

# **NON-RESIDENTIAL ENERGY CODE COMPLIANCE**

**Research, Development, and Demonstration Program  
Interim Evaluation Report & Proposal**

**September 20, 2005**

**SPRINGFIELD UTILITY BOARD**

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## TABLE OF CONTENTS

<b>Background .....</b>	<b><a href="#">1</a></b>
<b>Executive Summary .....</b>	<b><a href="#">1</a></b>
<b>Purposes of SUB’s Involvement in Energy Code Enforcement in Springfield .....</b>	<b><a href="#">1</a></b>
<b>Process of Energy Code Compliance .....</b>	<b><a href="#">2</a></b>
<b>Plan Review Process .....</b>	<b><a href="#">3</a></b>
<b>Site Inspection Process .....</b>	<b><a href="#">3</a></b>
<b>Results of Non-Residential Code Compliance .....</b>	<b><a href="#">4</a></b>
<b>Summary .....</b>	<b><a href="#">5</a></b>
<b>Springfield Utility Board Proposes .....</b>	<b><a href="#">6</a></b>
<b>Table 1</b>	<b>Non-Residential Code Statistics</b>
<b>Exhibit 1</b>	<b>Plan Review Process</b>
<b>Exhibit 2</b>	<b>Site Inspection Process</b>
<b>Chart 1</b>	<b>Status of Forms Submitted</b>
<b>Chart 2</b>	<b>Failed Plan Reviews</b>
<b>Chart 3</b>	<b>Failed Inspections</b>
<b>Chart 4</b>	<b>Failed Inspections for New Construction</b>
<b>Chart 5</b>	<b>Failed Inspections for Remodel Projects</b>
<b>Chart 6</b>	<b>New Construction – Failures by Process and Component</b>
<b>Chart 7</b>	<b>Remodel – Failures by Process and Component</b>

# **SPRINGFIELD UTILITY BOARD NON-RESIDENTIAL ENERGY CODE COMPLIANCE PROGRAM RD&D PROGRAM EVALUATION REPORT**

## **Background**

Springfield Utility Board (SUB) has enforced compliance of the Oregon Non-Residential Energy Code since 1993. During that time SUB's Energy & Conservation Services department has provided personnel to perform plans review and conduct code inspections as a service to the City of Springfield (City). As it is a lost opportunity to allow the building of non-compliant commercial space, SUB's motivation has been to achieve energy conservation through energy code compliance. Key elements on which the program has been built include direct interaction with the person(s) involved in each of the construction projects, effective communications with City of Springfield Development Services staff and a dedication of continued support from Springfield Utility Board for this activity.

In 2001, SUB submitted a RD&D proposal to the Bonneville Power Administration (BPA) under which SUB would review and inspect for Non-Residential Energy Code Compliance under ORS 455.010 through 455.895 for the City of Springfield. It was desired to seek outside funding sources to continue this important service to the community and to the region. SUB requested acceptance of Non-Residential Energy Code Enhancement as a qualified RD&D measure eligible for full (dollar for dollar) C&RD credit. On December 20, 2001 this proposal was formally accepted.

## **Executive Summary**

There are several generalizations that can be concluded as a result of SUB's energy code compliance program. Primary is the fact that energy codes are not adhered to when not enforced and that enforcing compliance does result in more energy efficient buildings. Furthermore, it is common to see non-compliance in both the planning stage as well as the building stage. Thus, not only must energy code plans review continue but also field inspections must be made to ensure compliance.

## **Purposes of SUB's Involvement in Energy Code Enforcement in Springfield**

Why has SUB sponsored and supported Non-Residential Code compliance in the past and feels the need to continue doing so in the future? What does SUB want to achieve for the ratepayers in its service territory? Four program objectives can be cited to help answer these questions.

1. Provide and maintain energy code compliance: The Non-Residential Energy Code, Chapter 13 of the Oregon Structural Specialty Code, 2004 Edition, is part of the Uniform Building Code that has been adopted by the State of Oregon. As stated in Section 1311.2, "The applicant shall submit documents showing compliance with the requirements of this chapter. This documentation shall be in a manner approved by the administrator of the Building Codes Division"<sup>1</sup>

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<sup>1</sup> Page 244 R.8, Chapter 13 Energy Conservation, Oregon Structural Specialty Code, 2004 Edition.

Thus is mandated an obligation not only to review the submitted documents but, as we believe, to also provide verification that the work being completed at the building site is as described in the submitted documentation.

2. Evaluate the level of code compliance and energy savings: Beginning in 1997 and continuing through 2004 completed projects in Springfield, which were involved in the code compliance review and inspection process, totaled over 3,100,000 square feet. During that same period the compliance rate was greater than 98%. Compliance at this level has been achieved when enforcement is given a very high priority and when high quality, technically competent people have been assigned to coordinate these efforts. From 2002 through 2004, energy savings beyond Code<sup>2</sup> have been calculated and exceed 1.56 million kWh or 1.05 kWh per square foot of projects completed within that time frame.
3. Interaction with the person(s) involved in the construction project: A key element in the success of our program has been the open communication established between SUB and select Development Services personnel at the City of Springfield. Without the cooperation and coordination of activities between these two parties, the steps necessary to accomplish the task of ensuring code compliance would be much more difficult and cumbersome, if not impossible.

Very often direct interaction is required between SUB and the various parties responsible for the design and construction of a particular project. This type of communication, especially if undertaken early on, can reconcile differences before the solution becomes too expensive or even impossible to implement. Exchanges of ideas, information regarding improved technologies, ways to better meet the objectives of the energy code and promotion of other utility programs have all been a result of early and sometimes frequent communications.

