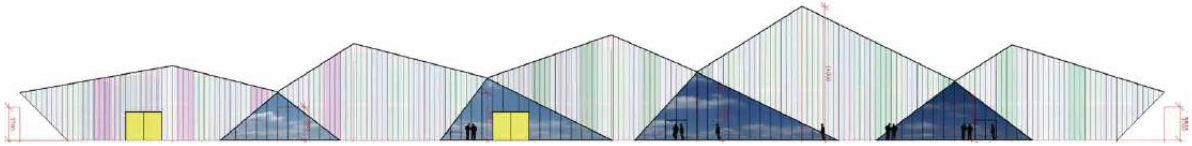
Sewage handling in Copenhagen

GreenPort Congress

October 10, 2017

www.cmport.com

LÆNGDESNIT



FACADE

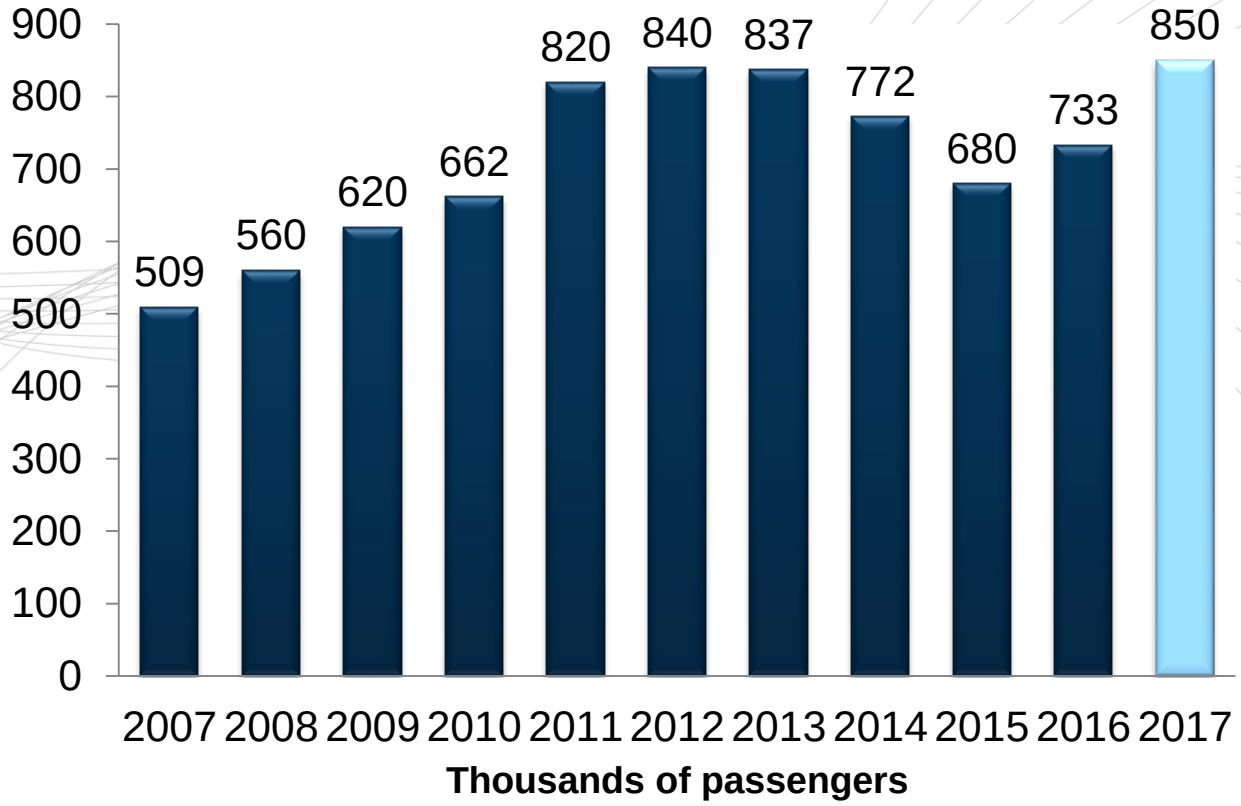
