Understanding Installation and Costs of the Residential Fire Sprinkler Market
Background and Objectives

The need for fire sprinkler systems in residential construction has been under discussion for some time. A key element of the discussion involves an analysis of the actual impact that fire sprinklers have on the construction process.

The purpose of this study was to obtain data directly from home builders concerning the installation of residential fire sprinkler systems. Some topics of interest included:

- Installation and design characteristics
- Permitting
- Costs
- Indirect impacts on the construction process
Data Collection

Data was collected via an online survey of builders. An email invitation was sent to both NAHB members as well as the NAHB Research Center’s Online Builder Panel in April of 2007.

The NAHB Research Center maintains its builder panel solely for the purpose of market research. The panel contains about 4,000 participants and is representative of the U.S. population of builders.

Participation criteria required respondents to have installed at least 1 residential fire sprinkler system in the past 3 years. Given the small percentage of homes with sprinkler systems, a relatively small group of builders is experienced in sprinkler installation. 126 builders took the survey, and of those builders 102 had definitive knowledge of sprinkler pricing—the data from those builders is used in this report.
Data Collection (continued)

Survey results were weighted to more accurately reflect market conditions. Weighting was based on number of homes built by each respondent. In other words, responses from builders are reflected in proportion to the number of units they construct--responses from larger builders are more heavily reflected than responses from smaller builders.
The results of the 2007 survey were obtained primarily from the NAHB Research Center Builder Panel. These results are compared with similar data obtained last year (2006) based on builder responses from a general survey conducted of builders in areas of the country where some form of a fire sprinkler mandate has been implemented.

The questions indicated on the following slides paraphrase the actual question posed to the respondent.
Why did your company install fire sprinkler systems in its new homes?

Reasons for Installation

- **Code requirement**: 94.7% (2006), 70.0% (2007)
- **Builder choice**: 13.7% (2006), 26.1% (2007)
- **Home buyer demand**: 0.4% (2006), 26.7% (2007)
- **Other reason(s)**: 4.8% (2006), 10.8% (2007)
Of the homes your company built what percent of fire sprinkler systems were installed by the following?

System Installer

- **Fire sprinkler contractor**: 91.5% (2006), 62.7% (2007)
- **Combination contractor (plumbing and fire sprinkler)**: 13.2% (2006), 13.2% (2007)
- **Plumbing contractor**: 5.3% (2006), 20.5% (2007)
- **Not sure**: 3.6% (2006), 3.2% (2007)
Type of Fire Sprinkler Permit

- **Other Permit**: 2.2%
- **Only a plumbing permit**: 8.3%
- **Not sure**: 13.7%
- **No permit is required**: 13.5%
- **Fire sprinkler permit part of plumbing permit**: 13.2%
- **Separate fire sprinkler permit**: 38.8%
- **Fire sprinkler permit part of building permit**: 38.0%

What type of fire sprinkler permit is typically required when installing fire sprinkler systems in your new homes?
What percent of the homes your company built with fire sprinkler systems used the following as their water supply?

- Public water system: 74.7% (2006), 97.5% (2007)
- Private well: 14.1% (2006), 2.5% (2007)
- Not sure: 9.4% (2006), 0.0% (2007)
- Other: 2.0% (2006), 0.0% (2007)
Typically, how much is a fire sprinkler permit fee?
In jurisdictions where you build most of your homes with fire sprinkler systems, what type of fire sprinkler inspections are required?

Fire Sprinkler Inspections

- Rough-in or Close-in: 64.0%
- Flow test: 43.5%
- Hydrostatic/Pressure test: 43.3%
- Final: 39.1%
- Part Of The Plumbing Inspection: 30.4%
- Thermal insulation - freeze protection: 12.0%
- Not sure: 13.2%
- Other: 0.0%
Have you ever installed a freeze protected (glycol) fire sprinkler system?

Installed Freeze Protected (Glycol) Fire Sprinkler System

- No: 50.4% in 2006, 63.0% in 2007
- Yes: 16.5% in 2006, 34.8% in 2007
- Not Sure: 33.1% in 2006, 2.2% in 2007
Homeowner Insurance Impact

- Provides home buyer with discounted insurance premium
  - 2006: 41.5%
  - 2007: 46.4%

- Results in coverage exclusions
  - 2006: 4.3%
  - 2007: 19.1%

- Not sure
  - 2006: 38.8%
  - 2007: 54.4%
Importance of Discounted Insurance Premium to Home Buyer

In your opinion, how important is the discounted insurance premium to the home buyer?

