate the safety effects of on-premise digital

signs. Wachtel (2009) also noted other limitations in Tantala and Tantala's study, such as a lack of adequate before-after and comparison group data; no clear definition and reasonable calculation of the visual range and legibility range of EBBs; and no crash data related to adverse weather, impaired drivers, and interchanges.

**Table 1. Safety effects of off-premise digital signs**

Study	Methods	Data Type	Results	Location	Sample Size
Wachtel and Netherton (1980)	Naïve before-after study	Crash frequency	The crash reduction of target area was 10% less than the overall reduction (after the installation of the signs)	Tele-Spot sign, Boston	Not provided
Wisconsin Department of Transportation (1994)	Naïve before-after study	Crash frequency, Average daily traffic (ADT)	Crash rate (eastbound): all crashes increased 36%, sideswipe crashes increased 8%, and rear-end crashes increased 21%	Milwaukee, Wisconsin	2
			Crash rate (westbound): all crashes increased 21%, sideswipe crashes increased 35%, and rear-end crashes increased 35%		
Smiley et al. (2005)	Before-after study (empirical Bayes)	Crash frequency, ADT, safety performance function	Downtown intersection sites: no significant change in crash rate (all crashes increased 0.6%, injury crashes increased 43%, and rear-end crashes increased 13%)	Toronto, Canada	3
	Before-after study (control group)	Crash frequency, ADT, control group	Rural sites: no significant change in crash rate based on most compared sites	Toronto, Canada	1
Tantala and Tantala (2007)	Naïve before-after study	Crash frequency, control group, ADT	No significant change in crash rate	Cuyahoga, Ohio	7
Tantala and Tantala (2009)	No description of the method		No significant change in crash rate	Cuyahoga, Ohio	7

The second shortcoming in Tantala and Tantala (2007) is that they used a simple correlation analysis between sign density and crash rate to examine safety effects of billboards. Using this approach, they found that the correlation coefficients among the scenarios analyzed were very low (around 0.20), indicating that the installation of billboards did not increase the number of crashes. This may well be true, but they did not use the right analysis tool. For investigating the relationship between sign density and the number of crashes, it is more appropriate to develop one or several regression models since the safety analyst can have a better control over other factors that can influence the number and severity of crashes (Lord and Mannering, 2010). In a regression model, several independent variables can be included, which is better to estimate the variable of interest (such as the installation of digital signs). However, it should be pointed out that the before-after study, as performed in this study, still remains the best methodological approach for estimating the safety effects of an intervention.

Among all studies in Table 1, Smiley et al. (2005) provides the more reliable results since they used a before-after method using a control group (CG) and empirical Bayes (EB) approach. The

only limitation is related to the small sample size. The authors of the study only evaluated three sites. Even with a small sample size, the EB method can still be successfully used to evaluate the safety effects of an intervention, as was done by Ye et al. (2011). Ye et al. (2011) used the EB method to estimate the safety impacts of gateway monument signs, which can be categorized as one type of off-premise sign. Gateway monuments are roadside structures used to introduce a city or town. These monuments usually have the name of the city or town and are located at the city limits.

According to Wachtel et al. (2009) and Farbry, (2001), using crash data might not be a precise method because crashes usually have multiple causal events, which are difficult to extract from crash datasets. For example, they noted that sign internal variables (such as size, brightness, viewing angle, etc.) might play main roles in drivers' distraction or ignoring of official traffic signs, while other external factors affect conflicts and crash risk. Although those reasons may be legitimate, utilizing crash data is still the best approach for evaluating the safety effects of interventions as well as those associated with operational and design features (Hauer 1997). As stated by Hauer, *"It follows that, in the final account, to preserve the ordinary meaning of words, the concept of safety must be linked to accidents."* Furthermore, using crash data have other advantages: lower cost and fewer artificial errors. Firstly, the cost of conducting a before-after crash study is much lower than human-centered methods because the researchers do not need to purchase equipment and hire participants for conducting driving tests. Secondly, crash data are based on crash reports, which can provide a more accurate measure of safety than surrogate measures such as speed, driver behavior, or other measures. Only by conducting a before-after crash study can one provide results that combine multiple casual variables in the real world. Other methods cannot displace the above advantages, which explain why the research team selected the before-after methodology for estimating the safety effects of digital signs.

### **Characteristics of the Evaluation Methods Used in Previous Studies**

This section describes the characteristics of other methods used in previous studies for examining the safety effects of off-premise digital signs. In addition to a crash before-after study approach, the most common study methods that have been used for examining the safety impacts of off-premise signs include eye fixations, traffic conflicts, headways and speeds, and public surveys. Most studies used one or more of the above methods to examine the impacts of off-premise signs (Molino et al., 2009). For instance, Smiley et al. (2005) used four different methods (eye fixation, conflict study, before-after crash study, and public survey) for examining a video sign located in Toronto. On the other hand, Lee et al. (2007) used eye fixations and a questionnaire for their study. It should be noted that the results from multiple measurements are usually inconsistent.

Briefly, the eye fixation study method uses an eye-tracking system to record drivers' eye movements. The results (e.g., eye glances and durations) can provide direct evidence of where drivers are looking while driving, leading to assumptions as to whether drivers are distracted when they are driving near or toward a sign (or at other roadside features). Traffic conflicts, often referred to as surrogate measures of safety, can be used for identifying risky driving behaviors, such as braking without good reason, inappropriate lateral lane displacement, and delays at the start of the green traffic signal phase. Headways and vehicle speed can be used to

assess distracted drivers since those drivers tend to have shorter headways and higher speed variances.

Most details about experiment design, such as the participant number, study site size, driving route length, and experiment duration can be found in Appendix B of the report prepared by Molino et al. (2009). In the current study, the researchers focus the discussion on the before-after crash data study method for two reasons. First, Molino et al. (2009) did not provide a detailed experimental design for using crash data, and some studies were criticized for inappropriate methodology (Tantala and Tantala, 2007; 2009). Second, the costs associated with other experimental methods are significant and are greater than the resources that were allocated for the current research study. According to Molino et al. (2009), the budgetary costs to conduct research using other experimental methods vary between \$0.4 million and \$0.8 million for using on-road instrumented vehicles, \$2 million and \$4 million for conducting a naturalistic driving study, and \$1 million and \$3 million for using an unobtrusive observation approach.

## **CHAPTER 3: STUDY DATA**

To conduct the safety analysis, the research team had to develop plans for collecting the necessary data, manipulating the data into a format that could be used for the safety analyses, and then conducting the statistical analysis to identify the safety impacts of on-premise digital signs. The success of this project relied upon the ability to acquire two distinct sets of data and the robustness of the individual datasets. The two datasets needed for the analysis included (1) information regarding the location and installation dates for on-premise digital signs, and (2) data regarding crash histories on the roadways in the vicinity of the on-premise digital signs. The latter also included information about operational (e.g., traffic flow and speed limit) and geometric (e.g., functional class and lane width) design features located at and adjacent to the on-premise digital signs. From the beginning of the project, the research team expected to use the HSIS crash data for the crash history dataset. The real challenge of this project was identifying specific information about on-premise digital signs for the states represented in the HSIS, and the researchers encountered numerous challenges in acquiring this information. Once the data for both groups were acquired, the researchers had to overcome differences in the datasets so that the data could be merged into a single dataset for analysis. The activities associated with the acquisition of the crash data, acquisition of the sign data, and the merging of the two datasets are described in this chapter.

### **CRASH DATA**

The HSIS is operated and maintained by the FHWA, and is widely used for safety research programs that provide input for public policy decisions. The HSIS is a multistate relational database that contains crash, roadway, and vehicle information. Crash information/files contain basic crash information, such as location (based on reference location or mile-point), time of day, lighting condition (e.g., daylight, dark and no lighting, dark and roadway lighting, etc.), weather conditions, crash severity, the number of related vehicles, and the type of crash (e.g., head-on, right angle, sideswipe, etc.). Each row in the spreadsheet file contains crash information for individual crashes and a unique ID number, and each column represents a variable. The roadway information/files provide traffic and geographic information for each roadway segment, such as annual average daily traffic (AADT), speed limit, beginning mile-point, end mile-point, number of lanes, lane and median width, shoulder width and type, rural or urban designation, and functional classification. The vehicle information/files contain driver and vehicle information, such as a crash identification number, driver gender, driver age, contributing factor (possible causal factor), vehicle type, and others. These individual file types can be linked together as a whole dataset. For example, crash files and road files can be linked by their location information (route number and mileage), or crash files and vehicle files can be linked together by their crash identification number.

Currently, there are seven states that actively participate in the HSIS: California, Illinois, Maine, Minnesota, North Carolina, Ohio, and Washington. However, the HSIS has an upper limit on the amount of data that can be requested by researchers (including the number of states, the request area, and total variables). To maximize the value of the crash data that they could request, the



research team held discussions with the research advisory panel to identify the states (from the list of seven HSIS participating states) where there would be higher concentrations of on-premise digital signs. Based on this input, the research team requested HSIS data for California, North Carolina, Ohio, and Washington in order to get a maximum number of study sites. All crash datasets were downloaded from the HSIS website and stored in a spreadsheet format. The definitions for the variables in a state's crash data were found in the HSIS guidebooks. It should be noted that each state has its own guidebook and data record format. In other words, one specific variable might be available for some states, but this variable may have different meanings or category types, or even be unavailable for other states. The inconsistent definitions among different states' crash datasets can affect the quality of analysis and results when selecting specific variables for identifying target crashes (such as rear-end crash) needed for more advanced analysis. The differences between states also create challenges when trying to merge data into a single dataset for analysis.

Although the HSIS dataset provides the most comprehensive crash data from different states, the HSIS has some limitations. First, the HSIS only includes crashes that occur on major roads, such as interstate highways, U.S. highways, and state highways. The HSIS dataset may not include crash-related data for secondary roads in rural areas or city streets in urban areas, including arterial streets that are major roads in a city but are not on the state highway system. Table 2 identifies the level of crash coverage and roadway length for each state selected for the analysis.

**Table 2. HSIS crash coverage and roadway length by state**

<b>California</b>	<ol style="list-style-type: none"> <li>1. More than 500,000 crashes occur each year; HSIS includes about 38% of those crashes.</li> <li>2. HSIS includes 15,500 miles of mainline (non-ramp) roadways.</li> </ol>
<b>North Carolina</b>	<ol style="list-style-type: none"> <li>1. About 230,000 crashes occur each year; HSIS includes 70% of those crashes.</li> <li>2. Of the 77,000 miles of roadway on the North Carolina state system, approximately 62,000 miles are included in the database.</li> </ol>
<b>Ohio</b>	<ol style="list-style-type: none"> <li>1. About 380,000 crashes occur each year; HSIS includes 40% of those crashes.</li> <li>2. In Ohio, about 116,000 miles of highway in total; HSIS includes approximately 19,500 miles of roadway.</li> </ol>
<b>Washington</b>	<ol style="list-style-type: none"> <li>1. 130,000 crashes occur each year; HSIS includes 37% of those crashes.</li> <li>2. HSIS contains 7,000 miles of mainline (non-ramp) roadway.</li> </ol>

Another limitation of the HSIS data is that the dataset is not continuously updated. The HSIS data represent the final crash datasets from each state after the state has processed the crash data. As a result, the HSIS dataset may not include the last several months or more of crash data from a state. Currently, the most updated HSIS crash data are through 2009 (California is updated to 2008), so the most recent one or two years of crashes are not included in the HSIS data. Also, the oldest HSIS crash data extend back only through 2004. Limiting crash data to the period from 2004 to 2009 was a significant consideration in this research project because the large growth of on-premise digital signs is relatively recent, having mostly grown since the mid- to late 2000s. The lack of data for the last two to three years created challenges with respect to developing a robust statistical analysis procedure. For a comparison of safety impacts of a treatment (such as installation of a digital sign) to be meaningful, both the before and after analysis periods need to be about equal and as long as possible. This meant that, to have two-year analysis periods (two years before and two years after) in the safety analysis, on-premise digital signs needed to be

installed in either 2006 or 2007. In order to focus the safety analysis on the long-term impacts of on-premise digital signs, the researchers did not include the calendar year of installation of a sign in the analysis. For example, if a sign was installed in 2006, the before period was calendar years 2004 and 2005, and the after period was calendar years 2007 and 2008.

An additional limitation of the HSIS crash data is that the crash location within the HSIS is identified to the nearest 0.1 mile (528 ft) on the roadway. This required the safety analysis to be conducted for the tenth of a mile length of roadway that a sign was located within. The level of accuracy is the primary reason that 0.1 miles was chosen as the effective area of the sign.

The researchers viewed the limitations mentioned above as minor and ones that had minimal impact on the study results. There are no comparable crash datasets available to researchers that could be used for a similar type of analysis of crashes. The only alternative available to the researchers would have been to try and obtain crash data from individual agencies where on-premise digital signs have been installed. Such an approach may have provided more specific data about individual signs and site characteristics, but would have resulted in an extremely small dataset. The researchers felt that such small sample sizes would not provide sufficient robustness for statistical analysis and that the approach using the HSIS data provided greater scientific validity and robustness, as discussed in the previous chapter.

## **SIGN DATA**

With the acquisition of the HSIS data, the research team had information to analyze crashes but had no idea about where to conduct the analysis. Determining the location for the crash analysis required information regarding the location of on-premise digital signs. Furthermore, due to the date limitations of the HSIS data, only sign sites where the sign was installed in 2006 or 2007 could be used for the crash analysis. So the research team began the process of identifying locations in California, North Carolina, Ohio, and Washington where on-premise digital signs had been installed on major roads in 2006 or 2007.

Initial attempts to identify sign locations focused upon getting information from the Signage Foundation, Inc., (SFI) research advisory panel. However, the results did not provide a large enough sample size for a robust statistical analysis. The research team began to contact sign installation companies but encountered challenges in acquiring the large amount of data needed to conduct the research. The primary challenge associated with contacting sign installation companies (which are the same companies that market the signs to individual businesses) was the proprietary nature of the business information the research team was requesting. Another challenge was the large number of individual companies that needed to be contacted to develop a robust sample size.

Because of the challenges of working with sign installation companies, the research team shifted the focus to sign-manufacturing companies. Eventually, the research team was able to work with two electronic sign-manufacturing companies to get a list of on-premise digital signs installed in any of the four study states during 2006 or 2007. Each of the two lists was converted into datasets for use in the research effort. The first dataset (dataset #1) contained 2,953 sign sites and 27 variables, which included the characteristics of signs and roads, such as sign order date, sign

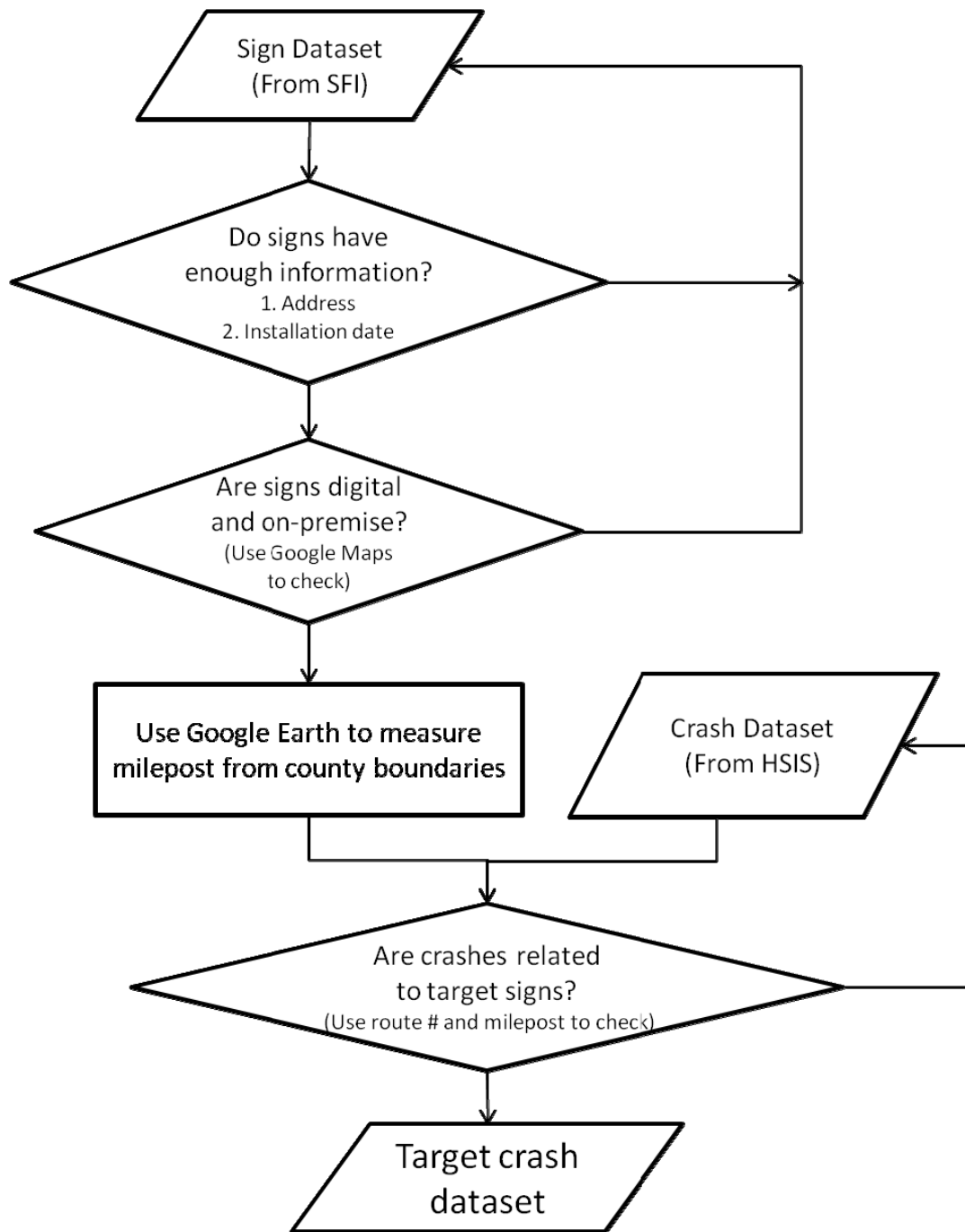
address (road, county, and state), the nearest cross street and its distance from the sign, the nearby cross street with the highest volume and its distance from the subject intersection, and traffic volume on the subject road. The research team did not use the road information from dataset #1, relying instead upon the road data in the HSIS crash dataset. This ensured consistency in the approach with the different sign datasets. Also, the sign installation date was considered to be the sign order date plus two weeks. This assumption was based on input from the sign-manufacturing company. Since the entire year that the sign was installed was excluded from the analysis, this was considered not to be a critical issue.

The second dataset (dataset #2) had 63 site addresses and 10 variables. Unlike the first dataset, most variables in dataset #2 were related to product information, such as installation data, sales representative, product name, matrix, color, customer ID (address), and status of signs.

For the analysis, these two datasets were combined as one for use in analyzing the crashes by individual state. The combined dataset was further refined by removing all sign locations that were not installed in either 2006 or 2007. The calendar year that a sign was installed was treated as the construction year, and the crashes that occurred in that year were removed from the analysis. The entire calendar year was removed from the analysis due to uncertainty over the actual installation date of the sign since the data provided only the order date for the sign. Removing the entire calendar year associated with installation also eliminated the novelty effect associated with implementing a new feature. The second variable, the sign installation address, was used to select related crashes by the sign's location and default sign-effective areas. For example, the researchers defined the crashes located within 0.1 miles from the target signs as related crashes. In reality, the effective area could be larger or smaller depending upon the sign size. The procedure used for this analysis did not adjust the effective area based on sign size or other factors. Overall, significant effort was put into ensuring the accuracy of the sign datasets because the quality of the data had a huge impact on the precision and accuracy of the analysis.

## **DATA-MERGING PROCEDURE**

The previous sections explain how the researchers obtained their study data (the sign dataset and the crash dataset) and the characteristics of each dataset. This section gives more details about the dataset-merging procedure. Several steps were involved in merging the crash and sign location datasets into a single dataset that could be used for statistical analysis. The early steps focused on confirming that the digital sign was still in place and near the road that it is related to. This was needed because a site could have an address on one road but have the sign facing traffic on another road bordering the site property. The later steps focused upon converting the street address of the sign location to a route and milepost value that could be used with the crash dataset. This complex effort was necessary due to the fact that the sign and crash datasets used different location methods. The sign dataset was based on the site address, while the crash database was based on route number and milepost. For example, a location in the sign dataset would record a location with "1234 North Highway 101, Anytown, WA 98584," but the HSIS would show the same location as "route number = 23101" and "mile post = 335.72." In order to define the related crashes that were adjusted to the target signs, the researchers needed to transfer sign locations into the HSIS location system. The basic steps are described below and illustrated in Figure 2.



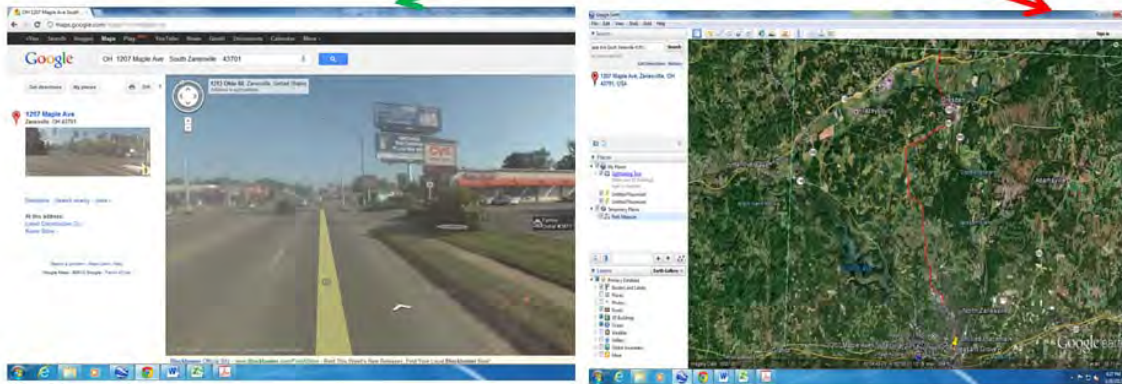
**Figure 2. The flow chart for data collection and merging procedure**

1. For each record of the combined sign dataset (3,016 total records), the research team evaluated the location information (typically a street address) and the sign order date. Records with missing or incomplete location information or with assumed sign installation dates that were not in 2006 or 2007 were deleted from the dataset.

2. Research team members then verified the location of the sign using the site address in the sign dataset and taking the steps listed below. Figure 3 shows an example table that the researchers used for the above data collection, including screenshots of Google Maps and Google Earth (Google Earth, 2008). Columns 1–3 are the address information given by the sign companies. Columns 4–7 are determined through Google Maps, and Columns 8–11 are determined through Google Earth.
  - a. The sign was located in Google Maps using the site address.
  - b. Using the Street View feature of Google Maps, a member of the research team identified the sign on the site or deleted the record with a note that the on-premise digital sign could not be identified. There were some challenges associated with finding digital signs using the Street View pictures from Google Maps, including fuzzy pictures with low resolution, which made it difficult to evaluate some signs, and digital signs that were not obvious during the daytime (Street View provides only daytime pictures).
  - c. The screen image of the subject sign was saved, and basic sign characteristics were identified and/or estimated. Examples include sign color, size, and business type.
  - d. An initial determination was made as to whether the sign was located on a major road that would be part of the HSIS crash dataset. If the road was not expected to be a major road, the record was deleted from the dataset.
3. The sign location was entered into Google Earth to determine the county in which the sign was located and the mileage from the county border. This included identifying the county identification code in the appropriate HSIS manual for a given state. This provided the milepost location information needed to relate the sign location to the location information in the crash dataset. Defining the milepost information required doing the following:
  - a. Identifying the neighboring county, which was used to determine in which direction the mileposts were increasing.
  - b. If the county had mileposts restarting at zero at the county borders, determining in which direction they were increasing, based on the number of lanes at the borders. If the direction could not be determined, a general rule of increasing from west to east or south to north was used.
  - c. Using the path tool in Google Earth to measure the distance from the county border to the sign. This distance and the beginning milepost at the county border established the milepost of the sign.

An example (using the above procedure) can be founded in Appendix A. After target sign locations were transferred into the HSIS locating system, a statistics software package, “R,” was used to select the related crashes among the whole HSIS dataset.

Sign ID	Address	Installation date	Google Map				Google Earth				Note
			Picture	Color (Single/ Multi.)	Dimension	Business Type	County ID	Route #	Distance	Mile post	



**Figure 3. Example work table of site data collection**

## **CHAPTER 4: STUDY METHODOLOGY**

Evaluating the effects of treatment on the number and severity of crashes is a very important topic in highway safety. For the last 30 years, various methods have been proposed for evaluating safety treatments (Abbess et al., 1981; Danielsson, 1986; Davis, 2000; Hauer, 1980a; Hauer, 1980b; Hauer et al., 1983; Maher and Mountain, 2009; Miranda-Moreno, 2006; Wright et al., 1988). The methods are classified under two categories: the before-after study and the cross-sectional study. In a before-after study, the safety impacts of an improvement or treatment at a given location are determined by comparing the change in crashes before and after the improvement/treatment was installed. In a cross-sectional study, crashes or crash rates on two different facilities with similar characteristics except for the improvement of interest are compared. The before-after study is typically more desirable because it provides a more direct evaluation of the safety impacts. Although they have been used by some researchers (Noland, 2003; Tarko et al., 1998), cross-sectional studies are more difficult to conduct because different facilities are rarely identical in all features except the one of interest. Hence, the cross-sectional approach was not used in this research. The before-after type of study can be further divided into several types:

- naïve before-after study,
- before-after study with control group,
- before-after study using the EB method, and
- before-after study using the full Bayes approach.

