23 Supply Drinking Water Without Power

I. Summary

Issue:
During a power failure, residential buildings using electric pumps lose their supply of potable water. Water may be present below the sixth floor, but in some cases remains unavailable if a nonoperating pump blocks the water supply.

Recommendation:
Require residential buildings to provide drinking water to a common area, supplied directly through pressure in the public water main.

II. Proposed Legislation, Rule or Study

Amendments to the New York City Plumbing Code:

1. Add new Section 614 as follows:

SECTION PC 614
EMERGENCY POTABLE WATER ACCESS

614.1 Buildings required to provide alternative potable water access. Buildings with residential occupancies where the water supply has been supplemented by an elevated water tank, a hydropneumatic pressure booster system, or a water pressure booster pump installed in accordance with Section 606.5 must provide an alternative potable water supply which is fed only by street pressure from the public water main. Such supply must be available at a freely accessible fixture.

614.2 Emergency potable water fixture. An emergency potable water fixture shall be a plumbing fixture meeting the requirements of this Section 614.2, which is provided with cold water from a supply line fed only by street pressure from the public water main and shall include the fixtures in Sections 614.2.1 and 614.2.2.

614.2.1 A sink meeting the requirements of Section PC 418 and fitted with a faucet or fitting suitable for supplying drinking water for human ingestion meeting the requirements of Section 424.

614.2.2 A floor drain meeting the requirements of Section 412 in combination with a faucet or fitting suitable for supplying drinking water for human ingestion meeting the requirements of Section 424.

614.3 Number of fixtures required. A building required to provide alternative potable water pursuant to Section 614.1 shall maintain a number of emergency potable water fixtures meeting the requirements of Section 614.2 equivalent to one emergency potable water fixture for every 75 residents or fraction thereof residing in the building.

614.4 Required Accessibility. Emergency potable water fixtures shall be located indoors in an area which is freely accessible to the tenants of the building.

614.5 Signage. Required emergency potable water fixtures shall be designated by a legible sign stating: “EMERGENCY POTABLE WATER”. Signs shall be readily visible and located near the emergency potable water fixture, and on the door to any room/closet in which the fixture is installed.

614.7 Prohibited location. Emergency potable water fixtures shall not be located in a public or private restroom.

III. Supporting Information

Expanded Issue and Benefits:

The inherent pressure within the municipal water system elevates water to roughly the sixth floor of buildings without the need for pumps. In taller buildings, water pressure booster pumps or elevated tanks supplied by pumps ensure delivery of water above the sixth floor. During power failures, occupants above the sixth floor can rapidly lose access to potable water.

To ensure potable water is accessible to tenants in the event of a power outage, residential buildings should designate one or more common areas on lower floors for potable water distribution. As this distribution would primarily be utilized by residents above the sixth floor, it is recommended that this emergency potable water access point be on as high a floor below the sixth as is practical.

Some buildings have onsite power generation that can serve the building’s water system during utility outages. However, onsite generation (whether a renewable source like solar photovoltaic panels or fuel-based like a diesel generator) can fail or the supply of fuel can be interrupted, both of which were frequent occurrences following Superstorm Sandy. This proposal ensures some potable water supply within the building at all times.

In some cases the layout of potable water supply plumbing may include inline electric pumps or water storage tanks that create blockages to delivery of water during a power outage. In these instances a manual emergency bypass at each of these blockages may be required to allow water to reach the emergency potable water access point. This problem can also be alleviated by installation of a dedicated riser serving only the emergency potable water fixtures.

In larger buildings, multiple water access areas will be required to ensure adequate water supply for residents. The number of required emergency potable water fixtures can be determined using the following assumptions and formula:

1. A fixture can provide about 750 gallons per day, based upon:
   a) Use: 10 hours per day, 8am-6pm (typical staff hours);
   b) Flow: 2.5 gallons/minute (typical faucet);
   c) Setup factor: Actual water flow about 50% of time to allow for bucket set up and to avoid long waiting periods.
2. Equation: (10 hours/day) X (2.5 gpm) X (60 minutes/hour) X (50%) = 750 gallons/day.
3. For the purposes of this proposal, assume a need of 10 gal/day/person for water for sanitation and hydration.
4. Therefore, one fixture can serve 75 people (750/10).

