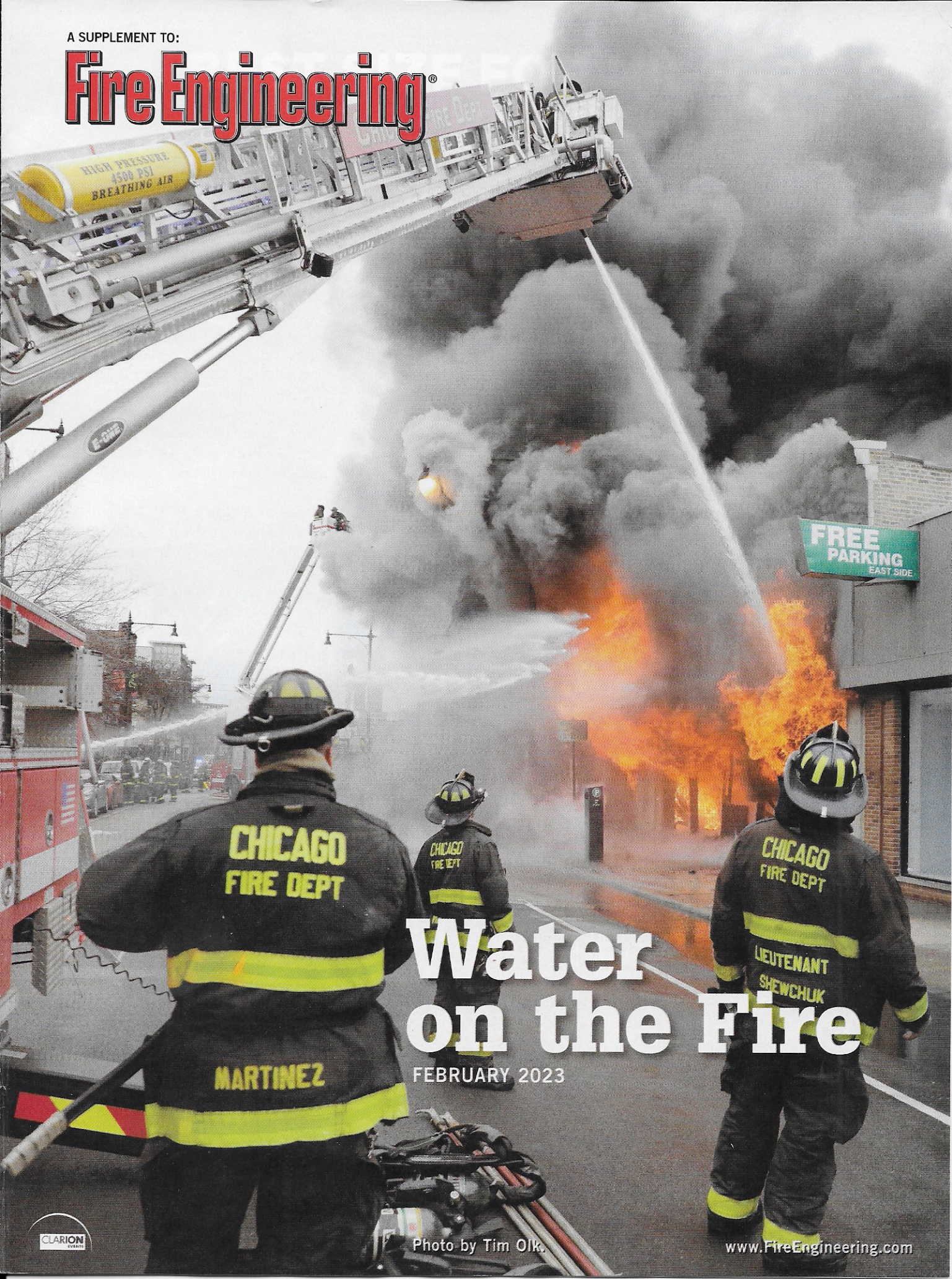


A SUPPLEMENT TO:

# Fire Engineering®



## Water on the Fire

FEBRUARY 2023

Photo by Tim Olk.