4. Lost opportunities and energy savings: As noted above, of direct benefit to the utility through its intervention and interaction in the energy code compliance process has been an identification of lost opportunities which have led to the 'capture' of energy savings through our Energy Smart Design (ESD) and Energy Savings Plan (ESP) programs. Though somewhat limited in the actual level of savings acquired up to this point, progress is being made to educate designers, developers and contractors to the benefits of building new or remodeling existing structures that substantially exceed code and therefore qualify for monetary incentives.

## **Process of Energy Code Compliance**

SUB and the Development Services personnel for the City of Springfield work closely to ensure that Non-Residential energy codes are reviewed in an effective manner that positively impacts processing time required for plan reviews and site inspections. The following describes the flow of procedures coordinated between SUB, the City of Springfield, and the designers, developers and contractors.

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<sup>2</sup> Table 1, kWh Lighting system savings beyond Code.

## **Plan Review Process (See Exhibit 1)**

1. Plans are submitted for review to the City. If applicable, energy code forms and related materials are to be submitted as well. If energy code forms are not provided at this time, City personnel have been asked not to accept the plans for review. However, as noted in Table 1 and despite numerous requests, plans are routinely accepted without the accompanying completed code forms.
2. City forwards one copy of plans and documents to SUB.
3. SUB reviews plans for code compliance. If no Energy Code forms were submitted, the City is contacted by the reviewer to request those forms from the parties who would normally be responsible for each of the different systems, i.e. architect/designer for building envelope, HVAC contractor for general systems and the electrical contractor for the building's lighting system. The SUB reviewer is responsible for contacting the appropriate person(s) if missing, incorrect, or non-compliant information is discovered. Substantial time and effort can be involved with this phase of the process. Many times multiple contacts are necessary in order to secure the requested information. At this juncture, a positive working relationship with the City is a valuable asset. On several occasions the cooperation of the client was forthcoming only with the 'encouragement' of the City's Development Services personnel.
4. When appropriate, SUB offers ideas to those involved with the project in an effort to secure additional energy savings above code.
5. SUB notifies the City of the status of the review. If a sense of urgency surrounds the review, a phone call or e-mail is sent to the City staff informing them of the outcome of the review. In all cases, SUB submits a weekly summary report via e-mail on the review status of each individual project.
6. The City will authorize issuance of the building permit once SUB, and other department reviews, are complete. Over 98% of the projects submitted to SUB are reviewed within one (1) week of receipt.

## **Site Inspection Process (See Exhibit 2)**

1. The on-site construction supervisor calls the City job inspection phone number to request an inspection.
2. The City creates a log of all calls received and notifies SUB of all inspection requests. Notifications are faxed each morning to SUB. To determine which inspections involve Non-Residential energy code, SUB staff performs a review of the log.
3. SUB performs site inspections as required. It should be noted that currently two staff members of SUB's Energy and Conservation Services department conduct both plan reviews and site inspections. Each person is responsible for a designated area of Springfield.

4. SUB notifies the on-site construction supervisor whether the site inspection passes or fails. The City is notified via e-mail of the results from each inspection conducted that day.
5. The City of Springfield issues the final building occupancy approval if all energy code requirements have been met.

Throughout the entire review and inspection process, improvements have been implemented over the years to help reduce administrative expense, streamline workflow, and improve the quality of communication between all those involved in the process. Effective communication skills and the development over time of interactive business relationships are key components in achieving and maintaining a successful energy code compliance program. As compared to fire codes or structural requirements that directly protect the health and safety of the occupants and general public, energy code enforcement may be given a low priority (allocation of resources) by governing jurisdictions. Therefore without these key components coupled with a failure to provide an adequate funding mechanism, the likelihood is that energy code activities would cease.

## **Results of Non-Residential Code Compliance**

A numerical representation of our efforts in achieving energy code compliance during the past three years is outlined by the statistical data found in Table 1. Here broken down into sub-categories are plan reviews conducted, completed projects in terms of quantity, area and lighting system savings beyond code, number and type of contacts made during both the review and inspection process, total number of inspections, number of failed inspections, and finally total work hours spent to perform the task of achieving energy code compliance. Since substantial effort has gone into increasing the awareness in our service area of the value and importance of energy code compliance, we sought to better understand why plan reviews and site inspections were failing. In order to gain that understanding, we examined the group of reviews that did not pass on the first attempt, identified how each review had failed and quantified the failures by individual category. We also categorized and quantified failed site inspections as well.

Several interesting trends came to light while analyzing the statistical data. For instance, over the past three years as the total number of projects reviewed has increased, the ratio of failed reviews as compared to the total number reviewed has remained somewhat constant. (See Chart 1). This trend indicates continued vigilance is warranted in continuing to resolve the reasons why projects fail plan review.

Specifically, considerable effort, both written and verbal, has been directed toward the City in an attempt to ensure code forms are included when the plans are presented for review. As the City is considered the gatekeeper for such activity, it seems reasonable that this responsibility should fall to them. Energy code forms should be submitted with **every** application for building permit, unless the work is exempted from permit as defined in Section 106.2, Structural Specialty Code, State of Oregon 1998 edition. If the project is not affected by energy codes, it is a simple matter for the applicant to indicate that on the forms and submit the pages to document that there are no energy

code issues associated with the project. In this three year period, only 53% of the total number of projects submitted for review initially provided complete documentation.<sup>3</sup>

With reference to Chart 2, the lighting system component is noted to have failed code review most often. In 2004 data, the spike in failures is assumed to be attributable to the tightening of the Oregon energy code requirements and reduction in Lighting Power Density (LPD) limits for most use categories. These changes took effect October of 2003.

