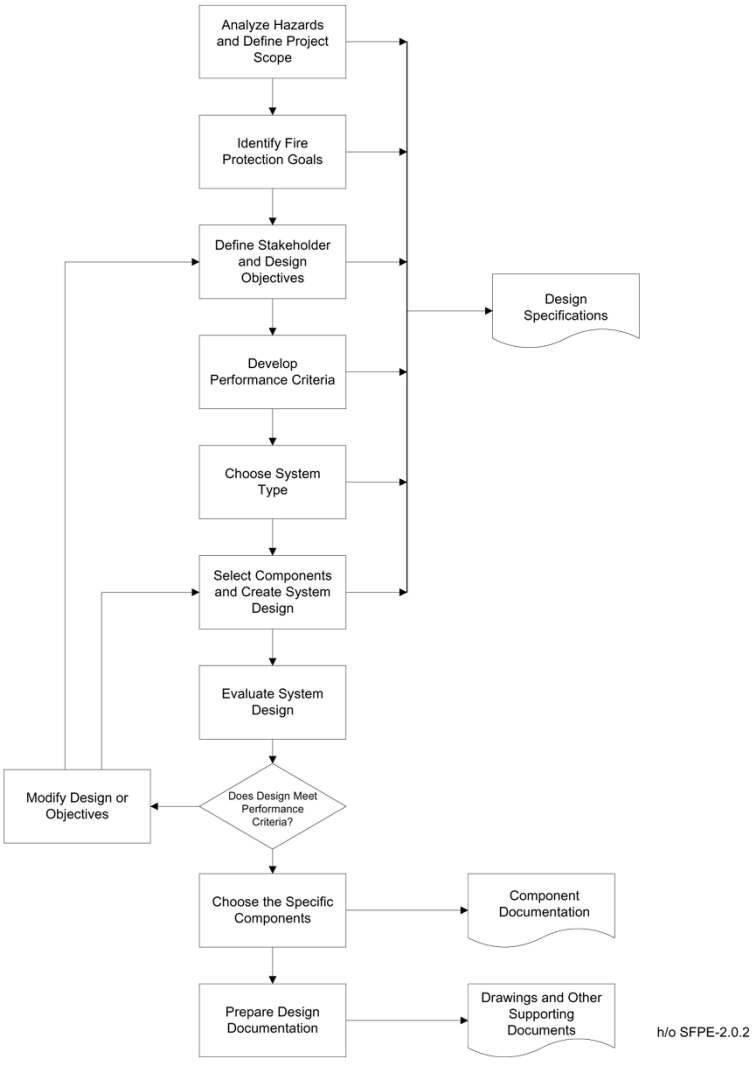
# Applying Performance-based Fire Alarm System Design – Part 3

**by Dean K. Wilson, P.E.**

Over the course of the last three issues I have 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 key to understanding the whole performance-based building design arena rests with realizing that a process makes it work. Thus, when applying a performance-based building design process to the design of 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.

The designer begins by analyzing the hazards and defining the project scope. Next, the designer identifies the specific fire protection goals that will apply to this project. Next, by gathering information from the stakeholders in the project, the designer defines the stakeholder objectives. The designer resolves any conflicts between various stakeholder objectives and combines the results into design objectives for the project. With these first three steps complete and documented in the design specifications, the designer then moves on to develop performance criteria for the fire alarm system.

In some ways, developing performance criteria presents a greater challenge than any of the other steps. Here the designer must carefully chose and then fully document measurable criteria against which he or she will measure the final design of the system. The designer asks the questions: “What specific requirements must the fire alarm system design satisfy?” and “What specific performance features must the fire alarm system design provide?”

Fortunately, in the case of a fire alarm system, some of the performance criteria exists within the context of NFPA 72-1999, *National Fire Alarm Code.* Such criteria would include such items as the capacity of the standby power supply. It would also include the timing of system processing from the time a fire alarm initiating device actuates until the fire alarm system control

unit annunciates an alarm signal. These two examples represent a host of other requirements detailed in the *Code.*

In fact, a wise designer will go through NFPA 72 page by page and clearly highlight each requirement that might constitute a performance-based design criterion. Of course, not every requirement will apply to every situation. However, this highlighting process will give a designer a good beginning at gathering a reference list of possible design criteria.

The designer must consider other site-specific conditions that might contribute to the design criteria. For example, in a large stadium project, any unusual exiting requirements may influence the nature and type of information that the fire alarm system must provide. Such special features would offer detailed design criteria to which the final system design must respond.

As the designer develops a comprehensive list of design criteria, he or she constantly refers to the design objectives of the system, the overall fire protection goals, the project scope and the hazard analysis. This constant referencing helps assure that the list of design criteria will incorporate all necessary items.

The designer also must examine each design criterion carefully to make certain that it includes a measurable component. Later in the process, the designer will use this measurable component to evaluate the final system design.

When the fire alarm system design becomes part of a larger performance-based building design, the fire alarm system designer may have to relate the fire alarm system design criteria to the overall list of design criteria for the building design. In doing this, the fire alarm designer will have to review and carefully consider the performance criteria for the building design. It may well be that some of the design criteria for the fire alarm system will actually support the manner in which the building design satisfies the overall design criteria.

Once the fire alarm system designer has compiled a complete list of the design criteria for the fire alarm system, he or she will document the criteria in detail in the design specifications. As with each of the previous three steps in the performance-based design process, the designer must clearly and carefully document the performance criteria in the Design Specifications. This written record will allow anyone reviewing the design to develop a thorough understanding of the decision making that the designer employed throughout the design process.

The designer must next choose a system type. And, we will focus on that important step during the next issue.

---

IMSA member Dean K. Wilson, P.E., C.F.P.S., works as Senior Engineer in the Windsor (CT) office of the fire protection engineering and code consulting firm, Hughes Associates, Inc. (www.haifire.com). The opinions expressed in this article are strictly his own. You can reach him by phone at (860) 687-1009; by FAX at (860) 687-1308; or by e-mail at dwilson@haifire.com.