

Fire Sprinklers Save Lives and Money

The Economics of Retrofit

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Fire sprinkler systems have been required for years by local codes and ordinances because they provide relatively simple, extremely reliable, affordable fire protection. But because they have been mandated by law, many building owners, architects, and specifying engineers see them as “extras” in construction and sometimes go to great lengths to avoid sprinkler protection.

But rather than look at sprinklers as “extras” in terms of cost, building owners, architects and engineers should be looking at sprinkler systems as excellent investment opportunities. Fire sprinklers lower the overall cost of owning and maintaining a building. With tax incentives and insurance discounts, not to mention the actual savings of lives and property not lost to a fire, sprinklers help save building owners hundreds of millions of dollars every year in the United States.

When a building is originally going to be constructed, the future owners of the building will benefit from all of the savings discussed in this paper, as well as considerable construction alternatives that are built into most codes. But this paper is not going to focus on new construction. Instead, this paper will focus on the financial impact to the owner of deciding to put a complete fire sprinkler system in an already existing building. This process is known as “retrofitting” an existing building with fire sprinklers.

There are six different situations that put money back in the pocket of a building owner once a fire sprinkler system is installed in their building. These six situations are:

- Insurance savings
- Income tax deductions
- Life Safety Code compliance
- Federal legislation
- Liability avoidance
- Continuous business operations

This paper will explore each of these situations and will provide concrete examples of savings for five different types of existing buildings. The examples will focus on the insurance and tax savings, but additional savings are also available from the other four situations as well.

Insurance Savings

Ever since fire sprinklers were invented in the mid 1800's insurance companies have recognized their value and provided incentives to building owners to install fire sprinklers in their buildings in the way of lower insurance premiums. The insurance industry knows that with fire sprinklers in a building, they will pay out significantly less in losses, and so they provide discounts to buildings with complete fire sprinkler systems.

Every insurance company has its own rating system, so it is difficult for the National Fire Sprinkler Association to say exactly what the discounts would be for any given building in any given state. Insurance rates are based on a wide variety of variables that are dependent on the insurance company's position and the state of the general economy.

In order to help insurance companies set rates, the Insurance Services Office (ISO) makes recommendations to insurance companies on rates for different types of buildings in different locations. ISO insurance rates suggest a discount for sprinklered properties. Although the insurance companies are not obligated to use the rates suggested by ISO, many do. Those insurance companies that do not use the rates recommended by ISO still provide discounts for sprinklered properties that are similar to the discounts recommended by ISO. So, even if a building owner is dealing with an insurance company that is not using ISO's recommendations, the spread between the sprinklered rates and unsprinklered rates discussed in this paper are still applicable to that building, even if the base rates are different.

It is important to note that just because a building is sprinklered does not mean that it will get a sprinklered rate. Usually, in order to get the sprinklered rate, the owner needs to send to the insurance company proof that the system has been inspected and tested at least annually. If the insurance company does not receive this proof, they could increase the insurance rate. Typical insurance increases are:

- If the building is up to 12 months overdue for an inspection, a 5% increase above the sprinklered rate is applied.
- If the building is between 12 and 24 months overdue for an inspection, a 20% increase above the sprinklered rate is applied.
- If the building is between 24 and 36 months overdue for an inspection, a 60% increase above the sprinklered rate it applied.
- If the building is more than 36 months overdue for an inspection, the building is rated as unsprinklered, even if it has a complete sprinkler system.

Many buildings are fully sprinklers, but have gone for so long without inspection and testing information being sent to the insurance company, the building owner is paying insurance on the building as if it were not sprinklered. Worse yet, most of these owners did not know why their insurance went up. They may have just thought it was the course of normal business. In order to prevent this from happening, building owners need to be getting their systems inspected and tested on a regular basis and then they need to send proof of their work to their insurance companies.

In order to show how the insurance discounts work, we picked five different types of buildings and assumed a location somewhere in the United States. The exact location is not important because the rates in other locations might be different, but the spread between sprinklered and unsprinklered rates remains fairly constant, so the savings would ultimately be the same. For each building, we obtained the ISO suggested rate for the building if it were sprinklered and if it were unsprinklered for comparison purposes. It should be noted that these are average buildings with normal occupancy and contents. There are no high hazard materials other than those normally associated with the usage of these typical buildings. These are sample buildings used for illustration purposes and do not represent any specific buildings nor are these rates a guarantee for any specific building. The five sample buildings selected are:

1. **Condominium** – Five stories, 100,000 sq ft, 10 years old, personal dwelling units, joisted masonry construction
2. **Hotel** – Twenty stories, 257,000 sq ft, 10 years old, masonry construction, noncombustible
3. **Office Building** – Ten stories, 110,000 sq ft, 10 years old, masonry construction
4. **Food Processing Plant** – One story, 20,000 sq ft, noncombustible construction
5. **Warehouse** – One story, 40,000 sq ft, general storage, noncombustible construction

The estimated rates for these average fictional properties with usual contents and occupancy are shown in Table 1 for both building insurance and contents insurance. Where ISO gives ranges in their rates, the low end of the range was used. The rates are annual costs per \$100 of value. So, for example, if a building's insurance rate was 0.273 and the building was worth \$4 million, the building's insurance cost for a year would be $0.273 \times 4,000,000 \div 100 = \$10,920$.