Port of Copenhagen 8-9 cruise berths

Langelinie and Nordre Toldbod

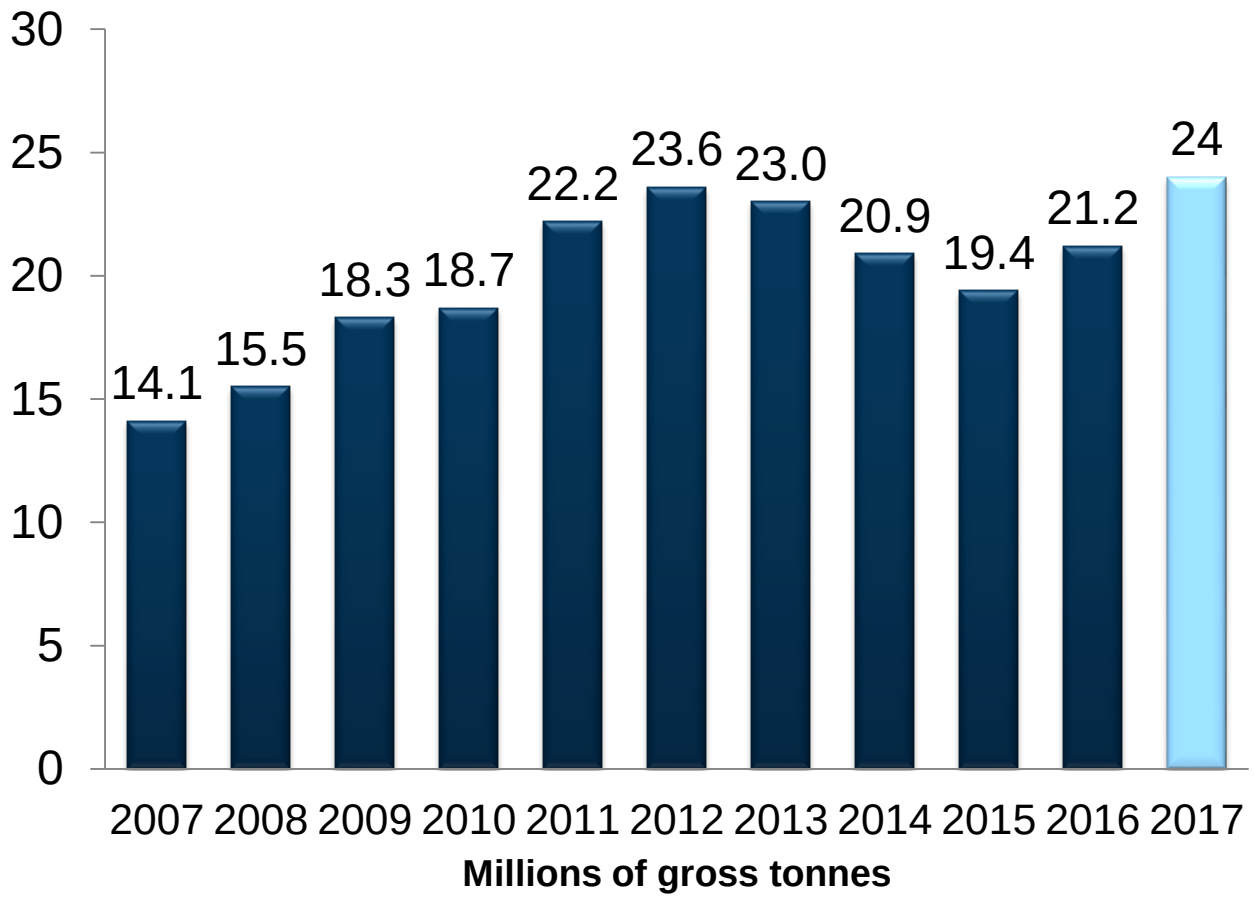
COPENHAGEN MALMÖ PORT

Oceankaj

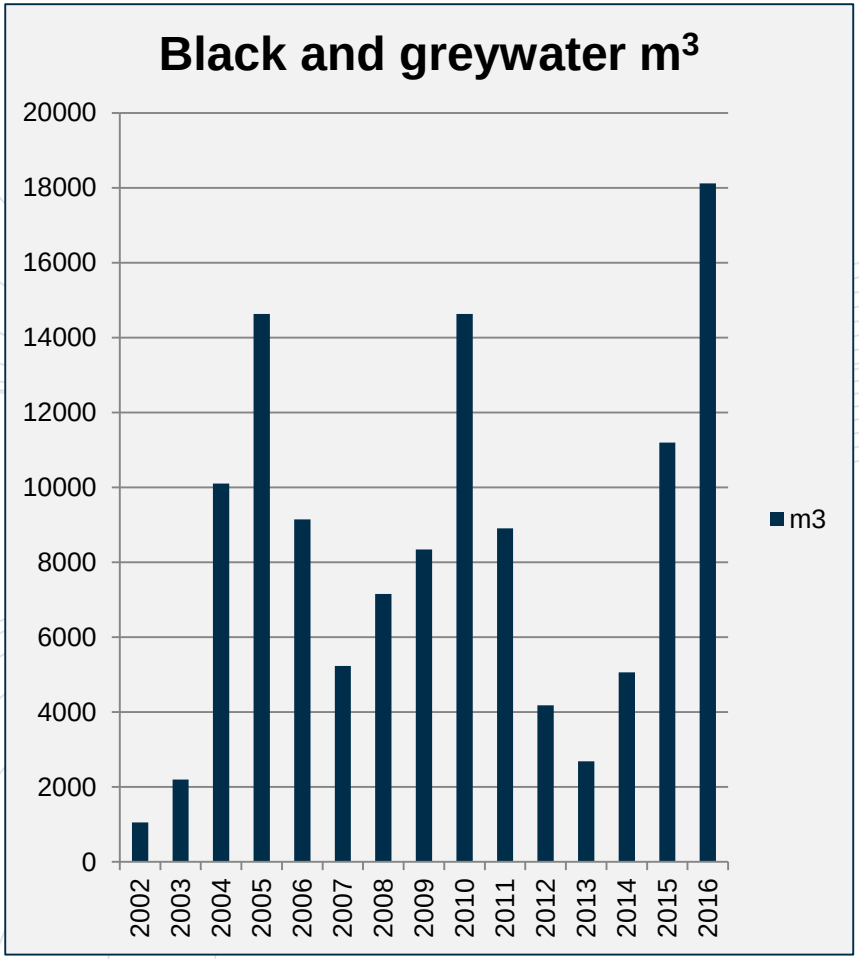
Cruise in figures



Cruise in figures



Waste Water reception in Port of Copenhagen



Year	m³ per ship	Dis-charges	Cruise calls	%
2010	378	38	308	12
2011	297	30	370	8
2012	189	22	375	6
~	~	~	~	~
2016	199	91	309	28