The before-after study using the full Bayes approach is a more recent development in statistical safety analysis, developed and used by several noted safety researchers (Hauer and Persaud, 1983; Hauer et al., 1983; Hauer, 1997; Li et al., 2008; Persaud and Lyon, 2007). The advantages and disadvantages for each of the above before-after methods are described in more detail in this chapter.

### **A BEFORE-AFTER STUDY AND A CROSS-SECTIONAL STUDY**

As mentioned previously, observational crash studies can be grouped into two types: the before-after study and the cross-sectional study. The selection of the study type is based on the availability of historical crash data, traffic volume, or the comparison group. The following sections provide details about the before-after methodology.

#### **The Before-After Study**

The before-after study is a commonly used method for measuring the safety effects of a single treatment or a combination of treatments in highway safety (Hauer, 1997). Short of a controlled and full randomized study design, this type of study is deemed superior to cross-sectional studies since many attributes linked to the converted sites where the treatment (or change) was implemented remain unchanged. Although not perfect, the before-after study approach offers a

better control for estimating the effects of a treatment. In fact, as the name suggests, it implies that a change actually occurred between the “before” and “after” conditions (Hauer, 2005).

As described by Hauer (1997), the traditional before-after study can be accomplished using two tasks. The first task consists of predicting the expected number of target crashes for a specific entity (i.e., intersection, segment where an on-premise sign was installed, etc.) or series of entities in the after period, had the safety treatment not been implemented. In other words, the before-after approach described by Hauer compares the expected number of crashes in the after period with the treatment installed to the expected number of crashes in the after period had the treatment not been installed. The calculation for each expected number of crashes is based on numerous factors, including the actual number of crashes in the before condition, the actual number of crashes in the after period, and incorporation of site-specific and statistical considerations. The symbol  $\pi$  is used to represent the expected number of crashes in the after period (a summary of all statistical symbols used in this report are presented in Appendix B). The second task consists of estimating the number of target crashes (represented by the symbol  $\lambda$ ) for the specific entity in the after period. The estimates of  $\pi$  and  $\lambda$  are  $\hat{\pi}$  and  $\hat{\lambda}$  (the caret or hat represents the estimate of an unknown value). Here, the term “after” means the time period after the implementation of a treatment; correspondingly, the term “before” refers to the time before the implementation of this treatment (an on-premise digital sign in this study). In most practical cases, either  $\hat{\pi}$  or  $\hat{\lambda}$  can be applied to a composite series of locations (the sum of  $i$ 's below) where a similar treatment was implemented at each location.

Hauer (1997) proposed a four-step process for estimating the safety effects of a treatment. The process is described as follows (see also Ye and Lord, 2009):

- Step 1: For  $i = 1, 2, \dots, n$ , estimate  $\lambda(i)$  and  $\pi(i)$ . Then, compute the summation of the estimated and predicted values for each site  $i$ , such that  $\hat{\lambda} = \sum \hat{\lambda}(i)$  and  $\hat{\pi} = \sum \hat{\pi}(i)$ .
- Step 2: For  $i = 1, 2, \dots, n$ , estimate the variance for each,  $Var\{\hat{\lambda}(i)\}$  and  $Var\{\hat{\pi}(i)\}$ . For each single location, it is assumed that observed data (e.g., annual crash counts over a long time frame) are Poisson distributed and  $\hat{\lambda}(i)$  can be approximated by the observed value in the before period. On the other hand, the calculation of  $Var\{\hat{\pi}(i)\}$  will depend on the statistical methods adopted for the study (e.g., observed data in naïve studies, method of moments, regression models, or EB technique). Assuming that crash data in the before and after periods are mutually independent, then  $Var\{\hat{\lambda}\} = \sum Var\{\hat{\lambda}(i)\}$  and  $Var\{\hat{\pi}\} = \sum Var\{\hat{\pi}(i)\}$ .
- Step 3: Estimate the parameters  $\delta$  and  $\theta$ , where  $\hat{\delta} = \hat{\pi} - \hat{\lambda}$  (again, referring to estimated values) is defined as the reduction (or increase) in the number of target crashes between the predicted and estimated values, and  $\hat{\theta} = \hat{\lambda} / \hat{\pi}$  is the ratio between these two values. When  $\theta$  is less than one, the treatment results in an improvement in traffic safety, and when it is larger than one, the treatment has a negative effect on traffic safety. The term  $\theta$  has also been referred to in the literature as the index of effectiveness (Persaud et al., 2001). Hauer (1997) suggests that when less than 500 crashes are used in the before-after study,  $\theta$  should be corrected to remove the bias caused by the small sample size using



the following adjustment factor:  $1/[1 + \text{Var}\{\hat{\pi}\}/\hat{\pi}^2]$ . The total number of crashes was over 500, but the adjustment factor had to be applied when subsets of the data, such as single- or multi-vehicle crashes, were analyzed.

- Step 4: Estimate the variances  $\text{Var}\{\hat{\delta}\}$  and  $\text{Var}\{\hat{\theta}\}$ . These two variances are calculated using the following equations (note:  $\text{Var}\{\hat{\theta}\}$  is also adjusted for the small sample size):

$$\text{Var}\{\hat{\delta}\} = \text{Var}\{\hat{\lambda}\} + \text{Var}\{\hat{\pi}\} \quad (\text{Eq. 1})$$

$$\text{Var}\{\hat{\theta}\} = \frac{\hat{\theta}^2[(\text{Var}\{\hat{\lambda}\}/\hat{\lambda}^2) + (\text{Var}\{\hat{\pi}\}/\hat{\pi}^2)]}{[1 + (\text{Var}\{\hat{\pi}\}/\hat{\pi}^2)]^2} \quad (\text{Eq. 2})$$

The four-step process provides a simple way for conducting before-after studies. Three common before-after methods will be introduced in the following sections. All three methods use the same four-step process.

## COMMON METHODS FOR CONDUCTING A BEFORE-AFTER STUDY

Having selected the before-after study approach, the research team then needed to decide which specific before-after method would be the most appropriate for analyzing the safety impacts of on-premise digital signs. This section of the report describes the methodologies and data needs associated with three before-after study types: naïve before-after studies, before-after studies with a CG, and the EB method.

### Naïve Method

Among all the before-after methods, the naïve method is the simplest. The estimation of  $\theta$  is simply equal to the ratio between the number of crashes in the after period and the number of crashes in the before period (which is used to predict the number of crashes in the after period if the treatment was not implemented). Equation 3 illustrates how the index of safety effectiveness is calculated. This method is very straightforward, but it is seldom used in the current safety study because it does not account for the RTM bias. Not including the RTM bias could overestimate the effects of the treatment or underestimate the safety impacts. The naïve method does not account for external factors that occur at the local or regional level, such as changes in weather patterns or economic conditions.

$$\hat{\theta}_{naive} = \frac{\hat{\lambda}}{\hat{\pi}} = \frac{\sum_{i=1}^n \sum_{j=1}^t N_{ij2}^T}{\sum_{i=1}^n \sum_{j=1}^t N_{ij1}^T} \quad (\text{Eq. 3})$$

Where

$\hat{\theta}_{naive}$  = the estimate of safety effectiveness by using the naïve method,

$\hat{\pi}$  = the predicted number of crashes for the treatment group in the after period,

$\hat{\lambda}$  = the estimated number of crashes for the treatment group in the after period,

$n$  = the sample size,

$t$  = the time period,

$N_{ij1}^T$  = the observed response for site i (T = treatment group) and year j (in the before period),  
and  
 $N_{ij2}^T$  = the observed response for site i (T = treatment group) and year j (in the after period).

The result can be adjusted when the traffic flow and time interval are different between the before and after periods. It is adjusted by modifying the predicted number of crashes as shown in Equation 4:

$$\pi = r_d r_f \sum_{i=1}^n \sum_{j=1}^t N_{ij1}^T \quad (\text{Eq. 4})$$

Where

$r_d$  = the ratio of the duration between the after and before periods, and  
 $r_f$  = the ratio of the traffic flow between the after and before periods.

### Control Group Method

The CG method can be used to help control for external factors. The number of crashes collected at the control sites is defined as  $\mu$  (before) and  $v$  (after). The adjusting factor, the ratio of  $v$  to  $\mu$ , is used to remove the effects caused by other external factors from  $\pi$  in the theorem. Equation 5 illustrates how to adjust the naïve estimate. It should be pointed out that the RTM could technically be removed if the characteristics of the control group are exactly the same as those of the treatment group. However, getting control group data with the exact same characteristics may not be possible in practice, as discussed in Kuo and Lord (2012). Collecting control group data usually adds extra cost and time compared to the naïve method since more data needs to be collected.

$$\hat{\theta}_{CG} = \frac{\hat{\lambda}}{\hat{\pi} \times \frac{\hat{v}}{\hat{\mu}}} = \frac{\sum_{i=1}^n \sum_{j=1}^t N_{ij2}^T}{\sum_{i=1}^n \sum_{j=1}^t N_{ij1}^T \times \sum_{i=1}^n \sum_{j=1}^t \frac{N_{ij2}^C}{N_{ij1}^C}} \quad (\text{Eq. 5})$$

Where

$\hat{\theta}_{CG}$  = the estimate of safety effectiveness by using the control group method,  
 $\hat{\lambda}$  = the estimated number of crashes for the treatment group in the after period,  
 $\hat{\pi}$  = the predicted number of crashes for the treatment group in the after period,  
 $\hat{v}$  = the estimated number of crashes for the control group in the after period,  
 $\hat{\mu}$  = the estimated number of crashes for the control group in the before period,  
 $N_{ij1}^T, N_{ij1}^C$  = the observed responses for site i (T = treatment group and C = control group) and year j (in the before period), and  
 $N_{ij2}^T, N_{ij2}^C$  = the observed responses for site i (T = treatment group and C = control group) and year j (in the after period).

## Empirical Bayes Method

The EB method is recommended in the *Highway Safety Manual* (HSM), published by the American Association of State Highway and Transportation Officials (AASHTO) and approved for use by the FHWA (AASHTO, 2010). The HSM is a recent document that defines standardized procedures for conducting safety analyses of highway safety improvements. The EB method combines short-term observed crash numbers with crash prediction model data in order to get a more accurate estimation of long-term crash mean. The EB method is used to refine the predicted value by combining information from the site under investigation and the information from sites that have the same characteristics, such as range of traffic flow, number of lanes, lane width, etc.

As an illustration, Hauer et al. (2002) use a fictional “Mr. Smith” to illustrate use of the EB method: Mr. Smith is a new driver in a city. He has no crash records during his first year of driving. Based on past crash histories for the city, a new driver in that city has 0.08 accidents per year. Based only on Mr. Smith’s record, it is not reasonable to say that he will have zero accidents or have 0.08 accidents for the next year (based on the average of all new drivers but disregarding Smith’s accident record). A reasonable estimate should be a mixture of these two values. Therefore, when estimating the safety of a specific road segment, the accident counts for this segment and the typical accident frequency of such roads are used together.

The index of safety effectiveness is illustrated in Equation 6. With the EB method, the analyst first estimates a regression model or safety performance function (SPF) using the data collected with the control group. Then, the model is applied to the sites where the treatment was implemented to get a preliminary predicted value for the after period. The EB method is then used to refine the estimate to account for the RTM bias and the external factors. It is possible for the EB method to be biased if the characteristics of the treatment and control groups are not the same (Lord and Kuo, 2012).

$$\hat{\theta}_{EB} = \frac{\hat{\lambda}}{\hat{\pi}} = \frac{\sum_{i=1}^n \sum_{j=1}^t N_{ij2}^T}{\sum_{i=1}^n \sum_{j=1}^t M_{ij1}^T} \quad (\text{Eq. 6})$$

Where

$\hat{\theta}_{EB}$  = the estimate of safety effectiveness based on the EB method;

$\hat{\pi}$  = the predicted number of crashes for the treatment group in the after period;

$\hat{\lambda}$  = the estimated number of crashes for the treatment group in the after period;

$M_{ij1}$  = the expected responses for site i for the EB method,

$$M_{ij1} = W \times (\hat{\Lambda}_1) + (1 - W) \times \left( \sum_{j=1}^t N_{ij1} \right);$$

$W$  = the weight for sites for the EB method,  $W = \frac{1}{1 + \hat{\Lambda}_1 \times \hat{\alpha}}$ ;

$\hat{\Lambda}_1$  = the estimate for the average number of crashes of all sites in the before period; and

$\hat{\alpha}$  = the estimate of the dispersion parameter.

$\hat{\Lambda}_i$  and  $\hat{\alpha}$  can be estimated using two different approaches (Hauer, 1997). They can be estimated based on a regression model or the method of moment. Both are calculated using data collected as part of the control group. For this research, the average number of crashes and dispersion parameter were estimated using a regression model.

## CALCULATION PROCEDURES AND EXAMPLES

The EB before-after method was applied to this study with the regression models or SPFs selected from the HSM (AASHTO, 2010), which includes road types from two to five lanes. As for sites located on wider roads (six lanes and eight lanes, which are not covered in the HSM), the researchers used the SPFs from a Texas A&M Transportation Institute (TTI) study (Bonneson and Pratt, 2009). The number of crashes in each year during the before period ( $\Lambda_i$ ) was estimated using the regression model shown in Equation 7:

$$\Lambda_i = \exp(a + bLn(AADT_i) + Ln(L_i)) \quad (\text{Eq. 7})$$

Where

$\Lambda_i$  = the estimator for the average number of crashes per year for site i,

$a, b$  = the coefficients in the regression model,

$AADT_i$  = the average daily traffic volume for site i,

$L_i$  = the road length for site i, and

$Ln$  = natural logarithm.

Table 3 shows the regression coefficients (a, b) used in Equation 7 for multi- and single-vehicle crashes.

One of the sign sites in Ohio provides an example of the detailed calculation of  $M_{i,EB}$ . This site is on an urban 4-lane divided highway segment in Allen County. As shown in Table 3, its intercept is -12.34 for multi-vehicle crashes and -5.05 for single-vehicle crashes, while the coefficients for the AADT are 1.36 and 0.47, respectively. For the analysis used in this report, a multi-vehicle crash is one involving two or more vehicles in the same collision.

Using the EB method, the analysis procedure to get the expected number of crashes in the before period has the following steps:

1. Identify the route number and milepost by the site's address. More specifically, the address of the example site is "1234 ABC St, Name of City, Allen County, OH." Follow the data analysis procedures discussed in Chapter 3 to identify that the route number is 657676309 and the milepost is 7.58.

**Table 3. Coefficients for multi and single-vehicle crash regression model**

Crash Type	Road Type*	Regression Coefficients		Dispersion Parameter ( $\alpha$ )
		Intercept (a)	AADT (b)	
Multi-vehicle	2U	-15.22	1.68	0.84
	3T	-12.4	1.41	0.66
	4U	-11.63	1.33	1.01
	4D	-12.34	1.36	1.32
	5T	-9.7	1.17	0.81
Single-vehicle	2U	-5.47	0.56	0.81
	3T	-5.74	0.54	1.37
	4U	-7.99	0.81	0.91
	4D	-5.05	0.47	0.86
	5T	-4.82	0.54	0.52

Note: \*U = undivided road, T = road with two-way left turn lane, D = divided road.

- Based on the route number and milepost obtained above, use R statistical software to select the related crashes and road files from the HSIS dataset, which includes (1) the observed crashes near the target sign site, (2) the observed crashes in the control group sites (10 sites, which are adjusted to the target sign site on the same road), and (3) the target road file, such as traffic volume, the number of lanes, and median type. For example, the number of observed crashes at the example site is 1 in 2004, and the crash counts of the related 10 control group sites are 0, 0, 1, 1, 0, 0, 0, 0, 1, and 1. The AADT of the site is 19,753 (vehicles/day), and it has four lanes.
- Use Equation 9 to predict the crash number of the example site:

$$\hat{\Lambda}_{2004} = \exp(a + b(\ln(AADT)) + \ln(L))$$

$$\hat{\Lambda}_{2004, \text{multi}} = \exp(-12.34 + 1.36 \times \ln(19753) + \ln(0.2)) = 0.61$$

$$\hat{\Lambda}_{2004, \text{single}} = \exp(-5.05 + 0.47 \times \ln(19753) + \ln(0.2)) = 0.13$$

$$\hat{\Lambda}_{2004} = \hat{\Lambda}_{2004, \text{multi}} + \hat{\Lambda}_{2004, \text{single}} = 0.74 \text{ (crashes/year)}$$

The estimated crash counts of the site and its control group sites are 0.74 and 6.64, respectively (the estimated multi-and single crash counts of its control group are 5.36 and 1.28).

- Due to using the SPFs from the HSM instead of the local SPFs from any existing studies conducted in the same study area, it is necessary to multiply the results by a calibration factor to adjust the prediction value (refer to Appendix A in the HSM for more details). The calibration factor of single-vehicle crashes at the example site in 2004 is 3.13, which is equal to the ratio of observed crashes in the control group divided by the predicted crash number in the control group ( $3.13 = (1 \times 4 + 0 \times 6) / 1.28$ ). By multiplying the above calibration factor, the final crash number estimation for the example site in 2004 should be 0.42 ( $= 0.13 \times 3.13$ ). A calibration factor was calculated for each site and each year included in the study.

5. Repeat steps 3 and 4 to get the final prediction crash number for the example site for each year in the before period. By doing so, the estimated multi- and single-vehicle crash counts of the site in 2005 are 4.65 and 0.21, respectively. Using the summary of this prediction crash number and dispersion parameter (obtained from Table 3) results in the weights ( $W$ ) for this site for the multi- and single-vehicle crashes, which are 0.07 and 0.65, respectively:

$$W = \frac{1}{1 + \hat{\Lambda}_1 \times \hat{\alpha}}$$

$$W_{multi} = \frac{1}{1 + (5.43 + 4.65) \times 1.32} = \frac{1}{1 + 10.08 \times 1.32} = 0.07,$$

$$W_{single} = \frac{1}{1 + (0.42 + 0.21) \times 0.86} = \frac{1}{1 + 0.63 \times 0.86} = 0.65$$

6. Because traffic volume and other explanatory variables may change between the before and after periods, the researchers used one factor to account for this difference. The crash counts of the example site in 2007 and 2008 can be estimated by repeating steps 3 and 4. The estimated multi- and single-vehicle crash counts of the site in the after period are 0.84 and 0.67, respectively. Factors are estimated by:

$$r = \hat{\Lambda}_{after} / \hat{\Lambda}_{before}$$

$$r_{i,multi} = (12.76 / 3) / (10.08 / 2) = 0.84$$

$$r_{i,single} = (0.63 / 3) / (0.63 / 2) = 0.67$$

Also, if the time periods ( $Y$ ) of the before and after periods are different, one factor is needed to adjusted it. Here, the before and after period are both two years:

$$t_i = Y_{i,after} / Y_{i,before} = 3 / 2 = 1.5$$

7. Using the EB method, the expected total number of crashes that would occur during the after period had the on-premise digital sign not been installed was 2.63:

$$M_{i,EB} = \left[ W \times (\hat{\Lambda}_1) + (1 - W) \times \left( \sum_{j=1}^t N_{ij1} \right) \right] \times r_i \times t_i$$

$$M_{i,multi,EB} = [0.07 \times 10.08 + (1 - 0.07) \times 0] \times 0.84 \times 1.5 = 1.14$$

$$M_{i,single,EB} = [0.65 \times 0.63 + (1 - 0.65) \times 3] \times 0.67 \times 1.5 = 1.49$$

$$M_{i,all,EB} = 1.14 + 1.49 = 2.63$$

8. The variance of the EB estimate at the example site is calculated by:

$$\text{Var}(M_{1,EB}) = (1 - W) \times M_{1,EB} \times r_i \times t_i$$

$$\text{Var}(M_{1,multi,EB}) = (1 - 0.07) \times 1.14 \times 0.84 \times 1.5 = 1.31$$

$$\text{Var}(M_{1,single,EB}) = (1 - 0.65) \times 1.49 \times 0.67 \times 1.5 = 0.54$$

$$\text{Var}(M_{1,all,EB}) = 1.31 + 0.54 = 1.85$$

9. The safety index of the example site is:

$$\hat{\theta}_{EB} = \frac{\hat{\lambda}}{\hat{\pi}} = \frac{\sum_{i=1}^n \sum_{j=1}^t N_{ij2}^T}{\sum_{i=1}^n \sum_{j=1}^t M_{ij1}^T} = \frac{9}{2.63} = 3.43$$

10. The 95 percent confidence interval of the example site is given as.

$$\hat{\theta} \pm Z_{0.25} \sqrt{\text{Var}(M_{1,EB})} = [3.43 \pm 1.96 \times \sqrt{1.85}] = [0.76, 6.10]$$

The same method was applied to other locations using the appropriate SPFs. The next chapter provides the final results of the completed safety analysis.

## **CHAPTER 5: RESULTS**

The previous chapter explained why the research team chose to use the EB analysis procedure and provided an example of how the EB analysis was conducted. The first section of this chapter provides the results of the before-after study for each state and all the states combined. The second section provides more details about how digital on-premise signs impact traffic safety for multi-vehicle and single-vehicle crashes. The third section provides a description of an analysis of variance of the means of the safety index ( $\theta$ ) among the different sign characteristics such as sign color, sign size, and type of business.

### **INDIVIDUAL AND COMBINED RESULTS**

As described in Chapter 3, the research team acquired the sign dataset from sign manufacturers. However, many signs were excluded from the analysis because of missing information in the dataset provided by the sign manufacturers or limitations in the HSIS crash dataset. The researchers retained only sign sites satisfying the following conditions:

1. the sign was located in Washington, North Carolina, Ohio, or California;
2. the sign was installed in 2006 or 2007 in order to have adequate time in both the before and after analysis periods to compare crash histories; and
3. the sign was located on a major road because the HSIS crash dataset usually does not include crashes that are located on minor roads or private driveways.

Table 4 shows the progression in sample sizes based on sites meeting the conditions identified above. For example, the original dataset for Washington included 413 site addresses that might have an on-premise digital sign. In order to make sure there was an adequate before-after crash data period for further analysis, the researchers had to filter these site addresses. The first filter excluded sites where the sign was not installed in 2006 or 2007, which was needed so that there was adequate time before and after the sign was installed to perform the safety analysis. About 40 percent of the Washington sites (159 sites) met this criterion. Then, the research team used the Street View function in Google Maps to double-check whether a digital sign was present at the given addresses and whether the sign was on a major road since the HSIS crash dataset only included crashes on major roads. Only 33 sites fit this criterion. The result was that in Washington, the research team was able to use about 33 of the 400 original sites, giving an 8.0 percent yield on the raw data.

Chapter 3 mentions that the main advantage of this study is the large sample size of data and advanced statistical methods that provide more accurate results than in similar studies. Figure 4 shows the sample size of this study in relation to other published papers and reports. This study has 135 sites from four states, a number much higher than the sample size of other similar studies. Hence, the results of this study are more robust and accurate.