Sample Building	Building Rates			Contents Rates		
	Unsprinklered	Sprinklered	% Reduction	Unsprinklered	Sprinklered	% Reduction
Condominium	0.273	0.103	62	0.461	0.200	57
Hotel	0.257	0.088	66	0.512	0.303	41
Office Building	0.110	0.059	46	0.161	0.092	43
Food Processing Plant	0.553	0.062	89	0.949	0.146	85
Warehouse	0.369	0.048	87	0.599	0.106	82

Table 1 – ISO Sample Rates for Example Buildings

As Table 1 shows, the reductions in insurance rates for sprinklered buildings are significant and often times enough to justify the cost of the sprinkler system. For example, consider the Food Processing Plant discussed above. A reasonable value for a 20,000 sq ft

industrial/factory building would be \$1.6 million and a reasonable value for the contents would be \$1,000,000 (inventory, specialized machines, etc.). A complete sprinkler system for this building might cost \$60,000, although we would expect it to be significantly less. Using the insurance rates above, the insurance for the building and contents would be:

- Building insurance if not sprinklered: $1,600,000 \div 100 \times 0.553 =$ \$8,850
- Contents insurance if not sprinklered: $1,000,000 \div 100 \times 0.949 =$ \$9,490
- Total insurance if not sprinklered: \$18,340

- Building insurance if sprinklered: $1,600,000 \div 100 \times 0.062 =$ \$1,000
- Contents insurance if sprinklered: $1,000,000 \div 100 \times 0.146 =$ \$1,460
- Total insurance if sprinklered: \$2,460

This building owner could save \$15,880 on insurance per year by putting in a sprinkler system. In less than four years, the sprinkler system would pay for itself and for every year after that, would put almost \$16,000 in the owner's pockets. And there are more savings than just insurance.

The insurance discounts being discussed here are for regular buildings. There are some properties that get even greater discounts because of the extra attention to detail that they provide to fire protection and the extra fire protection features they have in their buildings. These buildings that get special discounts are called "highly protected risks" (HPR). All HPR properties have a sprinkler system as a part of the special fire protection in their facility.

This paper will not use HPR rates, but the building owner should be made aware that sprinklers, in addition to other items, can help them achieve even greater savings.

Income Tax Deductions

Both businesses and individuals pay taxes on the money they make to both the state and the federal government. This paper focuses on the tax rules of the federal government. It is also possible that even greater savings are available from the state; however, the individual tax laws in each state are too different to be summarized in a paper of this kind. Check with your tax professional if you need to know about the tax situation in any specific state.

There are three types of income tax deductions that are allowed for businesses that install fire sprinkler systems in their buildings and one type of income tax deduction for personal income tax:

1. A business can take the depreciation allowance each year for the value of the fire sprinkler system.
2. A business can take a tax deduction for the interest they spend on a loan to install a fire sprinkler system.
3. A business might qualify for the federal Qualified Rehabilitation Tax Credit
4. A person can take a tax deduction for the interest on a second mortgage to their home if this is how they finance the installation of a fire sprinkler system.

The amount that can be taken as a depreciation allowance varies depending on the kind of building. For most buildings, the recovery period is 39 years, so the amount that can be taken each year as a tax deduction for depreciation is 1/39 (or 2.56%) of the cost of the system. However, if the building is a residential rental property (which might apply to some apartment or condominium situations) the recovery period is 27.5 years, so the amount that could be claimed each year as a tax deduction would be 1/27.5 (or 3.64%).

The National Fire Sprinkler Association is working on the Fire Sprinkler Incentive Act, which would modify the recovery period for the installation of fire sprinkler systems that have been retrofitted into buildings from 27.5 years or 39 years to 5 years. This would allow 20% of the cost of the system to be tax deductible in the five years after a system is placed into service, dramatically helping building owners to recover the cost of installing a fire sprinkler system.

Any business can consider the interest on a loan to improve their building as a tax deduction. The way that loans are structured, the interest is usually loaded to the front of the loan so that more interest is paid at the beginning than at the end. For the sake of simplifying the examples in this paper, the interest reported will be the average interest, which understates the advantages of sprinklers in the early years after construction.