Since the emergency fixture may receive only intermittent use, the water supply pipe serving it can become stagnant. This is known as a “dead leg”, and precautions should be taken to ensure that the potential dead leg does not harbor pathogens. Domestic cold water systems are ordinarily not a major problem for *Legionella* growth, and maintaining cold-water lines below 20°C (68°F) will limit the potential for growth of bacteria. However, if the cold water line is warmed by an external heat source, bacterial growth can become an issue.

The simplest means to prevent a dead leg is to ensure that a regularly used fixture is installed downstream on the same line feeding the emergency fixture. For example, the emergency fixture could be located in-line on a pipe that serves another fixture, such as a service sink in the lobby or the basement. Another possibility is to run the supply to the emergency fixture as a loop with a venturi tee or a small circulating pump to circulate water in the loop back to the riser or supply pipe. Finally, it might be possible to drain the supply line feeding the emergency fixture, so that it is kept dry in between uses. In this case, a valve would be installed so that the emergency fixture riser is only filled with water when in use during extended outages. Building staff would need to be aware of the location and trained in the use of this valve.

In the absence of one of these solutions, the supply line to the emergency fixture will need to be flushed regularly. An example of how this could be done is the specification for maintenance of emergency eyewash fixtures, ANSI Z358.1-2009, which requires that “Plumbed units should be activated long enough on a weekly basis to be sure flushing fluid is provided.” (Section 6.5.2) and also “Minimum flushing fluid of 3 GPM at 30 PSI for 15 minutes” (Section 6.1.6). However, a permanent plumbing method that ensures water safety without the need for ongoing attention and maintenance of building personnel is greatly preferred over a flushing regimen.

The Residential Buildings Committee recommends that this fixture by required in all R-1 and R-2 buildings, including retroactive application to existing buildings, within five years. The Critical Building Committee recommends extending this same timeline to I-1 buildings (adult care facilities).

Cost:

Turner Construction Company prepared cost estimates based upon several standardized building typologies. Due to the innate variances in construction costs between projects, the complexity of the Task Force proposals, and the wide range of buildings to which the proposals

may apply, these cost estimations should only be used as rough order-of-magnitude guides. The cost analysis is presented at the end of this proposal; more information about the cost methodology is given at the end of the full report.

Labor rates provided by Turner Construction Company are based upon union labor. While labor rates for non-union crews may be lower, other cost factors such as premiums for small projects and buying power with vendors influence the total cost of a project. For this proposal, using RSMeans 2012 data to estimate a 12% reduction in per-hour rates for non-union labor, total costs might be reduced by 2% to 6%.

NEW CONSTRUCTION

		Commercial High Rise				Commercial Low Rise				Residential High Rise				Residential Low Rise			
		Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total
23.1	**Supply Drinking Water Without Power**																
	Added Water Fixtures in a Room Already with an Approved Sink (ex: Laundry Room)																
	Electrical - NO CONSTRUCTION COST IMPACT												$0				
	1/2" pipe to hosebibs (6' each)									24	FT	$50.00	$1,200				
	Existing Approved Potable Water Fixture									1	EA	In Plan Already					
	Furnish and install one hosebib per 75 residents									4	EA	$300.00	$1,200				
	Furnish and install utility sinks with signage to drains									4	EA	$1,500.00	$6,000				
	4" sanitary and vent piping for drainage									24	FT	$150.00	$3,600				
	Pipe connections									1	ALW	$1,500.00	$1,500				
	Architectural re-work									1	ALW	$2,500.00	Required				
	SUBTOTAL DIRECT WORK												**$13,500**				
	Contingency										10%		$1,350				
	SUBTOTAL												**$14,850**				
	GC Mark-ups										20%		$2,970				
	TOTAL				**N/A**				**N/A**	**231,000**	**GSF**	**$0.08**	**$17,820**				**N/A**

