STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Voluntary Private Residential Fire Sprinkler Systems

Prepared by State Building Code Council
Technical Advisory Group under SHB 2575

December 2008
Report to the Legislature
John Neff, Chair

ACKNOWLEDGEMENTS

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Special thanks to the stakeholders who participated in the survey.

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November 14, 2008

The Honorable Frank Chopp, Speaker of the House
The Honorable Brad Owen, President of the Senate
House Committee on Local Government
Senate Committee on Government Operations and Elections

RE: REPORT ON VOLUNTARY PRIVATE RESIDENTIAL SPRINKLER SYSTEMS

Dear Legislative Members:

I am very pleased and honored to present to you the State Building Code Council's report, "Voluntary Private Residential Fire Sprinkler Systems." This report was developed in accordance with Substitute House Bill No. 2575, Chapter 60, Laws of 2008.

I want to thank all of the members of the technical advisory group (TAG) for their participation and thoughtful input. All of the constituent groups named in the legislation were active participants throughout the process. They all contributed to the final report. Their names are listed in the executive summary of the report. I want to especially thank the Washington Public Utility District Association for hosting the TAG meetings.

I hope that the report provides you with the information you need to address this important issue. Council members and staff are available to answer any questions you may have and to assist in moving forward with the recommendations found in the report.

Sincerely,

John Neff
Chairman
State Building Code Council

JNtn:sm

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I. EXECUTIVE SUMMARY

Substitute House Bill 2575

The state Legislature passed SHB 2575 in the 2007 session. The title of the bill is "An act relating to fire sprinkler systems in private residences." The bill directs the State Building Code Council (SBCC) to form a technical advisory group (TAG) to "examine issues, barriers, and incentives pertaining to….the voluntary installation of sprinkler systems in private residences."

The bill directs the SBCC to consider the work of the TAG and "develop recommendations for eradicating barriers that prevent the voluntary installation of sprinkler systems in private residences." The SBCC is to "report the findings of the TAG to the appropriate committees of the House of Representatives and the Senate by January 15, 2009."

The final bill report indicates that the study is to examine installation of residential fire sprinklers in single-family dwellings under the International Residential Code (IRC), where fire sprinklers are not required by the state or local residential/building/fire code. (Technically this would include one- and two-family dwellings and townhouses.) The bill report does this by defining the term "private residential fire sprinkler systems," as used in the legislation. The TAG abbreviated the term to "residential fire sprinkler systems" (RFSS), and alternated between "private residential fires sprinkler systems" and "voluntary residential fire sprinkler systems" during the process of review. Some members of the TAG felt strongly about using the term "voluntary" to emphasize that the systems are not mandatory. (Full text of SHB 2575 and the final bill report are in Appendix.)

TAG Members

The organizations represented by TAG members are specified in the bill. The SBCC was granted authority to appoint members and to designate additional members to the TAG. The SBCC appointed Council Chair John Neff as Chair of the TAG, and authorized the Chair to appoint members of the TAG. As a number of the TAG positions represent the constituent groups also represented on the SBCC, several Council members agreed to serve on the TAG: John Cochran, representing architects; Pat McBride, representing home builders; Mac McDowell representing counties; John Chelminiak, representing cities. Other SBCC members participating in the TAG were Tom Kinsman, representing structural engineers, and Dale Wentworth, representing the building trades.

The TAG held five monthly meetings in Olympia from April through August 2008. The agendas and complete minutes from the meetings are included in the appendix to this report. Participants included TAG members, TAG alternates, legislative staff, and other visitors. Appointed members are listed below.

John Neff, Chair	SBCC	City of Lacey SBCC
Stan Amas (Primary)	Residential Sprinkler Contractors	Western States Fire Protection
Jerry Benner, PE	Building Inspectors	City of Auburn Planning, Building & Community
Jim Boulanger (Alternate)	Residential Sprinkler Contractors	Patriot Fire Protection
Dick Bower	Washington Association of Building Officials	City of Gig Harbor
John Chelminiak	Association of Washington Cities	Bellevue City Council SBCC
John Cochran	American Institute of Architects	Callison Architecture Inc SBCC
Don Davidson	Department of Ecology	Water Resource Programs
Chuck Duffy	Office of The State Fire Marshal	
Ronald Greenman	Fire Protection Engineers	Bd of Directors Pacific NW Chapter of Society of Fire Protection Engineers
Gary (Ted) Hardiman	Mutual Water Company	Fruitland Mutual Water Company -- Pierce County Water Cooperative
Joe Herr	Residential Builders	Director of Design Burnstead Construction Company
Jim Hudson	Department of Health	Senior Environmental Engineer Office of Drinking Water
John Kounts	Washington Public Utility District Association	Executive Director WPUDA