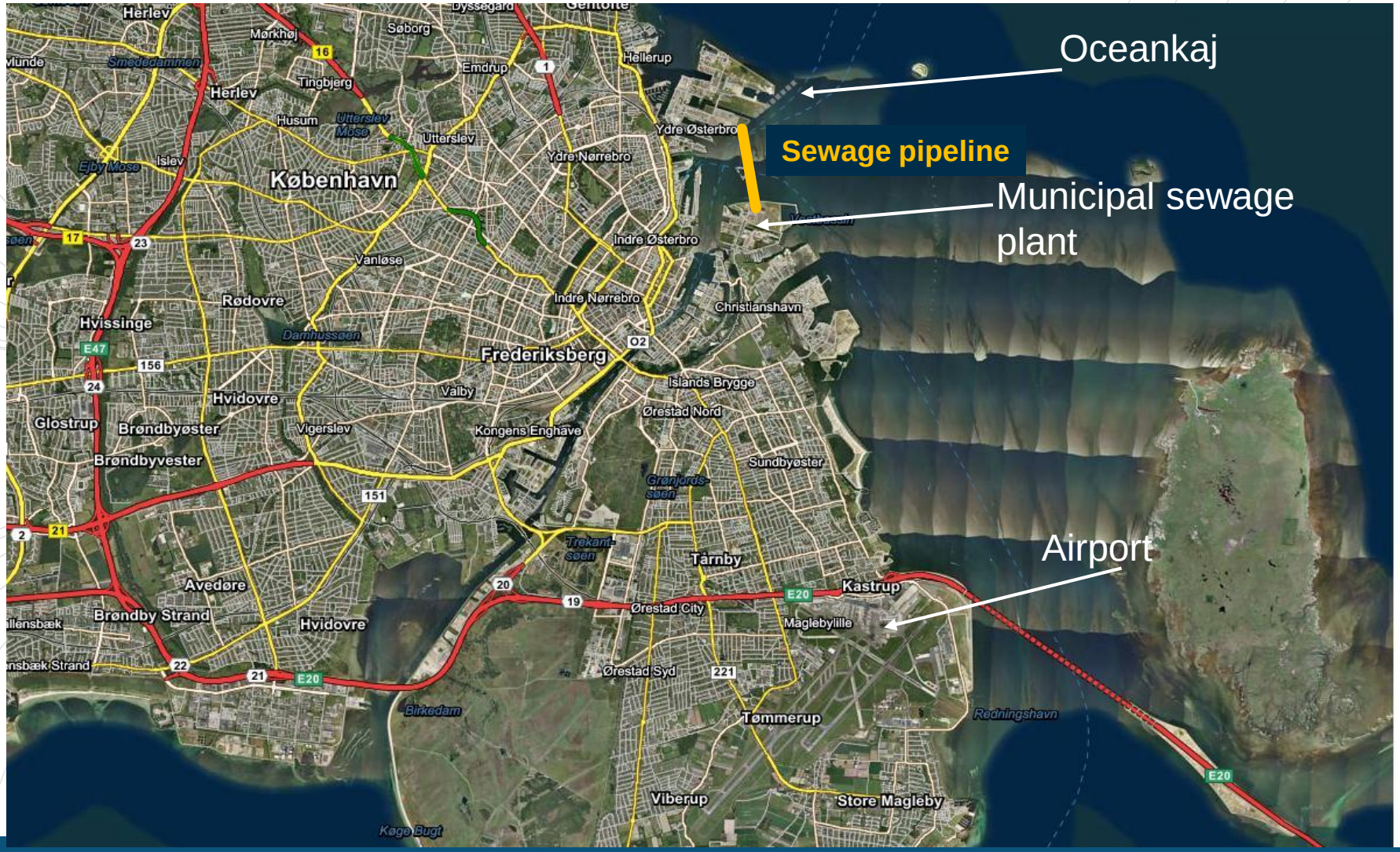
Volumes and costs is growing

Oceankaj 2014	Oceankaj 2015	Oceankaj 2016
109 cruise calls	164 cruise calls	120 cruise calls
5 discharges (1.400 m^3) Average 285 m^3	15 discharges (7.200 m^3) Average 480 m^3	48 discharges (10.742 m^3) Average 224 m^3

