
**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

**FIRE STUDY
AND
FIRE WATER MAIN NETWORK HYDRAULIC CALCULATION -
REFINERY AREA**

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1. GENERAL

1.1. Introduction

Neste has a target to increase its renewable diesel production capacity in Rotterdam with a new NExBTL2 Unit; in particular the units in RDCG scope of work are:

- Units in MNA Area:
 - Process Units:

▪ Heat Treatment Unit (HTU)	Unit 11;
▪ Pre-Treatment Unit (PTU)	Unit 12;
▪ NExBTL 2	Unit 21;
▪ Hot oil Unit	Unit 57;
 - Auxiliary Units, Utilities and Offsites:

▪ MNA Tank Farm	Unit 42;
▪ MNA Utilities	Unit 53;
▪ Waste Water Handling (MNA)	Unit 62;
▪ Flare System	Unit 67;
▪ Fire Water	Unit 86;
 - Other Units:

▪ Technical Buildings (MNA)	Unit 76;
▪ MNA Interconnecting	Unit 81;
▪ Corridor Interconnecting	Unit 82;
- Units in Existing Refinery:
 - Auxiliary Units, Utilities and Offsites:

▪ Refinery Tank Farm (existing)	Unit 40;
▪ Refinery Tank Farm (new)	Unit 41;
▪ Jetty Loading Expansion	Unit 45/46;
▪ Refinery Utilities	Unit 52;
▪ Refinery Waste Water Treatment (note: only new lifting station)	Unit 60 ;
 - Other Units:

▪ Civil/Industrial Buildings	Unit 70;
▪ Technical Buildings	Unit 75;
▪ Refinery Interconnecting	Unit 80..

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1.2. Scope of present document

Scope of present document is to establish the fire water demand deriving from new fire scenarios and to verify the hydraulic performance of the Fire Water Network related to “Refinery Area” as modified as part of Project.

Hydraulic calculation report related to “Maasvlakte New Area” (MNA) is included in a separated report (doc. N° 082755C-000-CN-1901-0002).

The fire water demand is based on the expected consumption of fire water used:

- as cooling medium,
- as fire suppression medium,
- as gas dispersion and/or abatement medium,
- as carrier for foaming solution for foam generation.

In order to achieve the scope of assessing the fire water demand and to verify the adequacy of the system the following steps are needed:

- a) establish system configuration,
- b) assess target for evaluation,
- c) perform assumption when data are not available,
- d) select tool for calculation,
- e) identify each separate fire scenario,
- f) assess fire water demand for each scenario,
- g) check adequacy of systems.

1.3. References

Ref	Title	Doc. Number	Rev
Ref. [1]	Fire Study And Fire Water Main Network Hydraulic Calculation	080871C-000-CN-1901-001	D
Ref. [2]	Active Fire Protection Philosophy	082755C-000-JSD-1900-0001	C
	AND Technical Query: Firefighting design in RDCG Existing Refinery area	082755C-RFI-PRO-00001	2
Ref. [3]	Refinery Area Plot Plan RDCG Project	082755C-000-DW-0051-0004	D
Ref. [4]	Active Fire Protection (Standard)	NMS ID: 54751170 – version 1	-
Ref. [5]	General Fire Water Main Network	2305-000-DW-1933-01-01	2
Ref. [6]	Fire Study And Fire Water Main Network Hydraulic Calculation	2305-000-CN-1901-01	0

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Ref	Title	Doc. Number	Rev
Ref. [7]	Centrifugal Pump Process Data Sheet	2305-G85-SP-0910-01	1
Ref. [8]	Fire Study And Fire Water Main Network Hydraulic Calculation	2305-000-CN-1901-01	0
Ref. [9]	Vendor Data Book VDB-011 – NEXBTL Product Tank 40FB-11	2305-252001-VDB-011	0

1.4. Acronyms and Abbreviations

FW:	Fire Water
MNA:	Maasvlakte New Area
NFPA:	National Fire Protection Association
PGS:	Publicatiereeks Gevaarlijke Stoffen
PTU:	Pre Treatment Unit
RJF:	Renewable Jet Fuel
RDCG:	Rotterdam Capacity Growth

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2. FIRE WATER SYSTEM DESCRIPTION**2.1. Existing Neste Rotterdam Refinery area**

The areas for the “Rotterdam Capacity Growth Project” where the following facilities are allocated:

- new Biopropane storage,
- new Renewable Diesel storage,
- new Renewable Naphtha storage,
- new Renewable Jet Fuel Storage,
- Jetty 1 Modifications;
- Jetty 2 Expansion,

will be served by existing storage and pumping facilities in existing Neste Rotterdam Refinery:

- Storage: 6000 m3
- Flowrate: 3000 m3/h

The existing fire water network is provided in Ref. [3] and Ref. [5].

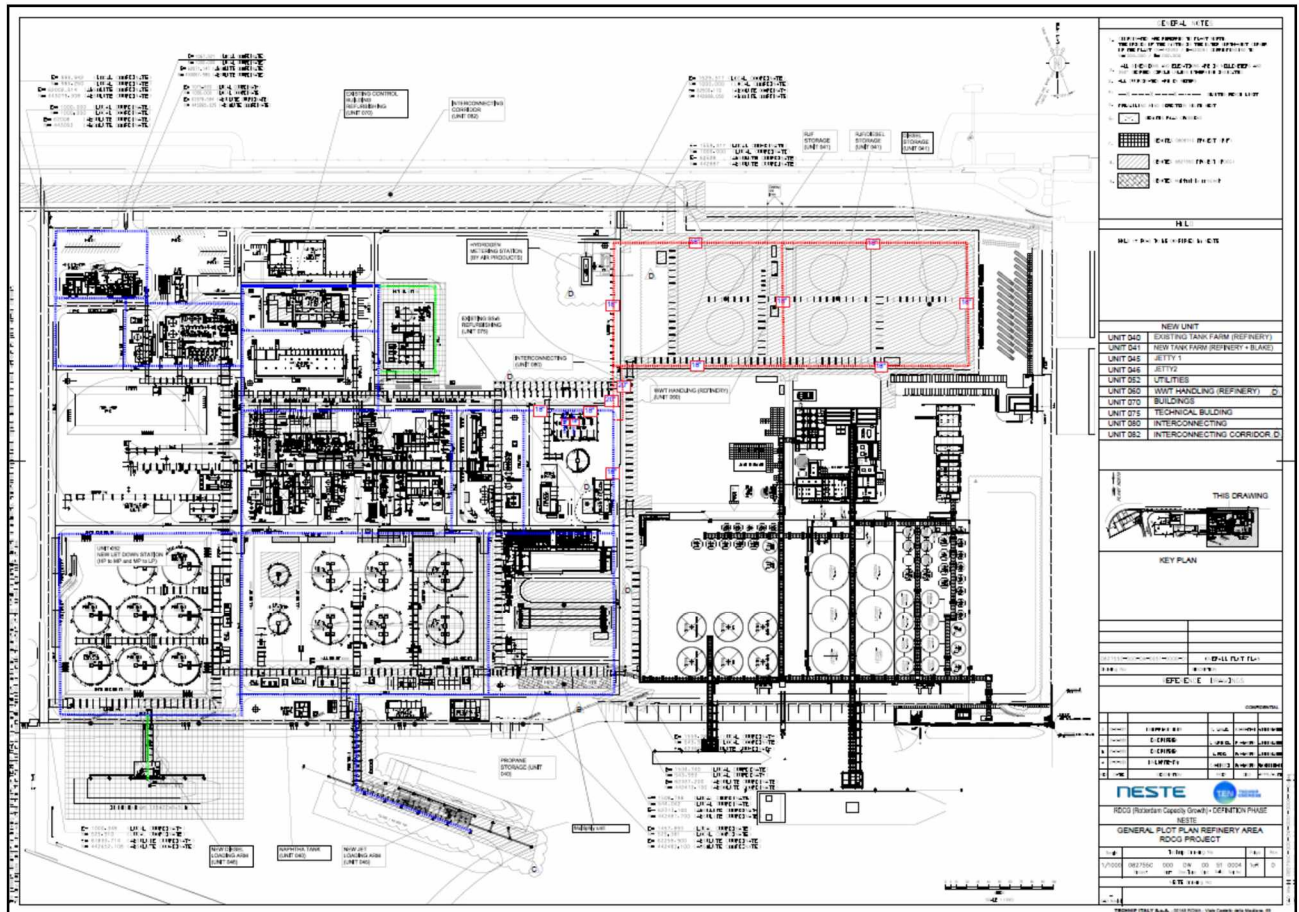
2.2. Project modifications on FW grid

The Neste existing fire water network shall be extended to implement a grid covering the new areas.

As part of current Project the existing networks will be modified as depicted in following picture 2.a and relevant details in picture 2.b.

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Picture 2.a: schematic representation of existing FW networks and new FW branches required for the RDCG (notes)

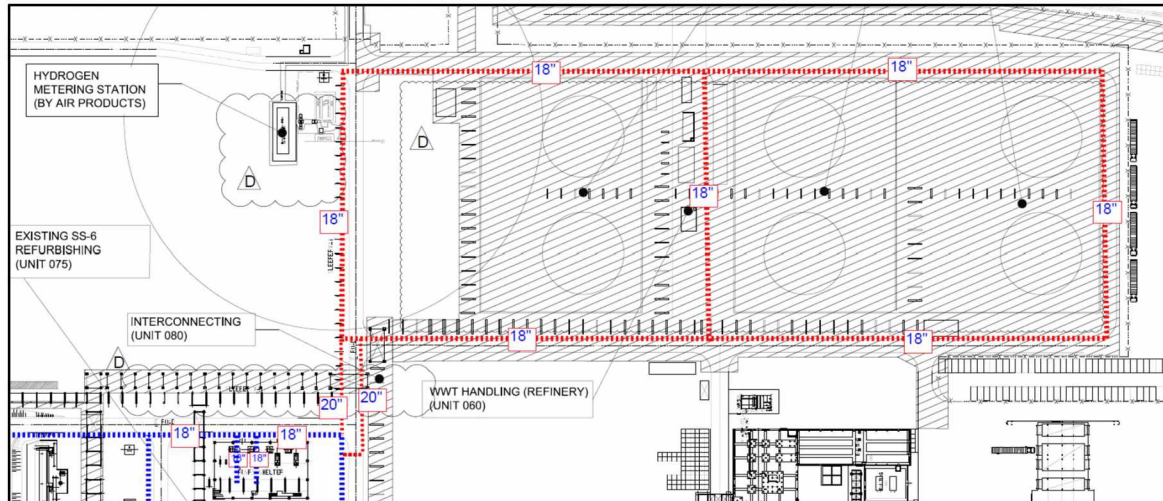


Notes:

- blue dotted lines represent existing Neste Refinery network;
- green dotted lines represent the modification done as part of Rotterdam Site Development Project;
- red dotted lines represent extension of network as part of RDCG Project.

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Picture 2.b: detail for schematic representation of the new FW branches required for the Expansion Project for new RJF and Diesel tanks



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3. FIRE WATER DEMAND CRITERIA

The fire water system shall be verified to guarantee the continuous supply at the required capacity and pressure for the required period.

The fire water storage capacity is calculated on the basis of the supply period for which the uninterrupted water supply is required: which is, for each fire scenario, the sum of the following:

- FW required for extinguishing primary source as per the scenario duration (especially for foam systems because the foam supply is limited);
- plus 4 hours for cooling;
- plus 4 hours for fire brigade.

Design water demand shall be considered as the maximum resulting from fire scenarios associated to new facilities in different areas according to Ref. [2].

In detail, according to Neste instructions, for the existing site's new naphtha tank the fire water calculations shall be based on Dutch Legislation and for the existing site's new RJF and Diesel tanks a combination of Dutch Legislation and Neste Standard shall be used.

For other fire scenarios related to biopropane storage, RJF pumping station and Diesel pumping station Neste Standard shall be followed.

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4. BASIS FOR FIRE WATER NETWORK VERIFICATION**4.1. Basis**

The main ring shall be verified by hydraulic calculation considering “C” factor for relating pipe material in the Hazen-William’s formula.

The network shall be verified to supply fire water at following conditions:

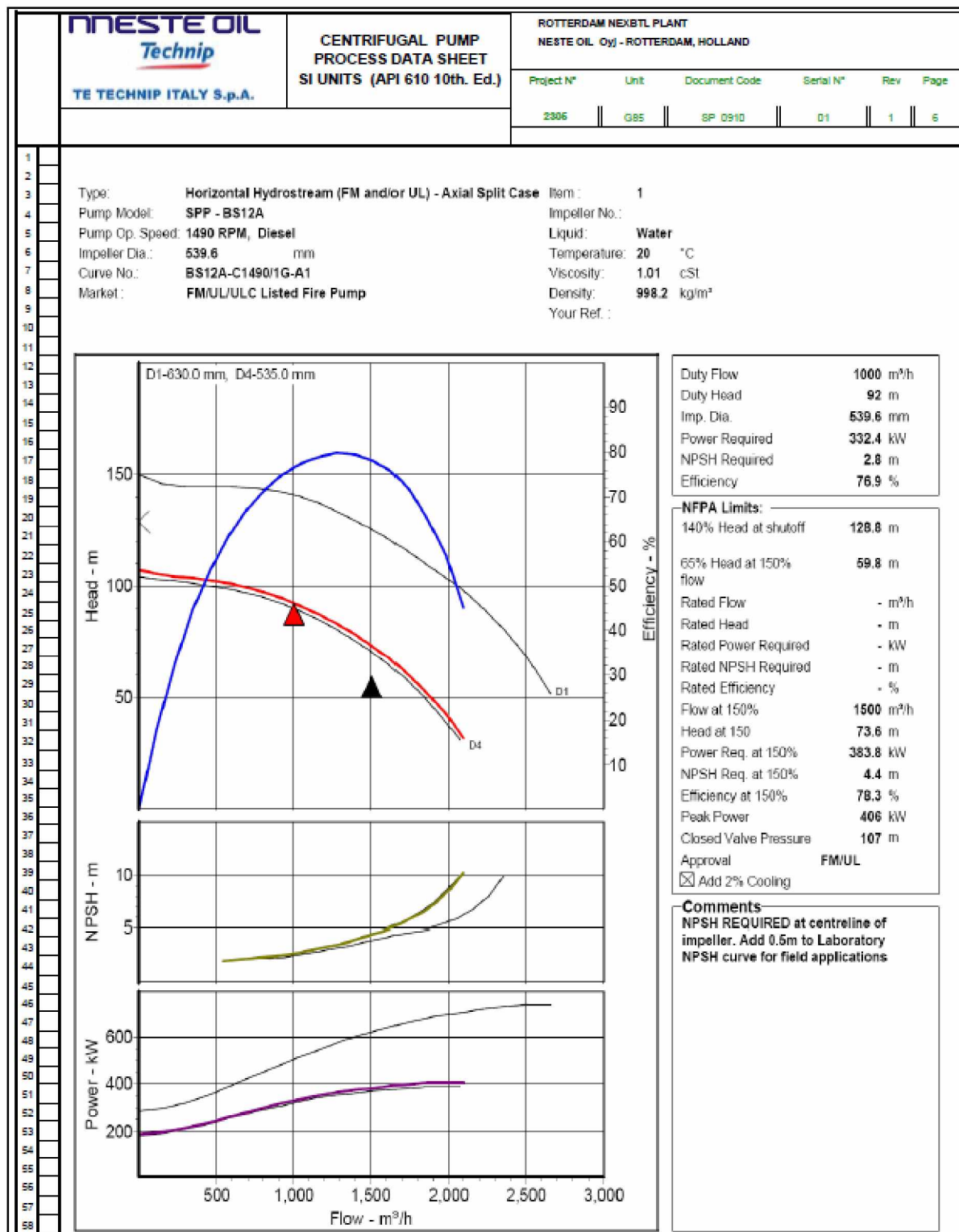
- Case A:
 1. Flowrate: equal to the Water Demand figure at the reference area;
 2. Pressure: the minimum operating pressure shall not be lower than 9.0 barg at network take-off point to the reference area users.
 3. Configuration: the network grid shall be considered in operation with one the fire water main supply route (one branch comprised between post indicator isolation valves) is out of operation.

Two cases have been analysed for each fire scenario:

 - Case A1: the out of service branch is part of the existing FW network;
 - Case A2: the out of service branch is part of the new FW network for those area served by new FW network.
- Case B:
 1. Flowrate: 120% of the Water Demand figure at the reference area;
 2. Pressure: the minimum operating pressure shall not be lower than 7.0 barg at network take-off point to the reference area users.
 3. Configuration: the network grid shall be considered in operation with all branches in service.