The Qualified Rehabilitation Tax Credit applies to nonresidential buildings that were constructed before 1936 or to buildings that are designated as “historic structures” (residential or nonresidential). When buildings in either of these two categories undergo a major renovation that is greater than or equal to the value of the building immediately prior to the renovation, the building owner receives a dollar for dollar tax credit in the first tax year that the building is placed back into service. The amount of the tax credit is 20% of the rehabilitation expense for historic structures and 10% of the rehabilitation expense for buildings constructed after 1936.

Although the retrofit of a sprinkler system alone is not normally enough to qualify for this credit, when other rehabilitation work is being done, fire sprinklers should be added as part of that rehabilitation. The remainder of the rehabilitation expenses would be expensed over the 27.5 year or 39 year depreciation schedule as discussed above.

For individuals having sprinkler systems installed in their homes (as sometimes happens in condominiums), they don't get the depreciation credits described above because they are not a business. There are not specific tax deductions for paying for the sprinkler system, but if the unit owner takes out a second mortgage using the equity in their unit to pay for the sprinkler system, the interest on that loan is deductible from the person's income taxes.

Life Safety Code Compliance

The Life Safety Code (NFPA 101) is one of the few codes that contain requirements for sprinkler protection in existing buildings. Starting with the 1991 edition of NFPA 101, all existing high-rise apartments, condominiums, co-ops, hotels and office buildings are required to be protected with fire sprinkler systems. In some cases an engineered life safety system is allowed to be substituted for a fire sprinkler system where an engineer has determined that a

reasonable minimum amount of protection is being provided. Engineered life safety systems are generally composed of some combination of standpipe systems, detectors, smoke control systems, exits, compartmentation and partial sprinkler protection. While the engineered life safety system might appear to be less expensive than the sprinkler system initially, often in the long run the sprinkler system will pay for itself while an engineered life safety system will not because of the lack of insurance discounts for engineered life safety systems.

The Life Safety Code might not be enforced in your jurisdiction right now, but it might be in the future. Even if it is not legally adopted, it has been adopted as an American National Standard by the American National Standards Institute (ANSI). As such, it has become considered as a minimum established level of expected care. Any building owner that does not provide that level of care may be open to additional liability. See the discussion on liability avoidance later in this paper for more information on this subject.

Federal Legislation

There are three pieces of federal legislation that help building owners save money or make money from their buildings: the Hotel and Motel Fire Safety Act, the Federal Fire Safety Act and the Americans with Disabilities Act.

The Hotel and Motel Fire Safety Act was passed in 1990 and it requires federal government employees on travel to stay in fire safe hotels. The act also requires that any conference or meeting held with federal funds needs to be in a fire safe hotel. The definition of a fire safe hotel greater than three stories in height is that it needs to have fire sprinklers. If a hotel owner wants a share of the billions of dollars that are spent each year on travel for federal employees, they need to sprinker their hotels.

The Federal Fire Safety Act was passed in 1992 and it applies to office buildings for federal employees, multi-family housing for federal employees and federally subsidized housing. Most of the act applies to new construction, but several parts of the act would apply to existing construction. One of the provisions of the act is that any newly leased office space for more than 25 federal employees needs to be sprinklered. This means that if an existing building owner wants to attract the federal government to lease space in his or her building, they need to have it sprinklered.

Another provision of the Federal Fire Safety Act is that any building of five or more stories with federal office space that is undergoing a renovation of more than 25% of the current value of the building (not including the value of the land) needs to have a fire sprinkler system. A third provision of the act that would apply to existing buildings is if the number of full time employees increases by 100 over the number of employees that the building had in 1992, then the building needs to have a fire sprinkler system.

The Americans with Disabilities Act requires an “area of refuge” in all buildings where at least two people in wheelchairs can go during a fire. There are a number of special requirements for this area of refuge that can be expensive to comply with. But in sprinklered buildings, the rules are much easier to comply with for areas of refuge.

Liability Avoidance

It is becoming increasingly important for building owners to provide fire sprinklers in buildings, even if the codes do not require them. Recent court decisions involving large loss fires have stated that even though codes did not require fire sprinkler systems when the building was constructed, widespread use of these systems along with requirements for new buildings to have them has led to the public expecting sprinklers as a “reasonable level of care”. These court decisions have required building owners to pay out more than \$1 million per life lost in fires; millions of dollars that would never have been had to be paid out had a sprinkler system been installed.

As explained under the Life Safety Code section of this paper, the requirement for sprinkler systems in certain existing buildings has been in the Life Safety Code for almost 20 years. This document has been adopted as an American National Standard and has established a minimum expected level of care, even if it is not enforced specifically in a community. This opens a building owner up to liability if anything ever goes wrong and a person dies from a fire in their building without sprinklers.