Regarding the inspection phase of the process, insulation and lighting systems are the most frequent components to fail (See Chart 3). The numbers of insulation failures typically are a result of installer error and multiple insulation inspections conducted at each building site. Failed lighting systems can often be attributed to changes made to the system, either through additions or deletions of fixtures, by the lighting designer and/or the electrical subcontractor AFTER the energy code forms have been submitted and approved. It is encouraging that due to the staff's persistent and consistent inspection process, the rate of inspection failures has fallen over the past three years from a high of 11.2% in 2002 to 4.4% in 2004.<sup>4</sup>

Observing the data presented in Charts 4 and 5, the review failure rates are 61% in new construction projects and 37% in projects that involve remodeling existing structures. It should be noted that if these failed reviews were not brought into compliance, which at this time SUB's compliance rate is 100%, the lost opportunity to capture the energy savings would be much higher. Also of interest to note is that failure rates appear not to be dependent on the size of the project, in terms of square footage affected, or whether the project is new construction or a remodel.

Charts 6 and 7 help to illustrate how the various component failures are distributed over the range of building sizes.

## **Summary**

Quality communication is essential in maintaining a quality program. If there is a serious inability to communicate effectively with city staff or the construction supervisor or even the laborers working at the site, corrections that are necessary may not be possible without incurring considerable anxiety and expense.

There is a dedication to continue support for a Non-Residential Energy Code Compliance program at Springfield Utility Board. With that support comes the obligation to maintain the areas of service that meet or exceed participants' expectations while continuing to strive to improve the areas of service which have been identified as lacking. It is important to note that this process can not be accomplished alone or in a vacuum. Cooperation between agencies remains crucial. The relationships that are developed over time are important resources that are to be respected.

But SUB can not continue to do it alone. The City of Springfield is thus far a jurisdiction in which the Development Services Department does not have the resources or the inclination to enforce Non-Residential energy code compliance. Non-Residential energy code compliance remains an

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<sup>3</sup> Table 1, Projects with Completed Code Forms

<sup>4</sup> Table 1, Failed Inspections and Number of Inspection Visits

“unfunded mandate.” In other words, if plan review and inspections do not involve fire, life and safety, enforcement by the City becomes tenuous at best.

**Springfield Utility Board Proposes to the Regional Technical Forum (RTF):**

1. Recognition of Non-Residential Code Enforcement as an eligible conservation measure.
2. RTF recommends that BPA allow utilities to claim costs associated with funding code compliance at the local level; which would permit SUB to continue to perform plan review and site inspections to verify code compliance. Without support it is highly unlikely that SUB will continue this service for the City of Springfield. Thus, the region will lose this low cost, long term source of energy conservation.

