



MSKCC

74th Street Ambulatory Care Center Flood Mitigation Strategies



Perkins Eastman | **ennead**

April 15, 2013

Flood Protection

Basis of Design – Prevent water from entering building

Assumptions

- DFE is 500 yr flood elevation = 13.35 FT
- Flood protection is at property line (not at lobby façade)
- Manually operated motorized barriers where building wall cannot be designed as barrier or grade cannot be adjusted

Programatic Strategy

- All Clinical Programs above DFE including Radiology

Structural Strategy

- “Bathtub” construction for foundation walls/pressure slab
- 4’ of water can be supported on LL2

Infrastructure Strategy

- Elevate all critical building infrastructure above the DFE



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Base Flood Elevation - Changes

	FIRM (pre- Sandy)	ABFE (2013)
BFE	8.25'	11.35'
DFE	10.25'	13.35'
MSK Ground Floor Elev.	11.00'	11.50'

- Ground Floor has been raised as high as possible without compromising drop off
- Additional manually operated motorized barriers added where walls cannot be brought above DFE 13.35'
- Grades adjusted at 73rd Street to provide egress at DFE 13.35'



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Base Flood Elevation (BFE)

	<u>NAVD 88</u>	<u>MN Datum</u>	
1.0% Elevation:	13.00	11.35	← Base Flood Elevation
0.2% Elevation:	15.00	13.35	

Design Flood Elevation (DFE)

Design Flood Elevation is based on the Structural Occupancy Category (Importance)

Category III: Buildings that represent a “substantial hazard to human life in the event of failure” including:

- Health care facilities with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities
- College buildings with occupancy greater than 500

$$\text{BFE} + 1.0' = \text{DFE}$$

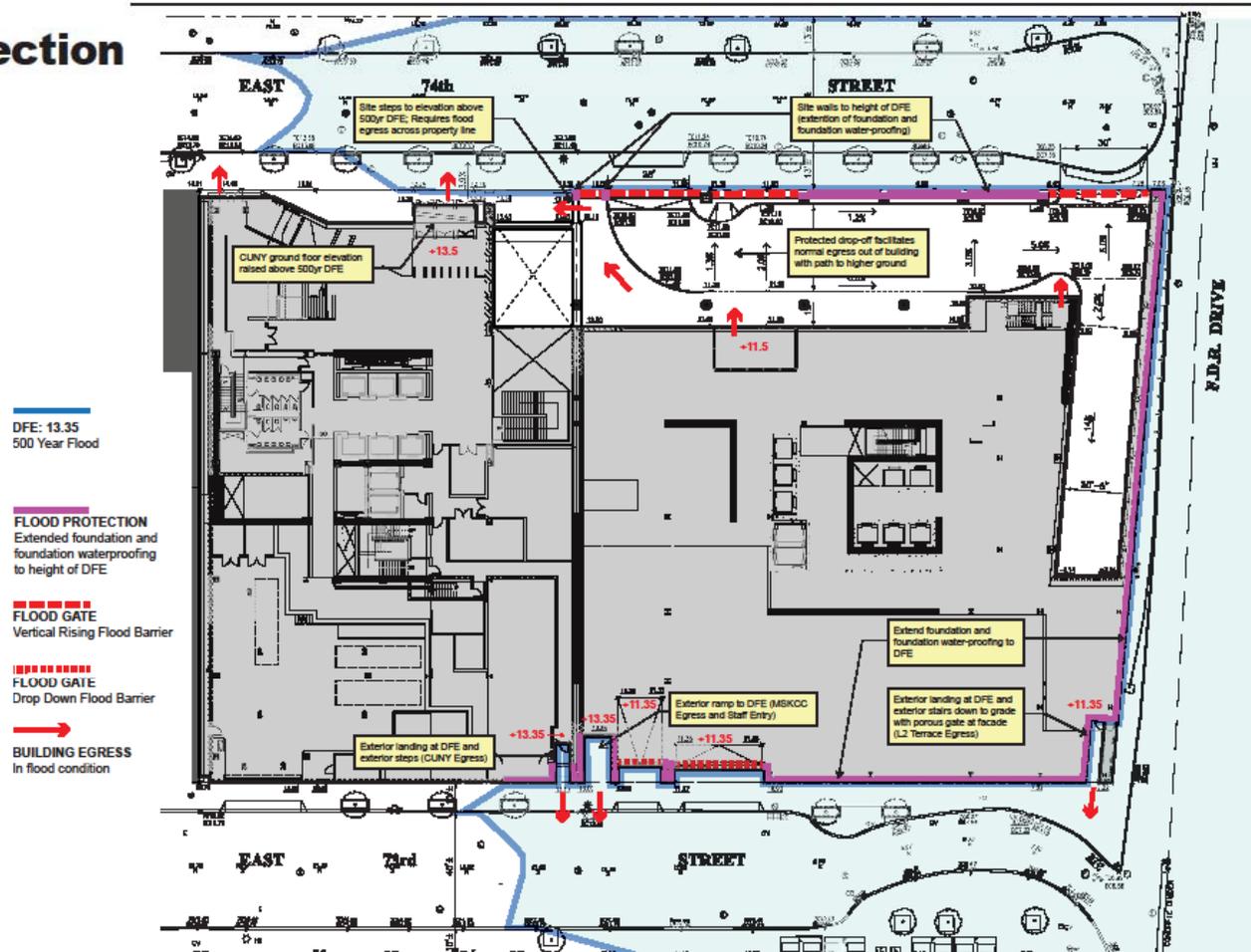
$$11.35' + 1.0' = 12.35' \text{ Code Minimum} \quad \leftarrow \text{Design Flood Elevation}$$

