

MAZZETTI

NPC 5 Water Rationing Report

By: Chelsea Quigley

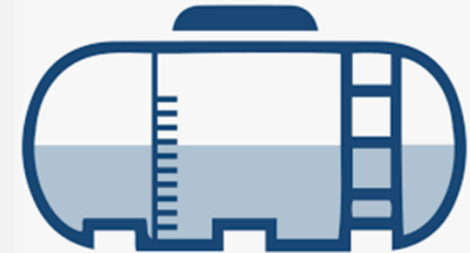


AGENDA

- What is NPC 5?
- Why is it Important?
- Water Tank Size Requirements
- Fixture Water Uses
- Specialty Area Water Uses
- Tank Information & Location
- Waste Tank Sizing

What We Will Not Cover

- NPC 4 & Below Requirements
- Emergency Generators & Fuel Oil Tanks
- Fire Water Requirements



What is NPC 5?

HCAI – Department of Health Care Access & Information
OSHPD - Office of Statewide Health Planning and Development
CDPH – California Department of Public Health

HCAI/OSHPD/CDPH Code Requirement

Applies to All General Acute Care Hospital Buildings in California
By 2030 all General Acute Care Buildings are required to meet NPC-5

SPC = Structural Performance Category

The probable seismic performance of building structural systems

NPC = Non-Structural Performance Category

The probable seismic performance of building contents, equipment, and systems critical to patient care

NPC Ratings are Cumulative

A building meeting NPC 5 would also meet NPC 1, 2, 3, 4D, or 4

NPC-5

The building meets the criteria for NPC “4” and onsite supplies of water and holding tanks for sewage and liquid waste, sufficient to support 72 hours of emergency operations, are integrated into the building plumbing systems in accordance with the California Plumbing Code. An onsite emergency system as defined in the California Electrical Code is incorporated into the building electrical system for critical care areas. Additionally, the system shall provide for radiological service and an onsite fuel supply for 72 hours of acute care operation.

Why Is It Important?

Hospitals in Austin are running out of water, forcing some to transfer patients

St. David's South Austin Medical Center said a series of problems began after it lost water pressure from the city Wednesday. Seton hospitals in the area are also facing water problems.

BY ASHLEY LOPEZ, [KUT NEWS](#) FEB. 17, 2021 10 PM CENTRAL

HCA's Mission Hospital in North Carolina still without running water days after Hurricane Helene hits

Mission Hospital's emergency department is at double capacity as supply shortages create processing delays, nurses told Healthcare Dive.

Published Oct. 2, 2024

By [Susanna Vogel](#)
Staff Reporter

Florida hospital without running water faces a sanitation crisis in the wake of Hurricane Ian

"Without the water, we can't flush the toilets, we can't wash our hands," one hospital worker told NBC News.

Sept. 30, 2022, 7:14 PM PDT

By [Deon J. Hampton](#), [Kalhan Rosenblatt](#), [Aria Bendix](#) and [Corky Siemaszko](#)

Tampa Bay Times, St. Petersburg, Fla.

No water, then no power. How one St. Petersburg hospital survived Milton.

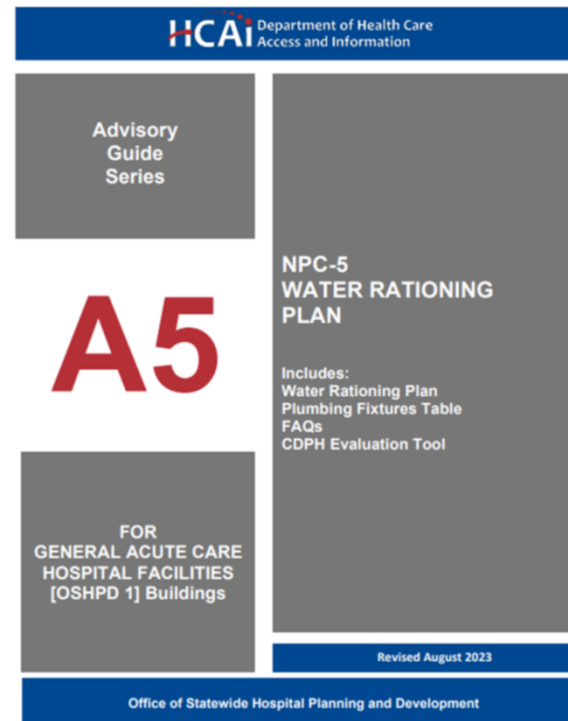
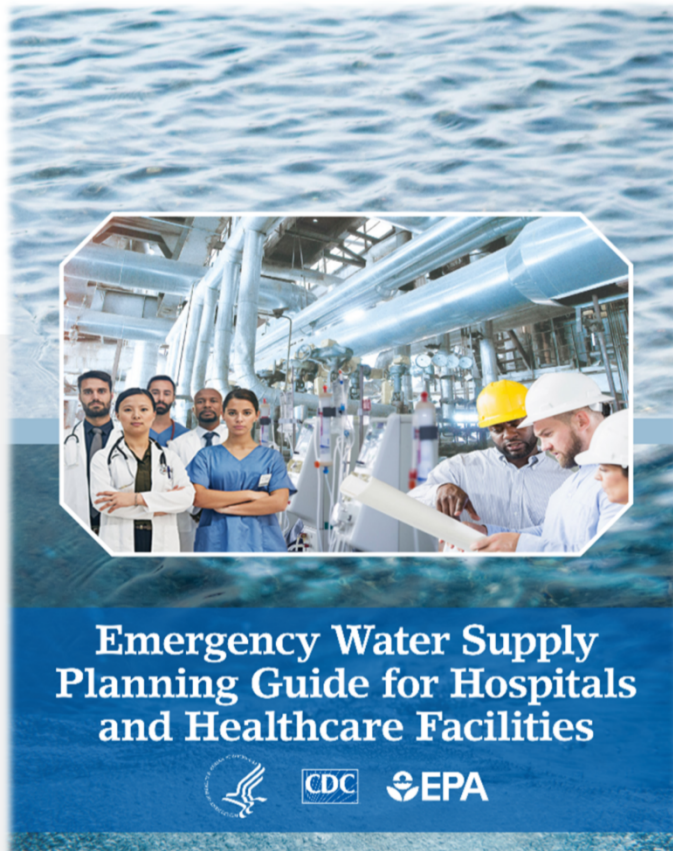
[Christopher O'Donnell](#), Tampa Bay Times