NON-RESIDENTIAL CODE STATISTICS

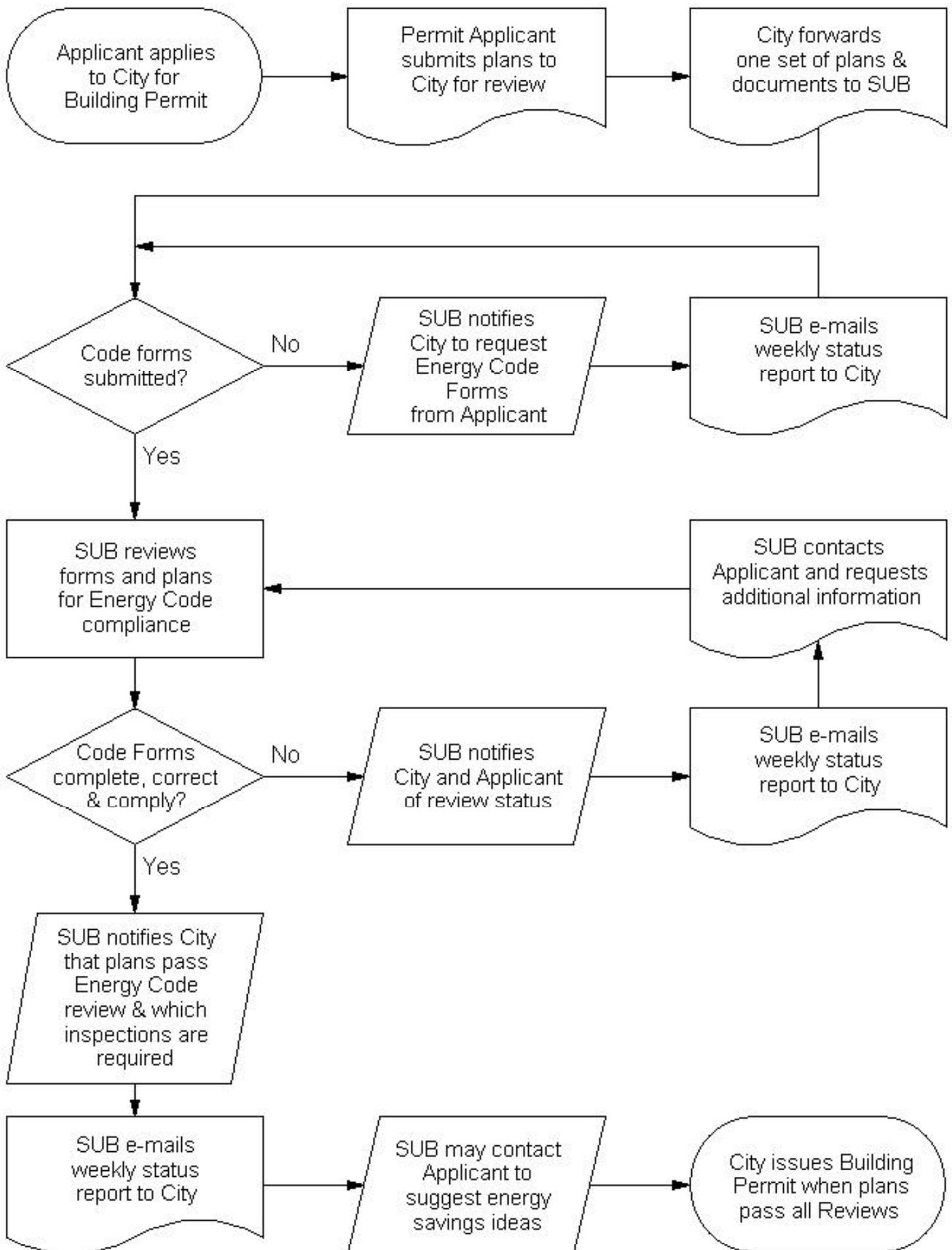
		# of Projects Reviewed NEW	# of Projects Reviewed REMODEL	# of Projects Completed NEW	# of Projects Completed REMODEL	Sq. Ft. of Complete Projects	kWh Savings Beyond Code #3	PASS 1ST REVIEW	FAIL 1ST REVIEW (see notes #1 & #2)				Contact with Project Principals, City, Architect, etc. (#-Type) Review / Inspection	# of Inspect Visits	Failed Inspections (#-Type)	Total Hrs. Spent on Code Compliance
								# of Projects with Completed Code Forms	# of Project W/O Completed Code Forms	Out of Date Code Forms	# of Projects that Forms & Plans Did Not Match	# of Projects that Fail to Comply to Code (# - Type)				
2002	Jan	5	2	5	0	384,067	662,461	5	5				5 - Review / 1 - Inspect	11	1-Ltg	33.0
	Feb	1	1	3	0	11,915	102	1	2				2 - Review / 1 - Inspect	10	1-Env	33.0
	Mar	4	3	1	2	31,580	11354	3	1				1 - Review	10	0	31.5
	Apr	2	4	2	1	7,170	1,244	3	1	1,170	1 - Ltg		3 - Review / 2 - Inspect	24	2-Env	39.0
	May	3	0	5	3	28,898	44,519	4	1				1 - Review / 1 - Inspect	25	1-Env	46.5
	Jun	1	2	0	1	0	0	2	1				1 - Review	6	0	26.3
	Jul	1	3	0	1	1,309	488	1	4	1	1-HV		6 - Review / 5 - Inspect	11	2-Env, 2-Ltg, 1-ExtLtg	24.8
	Aug	3	3	3	2	47,877	6,647	2	2		2 - Ltg		4 - Review / 5 - Inspect	18	3-Env, 1-Ltg, 1-ExtLtg	46.5
	Sep	1	1	0	3	4,063	10,000	1	1				1 - Review / 2 - Inspect	22	1-Env, 1-Ltg	36.8
	Oct	1	0	2	2	157,650	43,395	1	4		1-Env, 1-HV		6 - Review / 1 - Inspect	16	1-Ltg	43.2
	Nov	1	1	1	1	6,271	4,220	1	1				1 - Review / 1 - Inspect	10	1-HV	24.1
	Dec	0	4	1	1	4,930	23,252	2	1				0	6	0	40.7
	<b>Total</b>	<b>23</b>	<b>24</b>	<b>23</b>	<b>17</b>	<b>685,730</b>	<b>807,682</b>	<b>19</b>	<b>23</b>	<b>1</b>	<b>1</b>	<b>1-Env, 2-HV, 3-Ltg</b>	<b>31 - Review / 19 - Inspect</b>	<b>169</b>	<b>10-Env, 1-HV, 6-Ltg, 2-Ext</b>	<b>425.4</b>
								43%	52%	2%	2%		14%			
2003	Jan	1	6	1	2	93,338	2,348	0	2	0	1	0	3 - Review	6	0	18.0
	Feb	4	2	3	2	99,455	216,429	3	0	0	0	0	1 - Inspect	8	1-Env	16.8
	Mar	2	3	1	1	16,784	582	2	3	0	0	0	3 - Review	5	0	34.4
	Apr	1	4	1	1	58,424	284,244	4	2	0	0	0	2 - Review / 3 - Inspect	7	3-Env	40.0
	May	3	6	1	2	9,274	19,991	2	5	0	0	1 - HV	6 - Review / 1 - Inspect	12	1-Env	24.8