$$500 \text{ year Flood} = 13.35' \text{ FEMA Recommended} \quad \leftarrow \text{Recommended Design Flood Elevation}$$



Flood Protection

DFE 13.35: 500 Year



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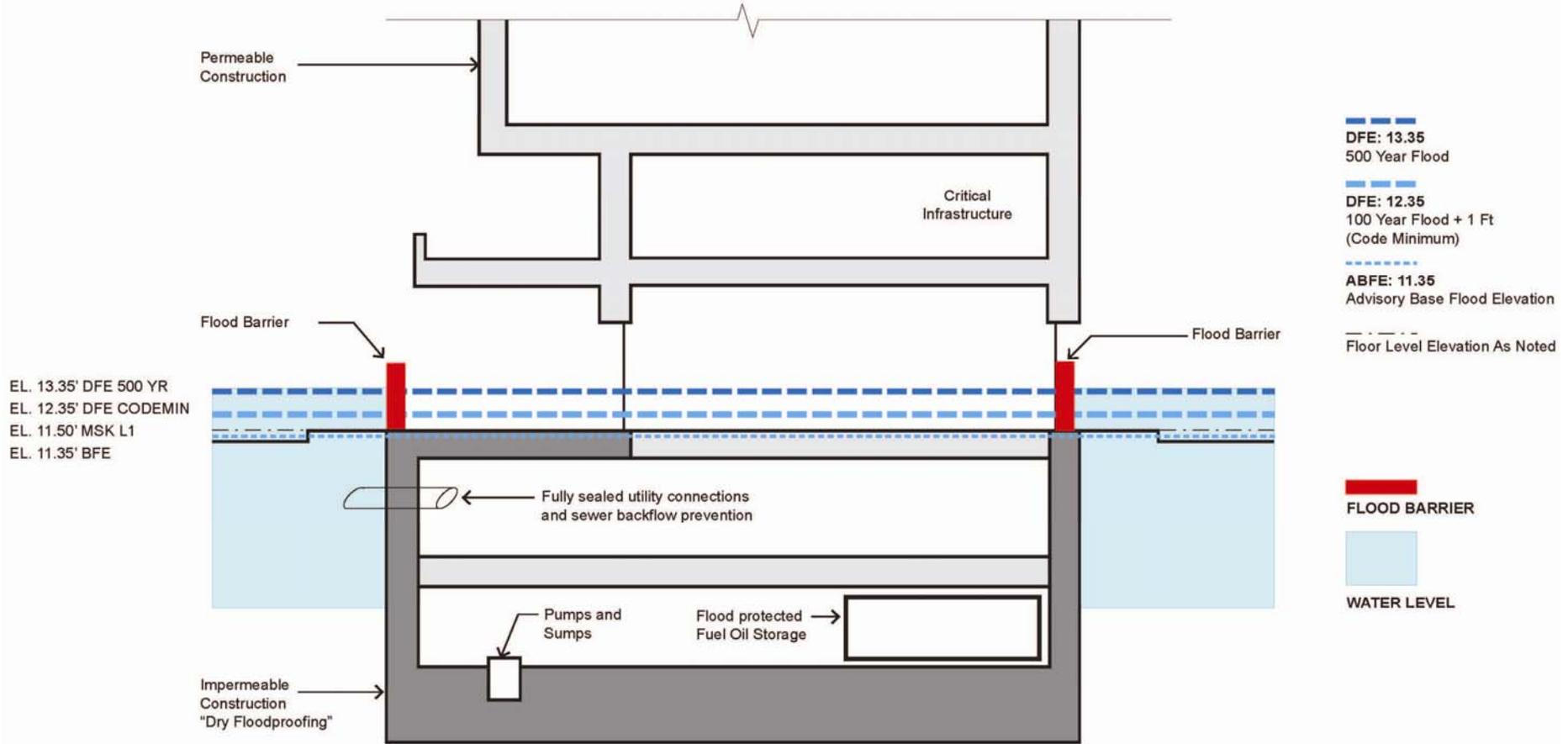
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Flood Protection