Updated Tue, October 22, 2024 at 8:11 AM PDT · 5 min read



Resources

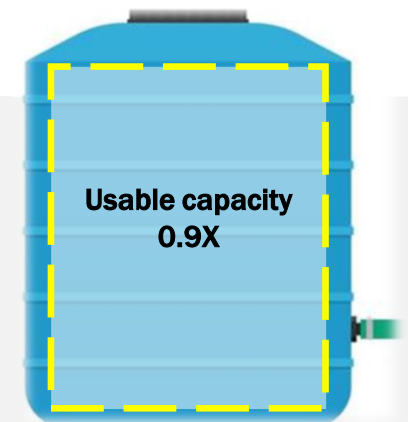
AWWA – American Water Works Association
CDC – Center for Disease Control and Prevention
EPA – Environmental Protection Agency



Water Tank Size Requirements

- Minimum of 50 gallons / bed / day
- Proof that tanks will support the facility for 72 hours of use
 - Can ration to meet 72-hour requirement
- Account for useable space of the tank
- Different strategies for different facility scenarios
 - Existing facility, tanks not yet installed
 - Existing facility, tanks already installed
 - New building

	Water Interruption time-period		
	0-24 hours	24-48 hours ³	48-72 hours ³
Code minimum for 75 beds – 11,250 gallons for 3 days ⁶			
Existing average water usage ¹	200,000	200,000	200,000
Water Rationing Plan water requirement - 60,000 gallons for 3 days.			
Existing water storage capacity	10,000 ⁵		
Additional proposed water storage capacity	10,000 ⁵		
Water replenishment/tanker truck arrangements		20,000 ⁵	20,000 ⁵
Water Rationing Plan wastewater requirement - 45,000 gallons for 3 days			
Existing wastewater storage capacity	NA	NA	NA
Additional proposed wastewater holding tanks	15,000 ^{2,5}		
Wastewater removal tanker truck arrangements		15,000 ⁵	15,000 ⁵
Service(s) affected under water rationing plan include _____	⁴		



TANK SIZE X Gallons

Water Tank Replenishment

- Tanker Trucks – 4000 gallons
- No more than once every 2 hours
- 36 trucks maximum over 3-day period
- 144,000 gallons total available
- Access considerations
- Must provide contracted company information
 - Have a valid contract
 - Proof of water quality



Existing Facility, No Tanks

- Collect water meter data
- Divide daily usage by # of beds
- Confirm minimum requirement is met
- Build tanks large enough to support 72-hours of typical use

Example:

Existing 200 bed facility

Minimum Req 30,000 gallons

Annual water use = 21,172,190 gallons

CUP meter is separate

Average daily use = 58,000 gallons

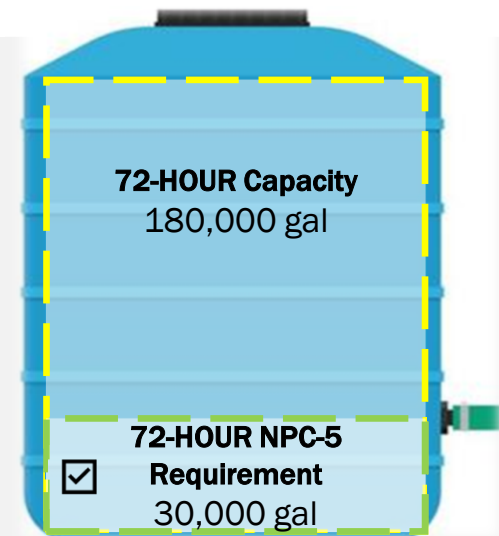
274 gallons / bed / day

72-hour Use = 174,000-gallon storage required

180,000 > 174,000 ✓

Water Usage under Normal Operating Conditions

For New Buildings in Design	Gallons per Day
Anticipated normal water usage (extrapolating from other similar existing buildings is acceptable.)	
For Existing Buildings	
Wintertime minimum normal water usage	
Summertime maximum normal water usage	



TANK SIZE 200,000 Gallons

Existing Facility, Tanks Installed

- Collect water meter data
- Divide daily usage by # of beds
- Compare to existing tank sizing
- Prepare rationing plan to account for use gap

Example:

Existing 200 bed facility

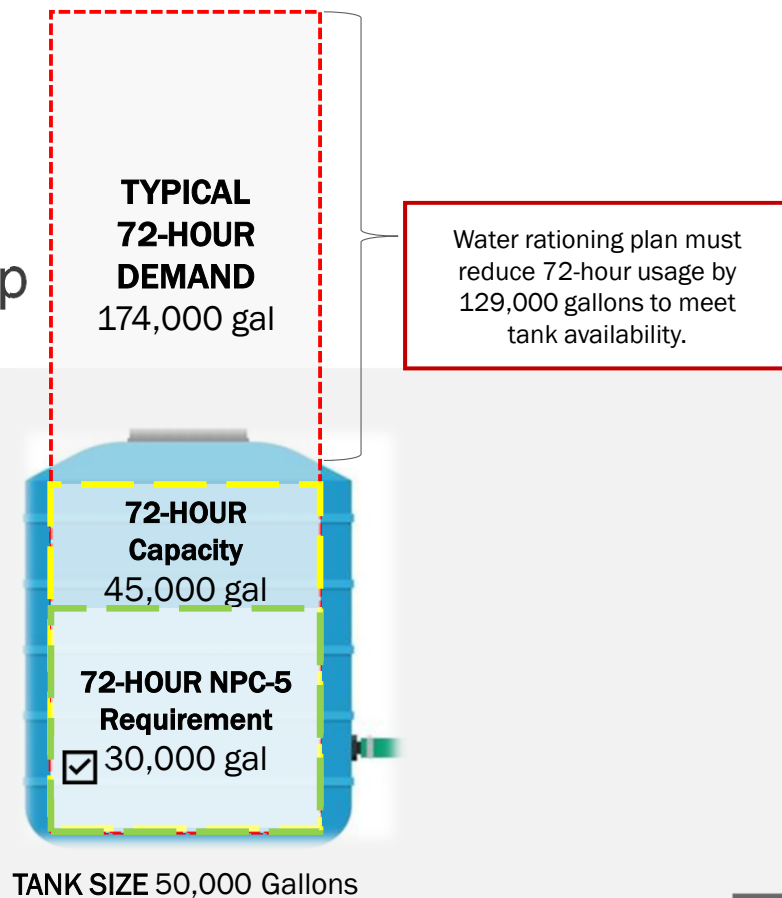
Existing 50,000-gallon tank – 45,000-gallon usable

Annual water use = 21,172,190 gallons

Average daily use = 58,000 gallons

72-hour Use = 174,000-gallon

Rationing plan needs to account for 43,000 gallons of savings per day



New Building, No Tanks

- Project water use
 - Fixtures
 - Specialty Use Areas

Example:

New 200 bed facility

Minimum Req 30,000 gallons

Project Fixture Use - ?

SPD - ?

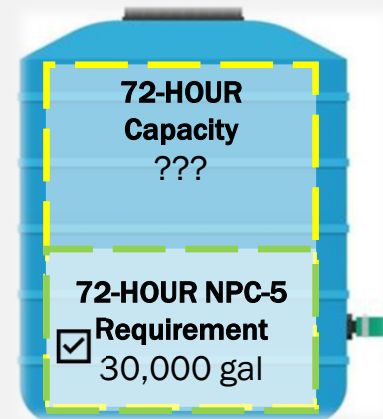
Clinical Labs - ?

Surgery - ?

Dialysis - ?

Kitchen - ?

Pharmacy - ?



TANK SIZE ??? Gallons

Plumbing Fixtures

- HCAI Advisory Guide Example calculates by quantity of each fixture type
- An alternate (and potentially easier) method is to calculate per **person/department**
- Both methods are acceptable
- Show your work!