**Table 4. Sign site sample size yield**

Number of Sites	California	North Carolina	Ohio	Washington	All States
Included in original list from sign manufacturers	86	249	372	413	1,120
Sign installation time between 2006–2007	27	94	178	159	458
Digital signs & located on major roads	6	40	73	34	153
With HSIS crash data (all crashes)	6	33	63	33	135
Data yield rate	7.0%	13.3%	16.9%	8.0%	12.1%
With HSIS crash data (multiple-vehicle crashes)	6	31	61	33	131
With HSIS crash data (single-vehicle crashes)	6	32	63	33	134

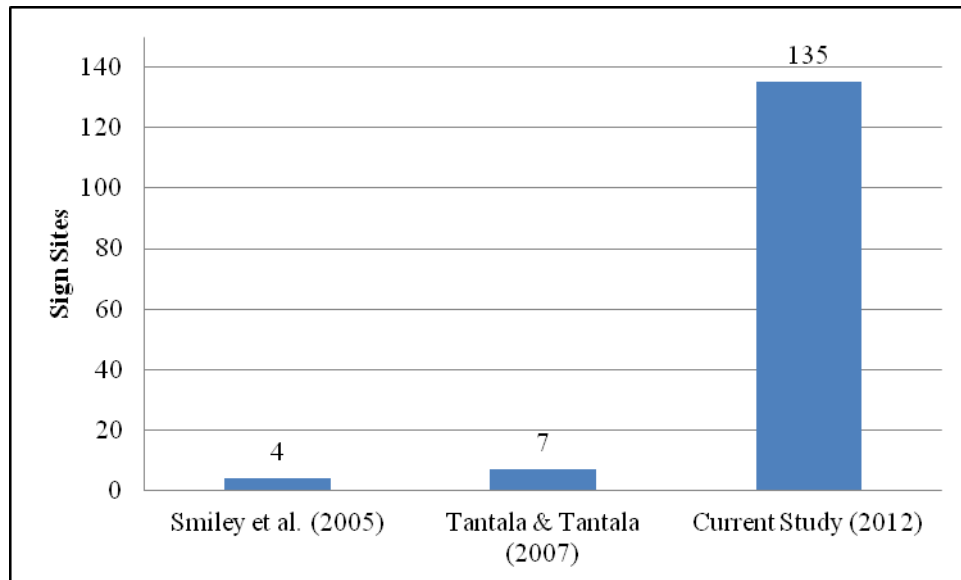
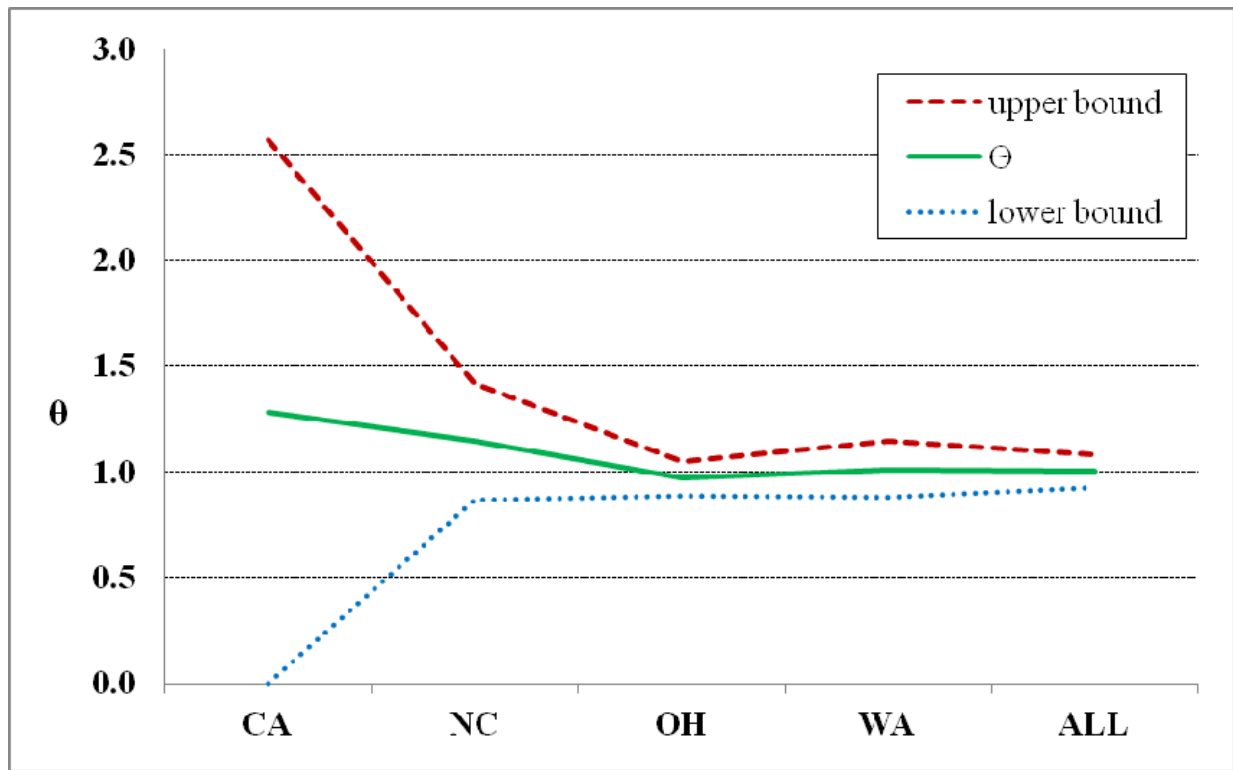
**Figure 4. A comparison of sample sizes from similar studies**

Table 5 presents the before-after results from the EB and the naïve statistical analysis methods. The naïve method results are provided only for comparison purposes as the naïve analysis method does not provide as meaningful results as the EB method. The results are also presented graphically in Figure 5. A safety effectiveness index ( $\theta$ ) of 1.0 indicates that there was no change in crashes between the before and after conditions. An index greater than 1.00 indicates that there was an increase in crash frequency in the after condition, while a value less than 1.00 indicates a decrease in crash frequency. The upper and lower bounds indicate the limits of statistical significance. If the value for  $\theta$  is between the upper and lower bounds, then the change in crashes is not statistically significant at a 95 percent confidence level. A larger sample size usually leads to a smaller difference between the upper and lower bounds, but this may not always be the case since it is also governed by the variability observed in the data.

**Table 5. Results of statistical analysis of before-after crash condition**

State	EB Method			Naïve Method		
	Lower Bound	$\theta$	Upper Bound	Lower Bound	$\theta$	Upper Bound
California	0.00	1.25	2.53	0.28	0.85	1.41
North Carolina	0.87	1.14	1.41	0.88	1.13	1.39
Ohio	0.89	0.97	1.05	0.95	1.05	1.15
Washington	0.88	1.01	1.15	0.79	0.90	1.01
All states*	0.93	1.00	1.07	0.93	1.00	1.07

Notes: \*\*“All states” represents the combined data of the four states.  
Naïve method values provided for comparison purposes only.

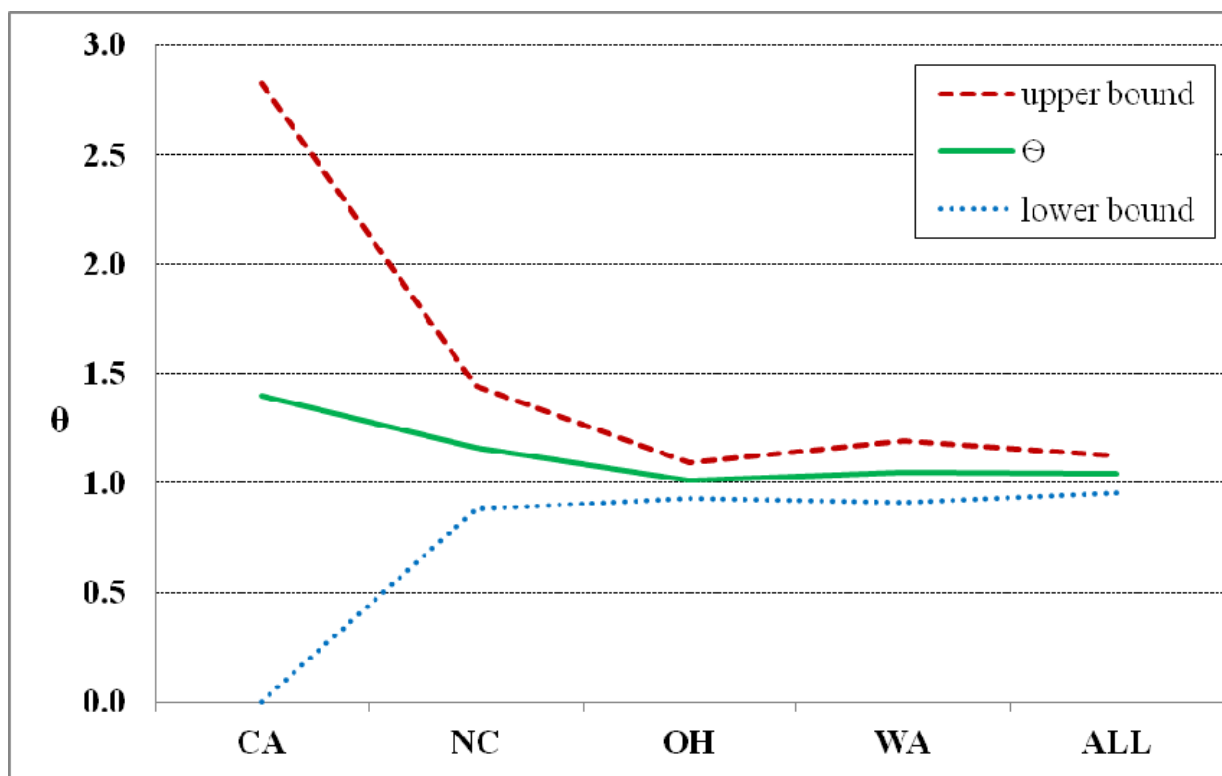
**Figure 5. The safety effectiveness index and the 95 percent confidence interval for each state (all crash types)**

The overall results show that there is no statistically significant increase in crash frequency after installing the on-premise digital sign because the safety effectiveness index ( $\theta$ ) for the entire dataset (all states) is 1.00, and the 95 percent confidence interval is 0.93–1.07 (which includes the index value of 1.00). The results for individual states are similar: no statistically significant safety impacts were observed after the installation of digital signs. In addition, one can see the width of the 95 percent confidence interval is largest for the California data. This is due to the variability of the California data and the small size of the sample set (only 6 sites). Comparing the width of the confidence intervals, from the widest to narrowest, the order is California > North Carolina > Washington > Ohio > All States.

## RESULTS FOR CRASHES RELATED TO MULTIPLE AND SINGLE VEHICLES

The next analysis effort evaluated the possible safety impacts of on-premise digital signs on different types of crashes. There are several common methods to group crashes into different categories, such as the number of related vehicles, the injury levels, the collision types, and so on. Such groupings may provide some insight into the safety impacts of specific crash types, but the estimated impacts might not be precise because of a smaller sample size.

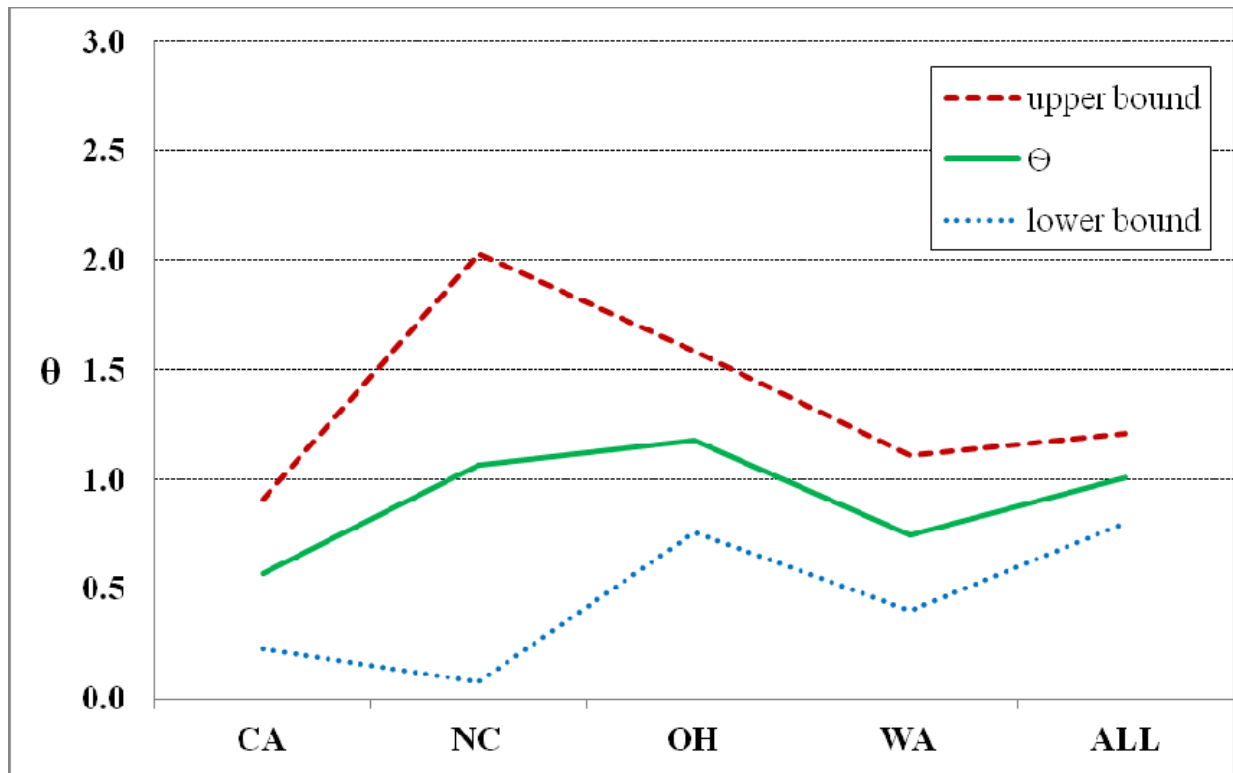
The additional analysis separated crashes into two subgroups: single- and multi-vehicle crashes. All calculations and notations were the same as used previously. By using the EB method to analyze crash data related to multiple vehicles, the researchers determined that the safety effectiveness index is equal to 1.00 for all states, and the 95 percent confidence interval varies between 0.96 and 1.21. Because the confidence interval of the safety effectiveness includes 1.00, there is no statistically significant change in crash frequency after installing the on-premise digital sign. Figure 6 graphically illustrates the results for multi-vehicle crashes. The 95 percent confidence intervals are slightly larger in this figure than in Figure 5.



**Figure 6. The safety effectiveness index and the 95 percent confidence interval for each state (multi-vehicle crashes)**

The results for single-vehicle crashes are presented in Figure 7. The overall results are the similar: there are no statistically significant safety impacts from digital signs, except for California. The California results for single-vehicle crashes indicate a statistically significant decrease in crash frequency in the after period. Although the before-after results of California show a decrease in the after period, it does not affect the overall result because the low sample

size (6 sites) makes it more difficult to establish statistical significance in the analysis results. It is also worth noting that the North Carolina data has the largest confidence interval, due to the variability in the North Carolina single-vehicle crash data.



**Figure 7. The safety effectiveness index and the 95 percent confidence interval for each state (single-vehicle crashes)**

## RESULTS FOR CRASHES RELATED TO DIFFERENT TYPES OF SIGNS

The research team also conducted an analysis to investigate the impacts of specific on-premise digital sign characteristics on the safety impacts of those signs. Specific sign characteristics that the research team evaluated included color (single or multi-color), size (small, medium, or large), and type of business. The research team used the analysis of variance (ANOVA) analysis method to evaluate whether the means of the safety index ( $\theta$ ) among the different characteristics of signs are equal.

An ANOVA is one of the most common statistical methods used to compare two or more means in the analysis of experimental data. In short, ANOVA provides a statistical test of whether or not the means of multiple groups are all equal, while a t-test is suitable only for the two-group case because doing multiple two-sample t-tests would increase the risk of a Type I error (for datasets containing more than 30 observations). In addition, when there are only two means to compare, the t-test and the ANOVA are equivalent. As a result, the research team chose the one-way ANOVA as the study tool to simplify the methodology, although some digital sign characteristics, such as sign color, have only two subgroups (i.e., single color and multi-color).

The theory of an ANOVA test is to separate the total variation in the data into a portion due to random error (sum of squares for error [SSE]) and portions due to the treatment (total sum of squares [SST]). Table 6 shows the typical form of a one-way ANOVA table. If the calculated  $F$  value ( $=$  treatment mean square [MST] / error mean square [MSE]) is significantly larger than  $F(k-1, N-k)$ , the null hypothesis is rejected.  $F(k-1, N-k)$  is the critical value when the means of each group are equal. Most statistic software will also provide the corresponding  $p$ -value for researchers making their decisions in different confidence intervals.

**Table 6. The typical form of a one-way ANOVA table**

Source	SS	DF	MS	F	P(>F)
Treatments	SST	k-1	SST / (k-1)	MST/MSE	
Error	SSE	N-k	SSE / (N-k)		
Total (corrected)	SS	N-1			

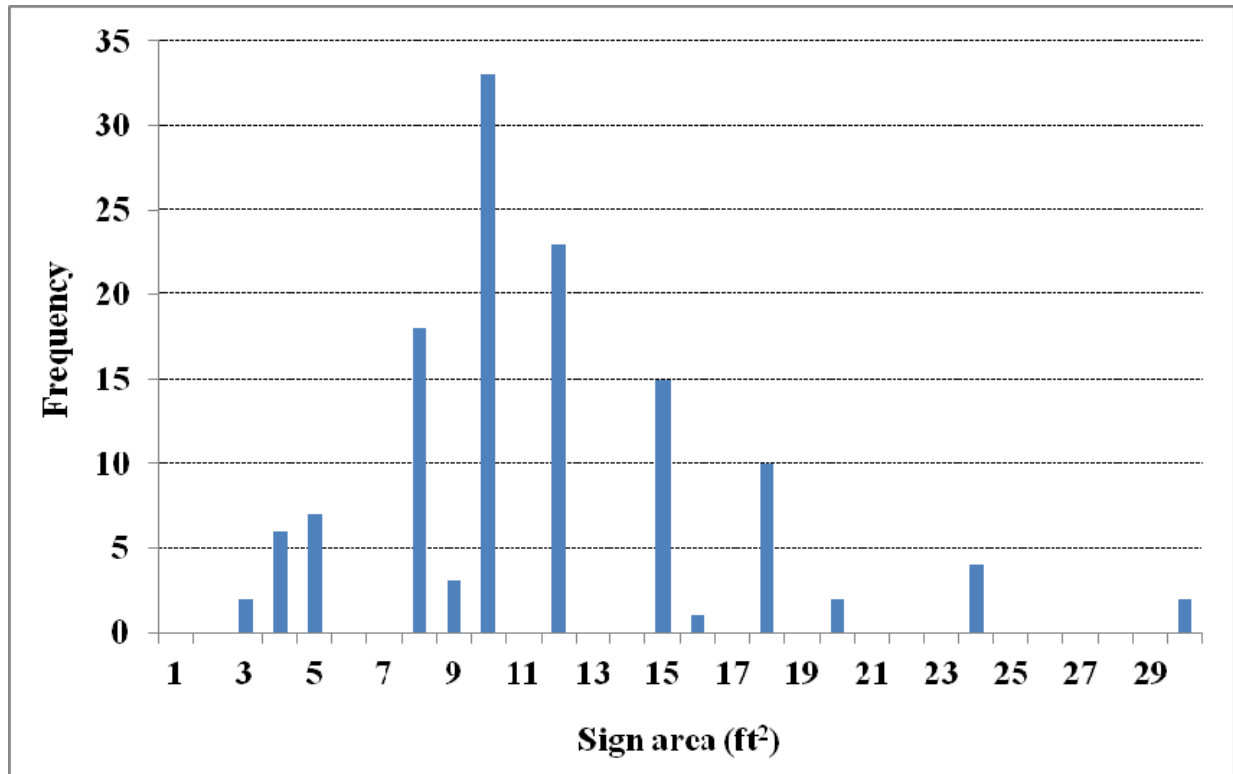
Notes:  $SS$  = sum of squares,  $DF$  = degrees of freedom,  $MS$  = mean of sum of squares,  $F$  =  $F$ -distribution (because the test statistic is the ratio of two scaled sums of squares, each of which follows a scaled chi-squared distribution),  $P(>F)$  = the  $p$ -value when the  $F$  value ( $=$  MST/MSE) is larger than  $F(k-1, N-k)$ ,  $k$  = number of treatments, and  $N$  = total number of cases.

There are three data assumptions for applying the ANOVA method:

1. Independence: The study data are independently, identically, and normally distributed.
2. Normality: The distributions of the data or the residuals are normal. This assumption is true when the sample size is larger than 30.
3. Homogeneity of variability: Equality of variances — the variance of data between groups — should be the same.

If the above conditions do not exist, the ANOVA results may not be reliable. However, if the sample size of each group is similar, one can usually ignore independence and homogeneity problems. Or statisticians may transform data (such as into the logarithmic form) to satisfy these assumptions of the ANOVA.

Based on the existing sign dataset, the research team focused on three digital sign characteristics: color (single color or multi-color), sign dimension (small, medium, or large), and business type (restaurants, pharmacies and retail stores, hotels, gas stations, auto shops, or others). The definitions of sign dimension level are based on the balance principle (making the sample size of each group equal). Figure 8 shows the distribution of signs as a function of different dimensions, and the research team defined signs with an area less than  $10 \text{ ft}^2$  as small signs. The medium sign size had an area of at least  $10 \text{ ft}^2$  but no more than  $15 \text{ ft}^2$ , and the large sign size had an area greater than  $15 \text{ ft}^2$ . The sign size represents the area of the electronic display, not the overall size of the complete sign. It was estimated from the Street View image in Google Maps and may not be an accurate assessment of the sign dimensions.



**Figure 8. The histogram of digital signs for each sign dimension**

Using the ANOVA method to analyze crash data related to specific design characteristics of the sign led to the conclusion that there is no statistically significant difference among the population means of the safety effectiveness index. The following descriptions provide more detail for each of the digital sign characteristics:

- Color:** According to images obtained from the Street View feature of Google Maps, 89 signs are single-color signs, and 37 signs are multi-colored signs. Table 7 shows the ANOVA results. The test statistic (F value) is 2.07, and its p-value is 0.1527. Because the probability is larger than the critical value (0.05 for 95 percent confidence interval), the null hypothesis of equal population means cannot be rejected. In other words, the ANOVA table shows no significant difference between the mean of safety index ( $\theta_{EB}$  = crash mean in the before period/crash mean in the after period) among signs having a single color or multiple colors.

**Table 7. Analysis of variance table (color)**

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	1	4.464	4.4640	2.0704	0.1527
Residuals	124	267.352	2.1561		

- Sign dimensions:** In the final sign dataset, 36 signs have a sign area less than 10 ft<sup>2</sup>, 56 signs have a sign area 10–15 ft<sup>2</sup>, and 34 signs have a sign area greater than 15 ft<sup>2</sup>. In Table 8, the F value is 0.7767, and its p-value is 0.4622. Because the probability is larger

than the critical value (0.05 for 95 percent confidence interval), the null hypothesis of equal population means cannot be rejected. Accordingly, researchers conclude that there is no (statistically) significant difference among the population means.

**Table 8. Analysis of variance table (sign dimension)**

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	2	3.39	1.6950	0.7767	0.4622
Residuals	123	268.43	2.1823		

- **Business type:** In the final sign dataset, 7 signs are for restaurants, 18 for pharmacies and retail stores, 3 for hotels, 3 for gas stations, 7 for auto shops, and 84 for other business types. Based on Table 9, the F value is 0.5401, and its p-value is 0.7455. As with the above types, the null hypothesis of equal population means cannot be rejected because the p-value is much larger than the critical value (0.05). The sample size of some business type groups is less than 30, so the research team combined all categories of business types with less than 20 samples into one large group, the “other” category. The resulting ANOVA analysis (Table 10) provides similar results: there is no significant difference among the population means.

**Table 9. Analysis of variance table (six business types)**

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	5	5.983	1.1966	0.5401	0.7455
Residuals	120	265.833	2.2153		

**Table 10. Analysis of variance table (two business types)**

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	1	0.728	0.7289	0.333	0.5649
Residuals	123	271.088	2.18619		

## IMPACT OF SIGN HOLD TIME

As an additional effort for this research effort, the research team worked with members of the SFI advisory panel to identify the potential impact of hold time on the relationship between on-premise digital signs and traffic safety. One of the advantages of digital signs is the ability to change the displayed message. The minimum length of time that a message must be displayed is often an element of local sign codes because some believe that frequent changing of sign messages can increase driver distraction and lead to increased crashes. Because the researchers were working with a large number of individual sites and crash records for the after period that spanned two years, it was not possible within the available resources of this project to determine what message(s) were displayed at the time of a crash or the hold time used at a particular site at the time of a crash.

As a surrogate for including hold times as part of the individual site characteristics, the research team acquired information for the hold time regulations in the jurisdictions where the signs were

located. The 135 sign sites were located in 108 jurisdictions. A member of the SFI advisory panel contacted these jurisdictions and was able to identify hold time regulations for 66 of them. The hold time regulations of these 66 jurisdictions are summarized in Table 11. Input from the advisory panel indicated that when a jurisdiction has no statutory language regarding digital sign hold times, it most often means that sign users are able to program their sign to change messages as often as they see fit. In some cases, it could mean that the state standard for digital signs applies, which ranges from 6 to 8 seconds in the four states included in the analysis.

**Table 11. Summary of sign hold times**

<b>Minimum Hold Time</b>	<b>Number of Jurisdictions</b>
2–6 seconds	14
7–10 seconds	12
20 seconds	3
1–60 minutes	2
24 hours	2
Variance required*	4
No specific restriction	29
Total	66

\* Hold times were established by variance on a case-by-case basis.



## CHAPTER 6: SUMMARY AND CONCLUSIONS

While there have been significant amounts of research devoted to the safety impacts of geometric design features and other aspects of the publicly owned transportation infrastructure, the same cannot be said about research on the safety impacts of privately owned signs that are directed to users of public roads. This research effort focused on addressing the safety impacts of on-premise digital signs. Previous research by others has documented the safety effects of on- and off-premise digital signs and their potential influence on crash risk to some extent. However, the results of recent crash studies are not consistent, and most studies have some important weaknesses, such as neglecting biases related to the regression-to-the-mean effects, low statistical power, and analysis results based on erroneous assumptions. In addition, Molino et al. (2009) report that the results from these studies are not comparable because of their different study methods, statistical powers, and cares of execution, which affected the quality of the research.