Pipe sizing shall be performed ensuring 3.5 m/s maximum water velocity (on entire network) for both cases A (with relevant subcases A1 and A2) and B above.

The discharge pressure given by existing fire water pumps in Neste Refinery has been established as per Ref. [7] for each fire scenario according to required flowrate supplied by FW pumps and related pump curve characteristics. Picture 4.a shows the pump curve used to perform the hydraulic calculations.

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4.2. Assumptions

Reinforced Fiber Glass is to be considered as material for new underground main network pipes, hence:

- C-factor has been assumed 150;
- Schedule of Reinforced Fiber Glass material has been considered for calculations (nominal diameter is the same of internal diameter).

For the underground main network straight pipes, the equivalent pipe lengths have to be evaluated as 120% of the geometrical pipe length to account of presence of valves.

Details for existing underground network are taken from Ref. [1] and Ref. [6].

Number of curves and tees connection of underground network pipes are estimated on the basis of proposed routing as shown on picture 2.a in chapter 2 above adding a presence of expected elbows/tees (refer to results report in Attachment 2.D, 3.D, ...).

4.3. Tool

The hydraulic calculation is using “PIPENET Vision 1.9.0” software developed by SUNRISE.

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5. FIRE SCENARIOS

5.1. Unit 40

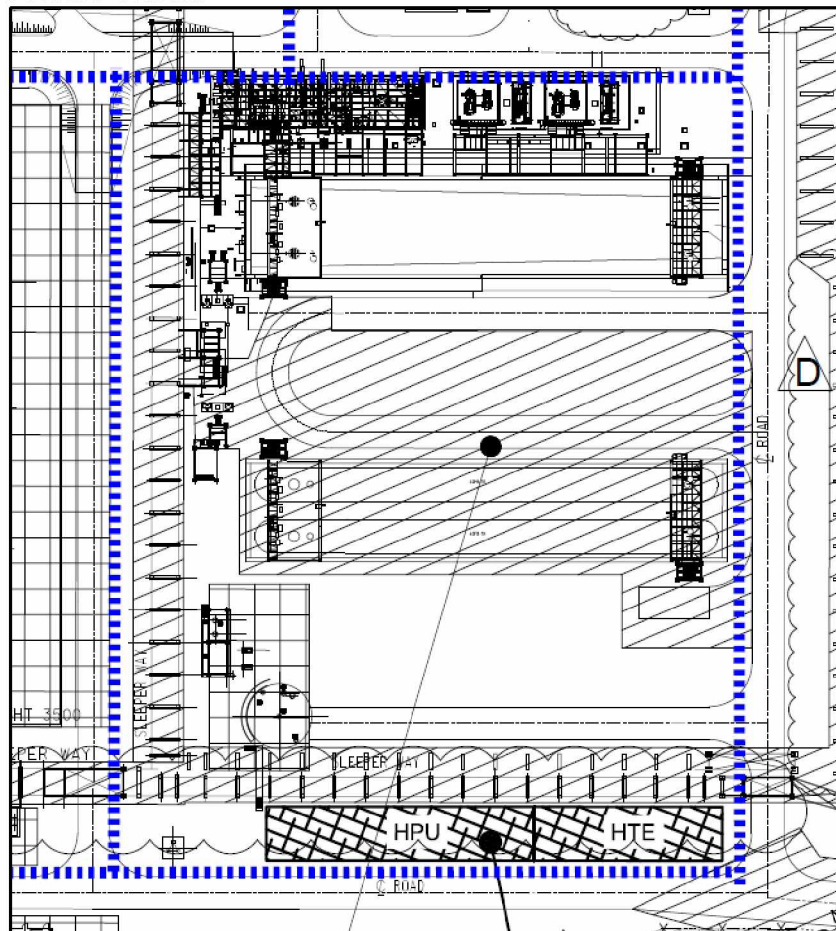
In the next paragraphs are discussed fire water demand calculations for following scenarios of Unit 40:

- Biopropane storage area;
- Naphtha storage area – tank fire scenario;
- Naphtha storage area – tank rim fire scenario;
- Naphtha storage area – bund fire scenario;

5.1.1. Fire Water Demand in the biopropane storage (Unit 40)

Calculation of fire water demand for the area (Picture 5.1.1.a) has been performed as shown on table 5.1.1.a, based on the fire protection layout developed.

Picture 5.1.1.a



For Definition stage an overall fire water demand of 1073 m³/h is assumed

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Additional updating is required during Execution stage of Project to check any possible change in layout or equipment dimension.

In Neste opinion pool fire may occur only in case of very large leakage and therefore only jet fire case is presented since considered the determining case.

Table 5.1.1.a

Jet Fire scenario inside Biopropane storage area			
TOTAL FLOW COMPONENTS	Item protected	Application rate details	Fire Water Flow Rate (m3/h)
Total flow required for fixed spray systems	40GA-11/S	20.4 l/min	15
Total flow required for monitor* application (with 30% additional margin)	Not Applicable	Monitor* required for jet fire application. Details not available. Assumed one monitor application being characteristics of jet fire (assumed only one equipment impinged by jet fire). One monitor capacity is 6000 l/min (360 m3/h).	360
Additional flow required for fire brigade	Not applicable	10000 l/min	600
Sub total			975
Ageing safety margin (10%)			98
TOTAL FIRE WATER DEMAND			1073

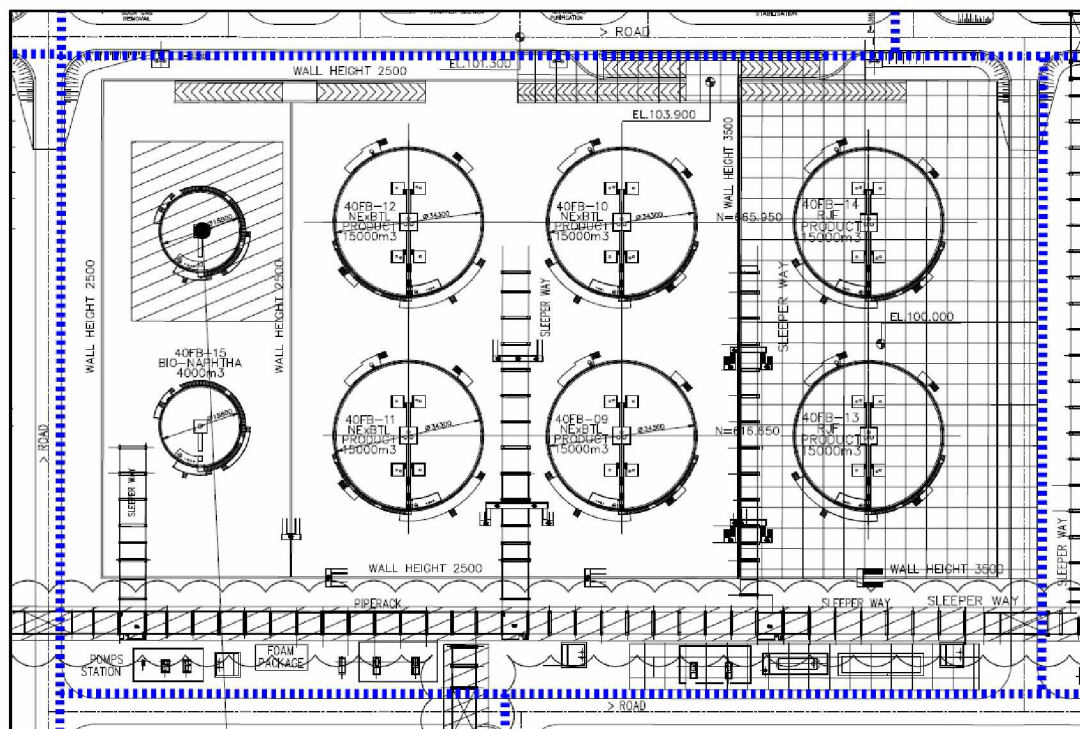
*: Monitor type and number will be defined during next phase of the Project according to outcomes of FHA - part 2.

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5.1.2. Fire Water Demand at naphtha storage area - tank fire scenario (Unit 40)

The following picture 5.1.2.a shows the layout of the naphtha storage area.

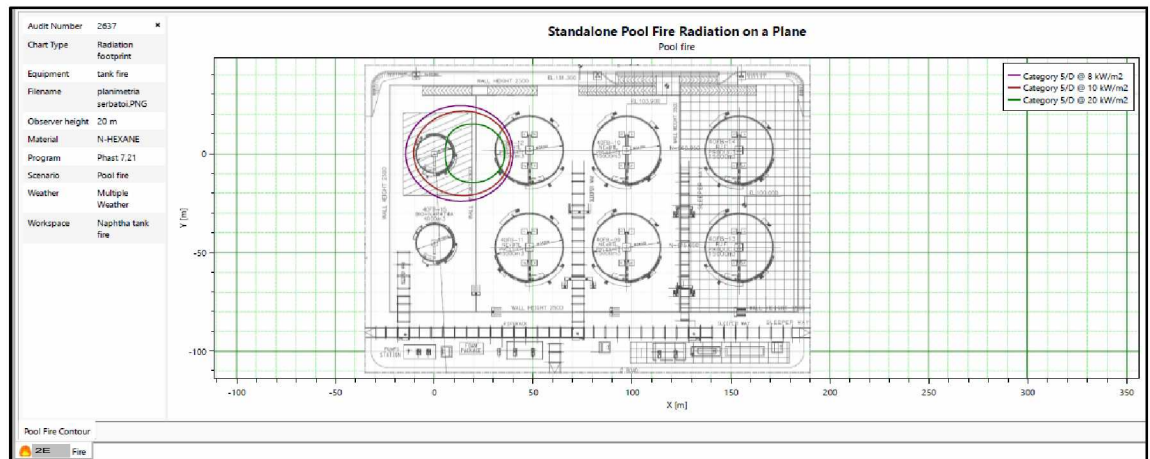
Picture 5.1.2.a



The following picture 5.1.2.b shows the radiation contour in case of fire in the new naphtha tank and wind blowing from Naphtha tank to the existing diesel tanks.

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Picture 5.1.2.b



The results according to criteria established in chapter 3 is that in case of fire inside the new Naphtha tank the radiation contour of 10 kW/m² may involve depending on wind direction the existing Naphtha tank or the adjacent diesel tank but not both tanks at the same time; similarly in case of fire inside the existing naphtha tank the radiation contour of 10 kW/m² may involve depending on wind direction the new Naphtha tank or the adjacent diesel tank but not both tanks at the same time.

However the tank fire scenario for naphtha storage area is considered not credible and therefore not included in present document.

In fact according to PGS 29, being the tank with floating roof (heavy structure) and being provided with a foam extinguishing system, the only rim scenario is to be considered.

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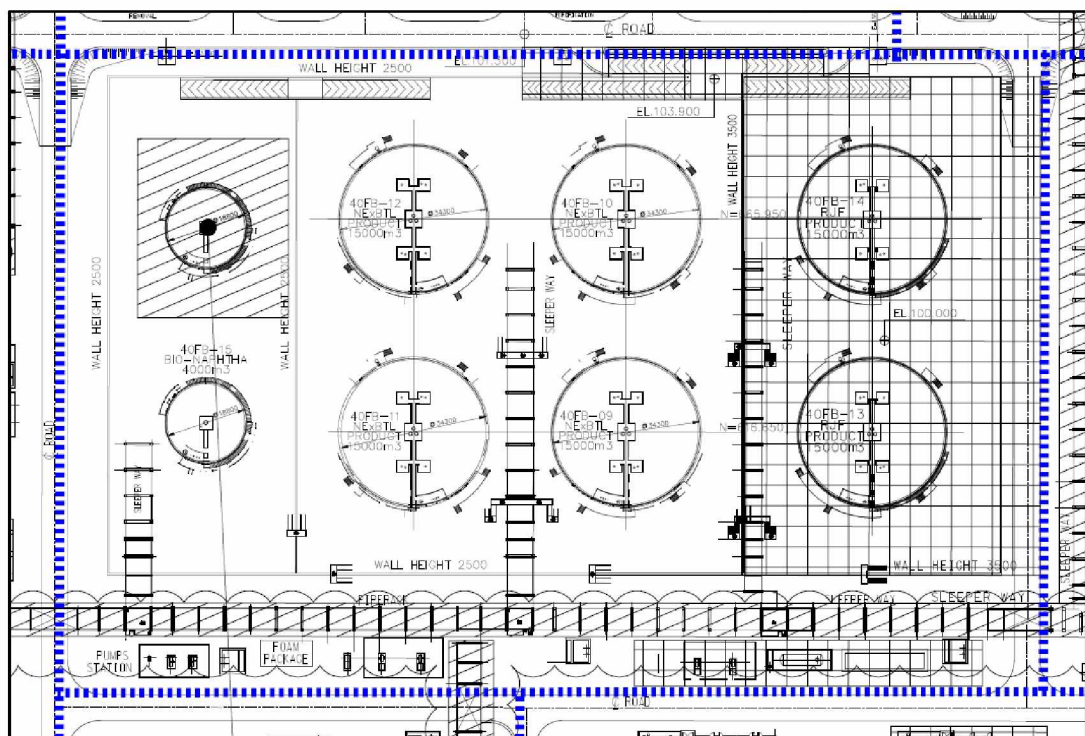
5.1.3. Fire Water Demand at naphtha storage area - tank rim fire scenario (Unit 40)

The following picture 5.1.3.a shows the layout of the Naphtha storage area.

Tank rim fire scenario is considered since the new Naphtha tank is “internal floated roof”, hence a pool fire may occur over the rim surface.

According to paragraph 5.1.2, in case of tank rim fire, the radiations contour of 10 kW/m² are not expected to reach neither existing naphtha tank nor existing diesel tanks since the pool surface in case of naphtha tank rim fire is lower than all naphtha tank fire (picture 5.1.2.b). However due to the fact that the existing naphtha tank is already permitted with cooling equipment, cooling of adjacent naphtha tank is required, hence the fire water demand is established as follow:

Picture 5.1.3.a



For Definition stage an overall fire water demand of 1017 m³/h is assumed

Calculation of fire water demand has been performed as shown on table 5.1.3.a

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Table 5.1.3.a

Naphtha tank rim fire scenario		
TOTAL FLOW COMPONENTS	Application rate details	Fire Water Flow Rate (m3/h)
Total flow required for fixed spray systems	Fixed water spray system Cooling of 50% shell of adjacent naphtha tank (Ref. [2]Ref. [8]) = 10.2 l/min m2*546 m2 = 5569 l/min. Cooling tank roof of adjacent naphtha tank (Ref. [2]Ref. [8]) = 10.2 l/min m2*305 m2 = 3111 l/min.	521
	Fixed water spray system (No cooling of naphtha tank in fire since Neste informed that cooling on tank shall be not provided when foam is present in the bund to do not have detrimental effect on foam stability)	0
	Fixed foam spray system: on adjacent naphtha tank As per Ref. [2] = 12.2 l/min m2*37.1 m2 = 453 l/min.	27
Total flow required for monitor application (with 30% additional margin)	No monitor for cooling purpose is supposed to be used in the area	0
	No foam monitor is required	0
Additional flow required for fire brigade	6000 l/min	360
Hydraulic profile factor (rim)		5
Hydraulic profile factor (cooling)		104
TOTAL FIRE WATER DEMAND		1017

Updating of above calculation is required during next stage of Project when design of fixed system will be available and also to check any possible change in layout or equipment dimension.

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5.1.4. Fire Water Demand at naphtha storage area - bund fire scenario (Unit 40)

This is an existing scenario and installation of the new naphtha tank inside the existing bund will decrease the severity of the conditions for which the system has been already designed. In fact the radiations contour of 10 kW/m² will be reduced since the pool surface is smaller than the one already considered in the existing (bund – 2 tanks horizontal surfaces instead of bund – 1 tank horizontal surface) and the foam application is more effective given the reduced surface where it is applicated.

For above reasoning the scenario is not included in present document.