Scott Kramer	Insurance Industry	State Farm
Marc Marcantonio (Alternate)	Mutual Water Company	Mt. View-Edgewood Water Company
Mac McDowell	Washington State Association of Counties	Island County Commissioner SBCC
Pat McBride	Building Industry Association of Washington	GMS Architects SBCC
Jon Napier (Alternate)	Washington State Association Of Fire Marshals	Fire Marshal City of Kent SBCC
John Norris	BIAW Residential Builders	Norris Homes
Darrin Parsons	Residential Sprinkler Fitters	Local 699
Doug Quinn	Member, WPUDA	Clark Public Utilities/Water Services
Greg Rogers	Washington State Association of Fire Marshals	South Kitsap Fire & Rescue
Brandy Smith (Alternate)	Residential Sprinkler Contractors	Smith Fire Systems
Stuart Turner	Wash Assn of Sewer & Water Districts	Shoreline Water District
David Velderman	American Institute of Building Design	Codes Chair

Information Gathering: Presentations by TAG Members

At the first meeting on April 22, 2008, the TAG agreed to have the interest groups each present their perspectives. TAG members did formal presentations to the group. Documents, reports and published articles related to fire sprinkler systems were also submitted by TAG members throughout the review process. TAG Chair John Neff also called for members to submit their list of issues for the group to consider. A complete list and set of documents, including meeting minutes are included in the appendix.

The second meeting was held on May 20. The TAG members representing water utilities presented an overview of water systems. A power point presentation outlined the design elements and configuration of water systems, water quality concerns, and the financial structure of water systems.

Also at the May 20 meeting, TAG members representing sprinkler installers presented information on the types of residential sprinkler systems, including the average costs of installation. The TAG also discussed the standard regulating the design and installation of fire sprinklers, NFPA 13D (National Fire Protection Association 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes). The installers provided sprinkler plans and cost estimates.

The third meeting was held on June 17. The TAG representative of the insurance industry presented insurance issues in a power point presentation. TAG visitors representing the Washington Survey and Rating Bureau also provided a power point presentation. These presentations addressed basic strategies used to set insurance premiums and loss experience associated with residential fires.

Also at the June 17 meeting, the home builders provided cost data for installing fire sprinkler systems in several residences. The builders cost estimates included the cost of financing the systems.

At its July and August meetings, the TAG reviewed the list of barriers identified through the process. The TAG considered documents submitted by members and agreed to work from the list submitted by TAG member Doug Quinn, representing water utilities, using the format identifying concerns, corrective actions, lead agencies and partners.

The original list contained 16 items, the TAG combined items to create a list of seven items.

List of Barriers

- Barrier 1: Lack of Education
- Barrier 2: Lack of Preferred Design and Installation Details and Guidelines
- Barrier 3: Cost and Cost Recovery of a Voluntary RFSS Installation
- Barrier 4: Costs for Permit and Inspection
- Barrier 5: Increased Cost of Hook-Up Fees in Form of Stand-By System Development Charges
- Barrier 6: Shut-Off Issues
- Barrier 7: Water Use Efficiency Rule Credit for Use of Larger Meters

II. BARRIERS:
VOLUNTARY INSTALLATION
OF RESIDENTIAL FIRE SPRINKLER SYSTEMS

The barriers were identified by the TAG and revised through several drafts. The format included a description under "Concerns", and steps to eliminate the barriers under "Solutions". To implement the solution, the report suggests "Lead agency", "Partners", and "Funding". The report lists affected parties or interest groups and potential funding sources. The affected parties do not necessarily support the action as proposed by this report.