Continuous Business Operations

Nobody ever plans on losing parts of all of a building. But a fire in an unsprinklered building will shut down major portions, if not the whole building. Loss in revenue to the owner takes many forms depending on the occupancy type. Owners no longer get rent, manufacturers lose space and products, and hotels lose conference bookings and guests until the hotel can reopen.

The vast majority of companies that suffer a major fire loss never open their door again. Take the office building at One Meridian Plaza in Philadelphia, PA as an example. A fire on February 23, 1991 killed three fire fighters and completely burned out the unsprinklered 22nd through 29th floors, with the occupants of those floors losing everything. Only the sprinkler system on the 30th floor saved the building from complete collapse. For many years after the fire, the building was completely empty and even on the lower floors that were undamaged by the fire, people could not enter the building due to contaminated water that fell as the fire department worked on the fire. Not only did the tenants of the building suffer, but restaurants and dry-cleaners in the vicinity of the building lost most of their customers and went out of business. Could your business afford such a loss? Could your community afford such a loss?

Fire sprinklers limit the fire and the damage to a small area. After a fire, rooms can quickly be reoccupied, minimizing losses in revenue. Wet items that are critical to your business can be dried out, but critical items that have burned to ash can never be reclaimed.

Examples of Savings

On the next few pages are a number of examples of how the insurance and tax savings can be put together for some of the sample buildings discussed earlier in this paper. Additional savings would be realized from the other situations discussed, but they are harder to quantify, so they have not been included. But since additional savings are possible, these examples are fairly conservative in how they show sprinklers helping building owners to save and make money.

In these examples, the building values have been estimated using a building valuation data service that estimates the cost of replacing buildings of specific occupancies and construction types. The contents have been valued using reasonable assumptions about what is in a typical building of that occupancy type. The loan payments have been calculated using a standard simple interest loan calculator.

Example #1 – Hotel Retrofit as an Investment

Earlier in this paper, we arrived at insurance rates for a 20 story hotel with a total of 257,000 sq ft. From studies within the fire sprinkler industry, we estimate that it would cost about \$800,000 to retrofit this hotel with a fire sprinkler system (257,000 sq ft x \$3/sq ft, rounded up to 800,000).

If the building owner had \$800,000 in cash on hand to pay for the sprinkler system, this example will show that this would be a better investment to install the sprinkler system than to do something else with the money, even if the owner thought that they could get a 10% return on investment.

Assuming that the building is worth \$40 million and the contents are worth \$5 million, the insurance situation would be as shown in Table 2.

Insurance	Unsprinklered	Sprinklered
Building	\$102,800	\$35,200
Contents	\$25,600	\$15,150
Total	\$128,400	\$50,350
Insurance Savings		\$78,050

Table 2 – Insurance Savings for Hotel

In addition to the insurance savings, the building owner will also get to take the depreciation on the cost of the sprinkler system as a tax deduction over the next 39 years (since hotels are considered commercial property). Each year, the depreciable amount will be \$20,500 (\$800,000 divided by 39). Assuming that the hotel is in the 34% tax bracket, a tax deduction of \$20,500 is equal to a savings of \$6,970 ($20,500 \times 0.34 = 6,970$) annually.

The sprinkler system will save this building owner \$85,020 ($78,050 + 6,970 = 85,020$) every year for the next 39 years and then will continue to save the owner more than 78,000 per year for every year after that.

Compare the savings discussed above with the income from other potential investments. If the owner took the \$800,000 in cash and decided to invest it in some other situation besides a sprinkler system that paid a dividend of 10% every year, the income would only be \$80,000. And taxes would probably need to be paid on that \$80,000, making the total investment closer to paying \$52,800 ($80,000 - 80,000 \times 0.34 = 52,800$).

As this example shows, if a building owner has the money to install a fire sprinkler system, then the savings are better than investing in some other option that pays back 10%. And finding an investment that pays as much as 10% consistently over time would be pretty difficult.

Example #2 – Hotel Retrofit with Borrowed Money

Since many hotel owners don't have \$800,000 in cash on hand to pay for a sprinkler system, they must consider some sort of financing. In addition to the insurance and depreciation savings discussed above, the interest on such a loan would be tax deductible to the hotel owner. If this owner borrowed the \$800,000 at 6% interest and agreed to pay it back over a 15 year period, the loan payments would be \$81,000 annually. Of this amount, the average amount of interest would be \$27,667 ($[(81,000 \times 15) - 800,000]/15 = 27,667$). Keeping the assumption of the 34% tax rate, this would average out to a savings of \$9,400 per year ($27,667 \times 0.34 = 9407$ rounded down). Table 3 shows a comparison of the annual cost of borrowing the money to install a sprinkler system and the annual savings.