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5.2. Unit 41

In the next paragraphs are discussed fire water demand calculations for following scenarios of Unit 41

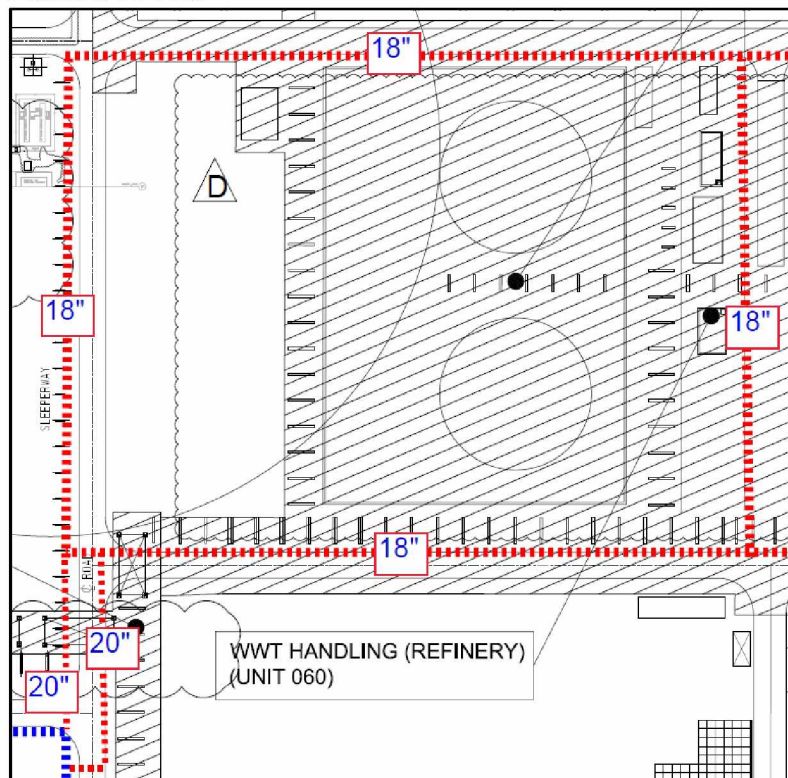
- RJF storage pumping area;
- RJF storage area – tank rim fire scenario
- RJF storage area – tank fire scenario
- RJF storage area – bund fire scenario
- Diesel storage pumping area
- Diesel storage area – tank fire scenario
- Diesel storage area – bund fire scenario

5.2.1. Fire Water Demand in the RJF storage pumping area (Unit 41)

The calculation of the fire water demand for the new area (Picture 5.2.1.a) has been performed as shown on table 5.2.1.a, based on the fire protection layout developed for the new area.

Additional updating is required during Execution stage of Project to check any possible change in layout or equipment dimension.

Picture 5.2.1.a



For Definition stage an overall fire water demand of 924 m³/h is estimated.

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Table 5.2.1.a

Pool Fire scenario inside pumping station into RJF storage area		
TOTAL FLOW COMPONENTS	Application rate details	Fire Water Flow Rate (m3/h)
Total flow required for monitor* application (with 30% additional margin)	No monitor for cooling purpose is supposed present in the area	0
	Water Monitor* required. One monitor capacity is 4000 l/min (240 m3/h) as per Ref. [2]	240
Additional flow required for fire brigade	10000 l/min	600
Sub total		840
Ageing safety margin (10%)		84
TOTAL FIRE WATER DEMAND		924

*: Monitor type and number will be defined during next phase of the Project according to outcomes of FHA - part 2

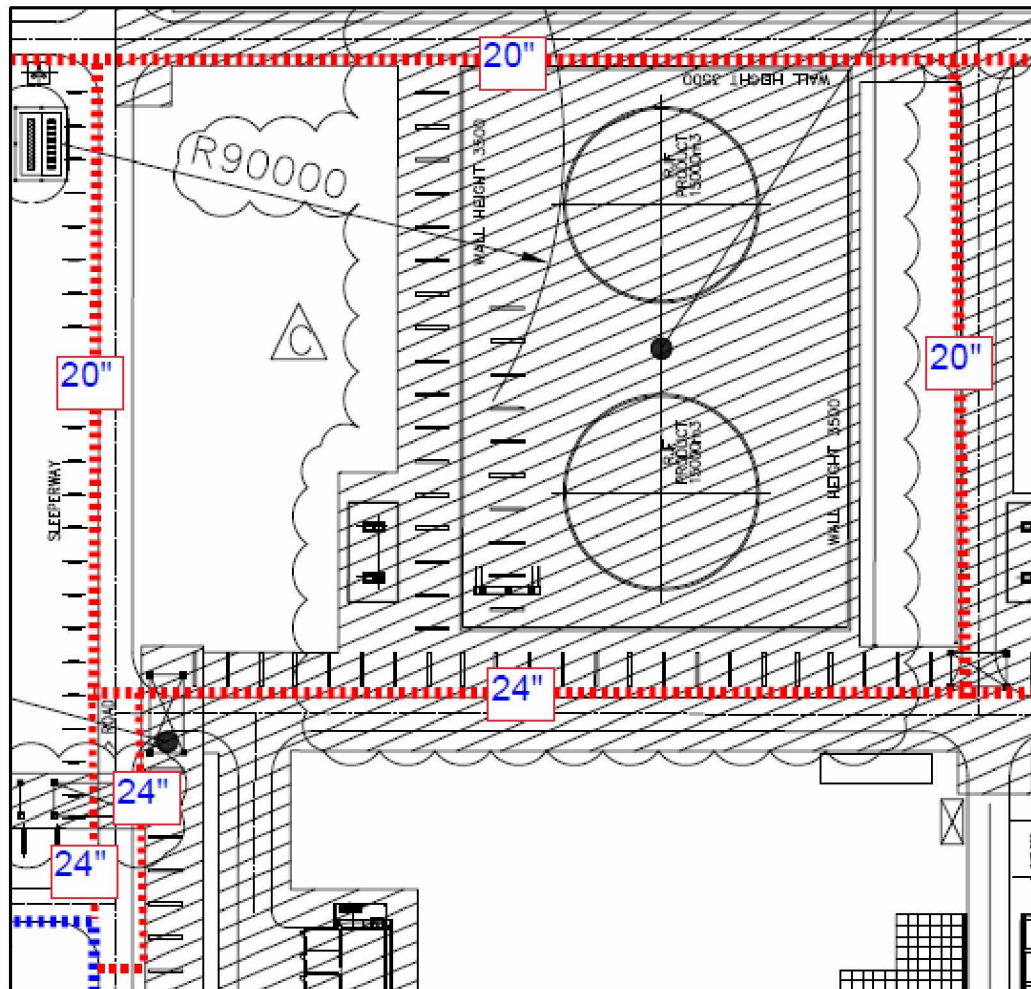
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5.2.2. Fire Water Demand at RJF storage area - tank rim fire scenario (Unit 41)

The following picture 5.2.2.a shows the layout of the new RJF storage area.

^{2E} fire scenario is not considered being rim not present, since the new RJF tanks are with “fixed roof”, hence a pool fire may occur over the whole tank surface.

Picture 5.2.2.a



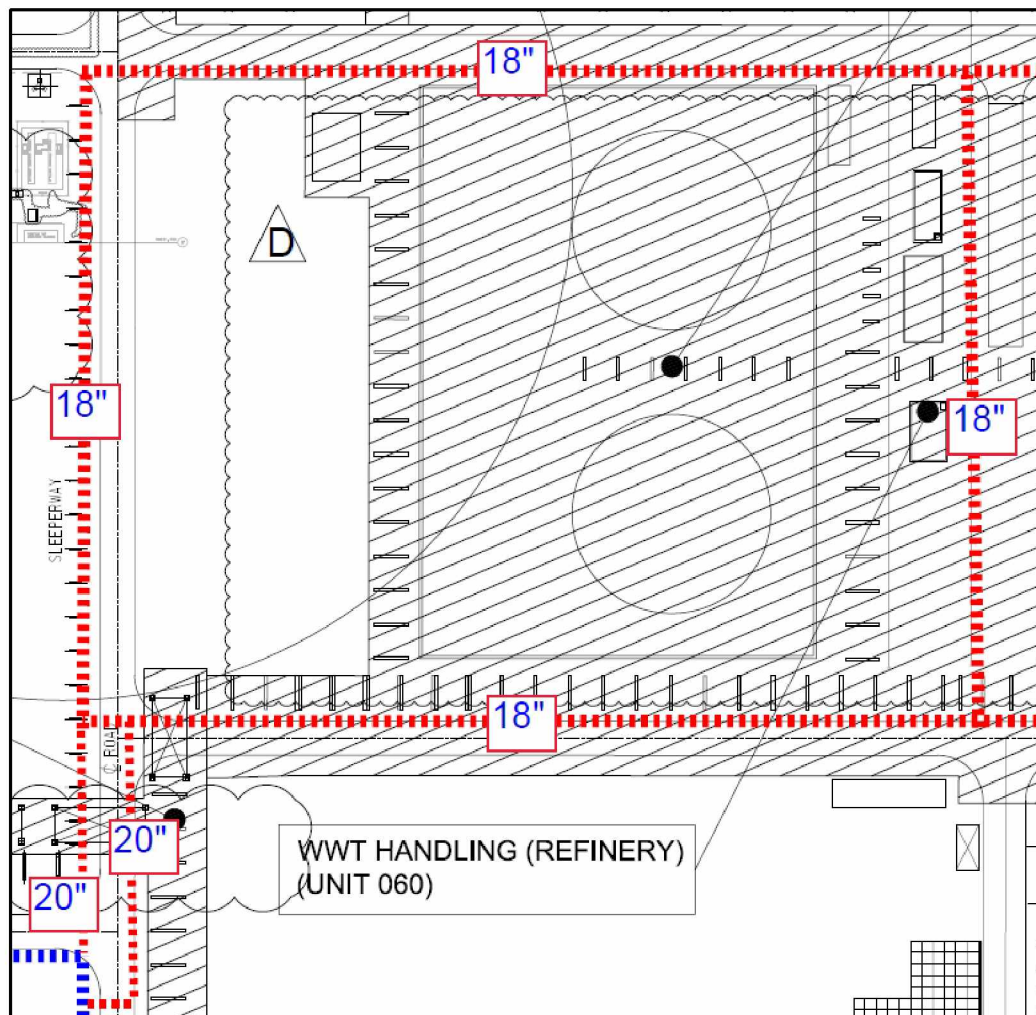
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5.2.3. Fire Water Demand at RJF storage area - tank fire scenario (Unit 41)

The following picture 5.2.3.a shows the layout of the new RJF storage area.

Tank fire scenario is considered being the new RJF tanks with “fixed roof”, hence a pool fire may occur over the whole tank surface.

Picture 5.2.3.a

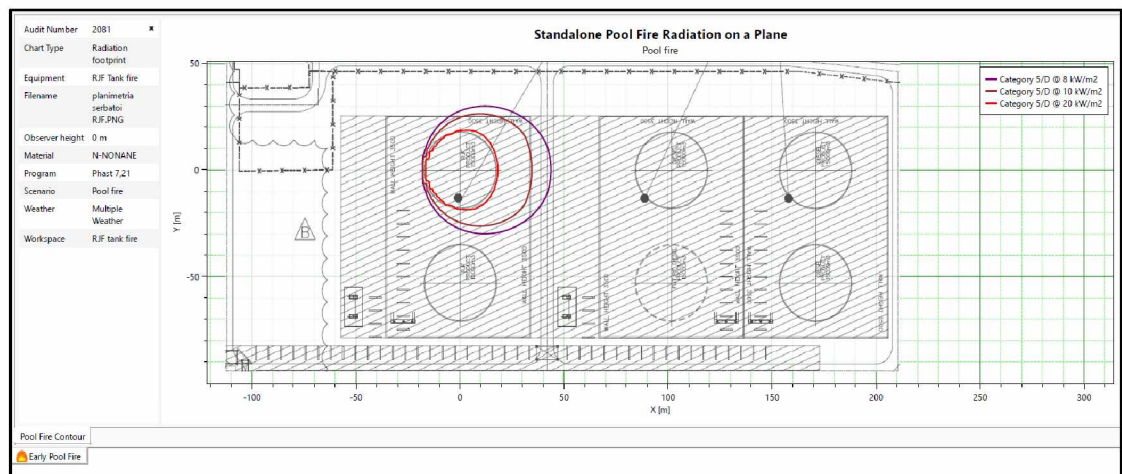


For Definition stage an overall fire water demand of 1105 m³/h is assumed

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The following picture 5.2.3.b shows the radiation contour in case of fire in one RJF tank and wind blowing from one RJF tank to the new diesel tanks .

Picture 5.2.3b



The results according to criteria established in chapter 3 is that in case of fire inside one RJF tank the radiation contour of 10 kW/m² may involve depending on wind direction the other RJF tank but not diesel tanks, similarly in case of fire inside the second RJF tank the radiation contour of 10 kW/m² may involve depending on wind direction the other RJF tank but not diesel tanks.

Hence the fire water demand is established as shown on table 5.2.3.a.

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Table 5.2.3.a

RJF tank fire scenario		
TOTAL FLOW COMPONENTS	Application rate details	Fire Water Flow Rate (m3/h)
Total flow required for fixed spray systems	Fixed water spray system: Cooling entire tank shell of adjacent RJF tank (Ref. [2]Ref. [8]) = 2 l/min m2 * 2047 m2= 4094 l/min. Cooling tank roof of adjacent RJF tank (Ref. [2]Ref. [8]) = 2 l/min m2 * 924 m2*1,1= 2032 l/min.	368
	Fixed water spray system (No cooling of RJF tank in fire as per Ref. [2])	0
	Fixed foam spray system: Appl. Rate= 5 l/min m2; Whole surface of the tank = 924 m2; Flowrate= 4620 l/min	277
Total flow required for monitor application (with 30% additional margin)	No monitor for cooling purpose is supposed to be used in the area	0
	No foam monitor is required	0
Additional flow required for fire brigade	6000 l/min	360
Sub total		1005
Ageing safety margin (10%)		100
TOTAL FIRE WATER DEMAND		1105

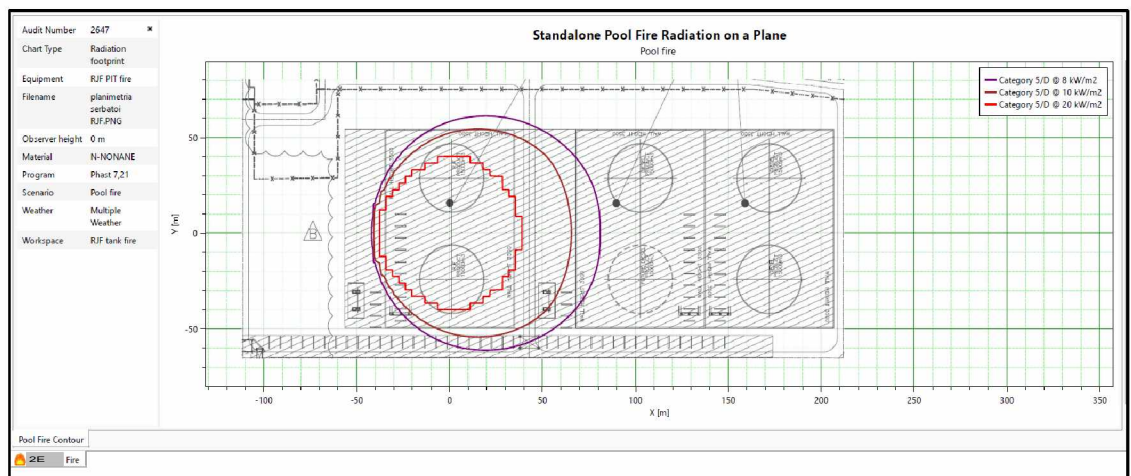
Updating of above calculation is required during next stage of Project when design of fixed system will be available and also to check any possible change in layout or equipment dimension.

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5.2.4. Fire Water Demand at RJF storage area - bund fire scenario (Unit 41)

The following picture 5.2.4.a shows the radiation contour in case of fire in RJF tanks bund fire and wind blowing from new RJF tanks to new Diesel tanks.

Picture 5.2.4.a



The results according to criteria established in chapter 3 is that in case of fire inside RJF tanks bund the radiation contour of 10 kW/m² does not involve adjacent new Diesel tanks.

Hence the fire water demand is established as shown on table 5.2.4.a.

