Florida PE Fire Alarm Workflow to Web App Architecture

This document details the professional engineering (PE) fire-alarm design workflow for Florida projects and outlines how to translate this process into a web application that generates a detailed Bill of Materials (BOM) and code-compliance notes, cross-referenced to Kidde Commercial products.

The core goal is to ingest project attributes and output a **detailed BOM** plus **code-compliance check notes**, and then **cross-reference that BOM to Kidde Commercial** equivalents, *without* performing drawing or device placement.

A) Florida PE Fire Alarm Design Workflow

The professional design process is structured into three phases to establish the code basis, system scope, and final BOM.

Phase 1 — Architectural Plan Review (System Scoping)

This phase establishes the **code basis** and **system scope** by extracting key project data from architectural sets.

Project Identity and Jurisdiction

Input	Requirement
Project Location	Project address, city/county
Authorities Having Jurisdiction (AHJ)	Fire Marshal, Building Dept.
Code Enforcement	Florida Building Code (FBC) plan review + Florida Fire Prevention Code (FFPC) enforcement
Local Factors	High-rise triggers, local amendments, special districts

Occupancy / Use Classification (System Requirement Driver)

Classification determines if a system is required and its type (manual, automatic detection, voice/EVACS).

- **Primary Occupancy:** Business, Mercantile, Storage, Factory/Industrial, Residential/Multi-family.
- **Mixed-Use:** Separations and accessory uses (e.g., retail under residential).
- **Special Rooms:** Electrical rooms, fire pump room, generator, elevator machine room, commercial kitchen hood, hazmat.

Size and Geometry (Notification Scope Driver)

These inputs drive the conceptual sizing of the system components (BOM-level scope).

- Total building area, floor areas, number of stories.
- Ceiling heights and types (open structure vs. ACT).
- Egress/Life Safety Features: Rated corridors, exit access corridors, stairs.

Egress and Life Safety Features (Interfaces)

These details define the interface scope for the fire alarm control panel (FACP).

- Elevator count and recall requirements (smoke detector locations for recall/shunt trip).
- Door hardware schedules for maglocks / access control (unlocking interfaces).
- HVAC shutdown zoning concept.
- Sprinkler system presence (for annunciation and location text).

Output of Phase 1: Structured "Project Intake Record" (Occupancy, Floors, Areas, Interfaces, Design Basis Assumptions).

Phase 2 — Code Research and Application (Design Basis)

The design must comply with two primary "code umbrellas" in Florida, plus referenced standards and state engineering rules.

1. **Florida Fire Prevention Code (FFPC):** Enforced by local fire officials. References NFPA 1 / NFPA 101.
2. **Florida Building Code (FBC):** Design framework for permitting. Specifically FBC Building and FBC Fire Protection Systems.

The design is engineered according to the following referenced standards:

- **NFPA 72:** The *how-to* standard for design, installation, and performance.
- **NFPA 101:** Often governs egress and occupant notification intent.
- **NEC / NFPA 70:** Affects wiring methods, power, and pathway survivability.

Code Methodology (App Thinking Model)

1. Determine **IF** a system is required (FBC/FFPC).
2. Determine **WHAT TYPE** is required (Manual only, automatic detection, voice, monitoring).
3. Determine **PERFORMANCE RULES** (Audibility, intelligibility, candela rules, survivability) via NFPA 72.
4. Determine **DOCUMENTATION RULES** for submittal per Florida engineering rules (FAC 61G15-32).

Phase 3 — Design Implementation (BOM + Compliance Notes)

The scope is translated into a category-based Bill of Materials and supporting documentation.

Step 1 — Choose System Architecture (BOM Driver #1)

System architecture selection drives major hardware requirements.

- Addressable vs. Conventional (Addressable preferred for most new commercial/multi-family).
- Voice (EVACS) vs. Horn/Strobe.
- Pathway Class (Class A/B).

App Output: Selected architecture with justification notes.