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Program Location

Lower Levels One and Two (Below DFE)

- Parking
- Environmental Services
- Storage
- Pumps and Tanks (water and fuel) which cannot be located higher up

Ground Floor (El. 11.5')

- Lobby
- Retail Pharmacy
- Grab and Go Food
- Loading Dock and Ambulance Entrances

Upper Floors (El. 36.5' and higher)

- All Clinical programs (including all Radiology and LINACs)
- All Public and Administrative Programs
- All Support and Infrastructure not listed above



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Waterproofing and Structure

Foundation

- Waterproof bathtub
- Designed to support hydrostatic loads of water to DFE

Structure

- Galvanized steel below DFE per Code
- Can support load imposed by water to 4' above LL2



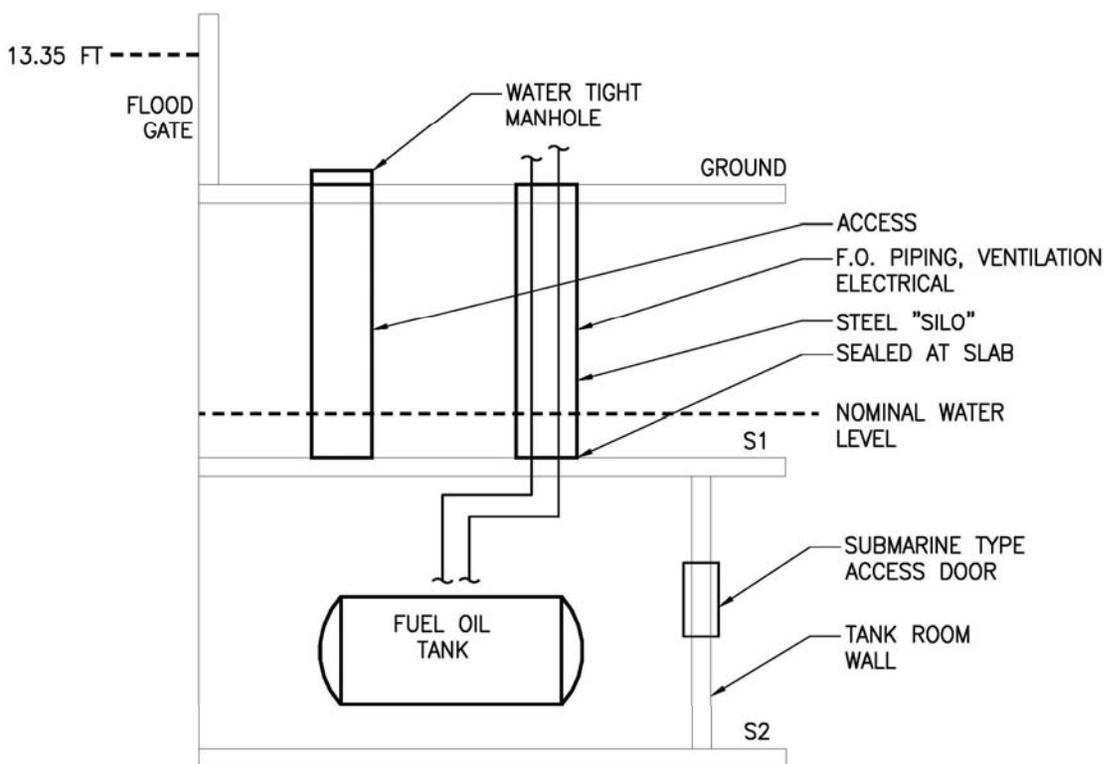
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MEP Infrastructure Flood Mitigation Strategy