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Table 5.2.4.a

Bund fire scenario inside RJF storage area		
TOTAL FLOW COMPONENTS	Application rate details	Fire Water Flow Rate (m3/h)
Total flow required for fixed spray systems	Fixed water spray system (No cooling of adjacent tanks since radiation < 10 kW/m2)	0
	Fixed water spray system (No cooling of RJF tanks inside the bund in fire as per Neste instruction that cooling on tank shall be not provided when foam is present in the bund to do not have detrimental effect on foam stability)	0
	Fixed foam spray system: Foam to extinguish fire on bund + Foam to extinguish fire inside RJF tank. Appl. Rate for bund= 5 l/min m2; Bund Area= (Bund – 2 x tank) = =6900 m2 – 2 x (924 m2) = 5052 m2; Flowrate= 5052 x 5 = 25265 l/min Appl. Rate for tank fire= 5 l/min m2; Whole surface of the tank = 924 m2; Flowrate= 924 x 5= 4620 l/min	1793
Total flow required for monitor application (with 30% additional margin)	No monitor for cooling purpose is supposed to be used in the area	0
	No foam monitor is required	0
Additional flow required for fire brigade	6000 l/min	360
Sub total		2153
Ageing safety margin (10%)		215
TOTAL FIRE WATER DEMAND		2368

Updating of above calculation is required during next stage of Project when design of fixed system will be available and also to check any possible change in layout or equipment dimension.

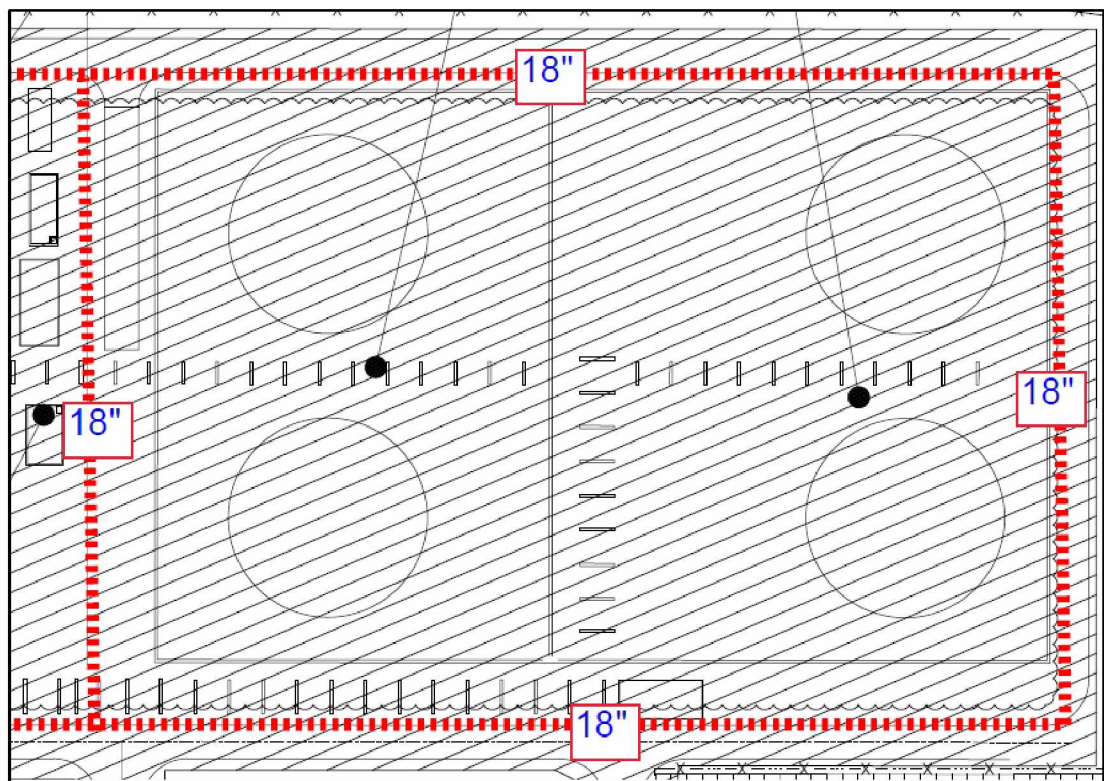
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5.2.5. Fire Water Demand in the diesel storage pumping area (Unit 41)

Calculation of the fire water demand for the new area (Picture 5.2.5.a) has been performed as shown on table 5.3.a, based on fire protection layouts developed for the area.

Additional updating is required during Execution stage of Project to check any possible change in layout or equipment dimension.

Picture 5.2.5.a



For Definition stage an overall fire water demand of 924 m³/h is estimated.

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Table 5.2.5.a

Pool Fire scenario inside pumping station into diesel storage area		
TOTAL FLOW COMPONENTS	Application rate details	Fire Water Flow Rate (m3/h)
Total flow required for monitor* application (with 30% additional margin)	No monitor for cooling purpose is supposed present in the area	0
	Water Monitor* required One monitor capacity is 4000 l/min (240 m3/h)	240
Additional flow required for fire brigade	10000 l/min	600
Sub total		840
Ageing safety margin (10%)		84
TOTAL FIRE WATER DEMAND		924

*: Monitor type and number will be defined during next phase of the Project according to outcomes of FHA - part 2

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5.2.6. Fire Water Demand at Diesel Storage Area – tank fire scenario (Unit 41)

Tank fire scenario for Diesel storage area is not considered credible and therefore not included in the following paragraphs.

In fact according to PGS 29, tank fire scenario is excluded for heated and/or hot stored class 3 that has been reclassified to class 2, hence it is excluded also for class 3 not heated. Diesel is classified as class 3.

5.2.7. Fire Water Demand at Diesel Storage Area – bund fire scenario (Unit 41)

Bund fire scenario for Diesel storage area is not considered credible and therefore not included in the following paragraphs.

In fact according to PGS 29, for tank diked areas where only class 3 is stored, it is not necessary to design for a fire scenario in a tank diked area. Diesel is classified as class 3.

6. NETWORK CONFIGURATION

Refer to picture 2.a and 2.b present in chapter 2.

In addition:

- the attachment 1.A presents the PIPENET schematic fire water layout (piping size):
- the attachment 1.B presents the PIPENET schematics fire water layout (length and elevation).

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7. RESULTS

7.1. Fire Water Demand

For the areas in “RDCG – Neste Refinery area” (picture 2.a in paragraph 2) the maximum fire water demand (2368 m3/h according to chapter 5 above) for new scenarios does not exceed the actual fire water flowrate available by existing fire water pumping station (3000 m3/h as per above chapter 2).

7.2. NESTE Refinery Fire Water Network

General

The calculation report outputs are presented in Attachments as follow:

- Attachment 2: Fire scenario in the biopropane storage area – case A1
- Attachment 3: Fire scenario in the biopropane storage area – case B

- Attachment 4: Fire scenario in the naphtha storage area - tank rim fire – Case A1
- Attachment 5: Fire scenario in the naphtha storage area - tank rim fire – Case B

- Attachment 6: Fire scenario in the RJF storage pumping area – case A1
- Attachment 7: Fire scenario in the RJF storage pumping area – case A2
- Attachment 8: Fire scenario in the RJF storage pumping area – case B

- Attachment 9: Fire scenario in the RJF storage area - tank fire – Case A1
- Attachment 10: Fire scenario in the RJF storage area - tank fire – Case A2
- Attachment 11: Fire scenario in the RJF storage area - tank fire – Case B

- Attachment 12: Fire scenario in the RJF storage area - bund fire – Case A1
- Attachment 13: Fire scenario in the RJF storage area - bund fire – Case A2
- Attachment 14: Fire scenario in the RJF storage area - bund fire – Case B

- Attachment 15: Fire scenario in the diesel storage pumping area – case A1
- Attachment 16: Fire scenario in the diesel storage pumping area – case A2
- Attachment 17: Fire scenario in the diesel storage pumping area – case B

Case A

The results are summarized in following table 7.2.2a and 7.2.2b (for Cases A1 and A2).

- Case A:
 - Flowrate: equal to the Water Demand figure at the reference area;

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- Pressure: the minimum operating pressure shall not be lower than 9.0 barg at network take-off point to the reference area users. Velocity in any branch of network shall not exceed 3.5 m/s.
 - Configuration: the network grid shall be considered in operation with one the fire water main supply route (one branch comprised between post indicator isolation valves) is out of operation.
- Two cases have been analysed for each fire scenario:
- Case A1: the out of service branch is part of the existing FW network;
 - Case A2: the out of service branch is part of the new FW network for those area served by new FW network.

Table 7.2.2a: Results at water demand flow rate for each fire scenario - Cases A1

<i>FIRE SCENARIO</i>	<i>FLOW RATE [m³/h]</i>	<i>CALCULATED RESIDUAL PRESSURE AT USER REMOTE POINT [barg]</i>	<i>MAX VELOCITY IN NETWORK [m/s]</i>
Fire scenario in the biopropane storage area – case A1	1073 (2x536.5)	9.3	4.1
Fire scenario in the naphtha storage area - tank rim fire – Case A1	1017 (2x508.5)	9.6	2.0
Fire scenario in the RJF storage pumping area – Case A1	924 (1x924)	8.9	1.8
Fire scenario in the RJF storage area - tank fire – Case A1	1105 (2x552.5)	9.5	2.1
Fire scenario in the RJF storage area - bund fire – Case A1	2368 (3x789.3)	7.9	4.6
Fire scenario in the diesel storage pumping area – Case A1	924 (1x924)	8.9	1.8

As shown on the calculation report outputs in above mentioned Attachments, the case A1 is not satisfied for several fire scenarios (cases are highlighted in bold) being:

- the target residual pressure at user lower than 9 barg; this is occurring since:
 - the network is existing and it was built according to sizing criteria not in line with actual required by Neste requiring the assumption of having one branch out of service;
 - the discharge pressure of the existing fire water pumps (9 barg at pump design flow rate when the fire water tank is at minimum level) is very close to the limit

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- established at user by actual Neste requirement and since the limit at user of 9 barg was not considered in existing design of circuit.
- the max velocity above 3.5 m/s in one or more branches of the existing network; this is occurring since the network is existing and it was built according to sizing criteria not in line with actual requiring the assumption of having one branch out of service.

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Table 7.2.2b: Results at water demand flow rate for each fire scenario - Cases A2

<i>FIRE SCENARIO</i>	<i>FLOW RATE [m³/h]</i>	<i>CALCULATED RESIDUAL PRESSURE AT USER REMOTE POINT [barg]</i>	<i>MAX VELOCITY IN NETWORK [m/s]</i>
Fire scenario in the RJF storage pumping area – Case A2	924 (1x924)	9.1	1.6
Fire scenario in the RJF storage area - tank fire – Case A2	1105 (2x552.5)	9.8	1.5
Fire scenario in the RJF storage area - bund fire – Case A2	2368 (3x789.3)	9.1	3.2
Fire scenario in the diesel storage pumping area – Case A2	924 (1x924)	9.1	1.6

As shown on the calculation report outputs in above mentioned Attachments, the case A2 is satisfied for all applicable scenarios.

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Case B

The results are summarized in following table 7.2.3 (for case B).

- Case B:
 - Flowrate: 120% of the Water Demand figure at the reference area;
 - Pressure: the minimum operating pressure shall not be lower than 7.0 barg at network take-off point to the reference area users. Velocity in any branch of network shall not exceed 3.5 m/s;
 - Configuration: the network grid shall be considered in operation with all branches in service.

Table 7.2.3: Results at 120% water demand e for each fire scenario (Case B):

<i>FIRE SCENARIO</i>	<i>FLOW RATE [m³/h]</i>	<i>CALCULATED RESIDUAL PRESSURE AT USER REMOTE POINT [barg]</i>	<i>MAX VELOCITY IN NETWORK [m/s]</i>
Fire scenario in the biopropane storage area – case B	1288 (2x644)	8.9	5.0
Fire scenario in the naphtha storage area - tank rim fire – Case B	1220 (2x610)	9.6	1.5
Fire scenario in the RJF storage pumping area – Case B	1109 (2x554.5)	9.8	1.5
Fire scenario in the RJF storage area - tank fire – Case B	1326 (2x663)	9.6	1.8
Fire scenario in the RJF storage area - bund fire – Case B	2842 (3x947.3)	8.7	3.5
Fire scenario in the diesel storage pumping area – Case B	1109 (2x554.5)	9.8	1.5

As shown on the calculation report outputs in above mentioned Attachments, the case B is not satisfied for the fire scenario in the biopropane storage area (case is highlighted in bold) being:

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- the max velocity above 3.5 m/s in one of the existing branch of the network; this is occurring since the criteria of increasing the demand flow rate by 20% was not considered in existing design of network.

7.3. Neste Refinery Fire Water Storage

The results are summarized in following table:

Table 7.3.1: Fire water consumption

FIRE SCENARIO	FW Flowrate [m³/h]			Overall Amount [m³]
	Total	<i>Of which used for Foam</i>	<i>Of which part of ageing safety margin (10%)</i>	
Fire scenario in the biopropane storage area	1073	0	98	(1073 – 98) m ³ /h x 4 h = 3900 m ³
Fire scenario in the naphtha storage area - tank rim fire	1017	32	Not applicable	(32 m ³ /h x 0.3 h + (1017 - 32) m ³ /h x 4 h = 3950 m ³
Fire scenario in the RJF storage pumping area	924	0	84	(924 – 84) m ³ /h x 4 h = 3360 m ³
Fire scenario in the RJF storage area - tank fire	1105	277	100	277 m ³ /h x 0.3 h + (1105 – 277 - 100) m ³ /h x 4 h = 2995 m ³
Fire scenario in the RJF storage area - bund fire	2368	1793	215	1793 m ³ /h x 0.3 h + (2368-1793 -215) m ³ /h x 4 h = 1978 m ³
Fire scenario in the diesel storage pumping area	924	0	84	(924 – 84) m ³ /h x 4 h = 3360 m ³

Updating of above calculation is required during Execution stage of Project when design of fixed system will be available and also to check any possible change in layout or equipment dimension

In conclusion the amount of fire water used in any scenario is lower than the actual stored fire water available in existing fire water storage.

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8. ATTACHMENTS

Attachment	0	Fire Water demand calculation support data
Attachment	1	PIPENET schematic fire water layout
	1.A	Piping size
	1.B	Length and elevation
Attachment	2	Fire scenario in the biopropane storage area – case A1
	2.A	PIPENET schematic layout with piping and nodes label
	2.B	PIPENET schematic layout with flow rate and pressure results
	2.C	PIPENET schematic layout with velocity results
	2.D	PIPENET input/output printout report
Attachment	3	Fire scenario in the biopropane storage area – case B
	3.A	PIPENET schematic layout with piping and nodes label
	3.B	PIPENET schematic layout with flow rate and pressure results
	3.C	PIPENET schematic layout with velocity results
	3.D	PIPENET input/output printout report
Attachment	4	Fire scenario in the naphtha storage area - Tank rim fire - Case A1
	4.A	PIPENET schematic layout with piping and nodes label
	4.B	PIPENET schematic layout with flow rate and pressure results
	4.C	PIPENET schematic layout with velocity results
	4.D	PIPENET input/output printout report
Attachment	5	Fire scenario in the naphtha storage area-Tank rim fire-Case B
	5.A	PIPENET schematic layout with piping and nodes label
	5.B	PIPENET schematic layout with flow rate and pressure results
	5.C	PIPENET schematic layout with velocity results
	5.D	PIPENET input/output printout report
	4	Fire scenario in the RJF storage pumping area – Case A1
	6.A	PIPENET schematic layout with piping and nodes label
	6.B	PIPENET schematic layout with flow rate and pressure results
	6.C	PIPENET schematic layout with velocity results
	6.D	PIPENET input/output printout report
Attachment	7	Fire scenario in the RJF storage pumping area – Case A2
	7.A	PIPENET schematic layout with piping and nodes label
	7.B	PIPENET schematic layout with flow rate and pressure results
	7.C	PIPENET schematic layout with velocity results
	7.D	PIPENET input/output printout report
Attachment	8	Fire scenario in the RJF storage pumping area – Case B