Cost	Benefit (Savings)
Loan Payments: \$81,000	Insurance: \$78,050
	Depreciation: 6,970
	Taxes from Interest: \$9,400
	Total Benefit: \$94,420
Income from sprinkler system over \$13,400	

Table 3 – Cost/Benefit Comparison for Hotel Retrofit

As Table 3 shows, the building owner actually makes more than \$13,400 per year by installing a sprinkler system with somebody else's money. This is not a huge profit, but in 15 years when the loan is paid off, that income jumps to \$94,420 for the next 24 years and then levels out to more than \$78,000 every year after that for the life of the building. Invested in a vehicle that only returns 4% profit each year and that income would grow to more than \$4.3 million in 39 years as shown in Figure 1.

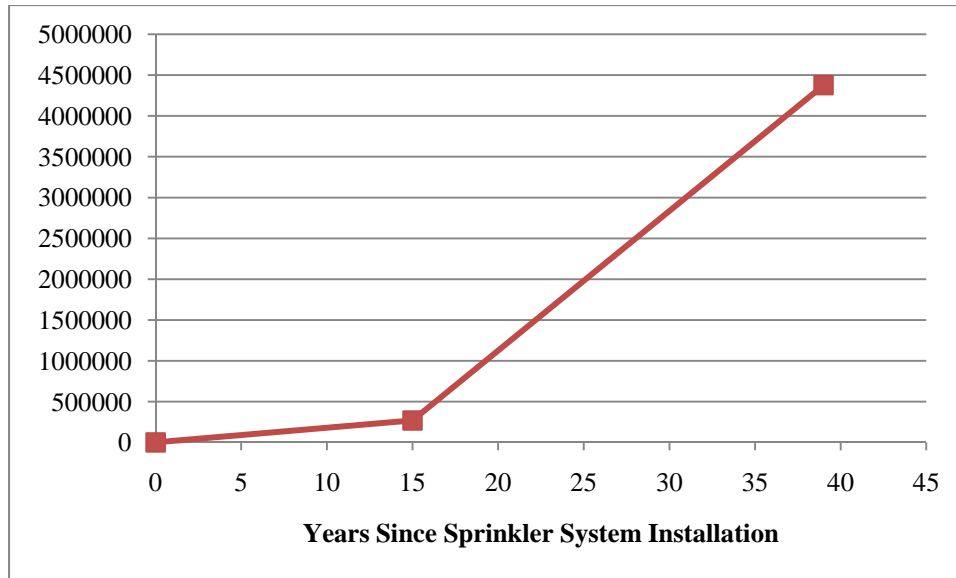


Figure 1 – Value of Savings for Hotel Example Invested at 4%

As Figure 1 shows, the investment of the sprinkler system yields the owner \$13,400 each year for the first 15 years. When invested with a return of 4% each year, this grows to about \$268,000 in 15 years. But once the loan is paid off, the insurance and tax savings continue, growing the fund to about \$1 million 20 years after the sprinkler system is installed and about \$4.3 million at the end of 39 years. Not bad considering it was done with somebody else’s money.

Example #3 – Office Building Retrofit

For the third example, consider the ten-story office building discussed earlier in this paper that was a total of 110,000 sq ft. We can estimate the cost for the retrofit of a sprinkler system at \$350,000 (\$3 per sq ft rounded up). The insurance savings would be as shown in Table 4.

Insurance	Unsprinklered	Sprinklered
Building	\$18,150	\$9,735
Contents	\$9,660	\$5,520
Total	\$27,810	\$15,255
Insurance Savings		\$12,555

Table 4 – Insurance Savings for Office

If the building owner borrowed the \$350,000 for the sprinkler system retrofit at an interest rate of 6% and agreed to pay it back over 15 years, the annual payments would be \$35,450. The average interest on the loan would be \$12,120 $[(35450 \times 15) - 350,000]/15 =$

12,116 rounded up). The taxes on the average interest would be \$4,120 ($12,120 \times 0.34 = 4120.8$ rounded down).

The value of the sprinkler system (\$350,000) could also be depreciated over 39 years, creating additional tax savings. Each year, the amount allowed for depreciation would be \$8,974 ($350,000/39$) and the tax savings from this income tax deduction would be worth \$3,050 ($8974 \times 0.34 = 3051.16$ rounded down). A cost benefit analysis is shown in Table 5.