- **Average disposal costs (sewage) = ≈ 12-14 € per m^3**

black water is included in general ship dues

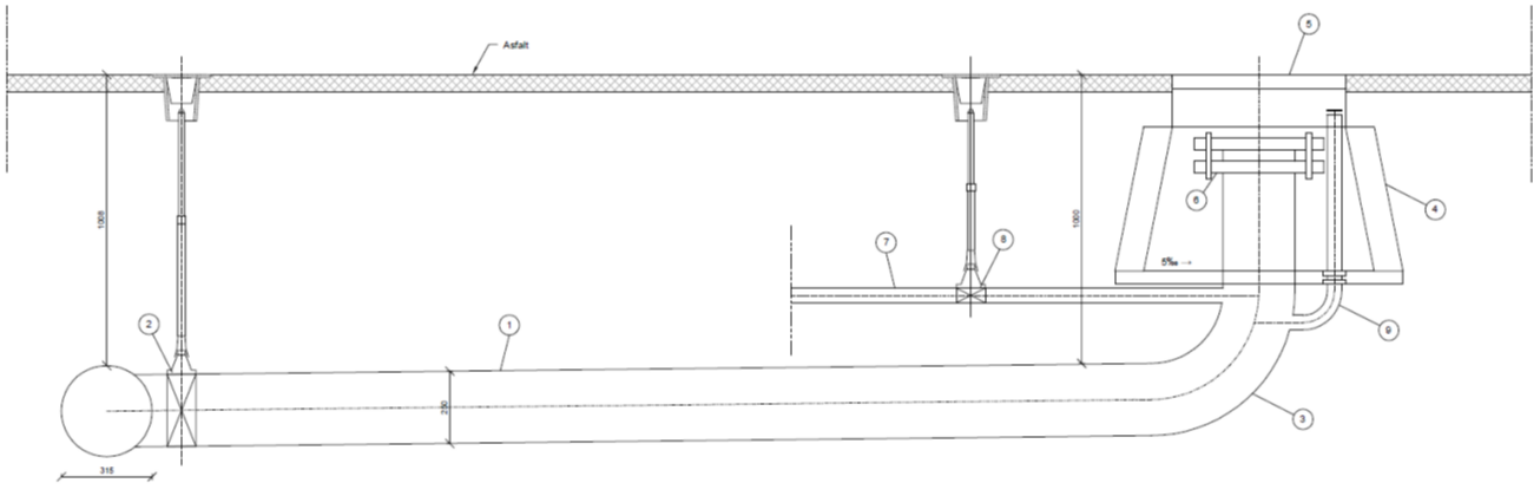
NSF volume: since last port of call.


Oceankaj
Sewage pipeline
Municipal sewage plant
Airport
Herlev
Mørkhøj
Søborg
Hellerup
Emdrup
Tingbjerg
Husum
Utterslev Mose
Utterslev
Ydre Østerbro
Ydre Nørrebro
Islev
Ejby Mose
København
Indre Østerbro
Vanløse
Rødovre
Indre Nørrebro
Christianshavn
Hvissinge
Damhussøen
Frederiksberg
Islands Brygge
Hvidovre
Valby
Ørestad Nord
Glostrup
Brøndbyøster
Vigerslev
Kongens Enghave
Brøndbyvester
Sundbyøster
Grønjords-søen
Trekant-søen
Tårnby
Avedøre
Kastrup
Brøndby Strand
Ørestad City
Maglebylille
Hvidovre
Ørestad Syd
Birkedam
Tømmerup
Rødningshavn
Viberup
Store Magleby
Køge Bugt

Reception of sewage

Wastewater pipes in the quay

- Receiving wastewater from 3 cruise ships simultaneously
- Capacity up to 900 m^3/hour (300 m^3/hour per ship)
- Connection point every 60 m.