APPENDIX B

**[OSHPD 1]
General Acute Care Hospital (GACH)
PLUMBING FIXTURES TABLE**

Plumbing Fixture Calculation							
Fixture Type	Quantity	Water Use		Duration	Use per Day ¹	Daily Total	72 Hour Total
Water Closet	(#)	1.28	flush	n/a	(#)	(#)	(#)
Urinal	(#)	(#)	flush	n/a	(#)	(#)	(#)
Handwash	(#)	(#)	minute	20 sec	(#)	(#)	(#)
Lavatory	(#)	(#)	minute	20 sec	(#)	(#)	(#)
Scrub Sink	(#)	(#)	minute	2 min	(#)	(#)	(#)
Process Sink	(#)	(#)	minute	tbd	(#)	(#)	(#)
Shower	(#)	1.5	minute	5 min	(#)	(#)	(#)
Clinical Sink	(#)	6.5	flush	n/a	(#)	(#)	(#)
Mop Sink	(#)	(#)	minute	tbd	(#)	(#)	(#)
Drinking Fountain	(#)	.25	minute	(30 sec)	(#)	(#)	(#)
Other							

Footnote 1: Use per Day factored on occupant load in building.

People & Dept Count

- Work with Owner to determine Staff & Department Counts
- Only include OSHPD 1 Buildings
- Patient Count based on licensed beds – ask about typical occupancy
- Visitor Counts assumptions required
- Different Assumptions for NPC 5 Scenarios?

Staff Count	
Total Staff	12,000
Non-Acute Care Buildings	3,000
Subtotal	9,000
Max on duty 50%	4500
Staff not scheduled 33%	1485
Max Staff at peak time	3015
Department Count	20

Patient & Visitor Count	
Licensed Beds	200
Typical Occupancy	200
NPC 5 Occupancy	200
Visitors	400
NPC 5 Visitors	40

Plumbing Fixtures Continued

WATER USE FACTOR TABLE

	TOILET USE	HANDWASHING	SHOWER	DRINKING
WATER FACTOR PER USE (GALLONS)	1.28	0.25	15	0.1
USES PER 24 HOURS STAFF	6	16	0.1	10
USES PER 24 HOURS PATIENT	6	8	0.5	10
USES PER 24 HOUR VISITOR	2	4	0	2
USES PER 24 HOURS RATIONED	0.6	8	0	0
WATER USE/ 24 HOURS (GALLONS) STAFF	7.68	4	1.5	1
WATER USE/ 24 HOURS (GALLONS) PATIENT	7.68	2	7.5	1
WATER USE/ 24 HOURS (GALLONS) RATIONED	0.768	2	0	0

BASELINE FIXTURE WATER USES TABLE

	COUNT	TOILET USE	HANDWASHING	SHOWER	DRINKING
STAFF	3015	23200	12100	4500	3000
PATIENT COUNT	200	1500	400	1500	200
VISITOR COUNT	400	1000	400	0	100
SUBTOTAL		25700	15900	6000	3300
				TOTAL	47,900

RATIONED FIXTURE WATER USES TABLE

	COUNT	TOILET USE	HANDWASHING	SHOWER	DRINKING
STAFF	3015	2300	6000	N/A	N/A
PATIENT COUNT	200	200	400	N/A	N/A
VISITOR COUNT	40	0	100	N/A	N/A
SUBTOTAL		3500	6500	0	0
				TOTAL	9000

USE INFORMATION TABLE

STAFF	3015
PATIENT COUNT	200
VISITOR COUNT	400
RATIONED VISITOR COUNT	40

NOTES:

1. Handwashing based on 0.5gpm fixtures for 30 seconds
2. Showers based on 1.5gpm fixtures for 10min
3. Drinking water assumes 1 gallon per day per person
4. Highlighted cells are calculated values
5. Rationed values assume 90% WAG Bag use. Only handwashing after using the WC, before eating, & when hands are visibly soiled. No showers. And stored bottled water for 72-hours of use.

Savings of **38,900 gallons** per day from fixture reduction strategies

43,000-38,900 = **4,100 gallons** per day required to meet goal on existing tank option



Housekeeping & Ice Machines

- Consult owner to see if housekeeping can be reduced, always keep for:
 - Infectious disease patient rooms
 - Pharmacy
 - Clinical Labs
 - ORs
- Consult owner to see if ice machines can be reduced, likely want to keep for Labor & Delivery areas

WATER USE FACTOR TABLE		
	UTILITY SINK	ICE MACHINE
WATER FACTOR PER USE (GALLONS)	20	50
USES PER 24 HOURS STAFF	6	1
USES PER 24 HOURS RATIONED	3	0.5
WATER USE/ 24 HOURS (GALLONS) STAFF	120	50
WATER USE/ 24 HOURS (GALLONS) RATIONED	60	25