Cost	Benefit (Savings)
Loan Payments: \$35,450	Insurance: \$12,555
	Depreciation: 3,050
	Taxes from Interest: \$4,120
	Total Benefit: \$19,725
Cost of sprinkler system:\$15,725	

Table 5 – Cost/Benefit Comparison for Office Retrofit

As Table 5 shows, the insurance and tax deductions alone are not enough to pay for the sprinkler system installation in the first 15 years. But after the 15 years are over, the cost of paying for the sprinkler system goes to zero, while the building owner continues to save more than \$15,000 per year in insurance savings and depreciation allowance. Together, these savings allow the sprinkler system to pay for itself in about 27 years and eventually turn a \$300,000 profit for the owner in 39 years, as shown in Figure 2.

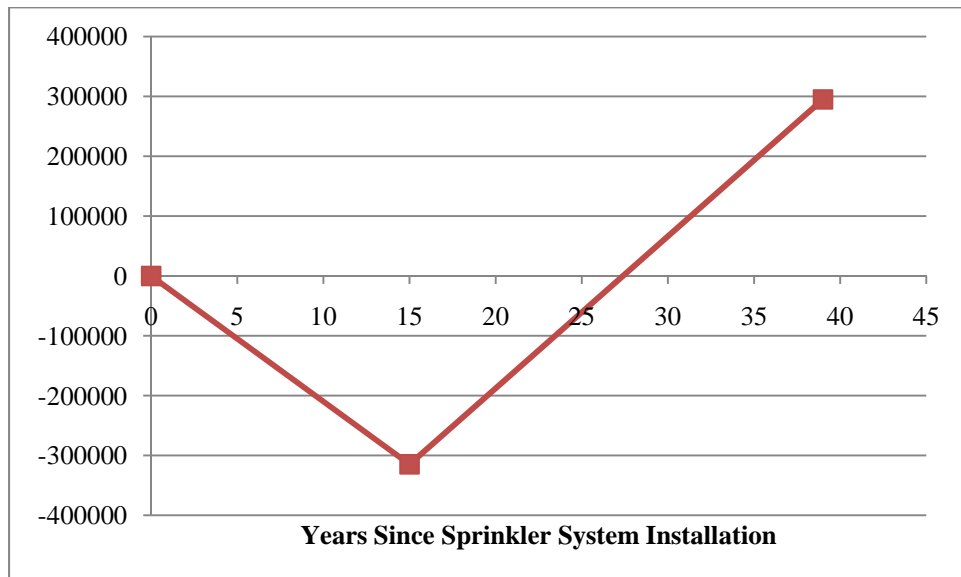


Figure 2 – Sprinkler System Savings for Office Example Invested at 4%

Of course, the insurance and tax savings are not the only savings that can occur for a sprinkler system in an office building. As discussed before, the installation of a sprinkler system

opens whole new opportunities for building owners interested in attracting business from the federal government or other forward thinking companies that do not want to take the chance at business interruption.

Some owners of office buildings only look at the first 15 years of the cost benefit analysis discussed above and (falsely) conclude that the sprinkler system will not be worth the investment. When offered engineered life safety systems that appear to be less expensive than a sprinkler system, they jump at the chance to spend less money initially. Unfortunately, as this analysis will show, these owners are costing themselves money in the long run and making bad decisions for the long-term investment in their buildings. For this analysis, consider the following engineered life safety system that might be proposed to be installed in an office building instead of a sprinkler system:

- Assume that the standpipe system is adequate: \$ 0
- Smoke detection system upgrade \$ 55,000
- Smoke control system installation \$ 60,000
- Exits are adequate \$ 0
- Compartmentation (some 2-hr separations added): \$ 70,000
- Partial sprinkler protection in hazardous areas: \$ 15,000
- Total cost of engineered life safety system \$200,000

Initially, the cost of the engineered life safety system at \$200,000 seems appealing when compared to the \$350,000 cost of the sprinkler system. And, to be fair, we should compare the annual cost of financing the engineered life safety system and the depreciation allowance for it, like we did the sprinkler system.

If the engineered life safety system were financed at 4% for 15 years, the annual payments would be \$20,250. Of this payment, the average interest would be \$6,917, of which \$2,352 would be tax deductible ($6917 \times 0.34 = 2352$). Also, the annual depreciation allowance for the engineered life safety system would be \$5,130 ($200,000/39$), which equates to a savings of \$1,744 for a business paying 34% income tax. This means that the total cost of the engineered life safety system is \$16,154. Note that, when everything is considered as shown in Table 6, the sprinkler system costs less than the engineered life safety system!

	Sprinkler System	Engineered Life Safety System
Initial annual cost	\$35,450	\$20,250
Savings from taxes on interest	\$4,120	\$2,352
Savings from taxes on depreciation	\$3,050	\$1,744
Insurance savings	\$12,555	\$0
Real annual cost	\$15,725	\$16,154

Table 6 – Comparison of Real Costs of Sprinkler System to Engineered Life Safety System

Note only is the sprinkler system less expensive than the engineered life safety system. But the engineered life safety system will never allow the building owner to recoup the money that was spent on it. As Figure 3 shows, the engineered life safety system never creates sufficient income to pay for itself.