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	8.A	PIPENET schematic layout with piping and nodes label
	8.B	PIPENET schematic layout with flow rate and pressure results
	8.C	PIPENET schematic layout with velocity results
	8.D	PIPENET input/output printout report
Attachment	9	Fire scenario in the RJF storage area-Tank fire–Case A1
	9.A	PIPENET schematic layout with piping and nodes label
	9.B	PIPENET schematic layout with flow rate and pressure results
	9.C	PIPENET schematic layout with velocity results
	9.D	PIPENET input/output printout report
Attachment	10	Fire scenario in the RJF storage area-Tank fire–Case A2
	10.A	PIPENET schematic layout with piping and nodes label
	10.B	PIPENET schematic layout with flow rate and pressure results
	10.C	PIPENET schematic layout with velocity results
	10.D	PIPENET input/output printout report
Attachment	11	Fire scenario in the RJF storage area-Tank fire–Case B
	11.A	PIPENET schematic layout with piping and nodes label
	11.B	PIPENET schematic layout with flow rate and pressure results
	11.C	PIPENET schematic layout with velocity results
	11.D	PIPENET input/output printout report
Attachment	12	Fire scenario in the RJF storage area-bund fire–Case A1
	12.A	PIPENET schematic layout with piping and nodes label
	12.B	PIPENET schematic layout with flow rate and pressure results
	12.C	PIPENET schematic layout with velocity results
	12.D	PIPENET input/output printout report
Attachment	13	Fire scenario in the RJF storage area-bund fire–Case A2
	13.A	PIPENET schematic layout with piping and nodes label
	13.B	PIPENET schematic layout with flow rate and pressure results
	13.C	PIPENET schematic layout with velocity results
	13.D	PIPENET input/output printout report
Attachment	14	Fire scenario in the RJF storage area-bund fire–Case B
	14.A	PIPENET schematic layout with piping and nodes label
	14.B	PIPENET schematic layout with flow rate and pressure results
	14.C	PIPENET schematic layout with velocity results
	14.D	PIPENET input/output printout report
Attachment	15	Fire scenario in the diesel storage pumping area – Case A1
	15.A	PIPENET schematic layout with piping and nodes label
	15.B	PIPENET schematic layout with flow rate and pressure results
	15.C	PIPENET schematic layout with velocity results
	15.D	PIPENET input/output printout report

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Attachment	16	Fire scenario in the diesel storage pumping area – Case A2
	16.A	PIPENET schematic layout with piping and nodes label
	16.B	PIPENET schematic layout with flow rate and pressure results
	16.C	PIPENET schematic layout with velocity results
	16.D	PIPENET input/output printout report
Attachment	17	Fire scenario in the diesel storage pumping area – Case B
	17.A	PIPENET schematic layout with piping and nodes label
	17.B	PIPENET schematic layout with flow rate and pressure results
	17.C	PIPENET schematic layout with velocity results
	17.D	PIPENET input/output printout report

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Attachment 0 Fire Water demand calculation support data

Attachment 0 contains 3 pages

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
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Fire Water demand calculation support data for fire scenario in the biopropane storage area

40GA-11/S wetted surface = 12 m²

Water application rate = 20.4 l/min/m²

Water for fixed spray system to be provided = 15 m³/h

Water for high capacity monitor = 360 m³/h

Water for fire brigade = 600 m³/h

Fire Water demand calculation support data for fire scenario in the naphtha storage area - tank rim fire

Naphtha tank data: diameter 18.8 m;

Foam application rate on rim: 12.2 l/min/m²

Water for foam to be provided on tank rim on fire = 27 m³/h (as per **Error! Reference source not found.**Ref. [8])

Water for fire brigade = 360 m³/h

Fire Water demand calculation support data for fire scenario in the RJF storage pumping area

Water for foam monitor = 240 m³/h

Water for fire brigade = 360 m³/h

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
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Fire Water demand calculation support data for fire scenario in the RJF storage area - tank fire

RJF tank data: diameter 34.3 m; height 19 m;
shell surface: 2047 m²; tank internal horizontal surface: 924 m²;
tank roof area (assumed 110% on flat roof): 1016 m²

Diesel tank data: diameter 34.3 m; height 19 m;
shell surface: 2047 m²; tank internal horizontal surface: 924 m²;
tank roof area (assumed 110% on flat roof): 1016 m²

Foam application rate on whole surface of the tank : 5 l/min/m²

Cooling rate: 2 l/min/m²

Water for foam to be provided on RJF tank on fire: 5 (l/min/m²) x 924 (m²) = 277 m³/h

Water for cooling entire shell of adjacent RJF tank: 2 (l/min/m²) x 2047 (m²) = 246 m³/h

Water for cooling tank roof of adjacent tank: 2 (l/min/m²) x 1016 (m²) = 122 m³/h

Water for fire brigade = 360 m³/h

Fire Water demand calculation support data for fire scenario in the RJF storage area - bund fire

RJF storage tank bund data: dimension: 69 m x 100 m; overall surface 6900 m²;
horizontal surface of one RJF tank: 924 m²

RJF tank data: diameter 34.3 m; height 19 m;
shell surface: 2047 m²; tank internal horizontal surface: 924 m²;
tank roof area (assumed 110% on flat roof): 1016 m²

Bund surface to be protected by foam: 6900 (m²) – 2 x 924 (m²) = 5052 m²

Foam application rate on bund: 5 l/min/m²

Foam application rate on whole surface of the tank : 5 l/min/m²

Water for foam to be provided on RJF tanks bund: 5 (l/min/m²) x 5052 (m²) = 1516 m³/h

Water for foam to be provided on RJF tanks whole surface: 5 (l/min/m²) x 924 (m²) = 277 m³/h

Water for fire brigade = 360 m³/h

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Fire Water demand calculation support data for fire scenario in the diesel storage pumping area

Water for foam monitor = 240 m3/h

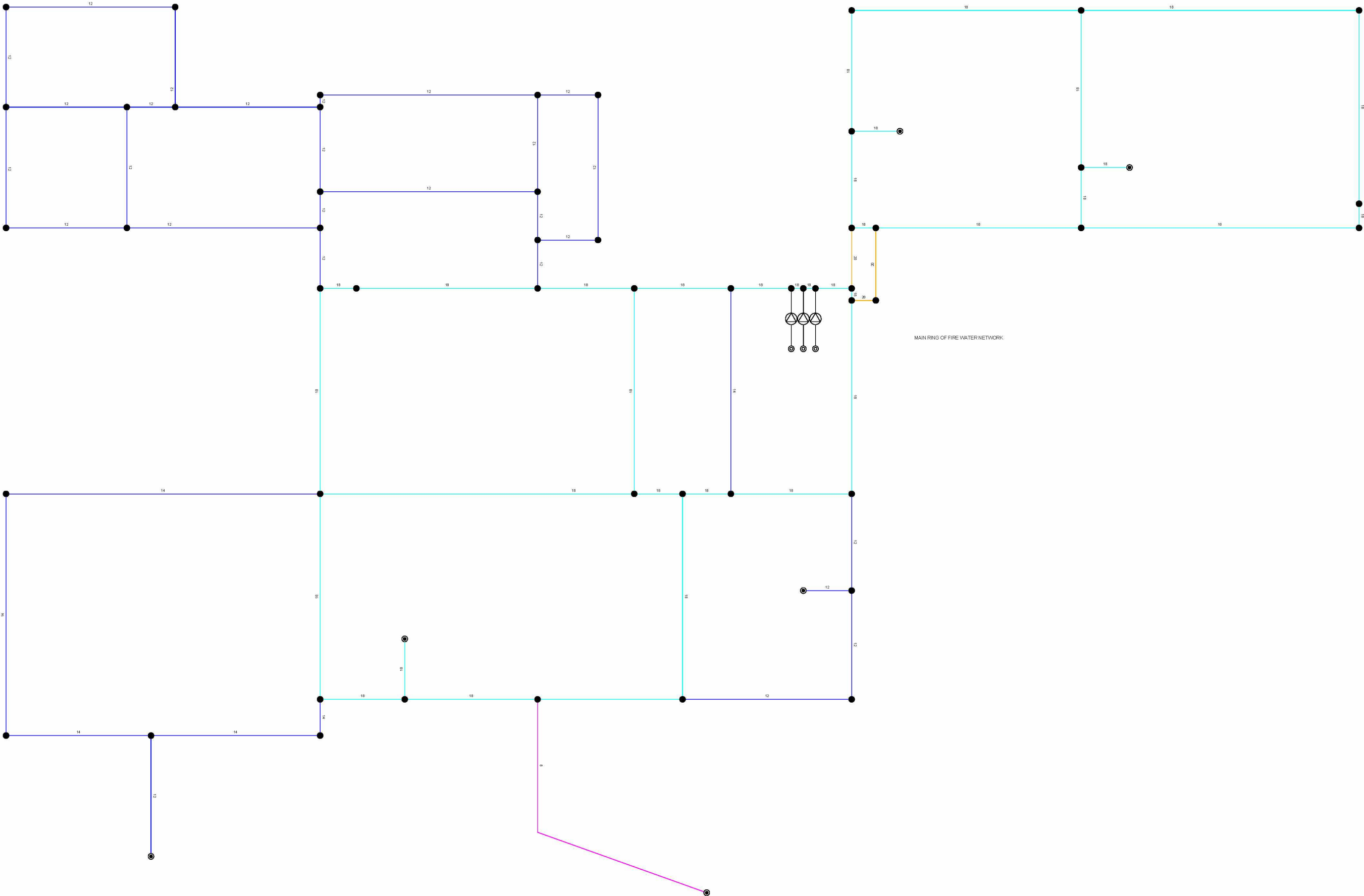
Water for fire brigade = 360 m3/h

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
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Attachment	1	PIPENET schematic fire water layout
	1.A	Piping size
	1.B	Length and elevation

Attachment 1.A contains 1 page

Attachment 1.B contains 1 page



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Thursday, May 20, 2021		Page 1 of 1
Pipe bore	 < 12.000000	 < 14.000000	 < 18.000000
(in)	 < 20.000000	 < 24.000000	 > 24.000000

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
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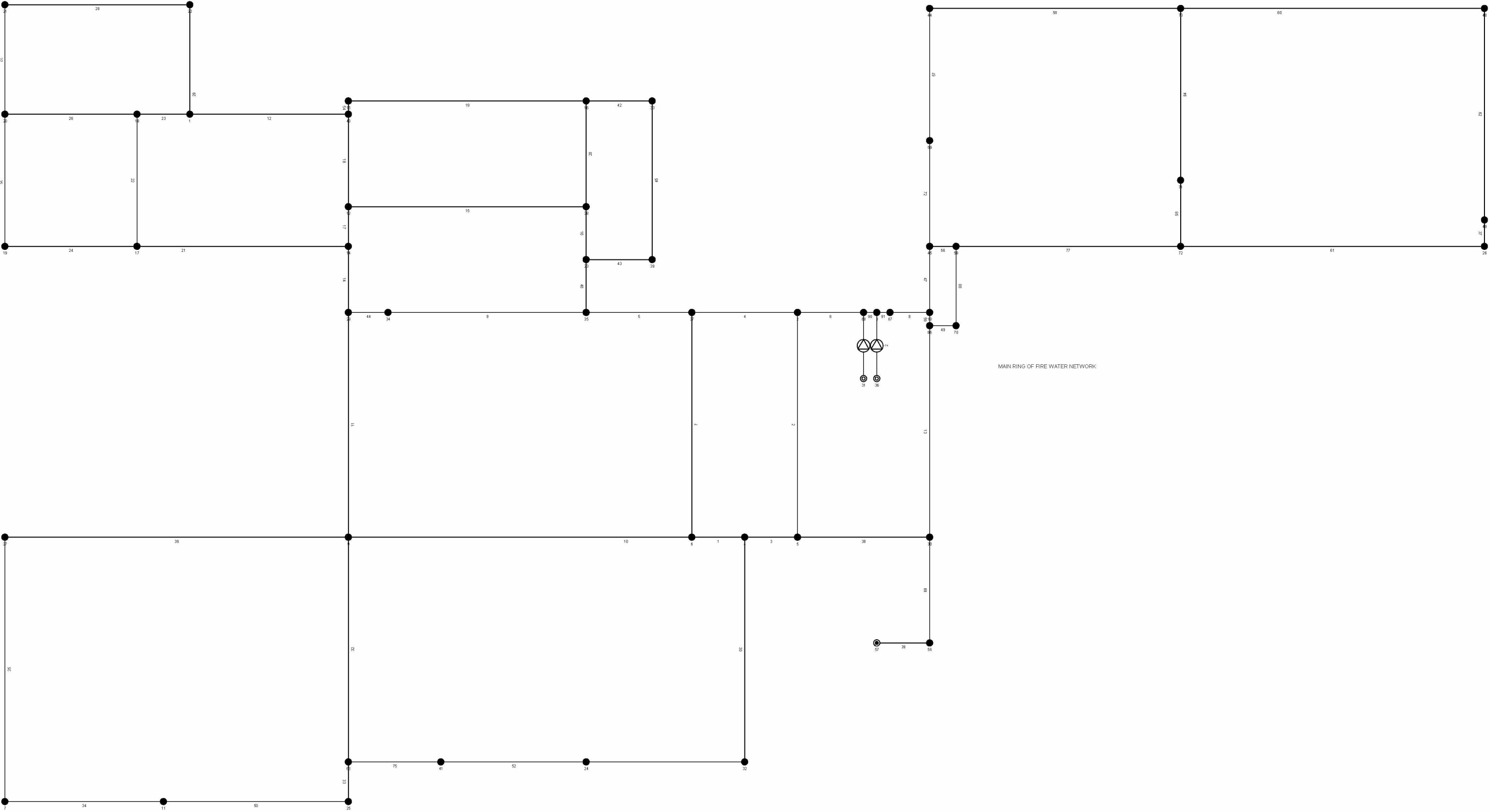
Attachment	2	Fire scenario in the biopropane storage area – case A1
	2.A	PIPENET schematic layout with piping and nodes label
	2.B	PIPENET schematic layout with flow rate and pressure results
	2.C	PIPENET schematic layout with velocity results
	2.D	PIPENET input/output printout report