[www.FireEngineering.com](http://www.FireEngineering.com)

# Fighting Porch Fires

BY NICHOLAS PAPA

**I**N OLDER CITIES ACROSS AMERICA, particularly in the Northeast, large, wood-frame porches are synonymous with pre-World War II-era multiple dwellings. In the classic New England mill city where I work, thousands of 2½- to 3½-story wood-frame (balloon-frame) construction and three- to four-story buildings of ordinary construction represent the predominant residential occupancy type and have these porches in the front; on the side; or, most often, in the rear of the building. The amount of wood present in these 25- to more than 40-foot-tall structures, which are exposed in open porches, can create a “vertical lumberyard.” With the lack of fire protection (i.e., rated materials or sheathing) and compartmentalization, you can encounter rapid fire growth and spread.

Porch fires in urban communities are a regular occurrence, largely attributed to several socioeconomic factors. Because they do not serve as living space and many are not fully enclosed, which exposes them to the elements, porches typically do not have smoke detectors, which delays detection and notification to the residents. Readily accessible from each floor, sometimes directly from the individual apartments, the porch is a convenient place for residents to

smoke, especially at night and in the winter. Porches may also be a secondary means of egress from an apartment, including a set of stairs from the top floor to the ground floor. Improperly discarded smoking materials can easily start fires. Since many porches are old and poorly maintained, the wood is often weathered and dried out, making the porch “a tinderbox.” Adding to the fuel load and potentially creating additional ignition sources, occupants may store belongings (e.g., strollers, bikes, mopeds, and tires) or put appliances, even propane grills, out on the porches—a major fire code violation. Since the rear porches are out of sight from the street, they can be a prime target for arson and juvenile firesetting.

## Strategy

When combating porch fires, the primary consideration is that the fire is of exterior origin. If the seat of the fire is on the outside of the building, that is where the attack must start. This is not a defensive strategy; you are simply initiating an offensive attack from that position to get base water application—the key to extinguishment. Doing so will allow the stream to access each level of the porch as well as the roofline in rapid

succession. Even if the fire has extended to the interior, knocking down the main body of fire first will cut the legs out from underneath it and dramatically stunt its progression. If you fail to do so, particularly when the porch is well-involved, it will allow the fire to rapidly grow and spread up the building unchecked, which can outpace and outmaneuver the initial handline. Porch fires require this “prevent” strategy to stop the vertical extension, as these fires are essentially a race to the attic/cockloft.

## Handline Selection

You should base handline selection on the size of the porch (its area and height), its construction (open, semi-enclosed, or fully enclosed), the building’s exterior sheathing and whether it contributes to the fuel load, and the level of involvement. You must obtain and process all this information in mere seconds during the 360° size-up.

For small to mid-size porches, a 1¾-inch handline is more than adequate. Using the standard residential fuel load equation—0.07 megawatts (MW) per square foot (ft<sup>2</sup>)—and the common dimensions of an enclosed rear porch on



(1) Fire is autoexposing from the front porch and is spreading into the top floor, along the gable, and into the structural void spaces. (Photo by Michael Carena Jr.) (2) The rear porch is well-involved, and fire has extended into the top floor and the structural void spaces. (Photo by Jonathan Turano.)



**(3)** The heavily involved rear porch of a six-family multiple dwelling created a large column of smoke that could be seen for miles. [Photo courtesy of the New Britain (CT) Fire Department.] **(4)** The extreme radiant heat from the fully involved rear porch of a six-family multiple dwelling melted the siding on the B side exposure and ignited the rear porch of the D side exposure (a building of similar construction). (Photo by Michael Carenza Jr.)

a “three-decker” (a three- to 3½-story balloon-frame multiple dwelling with one unit per floor)—18 feet × 6 feet or 108 ft<sup>2</sup>—each level would produce approximately 7.5 MW of heat energy for a total of roughly 23 MW for full involvement.

A fire stream can absorb 0.3 MW for every gallon per minute (gpm) applied using a smooth bore nozzle having an efficiency rating of 50%. Flowing 160 to 185 gpm on average, a 1¾-inch handline can handle up to 24 to 27 MW of heat energy (using a 7⁄8-inch tip and 15⁄16-inch tip, respectively), both above the peak output for the given fire. In the case of 2½-story frames, the charged handline can be manageably deployed to the interior after the fire on the porch is knocked down to rapidly address any extension. To do this, the motor pump operator (MPO) must factor in the additional hose needed to reach the uppermost level, which may be the attic, if it is accessible, with a full working length to operate within it.