Barrier 1: Lack of Education

CONCERNS

Significant limitations to the voluntary installation of a RFSS may be due to the lack of education and awareness. It is a cost effective investment to launch a coordinated, balanced educational campaign that informs affected parties. With guidance documents available to interested parties, long-term solutions and installation patterns will emerge, normalizing what appears at this time to be inconsistent or unnecessary barriers.

Perception of the Value of Residential Fire Sprinkler Systems

A possible barrier to the voluntary installation of RFSSs relates to perceived benefits. Concern was raised about life-safety benefits of sprinkler systems versus alarm systems given their cost difference. Better data is needed to show the statistical breakdown of lives saved between hardwired alarm systems, hardwired alarms tied to central systems and battery powered smoke alarm systems as compared to residential sprinkler system installations. Data could include the level of local fire protection, fire service response time, and the age of the structure involved.

SOLUTIONS

Actions:

1. Prepare an information packet or brochure that can be used by homeowners when making a decision about voluntary installation of a RFSS.
2. The packet should address new and existing single-family homes.
3. The packet should include information on the risk associated with nonsprinklered single-family homes.
4. Evaluate and improve life safety statistics related to the various systems and related costs of installation. Add components to fire event, recording methods to improve reporting to meet federal standards required to qualify for federal funds. Include the information in published educational materials.

Lead Agency:

The State Fire Marshals Office, the State Building Code Council and other agencies such as the Board of Realtors will coordinate assembly of the packet. The respective interest groups will prepare a guidance document specific to their area of influence.

Partners:

Water purveyors, system installers, the Department of Health, local board of health jurisdictions, builders, insurance representatives, building officials, and fire officials.

Funding:

Existing agency funds; State Building Code Council, State Fire Marshals Office, Fire Sprinkler Fund.

Barrier 2: Lack of Preferred Design & Installation Details & Guidelines

CONCERNS

There is a lack of consistent criteria to assist installers, builders, fire personnel, water purveyors, and homeowners regarding voluntary installation of a RFSS. Numerous installation options contribute to the perceived barrier. This information relates to the installation from the utility's service setting, commonly on the property line or at a meter setter, through to the end point within the residence. There is a similar issue among utility companies relative to the various approaches of bringing adequate supply from the main to the property line.

System Limitations

Private residences served by a well, as well as many smaller systems, lack adequate system capacity and storage to support a RFSS. Alternative designs may be helpful in encouraging installation of a RFSS, such as pneumatic tanks, storage improvements, or booster pumps.

Protection of Water Quality

The primary obligation of water purveyors is to provide safe, clean water for human consumption. Studies show that dead-ends on water systems increase the potential of contamination and that stagnant water will occur on a dead-end RFSS without frequent flushing. Most water systems are designed with looped piping to limit this exposure. Protection of the public water supply relies upon a functioning Double Check Valve

Assembly (DCVA). Due to challenges with ensuring properly operating devices and the ongoing annual expense of testing, the issue of protecting public water supply is of critical importance.

Double Check Valve Assembly

Depending upon the type of installation, an approved Double Check Valve Assembly (DCVA) providing back flow prevention may be required by state plumbing codes to protect the public water supply from contamination. Such devices require annual testing by certified inspectors, thus presenting an additional reoccurring cost to homeowners. Alternative service designs exist that remove the plumbing code requirement for installation of a DCVA.

Oversizing of Water Meters

Unless otherwise restricted, homeowners normally design their onsite systems based upon service and meter size available to their property. Installation of a larger service and meter to accommodate a RFSS will result in an increase in the peak withdrawal capacity of a property. Larger diameter piping runs and a reduced number of irrigation sprinkler zones would result in potentially higher instantaneous withdrawals on the system and have an adverse affect on system performance during peak hour and maximum day operation.

SOLUTIONS

Actions:

1. Prepare standard details and installation guidelines, including all facets of installation and development issues, complete from connection to the public supply to interior layout. Compile a RFSS guidance document complete with installation details, sizing guidelines, evaluations, costing, and other educational elements that relate to the voluntary installation of a RFSS.
2. (investigate) Provide trade-offs for sprinklers in the state residential code and local regulations related to planning, land use and zoning.
3. Address alternatives such as engineered systems to protect water purveyors from liability.
4. Develop a design installation guidance manual listing possible options and alternatives to accommodate limitations normally associated with small private systems.
5. Promote the installation of flow-through, multi-use, and combination type RFSSs that do not require installation of a DCVA.