BASELINE WATER USE TABLE			
	COUNT	UTILITY SINK	ICE MACHINE
DEPARTMENT COUNT	20	2400	1000
		TOTAL	3400

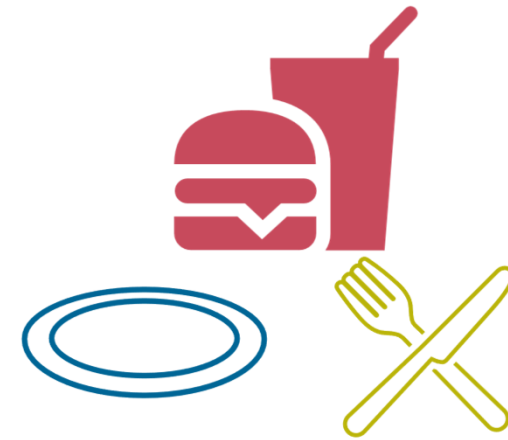
RATIONED WATER USE TABLE			
	COUNT	UTILITY SINK	ICE MACHINE
DEPARTMENT COUNT	20	1200	500
		TOTAL	1700

Savings of **1,700 gallons** per day from fixture reduction strategies

4,100 gallons – 1,700 gallons = **2,400-gallon** per day required to meet goal on existing tank option

Kitchen

- Ideally meter data if available
- Can calculate based on equipment use schedule
- On-site preserved food options
- Disposable plates & utensils



Unit	Gallons Per Cycle	Average # of Cycles/hours Daily	Average Gallons of Water Consumed Daily	Rationed
Hobart CL64-DWR+BUILDUP Conveyor Dishwasher (2) Tank Drain	0.33	250	83	0
Hobart CL64-DWR+BUILDUP Conveyor Dishwasher (2) Tank Drain	0.33	195	64	0
Hobart Dish LXeH Formula	0.72	30	22	22
Hobart Dish LXeH Human Milk	0.72	20	14	14
Cleveland Steamer Harvest Café X2	0.97	14 hrs. *2	27	27
Cleveland Steamer Dietary X 2	0.97	16 hrs. *2	31	31
Total			240	90

Savings of **150 gallons** per day from cafe reduction strategies

2,400 gallons – 150 gallons = **2,250-gallon** per day required to meet goal on existing tank option

Irrigation



- Ideally meter data if available
- Can calculate by flow rates if you have irrigation schedule
- Average irrigation uses of commercial landscaping in California
 - ~2.67 gallons/sq ft/month Feb-Oct
 - ~1.74 gallons/sq ft/month Nov-Jan

IRRIGATION FLOWS				
Equipment	Days of operation	Calculated Flow Gals/min	Duration	Totals (gals)
Zone A-1	1	8	15	120
Zone A-2	1	15	15	225
Zone A-3	1	23	15	345
Total calculated volume, (Gals):				690

Savings of **690 gallons** per day from cafe reduction strategies

2,250 gallons – 700 gallons = **1,560-gallon** per day required to meet goal on existing tank option

Surgery & SPD

- Will surgeries increase or decrease?
- Ideally meter data for SPD if available
- Do they keep a storage of sterilized equipment (e.g. 24-hours ahead)?
- RO/DI Reject & Regular water usage

SPD					
Instrument Washers	Cycle count per day	Gallons Hot Water	Gallons Cold Water	Gallons DI Water	Total Water Use
1	13	16	8	8	416
2	13	16	8	8	416
3	13	16	8	8	416
4	13	16	8	8	416
Cart Washers					
1	24	10	0	0	240
2	24	10	0	0	240
Sonic					
1	30	26	0	0	780
Sterilizers					
1	9	0	3	0	27
2	9	0	3	0	27
3	9	0	3	0	27
Total					3000
Rationed Total					2000

SURGERY						
QTY	Dept	Time of operation (mins)	Calculated Gals/min	Surgeries (Cases)	Washes	Totals (Gals)
3	Operating Rooms (General)	2	2.2	5	2	132
3	Operating Rooms (Specialty: Ortho, Neuro, Cardiac)	2	2.2	4	2	106
1	Operating Rooms (Trauma)	2	2.2	2	2	18
1	Cath/Hybrid	2	2.2	4	2	35
1	Shell (IR)	2	2.2	4	2	35
1	DGI/Endo	2	2.2	5	2	44
Total calculated volume, (Gals):						370

Savings of **1000 gallons** per day from cafe reduction strategies

1,560 gallons – 1000 gallons = **560-gallon** per day required to meet goal on existing tank option



Dialysis

- ~150 gallons / treatment
- Additional required for cleaning equipment between uses
- Ask owner for typical daily treatment numbers – inpatient vs. outpatient
- Continuous Renal Replacement Therapy (CRRT) can replace dialysis
 - No water use
 - Required to be continuously monitored – ICU bed needed
 - Inpatient only

Dialysis			
	Count	Gallons Used	Total Gallons
Inpatient	10	150	1500
Outpatient	5	150	750
Cleaning	15	10	150
		Total	2400
CRRT Available	5	N/A	N/A
Rationed Use	10	150	1500
Rationed Cleaning	10	10	100
		Total	1600



Savings of **800 gallons** per day from cafe reduction strategies

560 gallons – 800 gallons = **240-gallon excess**

Goal Met!