Fuel Oil System



Attributes

- Fuel oil tank and fuel oil pumps located in totally enclosed waterproof fuel oil room with submarine doors.
- Fuel oil piping, ventilation, electric and access enter fuel oil room through water-tight manway accessed through loading dock.
- Tank room walls to be constructed to withstand force of standing water.



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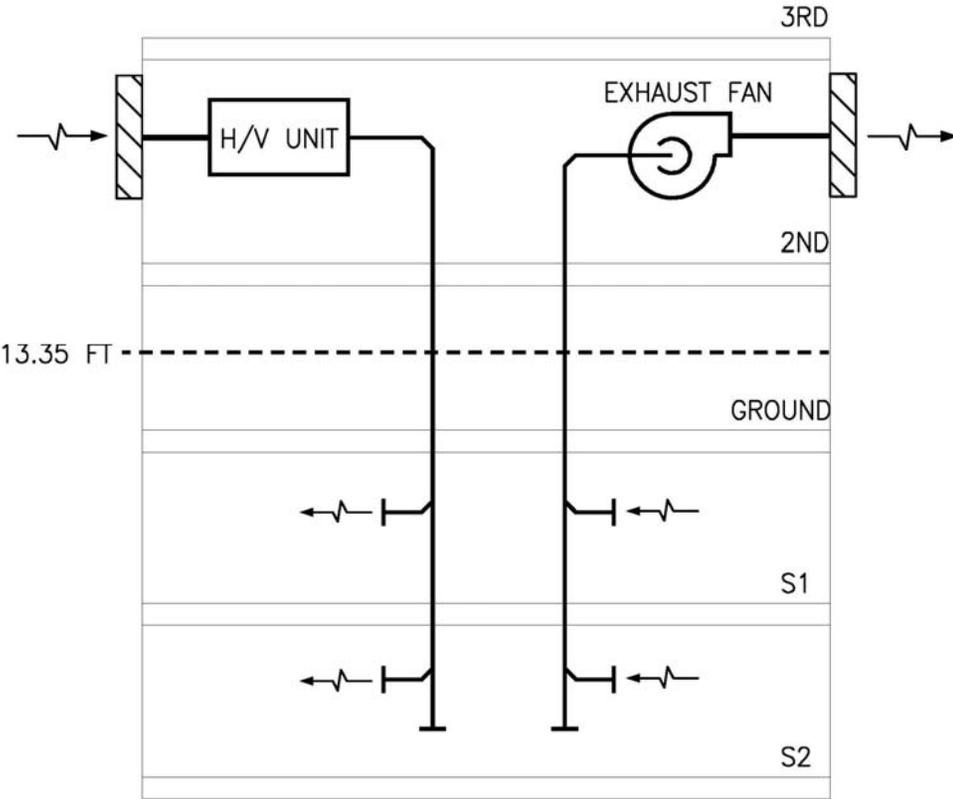


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MEP Infrastructure Flood Mitigation Strategy

Parking Garage Exhaust System



Attributes

- H/V unit and exhaust fan providing ventilation to level S1 and S2 are located in the ceiling of the ground floor above the 500 yr flood plane elevation.