For larger porches that are well-involved, especially those that are semi- or fully enclosed, have combustible siding (especially asphalt “gasoline” siding), and are more than three stories, a 2½-inch handline is most often a better choice. The common square footage of an enclosed porch on a “six-family” (a three-story ordinary construction, walk-up-style multiple dwelling with two railroad flat units per floor) is double that of a three-decker—217 ft<sup>2</sup> or 31 × 7 feet per level. Fires at such structures produce a considerable amount of heat energy as a

result (15 MW per level or 45 MW for full involvement); you may need added reach, penetration, and knockdown power. Flowing 264 to 300 gpm on average, a 2½-inch handline can handle about 40 to 45 MW of heat energy (for a 1½-inch tip and 1¾-inch tip, respectively).

Note, however, that the aforementioned heat energy figures are based on the fuel load of a fully furnished bedroom, which is likely above that of a porch, especially one of open construction. If the stream is applied properly—in a bottom-up fashion—it will not be subjected to the full output of the fire. The fire stream’s capabilities in either case should therefore be even greater than what is listed. Another benefit of initially deploying a 2½-inch handline, in these instances, is that it leaves the 1¾-inch lines available to be dry-stretched to the interior, particularly for upper floors, which is critical for well-advanced fires in six-family structures, where there are two separate units per floor, and must be addressed simultaneously.

### On Arrival

As the first-due engine company arrives, they should slow down as they approach and pull past a minimum of one full building to obtain a view of at least three sides to better assess the conditions, allowing the officer to transmit the most accurate arrival report for the incoming units and leave the entire frontage open for ladder company apparatus to position on either corner. A

good practice is to notify the second-due engine company (responsible for water supply) if a hydrant is located in close proximity to the apparatus, especially for narrow/congested streets. As the engine company officer goes off to quickly assess the rear of the structure, the nozzle firefighter must get to the tailboard and prepare to stretch, stepping up to remove the hosebed cover and conduct his own size-up, particularly the access, building (construction/layout), and conditions (extension).

Once the officer gives the order, the nozzle firefighter should immediately initiate the stretch. The MPO must assist in and estimate the stretch, ensuring the correct amount is deployed to at least arrive at the drop point and effectively operate, knocking down the fire on the porch. The MPO must remember to keep the hose out of the street as much as possible so it does not interfere with the positioning of ladder company apparatus. The MPO can facilitate this by slightly angling the cab away when spotting the apparatus on arrival, orienting the hosebed more directly at the fire building.

### Handline Placement and Stream Application

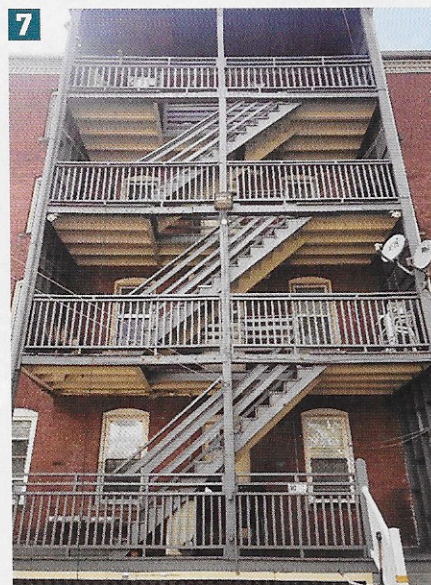
When positioning and operating the initial handline, follow the three S’s: square, steep, and sweep. First, set up perpendicular to the porch in the center. Next, get as close to it as possible to achieve a high angle and aim the solid/



**(5)** A semi-enclosed rear porch with openings on either end, which would benefit from an angled (“flanking”) position of the handline. (Photos 5–6 by Regina Papa.)



**(6)** An open rear porch with sheathing in front of the staircases creates an obstacle for stream application that has to be worked around. **(7)** The floor/roof rafters for the open rear porch run parallel with the back wall of the building, which requires you to lower the stream angle to maximize water mapping on each level as the water will largely run laterally and down as it impacts the face of each joist. (Photos 7–8 by Regina Papa.) **(8)** The upper level of the open front porch has sheathing on the roof rafters, which is ideal for water mapping, while the floor rafters on the lower level are running perpendicular to the front wall of the building, which will require a slow, sweeping motion to optimize water distribution throughout the space.



straight stream at the front portion of the porch ceiling/the underside of floor above, limiting the amount of air entrainment and maximizing water mapping. This allows water to largely ride along and fan out across that surface until it reaches the back wall of the building and cascades down, *without* driving the fire inside.