- **Very Important**: 16.4%
- **Important**: 71.2%
- **Neither unimportant nor important**: 13.3%
- **Unimportant**: 16.1%
- **Very unimportant**: 1.3%
- **Not sure**: 15.6%

Comparison between 2006 and 2007.
Of the homes you build with fire sprinkler systems, are sprinklers typically installed in the following locations:

- Attic
  - 2006: 23.4%
  - 2007: 42.7%
- Garage
  - 2006: 54.7%
  - 2007: 64.9%
- Crawlspace (for storage)
  - 2006: 27.2%
  - 2007: 42.2%
- Crawlspace (not for storage)
  - 2006: 35.8%
  - 2007: 42.7%
- Finished Basement
  - 2006: 30.0%
  - 2007: 52.7%
- Unfinished Basement
  - 2006: 0%
  - 2007: 10%

Bar chart showing the percentage of homes with sprinklers in different locations for the years 2006 and 2007.
In the jurisdiction where you build most of your homes with fire sprinkler systems, is a fire sprinkler system design and/or plan required?

Fire Sprinkler System Design/Plan

- **Yes**: 94.1%
  - 2006: 68.9%
  - 2007: 94.1%
- **No**: 18.9%
  - 2006: 18.9%
  - 2007: 12.2%
- **Not Sure**: 12.2%
  - 2006: 4.7%
  - 2007: 1.2%
Fire Sprinkler System Designed By

- Fire sprinkler contractor: 82.2% (2007), 57.4% (2006)
- Combination contractor (plumbing and fire sprinkler): 0.7% (2007), 10.6% (2006)
- Plumbing contractor: 13.1% (2007)
- Design consultant: 8.0% (2007), 11.6% (2006)
- Not sure: 7.2% (2007)
- Other: 9.1% (2007)
Is there a separate design fee for the fire sprinkler system?
Fire Sprinkler System Design Fee

Design Fee Cost

2007:
- $1 - $100: 27.4%
- $101 - $500: 16.0%
- $501 - $1000: 28.1%
- $1001 - $1500: 12.5%
- $1501 - $2000: 9.2%
- Greater than $2000: 6.8%

2006:
- $1 - $499: 19.9%
- $500 - $999: 25.2%
- $1000 - $1499: 0.0%
- $1500 - $1999: 13.4%
- $2000 or more: 41.5%
Of the homes you built with fire sprinkler systems, which of the following water service pipe changes resulted in an additional expense?

- Increased size of water service pipe
  - 2006: 50.3%
  - 2007: 64.4%

- Added an additional water service pipe
  - 2006: 31.8%
  - 2007: 22.9%

- No additional water service pipe changes
  - 2006: 28.8%
  - 2007: 34.8%

- Changes did not result in an additional expense
  - 2006: 11.9%
  - 2007: 1.8%

0% 10% 20% 30% 40% 50% 60% 70%
How much is the additional expense for the water service pipe changes?

Water Service Pipe Change Expense

- $8000 or more: 12.1%
- $7000 - $7999: 2.1%
- $6000 - $6999: 0.1%
- $5000 - $5999: 2.1%
- $4000 - $4999: 7.6%
- $3000 - $3999: 1.9%
- $2000 - $2999: 7.8%
- $1000 - $1999: 8.6%
- $500 - $999: 38.1%
- $250 - $499: 21.4%
- $1 - $249: 0.2%
How much is the additional expense for the water service pipe changes

Water Service Pipe Change Expense

- No additional Cost: 17.4%
- $1 - $100: 5%
- $101 - $500: 10%
- $501 - $1000: 15.5%
- $1001 - $2000: 17.4%
- $2001 - $3000: 27.3%
- $3001 - $4000: 15.5%
- $4001 - $5000: 9.4%
- Greater than $5000: 0.2%
Of the homes you built with fire sprinkler systems, which of the following water meter changes resulted in an additional cost?

- **No additional water meter changes**
  - 2006: 36.4%
  - 2007: 45.8%

- **Added an additional water meter**
  - 2006: 11.4%
  - 2007: 25.2%

- **Larger size water meter**
  - 2006: 27.4%
  - 2007: 43.6%

- **Changes did not result in an additional expense**
  - 2006: 13.8%
  - 2007: 9.2%
How much is the additional expense for the water meter?