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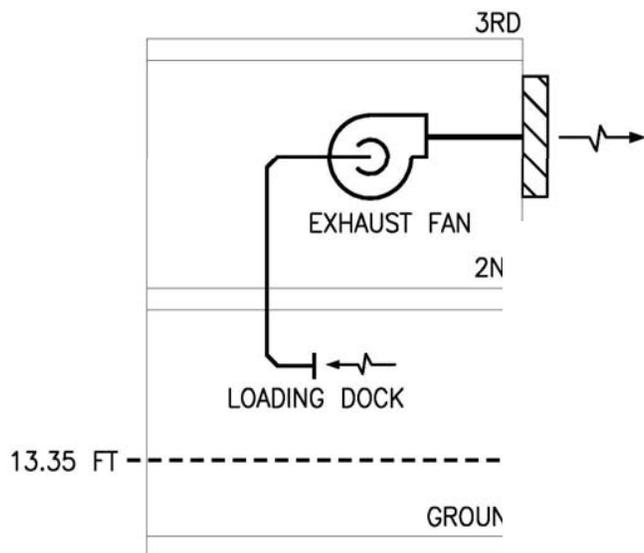
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MEP Infrastructure Flood Mitigation Strategy

Loading Dock Exhaust Systems



Attributes

- Loading dock exhaust system is located above the 500 yr flood plane elevation.



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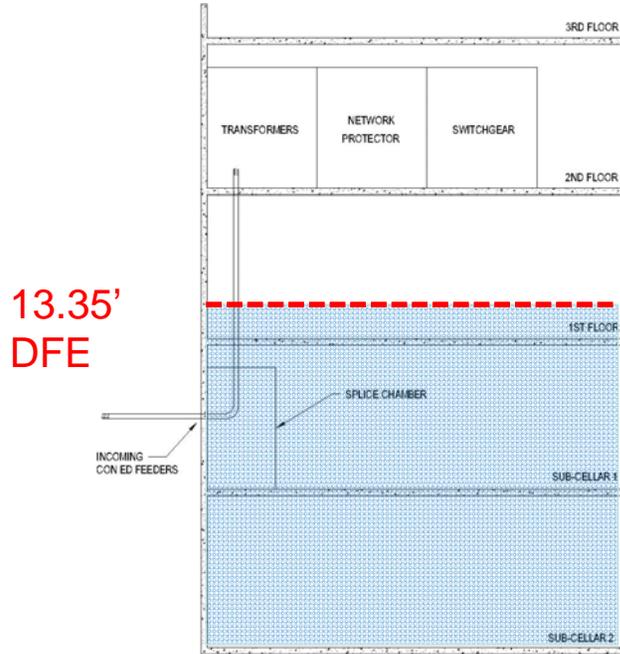
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MEP Infrastructure Flood Mitigation Strategy

Incoming Electrical Services



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Attributes

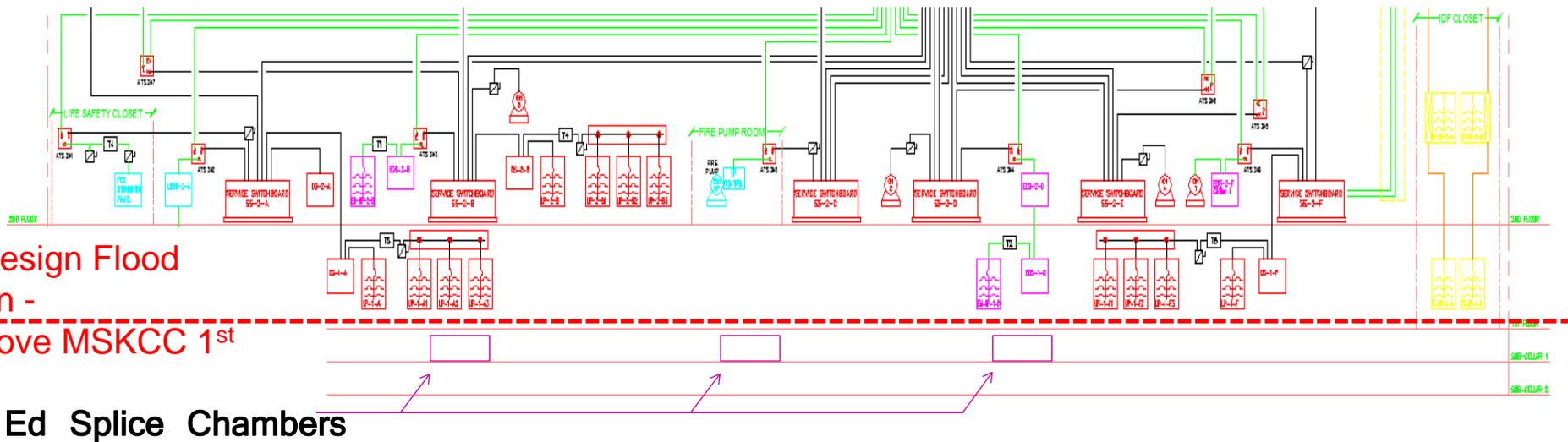
- Fully sealed electrical POE's with high voltage distribution directly up to electrical switchgear room and Con ED vaults. (MSKCC on 2nd Floor)
- Electrical closets not located on lowest level of building.