	Jun	2	9	2	1	4,340	58	5	6	0	0	1 - Ltg	6 - Review / 3 - Inspect	11	3-Env	38.7
	Jul	4	4	0	4	1,694	227	4	2	0	1	1 - Ltg	4 - Review	9	0	48.0
	Aug	6	3	2	2	68,566	4,841	9	0	0	1	1 - Ltg	2 - Review / 1 - Inspect	12	1-HV	35.6
	Sep	1	1	1	3	14,496	1,471	2	1	0	0	0	1 - Review	9	0	29.2
	Oct	1	6	0	0	0	0	4	3	0	0	0	3 - Review / 1 - Inspect	9	1-Env	34.5
	Nov	2	4	0	3	3,996	1,874	4	2	0	0	0	2 - Review / 1 - Inspect	8	1-Env	26.5
	Dec	3	6	1	0	1,354	1,785	6	3	1	0	1 - Ltg	3 - Review / 1 - Inspect	17	1-Env	33.0
	<b>Total</b>	<b>30</b>	<b>54</b>	<b>13</b>	<b>21</b>	<b>371,721</b>	<b>533,850</b>	<b>45</b>	<b>29</b>	<b>1</b>	<b>0</b>	<b>1-HV, 4-Ltg</b>	<b>35 - Review / 12 - Inspect</b>	<b>113</b>	<b>11-Env, 1-HV</b>	<b>379.5</b>
								58%	37%	1%	4%		6%			
										42%						
2004	Jan	4	3	1	3	3,118	1,652	2	1	1			2 - Review	19		46.8
	Feb	3	7	2	6	40,479	22,036	5	5	1		3-Ltg	9 - Review	12		40.5
	Mar	3	6	2	4	23,532	13,776	6					2 - Inspect	17	1-HV, 1-Ltg	39.8
	Apr	1	4	1	3	33,640	1,960	5	4				4 - Review / 1 - Inspect	28	1-Ltg	39.6
	May	4	4	3	8	18,936	26,543	3	3	1		1-HV	5 - Review / 1 - Inspect	21	1-Ltg	33.2
	Jun	1	6	2	2	38,761	22,176	4	1			1-Ltg	2 - Inspect	20		46.2
	Jul	5	8	0	2	18,510	0	10	3	0	0	1 - Ltg	4 - Review / 2 - Inspect	11	1-Env, 1-Ltg, 1-ExtLtg	36.3
	Aug	3	2	4	2	72,549	92,655	3	4	1	0	2 - Ltg	7 - Review / 2 - Inspect	16	2-Ltg	31.2
	Sep	4	5	2	5	48,230	3,593	3	5	0	2	0	7 - Review	13	0	34.8
	Oct	6	2	4	0	118,621	27,058	3	4	0	0	1 - Ltg, 1 - HV	6 - Review	18	0	53.8
	Nov	5	2	2	5	12,789	13,047	3	2	0	1	0	3 - Review	15	0	35.0
	Dec	6	6	1	4	7,000	186	3	3	0	3	1 - Ltg, 1 - HV	8 - Review	14	0	51.8
	<b>Total</b>	<b>45</b>	<b>55</b>	<b>24</b>	<b>44</b>	<b>436,165</b>	<b>224,682</b>	<b>50</b>	<b>35</b>	<b>4</b>	<b>6</b>	<b>3-HV, 9-Ltg</b>	<b>55 - Review / 10 - Inspect</b>	<b>204</b>	<b>1-Env, 1-HV, 6-Ltg, 1-Ext</b>	<b>489.0</b>
								53%	37%	4%	6%		13%			
										47%						
<b>Total</b>		<b>98</b>	<b>133</b>	<b>60</b>	<b>82</b>	<b>1,493,616</b>	<b>1,566,214</b>	<b>114</b>	<b>87</b>	<b>6</b>	<b>10</b>	<b>1-Env, 6-HV, 16-Ltg</b>	<b>121-Review / 41-Inspect</b>	<b>486</b>	<b>22-Env, 3-HV, 12-Ltg, 3-Ext</b>	<b>1,293.9</b>
								53%	40%	3%	5%		11%			
										47%						