6. Recognize the increased demand on the system through the application of meter charges or design a solution that limits the withdrawals to the residence while providing adequate flow to the RFSS.
7. Provide guidance documents and construction recommendations to water purveyors throughout the state and at all levels, including Class A, Class B and private well systems.

Lead Agency:

State Building Code Council, State Fire Marshals Office.

Partners:

System installers, water purveyors, builders, and fire agencies. AWC WACO

Funding:

Agency Budget.

BARRIER 3: COST AND COST RECOVERY OF A VOLUNTARY RFSS INSTALLATION

CONCERNS

While the cost of a RFSS may vary widely due to variables in installation cost, between $1.50 to $8.50 a square foot, this cost variable is a barrier to homeowners. In addition to the variable cost, the time of occupancy is not adequate for the homeowner to be provided with much cost recovery of the RFSS. These variables make it difficult to get a clear understanding of the true value of the RFSS.

INCREASED METER SIZING AND RATING

To meet the minimum fire flow requirements of 26 or 30 gallons per minute, owners are normally required to install a ¾" or 1" diameter meter. If normal residential fixture loading would allow a smaller service and meter, the owners bear an increased expense to install a RFSS when upsizing. The meter and service line each has performance characteristics that need to be considered. The length of run, installed diameter, and system pressure affects the final cost of installing a RFSS. Further, meters normally installed for domestic needs do not carry a UL or FM rating. Such ratings significantly limit the choice of meters to water purveyors.

FIRE SERVICE FINANCIAL INCENTIVE

The voluntary installation of a RFSS directly affects the level of fire protection services required within a jurisdiction. It enhances the capability of suppressing fires in residential buildings and correlates to a reduced load on future fire protection services. Recognizing that a direct cost savings will result over time, incentives should be offered by redirecting funds.

UTILITY DESIGN AND CONSTRUCTION COSTS

All Group A public water utilities in the State of Washington are required to comply with State Department of Health WAC 246-290-200 and 420, standards for utility construction and performance criteria. Utilities use various means to generate funds to pay for new construction, replacement, and rehabilitation of aging or worn segments of a utility infrastructure. In order to meet these standards, utilities have utilized various funding means to lower these impacts to their customers. Utilities are left with limited choices of funding and therefore must pass on these increasing costs to new and existing customers.

SOLUTIONS

Actions:

1. Recommend that the State Legislature draft legislation to exempt the assessment of the fire service impact fee for newly constructed homes which have a voluntary residential fire sprinkler system installed. The exempted fire service impact fee shall not include the proportionate share related to the delivery of emergency medical services.
2. Reduce premiums from the insurance industry.
3. Provide an incentive via a credit, using the Public Benefit Rating System, against future local property taxes and state taxes.
4. In addition to a credit against fire impact fees as noted above, local jurisdictions should be given legislative authority to grant incentives for the installation of a RFSS by redirecting monies normally earmarked for normal fire operations directly to homeowners at the time of building construction.
5. Develop detailed pressure and flow tables and service line sizing guidelines to ensure the cost-effective installation of systems.
6. Preserve and make available to all Group A public water systems continued state funding of the Public Works Trust Fund, and develop new additional funding resources. A low-cost fund to utilities will greatly reduce rate impacts, and other charges to new and existing customers.

Lead Agency:

Legislative authority collecting Fire Impact Fees; insurance industry and county/state taxing authority

Partners:

WABO, WFC, AWC, WSAC, insurance industry

Funding:

Fire impact fees, state taxes, state funds, Public Benefit Rating System

BARRIER 4: COSTS FOR PERMIT AND INSPECTION

CONCERNS

Voluntary installation of a RFSS requires an additional cost for plan review and inspections, and it requires that separate inspectors be used.