Attachment 2.A contains 1 page

Attachment 2.B contains 1 page

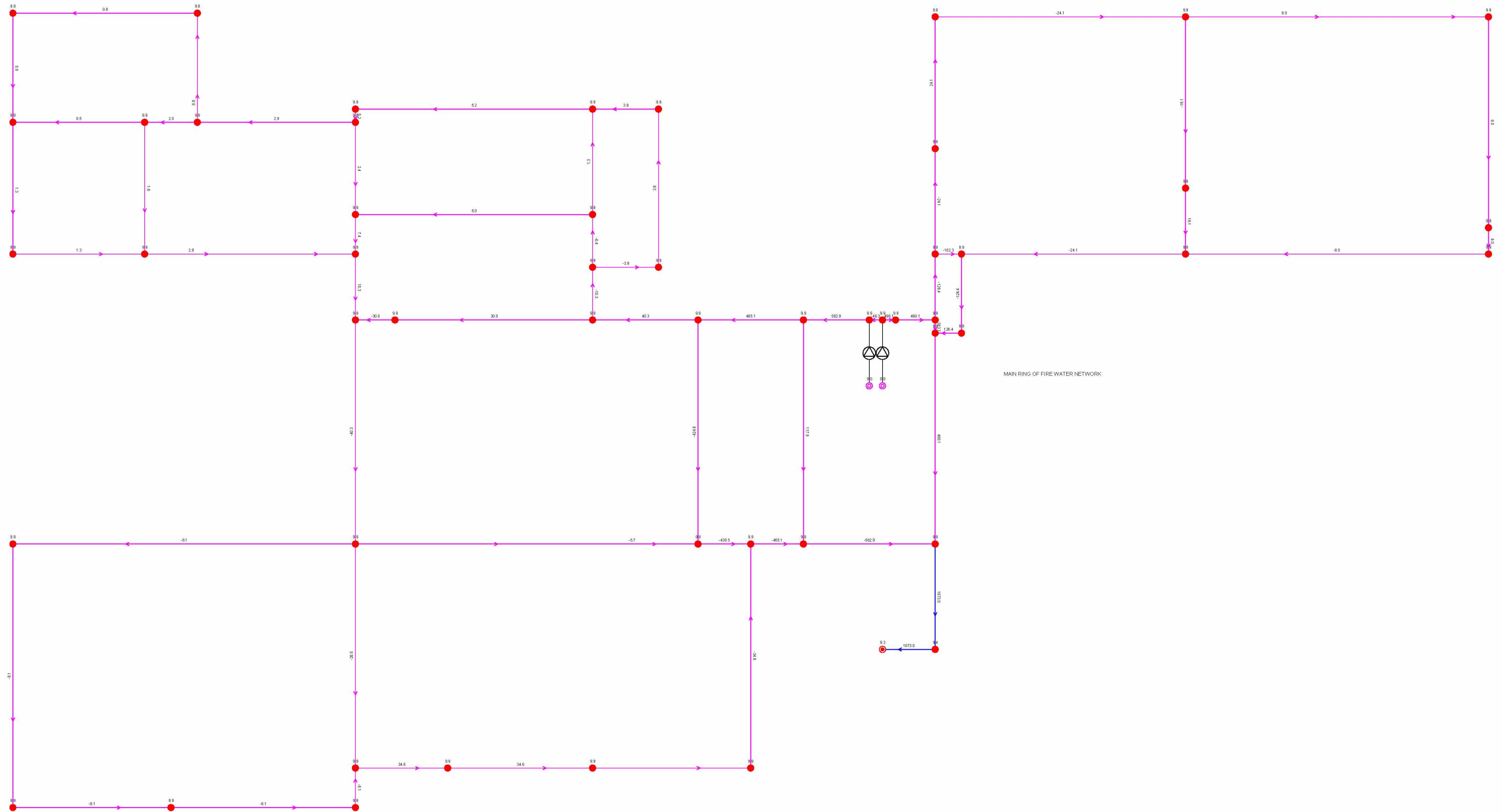
Attachment 2.C contains 1 page

Attachment 2.D contains 20 pages

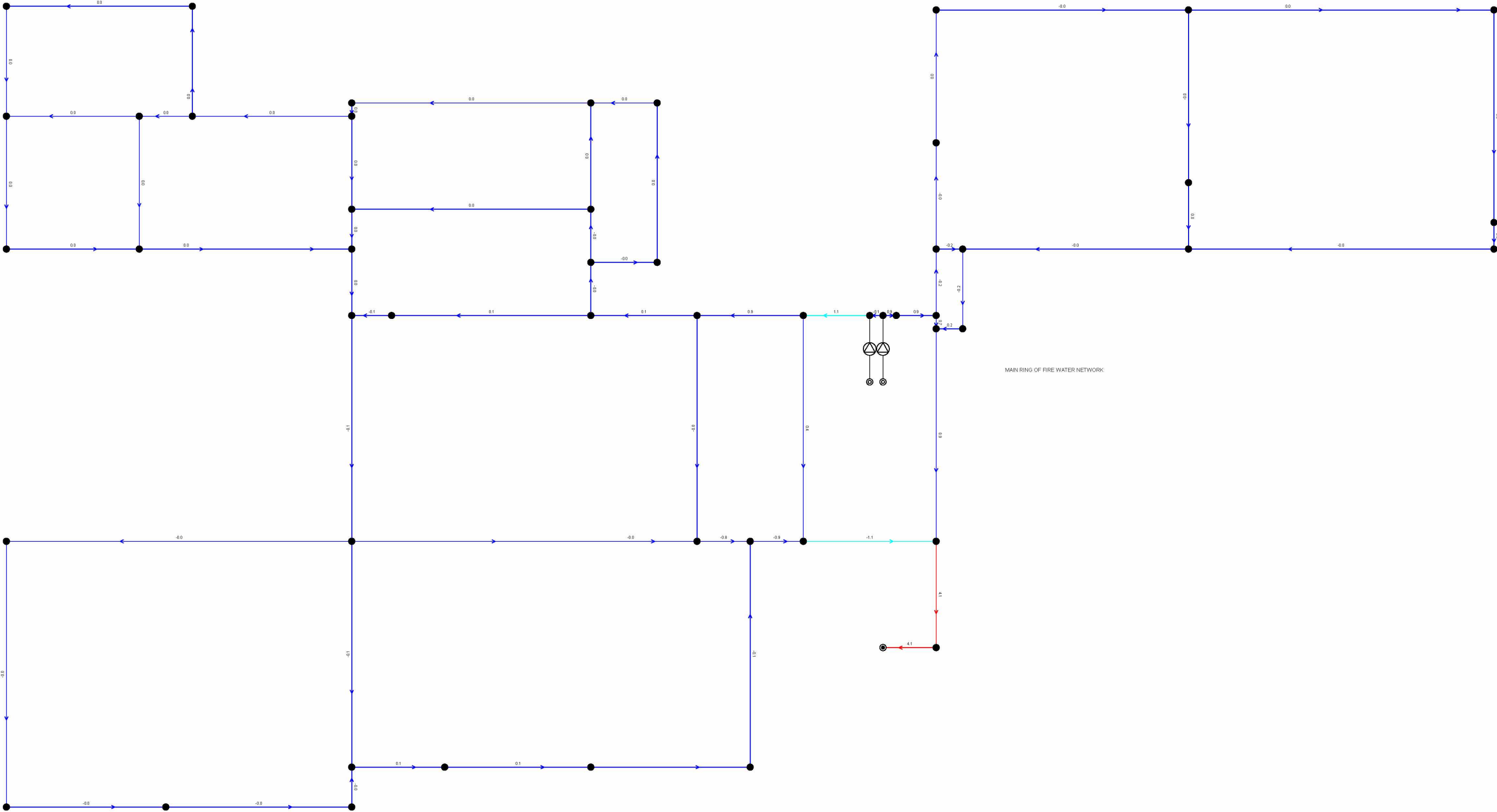


MAIN RING OF FIRE WATER NETWORK

Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		2E 21, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		2E 21, 2021	Page 1 of 1
Pressure (Bar G)	 < 7.000000	 < 7.500000	 < 8.000000
	 < 8.500000	 < 9.000000	 > 9.000000
Pipe vol. flow (m³/h)	 < 600.000000	 < 1200.000000	 < 1800.000000
	 < 2400.000000	 < 3450.000000	 > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	2E	21, 2021	Page 1 of 1
Pipe velocity (m/sec)	< 0.000000	< 1.000000	< 2.000000
	< 3.000000	< 3.500000	> 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

17:00 on 21-May-2021

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Designed Diameters & Flowrates.....	8
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Flow at Inlets.....	13
Flow at Outlets.....	14
Important Notice.....	15
Comments.....	16
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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
39	56	57	12.00	20.00	0.000	150.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13
45	39	33	12.00	97.00	0.000	120.0	16.46

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
32	1	x 4	27.13	
33	1	x 2	7.925	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-430.5041	3	16.8760	18.0000	*
2	2	5	117.7888	3	13.1240	14.0000	*
3	5	4	-465.0776	3	16.8760	18.0000	*
4	2	37	465.0776	3	16.8760	18.0000	*
5	37	35	40.2560	3	16.8760	18.0000	*
6	68	2	582.8664	3	16.8760	18.0000	*
7	6	37	-424.8216	3	16.8760	18.0000	*
8	67	10	490.1361	3	16.8760	18.0000	*
9	35	34	29.9830	3	16.8760	18.0000	*
10	6	9	-5.6824	3	16.8760	18.0000	*
11	9	29	-40.2560	3	16.8760	18.0000	*
12	43	1	2.8821	3	11.9380	12.0000	*
13	66	30	490.1361	3	16.8760	18.0000	*
14	14	29	10.2731	3	11.9380	12.0000	*
15	38	12	5.0359	3	11.9380	12.0000	*
16	38	23	-6.3648	3	11.9380	12.0000	*
17	12	14	7.3909	3	11.9380	12.0000	*
18	43	12	2.3550	3	11.9380	12.0000	*
19	16	15	5.2371	3	11.9380	12.0000	*
20	38	16	1.3288	3	11.9380	12.0000	*
21	17	14	2.8821	3	11.9380	12.0000	*
22	18	17	1.5641	3	11.9380	12.0000	*
23	1	18	2.0337	3	11.9380	12.0000	*
24	19	17	1.3180	3	11.9380	12.0000	*
25	20	19	1.3180	3	11.9380	12.0000	*
26	18	20	0.4695	3	11.9380	12.0000	*
27	21	20	0.8485	3	11.9380	12.0000	*
28	22	21	0.8485	3	11.9380	12.0000	*
29	1	22	0.8485	3	11.9380	12.0000	*
30	4	32	-34.5736	3	16.8760	18.0000	*
31	32	24	-34.5736	3	16.8760	18.0000	*
32	63	9	-26.4889	3	16.8760	18.0000	*
33	63	25	-8.0847	3	13.1240	14.0000	*
34	11	7	-8.0847	3	13.1240	14.0000	*
35	7	27	-8.0847	3	13.1240	14.0000	*
36	27	9	-8.0847	3	13.1240	14.0000	*
37	49	26	8.0245	9	18.0000	18.0000	*
38	30	5	-582.8664	3	16.8760	18.0000	*
39	56	57	1073.0024	9	12.0000	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
42	33	16	3.9083	3	11.9380	12.0000	*
43	39	23	-3.9083	3	11.9380	12.0000	*
44	29	34	-29.9830	3	16.8760	18.0000	*
45	39	33	3.9083	3	11.9380	12.0000	*
47	45	10	-126.3863	9	20.0000	20.0000	*
48	23	35	-10.2731	3	11.9380	12.0000	*
49	70	66	126.3863	9	20.0000	20.0000	*
50	25	11	-8.0847	3	13.1240	14.0000	*
52	41	24	34.5736	3	16.8760	18.0000	*
54	15	43	5.2371	3	11.9380	12.0000	*
56	58	45	-102.2696	9	18.0000	18.0000	*
57	59	44	24.1168	9	18.0000	18.0000	*
58	73	44	-24.1168	9	18.0000	18.0000	*
59	10	66	363.7498	3	16.8760	18.0000	*
60	73	48	8.0245	9	18.0000	18.0000	*
61	72	26	-8.0245	9	18.0000	18.0000	*
62	48	49	8.0245	9	18.0000	18.0000	*
69	30	56	1073.0023	3	11.9380	12.0000	*
72	59	45	-24.1168	9	18.0000	18.0000	*
75	63	41	34.5736	3	16.8760	18.0000	*
77	58	72	-24.1168	9	18.0000	18.0000	*
80	70	58	-126.3863	9	20.0000	20.0000	*
84	71	73	-16.0922	9	18.0000	18.0000	*
85	71	72	16.0922	9	18.0000	18.0000	*
90	68	3	-46.2560	3	16.8760	18.0000	*
91	3	67	490.1361	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined
9	-- Reinforced Fiber Gla	Not Lined

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.913	9.914	-1.2703E-03	1.2703E-03	-430.5	-0.8287
2	2	5	14.00	9.920	9.910	9.9354E-03	9.9354E-03	117.8	0.3749
3	5	4	18.00	9.910	9.913	-2.8229E-03	2.8229E-03	-465.1	-0.8952
4	2	37	18.00	9.920	9.915	5.3177E-03	5.3177E-03	465.1	0.8952
5	37	35	18.00	9.915	9.915	1.6975E-04	1.6975E-04	40.26	7.7488E-02
6	68	2	18.00	9.932	9.920	1.1462E-02	1.1462E-02	582.9	1.122
7	6	37	18.00	9.914	9.915	-5.2452E-04	5.2452E-04	-424.8	-0.8177
8	67	10	18.00	9.931	9.914	1.6706E-02	1.6706E-02	490.1	0.9434
9	35	34	18.00	9.915	9.915	1.4496E-04	1.4496E-04	29.98	5.7713E-02
10	6	9	18.00	9.914	9.914	1.1826E-04	1.1826E-04	-5.682	-1.0938E-02
11	9	29	18.00	9.914	9.915	-2.7561E-04	2.7561E-04	-40.26	-7.7488E-02
12	43	1	12.00	9.915	9.915	7.6294E-06	0.000	2.882	1.1086E-02
13	66	30	18.00	9.913	9.884	2.9122E-02	2.9122E-02	490.1	0.9434
14	14	29	12.00	9.915	9.915	4.7684E-05	4.7684E-05	10.27	3.9516E-02
15	38	12	12.00	9.915	9.915	5.0545E-05	5.0545E-05	5.036	1.9371E-02
16	38	23	12.00	9.915	9.915	-1.7166E-05	1.7166E-05	-6.365	-2.4483E-02
17	12	14	12.00	9.915	9.915	2.1935E-05	2.1935E-05	7.391	2.8430E-02
18	43	12	12.00	9.915	9.915	0.000	0.000	2.355	9.0587E-03
19	16	15	12.00	9.915	9.915	4.2915E-05	4.2915E-05	5.237	2.0145E-02
20	38	16	12.00	9.915	9.915	2.8610E-06	0.000	1.329	5.1114E-03
21	17	14	12.00	9.915	9.915	9.5367E-06	0.000	2.882	1.1086E-02
22	18	17	12.00	9.915	9.915	2.8610E-06	0.000	1.564	6.0165E-03
23	1	18	12.00	9.915	9.915	1.9073E-06	0.000	2.034	7.8227E-03
24	19	17	12.00	9.915	9.915	2.8610E-06	0.000	1.318	5.0698E-03
25	20	19	12.00	9.915	9.915	0.000	0.000	1.318	5.0698E-03
26	18	20	12.00	9.915	9.915	0.000	0.000	0.4695	1.8061E-03
27	21	20	12.00	9.915	9.915	0.000	0.000	0.8485	3.2637E-03
28	22	21	12.00	9.915	9.915	1.9073E-06	0.000	0.8485	3.2637E-03
29	1	22	12.00	9.915	9.915	0.000	0.000	0.8485	3.2637E-03
30	4	32	18.00	9.913	9.914	-4.1485E-04	4.1485E-04	-34.57	-6.6550E-02
31	32	24	18.00	9.914	9.914	-2.4509E-04	2.4509E-04	-34.57	-6.6550E-02
32	63	9	18.00	9.914	9.914	-2.2411E-04	2.2411E-04	-26.49	-5.0988E-02
33	63	25	14.00	9.914	9.914	-9.5367E-06	0.000	-8.085	-2.5732E-02
34	11	7	14.00	9.914	9.914	-3.5286E-05	3.5286E-05	-8.085	-2.5732E-02
35	7	27	14.00	9.914	9.914	-6.9618E-05	6.9618E-05	-8.085	-2.5732E-02
36	27	9	14.00	9.914	9.914	-7.2479E-05	7.2479E-05	-8.085	-2.5732E-02
37	49	26	18.00	9.914	9.914	0.000	0.000	8.025	1.3577E-02
38	30	5	18.00	9.884	9.910	-2.6702E-02	2.6702E-02	-582.9	-1.122
39	56	57	12.00	9.415	9.348	6.7125E-02	6.7125E-02	1073.	4.085
42	33	16	12.00	9.915	9.915	4.7684E-06	0.000	3.908	1.5034E-02
43	39	23	12.00	9.915	9.915	-4.7684E-06	0.000	-3.908	-1.5034E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
44	29	34	18.00	9.915	9.915	-5.2452E-05	5.2452E-05	-29.98	-5.7713E-02
45	39	33	12.00	9.915	9.915	1.0490E-05	1.0490E-05	3.908	1.5034E-02
47	45	10	20.00	9.914	9.914	-2.0504E-04	2.0504E-04	-126.4	-0.1732
48	23	35	12.00	9.915	9.915	-6.0081E-05	6.0081E-05	-10.27	-3.9516E-02
49	70	66	20.00	9.913	9.913	2.3270E-04	2.3270E-04	126.4	0.1732
50	25	11	14.00	9.914	9.914	-3.7193E-05	3.7193E-05	-8.085	-2.5732E-02
52	41	24	18.00	9.914	9.914	1.1539E-04	1.1539E-04	34.57	6.6550E-02
54	15	43	12.00	9.915	9.915	4.7684E-06	0.000	5.237	2.0145E-02
56	58	45	18.00	9.913	9.914	-2.3460E-04	2.3460E-04	-102.3	-0.1730
57	59	44	18.00	9.914	9.914	3.8147E-05	3.8147E-05	24.12	4.0805E-02
58	73	44	18.00	9.914	9.914	-6.9618E-05	6.9618E-05	-24.12	-4.0805E-02
59	10	66	18.00	9.914	9.913	1.1873E-03	1.1873E-03	363.7	0.7002
60	73	48	18.00	9.914	9.914	1.2398E-05	1.2398E-05	8.025	1.3577E-02
61	72	26	18.00	9.914	9.914	-1.2398E-05	1.2398E-05	-8.025	-1.3577E-02
62	48	49	18.00	9.914	9.914	7.6294E-06	0.000	8.025	1.3577E-02
69	30	56	12.00	9.884	9.415	0.4681	0.4681	1073.	4.127
72	59	45	18.00	9.914	9.914	-2.9564E-05	2.9564E-05	-24.12	-4.0805E-02
75	63	41	18.00	9.914	9.914	1.5259E-04	1.5259E-04	34.57	6.6550E-02
77	58	72	18.00	9.913	9.914	-6.4850E-05	6.4850E-05	-24.12	-4.0805E-02
80	70	58	20.00	9.913	9.913	-5.1498E-04	5.1498E-04	-126.4	-0.1732
84	71	73	18.00	9.914	9.914	-2.0027E-05	2.0027E-05	-16.09	-2.7228E-02
85	71	72	18.00	9.914	9.914	1.2398E-05	1.2398E-05	16.09	2.7228E-02
90	68	3	18.00	9.932	9.932	-3.2234E-04	3.2234E-04	-46.26	-8.9037E-02
91	3	67	18.00	9.932	9.931	1.4067E-03	1.4067E-03	490.1	0.9434