1. Projects may have multiple reasons for not passing on first review.

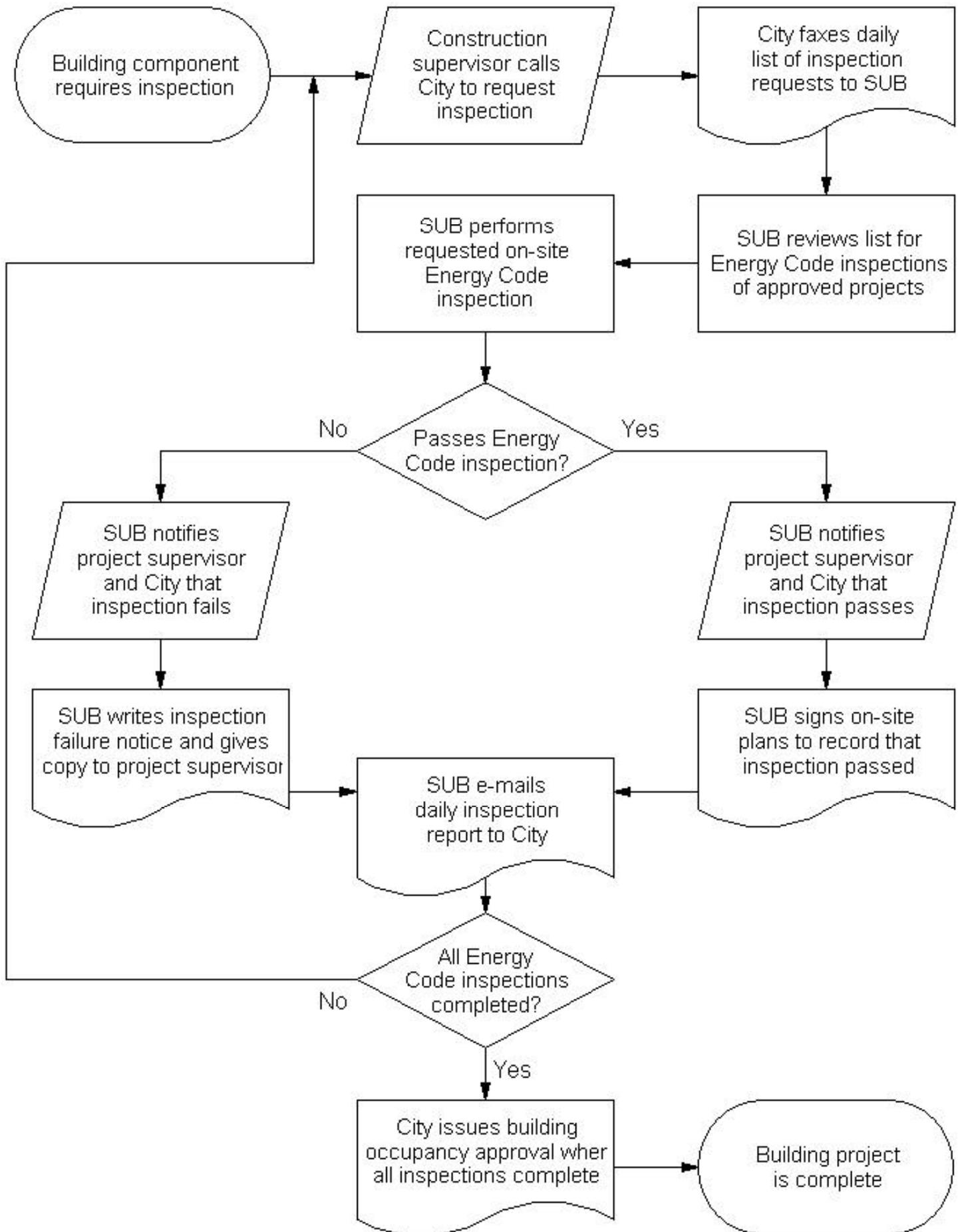
2. Projects may pass in another month than when first reviewed.