SOLUTIONS

Actions:

Mitigate or eliminate the cost of a separate permit by including system installation in the normal building permit issued by the code official

Lead Agency:

WABO, WFC

Partners:

Fire personnel

Funding:

Local budget

BARRIER 5: INCREASED COST OF HOOK-UP FEES IN FORM OF STAND-BY/SYSTEM DEVELOPMENT CHARGES

CONCERNS

Homeowners who voluntarily install a RFSS may have to increase the meter size serving their property. In addition to the actual cost of installation and materials, it is standard for utilities to charge a fee to reflect the increased load on the utility associated with a larger meter. It is important to note that many rural systems were not designed to meet additional flow requirements and have not planned for RFSS hook-ups. Thus there may also be additional costs for the main-to-meter service line upsizing and possibly source of supply upgrades required to accommodate the installations. It is recognized by water purveyors that an enlarged meter for a RFSS will also result in higher flows to the property during peak times associated with lawn irrigation and fixture loading.

SOLUTIONS

Actions:

Develop information and designs that will assist water purveyors in installing systems that minimize costs to homeowners. Identify the various methods of installation to ensure that connections are properly designed while minimizing cost to homeowners.

Lead Agency:

Water purveyors

Partners:

WFC

BARRIER 6: SHUT-OFF ISSUES

CONCERNS

Water service to a property may be interrupted for a number of reasons, including routine maintenance, system damage, and failure to pay their water bill. A rural water system may shut off due to power failure, where the system is dependent on a pump. Water purveyors may be exposed to increased liability as a result of a fire at a residence that has a RFSS but is inoperable due to the aforementioned reasons.

SOLUTIONS

Actions:

1. Develop "limited liability" language to protect water purveyors related to installation of RFSSs.
2. Evaluate and establish recommendations for legal notice requirements for residences served by a RFSS that are disconnected for non-payment, for scheduled construction or maintenance, and emergency repairs.

Lead Agency:

Water purveyors, Utilities and Transportation Commission, Legislature

Partners:

SBCC, AAG, DOH

BARRIER 7: WATER USE EFFICIENCY RULE CREDIT FOR USE OF LARGER METERS

CONCERNS

Due to the inaccuracy of larger water meters at low flow, the state Department of Health (DOH) should provide an incremental credit to water purveyors for unaccounted for water.

SOLUTIONS

Actions:

1. Establish a reasonable water loss estimate due to meter upsizing and have it recognized by DOH in reporting requirements for the Water Use Efficiency Rule.
2. Provide a water use credit to the water purveyor for installation of RFSS, accounting for water used by the sprinkler system versus water used by fire fighting.
3. Revisit the Water Use Efficiency Rule to address the difference between leaks and metering waste.

Lead Agency:

DOH

Partners:

Water purveyors

III. CONCLUSION AND RECOMMENDATIONS

RECOMMENDATIONS

The State Building Code Council recommends that the legislature direct the Council to convene a technical advisory group to review the contents of the design standards and the details to implement voluntary residential fire sprinkler systems. Funding for this action will be from the existing State Building Code Council account.

The State Building Code Council recommends the following actions to eradicate barriers that prevent voluntary installation. The actions fall into three general categories:

- Statutory / Legislative
- Codes / Standards
- Administrative

Barrier 1: Lack of Education and Barrier 2: Lack of Preferred Design and Installation Details and Guidelines

- Recommend that the legislature direct the Fire Protection Policy board to evaluate and improve the collection of incident data related to the various installed life safety systems and related costs of installation. Any identified changes to the National Fire Information Reporting System will be submitted to the United States Fire Administration by January 1, 2010.
  [Statutory Amendments]

- Provide trade-offs for sprinklers in the state residential code.
  [Codes/Standards]

- Recommend that the legislature allow the fire protection contractor license fund, created under RCW 18.160.050, to be used to implement an informational program on the installation of voluntary residential fire sprinklers for use by homeowners, code officials, realtors, building and insurance industries and water purveyors. The informational program shall be completed by January 1, 2010. The program shall consider but not be limited to the following:
  - Creation of an informational packet or brochure for homeowners considering the installation of residential fire sprinklers.
  - Prepare standard details and installation guidelines, including all facets of installation and development issues for the use by code officials, water purveyors and industry.
  - Develop a residential fire sprinkler system guidance document, including standard details and guidelines for the installation of residential fire sprinkler systems.

- Develop a design installation guidance manual listing possible options and alternatives to accommodate limitations normally associated with small private systems.
- Provide guidance documents and construction recommendations to water purveyors throughout the state and at all levels, including Class A, Class B and private well systems.