The research effort described in this report examined the safety impacts of on-premise digital signs using a large sample size of data and advanced statistical methods that provide more accurate results than previous studies. With the help of sign data provided by sign-manufacturing companies and crash data obtained from the Federal Highway Administration Highway Safety Information System, the research team obtained extensive datasets for signs and crashes in four states. The research team began the safety analysis with 1,120 potential study sites, but only 135 sites were usable due to limitations related to the individual signs or the related crash data. Although the yield of usable data was only 11.3 percent, the final sample size of 135 sites was much higher than the sample size of other published papers and reports related to on- and off-premise signs, indicating the results of this research are more robust and accurate.

The research team used the empirical Bayes (EB) statistical analysis method, which is the method recommended in the *Highway Safety Manual*, to conduct the safety analysis described in this report. The *Highway Safety Manual* is a recently published document that is recognized within the transportation profession as the authoritative document for analyzing the safety impacts of various transportation improvements or treatments. The EB analysis procedure uses a before-after approach, with the before and after values modified to address local safety characteristics, regression to the mean, and other factors. The EB method reports the safety impacts through the use of a safety index indicator (represented by  $\theta$ ). A value greater than 1 indicates an increase in crashes, and a value less than 1 indicates a decrease in crashes from the before to the after period. However, for the results to be statistically significant, the  $\theta$  value must be outside the limits of the 95 percentile confidence interval.

For the entire sample size of 135 sites, the results from the EB method show that there is no statistically significant change in crash frequency associated with installing on-premise digital signs because the safety effectiveness index ( $\theta$ ) is determined to be 1.00, and the 95 percent confidence interval is equal to 0.93 to 1.07 (which includes 1.00, indicating no statistically significant change). The research team also conducted the analysis for each of the four individual states and obtained the same results: there are no statistically significant safety impacts from

installing on-premise digital signs. In addition, the researchers analyzed the safety impacts related to both single- and multi-vehicle crashes. The results for these analyses were also the same: there is no statistically significant increase in crashes associated with the installation of on-premise digital signs. Chapter 5 includes plots that illustrate the safety index values and confidence intervals for all of these results. As a final analysis, the research team performed an ANOVA to evaluate whether the means of the safety index ( $\theta$ ) varied as a function of sign factors (color, size, and type of business). The color analysis evaluated whether there was a difference in the means of the safety index for single- and multi-colored signs, and the results did not find a difference. The size analysis divided the signs in the study into three categories ( $<10 \text{ ft}^2$ ,  $10\text{--}15 \text{ ft}^2$ , and  $>15 \text{ ft}^2$ ), and the results did not find a difference. Signs were also categorized by the type of business (restaurants, pharmacies and retail stores, hotels, gas stations, auto shops, and others). Once again, there were no differences in the means. Overall, the ANOVA analysis did not identify any factor that led to an increase or decrease in traffic safety for the subcategories evaluated in the ANOVA.

Based on the analysis performed for this research effort, the authors are able to conclude that there is no statistically significant evidence that the installation of on-premise signs at the locations evaluated in this research led to an increase in crashes.

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## APPENDIX A: STEP-BY-STEP INSTRUCTIONS FOR STUDENTS TO RECORD SIGN DATA

1. Open one SFI sign dataset (e.g., “Washington\_2006-2007.xls”). This dataset includes about 150 signs located in the state of Washington during 2006–2007.
2. Input the address information (such as Primary Street Address, City, ZIP Code, County Name, and State) of each sign in Google Maps and use the Street View function to identify the target signs. Please see this link, [http://maps.google.com/help/maps/starthere/index.html#streetview&utm\\_campaign=en&utm\\_medium=et&utm\\_source=en-et-na-us-gns-svn&utm\\_term=gallery](http://maps.google.com/help/maps/starthere/index.html#streetview&utm_campaign=en&utm_medium=et&utm_source=en-et-na-us-gns-svn&utm_term=gallery), for a demo about how to use the Street View. If you did not find any on-premise digital signs near this site, please make a note in Table 12. Check the characteristics of each sign (including colors, dimensions, and business types) and fill out Table 12. Then, use the “Print Screen” button to copy each sign’s picture, and paste it in this document (such as Figure 9). The different business types are classified as (1) Restaurant, (2) Pharmacy and Retail Store, (3) Hotel, (4) Gas Station, (5) Auto Shop, and (6) Other.

**Table 12. Example work table of site data collection procedure**

Sign ID	Address	Installation Date	Google Maps				Google Earth				Note
			Picture	Color (Single/Multi.)	Dimension (Estimated)	Business Type	County ID	Route #	Distance	Mile-post	
79016	19330 N US HIGHWAY 101 Shelton 98584 Mason County, WA	2006/9/15	Fig 2	S	3 ft × 6 ft	6	Mason (23)	101	19.3	335.72	

3. Then, use Google Earth to determine the county and route number, and to measure the distance between the closet county boundaries and sign location along the route (recorded in the distance column). The corresponding ID for county and route number is based on the HSIS data manual (file name: guidebook\_WA[1].pdf). Then, estimate the milepost value of the sign by the distance and the milepost of the route in the boundaries (based on the HSIS road file, such as wa04road.xls). Take Figure 10; for example, the end mile point of Highway 101 in the county boundary is 355.18, and the distance between the sign and the county boundary is 19.3; so, the milepost of our sign is 335.72. Generally, the milepost value increases from south to north and from west to east. However, the best way to check it is to compare the value of the milepost of adjusted counties. For example, the milepost of US 101 in Mason County is 313.96~355.18, and the milepost of US 101 in Thurston County (located south of Mason) is 355.18~365.56. So, it is known that the mileposts increase from north to south in Mason County. The above variables will be used in the R software to select target crashes from HSIS crash datasets.
4. Write down any questions or comments in the note column. Feel free to ask us if you have any questions.

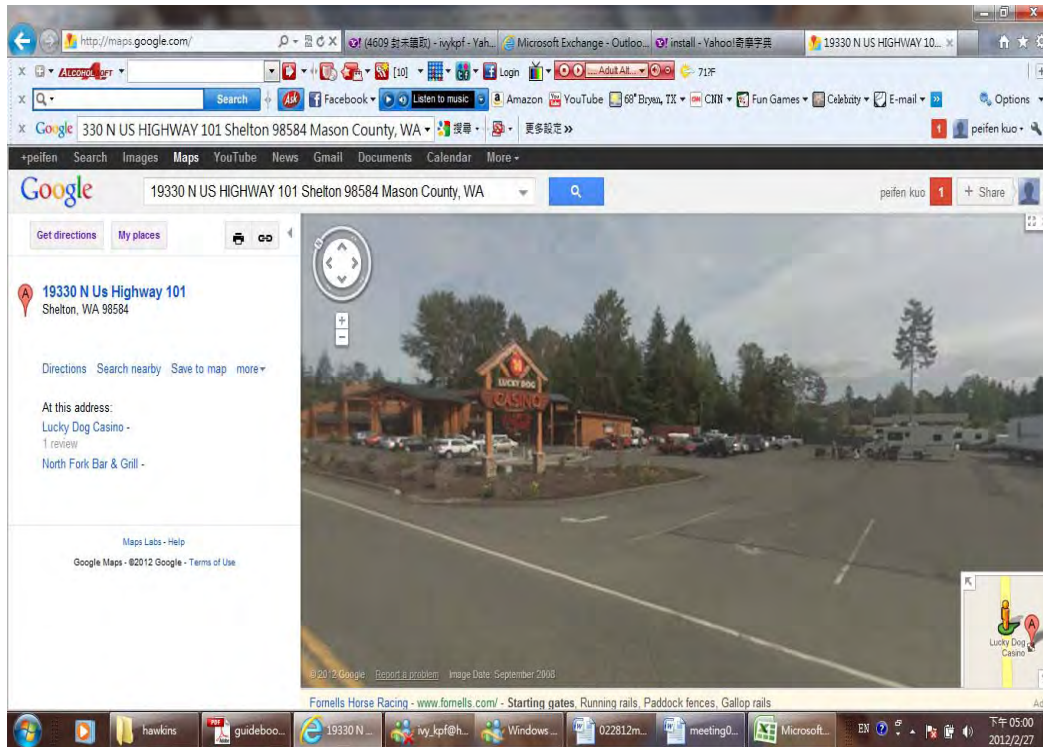


Figure 9. Example screenshot of Google Maps

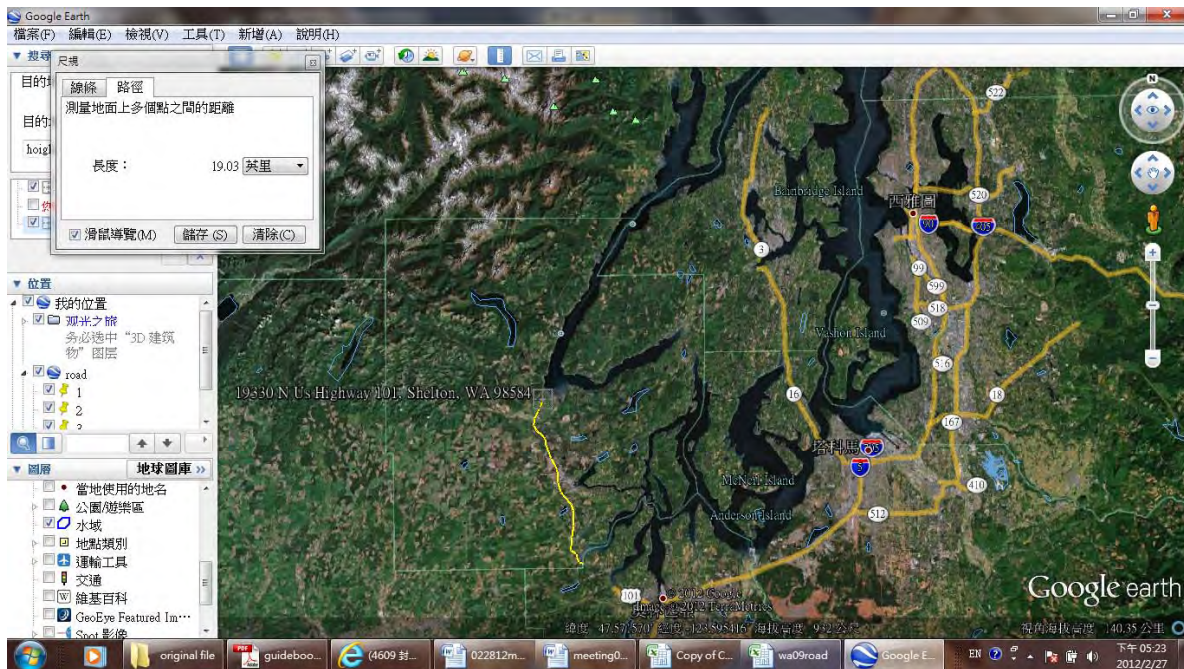


Figure 10. Example screenshot of Google Earth

## APPENDIX B: STATISTICAL SYMBOLS

The following statistical symbols are used throughout this report.

$\theta$  = the safety effectiveness,  $0 < \theta \leq 1$  (can be theoretically higher, but not in this study).

$n$  = the sample size.

$\alpha$  = the dispersion parameter (of the negative binomial model).

$t$  = the time period.

$\hat{\theta}_{CS}$  = the estimate of safety effectiveness by using the CS method.

$\hat{\theta}_{naive}$  = the estimate of safety effectiveness by using the naïve method.

$\hat{\theta}_{CG}$  = the estimate of safety effectiveness by using the control group method.

$\hat{\theta}_{EB}$  = the estimate of safety effectiveness by using the EB method.

$\hat{\lambda}$  = the estimated number of crashes for the treatment group in the after period.

$\hat{\pi}$  = the estimated number of crashes for the treatment group in the before period.

$\hat{\nu}$  = the estimated number of crashes for the control group in the after period.

$\hat{\mu}$  = the estimated number of crashes for the control group in the before period.

$N_{ij1}^T, N_{ij1}^C$  = the observed responses for site i (T = treatment group and C = control group) and year j (in the before period).

$N_{ij2}^T, N_{ij2}^C$  = the observed responses for site i (T = treatment group and C = control group) and year j (in the after period).

$M_{ij1}$  = the expected responses for site i for the EB method,

$$M_{ij1} = W \times (\hat{\Lambda}_1) + (1 - W) \times \left( \sum_{j=1}^t N_{ij1} \right).$$

$W$  = the weight for sites for the EB method,  $W = \frac{1}{1 + \hat{\Lambda}_1 \times \hat{\alpha}}$ .

$\hat{\Lambda}_1$  = the estimate for the average crash rate of all sites in the before period.

$\hat{\alpha}$  = the estimate of the dispersion parameter (from the negative binomial model).



# ITEM 16-070

To hold a Public Hearing to consider and act on amendments to Chapter 315 (Zoning), Section 61 (Street Construction) of the Cumberland Code, as recommended by the Planning Board



# M E M O R A N D U M

TOWN OF CUMBERLAND, MAINE  
290 TUTTLE ROAD  
CUMBERLAND, MAINE 04021  
TEL: 207-829-2205 FAX: 829-2224

**To:** Town Council  
**From:** William R. Shane, Town Manager  
**Date:** May 18, 2016  
**Re:** 16-070 Chapter 315 –Section 61 Street Construction

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The Ordinance Committee and the Planning Board recommended changes to the Street Construction Standards (315-61) all which apply to Private Roads. The changes would require:

- 1 type of road 18' wide
- 36' right- of way
- Turnaround

And would standardize private roads. I would recommend you repeal and replace the existing ordinance Chapter 315- 61 Street Construction with the attached language.

Notice of Decision

**Date:** April 28, 2016

**To:** William Shane, Town Manager  
Town of Cumberland  
290 Tuttle Road  
Cumberland, ME 04021

**Re:** *Recommendation to Town Council re: Amendments to Section 315-61 (street construction) of the Zoning Ordinance.*

*This is to advise you that on April 26, 2016, 2016 the Planning Board voted to recommend to Town Council amendments to Section 315-61 (street construction) of the Zoning Ordinance.*

**Findings of Fact:**     None

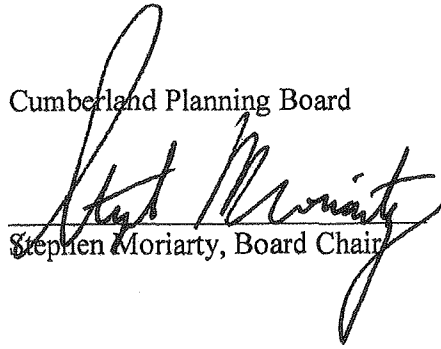
**Waivers granted:**     None

**Waivers Denied:**     None

**Standard Conditions of Approval**

This approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted by the applicant. Any variation from the plans, proposals and supporting documents, except minor changes as so determined by the Town Planner which do not affect approval standards, is subject to review and approval of the Planning Board prior to implementation.

Cumberland Planning Board

  
Stephen Moriarty, Board Chair

## Chapter 315. Zoning

### Article VI. General Regulations

#### § 315-61. Street construction.

Private streets meeting the following standards, as determined by the Code Enforcement Officer, may be used to satisfy the lot frontage requirement for residential uses:

A.

Except in the IR Zone, the private street application shall be accompanied by a plan showing the private street(s), which plan shall be prepared by a registered land surveyor. The plan shall be drawn in permanent ink on permanent transparency material and shall be sealed by the surveyor preparing the plan. The plan shall be labeled "Plan for a Private Street" and shall provide an approval block for the signature of the Code Enforcement Officer, the date of the approval, and the words "Private Street, Approved by the Town of Cumberland Code Enforcement Officer." The plan shall show information sufficient to establish on the ground the exact location, direction, width, and length of the private street. Where a proposed private street contains severe slopes, stream crossings, or a significant amount of cut and fill, the applicant shall also provide a profile of the street. In addition, a street plan and cross section shall be submitted for each private street serving two or more dwelling units. The plan shall also contain a note which shall read: "The Town of Cumberland shall not be responsible for the maintenance, repair, plowing, or similar services for the private street shown on this plan." The original plan(s) shall be recorded in the Cumberland County Registry of Deeds within 90 days of approval of the plan of the private street, and proof of such recording shall be submitted to the Code Enforcement Officer prior to the issuance of any building permit. If the plan is not recorded within this period, the approval shall be void.<sup>[1]</sup>

[1]

*Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).*

B.

If the private street provides access to two or more dwelling units, the applicant shall prepare a maintenance agreement in a form acceptable to the Town Attorney and shall submit this as part of the application. This maintenance agreement shall specify the rights and responsibilities of each lot owner with respect to the maintenance, repair and plowing of the private street. The applicant shall record this maintenance agreement in the Cumberland County Registry of Deeds within 90 days of approval of the plan of the private street by the Code Enforcement Officer and shall submit proof of such recording to the Code Enforcement Officer prior to the issuance of any building permit. Deeds to new lots located on private streets servicing two or more dwelling units shall include references to the required maintenance agreement.

C.

Except in the IR Zone, private streets shall have a minimum right-of-way width of ~~50-36'~~ feet with 5' easements each side for snow storage and future utilities and a paved apron at least five feet in length commencing at the edge of pavement where it intersects with existing street. The paved apron shall be constructed to the following standards:<sup>[2]</sup>

(1)

Fifteen inches of base gravel meeting MDOT Spec. 703.06 Type D.

(2)

Three inches of surface crushed gravel meeting MDOT Spec. 703.06 Type A.

(3)

The thickness of paving of the apron shall be a total thickness of three inches of hot bituminous pavement, with a surface course (9.5 MMMMGrading "C") of one inch and a base course (Grading "B" 19 MM) of two inches.

(4)

A negative two-percent grade from the existing edge of pavement to an appropriate drainage way, but in no case less than five feet from the travel surface of the public street it intersects.

(5)

Approach radius shall be specified by the Public Services Director.

(6)

All entrances shall be located so that the sight distance in both directions is 10 feet of sight for every one mile of posted speed limit. This standard may be reasonably reduced by the Public Services Director in circumstances where no reasonable alternative exists.

~~[2]~~

*Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).*

D.

Private streets.

(1)

Except in the IR Zone, the construction of private streets shall meet the following minimum standards:<sup>[2]</sup>

<u>Minimum roadway width (feet)</u>	<u>18'</u>
<u>Minimum base (inches)</u>	<u>15"</u>
<u>Wearing surface (inches)</u>	<u>3"</u>
<u>Maximum length</u>	<u>None</u>
<u>Maximum grade</u>	<u>10%</u>
<u>Minimum grade</u>	<u>0.5%</u>
<u>Minimum center-line radius (feet)</u>	<u>100'</u>

<u>Minimum tangent between curves of reverse alignment (feet)</u>	<u>0</u>
<u>Minimum angle at street intersections</u>	<u>75 degrees</u>
<u>Turnaround at dead end</u>	<u>See Required Turnaround</u>
<u>Stormwater drainage</u>	<u>Approved By Town</u>

	<b>Number of Dwelling Units Served</b>			
	<b>3 to 5</b>	<b>6 to 10</b>	<b>11+</b>	
Minimum roadway width (feet)	12*	16*	20*	Same as residential access streets as required by Table 2 of Chapter <u>250</u> , Subdivision of
Minimum base (inches)	12	15	15	
Wearing surface (inches)	3	3	3	
Maximum length	None	None	None	
Maximum grade	10%	10%	10%	
Minimum grade	0.5%	0.5%	0.5%	
Minimum center line radius (feet)	100	100	100	
Minimum tangent between curves of reverse alignment (feet)	50	50	50	
Minimum angle at street intersections	75°	75°	75°	
Turnaround at dead end			T	
Stormwater drainage	Approval of Public Services Director			

**Notes:**

\* Vehicle turnout(s) providing space for two vehicles to pass shall be specified by the Town Engineer or Public Serv if necessary due to the length of the private way.

[3]

Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).

(2)

Where a proposed private street will be located adjacent to lots with existing structures that are not part of the development that will be served by the proposed private street, the traveled portion of the private street shall be located in a manner that retains an undeveloped portion of the street adjacent to the existing structures, with such undeveloped portion including an effective landscaped buffer.

E.

Private streets shall be inspected by the Public Services Director, unless the Public Services Director determines physical conditions such as stream crossings or wetland areas require inspection by a registered professional engineer or other qualified land use professional. Prior to the issuance of building permits for lots served by a private street, the Public Services Director shall certify to the Code Enforcement Officer that the private street(s) has been constructed in accordance with this section. The applicant shall be responsible for the cost of each inspection by a registered professional engineer.

F.

Fees.

(1)

To help recover costs incurred by the Town in the review, administration, site inspection, and public notice associated with the private street application, at the time of filing the private street application, the applicant shall pay to the Town of Cumberland fees and deposits in such amount(s) and for such purpose(s) as the Town Council may from time to time establish by Council order.<sup>[4]</sup>

[4]

*Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).*

(2)

All fees shall be nonrefundable, except unexpended escrow deposits, which shall be refunded in accordance with Chapter **229**, Site Plan Review.

G.

The Code Enforcement Officer, the Town Planner, and the Public Services Director shall review and approve applications for private streets serving dwelling units when such private streets meet the standards set forth in this chapter. The Code Enforcement Officer shall issue decisions under this section in writing. Such decisions may be appealed by filing a written notice of appeal stating the reasons therefor with the Cumberland Board of Adjustment and Appeals within 30 days of the date of decision.

H.

This amendment<sup>[5]</sup> applies to all private streets proposed to be created after the effective date of this amendment and to existing private streets upon which one or more new dwelling units are proposed to be constructed after the effective date of this amendment, unless such dwelling is to be constructed on a lot that was in existence on August 10, 1998.

[5]

*Editor's Note: This section was amended effective 8-10-1998 and 3-24-2003.*

I.

In the IR Zone, an applicant shall submit to the Code Enforcement Officer an application for a private right-of-way required to provide access to a structure located within that zone. The application shall specify the location of the proposed right-of-way, the proposed width, the materials to be utilized in the construction of the road, grades, provisions for drainage, and sight distances at any turning radius. The Code Enforcement Officer shall approve any plan that makes adequate provision for these items, provided that the Fire/EMS Chief approves the application for sufficiency of access for emergency vehicles.<sup>[6]</sup>

[6]

*Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).*

J.

The provisions of this section shall not apply to privately owned roads within a mobile home park.



# ITEM

# 16-071

To hold a Public Hearing to consider and act on amendments to the Contract Zone Agreement for Village Green Cumberland, LLC to add 4 additional lots on a portion of Tax Assessor Map U10/Lot 1B, as recommended by the Planning Board



# M E M O R A N D U M

TOWN OF CUMBERLAND, MAINE  
290 TUTTLE ROAD  
CUMBERLAND, MAINE 04021  
TEL: 207-829-2205 FAX: 829-2224

**To:** Town Council  
**From:** William R. Shane, Town Manager  
**Date:** May 18, 2016  
**Re:** 16-071 VG CZA Amendments

---

The Planning Board unanimously recommended the following changes to the CZA for Village Green as highlighted in the attached document.

The significant change is the inclusion of 4 additional lots plus the Russell lot into the CZA. The developer agreed to provide a 75' buffer, 25' would be a planted, and approved by the Planning Board) landscaped and vegetated buffer. The Developer further agreed to slide the building windows and setback bordering the Civic Lot 25' further away from the civic lot leaving a new 40' back setback versus the previously approved 15'.

**Notice of Decision**

**Date:** April 28, 2016

**To:** Nathan Bateman  
Bateman Partners, LLC  
470 Fore St., Suite 400  
Portland, ME 04101

**Re:** *Public Hearing: Recommendation to Town Council on Amendment to a contract zone agreement for Village Green subdivision to add 4 additional lots on a portion of Tax Assessor Map U10- Lot 1B.*

*This is to advise you that on April 26, 2016, 2016 the Planning Board voted to recommend to the Town Council an Amendment to a contract zone agreement for Village Green subdivision to add 5 additional lots on a portion of Tax Assessor Map U 10 Lot 1 B; with the additional recommendation that the contract zone include a 25 foot vegetative buffer to be part of a landscape plan to be approved by the Planning Board (in addition to the 50 foot no-cut buffer along the northern border of the property), and that the building envelopes for Lots 1 and 2 move 25 feet to the west in accordance with the pending road repositioning in the same amount and direction."*

**Findings of Fact:** None

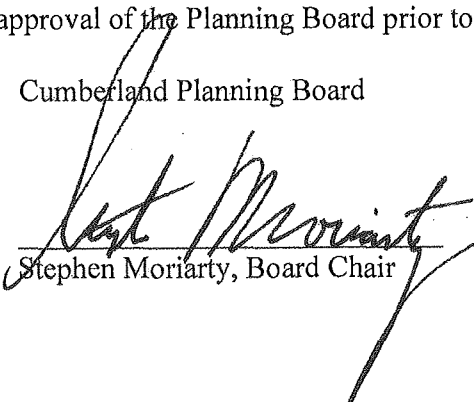
**Waivers granted:** None

**Waivers Denied:** None

**Standard Conditions of Approval**

This approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted by the applicant. Any variation from the plans, proposals and supporting documents, except minor changes as so determined by the Town Planner which do not affect approval standards, is subject to review and approval of the Planning Board prior to implementation.

