



● INTRODUCTION

In today's building climate, 4-6 story multifamily and office structures are common to the suburban Chicagoland landscape. Many builders wisely choose fire-resistance rated masonry walls and concrete plank floors for these structures. When it comes to roof construction, however, concrete is often overlooked in favor of a more aesthetically pleasing pitched roof system. In doing so, builders are missing out on an opportunity to offer prospective building owners an important money-saving insurance benefit. Property insurance savings realized with concrete plank roof construction facilitates amazingly short payback periods in offsetting the added initial cost of the roof. Builders who understand this can use it along with concrete and masonry's other qualities in selling the merits of the new building investment to potential buyers.

Utilizing concrete plank floor/ceiling construction can also directly benefit the builder. Concrete's ability to prevent the spread of fire to other parts of the building, should a roof fire occur during the construction phase, allows for faster cleanup and a shorter restoration period prior to resuming construction. This minimizes the builder's amount of valuable lost time in being able to keep the project on schedule. Since the insurance company reaps the benefits of a reduced exposure to risk, the builder should inquire about the potential of receiving a credit on his insurance premium covering his construction loan.

● LINKING CONSTRUCTION AND INSURANCE COSTS

Insurance savings resulting from the installation of concrete plank roof construction are related to the roof's contribution to the building's increased fire resistance as well as its barrier separation capabilities. The insurance industry acknowledges this by applying a more favorable rating category to a structure having a concrete roof than one without it. In fact, structures are often penalized when a concrete roof is not installed. For example, a building having a wood roof, but meeting all of the other criteria of a "fire resistive" classification (see definition below) with the exception of a concrete roof is downgraded to a less desirable rating category. Alternatively, if the wood roof is installed on top of a concrete plank roof as an aesthetic feature, the building receives the most favorable rate that is reserved for fire resistive structures.

This publication examines payback periods in consideration of better insurance rates that are applicable when concrete plank roofs are installed in buildings constructed for multifamily or office occupancy. Realizing that pitched roof structures seem to be preferable among the design community, the case example that follows focuses on buildings having pitched roofs, with and without the presence of a structural concrete roof. Well established life-cycle cost techniques are used in the analyses to determine payback periods.

For purposes of this investigation, the following definitions apply:

Fire Resistive (FR) - exterior walls are reinforced concrete (or masonry) or steel encased in concrete, with hollow core plank floors and roof.

Fire Resistive/wood (FRw) - exterior walls are reinforced concrete (or masonry) or steel encased in concrete; floors are hollow core plank with built up wood joist or truss on top of the structural concrete roof.

Modified Masonry Joist (MMJ) - same as fire resistive structure except having a built up wood joist or truss roof with no structural concrete floor/ceiling assembly as a separation element.

EXAMPLE CASE STUDY - MULTIFAMILY AND OFFICE BUILDINGS

Given: 6-story, identical size buildings of construction classifications previously described within a given occupancy type. Building values are based on 65,000 sq. ft. for multifamily buildings and 64,000 sq. ft. for office buildings. The location is Cook County, Illinois. Automatic sprinkler protection and alarm and detection systems are excluded from the study, as the cost differential of these systems corresponding to buildings differing only in roof construction is insignificant.

Table 1 summarizes comparative cost information related to building construction and annual property insurance for multifamily and office buildings of various construction types in Cook County, Illinois.

Table 1. Comparative Construction and Insurance Costs Based on Construction Classification (Rounded amounts)

Building Construction Classification	Multifamily Building Costs ¹	Annual Property Insurance Premiums Multifamily ²	Office Building Costs ¹	Annual Property Insurance Premiums - Office ²
Fire resistive/wood (conc. roof) Cook County	\$4,680,900	\$9,920	\$7,024,000	\$9,410
Modified Masonry Joist (no conc. roof) Cook County	\$4,612,800	\$20,390	\$6,956,900	\$22,680
Fire resistive/wood (conc. roof) Outside Cook Co.	\$4,680,900	\$7,210	\$7,024,000	\$8,850
Modified Masonry Joist (no conc. roof) Outside Cook Co.	\$4,612,800	\$14,810	\$6,956,900	\$23,310

¹ Sources: Cost estimates developed from 1999 Commercial Square Foot Building Costs, Saylor Publications, Inc. and data from R.H. Means, 1999.

² Insurance costs are based on average rates for Cook County, IL as provided by one of the largest commercial insurers of multifamily and office buildings in the United States. Rates include fire, extended coverage, and business interruption (loss of rents) based on 12 months rental income. An insurance deductible of \$500 applies

PAYBACK/LIFE-CYCLE COST ANALYSIS EXAMPLE

Given: 6-story, 65,000 sq. ft. multifamily buildings in Cook County, Illinois, one classified as fire resistive/wood (wood roof built on concrete plank) and one as modified masonry joist (wood roof without concrete plank separation) construction. Building owner is leveraged at 20%, i.e. 80% loan-to-value; 10-year, fixed 8.0% mortgage rate, amortized over 25 years; no points at closing (Citibank source); 1.96% rate of inflation based on Consumer Price Index for June 1999.

Using the modified uniform present worth formula,

$$P = A[(1+e)/(i-e)][1 - ((1+e)/(1+i))^n]$$

where:

P = present worth of annual insurance savings
 A = annual insurance savings (from Table 1)
 i = interest rate on mortgage
 e = rate of inflation on insurance costs
 n = time horizon for payback (years)

the payback period, n, is calculated using an iterative process and comparing 'P' to the leveraged amount (20%) of the construction cost difference.

$P = \$13,675 > \$13,628$ (construction cost differential) for a payback period of $n = 1.40$ years.

Table 2 summarizes the results of similar analyses for the various scenarios under investigation.

Table 2. Payback Periods Using Insurance Savings to Overcome the 20% Leveraged Added Cost for the Installation of Concrete Plank Roof Construction - Multifamily & Office Buildings

Occupancy/County/Construction Type	20% Equity Construction Cost Difference	Corresponding Payback Period (years)
Multifamily - Cook County Fire Resistive/wood roof on plank Versus Modified Masonry Joist (no concrete roof)	\$13,630	1.4
Multifamily - Outside Cook County Fire Resistive/wood roof on plank Versus Modified Masonry Joist (no concrete roof)	\$13,630	1.96
Office - Cook County Fire Resistive/wood roof on plank Versus Modified Masonry Joist (no concrete roof)	\$13,420	1.07
Office - Outside Cook County Fire Resistive/wood roof on plank Versus Modified Masonry Joist (no concrete roof)	\$13,420	0.98

Observations/Conclusions

- Annual insurance premiums can be cut in half (see Table 1) by installing a concrete plank floor/ceiling assembly as a separation element to wood roof construction in structures built for multifamily or office occupancy.
- Payback periods to offset the added initial cost of installing a concrete plank floor/ceiling assembly are incredibly short (1-2 years) in consideration of insurance savings that are realized.
- Builders should use the above information as a tool in selling the attributes of a building to a potential property owner.

- By utilizing a concrete plank floor/ceiling assembly as a barrier to wood roof construction, both the builder and insurance company reduce their exposure in the case of a roof fire during the construction phase. Confinement of the damage to the roof allows builders to minimize restoration delays in getting the project's construction back on schedule; and the insurance company reduces its exposure in the decreased percentage of the building that is subjected to loss. The builder should use these factors to inquire about the possibility of receiving a credit on his insurance policy covering the construction loan.

We would like to hear your comments. Send them to:
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