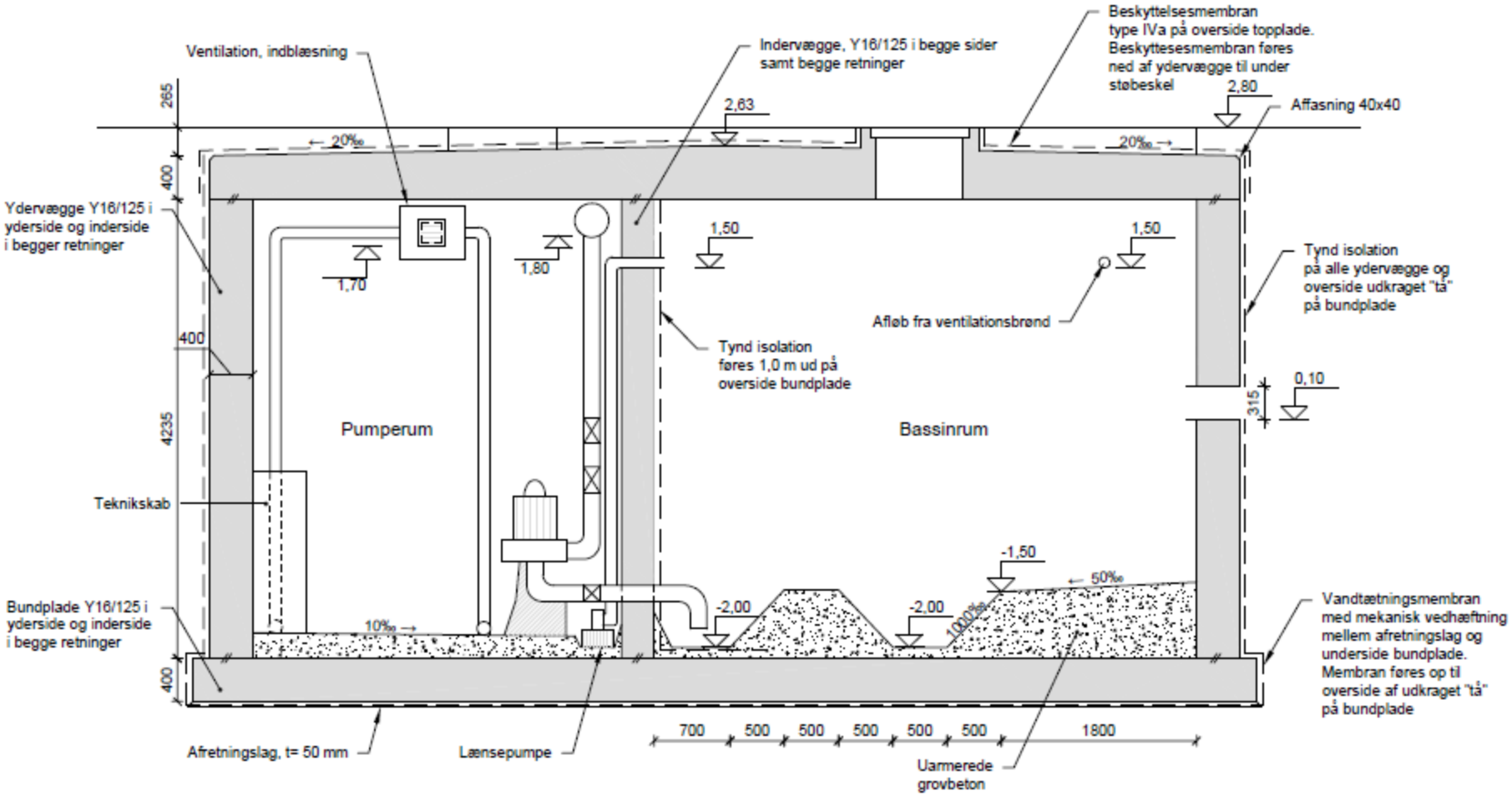
Samples

AL
Info
CTP
CT0
CT1
CT2
CT3
CT4
Krydstogtterminalen
30-06-2015
11:48:
Pumper
Start
Stop
LT011
0,50
m(DVR)
Påfyldning af vand
Åbn
Luk
0,53
0,49
MV041
Reset
Auto
Man
Normal
Simuler

Parameter	Unit	Ship 1	Ship 2
Wastewater volume	m³	245	120
- grey	m³	75	-
- black	m³	170	-
pH		7.2	6.7
Conductivity	mS/m	187	163
Solids SS	mg/l	20	4,900
	kg		588
$BOD_{7,ATU}$	mg/l		3,100
	kg		372
COD_{Cr}	mg/l		8,000
	k		960
NH_4 nitrogen			100
			12
Total nitrogen			300
		54	36
Total phosphorus		15	48
		3.7	5.8
Sulphate		40	3.0
		9.8	0.4
Grease content	g/l	7.0	45
	kg	1.7	5.4
Nutrient ratios	BOD:N:P	100:22:2.4	100:9.7:1.5
Equivalent figure per $resident_{BOD}$ (70 g BOD/res./d)	res.	2,200	5,300
Equivalent figure per $resident_N$ (15 g N/res./d)	res.	2,300	2,400
Equivalent figure per $resident_P$ (2.5 g P/res./d)	res.	1,500	2,300

Waste water samples collected at all quays each year

Collecting rainwater for flushing



Pumps, valves and chemical addition

Pipes forwarding sewage to municipal sewage plant

Smell removal

- Ferric chloride
- 6 m3
- removes odour from hydrogen sulphide

Thank you for your attention!