Cumberland Planning Board

  
Stephen Moriarty, Board Chair

**AMENDED AND RESTATED**  
**CONTRACT ZONING AGREEMENT**  
**BY AND BETWEEN THE TOWN OF CUMBERLAND**  
**AND**  
**VILLAGE GREEN CUMBERLAND, LLC**

**RELATING TO PHASE ~~I-1~~ and PHASE 4 OF THE**  
**VILLAGE GREEN REVITALIZATION MASTER PLAN**

**(The former “Doane” Parcel Consisting of Approximately 40.7 Acres)**

This Amended and Restated Contract Zoning Agreement is entered into this 11th day of April, 2011, 2016 by and between the **Town of Cumberland**, a Municipal Corporation (the “**Town**”), and **Village Green Cumberland, LLC**, a Maine Limited Liability Company with a business address of PO Box 3572, Portland, ME 04104-3571, its nominee or assigns (the “**Developer**”), pursuant to the Conditional and Contract rezoning provisions set forth in 30-A M.R.S.A. Section 4352 (the “**Act**”) and Section 606-315-79 of the Cumberland Zoning Ordinance Code, as amended (the “**Zoning Ordinance Code**”).

WHEREAS, the Town and Developer entered into a Contract Zoning Agreement dated April 11, 2011, which is recorded at the Cumberland County Registry of Deeds in Book 28735, Page 158 (the “Original Agreement”); and

WHEREAS, the Town conveyed to the Developer the property subject to the Original Agreement, a 40.7 +/- acre parcel of unimproved real estate located between Drowne Road and Wyman Way, identified on the Town of Cumberland Tax Assessor map as Map U10, Lot 7B (the “Original Property”), by virtue of a Deed dated January 18, 2012, recorded in the Cumberland County Registry of Deeds in Book 29285, Page 284; and

WHEREAS, the Developer has begun developing the Original Property into a 59 lot residential subdivision, subject to the terms and conditions set forth in the Original Agreement and a subdivision plan as approved by the Cumberland Planning Board on January 17, 2012, recorded in the Cumberland County Registry of Deeds in Plan Book 212, Page 18; and

WHEREAS, the Developer intends to expand the residential subdivision of the Original Property, subject to the terms and conditions set forth herein, to include additional residential lots on a 5.72 +/- parcel of real estate adjoining the Original Property, identified on the Town of Cumberland Tax Assessor map as Map U10, Lot 1B (the “Phase 4 Property”), which property is currently owned by George and Constance Russell by virtue of a Deed dated August 20, 2001, recorded in the Cumberland County Registry of Deeds in Book 16675, Page 235; and

WHEREAS, the Town and the Developer desire to amend and restate the Original Agreement in its entirety;

NOW THEREFORE, the Original Agreement is hereby amended and restated in its entirety, as follows, it being understood that this Amended and Restated Contract Zoning Agreement supersedes and replaces the Original Agreement, which shall be of no further force and effect:

WHEREAS, the property subject to this Amended and Restated Contract Zoning Agreement consists of two separate parcels, the Original Property, a 40.7 +/- acre parcel of ~~unimproved~~ real estate located between Drowne Road and Wyman Way, identified on the Town's Tax Assessor map as MAP U10, Lot 7B, and the Phase 4 Property, a 5.72 +/- acre parcel of real estate located adjacent to the northern boundary of the Original Property, identified on the Town's Tax Assessor map as Map U10, Lot 1B, both properties consisting of 46.41 +/- acres total as more particularly shown on Exhibit A attached hereto (together hereinafter referred to as the "Property"), ~~which property is currently owned by the Town by virtue of a certain Deed dated September 13, 2000, recorded in the Cumberland County Registry of Deeds in Book 15732, Page 22; and~~

WHEREAS, the Original Property is located in the Village Mixed-Use Zone (V-MUZ) Zoning-District (the "**V-MUZ Zoning-District**") located in ~~s~~Section 204.13315-18 of the Zoning OrdinanceCumberland Code; and

WHEREAS, the Phase 4 Property is located in the Rural Residential 1 (RR1) Zoning District (the "RR1 Zoning District") located in Section 315-6 of the Cumberland Code; and

~~WHEREAS, the Developer has entered into a Purchase and Sale Agreement—Land Only, dated 3/14/2011, as amended (the "**Purchase and Sale Agreement**"), pursuant to which the Developer has agreed to purchase the Property from the Owner;~~

WHEREAS, the Town desires to sell the property to generate tax revenue and stimulate further economic development in the town center as recommended by the 2009 Comprehensive Plan.

~~WHEREAS, the Developer intends to develop the Property into a 59 lot residential subdivision, subject to the terms and conditions set forth herein, as further described in the Exhibit B attached hereto (the "**Project**");~~

WHEREAS, the Developer has submitted an application for subdivision approval to the Cumberland Planning Board, in accordance with the subdivision plan attached hereto as Exhibit E; and

WHEREAS, in order for the Project to be financially feasible for the construction and sale of residential dwelling units while meeting all applicable codes, certain Amendments with respect to dimensional, design and certain other performance standards of the Cumberland Zoning Ordinance are required, ~~and; and~~

WHEREAS, the Developer has the ability to acquire additional land to the underlying contract zone and the Town would be benefitted thereby, and;

WHEREAS, ~~the Town and Developer desire to enter into this Contract Zoning Agreement relating to the Property, subject to the terms and conditions set forth herein on \_\_\_\_\_, the Cumberland Town Council approved the execution of this Amended and Restated Contract Zoning Agreement, subject to later compliance with the Subdivision and Site Plan Standards as set forth in Chapter 250 and Chapter 229, respectively, of the Cumberland Code, provided such provisions are not in conflict with the Act;~~

NOW THEREFORE, pursuant to the provisions of 30-A.M.R.S.A. § 4352(8) and Section ~~606-315-79~~ of the ~~Cumberland Zoning Ordinance Code~~, as amended, the Cumberland Town Council hereby finds that this Amended and Restated Contract Zoning Agreement:

- A) is consistent with the Comprehensive Plan duly adopted by the Town of Cumberland on November 9, 2009; ~~and~~
- B) establishes a contract zone area consistent with the existing and permitted uses in the original zone of the area involved; ~~and~~
- C) only includes conditions and restrictions which relate to the physical development and future operation of the proposed development; and
- D) imposes those conditions and restrictions which are necessary and appropriate for the protection of the public health, safety and general welfare of the Town.

In furtherance of these common goals, the parties agree as follows:

I. **Establishment of the Contract Zone:**

The Town hereby agrees that the Property as described herein shall be a contract zone (the “**Contract Zone**”) pursuant to the provisions of 30-A.M.R.S.A. § 4352(8) and Section ~~606-315-79~~ of the Cumberland ~~Zoning Ordinance Code~~. This Agreement shall create an overlay zone. Except as expressly modified or otherwise stated herein, the Property shall be subject to the requirements of the ~~underlying~~ V-MUZ ~~Zoning~~ District, as the same may be amended from time to time, together with all applicable lot requirements and general requirements, not modified herein.

II. **Permitted Uses Within the Contract Zone:**

The development permitted within the Contract Zone established herein shall be as follows:

A. All uses currently authorized either as permitted uses or special exceptions in the V-MUZ ~~Zoning~~ District, or as specifically authorized herein.

B. Up to four additional residential dwelling units may be constructed on the Phase 4 Property, not including the existing residential dwelling unit that currently exists on the Phase 4 Property and is currently occupied by the property owners George and Constance Russell.

III. **Restrictions and Certain Design Standards Within ~~t~~The Contract Zone:**

All restrictions as currently set forth in Section ~~606-315-79~~ of the Cumberland ~~Zoning Ordinance~~Code, except as modified herein and as appears on Exhibit C, attached hereto and made a part hereof.

IV. **Performance Standards Within the Contract Zone:**

The following performance standards shall apply to the Contract Zone (Phase ~~I-1~~ and Phase 4 of the VGRMP) as follows:

- A. The Recreation Facilities and Open Space Impact Fee Ordinance of the Town of Cumberland shall be waived in accordance with Article ~~4-10~~Section 137-10, Waiver of Impact Fee subject to the following provisions:
- 137--6 Payment of Fees shall be modified as follows: the Developer shall submit to the Town a list of specific public improvements with corresponding values for said improvements to be provided by each Phase of the approved Village Green Revitalization Master Plan (VGRMP). The public improvements shall include construction of a roadway from the existing terminus of Wyman Way, crossing the Property and connecting with Drowne Road. All public improvements provided in lieu of the impact fee for each Phase of the approved VGRMP shall be completed prior to the final release of bonds or letter of credit(s) required to secure all public improvements for each Development Phase. Performance guarantees, including Letters of Credit and bonds, shall include the value of the in lieu payments attributed to Public Improvements, even where the Public Improvements are to be located upon future Phases which may or may not be constructed.
  - The public improvements provided for each Phase of the approved VGRMP will, at a minimum, equal the value of the impact fee(s) otherwise due as provided in 137--11 Calculation of Fees.
  - All public improvements to be located within the adjacent "Civic Lot" (Map U10-A, Lot 13) provided by the Developer as part of this Agreement shall be in accordance with a Site Plan approved in advance by the Town.



- Certain areas within the parcel purchased from the Town (Map U10, Lot 7B) by the Developer shall be subject to an easement which allows for public use and recreation (see Exhibit D Plan of Open Space/Recreational Easements). The value of these easements for the purposes of ~~137-~~11 Calculation of Fees (Land for Public Use) shall be based on the total purchase price paid for said parcel, divided by the total acreage of the parcel multiplied by the acreage finally included within the easement area(s). Provided, however, that the Developer shall not be credited for any easements or improvements that are required by law or ordinance of residential subdivisions approved by the Town. The financial guarantees, including Letters of Credit, posted by the Developer to assure the construction of qualifying public improvements in phases future to Phase 1, may be required to be maintained in applicable portion by the Town until the Town and Developer have mutually determined an agreed plan for the future phases.

- B. The Town of Cumberland's Growth Management Ordinance is hereby amended to include the following additional exemption within Section ~~106~~ 118-6 of this ordinance:

~~106.6~~118-6(E) Lots included within the Phase ~~I-1~~ and Phase 4 subdivision of the approved Village Green Revitalization Plan.

- C. The improvements to be constructed within Phase 1 and Phase 4 of the development shall be constructed in a manner to take advantage of emerging energy conservation techniques and technologies, consistent with the standards set forth in Exhibit E-F hereto.

Subject to the terms herein, the Cumberland Planning Board shall have review authority under the applicable provisions of the Cumberland Subdivision, Site Plan and Zoning Ordinances to impose conditions of approval pursuant to said Ordinances relating to the development and construction.

V. **Miscellaneous Provisions:**

- A. Survival Clause: The terms and conditions of this Agreement shall run with the land and be binding upon and shall inure to the benefit of the respective successors, heirs and assigns of the parties hereto except as specifically set forth herein. This Agreement shall not be assignable without the prior approval of the Cumberland Town Council, provided, however, that the Developer may assign this Agreement without such approval to a corporate entity or limited liability company solely owned and organized by the Developer for the purpose of developing the Project. A true copy of this Agreement shall be recorded in the Cumberland County Registry of Deeds.



VI. **Further Assurances:** In order to effectively and properly implement this Agreement, the parties agree to negotiate in good faith the terms and conditions of such further instruments and agreements as may be reasonably necessary from time to time to give effect to this Agreement.

VII. **Maine Agreement:** This contract is a Maine Agreement, entered into in the State of Maine and shall be governed by and enforced in accordance with the laws of the State of Maine.

VIII. **Binding Covenants:** The above stated restrictions, provisions, and conditions are an essential part of this contract and shall run with the subject premises, shall bind the interest therein, and any party in possession or occupancy of said property or any part thereof, and shall inure to the benefit of and be enforceable by the Town, by and through its duly authorized representatives. This Agreement may not be amended except by mutual written agreement by the parties.

IX. **Severability:** In the event any one or more clauses of this Agreement shall be held to be void or unenforceable for any reason by any court of competent jurisdiction, such clause or clauses shall be deemed to be severable and of no force or effect in such jurisdiction, and the remainder of this Agreement shall be deemed to be valid and in full force and effect, and the terms of this Agreement shall be equitably adjusted if possible so as to compensate the appropriate party for any consideration lost because of the elimination of such clause or clauses.

X. **Enforcement:** The Town shall also have the ability to enforce any breach of this Agreement or any other violation of the Zoning Ordinance through the provisions of 30-A M.R.S.A § 4452.

IN WITNESS WHEREOF, the parties have hereunto caused this Agreement to be executed as of the day and year first above written.

WITNESS:

Town of Cumberland

\_\_\_\_\_

By:

\_\_\_\_\_  
William R. Shane  
Its Town Manager

WITNESS:

Village Green Cumberland, LLC

\_\_\_\_\_

By:

\_\_\_\_\_  
David H. Bateman  
Its Manager

State of Maine

County of Cumberland, ss.

~~28~~\_\_\_\_\_, ~~2015~~2016

—~~July~~

Personally appeared the above-named William R. Shane, Town Manager of the Town of Cumberland and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of the Town of Cumberland and subscribed and swore to the same.

\_\_\_\_\_  
Notary Public/Attorney-at-Law  
Print Name: ~~Kenneth M. Cole III,~~

~~Esq.~~\_\_\_\_\_

State of Maine

County of Cumberland, ss.

\_\_\_\_\_, ~~July 28, 2015~~2016

Personally appeared the above-named David H. Bateman, Manager of Village Green Cumberland, LLC and acknowledged the foregoing to be his free act and deed in his said capacity, and the free act and deed of Village Green Cumberland, LLC.

\_\_\_\_\_  
Notary Public/Attorney-at-Law  
Print Name: ~~Kenneth M. Cole III,~~

~~Esq.~~\_\_\_\_\_

## EXHIBITS

**Exhibit A** Survey of the Property

**Exhibit B** Approved Village Green Revitalization Master Plan (VGRMP) Phase 1  
**and Phase 4**

**Exhibit C** Summary of Zoning Amendments

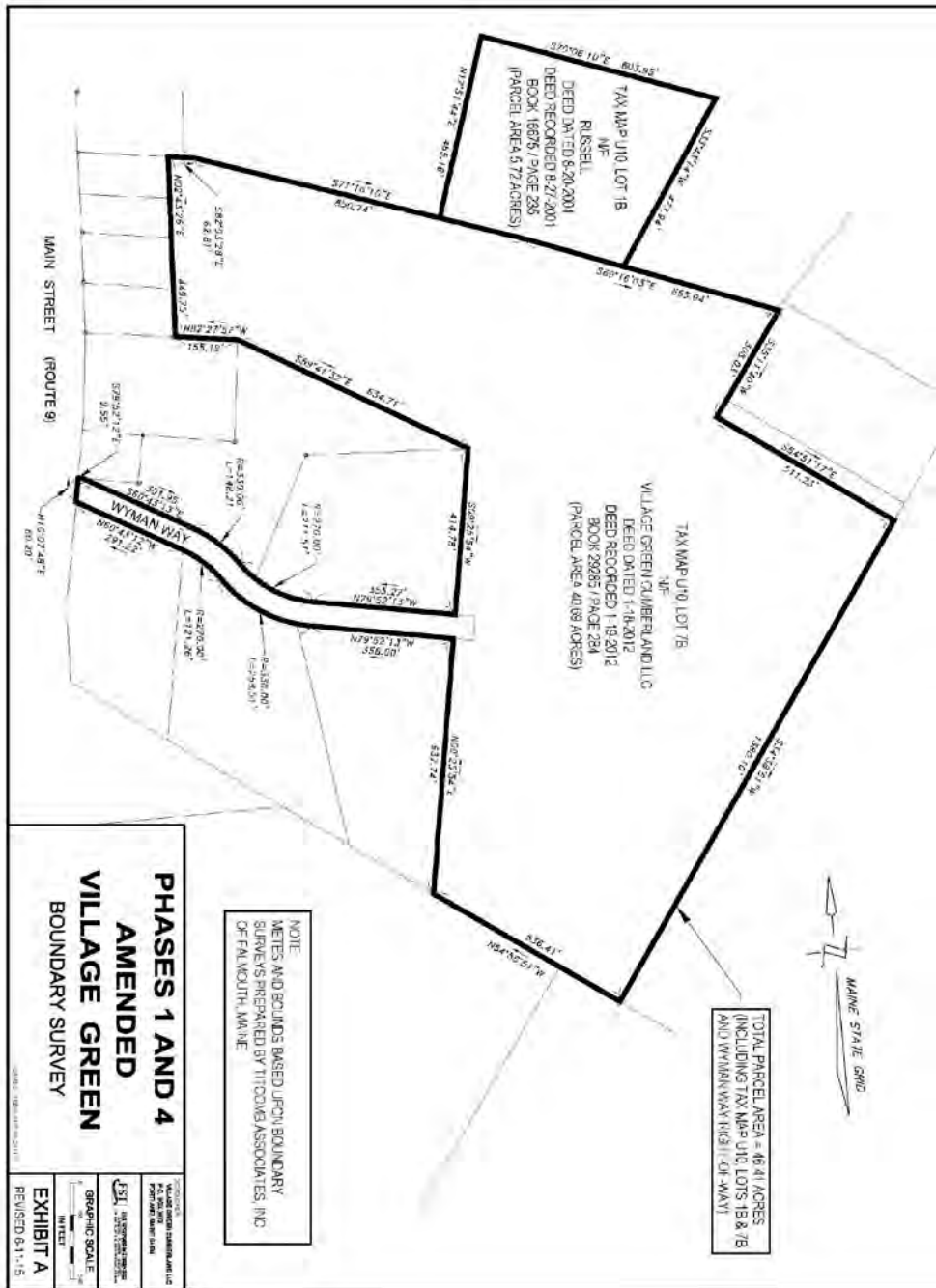
**Exhibit D** Plan of Open Space/Recreational Easement(s)

**Exhibit E** Proposed Subdivision Plan

**Exhibit F** Energy Conservation Standards

**Exhibit F-1** Street Lighting

# EXHIBIT A



# EXHIBIT B

R:\SC-M147-Russell Property\Cadd\Concept Set\dwg\SC-M147-AMENDED MASTER PLAN.dwg, EXHIBIT B-PHASES 1 & 4, 6/15/2015 11:23:24 AM, dube\_c, 1:2.865



**EXHIBIT C**  
Summary of Zoning Amendments

A) The following minimum lot frontages shall be required on a Private Drive within the Contract Zone (Phase I and Phase 4 of the Village Green Revitalization Master Plan, VGRMP) as follows:

Use	Min. Lot Frontage
Detached Single Family Residential Structure	15'
Attached Single Family Residential Structure	15'
Duplex Residential Structure	50'

Maximum Number of Residential Units Accessed from Private Drive = 6

B) The following minimum setbacks within the V-MUZ District shall be modified for all structures within the Contract Zone (Phase I and Phase 4 of the VGRMP) as follows:

Structure Type	Front	Side
Detached Single Family Residential Structure and Garage	15' *	
Attached Single Family Residential Structure and Garage	15' *	10' **
Duplex Residential Structure and Garage	15' *	
Driveways	0'	8' **
<b>Note: See additional buffer and setback requirements in Section F below</b>		

\* Setback between face of garage and sidewalk shall be minimum distance of 20'

\*\* Side setback reduced to 0' along common sideline between attached residential structures and garages

C) All public roads within the Contract Zone (Phase I and Phase 4 of the VGRMP), including the full extent of Wyman Way connecting to Main Street, shall be designed in accordance with the residential sub-collector roadway standards as contained in Section 8.2 Article VI and Table 2 of Chapter 250, of the Subdivision Ordinance of Land, of the Cumberland Code, as modified by Section 204.13.5.4315-18, of the V-MUZ District, of the Cumberland Code, and as further modified below:

Standard	Public Road
Grass Esplanade	6' * (one side)
Paved Sidewalk	6' (one side)
Min. Tangent Length Between Curves of Reverse Alignment	0'
Min. Distance Between Street Intersections on Same Side	100'



Min. Distance Between Street Intersections on Opposite Side	200'
Min. Pavement Radii at Intersections	25'
Min. K Factor, Crest Vertical Curve	15
Min. K Factor, Sag Vertical Curve	20
MPH Design Speed	25
Min. Property Line Radius at Intersection	15'
Dead End Turn Around	Cul-de-Sac Per 8.2.D.3
Right-of-Way Width	50'
Minimum Centerline Radius	100'
Minimum Angle of Street Intersection	71 degrees
Minimum Pavement Radii at Intersection	25'
Aggregate Subbase Course: Sand	0"

\* Reduce esplanade width to 0' along portion of Wyman Way extending between Parcel 1 (Tax Map U10, Lot 7B) – Former Doane Parcel and Main Street (Route 9).

D) All private roads within the Contract Zone (Phase 1 and Phase 4 of the VGRMP) shall be designed in accordance with the private roadway standards as contained in Article VI and Table 2 of Chapter 250, Section 8.2 of the Subdivision of Land Ordinance, of the Cumberland Code, as modified by Section 204.13.5.4315-18, -of the V-MUZ District, of the Cumberland Code, and as further modified below:

Standard	Private Road
Grass Esplanade	4' (one side)
Paved Sidewalk	5' (one side)
Min. Tangent Length Between Curves of Reverse Alignment	0'
Min. Distance Between Street Intersections on Same Side	100'
Dead End Turn Around	Tee Turn Around 25' Length

E) The following roadway standards shall apply to private drives within the Contract Zone (Phase 1 and Phase 4 of the VGRMP):

Standard	Private Drive
Right-of-Way Width	30'
Roadway Pavement Width	18'
Grass Esplanade	N/A
Paved Sidewalk	N/A
Max. Dead End Road Length	<u>250'-675'</u>
Min. Roadway Centerline Grade (1.0% preferred)	1.0%
Max. Roadway Centerline Grade	10%

Min. Centerline Radius (100' Preferred)	100'
Min. Tangent Length Between Curves of Reverse Alignment	0'
Min. Angle of Street Intersections (90° Preferred)	75°
Min. Distance Between Street Intersections on Same Side	100'
Min. Distance Between Street Intersections on Opposite Side	100'
Min. Pavement Radii at Intersections	10'
Min. Pavement Crown	¼" per foot
Min. Slope of Gravel Shoulder	½" per foot
Min. K Factor, Crest Vertical Curve	15
Min. K Factor, Sag Vertical Curve	20
MPH Design Speed	25
Max. Grade within 75' of Intersection	3%
Min. Property Line Radius at Intersection	0'
Dead End Turn Around	N/A

F) The following design standards shall apply to the Contract Zone (Phase I and Phase 4 of the VGRMP) as follows:

1. The portion of public roadway along the existing Wyman Way right-of-way shall conform to the existing right-of-way dimensions and geometry, which shall include the ability of the roadway not to be centered within the existing right-of-way.
2. The drainage system for public and private roadways shall consist of closed drainage to the extent practicable; however, shallow under-drained swales may be used alongside roadways where no sidewalk is proposed. Where sidewalks are proposed, they shall be constructed with curb and access to the closed drain system through catch basin inlets, for example.
3. Parking and garage doors facing towards the public right-of-way are permissible provided the garages are architecturally designed to not be the principal element of the structure. Parking and garage doors facing towards private roads and private drives are permissible.
4. No minimum wooded buffer strip is required to be maintained along existing public streets as referenced in Section 7.9 of the Subdivision Ordinance.
5. Curbing at roadways to be either bituminous or slip form concrete.
6. A minimum 50' buffer shall be maintained along the exterior of the VGRMP parcel (excluding Wyman Way right-of-way and the Phase 4



Property) and abutting residential development. The 50' buffer shall not be required to adjacent land owned by the Town.

7. For the residential lots proposed to be built on the Phase 4 Property (Lots 2, 3, 4 and 5 as shown on Exhibit E) the following buffers shall be maintained:

- a. A 75 foot wide buffer between the project boundary line that abuts the Cumberland Common residential lots and the proposed new residential Lots 3 and 4 as shown on Exhibit E. Of the 75 foot wide buffer, 50 feet shall remain natural and undisturbed, and 25 feet shall be vegetated.
- b. A 40 foot wide setback along the boundary line of the Phase 4 Property that abuts the Town Civic Lot, behind proposed residential Lots 2 and 3, as shown on Exhibit E.

~~6.8.~~ Upon completion of construction providing access to Phase 4 via Bradbury Way as shown on Exhibit E, no access to the VGRMP Property, including, but not limited to, the Phase 1 and Phase 4 Property, shall be permitted from Amanda's Way. Current access from Amanda's Way shall be discontinued and landscaping shall be installed along the Phase 4 property boundary to prevent future access to and from Amanda's Way. The Developer shall add proposed landscaping features to the subdivision plan and submit to the Planning Board for review and approval.



## 16

[illegible]

# EXHIBIT EF

## CHAPTER 4

### RESIDENTIAL ENERGY EFFICIENCY

#### SECTION 401 GENERAL

**401.1 Scope.** This chapter applies to residential buildings.

**401.2 Compliance.** Projects shall comply with Sections 401, 402.4, 402.5, and 403.1, 403.2.2, 403.2.3, and 403.3 through 403.9 (referred to as the mandatory provisions) and either:

1. Sections 402.1 through 402.3, 403.2.1 and 404.1 (prescriptive); or
2. Section 405 (performance).

**401.3 Certificate.** A permanent certificate shall be posted on or in the electrical distribution panel. The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall be completed by the builder or registered design professional. The certificate shall list the predominant *R*-values of insulation installed in or on ceiling/roof, walls, foundation (slab, basement wall, crawlspace wall and/or floor) and ducts outside conditioned spaces; *U*-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficien-

cies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be listed for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

#### SECTION 402 BUILDING THERMAL ENVELOPE

**402.1 General (Prescriptive).**

**402.1.1 Insulation and fenestration criteria.** The building thermal envelope shall meet the requirements of Table 402.1.1 based on the climate zone specified in Chapter 3.