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	536.6	0.000	9.932	9.932	10.17	0.1002	1.4804E+05	100.0
2	536.4	0.000	9.932	9.932	10.17	0.1002	1.4798E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 536.4	0.0000
31	0.000	* 536.6	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
57	9.348	1073. *	350.94

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 21-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

COMMENTS

Analysis Converged in 2 Iterations

WARNINGS

*** WARNING - Velocity in pipe	39	exceeds specified maximum
*** WARNING - Velocity in pipe	69	exceeds specified maximum

=====

Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

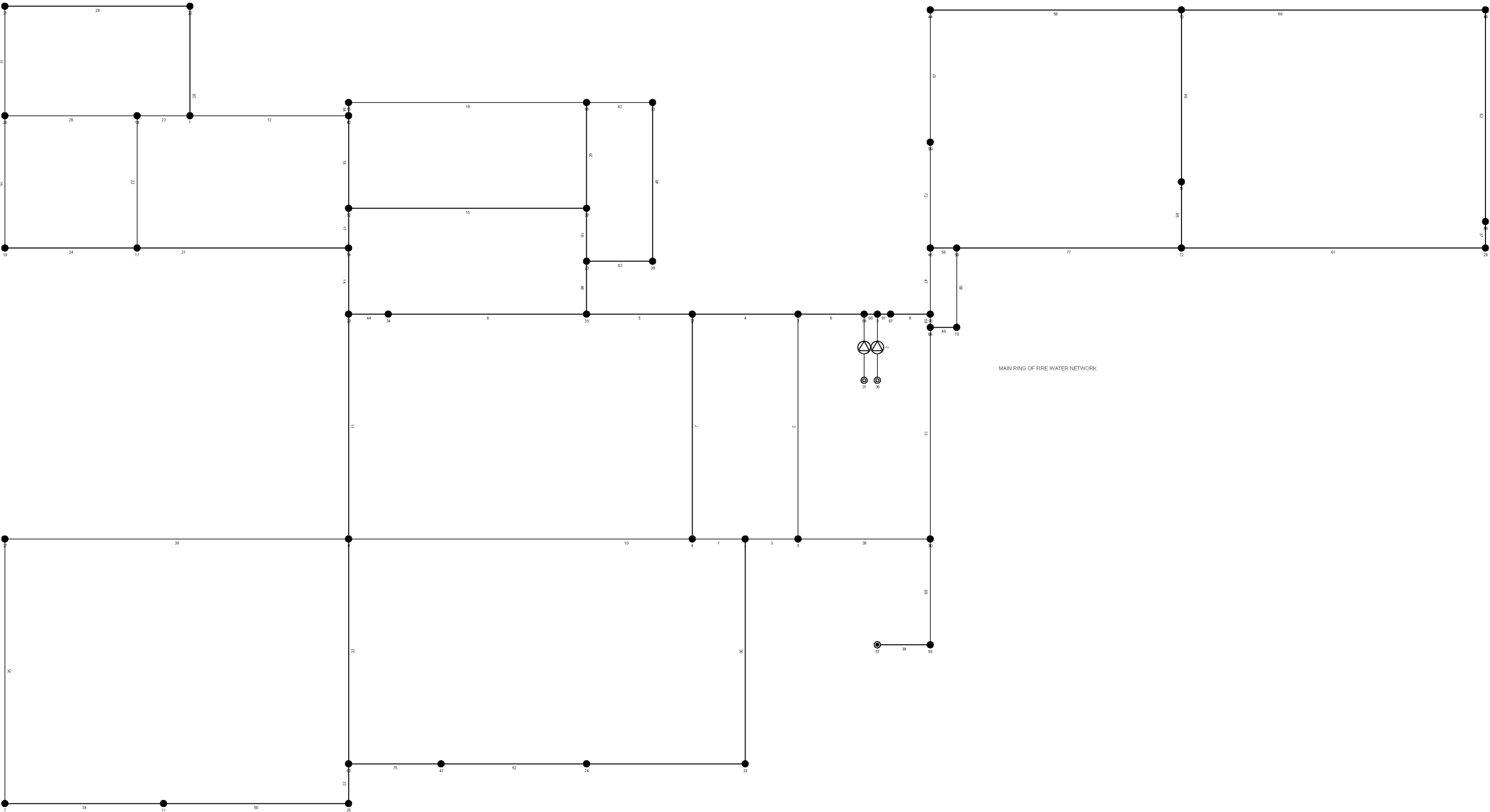
Attachment	3	Fire scenario in the biopropane storage area – case B
	3.A	PIPENET schematic layout with piping and nodes label
	3.B	PIPENET schematic layout with flow rate and pressure results
	3.C	PIPENET schematic layout with velocity results
	3.D	PIPENET input/output printout report

Attachment 3.A contains 1 page

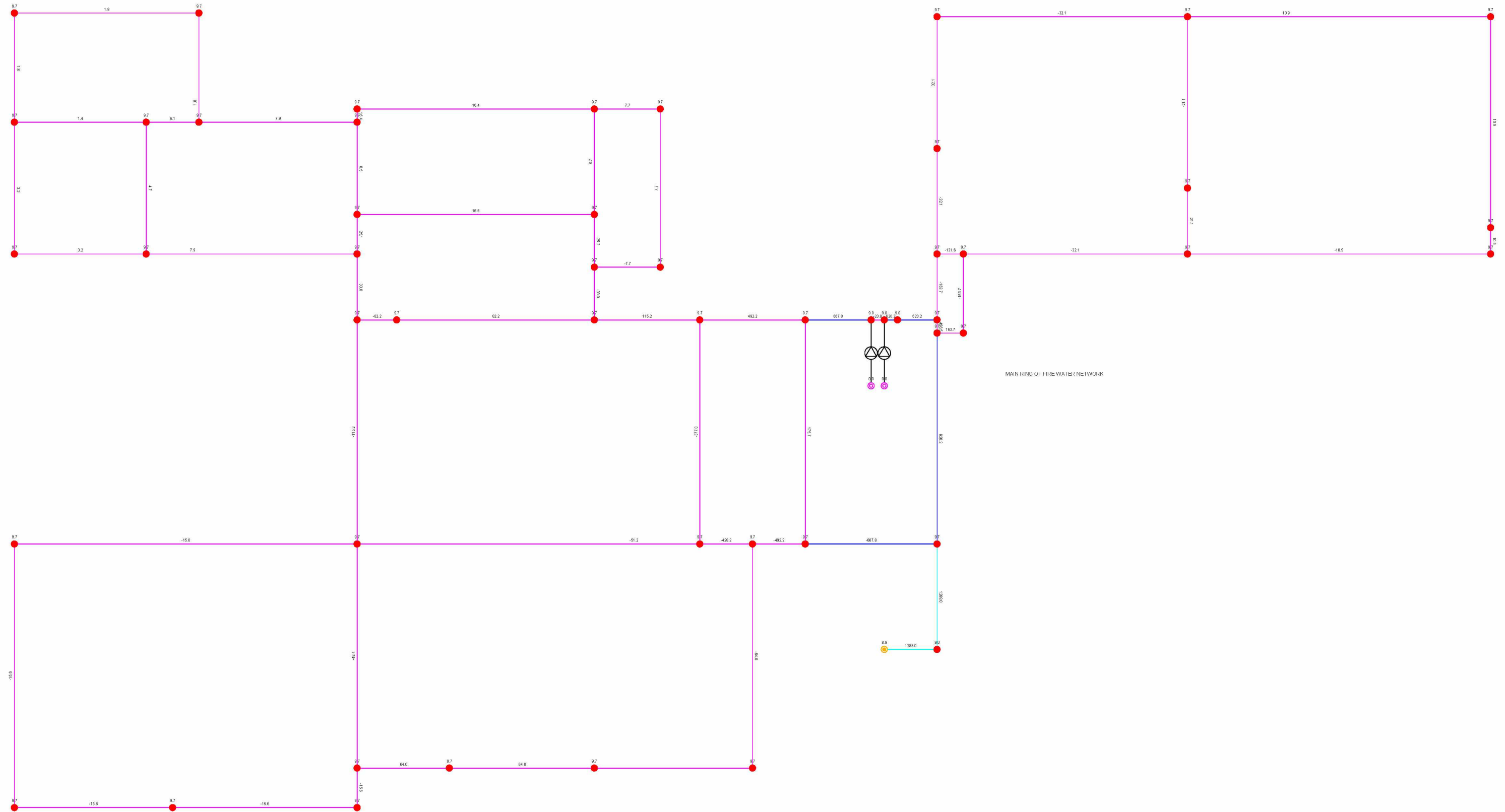
Attachment 3.B contains 1 page

Attachment 3.C contains 1 page

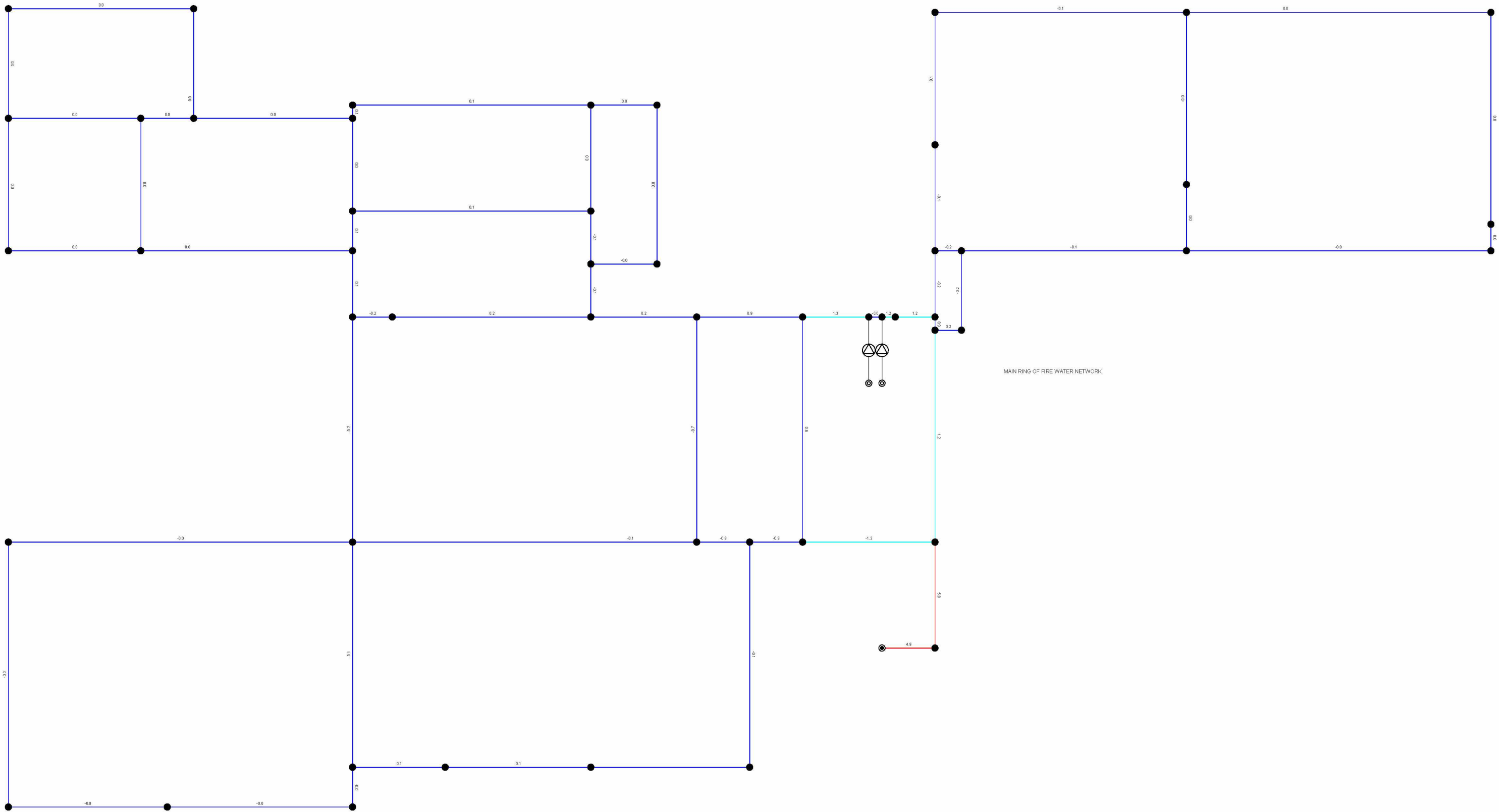
Attachment 3.D contains 20 pages



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PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Wednesday, May 26, 2021	
		Page 1 of 1	
Pressure	< 7.000000	< 7.500000	< 8.000000
(Bar G)	< 8.500000	< 9.000000	> 9.000000
Pipe vol. flow	< 600.000000	< 1200.000000	< 1800.000000
(m³/h)	< 2400.000000	< 3450.000000	> 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Wednesday, May 26, 2021		Page 1 of 1
Pipe velocity (m/sec)	 < 0.000000	 < 1.000000	 < 2.000000
	 < 3.000000	 < 3.500000	 > 3.500000

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PIPENET SPRAY/SPRINKLER MODULE

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VERSION 1.9.0

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Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

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12:29 on 26-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :		
Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
39	56	57	12.00	20.00	0.000	150.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13
45	39	33	12.00	97.00	0.000	120.0	16.46

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
32	1	x 4	27.13	
33	1	x 2	7.925	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-428.1852	3	16.8760	18.0000	*
2	2	5	175.6768	3	13.1240	14.0000	*
3	5	4	-492.1690	3	16.8760	18.0000	*
4	2	37	492.1690	3	16.8760	18.0000	*
5	37	35	115.2020	3	16.8760	18.0000	*
6	68	2	667.8458	3	16.8760	18.0000	*
7	6	37	-376.9670	3	16.8760	18.0000	*
8	67	10	620.1571	3	16.8760	18.0000	*
9	35	34	82.2189	3	16.8760	18.0000	*
10	6	9	-51.2182	3	16.8760	18.0000	*
11	9	29	-115.2020	3	16.8760	18.0000	*
12	43	1	7.8815	3	11.9380	12.0000	*
13	66	30	620.1571	3	16.8760	18.0000	*
14	14	29	32.9831	3	11.9380	12.0000	*
15	38	12	16.5525	3	11.9380	12.0000	*
16	38	23	-25.2424	3	11.9380	12.0000	*
17	12	14	25.1017	3	11.9380	12.0000	*
18	43	12	8.5492	3	11.9380	12.0000	*
19	16	15	16.4307	3	11.9380	12.0000	*
20	38	16	8.6899	3	11.9380	12.0000	*
21	17	14	7.8815	3	11.9380	12.0000	*
22	18	17	4.7216	3	11.9380	12.0000	*
23	1	18	6.0960	3	11.9380	12.0000	*
24	19	17	3.1599	3	11.9380	12.0000	*
25	20	19	3.1599	3	11.9380	12.0000	*
26	18	20	1.3745	3	11.9380	12.0000	*
27	21	20	1.7854	3	11.9380	12.0000	*
28	22	21	1.7854	3	11.9380	12.0000	*
29	1	22	1.7854	3	11.9380	12.0000	*
30	4	32	-63.9838	3	16.8760	18.0000	*
31	32	24	-63.9838	3	16.8760	18.0000	*
32	63	9	-48.3997	3	16.8760	18.0000	*
33	63	25	-15.5842	3	13.1240	14.0000	*
34	11	7	-15.5842	3	13.1240	14.0000	*
35	7	27	-15.5842	3	13.1240	14.0000	*
36	27	9	-15.5842	3	13.1240	14.0000	*
37	49	26	10.9484	9	18.0000	18.0000	*
38	30	5	-667.8458	3	16.8760	18.0000	*
39	56	57	1288.0029	9	12.0000	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
42	33	16	7.7408	3	11.9380	12.0000	*
43	39	23	-7.7408	3	11.9380	12.0000	*
44	29	34	-82.2189	3	16.8760	18.0000	*
45	39	33	7.7408	3	11.9380	12.0000	*
47	45	10	-163.6514	9	20.0000	20.0000	*
48	23	35	-32.9831	3	11.9380	12.0000	*
49	70	66	163.6514	9	20.0000	20.0000	*
50	25	11	-15.5842	3	13.1240	14.0000	*
52	41	24	63.9838	3	16.8760	18.0000	*
54	15	43	16.4307	3	11.9380	12.0000	*
56	58	45	-131.5706	9	18.0000	18.0000	*
57	59	44	32.0807	9	18.0000	18.0000	*
58	73	44	-32.0807	9	18.0000	18.0000	*
59	10	66	456.5057	3	16.8760	18.0000	*
60	73	48	10.9484	9	18.0000	18.0000	*
61	72	26	-10.9484	9	18.0000	18.0000	*
62	48	49	10.9484	9	18.0000	18.0000	*
69	30	56	1288.0027	3	11.9380	12.0000	*
72	59	45	-32.0807	9	18.0000	18.0000	*
75	63	41	63.9838	3	16.8760	18.0000	*
77	58	72	-32.0807	9	18.0000	18.0000	*
80	70	58	-163.6514	9	20.0000	20.0000	*
84	71	73	-21.1323	9	18.0000	18.0000	*
85	71	72	21.1323	9	18.0000	18.0000	*
90	68	3	-23.7611	3	16.8760	18.0000	*
91	3	67	620.1571	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined
9	-- Reinforced Fiber Gla	Not Lined

