



In-Station Training

TM 23-15 Apartment Fire-Flow Rate & Distribution



Author

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Purpose

A quick hit from the exterior can be an extremely effective tactic to quickly reduce heat release rate and there are options for performing this tactic including small and large attack lines, portable master stream devices, and apparatus mounted master streams. Effective and efficient water application depends on selecting an appropriate flow rate and point(s) of application, and application technique.

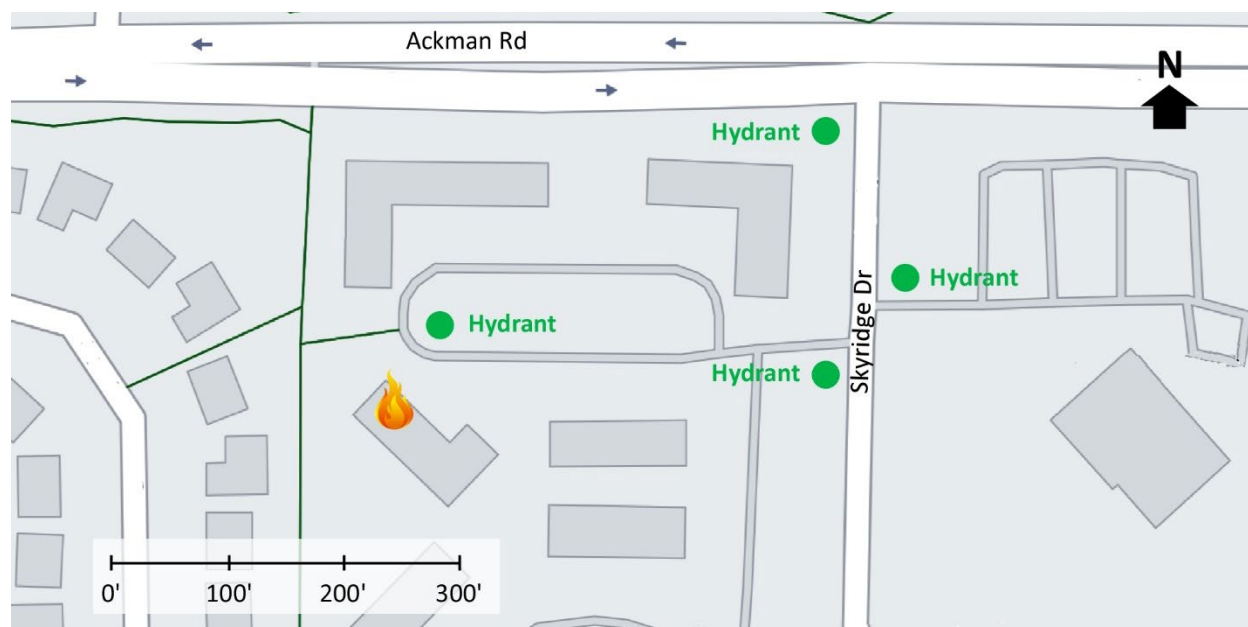
Learning Outcomes

Firefighters and officers perform an effective size-up; select an appropriate strategy, and implement tactics based on the strategic decision-making model.

Conducting the Drill

This incident involved fire at Skyridge Club Apartments, 1348 Skyridge Drive in Crystal Lake, Illinois on February 26, 2023, at 12:24 (Northern Midwest Fire Photos, 2023 & Borgia, 2023). Review the map and photos (Figures 1-6) to gain an understanding of area and building involved.

Figure 1. Map of the Incident Area



Note: Adapted from Google. (2023a). [map 1348 Skyridge Drive in Crystal Lake, IL].

<http://bit.ly/3K8wEN5>.

The closest hydrant is located opposite the main fire occupancy and other hydrants are located outside the complex on Skyridge Drive and Ackman Road as illustrated in Figures 1 and 3.

Figure 2. Aerial View



Note: Adapted from Google. (2023b). [aerial view 1348 Skyridge Drive in Crystal Lake, IL].
<http://bit.ly/3z6qqqG>.

Figure 3. Alpha/Delta Corner



Note: Adapted from Google. (2018). [street view 1348 Skyridge Drive in Crystal Lake, IL].
<http://bit.ly/3FUE5VL>.

This building has eight units, four on the first floor and four on the second floor.