This deviates from the traditional approach of setting up on a corner and flanking the fire, which was done to prevent such an occurrence from pushing the fire into the interior. Such an event is most often the result of improper stream application and not the position of the handline. Where you may need an angled approach is with a semi or fully enclosed porch in which the fire is venting out but has not burned through the walls yet and

the natural openings are limited—they may only be on the ends of each level. This can also be the case with an open porch where the staircases are shielded with plywood or oriented strand board, preventing the stream from penetrating from a centered position. A flanking approach in these instances can allow the stream to enter on the diagonal and ride across the length of the porch. The water will still fan out, but the trade-off is that a considerable portion of it can run out the other end of the porch instead of it largely flowing down the back wall of the building.

The next step in the attack sequence is to move the stream slowly from side to side to coat the far ends, particularly for wider porches. Doing so is also beneficial, especially in open or semi-enclosed

porches, because there may not be a ceiling to provide a smooth surface for the water to flow across. By moving the stream, it will alternate from the underside of the floor decking to the exposed joists (if they are running perpendicular to the back wall of the building), which will intermittently cause the stream to break apart and distribute more water down into the center of the porch. If the joists are running parallel with the back wall, however, the initial aim should be the center of the porch because the stream will be impacting the face of a single joist, causing the water to be largely dispersed laterally (along that joist bay) and straight down. The angle will have to be adjusted slightly to capture the other joist bays and get water down the back wall of the building. After



(9) The open rear porch fire was quickly knocked down by a 1 $\frac{3}{4}$ -inch handline. (Photos 9-10 by Chris Sargis.) (10) The proper positioning and operation of the 1 $\frac{3}{4}$ -inch handline knocked down the porch fire and checked the extension into the second and third floors.

knocking down the porch fire, elevate the stream to scrub the roofline using the same sweeping motion. Centering on the backside of the building will allow the stream to penetrate the eaves/soffit and get effective water distribution throughout the attic/cockloft.

When starting your attack, begin at the lowest level of involvement and work your way up after knocking down each section, finishing with the roofline. If the fire has penetrated the sheathing and entered the structural voids, get water into the attic/cockloft to stop it from extending or the fire will likely outrun you and eventually burn the roof off. Although the nozzle firefighter must be sure the porch fire is sufficiently knocked down, he must be judicious with his water usage. He should attempt to gauge how long he is flowing, especially when employing a 2 $\frac{1}{2}$ -inch handline, as it will have less than two minutes of usage on a 500-gallon booster tank. If the MPO has time, he can assist the second-due engine company in establishing the water supply by rolling out the appropriate short ("pony") length of supply hose toward the hydrant and connecting it to the apparatus. It is critical that the MPO closely monitor the booster tank level and provide the engine company officer with benchmark reports at each quarter-level of consumption and notify him when they are on a positive water supply.

### Ladder Company Inside Team Functions

While the first handline is being stretched to attack the porch fire, the ladder company inside teams must initiate the primary search immediately. The search should begin in the area most threatened, which will be the side closest to the fire and typically on the top floor, unless the fire has an open pathway (i.e., an open door or an open/failed window) to an apartment on a lower level and has communicated into that space first. The ladder company inside teams should quickly check the conditions on each floor as they ascend to ensure they are not passing by fire.

While searching, they must be mindful of the level of extension and the progress of the fire attack. Until additional lines are stretched to their location, the inside teams must exercise door control of the apartment entry doors to limit the intake of fresh air to the fire and the interior doors to help confine the fire and isolate it from the rest of the unit. During that time, they must also refrain from opening up the walls and ceilings. If the fire has penetrated the voids, prematurely exposing it can be detrimental. Before a charged handline is in position, you should only vent windows in areas that you can isolate from the fire (i.e., controlling the door to a remote bedroom) or if the outside vent firefighter is initiating a targeted search from the exterior to effect a rescue.