MEP Infrastructure Flood Mitigation Strategy

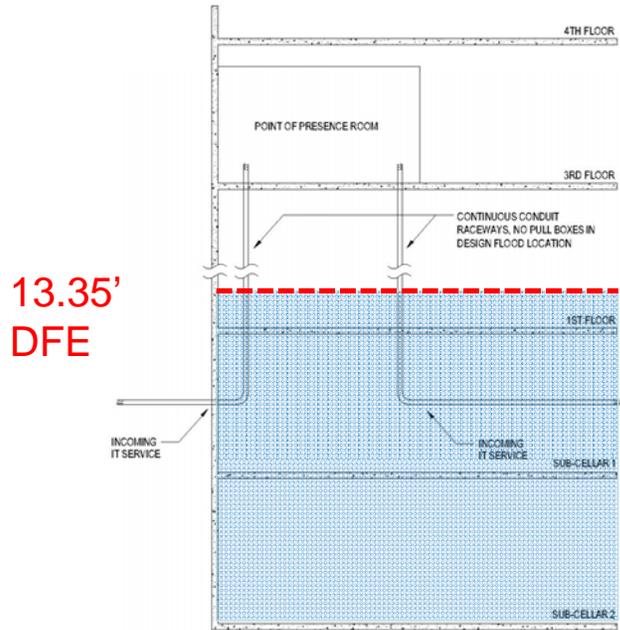
Building Electrical Distribution System

- Three (3) Con Ed Splice Chambers for incoming services
- Panel boards on 1st Floor serve parking and back of house loads on lower levels



MEP Infrastructure Flood Mitigation Strategy

Incoming IT Services



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Attributes

- There will be two (2) Telecommunication Point-of-Entry (POE) locations.
- The incoming conduits will enter the building through the foundation wall using water tight “Link-Seal” modular seals.
- Within the building the POE conduits will homerun directly to the Point-of-Presence (POP) Room on 3rd floor



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Plumbing & Fire Protection Systems

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POE's come in at level SC1 Level and come up to the 2nd floor with devices, valves, etc.

- Water and Fire Service POE's
- Gas Service POE
- Fire Pump Locations
- Domestic Pumps