Figure 4. Charlie/Delta Corner



Note: Adapted from Google. (2023c). [3d aerial view 1348 Skyridge Drive in Crystal Lake, IL].
<http://bit.ly/3TINVQm>.

Figure 5. Bravo/Charlie Corner



Note: Adapted from Google. (2023d). [3d aerial view 1348 Skyridge Drive in Crystal Lake, IL].
<http://bit.ly/3z69xws>.

Figure 6. Alpha/Bravo Corner



Note: Adapted from Google. (2023e). [3d aerial view 1348 Skyridge Drive in Crystal Lake, IL].

<http://bit.ly/42Egbal>.

You have been dispatched to Skyridge Club Apartments at 1348 Skyridge Drive for an apartment fire. You are the company officer or AIC of the first arriving engine and have your company's typical staffing. Temperature is 46° F with wind at 5 mph from the east northeast (Weather Underground, 2023).

1. What critical factors would you consider when dispatched and during response and what conversations would you have with your crew while responding?

While responding you hear a command officer, an engine and advanced life support ambulance with typical staffing for your agency go enroute. The second engine and ALS ambulance will arrive approximately four minutes after you, followed by the command officer. All other units dispatched on the first alarm will arrive after the command officer. You are arriving from the north on Skyridge Drive.

Watch the first four seconds of the [incident video](#) (Northern Midwest Fire Photos, 2023) and examine Figure 7 illustrating conditions on arrival.

Figure 7. Conditions on Arrival



Note: Adapted from Northern Midwest Fire Photos. (2023). ****Pre-arrival** Crystal Lake (IL) Fire Rescue box alarm apartment fire (2/26/23)* [video]. <https://bit.ly/40zbSM7>.

2. State your initial radio report (IRR) exactly as you would transmit it to dispatch.

3. What specific actions would you take (as the company officer) immediately upon arrival and exiting the apparatus and what task orders you would give your crew?

Occupants of the building meet you when you exit the apparatus and advise that they believe the occupants of involved unit are not home but are unsure. Conditions on Sides Bravo, Charlie, and Delta are consistent with those observed from Side Alpha with smoke showing from the windows and eaves on Side Charlie.

4. Would you change the action you are taking or modify the assignments given to your crew? If so, what task orders would you provide?

5. State your update report exactly as you would transmit it to dispatch.
6. State the tactical assignment you would give the next arriving engine exactly as you would transmit it.
7. Based on the anticipated effectiveness of your tactical operations, state your conditions, actions, and needs (CAN) report that you would provide to the first arriving command officer as part of command transfer to IC #2?

Watch the [incident video](#) (Northern Midwest Fire Photos, 2023) from 00:05 to 02:58 and consider that the first arriving engine in this incident had a staffing level of four before answering the next several questions.

8. The incident action plan (stated in the initial radio report) was an initial attack with the deck gun through the second floor window. Was this an appropriate tactic based on this incident's critical factors? Why or why not?
9. How would the position of the first arriving engine and the tree located on Side Alpha have impacted the effectiveness of water application into the second-floor apartment?
10. While the first arriving engine was working on getting the master stream into operation it appeared that a later arriving company stretched an attack line on Side Alpha and made a quick hit through the window? Was this an appropriate tactic? Why or why not? How could the effectiveness of the quick hit have been improved?

Additional Learning: Apartments in Skyridge Club complex are 1- or 2-bedroom apartments ranging in size from 631 to 1159 square feet of floor area (Skyridge Club Apartments, 2023). Examine Figure 8

which illustrates a Underwriters Laboratories Fire Safety Research Institute (UL FSRI) experiment in a similar sized apartment in Cobb County, Georgia.