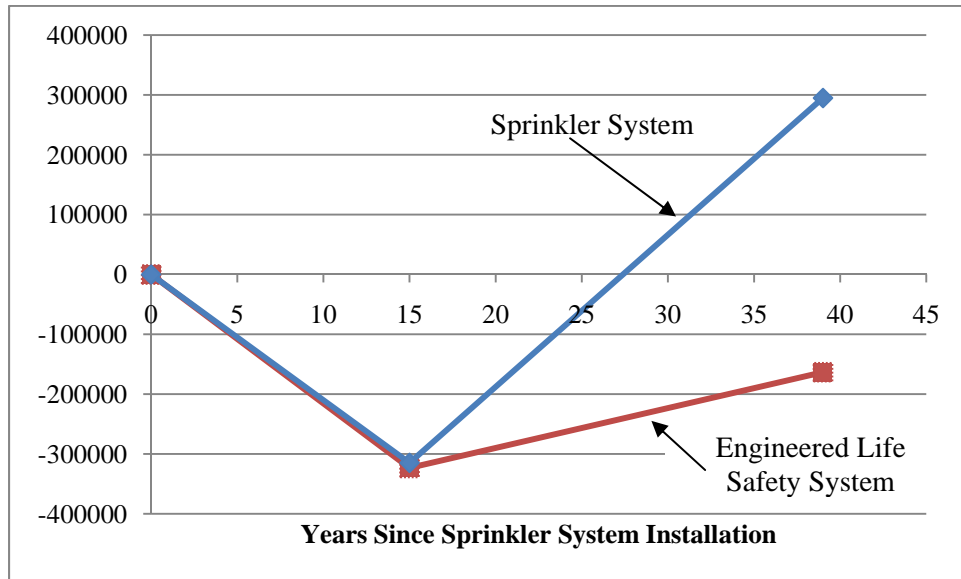


Figure 3 – Comparison of Sprinkler System to Engineered Life Safety System

Example #4 – Condominium Retrofit

For this example, consider the five-story condominium that was discussed in the insurance section earlier in this paper. The condominium is 100,000 sq ft in area and a retrofit sprinkler system is expected to cost \$400,000 (\$4.00 per sq ft). Note that this is 33% more per square foot than the other retrofit estimates. This additional amount is intended to cover aesthetic issues that are more important to home owners than might be important in other commercial occupancies when retrofitting a sprinkler system.

In this particular example, there are multiple building owners to consider. There are the individual owners of each unit (this analysis will assume 50 total units) and then there is the condominium association itself, which is responsible for the common areas (including the building structure) and pays separate insurance for those areas. The condominium association gets the money to pay the common area insurance from the individual 50 unit owners, so eventually, all costs are passed to these 50 owners.

The insurance savings are summarized in Table 7 and include both the savings to the condo association and the unit owners on their personal unit insurance. The table is based on the cost to a single owner. To get the cost of the total situation, each of the values in Table 7 can be multiplied by 50.

Insurance	Unsprinklered	Sprinklered
Building (paid by association, but passed down to building owners)	\$710	\$268
Contents (paid by individual owners on the contents of their unit)	\$92	\$40
Total	\$802	\$308
Insurance Savings		\$494

Table 7 – Insurance Savings for Condominium

With the total cost of the sprinkler retrofit being \$400,000, each of the 50 owners of the units are going to be asked to come up with \$8,000 to pay for their share of the expense. For each unit owner that takes out a second mortgage or in some way uses the equity in their unit to finance their \$8,000 share of the cost, their annual payments would be \$1,856 assuming 6% interest and a 5-year loan.

The interest on the loan would be deductible from their income taxes at whatever their income tax rate is. The average amount of interest paid on the loan would be \$256 per year, which would mean another \$72 in annual savings for a person in the 28% tax bracket.

The true cost of the sprinkler system for the first five years would be \$1,290 per year ($1856 - 494 - 72 = 1290$). This is a small price to pay for sprinkler protection. In fact, it is less than \$3.53 per day, which is less than the cost of one fancy coffee drink.

However, this is just looking at the situation for five years. After the payments are over, the insurance savings continue to come in. As Figure 4 shows, after about 14 years, the unit owner makes their money back and starts to make money from the sprinkler system. It does not matter whether the unit owner plans to stay in the unit that long or not; the fact that the sprinkler system lowers the insurance costs makes the units more valuable, so that if the unit owner goes to sell their unit, they will be able to pay off their second mortgage loan.