EXISTING BUILDINGS

		Commercial High Rise				Commercial Low Rise				Residential High Rise				Residential Low Rise			
		Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total
23.1	**Supply Drinking Water Without Power**																
	Tap off Existing Sink and Common Space Area																
	Electrical - NO CONSTRUCTION COST IMPACT												$0				
	1/2" pipe to hosebibs (6' each)									24	FT	$50.00	$1,200				
	Furnish and install one hosebib per 75 residents									4	EA	$300.00	$1,200				
	Furnish and install utility sinks with signage to drains									4	EA	$1,500.00	$6,000				
	4" sanitary and vent piping for drainage									24	FT	$150.00	$3,600				
	Pipe connections									1	ALW	$1,500.00	$1,500				
	Architectural re-work									1	ALW	$2,500.00	$2,500				
	SUBTOTAL DIRECT WORK												**$16,000**				
	Contingency										10%		$1,600				
	SUBTOTAL												**$17,600**				
	GC Mark-ups										20%		$3,520				
	TOTAL				**N/A**				**N/A**	**231,000**	**GSF**	**$0.09**	**$21,120**				**N/A**

NEW CONSTRUCTION																				
		Commercial High Rise				Commercial Low Rise				Residential High Rise				Residential Low Rise			
		Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total
23.2	**Supply Drinking Water Without Power**																
	Dedicated Emergency Potable Water Cabinets in Common Space																
	Electrical - NO CONSTRUCTION COST IMPACT												$0				
	2" pipe outlet off riser (assume 100' or less)									100	LF	$90.00	$9,000				
	1/2" pipe to hosebibs (6' each)									30	LF	$50.00	$1,500				
	Furnish and install one hosebib per 75 residents									5	EA	$300.00	$1,500				
	Furnish and install utility sinks with signage to drains									5	EA	$1,500.00	$7,500				
	4" sanitary and vent piping for drainage									100	LF	$150.00	$15,000				
	Architectural hosebib cabinets and signage									5	EA	$500.00	$2,500				
	Demolition of existing conditions											Not Required					
	Core drilling - 2" each supply and drain											Not Required					
	System draindown											Not Required					
	Connection to existing cold water supply									1	ALW	$1,000.00	$1,000				
	2" ball valve at tee connection									1	ALW	$1,000.00	$1,000				
	SUBTOTAL DIRECT WORK												**$39,000**				
	Contingency											10%	$3,900				
	SUBTOTAL												**$42,900**				
	GC Mark-ups											20%	$8,580				
	TOTAL				**N/A**				**N/A**	**231,000**	**GSF**	**$0.22**	**$51,480**				**N/A**

EXISTING BUILDINGS

		Commercial High Rise				Commercial Low Rise				Residential High Rise				Residential Low Rise			
		Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total	Quantity	Unit	Unit Cost	Total
23.2	**Supply Drinking Water Without Power**																
	New Emergency Potable Water Cabinets																
	Electrical - NO CONSTRUCTION COST IMPACT												$0				
	2" pipe outlet off riser (assume 100' or less)									100	FT	$90.00	$9,000				
	1/2" pipe to hosebibs (6' each)									30	FT	$50.00	$1,500				
	Furnish and install one hosebib per 75 residents									5	EA	$300.00	$1,500				
	Furnish and install utility sinks with signage to drains									5	EA	$1,500.00	$7,500				
	4" sanitary and vent piping for drainage									100	FT	$150.00	$15,000				
	Architectural hosebib cabinets and signage									5	EA	$500.00	$2,500				
	Demolition of existing conditions									1	ALW	$15,000.00	$15,000				
	Core drilling - 2" each supply and drain									4	EA	$1,000.00	$4,000				
	System draindown									1	ALW	$1,500.00	$1,500				
	Connection to existing cold water supply									1	ALW	$2,500.00	$2,500				
	2" ball valve at tee connection									1	ALW	$1,000.00	$1,000				
													$0				
	SUBTOTAL DIRECT WORK												**$61,000**				
	Contingency											10%	$6,100				
	SUBTOTAL												**$67,100**				
	GC Mark-ups											20%	$13,420				
	TOTAL				**N/A**				**N/A**	**231,000**	**GSF**	**$0.35**	**$80,520**				**N/A**