**402.1.2 *R*-value computation.** Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

TABLE 402.1.1  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT\*

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b, c</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>i</sup>	FLOOR R-VALUE	BASEMENT <sup>e</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>e</sup> WALL R-VALUE
1	1.2	0.75	0.30	30	13	3/4	13	0	0	0
2	0.65 <sup>j</sup>	0.75	0.30	30	13	4/6	13	0	0	0
3	0.50 <sup>j</sup>	0.65	0.30	30	13	5/8	19	5/13 <sup>f</sup>	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13+5 <sup>h</sup>	13/17	30 <sup>g</sup>	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13+5 <sup>h</sup>	15/19	30 <sup>g</sup>	15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38 <sup>g</sup>	15/19	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

- R*-values are minimums. *U*-factors and SHGC are maximums. R-19 batts compressed into a nominal 2 × 6 framing cavity such that the *R*-value is reduced by R-1 or more shall be marked with the compressed batt *R*-value in addition to the full thickness *R*-value.
- The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
- "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.
- There are no SHGC requirements in the Marine Zone.
- Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.
- Or insulation sufficient to fill the framing cavity, R-19 minimum.
- "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.
- The second *R*-value applies when more than half the insulation is on the interior of the mass wall.
- For impact rated fenestration complying with Section R301.2.1.2 of the *International Residential Code* or Section 1608.1.2 of the *International Building Code*, the maximum *U*-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.



TABLE 402.1.3  
EQUIVALENT U-FACTORS<sup>a</sup>

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR <sup>b</sup>	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR <sup>c</sup>
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	0.035	0.082	0.141	0.047	0.091 <sup>c</sup>	0.136
4 except Marine	0.35	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.028	0.050	0.065

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Zone 1, 0.14 in Zone 2, 0.12 in Zone 3, 0.10 in Zone 4 except Marine, and the same as the frame wall U-factor in Marine Zone 4 and Zones 5 through 8.

c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure 301.1 and Table 301.1.

**402.1.3 U-factor alternative.** An assembly with a U-factor equal to or less than that specified in Table 402.1.3 shall be permitted as an alternative to the R-value in Table 402.1.1.

**402.1.4 Total UA alternative.** If the total building thermal envelope UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table 402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table 402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

#### 402.2 Specific insulation requirements (Prescriptive).

**402.2.1 Ceilings with attic spaces.** When Section 402.1.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section 402.1.3 and the total UA alternative in Section 402.1.4.

**402.2.2 Ceilings without attic spaces.** Where Section 402.1.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Sec-

tion 402.1.1 shall be limited to 500 square feet (46 m<sup>2</sup>) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section 402.1.3 and the total UA alternative in Section 402.1.4.

**402.2.3 Access hatches and doors.** Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

**402.2.4 Mass walls.** Mass walls for the purposes of this chapter shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs.

**402.2.5 Steel-frame ceilings, walls, and floors.** Steel-frame ceilings, walls and floors shall meet the insulation requirements of Table 402.2.5 or shall meet the U-factor requirements in Table 402.1.3. The calculation of the U-factor for a steel-frame envelope assembly shall use a series-parallel path calculation method.

**Exception:** In Climate Zones 1 and 2, the continuous insulation requirements in Table 402.2.5 shall be permitted to be reduced to R-3 for steel frame wall assemblies with studs spaced at 24 inches (610 mm) on center.

TABLE 402.2.5  
STEEL-FRAME CEILING, WALL AND FLOOR INSULATION  
(R-VALUE)

WOOD FRAME R-VALUE REQUIREMENT	COLD-FORMED STEEL EQUIVALENT R-VALUE <sup>a</sup>
<b>Steel Truss Ceilings<sup>b</sup></b>	
R-30	R-38 or R-30 + 3 or R-26 + 5
R-38	R-49 or R-38 + 3
R-49	R-38 + 5
<b>Steel Joist Ceilings<sup>b</sup></b>	
R-30	R-38 in 2 × 4 or 2 × 6 or 2 × 8 R-49 in any framing
R-38	R-49 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10
<b>Steel-Framed Wall</b>	
R-13	R-13 + 5 or R-15 + 4 or R-21 + 3 or R-0 + 10
R-19	R-13 + 9 or R-19 + 8 or R-25 + 7
R-21	R-13 + 10 or R-19 + 9 or R-25 + 8
<b>Steel Joist Floor</b>	
R-13	R-19 in 2 × 6 R-19 + 6 in 2 × 8 or 2 × 10
R-19	R-19 + 6 in 2 × 6 R-19 + 12 in 2 × 8 or 2 × 10

a. Cavity insulation R-value is listed first, followed by continuous insulation R-value.

b. Insulation exceeding the height of the framing shall cover the framing.

**402.2.6 Floors.** Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

**402.2.7 Basement walls.** Walls associated with conditioned basements shall be insulated from the top of the *basement wall* down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections 402.1.1 and 402.2.6.

**402.2.8 Slab-on-grade floors.** Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table 402.1.1. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table 402.1.1 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. The top edge of the insulation installed between the *exterior wall* and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the *exterior wall*. Slab-edge insulation is not required in jurisdictions designated by the *code official* as having a very heavy termite infestation.

**402.2.9 Crawl space walls.** As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizon-

tally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder in accordance with the *International Building Code*. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (153 mm) up the stem wall and shall be attached to the stem wall.

**402.2.10 Masonry veneer.** Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

**402.2.11 Thermally isolated sunroom insulation.** The minimum ceiling insulation R-values shall be R-19 in Zones 1 through 4 and R-24 in Zones 5 through 8. The minimum wall R-value shall be R-13 in all zones. New wall(s) separating a sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

#### 402.3 Fenestration. (Prescriptive).

**402.3.1 U-factor.** An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements.

**402.3.2 Glazed fenestration SHGC.** An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the SHGC requirements.

**402.3.3 Glazed fenestration exemption.** Up to 15 square feet (1.4 m<sup>2</sup>) of glazed fenestration per dwelling unit shall be permitted to be exempt from U-factor and SHGC requirements in Section 402.1.1. This exemption shall not apply to the U-factor alternative approach in Section 402.1.3 and the Total UA alternative in Section 402.1.4.

**402.3.4 Opaque door exemption.** One side-hinged opaque door assembly up to 24 square feet (2.22 m<sup>2</sup>) in area is exempted from the U-factor requirement in Section 402.1.1. This exemption shall not apply to the U-factor alternative approach in Section 402.1.3 and the total UA alternative in Section 402.1.4.

**402.3.5 Thermally isolated sunroom U-factor.** For Zones 4 through 8, the maximum fenestration U-factor shall be 0.50 and the maximum skylight U-factor shall be 0.75. New windows and doors separating the sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

**402.3.6 Replacement fenestration.** Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and SHGC in Table 402.1.1.

#### 402.4 Air leakage (Mandatory).

**402.4.1 Building thermal envelope.** The *building thermal envelope* shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material:

1. All joints, seams and penetrations.

2. Site-built windows, doors and skylights.
3. Openings between window and door assemblies and their respective jambs and framing.
4. Utility penetrations.
5. Dropped ceilings or chases adjacent to the thermal envelope.
6. Knee walls.
7. Walls and ceilings separating a garage from conditioned spaces.
8. Behind tubs and showers on exterior walls.
9. Common walls between dwelling units.
10. Attic access openings.
11. Rim joist junction.
12. Other sources of infiltration.

**402.4.2 Air sealing and insulation.** Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section 402.4.2.1 or 402.4.2.2:

**402.4.2.1 Testing option.** Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is less than seven air changes per hour (ACH) when tested with a blower door at a pressure of 50 pascals (1 psf). Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;
2. Dampers shall be closed, but not sealed, including exhaust, intake, makeup air, backdraft and flue dampers;
3. Interior doors shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling system(s) shall be turned off;
6. HVAC ducts shall not be sealed; and
7. Supply and return registers shall not be sealed.

**402.4.2.2 Visual inspection option.** Building envelope tightness and insulation installation shall be considered acceptable when the items listed in Table 402.4.2, applicable to the method of construction, are field verified. Where required by the *code official*, an *approved* party independent from the installer of the insulation shall inspect the air barrier and insulation.

**402.4.3 Fireplaces.** New wood-burning fireplaces shall have gasketed doors and outdoor combustion air.

**402.4.4 Fenestration air leakage.** Windows, skylights and sliding glass doors shall have an air infiltration rate of no

more than 0.3 cfm per square foot (1.5 L/s/m<sup>2</sup>), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m<sup>2</sup>), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

**Exceptions:** Site-built windows, skylights and doors.

**402.4.5 Recessed lighting.** Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the *conditioned space* to the ceiling cavity. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

**402.5 Maximum fenestration U-factor and SHGC (Mandatory).** The area-weighted average maximum fenestration U-factor permitted using trade-offs from Section 402.1.4 or 405 shall be 0.48 in Zones 4 and 5 and 0.40 in Zones 6 through 8 for vertical fenestration, and 0.75 in Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using trade-offs from Section 405 in Zones 1 through 3 shall be 0.50.

## SECTION 403 SYSTEMS

**403.1 Controls (Mandatory).** At least one thermostat shall be provided for each separate heating and cooling system.

**403.1.1 Programmable thermostat.** Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

**403.1.2 Heat pump supplementary heat (Mandatory).** Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

### 403.2 Ducts.

**403.2.1 Insulation (Prescriptive).** Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

**Exception:** Ducts or portions thereof located completely inside the *building thermal envelope*.

**403.2.2 Sealing (Mandatory).** All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed.

Joints and seams shall comply with Section M1601.4.1 of the *International Residential Code*.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area* or a total leakage less than or equal to 12 cfm (12 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-In test: Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area*.

**Exceptions:** Duct tightness test is not required if the air handler and all ducts are located within *conditioned space*.

TABLE 402.4.2  
AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material. Air-permeable insulation is inside of an air barrier.
Ceiling/attic	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jams and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above-garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
Crawl space walls	Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception—fixtures in conditioned space.
Plumbing and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical/phone box on exterior walls	Air barrier extends behind boxes or air sealed-type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.



**403.2.3 Building cavities (Mandatory).** Building framing cavities shall not be used as supply ducts.

**403.3 Mechanical system piping insulation (Mandatory).** Mechanical system piping capable of carrying fluids above 105°F (41°C) or below 55°F (13°C) shall be insulated to a minimum of R-3.

**403.4 Circulating hot water systems (Mandatory).** All circulating service hot water piping shall be insulated to at least R-2. Circulating hot water systems shall include an automatic or readily *accessible* manual switch that can turn off the hot-water circulating pump when the system is not in use.

**403.5 Mechanical ventilation (Mandatory).** Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

**403.6 Equipment sizing (Mandatory).** Heating and cooling equipment shall be sized in accordance with Section M1401.3 of the *International Residential Code*.

**403.7 Systems serving multiple dwelling units (Mandatory).** Systems serving multiple dwelling units shall comply with Sections 503 and 504 in lieu of Section 403.

**403.8 Snow melt system controls (Mandatory).** Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F, and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F.

**403.9 Pools (Mandatory).** Pools shall be provided with energy-conserving measures in accordance with Sections 403.9.1 through 403.9.3.

**403.9.1 Pool heaters.** All pool heaters shall be equipped with a readily *accessible* on-off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas or LPG shall not have continuously burning pilot lights.

**403.9.2 Time switches.** Time switches that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on swimming pool heaters and pumps.

**Exceptions:**

1. Where public health standards require 24-hour pump operation.
2. Where pumps are required to operate solar- and waste-heat-recovery pool heating systems.

**403.9.3 Pool covers.** Heated pools shall be equipped with a vapor-retardant pool cover on or at the water surface. Pools heated to more than 90°F (32°C) shall have a pool cover with a minimum insulation value of R-12.

**Exception:** Pools deriving over 60 percent of the energy for heating from site-recovered energy or solar energy source.

## SECTION 404 ELECTRICAL POWER AND LIGHTING SYSTEMS

**404.1 Lighting equipment.** A minimum of 50 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps.

## SECTION 405 SIMULATED PERFORMANCE ALTERNATIVE (Performance)

**405.1 Scope.** This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling, and service water heating energy only.

**405.2 Mandatory requirements.** Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-6.

**405.3 Performance-based compliance.** Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

**Exception:** The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

### 405.4 Documentation.

**405.4.1 Compliance software tools.** Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

**405.4.2 Compliance report.** Compliance software tools shall generate a report that documents that the *proposed design* complies with Section 405.3. The compliance documentation shall include the following information:

1. Address or other identification of the residence;
2. An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table 405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design*, and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and

4. Name and version of the compliance software tool.

**Exception:** Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations.

**405.4.3 Additional documentation.** The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *standard reference design*.
2. A certification signed by the builder providing the building component characteristics of the *proposed design* as given in Table 405.5.2(1).
3. Documentation of the actual values used in the software calculations for the *proposed design*.

#### 405.5 Calculation procedure.

**405.5.1 General.** Except as specified by this section, the *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques.

**405.5.2 Residence specifications.** The *standard reference design* and *proposed design* shall be configured and analyzed as specified by Table 405.5.2(1). Table 405.5.2(1) shall include by reference all notes contained in Table 402.1.1.

#### 405.6 Calculation software tools.

**405.6.1 Minimum capabilities.** Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities:

1. Computer generation of the *standard reference design* using only the input for the *proposed design*. The calculation procedure shall not allow the user to directly modify the building component characteristics of the *standard reference design*.
2. Calculation of whole-building (as a single zone) sizing for the heating and cooling equipment in the *standard reference design* residence in accordance with Section M1401.3 of the *International Residential Code*.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
4. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table 405.5.2(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EER, etc.).

**405.6.2 Specific approval.** Performance analysis tools meeting the applicable sections of Section 405 shall be permitted to be *approved*. Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

**405.6.3 Input values.** When calculations require input values not specified by Sections 402, 403, 404 and 405, those input values shall be taken from an *approved* source.

## RESIDENTIAL ENERGY EFFICIENCY

**TABLE 405.5.2(1)**  
**SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame. Gross area: same as proposed U-factor: from Table 402.1.3 Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed As proposed
Basement and crawl space walls	Type: same as proposed Gross area: same as proposed U-factor: from Table 402.1.3, with insulation layer on interior side of walls.	As proposed As proposed As proposed
Above-grade floors	Type: wood frame Gross area: same as proposed U-factor: from Table 402.1.3	As proposed As proposed As proposed
Ceilings	Type: wood frame Gross area: same as proposed U-factor: from Table 402.1.3	As proposed As proposed As proposed
Roofs	Type: composition shingle on wood sheathing Gross area: same as proposed Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed
Attics	Type: vented with aperture = 1 ft <sup>2</sup> per 300 ft <sup>2</sup> ceiling area	As proposed
Foundations	Type: same as proposed foundation wall area above and below grade and soil characteristics: same as proposed.	As proposed As proposed
Doors	Area: 40 ft <sup>2</sup> Orientation: North U-factor: same as fenestration from Table 402.1.3.	As proposed As proposed As proposed
Glazing*	Total area <sup>b</sup> = (a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area. Orientation: equally distributed to four cardinal compass orientations (N, E, S & W). U-factor: from Table 402.1.3 SHGC: From Table 402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: Summer (all hours when cooling is required) = 0.70 Winter (all hours when heating is required) = 0.85 <sup>c</sup> External shading: none	As proposed   As proposed As proposed Same as standard reference design  As proposed
Skylights	None	As proposed
Thermally isolated sunrooms	None	As proposed

(continued)

TABLE 405.5.2(1)—continued  
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Specific leakage area (SLA)* = 0.00036 assuming no energy recovery	For residences that are not tested, the same as the standard reference design. For residences without mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate <sup>f</sup> but not less than 0.35 ACH For residences with mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate <sup>g</sup> combined with the mechanical ventilation rate, $f$ which shall not be less than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: $CFA$ = conditioned floor area $N_{br}$ = number of bedrooms
Mechanical ventilation	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: $kWh/yr = 0.03942 \times CFA + 29.565 \times (N_{br} + 1)$ where: $CFA$ = conditioned floor area $N_{br}$ = number of bedrooms	As proposed
Internal gains	$IGain = 17,900 + 23.8 \times CFA + 4104 \times N_{br}$ (Btu/day per dwelling unit)	Same as standard reference design
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element <sup>g</sup> but not integral to the building envelope or structure
Structural mass	For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air.	As proposed
	For masonry basement walls, as proposed, but with insulation required by Table 402.1.3 located on the interior side of the walls	As proposed
	For other walls, for ceilings, floors, and interior walls, wood frame construction	As proposed
Heating systems <sup>h</sup>	As proposed Capacity: sized in accordance with Section M1401.3 of the <i>International Residential Code</i>	As proposed
Cooling systems <sup>h,j</sup>	As proposed Capacity: sized in accordance with Section M1401.3 of the <i>International Residential Code</i>	As proposed
Service H <sub>2</sub> O heating <sup>h,k,l</sup>	As proposed Use: same as proposed design	As proposed $gal/day = 30 + (10 \times N_{br})$
Thermal distribution systems	A thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems other than tested duct systems. Duct insulation: From Section 403.2.1. For tested duct systems, the leakage rate shall be the applicable maximum rate from Section 403.2.2.	As tested or as specified in Table 405.5.2(2) if not tested
Thermostat	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature setpoint = 72°F	Same as standard reference

(continued)

# RESIDENTIAL ENERGY EFFICIENCY

TABLE 405.5.2(1)—continued

For SI: 1 square foot = 0.93 m<sup>2</sup>; 1 British thermal unit = 1055 J; 1 pound per square foot = 4.88 kg/m<sup>2</sup>; 1 gallon (U.S.) = 3.785 L; °C = (°F-3)/1.8; 1 degree = 0.79 rad.

- a. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

- b. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:

$$AF = A_s \times FA \times F$$

where:

$AF$  = Total glazing area.

$A_s$  = Standard reference design total glazing area.

$FA$  = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 × below-grade boundary wall area).

$F$  = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

- c. For fenestrations facing within 15 degrees (0.26 rad) of true south that are directly coupled to thermal storage mass, the winter interior shade fraction shall be permitted to be increased to 0.95 in the proposed design.

- d. Where leakage area ( $L$ ) is defined in accordance with Section 5.1 of ASHRAE 119 and where:

$$SLA = L/CFA$$

where  $L$  and  $CFA$  are in the same units.

- e. Tested envelope leakage shall be determined and documented by an independent party approved by the code official. Hourly calculations as specified in the 2001 ASHRAE Handbook of Fundamentals, Chapter 26, page 26.21, Equation 40 (Sherman-Grimsrud model) or the equivalent shall be used to determine the energy loads resulting from infiltration.

- f. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE Handbook of Fundamentals, page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE Handbook of Fundamentals, page 26.19 for intermittent mechanical ventilation.

- g. Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.

- h. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

- i. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design. For electric heating systems, the prevailing federal minimum efficiency air-source heat pump shall be used for the standard reference design.

- j. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

- k. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

TABLE 405.5.2(2)  
DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR PROPOSED DESIGNS<sup>a</sup>

DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION:	FORCED AIR SYSTEMS	HYDRONIC SYSTEMS <sup>b</sup>
Distribution system components located in unconditioned space	—	0.95
Untested distribution systems entirely located in conditioned space <sup>c</sup>	0.88	1
"Ductless" systems <sup>d</sup>	1	—

For SI: 1 cubic foot per minute = 0.47 L/s; 1 square foot = 0.093 m<sup>2</sup>; 1 pound per square inch = 6895 Pa; 1 inch water gauge = 1250 Pa.

- a. Default values given by this table are for untested distribution systems, which must still meet minimum requirements for duct system insulation.

- b. Hydronic systems shall mean those systems that distribute heating and cooling energy directly to individual spaces using liquids pumped through closed loop piping and that do not depend on ducted, forced airflow to maintain space temperatures.

- c. Entire system in conditioned space shall mean that no component of the distribution system, including the air handler unit, is located outside of the conditioned space.

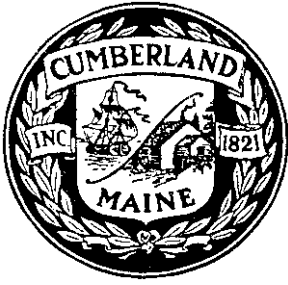
- d. Ductless systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer's air handler enclosure.

**EXHIBIT FE-1**

Street lighting in Phase 1 shall utilize current energy-saving lighting equipment and technologies for street lighting, including LED cut-offs on all Town roads, private roads and common parking areas.

# ITEM 16-072

To appoint Charles Rumsey as Police Chief effective June 6, 2016



# M E M O R A N D U M

TOWN OF CUMBERLAND, MAINE  
290 TUTTLE ROAD  
CUMBERLAND, MAINE 04021  
TEL: 207-829-2205 FAX: 829-2224

**To:** Town Council  
**From:** William R. Shane, Town Manager  
**Date:** May 18, 2016  
**Re:** Appointment of Charles Rumsey as Police Chief

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The Town Charter clearly states the Town Council must approve the initial appointment of all Department Heads:

## **ARTICLE IV Personnel Management**

### ***Section 4. Town Council: Appointments***

A majority of the Town Council must approve the initial appointment of all department heads when recommended for employment by the Town Manager. Except as specified above, the Council shall not otherwise participate in appointments, and neither the Council nor any of its members shall direct or request the appointment of any person to office by the Manager.

It is with great confidence I am recommending that Charles “Chip” Rumsey be appointed as the new Chief of the Cumberland Police Department.

Chief Rumsey will begin his duties on Monday, June 6, 2016. He is actively looking for housing in our Town and is very excited about this opportunity. I have attached components of his resume for your files. Chief Rumsey and his family will be at your June 6, 2016 meeting for his formal swearing in ceremony. We will hold a welcome reception for staff and community from 6-7 PM that evening.



# CHARLES J RUMSEY, IV



4/25/2016

Town of Cumberland

Candidate for:

## Chief of Police

**CHARLES J. RUMSEY IV, MPA**

**178 Clinton Avenue**

**Winslow, ME 04901**

**Mobile (207) 692-4102**

**Office (207) 680-4703**

**EXPERIENCE:**

**Waterville Police Department, Waterville, ME**

*Deputy Chief of Police, 2007 to present*

*Sergeant, 2002 to 2007*

*Detective, 1998 to 2002*

*Patrol Officer, 1995 to 1998*

Responsible for managing the day-to-day operation of a 40 employee law enforcement agency. Oversee recruitment, hiring, training, and retention. Responsible for grant writing and management, policy development, and program management. Assist in every aspect of the preparation and administration of a 3 million dollar annual budget.

**Thomas College, Waterville, ME**

*Adjunct Instructor, Spring 2009 to present*

Teach Criminal Investigations, a 300-level undergraduate course.

Teach Police Administration, a 300-level undergraduate course (2015 to present)

**EDUCATION:**

**FBI National Academy, 242<sup>nd</sup> Session, 2010**

**University of Maine, 2001-2009**

*Master of Public Administration*

**University of North Dakota, 1989-1994**

*Bachelor of Science in Criminal Justice Studies*

**ORGANIZATIONS:**

**High Hopes Clubhouse, 2014-present**

Member of the Advisory Committee. Provide law enforcement perspective and connection to a skills-based and employment-based non-profit organization for the mentally ill.

**Children's Advocacy Center of Kennebec and Somerset Counties, 2011-present**

Founding member of the Multi-disciplinary team. Worked to draft the CAC's mission statement and guidelines. Current co-chair of the CAC Advisory Committee.

## **ORGANIZATIONS (*continued*):**

**Maine Chiefs of Police Association**, Member, 2007-present

**International Assoc. of Chiefs of Police**, Member, 2007-present

**Northern Kennebec Underage Drinking Task Force**, 2008-2013

Founding task force member. Worked to craft subcontract agreement between community funding organization and local police departments. Forged a multi-jurisdictional approach to combating underage drinking. Coordinated and organized a multifaceted approach to reduce access to alcohol for minors.

**Colby College Campus Culture Working Group**, 2008-2009

Served as a member of a group comprised of campus administrators, educators, coaches, students, alumni and Trustees. Contributed to a comprehensive review of the College environment and culture and made concrete recommendations geared toward reducing dangerous drinking by students.

**Waterville Safety Council**, 2007-2013

Worked as liaison between Police Department and group comprised of community members which strove to improve safety for pedestrians, cyclists and motorists in the City of Waterville. Briefed Council on Police Department initiatives and interfaced with other municipal departments to solve traffic flow problems as necessary.