POEs come in at SC1 Level and remain at this level

- Sanitary POE
- Storm POE
- Plaza Drainage



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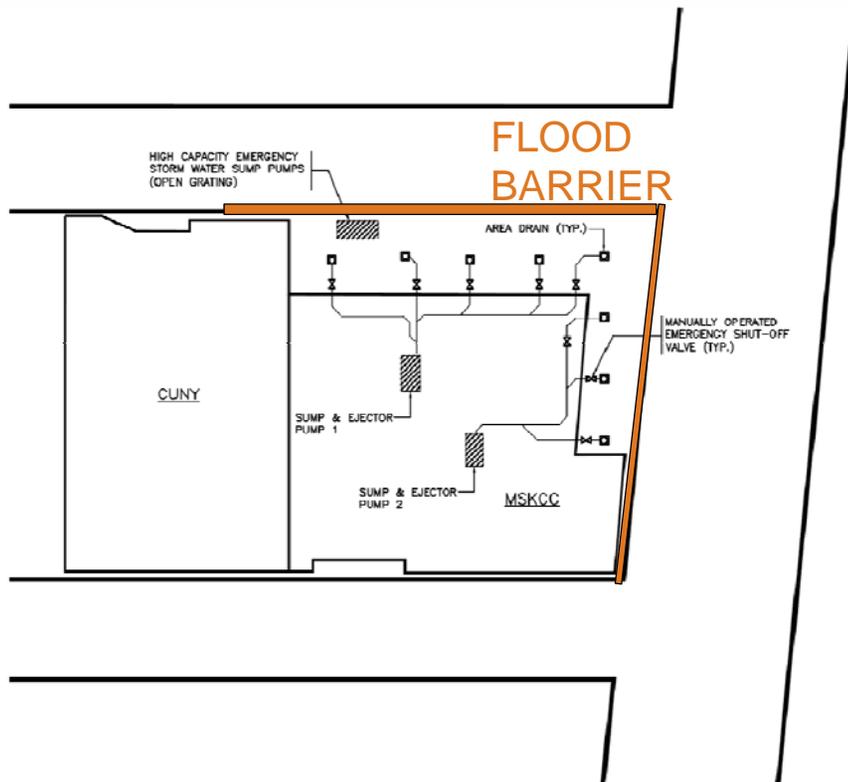
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Plumbing & Fire Protection Systems

Patient Drop-Off Area Drains



Attributes

- Provide area drains in MSKCC patient drop-off. Install a manually operated shut-off valve for each drain.
- Prior to a catastrophic event, manually close each valve to eliminate backflow into building.
- Emergency storm water sump pumps installed at SC2 level. Sized for 100 GPM to accommodate nominal amount of water infiltration.



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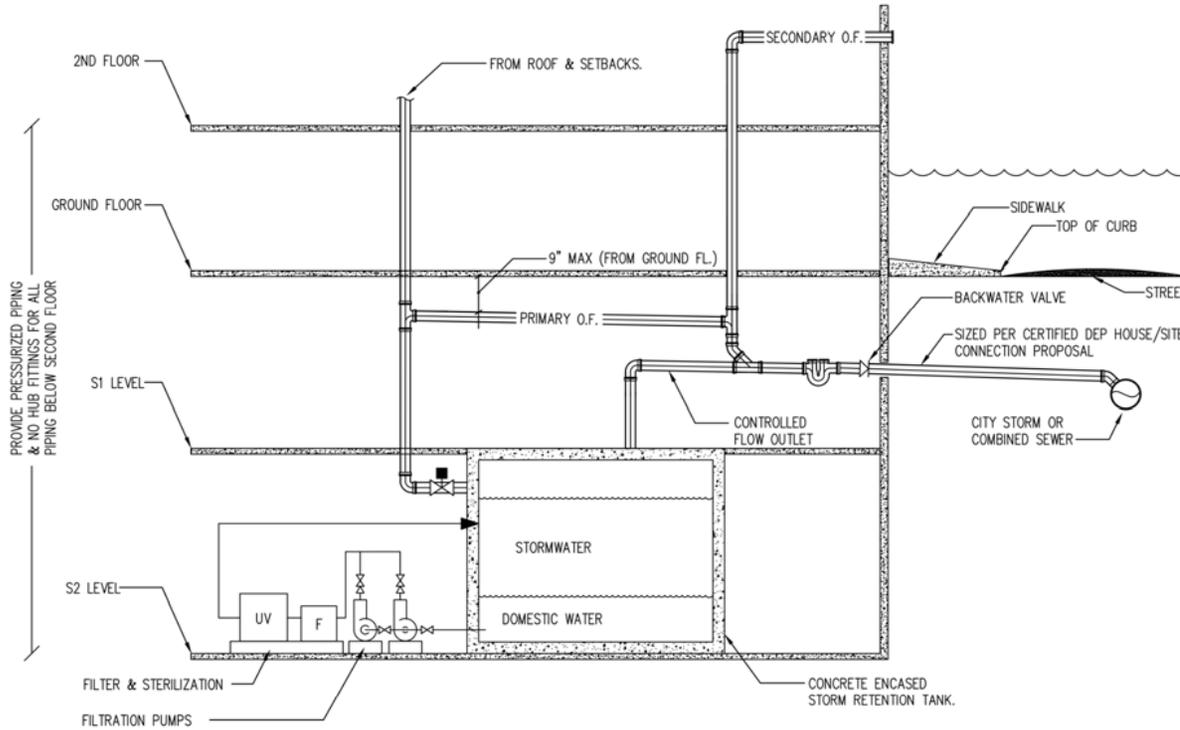
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Plumbing & Fire Protection Systems