Figure 8. UL FSRI Apartment Fire Experiment

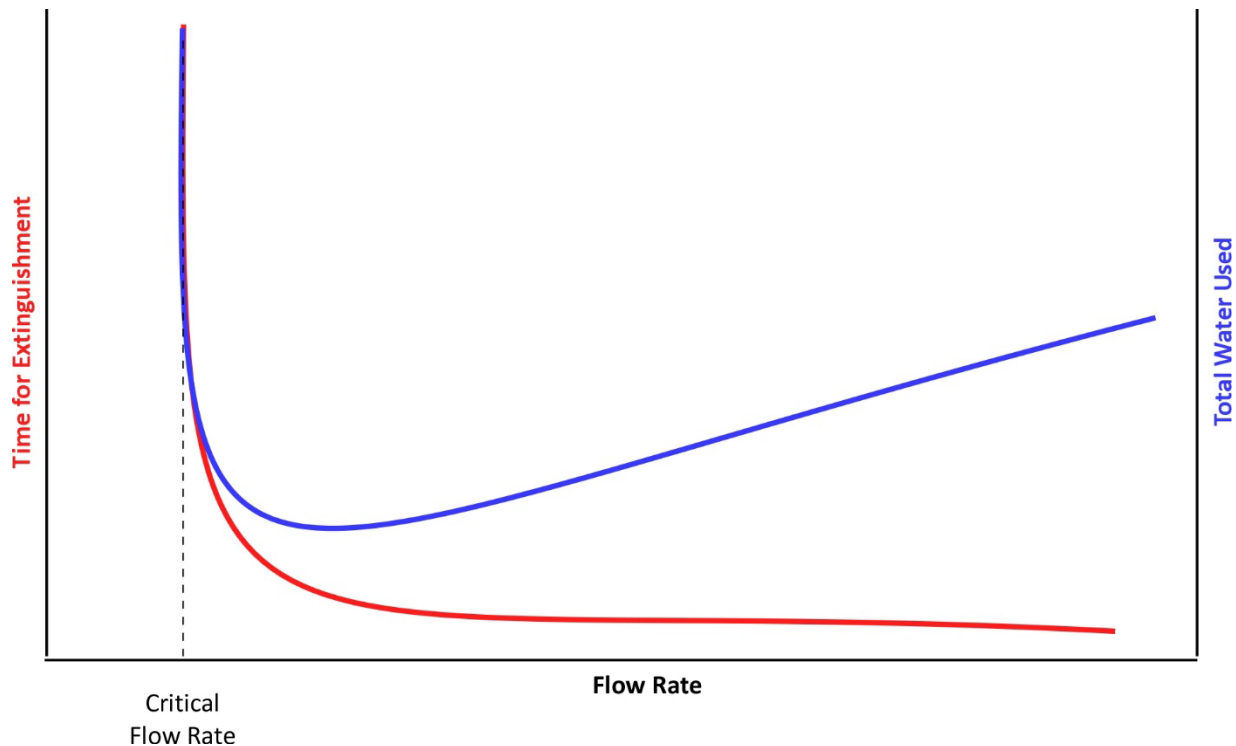


In UL FSRI research examining fire control in single- and multi-family dwellings, a flow rate of 150 gpm to 160 gpm was adequate to quickly achieve fire control for fires involving one to three rooms along with extension into structural voids (Zevotek, Stakes, & Willi, 2018; Regan, Bryant, & Weinschenk, 2020; & Stakes, Bryant, Dow, Regan, & Weinschenk, 2020). However, this does not mean that a higher flow rate is never required...

Depending on the specific tactic, use of an increased flow rate may slow water application or require a larger commitment of resources. Consider the impact of using a small (1 ½" or 1 ¾") versus a large (2 ½") attack line on flow rate, time to deploy, and mobility once charged.

Increasing the flow rate (all other factors being equal) will decrease time to extinguishment. However, as illustrated in Figure 9, increasing the flow rate also results in increased water use. In this graph, the critical flow rate is the flow of water below which the fire will not be extinguished regardless of the duration of application. What is the intended outcome; rapid fire control, minimizing water use, or a combination of both?

Figure 9. Flow Rate vs Time for Extinguishment and Water Used



Note: Adapted from Särndqvist, S. (2002). *Water and other extinguishing agents*. Retrieved April 6, 2023 from <https://bit.ly/3K7VE5S>.

Discuss the flow rates from small attack lines, large attack lines, portable master streams, and apparatus mounted master streams with your crew. What options are available from your apparatus? How will you make the decision as to what flow rate is required?

Get out and stretch some hose. Identify the time required to place a small attack line, a large attack line, portable master stream, and apparatus mounted master stream into operation. Time stops when water is flowing at the correct pressure and flow rate based on the nozzle used. For the attack lines, reposition the line 25' and place it back into operation. How long did this take. Discuss hose management transition to the interior after a quick hit from the exterior with your crew.

References

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