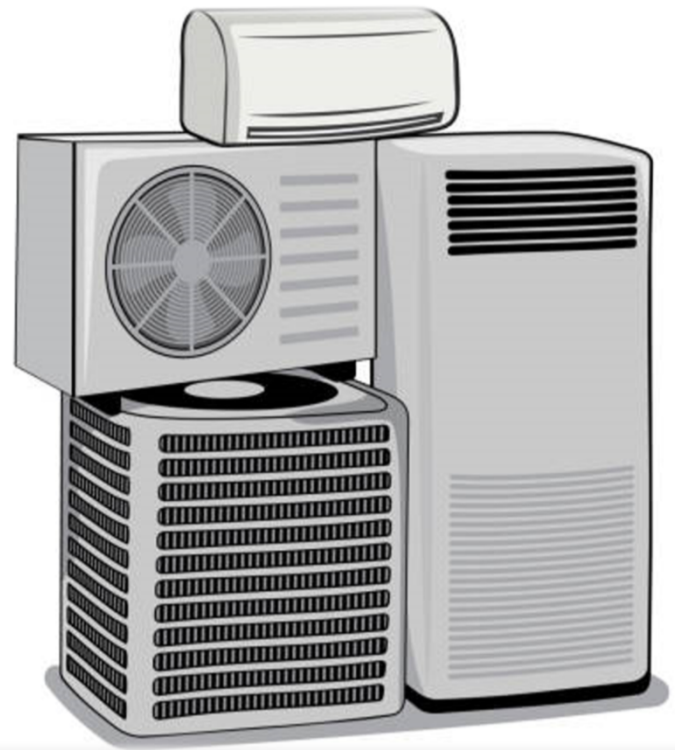
Clinical Labs & Pharmacy

- Will need owner input on typical use
- Do you expect increase/decrease in labs?
- Pharmacy has strict handwashing and cleaning requirements



Heating, Cooling & Humidification

- Talk to your mechanical engineer
- Do you have a CUP? / Is mechanical data included in meter data?
- Well water backup allowed
- Turning off cooling to non-essential spaces
- Code required – ORs, Kitchen, Patient Room Heating (not cooling)
 - If active, also confirm IT needs
- For electric buildings - Heat recovery (air source heat pumps) can be used in cooling mode to create cold water – operate like an air-cooled chiller (water free process)
- Humidification isn't a high-water use, code based so unlikely to reduce here
- Can subtract from waste tank sizing requirement
- If you will be rationing, only use rationed numbers to subtract



Waste Tank

- Water in = water out
- Except some mechanical water uses (see previous slide)
- Provide diverter valve to divert waste to tank
- Strategy for post NPC-5 scenario
 - Pump out waste only
 - Reconnect to exist city main
 - Coordinate with Civil