Step 2 — Define Required Functions (BOM Driver #2)

Key functional categories for the BOM:

- **Initiation:** Pull stations, sprinkler flow/supervisory, duct/smoke, elevator interfaces.
- **Notification:** Horn/strobe or speaker/strobe; Public vs. Private mode; ADA visible scope.
- **Monitoring:** Communicator type (Cellular/IP).
- **Annunciation:** Remote annunciator requirements.

Step 3 — Produce the BOM (Category-Based Tiers)

The BOM is generated in tiers, accounting for definite items, rule-driven quantities, and necessary allowances.

Tier	Description	Examples
A: Definite Items	Nearly always required major components.	FACP, power supply, batteries, communicator, surge protection, interface modules.
B: Rule-Driven Qty	Quantities derived from intake counts.	Monitor modules (per sprinkler riser/valve), interface points (per elevator), pull stations (per stairs/exits).
C: Allowances	Placeholder capacity for unknown tenant improvements (TI) or future needs.	Device allowance per 1,000 SF, spare expansion capacity.

Step 4 — Compliance Check Notes (The "Secret Sauce")

Each BOM line/category must be supported by compliance notes, consistent with Florida engineering rules (FAC 61G15-32).

- **Why included:** Trigger condition from project intake.
- **What it satisfies:** NFPA 72 performance requirement category.
- **What must be verified later:** E.g., "audibility calcs pending final reflected ceiling plans."
- **Assumptions:** Necessary engineering judgments used in the calculation.

B) Web App Architecture and Rules

The web app should mimic the professional workflow across four steps, using a defined data model and rules engine.

1) Core Workflow (UI Steps)

1. **Project Intake Wizard:** Guided form mirroring Phase 1 data inputs.
2. **Code Basis + Requirement Engine:** User selects code cycles; app produces system requirement report (e.g., "System required: yes," "Type: horn/strobe," "Monitoring required: yes").
3. **BOM + Compliance Notes:** Generates the tiered BOM with notes/assumptions.
4. **Kidde Cross-Reference:** Maps generic specs to Kidde families and models.

2) Data Model

A relational structure ensures project data integrity and clean mapping.

- **Project:** Contains jurisdiction, occupancy, scale, and features.
- **CodeBasis:** Stores FBC, FFPC, NFPA 72, NFPA 101, and NEC editions.
- **Requirement:** requirement_id, trigger, result (required/optional), citation pointer.
- **BOMLine:** category, description, quantity (definite/rule-based/allowance), compliance notes, assumptions.
- **KiddeMapping:** generic spec, Kidde family/model options, compatibility constraints.

3) Rules Engine Logic

The engine drives the BOM generation and note attachment.

1. Classify occupancy + features.
2. Run requirement rules to define required functions.
3. Convert functions to a generic BOM template.
4. Apply project scale multipliers.
5. Attach NFPA 72-based compliance notes and verification checklists.

Important Note: Where code interpretation is provisional, the app must output: "Assumption: " and "Verify on sheets: ."

4) Kidde Commercial Cross-Reference

The cross-reference prevents guessing SKUs and relies on a structured mapping layer.

1. **Create a "Generic Spec BOM" first:** E.g., "Addressable FACP, min 2 SLC, min 2 NAC."
2. **Map Generic Spec → Kidde Families:** Use a structured mapping table (e.g., VS Series, Notification families).
3. **Enforce Compatibility:** Ensure addressable protocol, power/load, and listed combinations are constrained.
4. **Output:** Show the generic line, Kidde option(s), and a note: "requires verification with dealer submittal; confirm listing/compatibility."

C) Minimum Viable Product (MVP) Feature List

This list represents the fastest path to a professional-grade product.

- Project intake wizard (occupancy + features + scale).

- Code-basis selector (FBC/FFPC cycle + NFPA standard edition basis).
- Requirement report (system required? voice? monitoring? key interfaces?).
- BOM generator (Definite + Rule-based + Allowances).
- Compliance notes per BOM line (with assumptions + verification checklist).
- Kidde cross-reference (generic → Kidde family options).
- Export: Excel BOM + PDF report.