[Statutory Amendments; Administrative]

Barrier 3: Cost and Cost Recovery of a Voluntary RFSS Installation

- Recommend that the State Legislature draft legislation to exempt the assessment of the fire service impact fee for newly constructed homes which have a voluntary residential fire sprinkler system installed. The exempted fire service impact fee shall not include the proportionate share related to the delivery of emergency medical services.

[Statutory Amendments]

Barrier 4: Costs for Permit and Inspection

- Mitigate or eliminate the cost of a separate permit

[Administrative/ Local]

Barrier 5: Increased Cost of Hook-Up Fees in Form of Stand-By/System Development Charges

- Minimize costs to homeowners.

[Administrative / Technical]

Barrier 6: Shut-Off Issues

- Recommend the state legislature develop "limited liability" language to protect water purveyors

[Statutory Amendment]

Barrier 7: Water Use Efficiency Rule Credit for Use of Larger Meters

- Establish a reasonable water loss estimate due to meter upsizing and have it recognized by DOH in reporting requirements for the Water Use Efficiency rule.

[**Administrative Rule]**

LIST OF ITEMS SUBMITTED TO RFSS TAG

NAHB/BIAW

Residential Fire Sprinklers, Problems with NFPA 13D, Richard Schunk, February 2008

House Fire Deaths, Elliot Eisenberg; Housing Economics, November 2002.

Households Priced Out of the Market for a New Home in 2005, by Metro Area.

Interest Rates and House Prices: the "Priced Out" Effect, Paul Emrath, March 2005.

Fire Sprinkler Costs, Lozier Homes, Spreadsheet, Joe Herr.

Fire Sprinkler Costs, RBC, Spreadsheet, Joe Herr.

Water Purveyors

Water Systems Presentation, May 20 2008.

Water Rate Analysis, Lakewood Water District, May 2008.

Fire Service Policy, Summit Water and Supply Company, February 1998.

Utility Connection/ Hook-up Fee Comparison, January 2007.

Department of Health, Office of Drinking Water

Summary of Backflow Incidents Reported since 1996.

Residential Fire Sprinkler Systems and Backflow Prevention, AWWA, June 2003.

Metering: The First Step to Improving Efficiency

Help Protect your Drinking Water from Contamination, AWWA, June 2003.

Discontinuing Water Service Because of a Cross-Connection Hazard, Consistency Statement, January 2001.

Group A Public Water Supplies Chapter 246-290 WAC, Section 230(5-6), Distribution Systems.

Cross-Connection Control Rules and Definitions, Extracts from Chapter 246-290 WAC, Group A Drinking Water Rules, February 2008.

National Fire Sprinkler Association

Water Purveyor's Guide to Fire Sprinklers in Single-Family Dwellings, 2006.

Cost/Benefit to Society for Having Sprinklers in One- and Two-Family Dwellings- A Pessimistic Analysis, Kenneth E. Isman, P.E., Sprinkler Quarterly, Fall 2005.

A 15-Year Update on the Impact and Effectiveness of the Scottsdale Sprinkler Ordinance, Jim Ford, Fire Marshal, Scottsdale, January 2001.

Benefit-Cost Analysis of Residential Fire Sprinkler Systems, NIST: Butry, Brown, Fuller, September 2007.

Collage Lot 19, Fire Sprinkler Plan

NFPA 13D Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes, Appendix A Section A.3.3.9.3 Multipurpose Piping System.

Washington State Fire Marshals Office

Fire Sprinkler Licensing Program, internet site wsp.wa.gov/fire/sprinkler/licensing.htm

Washington State Fire Deaths in One and Two-family Residences, 2003 to 2007

American Water Works Association

Residential Fire Service Meter Task Group Seeks Member Input, Journal AWWA, April 2008

Insurance Industry

Residential Fire Sprinkler Systems, Power Point, June 2008.

TAG Member Comments

Island County, Public Water System Information, May 19, 2008.

Barriers and Incentives to the Voluntary Installation of Residential Home Fire Sprinklers, Jim Hudson, DOH.

Issues, Barriers and Incentives, John Cochran.

Sprinkler TAG Issues, Tom Kinsman

Fire Sprinkler Issues and Costs, Mac MacDowell

Please note that copies of the above documents may be obtained by contacting Tim Nogler, 725-2966, timn@cted.wa.gov.