3. Savings from Interior Lighting Systems only.

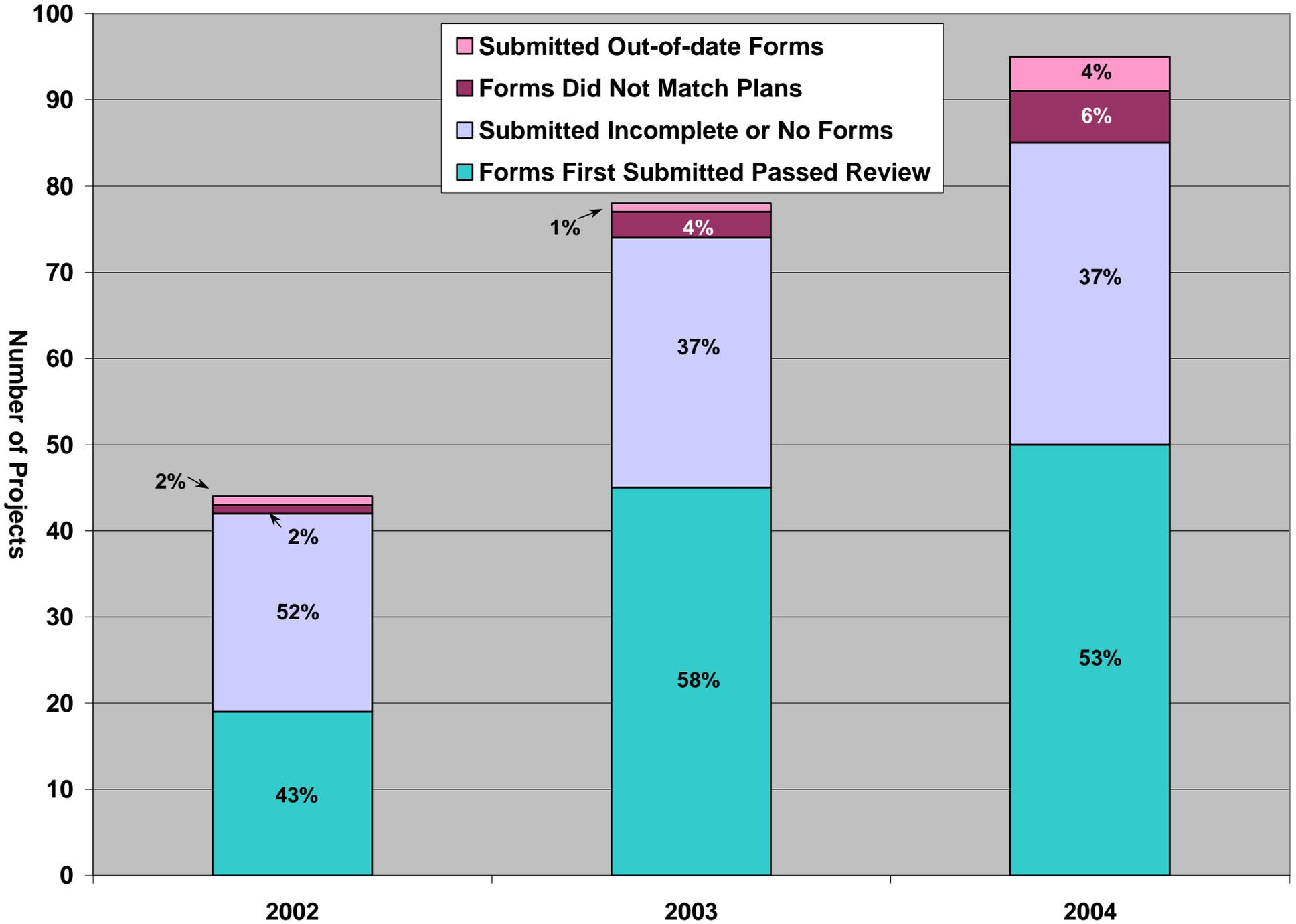
# Plan Review Process



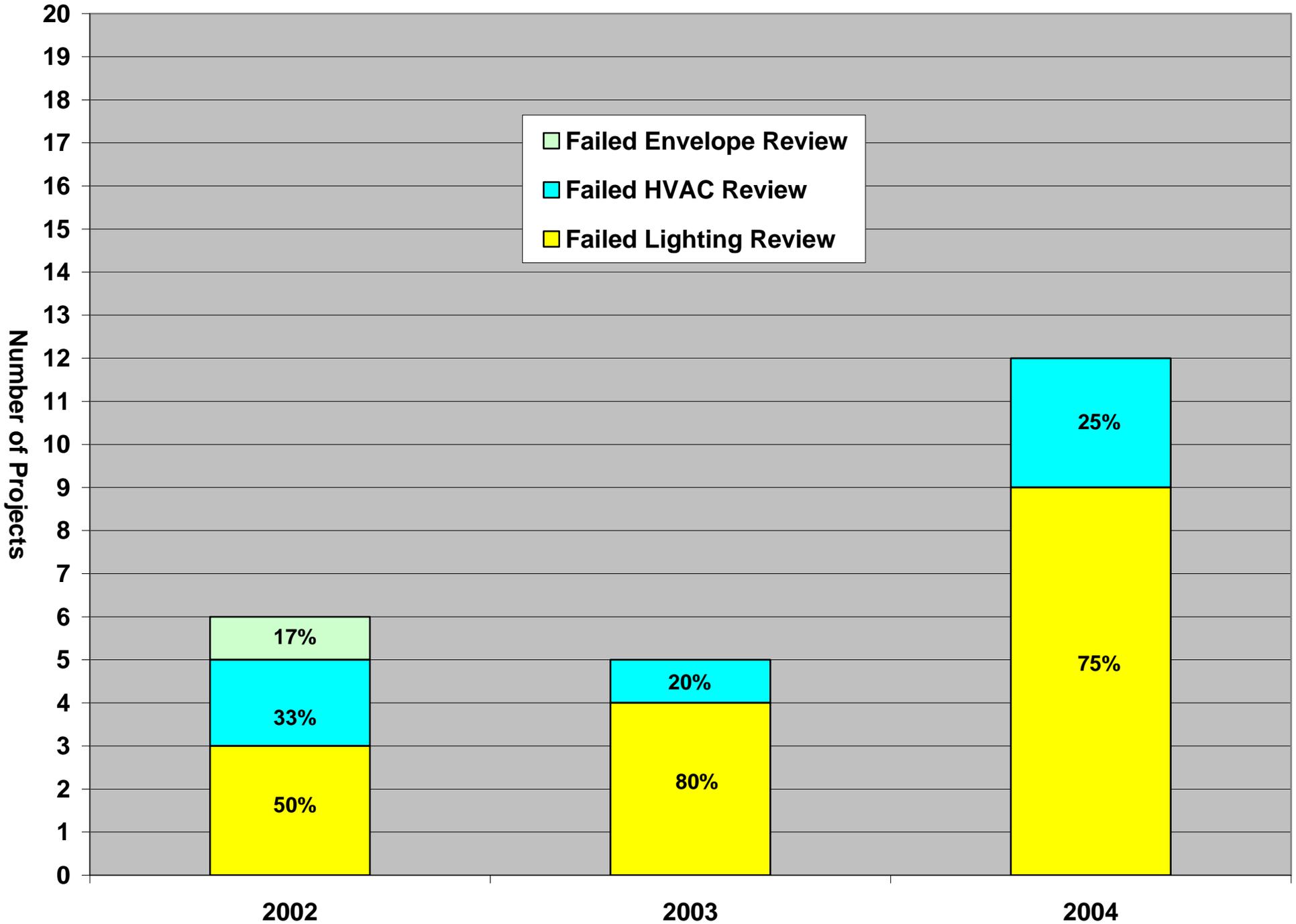
# Site Inspection Process



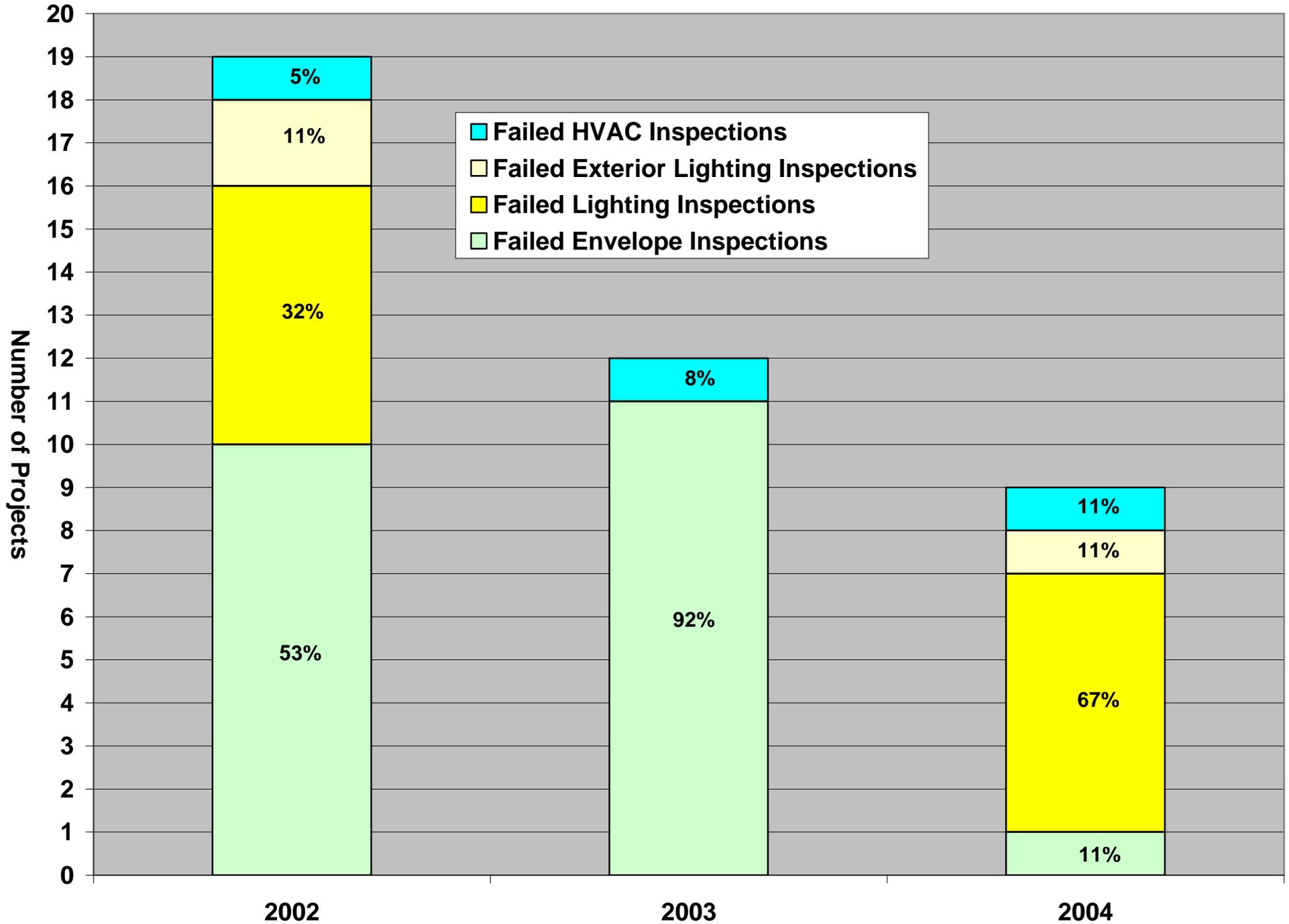