Water Meter Additional Expense

- No additional cost: 99.8%
- $1 - $1499
- $1500 - $1999
- $2000 - $2499
- $2500 - $2999
- $3000 or more

2006
How much is the additional expense for the water meter?
**Added Time or Money to the Construction Process**

<table>
<thead>
<tr>
<th>Processes resulting in additional cost</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinating inspections between fire officials and building officials</td>
<td>55.1%</td>
</tr>
<tr>
<td>Coordinating fire sprinkler contractor with other trades</td>
<td>52.7%</td>
</tr>
<tr>
<td>Fire sprinkler system testing prior to inspection</td>
<td>50.5%</td>
</tr>
<tr>
<td>Fire sprinkler system design and permit</td>
<td>49.4%</td>
</tr>
<tr>
<td>Fire department/inspector delays</td>
<td>48.0%</td>
</tr>
<tr>
<td>Site supervisor time</td>
<td>45.6%</td>
</tr>
<tr>
<td>Protection of system during construction</td>
<td>38.0%</td>
</tr>
<tr>
<td>Additional framing modifications due to pipe location</td>
<td>37.0%</td>
</tr>
<tr>
<td>Repairing leaks</td>
<td>22.5%</td>
</tr>
<tr>
<td>Installing underground fire lines when developing the subdivision</td>
<td>17.0%</td>
</tr>
<tr>
<td>Other(s)</td>
<td>9.8%</td>
</tr>
</tbody>
</table>
## Finished Square Footage of Living Space

Of the homes you built with fire sprinkler systems that used [_____] as their water source, what was the typical total finished square footage of living space?

<table>
<thead>
<tr>
<th>Total Finished Square Footage</th>
<th>Public Water Source 2007</th>
<th>Private Water Source 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>Less than 500 sq ft</td>
<td>0</td>
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<td>500 – 999 sq ft</td>
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<tr>
<td>1500 - 1999 sq ft</td>
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</tr>
<tr>
<td>2000 - 2499 sq ft</td>
<td>20.1</td>
<td>10.1</td>
</tr>
<tr>
<td>2500 - 2999 sq ft</td>
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<td>5.6</td>
<td>22.3</td>
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<td>4500 - 4999 sq ft</td>
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<tr>
<td>5000 - 5499 sq ft</td>
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<td>5500 - 5999 sq ft</td>
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<tr>
<td>6000 sq ft and over</td>
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<td>1.1</td>
</tr>
<tr>
<td>Respondents</td>
<td>83</td>
<td>19</td>
</tr>
</tbody>
</table>
Of the homes you built with fire sprinkler systems that used _____ as their water source, what was the typical cost of fire sprinkler system installation?

<table>
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</thead>
<tbody>
<tr>
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<tr>
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<td>14.9</td>
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<td>21.2</td>
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<td>4.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Respondents</td>
<td>68</td>
<td>19</td>
</tr>
</tbody>
</table>
Of the homes you built with fire sprinkler systems that used _______ as their water source, what was the typical additional fire sprinkler system costs

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Less Than $2500</td>
<td>82.7%</td>
<td>93.1%</td>
</tr>
<tr>
<td>$2500 - $3499</td>
<td>9.4%</td>
<td>.1%</td>
</tr>
<tr>
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<td>5.5%</td>
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<td>.9%</td>
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<td>.1%</td>
<td>.3%</td>
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</table>
### Total Cost

Of the homes you built with fire sprinkler systems that used ________ as their water source, what was the total fire sprinkler system cost?

<table>
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<tbody>
<tr>
<td>Unknown</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Less Than $2500</td>
<td>11.9</td>
<td>10.2</td>
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<tr>
<td>$2500 - $3499</td>
<td>16.8</td>
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<td>$6000 - $6999</td>
<td>11.9</td>
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<td>27</td>
</tr>
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</table>
For the homes you built with fire sprinkler systems, which of the following problems or issues have occurred related to the plan, design, installation or sale of the home:

- Construction delays due to inspections needed for fire sprinklers: 52.4%
- Requires framing modifications: 47.8%
- Coordination with following trades (electricians, plumbers, etc.): 46.3%
- Construction delays due to design of fire sprinklers: 43.6%
- Construction delays in permitting: 43.3%
- Lack of aesthetic options: 38.0%
- Lack of architect planning with construction features: 35.1%
- Construction delays due to overlapping authority (building vs. fire officials): 34.4%
- Damage to fire sprinklers during construction and water leaks: 29.3%
- Problems with freezing and/or freeze protection: 23.2%