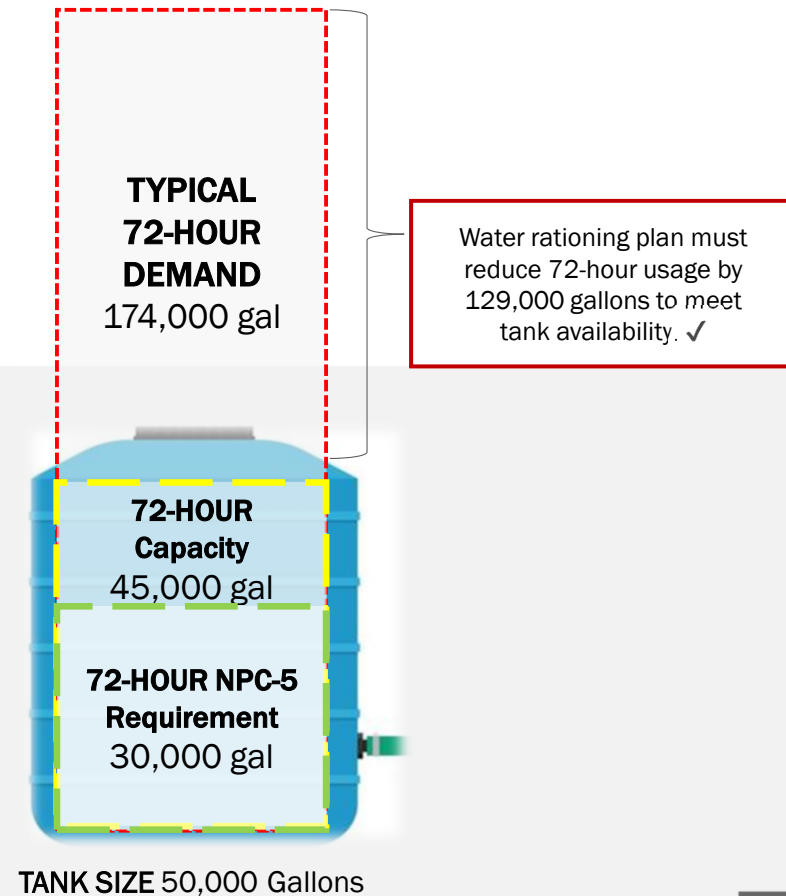


Totals

Baseline	
Plumbing Fixtures	47,900
Housekeeping	2,400
Ice Machines	1,000
Kitchen	240
Irrigation	690
SPD	3,000
Surgery	370
Dialysis	2,400
Daily Use	58,000
72-hour Use	174,000

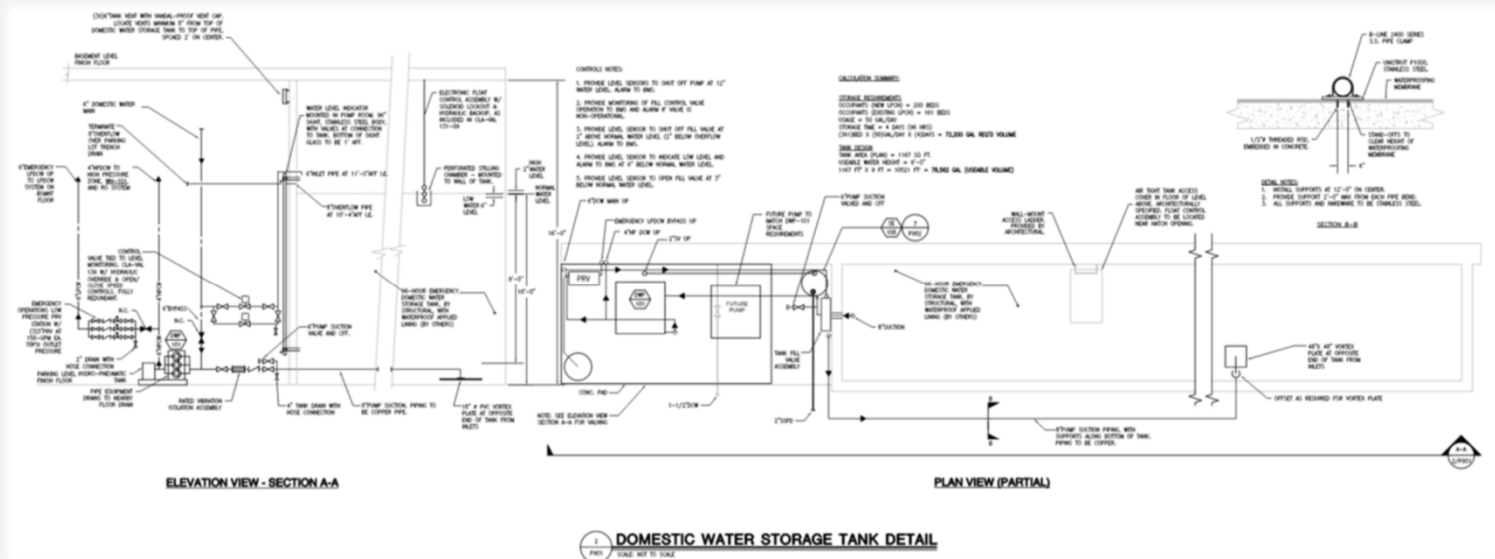
Rationed	
Plumbing Fixtures	9,000
Housekeeping	1,200
Ice Machines	500
Kitchen	90
Irrigation	-
SPD	2,000
Surgery	370
Dialysis	1,600
Daily Use	14,760
72-hour Use	44,280

- Confirm against meter data – do total uses match
- Rationed value meets tank capacity ✓