**Rape Crisis Assistance and Prevention**, 2001-2005

*Member, Board of Directors, 2001-2003*

*President, Board of Directors, 2003-2004*

*Vice President, Board of Directors, 2004-2005*

Career Related Duties:

Supported and reviewed performance of agency Director

Governed organization by setting policies and objectives

Reviewed and approved annual budget

Determined and monitored agency programs and services

## **TRAINING:**

Hundreds of hours of pertinent in-service training including:

**FBI LEEDA Supervisor Leadership Institute**, March 2015

**FBI LEEDA Executive Leadership Institute**, Dec. 2014

**Managing the Investigative Unit**, September 2012

**7 Habits of Highly Effective Law Enforcement**, March 2012

**Police Executive Development (POLEX)**, January 2009

**New Chief / Sheriffs Seminar**, April 2008

**FBI Law Enforcement Executive Development**, March 2008

**Investigating Complaints of Officer Misconduct**, Feb. 2008

**Civil Rights Officer Training**, August 2007

**Advanced Supervision Skills**, May 2006

**Supervisor Development**, March 2003



## ACTIVITIES:

Certified MCJA Instructor, assisted in planning and instruction of Sexual Assault Investigations training / *Certified Field Training Officer* / Drafted legislation to address metal theft / *Panelist, 2013 Conference on Poverty, Thomas College* / Director, New Dimensions FCU Board of Directors

## AWARDS:

Maine Network of Children's Advocacy Centers, 2015, **Children's Advocate Award**

Sexual Assault Crisis & Support Center, 2013, **Hero in Healing Award**

Inductee, 2009, **Pi Alpha Alpha National Honor Society for Public Affairs and Administration**

University of Maine, 2009, winner **Barrie E. Blunt Outstanding Graduate Student Memorial Award**

Maine Criminal Justice Academy, 2007, **Executive Certificate**

Waterville R.E.M. Awards, 2003, **Volunteer of the Year**

Waterville Exchange Club, 2002, **Police Officer of the Year**

## REFERENCES:

*John Morris, Commissioner of Public Safety, State of Maine  
45 Commerce Drive  
104 State House Station, Augusta, ME 04333  
(207) 626-3803*

*Hon. Evert Fowle, Judge, Capital Judicial Center  
1 Court Street, Augusta, ME 04330  
(207) 213-2982*

*James Terhune, Vice President of Student Affairs and Dean of Students, Colby College  
4780 Mayflower Hill Drive, Waterville, ME 04901  
(207) 859-4782*

*≈Additional references available upon request≈*

# ITEM 16-073

To consider and act on moving the June 13<sup>th</sup> and 27<sup>th</sup> Town  
Council Meetings to June 6<sup>th</sup> and 20<sup>th</sup>

# ITEM

# 16-074

To hold a Public Hearing to consider and act on a Liquor License  
for Doc's Café for Class III (Vinous & Malt in Café) and Class I  
(all alcohol with catering) for a period of May 28, 2016 to  
May 28, 2017



**BUREAU OF ALCOHOLIC BEVERAGES  
DIVISION OF LIQUOR LICENSING & ENFORCEMENT  
8 STATE HOUSE STATION  
AUGUSTA, ME 04333-0008**



Promise by any person that he or she can expedite a liquor license through influence should be completely disregarded.

To avoid possible financial loss an applicant, or prospective applicant, should consult with the Division before making any substantial investment in an establishment that now is, or may be, attended by a liquor license.

**DEPARTMENT USE ONLY**

**LICENSE NUMBER:**

**CLASS:**

**DEPOSIT DATE**

**AMT. DEPOSITED:**

**BY:**

**CK/MO/CASH:**

**PRESENT LICENSE EXPIRES** \_\_\_\_\_

**INDICATE TYPE OF PRIVILEGE:** ☒ MALT ☒ SPIRITUOUS ☒ VINOUS

**INDICATE TYPE OF LICENSE:**

- ☒ RESTAURANT (Class I,II,III,IV)  
☐ HOTEL-OPTINONAL FOOD (Class I-A)  
☐ CLASS A LOUNGE (Class X)  
☐ CLUB (Class V)  
☐ TAVERN (Class IV)

- ☐ RESTAURANT/LOUNGE (Class XI)  
☐ HOTEL (Class I,II,III,IV)  
☐ CLUB-ON PREMISE CATERING (Class I)  
☐ GOLF CLUB (Class I,II,III,IV)  
☐ OTHER: \_\_\_\_\_

**REFER TO PAGE 3 FOR FEE SCHEDULE**

**ALL QUESTIONS MUST BE ANSWERED IN FULL**

<b>1. APPLICANT(S)</b> —(Sole Proprietor, Corporation, Limited Liability Co., etc.)			<b>2. Business Name (D/B/A)</b>		
DOB:			Doe's Cafe's Marketplace		
Rebecca Williams			371 Tuttle Rd Unit 1		
DOB:			Location (Street Address)		
DOB:			Cumberland ME 04001		
Address			City/Town	State	Zip Code
6 Hemlock Drive					
Cumberland, ME 04021			Mailing Address		
			same		
City/Town	State	Zip Code	City/Town	State	Zip Code
2073471298					
Telephone Number		Fax Number	Business Telephone Number		Fax Number
Federal I.D. #			Seller Certificate #		
45-4820323			1155716		

**EMAIL ADDRESS:** rebecwilliams@yahoo.com

3. If premises is a hotel, indicate number of rooms available for transient guests: 512.076.61
4. State amount of gross income from period of last license: ROOMS \$ \_\_\_\_\_ FOOD \$ \_\_\_\_\_ LIQUOR \$ 5012.00
5. Is applicant a corporation, limited liability company or limited partnership? YES ☒ NO ☐

If YES, complete Supplementary Questionnaire

7. If manager is to be employed, give name: \_\_\_\_\_

8. If business is NEW or under new ownership, indicate starting date: \_\_\_\_\_

Requested inspection date: \_\_\_\_\_ Business hours: \_\_\_\_\_

9. Business records are located at: 371 Middle Rd Cumberland ME 04021

10. Is/are applicant(s) citizens of the United States? YES ☒ NO ☐

11. Is/are applicant(s) residents of the State of Maine? YES ☒ NO ☐

12. List name, date of birth, and place of birth for all applicants, managers, and bar managers. Give maiden name, if married:  
Use a separate sheet of paper if necessary.

Name in Full (Print Clearly)	DOB	Place of Birth
Rebecca Williams	5/21/78	Pensacola, FL

Residence address on all of the above for previous 5 years (Limit answer to city & state)

329 Greely Rd. N. Yarmouth ME  
16 Hemlock St Cumberland ME

13. Has/have applicant(s) or manager ever been convicted of any violation of the law, other than minor traffic violations, of any State of the United States? YES ☐ NO ☒

Name: \_\_\_\_\_ Date of Conviction: \_\_\_\_\_

Offense: \_\_\_\_\_ Location: \_\_\_\_\_

Disposition: \_\_\_\_\_

14. Will any law enforcement official benefit financially either directly in your license, if issued?

Yes ☐ No ☒ If Yes, give name: \_\_\_\_\_

15. Has/have applicant(s) formerly held a Maine liquor license? YES ☒ NO ☐

16. Does/do applicant(s) own the premises? Yes ☒ No ☐ If No give name and address of owner: \_\_\_\_\_

17. Describe in detail the premises to be licensed: (Supplemental Diagram Required) \_\_\_\_\_

18. Does/do applicant(s) have all the necessary permits required by the State Department of Human Services?

YES ☒ NO ☐ Applied for: \_\_\_\_\_

19. What is the distance from the premises to the NEAREST school, school dormitory, church, chapel or parish house, measured from the main entrance of the premises to the main entrance of the school, school dormitory, church, chapel or parish house by the ordinary course of travel? 265 yards Which of the above is nearest? church

20. Have you received any assistance financially or otherwise (including any mortgages) from any source other than yourself in the establishment of your business? YES ☐ NO ☒

If YES, give details: \_\_\_\_\_



NOTE: "I understand that false statements made on this form are punishable by law. Knowingly supplying false information this form is a Class D offense under the Criminal Code, punishable by confinement of up to one year or by monetary fine of up to \$2,000 or both."

Dated at: Cumberland, ME on 5/15/16, 20 16  
Town/City, State Date

**Please sign in blue ink**

Signature of Applicant or Corporate Officer(s)

Signature of Applicant or Corporate Officer(s)

Print Name \_\_\_\_\_

Print Name \_\_\_\_\_

## NOTICE – SPECIAL ATTENTION

All applications for NEW or RENEWAL liquor licenses must contact their Municipal Officials or the County Commissioners unincorporated places for approval of their application for liquor licenses prior to submitting them to the bureau.

**THIS APPROVAL EXPIRES IN 60 DAYS.**

## FEE SCHEDULE

<b>Class I</b>	Spirituous, Vinous and Malt .....	\$ 900.00
<b>CLASS I:</b>	Airlines; Civic Auditoriums; Class A Restaurants; Clubs with catering privileges; Dining Cars; Golf Clubs; Hotels; Indoor Ice Skating Clubs; Indoor Tennis Clubs; Vessels; Qualified Caterers; OTB.	

<b>Class I-A</b>	<b>Spirituos, Vinous and Malt, Optional Food (Hotels Only)</b>	<b>\$1,100.00</b>
	<b>CLASS I-A: Hotels only that do not serve three meals a day.</b>	

<b>Class II</b>	Spirituos Only .....	\$ 550.00
<b>CLASS II:</b> Airlines; Civic Auditoriums; Class A Restaurants; Clubs with catering privileges; Dining Cars; Golf Clubs; Hotels; Indoor Ice Skating Clubs; Indoor Tennis Clubs; and Vessels.		

<b>Class III</b>	Vinous Only .....	\$ 220.00
	<b>CLASS III:</b> Airlines; Civic Auditoriums; Class A Restaurants; Clubs with catering privileges; Dining Cars; Golf Clubs; Hotels; Indoor Ice Skating Clubs; Indoor Tennis Clubs; Restaurants; Vessels; Pool Halls; and Bed and Breakfasts.	

<b>Class IV</b>	Malt Liquor Only .....	\$ 220.00
	<b>CLASS IV:</b> Airlines; Civic Auditoriums; Class A Restaurants; Clubs with catering privileges; Dining Cars; Golf Clubs; Hotels; Indoor Ice Skating Clubs; Indoor Tennis Clubs; Restaurants; Taverns; Pool Halls; and Bed and Breakfasts.	

<b>Class V</b>	Spirituuous, Vinous and Malt (Clubs without Catering, Bed & Breakfasts) .....	\$ 495.00
<b>CLASS V:</b> Clubs without catering privileges.		

<b>Class X</b>	Spiritous, Vinous and Malt – Class A Lounge .....	\$2,200.00
	<b>CLASS X: Class A Lounge</b>	

<b>Class XI</b>	Spirituos, Vinous and Malt – Restaurant Lounge .....	\$1,500.00
<b>CLASS XI: Restaurant/Lounge; and OTB.</b>		

**FILING FEE** ..... \$ 10.00

**UNORGANIZED TERRITORIES** \$10.00 filing fee shall be paid directly to County Treasurer. All applicants in unorganized territories shall submit along with their application evidence of payment to the County Treasurer.

All fees must accompany application, made payable to the **Treasurer of Maine**. This application must be completed and mailed to Bureau of Alcoholic Beverages and Lottery Operations, Division of Liquor Licensing and Enforcement, 8 State House Station, Augusta ME 04333-0008. Payments by check subject to penalty provided by Title 28A, MRS, Section 3-B.

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## STATE OF MAINE

Dated at: \_\_\_\_\_, Maine \_\_\_\_\_ ss  
City/Town (County)

On: \_\_\_\_\_  
Date

The undersigned being:                      ☐ Municipal Officers                      ☐ County Commissioners                      of the  
☐ City    ☐ Town    ☐ Plantation    ☐ Unincorporated Place    of: \_\_\_\_\_, Maine

Hereby certify that we have given public notice on this application and held public hearing thereon as required by Section 653 Title 28A, Mai Revised Statutes and herby approve said application.

**THIS APPROVAL EXPIRES IN 60 DAYS**

## NOTICE – SPECIAL ATTENTION

§ 653. Hearings; bureau review; appeal

1. **Hearing.** The municipal officers or, in the case of unincorporated places, the county commissioners of the county in which the unincorporated place located, shall hold a public hearing for the consideration of applications for new on-premise licenses and applications for transfer of location of existing on-premise licenses. The municipal officers or county commissioners may hold a public hearing for the consideration of requests for renewal of licenses, except that when an applicant has held a license for the prior 5 years and a complaint has not been filed against the applicant within that time, applicant may request a waiver of the hearing.
  - A. The bureau shall prepare and supply application forms. [1993, c.730, §27(amd).]
  - B. The municipal officers or the county commissioners, as the case may be, shall provide public notice of any hearing held under this section causing a notice, at the applicant's prepaid expense, stating the name and place of hearing, to appear on at least 3 consecutive days before date of hearing in a daily newspaper having general circulation in the municipality where the premises are located or one week before the date of the hearing in a weekly newspaper having general circulation in the municipality where the premises are located. [1995, c.140, §4 (amd)]
  - C. If the municipal officers or the county commissioners, as the case may be, fail to take final action on an application for a new on-premise license, for transfer of the location of an existing on-premise license or for renewal of an on-premise license within 60 days of the filing of application, the application is deemed approved and ready for action by the bureau. For purposes of this paragraph, the date of filing of application is the date the application is received by the municipal officers or county commissioners. This paragraph applies to all applications pending before municipal officers or county commissioners as of the effective date of this paragraph as well as all applications filed or after the effective date of this paragraph. This paragraph applies to an existing on-premise license that has been extended pending renewal. The municipal officers or the county commissioners shall take final action on an on-premise license that has been extended pending renewal within 120 days of the filing of the application. [1999, c.589, §1 (amd).]
2. **Findings.** In granting or denying an application, the municipal officers or the county commissioners shall indicate the reasons for their decision and provide a copy to the applicant. A license may be denied on one or more of the following grounds:
  - A. Conviction of the applicant of any Class A, Class B or Class C crime: [1987, c.45, Pt.A§4 (new).]
  - B. Noncompliance of the licensed premises or its use with any local zoning ordinance or other land use ordinance not directly related to liquor control; [1987, c.45, Pt.A§4(new).]
  - C. Conditions of record such as waste disposal violations, health or safety violation or repeated parking or traffic violations on or in the vicinity of the licensed premises and caused by persons patronizing or employed by the licensed premises or other such conditions caused by persons patronizing or employed by the licensed premises that unreasonably disturb, interfere with or affect the ability of persons or businesses residing or located in the vicinity of the licensed premises to use their property in a reasonable manner; [1993, c.730, §27 (amd).]
  - D. Repeated incidents of record of breaches of the peace, disorderly conduct, vandalism or other violations of law on or in the vicinity of the licensed premises and caused by persons patronizing or employed by the licensed premises; [1989, c.592, §3 (amd).]
  - E. A violation of any provision of this Title; and [1989, c.592, §3 (amd).]
  - F. A determination by the municipal officers or county commissioners that the purpose of the application is to circumvent the provisions of section 601. [1989, c.592, §4 (new).]

[1993, c730, §27 (amd).]

3. **Appeal to bureau.** Any applicant aggrieved by the decision of the municipal officers or county commissioners under this section may appeal to the bureau within 15 days of the receipt of the written decision of the municipal officers or county commissioners. The bureau shall hold a public hearing in the city, town or unincorporated place where the premises are situated. In acting on such an appeal, the bureau may consider all licensure requirements and findings referred to in subsection 2.
- A. [1993, c.730, §27 (rp).]
4. **No license to person who moved to obtain a license. (REPEALED)**
5. **(TEXT EFFECTIVE 3/15/01) Appeal to District Court.** Any person or governmental entity aggrieved by a bureau decision under this section may appeal the decision to the District Court within 30 days of receipt of the written decision of the bureau.

An applicant who files an appeal or who has an appeal pending shall pay the annual license fee the applicant would otherwise pay. Upon resolution of appeal, if an applicant's license renewal is denied, the bureau shall refund the applicant the prorated amount of the unused license fee.



**State of Maine**  
**Bureau of Alcoholic Beverages**  
**Division of Liquor Licensing and Enforcement**

**Supplemental Information Required for  
Business Entities Who Are Licensees**

**For Office Use Only:**

License #: \_\_\_\_\_

Date Filed: \_\_\_\_\_

For information required for Questions 1 to 4, this information is on file with the Maine Secretary of State's office and must match their record information. Please clearly complete this form in its entirety.

1. Exact legal name:

Doc's Cafe LLC

2. Other business name for your entity (DBA), if any:

Doc's Cafe & Marketplace

3. Date of filing with the Secretary of State: Jan 1, 12

4. State in which you are formed: Maine

5. If not a Maine business entity, date on which you were authorized to transact business in the State of Maine: \_\_\_\_\_

6. List the name and addresses for previous 5 years, birth dates, titles of officers, directors and list the percentage ownership: (attached additional sheets as needed)

Name	Address for Previous 5 years	Date of Birth	Ownership %
Rebecca Williams	66 Hamlock Dr. Cumberland ME 04001	5/21/78	100
	329 Greely Rd N. Yarmouth ME 04097		

7. Is any principal person involved with the entity a law enforcement official?

Yes

☐

No

☒

8. If Yes to Question 7, please provide the name and law enforcement agency:



9. Has any principal person involved in the entity ever been convicted of any violation of the law, other than minor traffic violations, in the United States?

Yes ☐

No ☒

10. If Yes to Question 9, please complete the following: (attached additional sheets as needed)

Name: \_\_\_\_\_

Date of Conviction: \_\_\_\_\_

Offense: \_\_\_\_\_

Location of Conviction: \_\_\_\_\_

Disposition: \_\_\_\_\_

**Signature:**



Signature of Duly Authorized Person

5/15/16

Date

Rebecca Williams

Print Name of Duly Authorized Person

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If you have questions regarding the legal name or assumed (DBA) name on file with the Secretary of State's office, please call (207) 624-7752. The SOS can only speak to the information on file with their office, not the filing of this supplemental information – please direct any questions about this form to our office at the number below.

Submit Completed Forms To:

Bureau of Alcoholic Beverages and Lottery  
Operations Division of Liquor Licensing Enforcement  
8 State House Station Augusta, Me 04333-0008  
Telephone Inquiries: (207) 624-7220  
Fax: (207) 287-3434  
Email Inquiries: [MaineLiquor@Maine.gov](mailto:MaineLiquor@Maine.gov)

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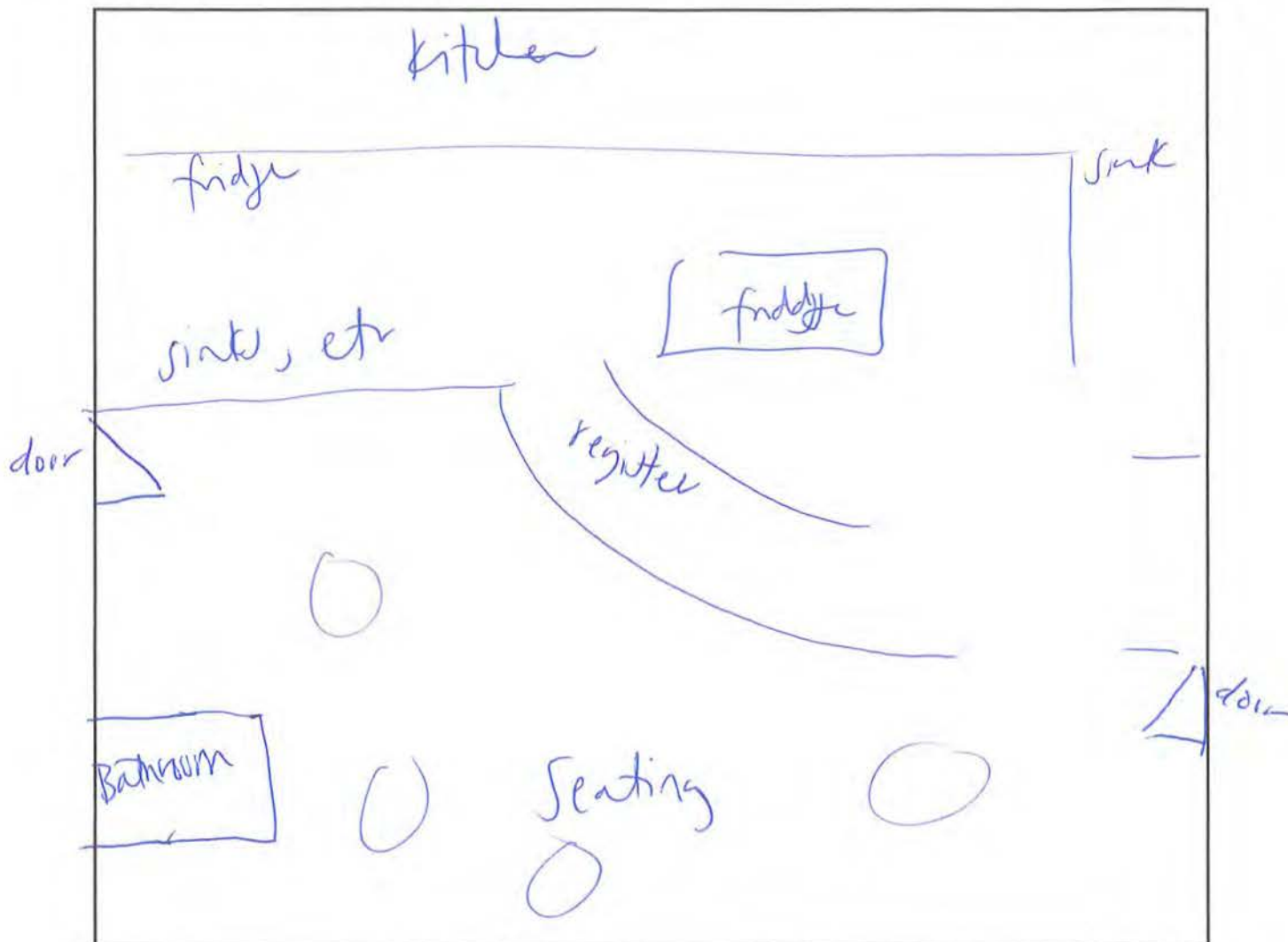


Bureau of Alcoholic Beverages  
Division of Liquor Licensing & Enforcement  
8 State House Station  
Augusta, ME 04333-0008  
Tel: (207) 624-7220 Fax: (207) 287-3434

## SUPPLEMENTAL APPLICATION FORM ON-PREMISE DIAGRAM

In an effort to clearly define your license premise and the areas that consumption and storage of liquor is allowed, The Division requires all applicants to submit a diagram of the premise to be licensed in addition to a completed license application.

Diagrams should be submitted on this form and should be as accurate as possible. Be sure to label the areas of your diagram including entrances, office area, kitchen, storage areas, dining rooms, lounges, function rooms, decks and all areas that you are requesting approval from the Division for liquor consumption.



# ITEM

## 16-075

To set a Public Hearing date of June 6<sup>th</sup> to consider and act on a  
Mass Gathering Permit for United Maine Craftsmen Cumberland  
Arts and Craft Show to be held at the Cumberland Fairgrounds  
August 11<sup>th</sup> through 14<sup>th</sup>



TOWN OF CUMBERLAND

Publication dates: \_\_\_\_\_  
Publication names: \_\_\_\_\_  
Date filed: \_\_\_\_\_  
Fee rec'd: \_\_\_\_\_  
Date Ordinance received: \_\_\_\_\_  
Issued: \_\_\_\_\_  
Denied: \_\_\_\_\_

Mass Gathering Application – Major Outdoor Event  
(5,000 or more persons)

This application must be filed with the Town Clerk not less than 60 days before the date of the event.  
Application must be accompanied by a non-refundable fee of \$500.

Name of applicant: United Maine Craftsmen

Address of applicant: 16 Old Wintthrop Rd Suite 2 Tel. # 621-2818  
Manchester, ME 04364

Name of event: Cumberland Arts + Crafts Show

Facility where the event will be held: Cumberland Fairgrounds

Is the facility owned by the applicant: \_\_\_\_\_ yes; ☒ no, (if no, attach a copy of the contract with the owner which allows use of the property)

Name of promoter (if different from above): Same

Telephone number: 621-2818

Will any food vendors be serving at the event? ☒ yes, \_\_\_\_\_ no (if yes, how many, and what types) 8-10 food vendors/concessions - free standing tents/truck units and Lion's Club Building

Will any alcohol vendors be serving at the event? \_\_\_\_\_ yes, ☒ no (if yes, list name and attach a copy of the vendors license to sell alcohol, describe alcohol will be served) \_\_\_\_\_

Date of event: Aug 11-14, 2016 Time (start and finish times): Thurs-Sat 10-5  
Sun 10-4

Number of tickets available: ~~8000~~ unlimited - sold @ gate

Expected attendance: 8000+

Description of event: over 160 Maine artisans selling their handcrafted products



Describe the three most recent outdoor performances of the group, performer, or event being proposed. Include location, date(s), number in attendance, promoter or sponsoring person or organization.