Because the ladder company inside teams are operating without the immediate protection of a handline, they should bring in a 2 $\frac{1}{2}$ -gallon water extinguisher. The "can" is able to knock back a considerable amount of fire, which will further aid in confining it and promote a more aggressive search. If the initial handline encounters any issues while knocking down the porch fire, such as water loss (including depleting the booster tank before a positive water supply is established) or a leaking grill propane tank is feeding the fire, the engine company officer must transmit an urgent message to alert the ladder company inside teams, as their protection from the main body of fire may have been compromised or significantly delayed. The ladder company inside teams must closely monitor the radio traffic and the conditions, providing pertinent updates and progress reports to the incident commander (IC).

When the fire has extended to the interior, it is imperative to get handlines to those floors as soon as possible. Traditionally, later-arriving engine companies (the second or third due) would accomplish this task. If the first due is well trained, however, they can get a handline (potentially the first) to the interior too, even with a three-person crew. One of our most respected and experienced officers (now retired) developed this tactic within our department, which we respectfully refer to as the "Lt. Pohl Maneuver."

After the initial handline is stretched to the porch and the nozzle firefighter is effectively operating, the engine company officer returns to the apparatus and stretches another. This requires the officer to account for the additional hose needed to traverse the stairs to reach an upper floor, deploying the hose in a manner that will allow it to pay off as he ascends. If the MPO is not already engaged in establishing the positive water supply, he can assist in the stretch from the rig to the entry door as long as he does not overcommit and become distracted from his primary responsibilities.

It is critical that the engine company officer arrives at the fire floor stairway landing with the *full* working length so it can be flaked out with the nozzle and the coupling at the apartment door. Whenever a well hole of sufficient size is present, use it if it will expedite the stretch (ensuring that the hose is tied off with a

hose strap or hose rope tool at the top). Once the porches are knocked down, the nozzle firefighter notifies the officer and confirms his location to meet up and advance the other handline in the involved apartment. If the nozzle firefighter is delayed because of advanced fire conditions on the exterior or other complicating factors, the officer can request assistance from another engine company to advance and operate that (interior) handline. This tactic requires a great deal of coordination, skill, and trust only attained through training and experience.

### Ladder Company Outside Team Functions

The ladder company outside teams must position the apparatus to optimize their scrub area and access. Although their primary objective will typically be the roof, they must be proactive. By setting up on the corners, they will be

able to operate along two faces of the building and the adjacent exposure.

When the outside teams arrive on the roof, they must immediately begin scouting for signs of extension into the attic/cockloft (e.g., smoke pushing from the shingles or cockloft vents; smoke/embers issuing from the soil pipes, which may also be hot to the touch; and melting/bubbling tar or snow), immediately communicating those findings to the IC. They must then make diagnostic cuts (i.e., kerf cuts/inspection holes) to identify the boundaries of the fire, gauging the level of extension and determining where to open up.

Begin the process with any natural openings (within the area of involvement only) such as scuttles (typically located over the rear porch), skylights (located over the center stairway of six-family multiple dwellings), and the return walls (which shroud the light well and separate it from the cockloft). When cutting to relieve