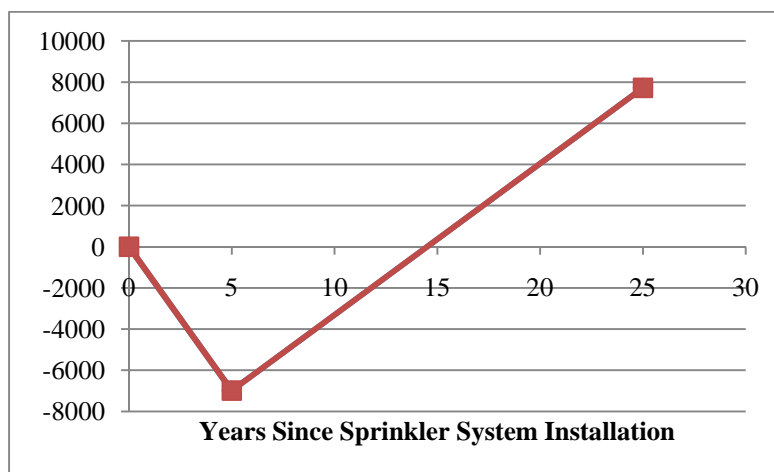


Figure 4 – Long-Term Benefit of Sprinkler System in Condos

Example #5 Food Processing Plant

There are many small unsprinklered factory and industrial occupancies in the United States that would financially benefit from the installation of a sprinkler system, but nobody has taken the time to educate the owners of these facilities. A food processing plant was chosen in this example because a few years ago, a fire in just such an unsprinklered plant led to the deaths of many workers and a complete shutdown of a regional chicken supplier.

A single story 20,000 sq ft building would likely cost much less than \$60,000 to protect with a fire sprinkler system, but we will use this number to be consistent with the \$3 per sq ft cost that we have used throughout this example. The insurance savings for the plant are summarized in Table 8.

Insurance	Unsprinklered	Sprinklered
Building	\$8,850	\$1000
Contents	\$9,490	\$1,460
Total	\$18,340	\$2,460
Insurance Savings		\$15,880

Table 8 – Insurance Savings for Food Processing Plant

If the building owner chose to finance the cost of the sprinkler system at 6% over 5 years, the annual cost of the loan payments would be \$14,000. The average amount of interest that would be paid on this loan is \$2,000 per year. At a tax rate of 34%, this would be a savings in \$680 in lower income tax. Also, income taxes would be saved due to depreciation on the sprinkler system, which would be \$1,538 per year in tax deductions, which would equate to \$523 in tax savings at a rate of 34%.

The total insurance and tax savings to the owner for installing a sprinkler system in this food processing plant would be \$17,083 per year. With annual payments of \$14,000 to pay off the loan, the owner still makes \$3,083 for the first five years and then after the loan is paid off, the owner makes more than \$17,000 for putting a sprinkler system in the building.

Example #6 – Warehouse Retrofit

Many small warehouses exist in the United States that have gone unsprinklered. Like the factor/industrial example above, many building owners just have not been shown the financial value of sprinklers. For the 40,000 sq ft warehouse discussed earlier in this paper, Table 9 shows the summary of the insurance savings.

Insurance	Unsprinklered	Sprinklered
Building	\$11,800	\$1,540
Contents	\$30,000	\$5,300
Total	\$41,800	\$6,840
Insurance Savings		\$34,960

Table 9 – Insurance Savings for Warehouse Retrofit

The retrofit of a warehouse should not be as much as the \$3 per sq ft that has been used in this paper. Open structural members and lack of compartments in most warehouses make sprinkler retrofit extremely easy. But for the sake of consistency, \$3 per sq ft will still be used to estimate the cost of the sprinkler system. With the warehouse being 40,000 sq ft, the retrofit cost is then estimated at \$120,000.

If the owner of the warehouse was going to finance the sprinkler system by borrowing the \$120,000 at 6% over 5 years, the annual cost of the payments would be \$27,850. The average interest on these payments would be \$3,850, which would be a savings in income tax of \$1,309 at a tax rate of 34%. The depreciation on the sprinkler system would be worth \$3,077 (120,000/39), which would equate to a savings of \$1,046 at a tax rate of 34%.

The insurance savings and tax savings add up to \$37,315 each year as compared to the \$27,850 loan payments. This building owner can make almost \$10,000 per year for five years by putting a sprinkler system in their building. After five years, the tax savings and insurance savings would continue, helping the owner to make more than \$37,000 per year, just by installing a sprinkler system with someone else's money.

Conclusion

Retrofitting sprinkler systems into existing buildings can be a cost effective proposition. As our examples have shown, fire sprinklers are a wise investment for all types of occupancies. When the insurance savings, income tax savings, and other benefits are examined, building owners need to be shown that fire sprinkler systems truly save both lives and money.

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