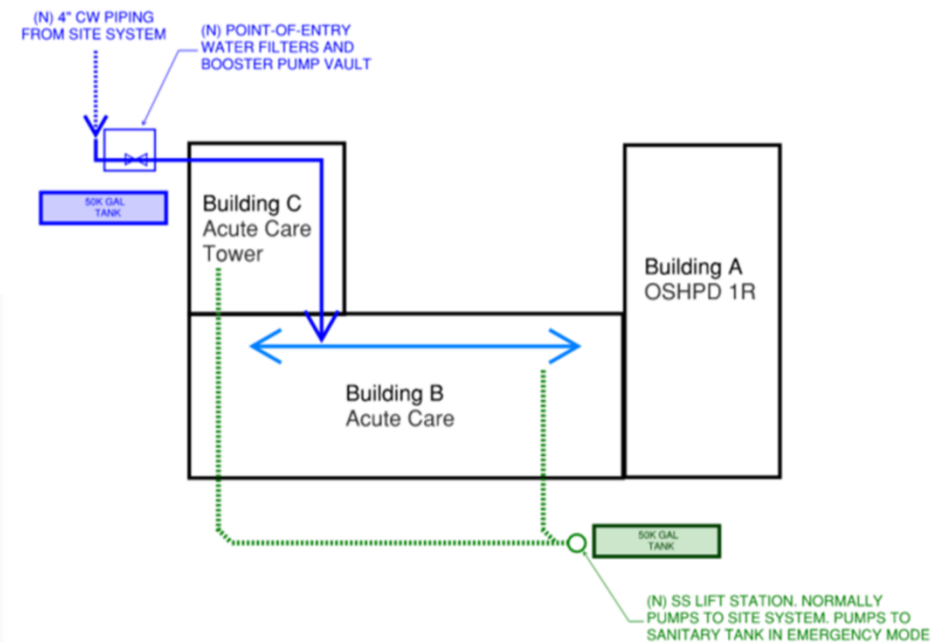
Tank Information

- Pre-cast
- Cast in place
- Location Considerations
 - Pass-through



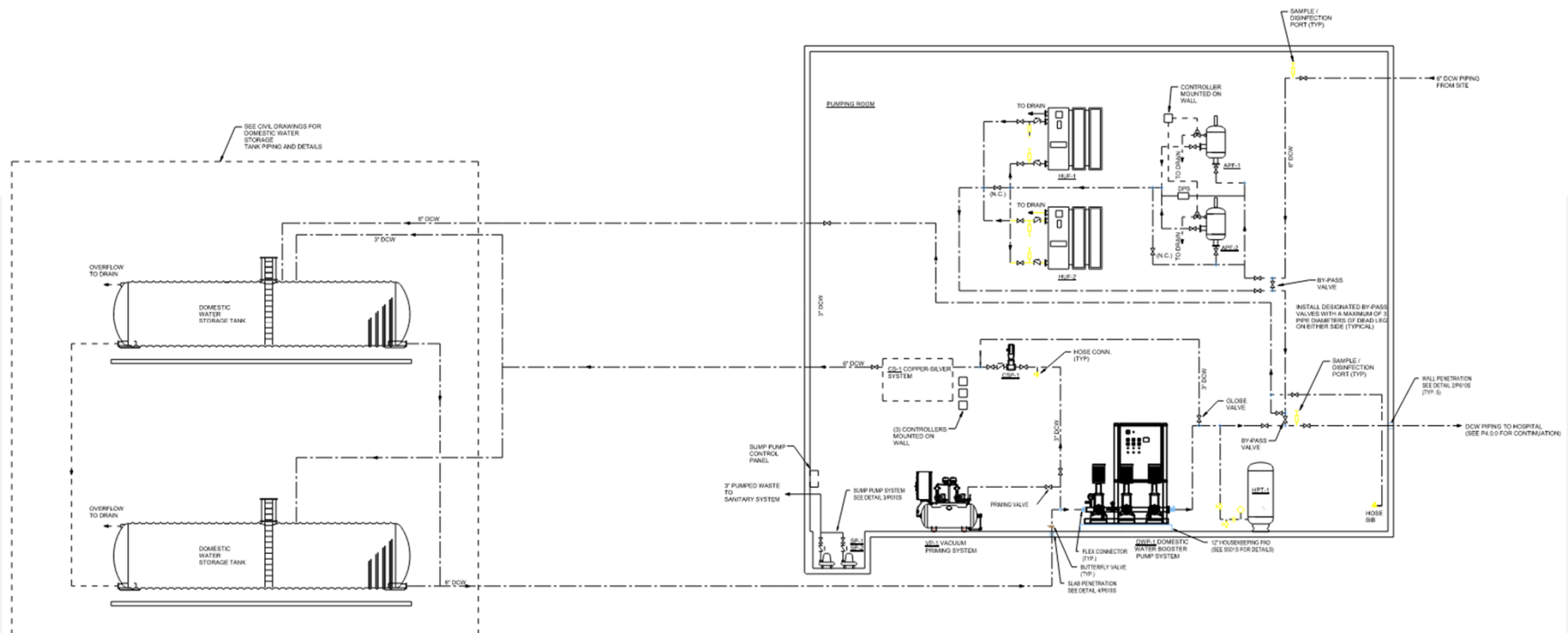
Facility Map

- Show valve locations
- How does system change in NPC 5 situation
- Can't serve a higher rated building from a lower rated building (NPC 5 can feed lower but not vice versa)



System Diagram

- POE Filtration
- Low/lost water sensors



MAZZETTI

Questions?

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