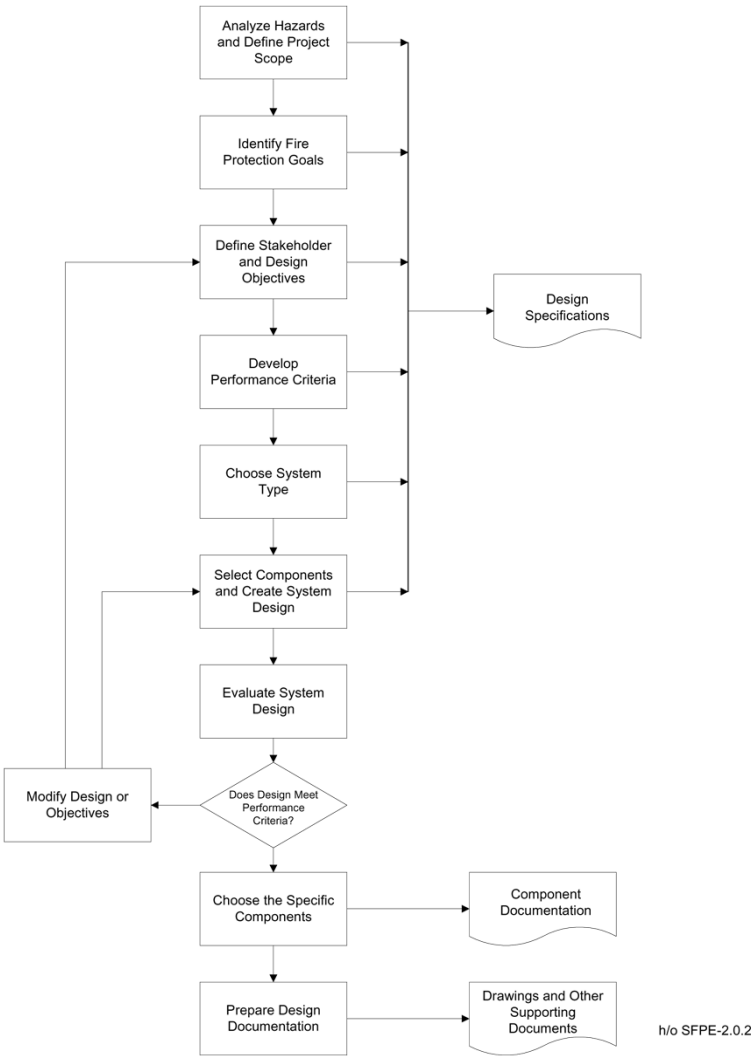
Applying Performance-based Fire Alarm System Design – Part 2

by Dean K. Wilson, P.E.

In the last two issues I shared one of the hottest topics in the fire protection community today, performance-based building design, and presented a graphical representation of how this performance-based design process or procedure might work for designing a fire alarm system.



The fire alarm system designer who follows this concept applies a methodical procedure. Not only does this procedure help ensure that the results meet the specific needs of the project, but it also provides a comprehensive solution to whatever fire protection problems the procedure has identified.

Once the designer has analyzed the hazards and defined the project scope, he or she must identify the specific fire protection goals that will apply to this project. This goal-setting procedure has a basic foundation that relies on an understanding of several common threads that seem to run through the minds of the individuals who have an interest in or "stake" in the success of the design.

These typical threads include: Life Safety, Property Protection, Mission Continuity, Heritage Preservation, and Environmental Protection. Sometimes, Heritage Preservation falls under the category of Property Protection. Whether a particular designer has five broad categories or four, the concept remains the same. Each of these items has a decided impact on the success of a particular design.

Most designers will find some help by asking specific questions relating to these categories. What Life Safety goal does the owner wish to achieve? Said another way: How many people does the owner expect to permit the fire to kill or injure?

"Now wait just a minute," you may exclaim. "What a stupid question. The answer to that will always be, NONE!"

Will it? What about the well-accepted fact that fire protection systems can usually not protect persons intimate with the fire? While our natural compassion may try to prevent us from facing reality, is it really so unreasonable to admit that there may well be circumstances where we cannot reasonably protect every single person in a building during a fire?

In any case, compassionate or dispassionate, the question must have an answer. And that answer will provide a profound influence on the nature of the design of the fire alarm system.

Moving along to a somewhat less emotionally tugging question: How much property does the owner expect to sacrifice to fire-related damage? The answer may come in terms of dollars of value, square footage, or may be defined by numbers of compartments within the building. Whatever the descriptor, some concrete answer must arise. And, again, that answer will significantly impact on the fire alarm system design for the building.

What special steps must the owner take to preserve the mission of the facility? The answer to this question often surfaces from an in-depth analysis of what production bottlenecks exist or what production interdependencies might affect mission continuity. Far too often, business owners have failed to give careful attention to this item. After the fire, they have discovered that some critical piece of equipment has suffered damage. Without that equipment, the product cannot be produced. So, once again, the answer will influence the fire alarm system design.

As mentioned before, an analysis of heritage preservation may be included in a study of the property protection concerns, or it may be completed as a separate item. What heritage must the owner preserve? This could take the form of critical records, or it might actually include items that have genuine historical value. In any case, an analysis will reveal the impact this matter will have on the fire alarm system design.

Similarly, asking what impact a fire at this property will have on the environment will sometimes reveal critical concerns. The classic case history involves the paint warehouse located adjacent to the well field for the large city's public water supply. In developing a fire response plan, no one had anticipated the fact that toxic run-off from the warehouse during a fire could possibly contaminate the well field and poison the city's water supply. Fortunately, when the fire did occur,

the fire chief realized this problem early and averted a serious disaster by electing to allow the fire to burn itself out with little application of water except to preserve the exposed properties.

Once the designer has clearly identified the Fire Protection Goals for this particular performance-based design, he or she must document these goals as the third part of the project's design specifications. The report of the goals helps create a written baseline to which all future project decisions can refer.

Next the designer must seek input from all of the individuals who have a stake in the success of the project. This input will comprise the stakeholders objectives. The stakeholders will include a wide range of individuals: from the owner and tenants of the building through the various authorities having jurisdiction.

In developing a list of stakeholder objectives, the designer may find that some of the objectives from stakeholders may conflict with each other. The designer will have to arbitrate those conflicts. This process may take several meetings between stakeholders. Yet the stakeholders must reach agreement before the project can move forward.

Once the designer has a comprehensive list of the stakeholder objectives, he or she will include these in the project specifications.

Then the designer will consolidate and prioritize those objectives into a list of the design objectives for the project. The designer will document the written design objectives in the design specifications. There they will join the hazard analysis, project scope, fire protection goals, and stakeholder objectives to form that baseline to which all future project decisions can refer.

In the next issue of *IMSA Journal,* I will discuss how this performance-based design procedure for designing fire alarm systems develops the performance criteria.

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