# Status of Forms Submitted



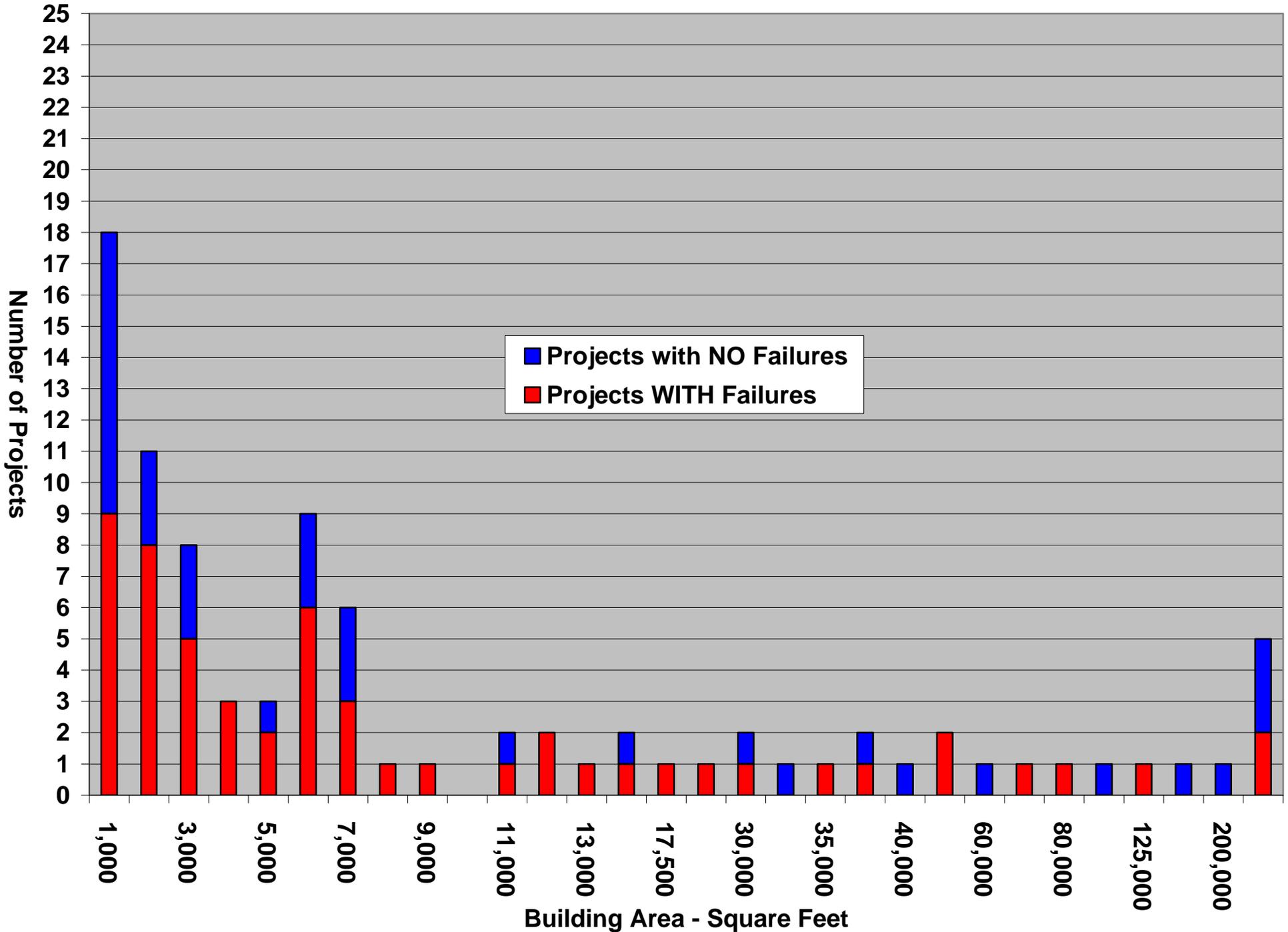
# Failed Plan Reviews



# Failed Inspections



# Failed Inspections for New Construction



# Failed Inspections for Remodel Projects