Storm Retention Tank



Attributes

- **Pressurized piping to be installed from 2nd floor down for all storm piping to withstand maximum flood elevation static head.**
- **Storm retention tank to be fully enclosed by concrete.**
- **Install ductile iron piping for all storm & sanitary piping 2nd floor and below.**



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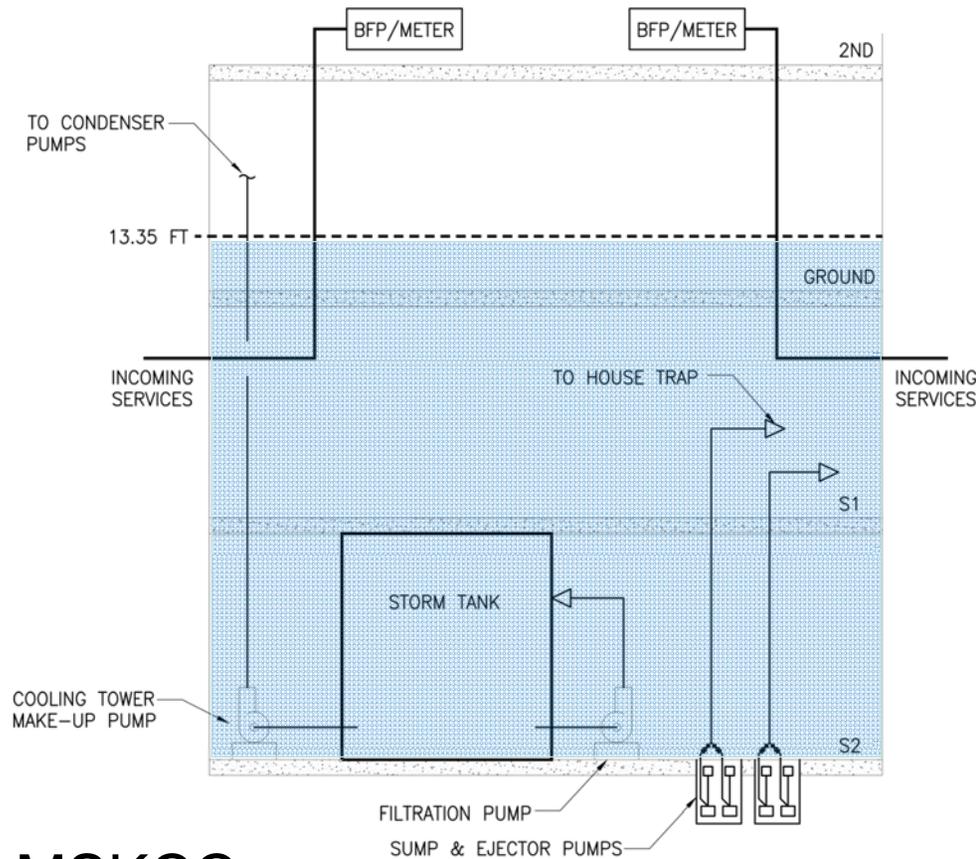
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Plumbing & Fire Protection Systems

MSKCC - Pump Locations



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SC2 LEVEL:

- Storm Water Filtration Pumps
- Cooling Tower Make-up Pump
- Sump & Ejector Pumps

2nd FLOOR:

- Domestic House Pumps
- Automatic Fire Pump & Jockey Pump
- Irrigation Pump 1

3rd FLOOR:

- Hot water heaters & circulation pumps 1 & 2

19th FLOOR:

- Hot water heaters & circulation pumps 3
- Irrigation Pump 2

23rd FLOOR:

- Domestic Booster Pump & Cooling Tower Make-up Back-up
- Hot water heaters & circulation pumps 4
- Special Service Fire Pump & Jockey Pump



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