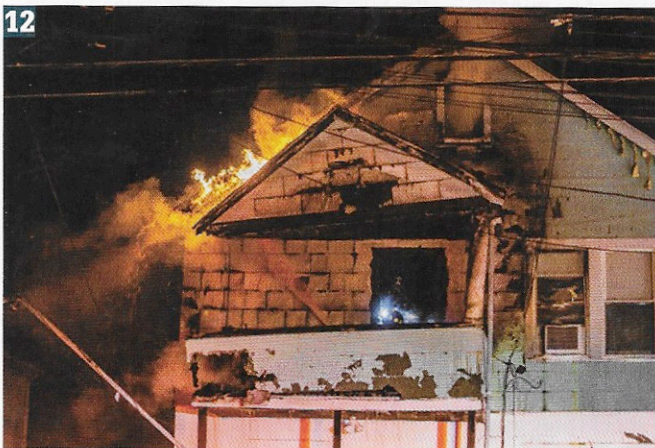
11



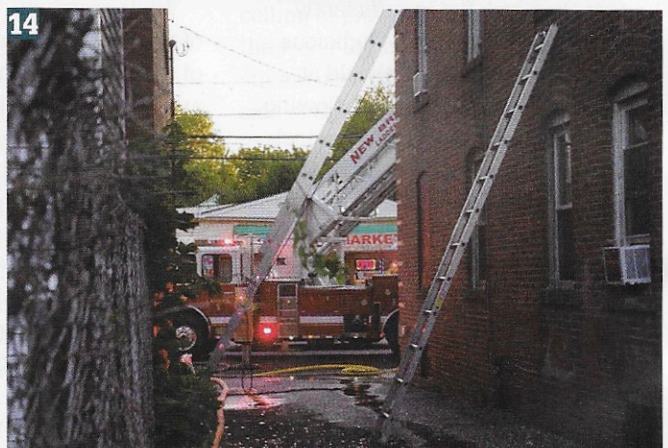
13



12



14



(11) The heavy body of fire, accelerated by the asphalt ("gasoline") siding that was underneath the vinyl siding, burned away the exterior sheathing and allowed the stream to effectively penetrate the enclosed rear porch. (Photo by Michael Carezza Jr.) (12) The asbestos siding resisted the fire from the second floor of the open front porch, which did not add to the fuel load, slowed the fire's rate of growth, and limited extension into the attic. (Photo by Chris Sargis.) (13) The engine pulled past the fire building to leave the frontage open for the ladder tower, which had to split the wires to get into position and access the roof. (Photo by Chris Sargis.) (14) Ground ladders were thrown down the alley for additional means of egress. (Photo by Michael Carezza Jr.)



(15) Prompt (coordinated) vertical ventilation was conducted to help confine the fire extension in the attic and limit its horizontal spread. (Photo by Michael Carenza Jr.) (16) The scuttle hatch over the open rear porch and the skylight over the center stairway are visible on the roof of the mixed occupancy—residential (boarding house) over commercial (bar). (Photo by Regina Papa.)

conditions on the top floor, target the involved spaces, which you can accomplish by orienting yourself with the location of the windows (looking over the side of the roof, if needed). It is important to remember that six-family multiple dwellings have two units per floor that are split by a common center hallway in the rear and will require two separate cuts to improve conditions within each apartment.

Topside ventilation, like all other forms, must be coordinated with the

progress of the interior operations, requiring the ladder company outside teams to closely monitor the radio traffic and communicate to confirm the status of door control and the handlines. If the attic/cockloft is involved, it is imperative to get handlines ahead of the leading edge of the fire and promptly vent the roof to stop the horizontal spread. Interior extension through the open stud channels is a major threat when operating in balloon-frame structures, as are

the plumbing chases (the “wet walls”) within ordinary construction buildings, allowing the fire to spread vertically, unimpeded. When involving a cockloft or an inaccessible attic, you will need many hooks to open up the ceilings from below. In six-family multiple dwellings, you will need hooks and handlines in both top-floor apartments to access the entire cockloft, since the fire is unobstructed and can spread rapidly throughout.

Porch fires are labor and resource intensive and may require additional alarms (which may require mutual/automatic aid) to get and stay ahead of them. If the fire has significantly extended to the interior and it is not put in check after the first wave of attack, it can be easily lost if “on-deck” crews are not readily available to replace the first-alarm companies as they start to run low on air and require relief.

Porch fires can be spectacular, fast-moving fires that can challenge any agency, especially those with limited staffing. When departments are well-prepared (having unit/riding/tool assignments that are supported by standard operating procedures and training) and members are properly supported and empowered to take the initiative and operate aggressively, however, porch fires can be stopped in their tracks and brought under control in relatively short order. ■

*Author’s note:* Thanks to New Britain (CT) Fire Department Engine 1 and Ladder 1, Group A for their assistance in preparing this article and Lt. Steve Pohl, DCE William McCrann, and other officers who came before them for passing on their experience, knowledge, and tactics. These techniques were born out of necessity, tempered in training, and honed with experience.

**NICHOLAS PAPA** is a captain with the New Britain (CT) Fire Department, where he has served for more than 15 years. He is the author of the best-selling book *Coordinating Ventilation: Supporting Extinguishment & Survivability* (Fire Engineering, 2021). He is a frequent contributor to *Fire Engineering* and has been an FDIC International instructor since 2017. He was a technical panelist for the UL-FSRI research project The Study on Coordinated Fire Attack in Acquired Structures. He is also the founder of the fire service training organization Fireside Training LLC ([www.firesidetraining.org](http://www.firesidetraining.org)).