1. 46th Annual Cumberland Arts + Crafts Show  
Aug 6-9, 2015 8000+ customers 170 exhibitors
2. 14th Annual Fall Festival of Arts + Crafts Smiling Hill Farm  
Sept 12, 2015 2000 customers, 100 exhibitors
3. Payson Pop-Up - Payson Park, Portland  
July 11, 2015 - not sure - 50 crafters

**Description of facility:**

- A. Seating capacity: \_\_\_\_\_ permanent; \_\_\_\_\_ temporary
- B. Other seating capacity: \_\_\_\_\_ festival; \_\_\_\_\_ standing room only
- C. Number of toilets available: \_\_\_\_\_ permanent; \_\_\_\_\_ portable
- D. Number of parking spaces available: \_\_\_\_\_ on-site; \_\_\_\_\_ off-site
- E. Are all parking lots lighted (applicable only if event runs into evening hours)  
\_\_\_\_\_ yes; \_\_\_\_\_ no, if no, which lots are not lighted \_\_\_\_\_
- F. Source of potable water: Portland Water District
- G. Refuse containers available, number and size: (2) 30 yard roll off  
containers
- H. Name of refuse disposal company (attach a copy of the agreement to pick up refuse)  
Triolano Waste Service
- I. When will refuse be picked up? Monday, August 15, 2016

**Public Safety:**

- J. Describe first aid facilities: Cumberland Rescue
- K. Describe emergency facilities: Cumberland Police and Rescue



L. Describe communication facilities: 100 necessary personnel will carry radios, cell phones also available

M. Number of certified police officers: one - on-site, will increase if necessary.

N. Other security personnel (include company name and qualifications): \_\_\_\_\_

O. Describe fire personnel: Cumberland Fire Dept.

#### Traffic Plan

- P. Description of routes persons attending the event are likely to take, include number of traffic controllers and deployment descriptions. Cumberland Police will be at the Blanchard Rd gate to assist with traffic, if necessary.
- Q. Describe methods used to publicize alternate routes of reaching the scene of the event. Directional Signs.
- R. Attach statement of availability of private towing firms to remove disabled vehicles.

#### Crowd Management

- S. Plan for discouraging those not holding tickets for the event from not coming to the event site. All gates manned during show hours.
- T. Plan for preventing trespassing on private property in the area. Not an issue.
- U. Will all publicity stop as soon as it is apparent that the event is sold out? \_\_\_\_\_ yes; \_\_\_\_\_ no Not an issue.
- V. Description of how the event will be publicized, include how a sell-out will be publicized. TV, print, e-mail, flyers, postcards, website, (sell out is not an issue).

#### Other

- W. Name of liability insurance Zurich Insurance  
Amount of coverage \$2,000,000; amount of property insurance \$1,000,000
- X. Preferred type of performance guarantee (i.e., escrow account, irrevocable letter of credit)  
N/A

June Budraw

Authorized signature

On \_\_\_\_\_ (date), I received a copy of the Cumberland Mass  
Gathering Ordinance. \_\_\_\_\_ (authorized signature)

# Cumberland Farmer's Club

Mike Timmons, President  
140 Bruce Hill Road  
Cumberland, ME 04021  
Business Telephone: 207-829-5531 Fax: 207-829-3205

## Rental Agreement

NAME OF ORGANIZATION: United Maine Craftsmen, Inc.

EVENT DATES: August 11-12-13-14, 2016

Rental of Grounds for the period August 8, 2016 through, August 15, 2016 \$8,200.00  
Rent for Exhibition Hall 500.00

MT  
MT

Maintenance person on grounds during event

\$ N/A

Camping to be handled by the Cumberland Farmers Club.

### The following conditions will apply:

United Maine Craftsmen will provide proof of \$1,000,000 liability insurance  
and name Cumberland Farmers club as co-insured.

Terms: One-half of rental due at the time of signing of this agreement; the balance due  
the day before the scheduled event.

NAME OF ORGANIZATION: United Maine Craftsmen, Inc.

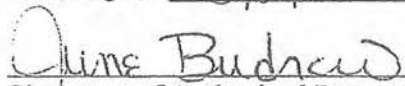
MAILING ADDRESS: 16 Old Winthrop RD #2, Manchester, ME 04351

TELEPHONE NUMBER: 207-621-2818

FEDERAL ID# 23-7072870

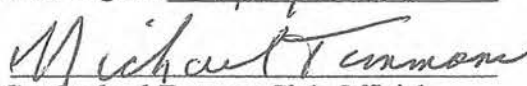
DATES OF RENTAL: August 8-15, 2016

Date Signed: 3/2/16



Signature of Authorized Person for UMC  
June Budrow, Co-Administrator

Date Signed: 4/1/2016



Cumberland Farmers Club Official

APR 01 2016



# BUDGET REPORT

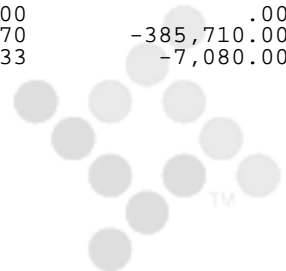
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TOWN OF CUMBERLAND  
HISTORICAL ACTUALS COMPARISON REPORT

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FOR PERIOD 11 OF 2016

ACCOUNTS FOR:	PRIOR YR3	PRIOR YR2	LAST YR	CURRENT YR	CY REV
001 General Fund	ACTUALS	ACTUALS	ACTUALS	ACTUALS	BUDGET
<hr/>					
0011 Tax Revenues					
<hr/>					
0011 0303 Motor Vehicle Excise Tax	-1,312,358.85	-1,454,242.58	-1,515,057.46	-1,596,784.81	-1,480,000.00
0011 0304 Boat Excise Tax	-11,163.50	-10,302.20	-9,527.50	-10,329.30	-10,000.00
0011 0325 Supplemental Taxes	.00	.00	.00	-12,507.10	.00
0011 0328 Outer Islands Property Tax	-40,464.64	-41,566.42	-41,866.88	-39,889.25	-40,000.00
0011 0329 Payment in Lieu of Taxes	.00	-11,556.00	-16,828.00	-29,608.00	-23,793.00
TOTAL Tax Revenues	-1,363,986.99	-1,517,667.20	-1,583,279.84	-1,689,118.46	-1,553,793.00
0012 License & Permit Revenues					
<hr/>					
0012 0311 Hunting & Fishing License	-470.83	-540.41	-566.50	-447.25	-600.00
0012 0312 Marriage Lic & Vital Records	-1,929.60	-1,576.80	-2,400.80	-1,838.00	-1,900.00
0012 0313 Birth Certificates	-1,196.00	-1,565.80	-1,276.80	-1,069.80	-365.00
0012 0314 Death Certificates	-1,644.40	-713.20	-1,635.60	-1,359.80	-1,000.00
0012 0315 Clerk Licenses	-2,691.00	-3,540.00	-3,715.00	-4,695.00	-4,500.00
0012 0316 Shellfish Licenses	-2,612.08	-1,889.47	-1,854.28	-537.97	-3,000.00
0012 0317 Conservation Fees	-692.92	-536.53	-480.72	-117.03	-500.00
0012 0334 Snowmobile Reg	-444.54	-201.00	-217.00	-183.00	-200.00
0012 0361 Auto Reg. Fees	-18,117.00	-19,102.00	-18,851.00	-18,418.00	-21,000.00
0012 0362 Boat Reg. Fees	-515.00	-2,074.80	-1,801.40	-457.00	-500.00
0012 0366 Building Permits	-85,635.33	-70,711.04	-70,930.60	-70,454.32	-70,000.00
0012 0367 Electrical Permits	-19,741.33	-16,565.45	-16,375.35	-16,937.10	-18,000.00
0012 0368 Plumbing Permits	-18,917.62	-18,872.80	-18,611.75	-12,455.48	-18,000.00
0012 0369 Other Permits	-950.00	-1,575.00	-1,750.00	-1,250.00	-2,500.00
0012 0383 Agent Fees-Moses	-25.92	-14.84	-18.00	-28.00	.00
0012 0398 Application Fee	-1,500.00	-1,333.33	-1,311.12	-897.23	-1,000.00
0012 0401 Dog Licenses	-4,085.00	-3,417.00	-2,682.00	-2,384.00	-3,000.00
0012 0404 Commercial Haulers License	-200.00	.00	.00	-200.00	-600.00
TOTAL License & Permit Revenue	-161,368.57	-144,229.47	-144,477.92	-133,728.98	-146,665.00
0013 Intergovernmental Revenues					
<hr/>					
0013 0327 Homestead State Reimb	-171,007.14	-128,546.00	-104,285.00	-151,273.00	.00
0013 0331 State Revenue Sharing	-542,963.43	-367,879.14	-377,290.36	-329,518.70	-385,710.00
0013 0332 Park Fee Sharing	-7,212.00	-7,311.82	.00	-8,133.33	-7,080.00



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TOWN OF CUMBERLAND  
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FOR PERIOD 11 OF 2016

ACCOUNTS FOR:	PRIOR YR3	PRIOR YR2	LAST YR	CURRENT YR	CY REV
001 General Fund	ACTUALS	ACTUALS	ACTUALS	ACTUALS	BUDGET
0013 0335 DOT Block Grant	-81,672.00	-68,440.00	-62,592.00	-63,232.00	-62,592.00
0013 0341 North Yarmouth Recreation Shar	-50,353.00	-12,747.00	-26,928.00	-5,466.00	-7,355.00
0013 0342 North Yarmouth Library Share	-131,276.00	-99,713.00	-106,035.00	-109,464.00	-145,952.00
0013 0347 North Yarmouth Channel 2	.00	-1,820.00	-1,909.00	-1,911.00	-2,674.00
0013 0348 ACO Sharing Payments	-3,722.22	-2,475.00	-6,322.00	-6,322.00	.00
0013 0397 Windham-Fire & Rescue	.00	.00	-3,900.00	.00	-3,900.00
0013 0509 Regional Assessing	4,874.00	.00	.00	.00	.00
0013 0545 North Yarm Sidewalk Plowing	-2,600.00	-2,200.00	.00	.00	.00
TOTAL Intergovernmental Revenue	-985,931.79	-691,131.96	-689,261.36	-675,320.03	-615,263.00
0015 Other Revenues					
0015 0305 Interest & Penalties	-44,469.81	-50,606.67	-33,458.08	-27,697.84	-40,000.00
0015 0306 Over/Short	73.82	227.38	-372.87	121.92	-100.00
0015 0364 Growth Permits	-3,600.00	-4,400.00	-3,300.00	-3,700.00	-2,000.00
0015 0365 Board of Appeals	-200.00	-100.00	.00	-500.00	-100.00
0015 0379 Investment Earnings	-1,374.67	-191.90	-233.14	783.86	.00
0015 0381 Building Rentals	.00	.00	.00	.00	-500.00
0015 0382 Sale of Assets	-21,209.00	-17,393.56	-8,300.00	-7,599.00	-25,000.00
0015 0390 Misc. Revenue	-3,821.90	-41,726.20	-41,260.75	-40,482.63	-38,000.00
0015 0399 Staff Review Fee	-12,650.00	-2,866.67	-15,347.88	-4,527.77	-10,000.00
0015 0402 Cable TV Revenue	-117,289.20	-112,749.93	-114,620.19	-111,418.32	-107,000.00
0015 0403 Mooring Fees	-1,010.00	-925.00	-480.00	-985.00	-1,000.00
0015 0410 Private Ways	-200.00	-600.00	-600.00	-1,200.00	-400.00
0015 0432 Workers Compensation Dividend	-7,300.34	-15,122.30	-26,586.80	-10,803.37	.00
0015 0508 Impact Fees	-65,084.80	-71,792.75	-63,627.45	-103,822.70	-50,000.00
0015 0513 Assessing Records	.00	.00	-30.00	.00	-100.00
TOTAL Other Revenues	-278,135.90	-318,247.60	-308,217.16	-311,830.85	-274,200.00
0021 Police Related Revenues					
0021 0337 State Grant revenue	.00	.00	-4,508.74	.00	.00
0021 0351 Police Issued Permits	-4,581.00	-1,023.28	-3,793.00	-3,487.00	-3,500.00
0021 0353 Police Insurance Reports	-444.00	-536.00	-474.00	-497.00	-500.00
0021 0427 Parking Tickets	-407.20	-10.00	.00	.00	-200.00
0021 0431 Outside Detail	-24,266.67	-26,000.26	-16,868.29	-25,017.14	-35,000.00
0021 0536 Animal Control Officer Revenue	-1,940.60	-2,068.00	-1,832.00	-1,681.00	-2,500.00
0021 0546 Court Reimbursements	-1,791.91	-3,295.85	-1,094.80	-989.76	-3,500.00



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TOWN OF CUMBERLAND  
HISTORICAL ACTUALS COMPARISON REPORT

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FOR PERIOD 11 OF 2016

ACCOUNTS FOR:	PRIOR YR3	PRIOR YR2	LAST YR	CURRENT YR	CY REV
001 General Fund	ACTUALS	ACTUALS	ACTUALS	ACTUALS	BUDGET
0021 0547 Miscellaneous Police Revenue	-23,673.14	-5,398.05	-874.40	-536.00	-500.00
0021 0620 Federal Grant revenue	.00	-35,000.00	-25,206.00	-25,000.00	-25,000.00
TOTAL Police Related Revenues	-57,104.52	-73,331.44	-54,651.23	-57,207.90	-70,700.00
0022 Fire Related Revenues					
0022 0390 Misc. Revenue	-15,514.25	-7,835.00	-785.00	-55.00	-15,000.00
0022 0431 Outside Details	-15,866.00	-19,234.00	-19,019.57	-17,921.35	-15,000.00
0022 0504 Rescue Billing	-106,852.47	-71,468.48	-128,218.39	-111,270.24	-155,000.00
0022 0505 Non Emergency Transports	-7,523.74	-17,907.42	-48,955.79	-56,412.68	-31,200.00
0022 0507 Paramedic Intercepts	-1,800.00	-2,400.00	-300.00	-900.00	-2,000.00
TOTAL Fire Related Revenues	-147,556.46	-118,844.90	-197,278.75	-186,559.27	-218,200.00
0023 Rescue Related Revenues					
0023 0504 Rescue Billing	86.07	.00	.00	.00	.00
TOTAL Rescue Related Revenues	86.07	.00	.00	.00	.00
0031 Public Works Related Revenues					
0031 0355 Recycling Income	.00	-20.00	.00	.00	.00
0031 0390 Misc. Revenue	-998.00	-351.00	-31,921.00	-351.00	-500.00
0031 0517 Bags/Universal Waste	-192,304.50	-213,704.50	-208,158.50	-196,442.50	-260,000.00
0031 0539 Brush Passes	-7,673.00	-6,332.00	-7,214.00	-6,441.00	-7,500.00
TOTAL Public Works Related Rev	-200,975.50	-220,407.50	-247,293.50	-203,234.50	-268,000.00
0037 ValHalla Revenues					
0037 0306 Over/Short	.00	.00	.00	-12.21	.00
0037 0329 Payment in Lieu of Taxes	.00	.00	.00	-2,000.00	-8,000.00
0037 0357 Golf Memberships	.00	.00	.00	-216,979.85	-239,283.00
0037 0358 Greens Fees	.00	.00	.00	-107,121.95	-127,148.00



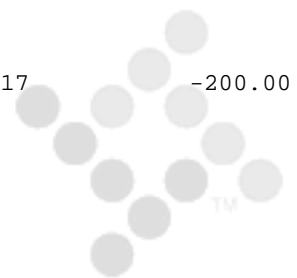
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HISTORICAL ACTUALS COMPARISON REPORT

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ACCOUNTS FOR:	PRIOR YR3	PRIOR YR2	LAST YR	CURRENT YR	CY REV
001 General Fund	ACTUALS	ACTUALS	ACTUALS	ACTUALS	BUDGET
0037 0359 Golf Cart Rentals	.00	.00	.00	-65,212.24	-89,232.00
0037 0378 Soda Sales	.00	.00	.00	-1,986.87	-3,325.00
0037 0416 Practice Range	.00	.00	.00	-7,879.00	-9,465.00
0037 0417 Program Revenues	.00	.00	.00	-34,626.00	-60,132.00
0037 0419 Advertising Sales	.00	.00	.00	-6,050.00	-24,000.00
0037 0522 Outing Golf	.00	.00	.00	-72,602.08	-72,315.00
0037 0560 Rental Income	.00	.00	.00	-15,077.70	-21,600.00
0037 0565 Cell Tower Land Lease	.00	.00	.00	-12,600.00	-20,000.00
TOTAL ValHalla Revenues	.00	.00	.00	-542,147.90	-674,500.00
0041 Recreation Related Revenues					
0041 0370 Recreation Programs	-24,270.75	-24,683.25	-8,176.66	-7,996.00	-32,408.00
0041 0371 Fall Recreation Revenue	-43,997.62	-42,922.48	-33,432.50	-44,877.45	-36,228.00
0041 0372 Winter Recreation Revenue	-90,504.09	-97,303.25	-105,890.26	-97,131.00	-124,846.00
0041 0373 Spring Recreation Revenue	-14,659.99	-36,724.04	-24,691.10	-37,192.00	-41,239.00
0041 0374 Summer Recreation Revenue	-108,032.70	-131,677.04	-121,936.59	-128,217.50	-223,017.00
0041 0385 After School Programs	-101,536.99	-141,066.90	-172,784.20	-186,427.43	-173,302.00
0041 0386 Special Events/Trips Revenues	.00	.00	.00	-285.00	.00
0041 0387 Adult Enrichment Revenue	.00	.00	.00	-37,036.60	-32,377.00
0041 0388 Adult Fitness Revenue	.00	.00	.00	-54,715.75	-41,840.00
0041 0570 Rec Soccer Revenue	-3,732.39	-10,460.00	-7,636.00	-6,860.00	-10,211.00
0041 0571 Rec Ultimate Frisbee Revenue	.00	.00	.00	-15,663.00	.00
0041 0606 CPR/First Aid Revenues	.00	.00	-150.00	1,401.20	.00
TOTAL Recreation Related Reven	-386,734.53	-484,836.96	-474,697.31	-615,000.53	-715,468.00
0043 Park Revenues					
0043 0391 Field Usage Fees	-11,980.77	-13,747.04	-8,372.08	-10,847.56	-15,000.00
0043 0431 Outside Details	.00	.00	.00	-1,909.49	.00
0043 0617 Twin Brooks Donations	.00	.00	-177.00	-77.00	.00
TOTAL Park Revenues	-11,980.77	-13,747.04	-8,549.08	-12,834.05	-15,000.00
0045 Library Related Revenues					
0045 0379 Library Interest Income	-335.84	-217.38	-120.96	-227.17	-200.00





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<b>ACCOUNTS FOR:</b>		<b>PRIOR YR3</b>	<b>PRIOR YR2</b>	<b>LAST YR</b>	<b>CURRENT YR</b>	<b>CY REV</b>
<b>001</b>	<b>General Fund</b>	<b>ACTUALS</b>	<b>ACTUALS</b>	<b>ACTUALS</b>	<b>ACTUALS</b>	<b>BUDGET</b>
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0045	0392 Library Fines	-3,881.14	-3,924.69	-5,164.88	-3,830.55	-3,500.00
0045	0394 Misc. Library Revenue	-1,516.60	-1,106.00	-1,414.00	-1,062.45	.00
	TOTAL Library Related Revenues	-5,733.58	-5,248.07	-6,699.84	-5,120.17	-3,700.00
	TOTAL General Fund	-3,599,422.54	-3,587,692.14	-3,714,405.99	-4,432,102.64	-4,555,489.00
	TOTAL REVENUES	-3,599,422.54	-3,587,692.14	-3,714,405.99	-4,432,102.64	-4,555,489.00
	GRAND TOTAL	-3,599,422.54	-3,587,692.14	-3,714,405.99	-4,432,102.64	-4,555,489.00



# EXPENSES



Financials, Revenue & Citizen Services and Human Capital Management



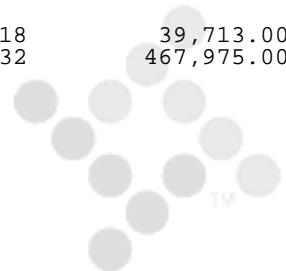
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ACCOUNTS FOR:	PRIOR YR3	PRIOR YR2	LAST YR	CURRENT YR	CY REV
001 General Fund	ACTUALS	ACTUALS	ACTUALS	ACTUALS	BUDGET
<hr/>					
10 General Government					
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130 Administration	465,180.42	459,439.93	491,239.21	557,697.36	548,827.00
140 Assessor	41,158.87	56,913.00	79,699.00	101,413.08	79,486.00
150 Town Clerk	178,612.15	176,862.72	179,671.02	200,512.99	221,002.00
160 Technology	166,548.36	169,103.86	152,798.93	154,338.09	166,546.00
165 Elections	4,108.87	2,968.35	12,512.83	3,348.21	11,953.00
170 Planning	55,432.87	53,132.61	54,689.67	65,961.65	63,775.00
190 Legal	27,150.78	25,002.80	48,349.35	43,485.66	42,500.00
999 Finance/GAAP entries	.00	.00	-100.00	-1,346.92	.00
TOTAL General Government	938,192.32	943,423.27	1,018,860.01	1,125,410.12	1,134,089.00
20 Public Safety					
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210 Police	963,206.18	976,969.26	1,078,704.66	1,241,016.08	1,257,423.00
220 Fire	682,931.82	704,892.79	790,867.02	780,336.96	885,161.00
240 Code Enforcement	75,449.72	75,794.60	87,601.12	100,351.80	94,049.00
260 Animal Control	36,161.28	29,328.72	25,452.20	28,885.48	27,661.00
TOTAL Public Safety	1,757,749.00	1,786,985.37	1,982,625.00	2,150,590.32	2,264,294.00
30 Public Services					
<hr/>					
310 Public Works	892,097.19	854,185.16	931,309.49	916,748.40	1,024,331.00
320 Waste Disposal	577,758.15	479,321.73	426,855.24	402,940.77	520,525.00
430 Parks	134,066.63	167,303.26	200,553.87	204,566.12	221,520.00
440 West Cumberland Rec	5,962.35	5,826.99	4,945.27	3,316.24	7,775.00
470 Historical Society Building	.00	.00	969.40	2,573.45	2,102.00
TOTAL Public Services	1,609,884.32	1,506,637.14	1,564,633.27	1,530,144.98	1,776,253.00
37 Val Halla Golf Club					
<hr/>					
350 Valhalla-Club	.00	.00	.00	30,935.18	39,713.00
360 Valhalla-Course	.00	.00	.00	409,959.32	467,975.00



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ACCOUNTS FOR:	PRIOR YR3	PRIOR YR2	LAST YR	CURRENT YR	CY REV
001 General Fund	ACTUALS	ACTUALS	ACTUALS	ACTUALS	BUDGET
370 Valhalla-Pro Shop	.00	.00	.00	197,831.55	195,668.00
TOTAL Val Halla Golf Club	.00	.00	.00	638,726.05	703,356.00
40 Recreation					
410 Recreation	568,244.97	564,218.89	674,850.34	749,701.85	783,686.00
TOTAL Recreation	568,244.97	564,218.89	674,850.34	749,701.85	783,686.00
45 Library					
450 Library	347,313.81	354,184.87	353,029.58	364,160.05	411,267.00
TOTAL Library	347,313.81	354,184.87	353,029.58	364,160.05	411,267.00
50 Health & Welfare					
580 General Assistance	29,338.01	38,287.86	29,742.99	27,342.29	35,000.00
590 Health Services	8,577.20	8,577.20	10,077.20	13,077.20	13,375.00
TOTAL Health & Welfare	37,915.21	46,865.06	39,820.19	40,419.49	48,375.00
90 Other					
620 Cemetery Association	24,240.00	26,250.00	22,500.00	38,450.00	26,700.00
630 Conservation Commission	596.25	3,410.00	2,902.51	6,046.68	6,000.00
800 Fire Hydrants	47,478.05	48,159.48	51,150.50	51,681.04	65,000.00
810 Street Lighting	38,872.96	31,210.61	38,613.75	36,534.69	37,000.00
830 Contingent	45,882.49	19,112.08	2,211.60	4,257.62	25,000.00
840 Municipal Building	146,191.65	163,159.20	146,546.18	69,000.63	80,629.00
850 Abatements	19,399.95	24,544.80	73,676.78	86,707.09	20,000.00
TOTAL Other	322,661.35	315,846.17	337,601.32	292,677.75	260,329.00
98 Fixed Expenses					



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<b>ACCOUNTS FOR:</b>	<b>PRIOR YR3</b>	<b>PRIOR YR2</b>	<b>LAST YR</b>	<b>CURRENT YR</b>	<b>CY REV</b>
<b>001      General Fund</b>	<b>ACTUALS</b>	<b>ACTUALS</b>	<b>ACTUALS</b>	<b>ACTUALS</b>	<b>BUDGET</b>
650 Debt Service	794,792.19	790,442.77	766,386.42	835,125.86	825,000.00
750 Insurance	309,286.83	320,158.17	197,510.19	217,228.77	219,499.00
860 MSAD #51	12,078,556.05	12,553,836.23	13,120,530.50	14,260,630.01	15,557,051.00
890 County Tax	623,416.00	665,675.00	696,073.00	747,431.00	747,431.00
910 Capital Imp. Plan	896,137.00	1,133,693.00	1,323,868.00	1,181,500.00	1,181,500.00
TOTAL Fixed Expenses	14,702,188.07	15,463,805.17	16,104,368.11	17,241,915.64	18,530,481.00
TOTAL General Fund	20,284,149.05	20,981,965.94	22,075,787.82	24,133,746.25	25,912,130.00
TOTAL EXPENSES	20,284,149.05	20,981,965.94	22,075,787.82	24,133,746.25	25,912,130.00
GRAND TOTAL	20,284,149.05	20,981,965.94	22,075,787.82	24,133,746.25	25,912,130.00