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.729	9.731	-2.4443E-03	2.4443E-03	-428.2	-0.8242
2	2	5	14.00	9.745	9.724	2.1442E-02	2.1442E-02	175.7	0.5591
3	5	4	18.00	9.724	9.729	-4.6730E-03	4.6730E-03	-492.2	-0.9474
4	2	37	18.00	9.745	9.737	8.8024E-03	8.8024E-03	492.2	0.9474
5	37	35	18.00	9.737	9.735	1.2579E-03	1.2579E-03	115.2	0.2217
6	68	2	18.00	9.762	9.745	1.6478E-02	1.6478E-02	667.8	1.286
7	6	37	18.00	9.731	9.737	-5.5227E-03	5.5227E-03	-377.0	-0.7256
8	67	10	18.00	9.760	9.734	2.6384E-02	2.6384E-02	620.2	1.194
9	35	34	18.00	9.735	9.734	1.0672E-03	1.0672E-03	82.22	0.1583
10	6	9	18.00	9.731	9.732	-7.9823E-04	7.9823E-04	-51.22	-9.8588E-02
11	9	29	18.00	9.732	9.734	-2.0075E-03	2.0075E-03	-115.2	-0.2217
12	43	1	12.00	9.734	9.734	6.9618E-05	6.9618E-05	7.881	3.0317E-02
13	66	30	18.00	9.732	9.686	4.6000E-02	4.6000E-02	620.2	1.194
14	14	29	12.00	9.734	9.734	3.3951E-04	3.3951E-04	32.98	0.1269
15	38	12	12.00	9.735	9.734	3.6240E-04	3.6240E-04	16.55	6.3671E-02
16	38	23	12.00	9.735	9.735	-1.5450E-04	1.5450E-04	-25.24	-9.7097E-02
17	12	14	12.00	9.734	9.734	1.6785E-04	1.6785E-04	25.10	9.6556E-02
18	43	12	12.00	9.734	9.734	1.7166E-05	1.7166E-05	8.549	3.2885E-02
19	16	15	12.00	9.735	9.734	3.0231E-04	3.0231E-04	16.43	6.3202E-02
20	38	16	12.00	9.735	9.735	7.6294E-06	0.000	8.690	3.3426E-02
21	17	14	12.00	9.734	9.734	8.4877E-05	8.4877E-05	7.881	3.0317E-02
22	18	17	12.00	9.734	9.734	2.0027E-05	2.0027E-05	4.722	1.8162E-02
23	1	18	12.00	9.734	9.734	1.0490E-05	1.0490E-05	6.096	2.3449E-02
24	19	17	12.00	9.734	9.734	1.0490E-05	1.0490E-05	3.160	1.2155E-02
25	20	19	12.00	9.734	9.734	7.6294E-06	0.000	3.160	1.2155E-02
26	18	20	12.00	9.734	9.734	1.9073E-06	0.000	1.374	5.2870E-03
27	21	20	12.00	9.734	9.734	4.7684E-06	0.000	1.785	6.8678E-03
28	22	21	12.00	9.734	9.734	1.9073E-06	0.000	1.785	6.8678E-03
29	1	22	12.00	9.734	9.734	5.7220E-06	0.000	1.785	6.8678E-03
30	4	32	18.00	9.729	9.730	-1.1568E-03	1.1568E-03	-63.98	-0.1232
31	32	24	18.00	9.730	9.730	-6.9046E-04	6.9046E-04	-63.98	-0.1232
32	63	9	18.00	9.731	9.732	-6.4278E-04	6.4278E-04	-48.40	-9.3163E-02
33	63	25	14.00	9.731	9.731	-2.9564E-05	2.9564E-05	-15.58	-4.9601E-02
34	11	7	14.00	9.731	9.731	-9.2506E-05	9.2506E-05	-15.58	-4.9601E-02
35	7	27	14.00	9.731	9.732	-2.0027E-04	2.0027E-04	-15.58	-4.9601E-02
36	27	9	14.00	9.732	9.732	-2.1267E-04	2.1267E-04	-15.58	-4.9601E-02
37	49	26	18.00	9.733	9.733	1.9073E-06	0.000	10.95	1.8524E-02
38	30	5	18.00	9.686	9.724	-3.8392E-02	3.8392E-02	-667.8	-1.286
39	56	57	12.00	9.029	8.935	9.4108E-02	9.4108E-02	1288.	4.903
42	33	16	12.00	9.735	9.735	4.7684E-05	4.7684E-05	7.741	2.9776E-02
43	39	23	12.00	9.735	9.735	-4.6730E-05	4.6730E-05	-7.741	-2.9776E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
44	29	34	18.00	9.734	9.734	-3.9196E-04	3.9196E-04	-82.22	-0.1583
45	39	33	12.00	9.735	9.735	6.7711E-05	6.7711E-05	7.741	2.9776E-02
47	45	10	20.00	9.733	9.734	-3.4523E-04	3.4523E-04	-163.7	-0.2243
48	23	35	12.00	9.735	9.735	-4.3488E-04	4.3488E-04	-32.98	-0.1269
49	70	66	20.00	9.732	9.732	3.9005E-04	3.9005E-04	163.7	0.2243
50	25	11	14.00	9.731	9.731	-1.0777E-04	1.0777E-04	-15.58	-4.9601E-02
52	41	24	18.00	9.731	9.730	3.2234E-04	3.2234E-04	63.98	0.1232
54	15	43	12.00	9.734	9.734	3.5286E-05	3.5286E-05	16.43	6.3202E-02
56	58	45	18.00	9.733	9.733	-3.9291E-04	3.9291E-04	-131.6	-0.2226
57	59	44	18.00	9.733	9.733	6.0081E-05	6.0081E-05	32.08	5.4280E-02
58	73	44	18.00	9.733	9.733	-1.1730E-04	1.1730E-04	-32.08	-5.4280E-02
59	10	66	18.00	9.734	9.732	1.9855E-03	1.9855E-03	456.5	0.8787
60	73	48	18.00	9.733	9.733	2.0027E-05	2.0027E-05	10.95	1.8524E-02
61	72	26	18.00	9.733	9.733	-2.0027E-05	2.0027E-05	-10.95	-1.8524E-02
62	48	49	18.00	9.733	9.733	1.2398E-05	1.2398E-05	10.95	1.8524E-02
69	30	56	12.00	9.686	9.029	0.6563	0.6563	1288.	4.954
72	59	45	18.00	9.733	9.733	-5.0545E-05	5.0545E-05	-32.08	-5.4280E-02
75	63	41	18.00	9.731	9.731	4.3011E-04	4.3011E-04	63.98	0.1232
77	58	72	18.00	9.733	9.733	-1.1063E-04	1.1063E-04	-32.08	-5.4280E-02
80	70	58	20.00	9.732	9.733	-8.5735E-04	8.5735E-04	-163.7	-0.2243
84	71	73	18.00	9.733	9.733	-3.4332E-05	3.4332E-05	-21.13	-3.5755E-02
85	71	72	18.00	9.733	9.733	2.0027E-05	2.0027E-05	21.13	3.5755E-02
90	68	3	18.00	9.762	9.762	-2.8229E-04	2.8229E-04	-23.76	-4.5737E-02
91	3	67	18.00	9.762	9.760	2.2249E-03	2.2249E-03	620.2	1.194

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	644.1	0.000	9.762	9.762	10.17	0.1020	1.7465E+05	100.0
2	643.9	0.000	9.762	9.762	10.17	0.1020	1.7461E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 643.9	0.0000
31	0.000	* 644.1	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
57	8.935	1288. *	430.89

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 26-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 26-May-2021

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COMMENTS

Analysis Converged in 2 Iterations

WARNINGS

*** WARNING - Velocity in pipe	39	exceeds specified maximum
*** WARNING - Velocity in pipe	69	exceeds specified maximum

=====

Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

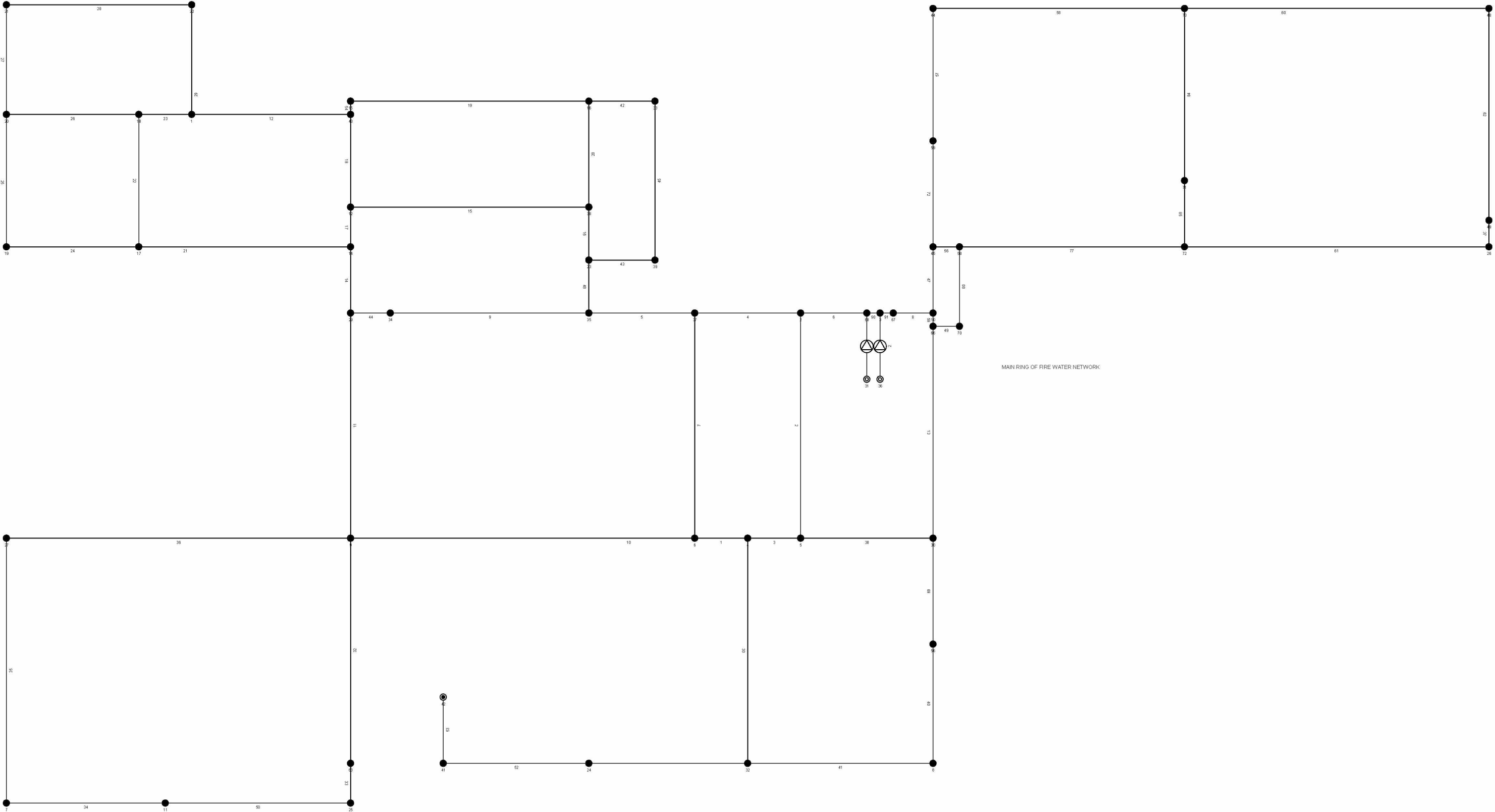
Attachment	4	Fire scenario in the naphtha storage area-Tank rim fire- Case A1
	4.A	PIPENET schematic layout with piping and nodes label
	4.B	PIPENET schematic layout with flow rate and pressure results
	4.C	PIPENET schematic layout with velocity results
	4.D	PIPENET input/output printout report

Attachment 4.A contains 1 page

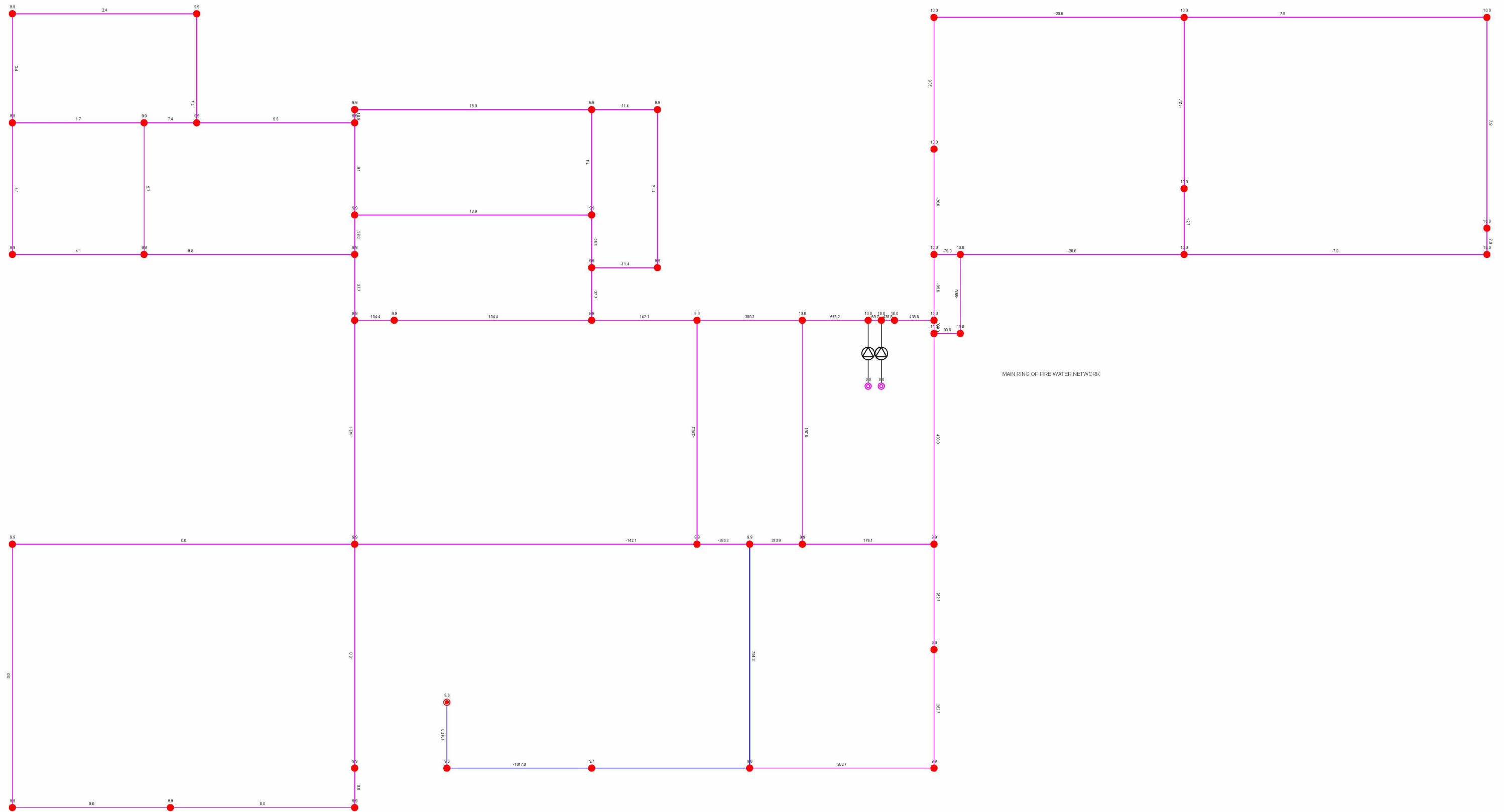
Attachment 4.B contains 1 page

Attachment 4.C contains 1 page

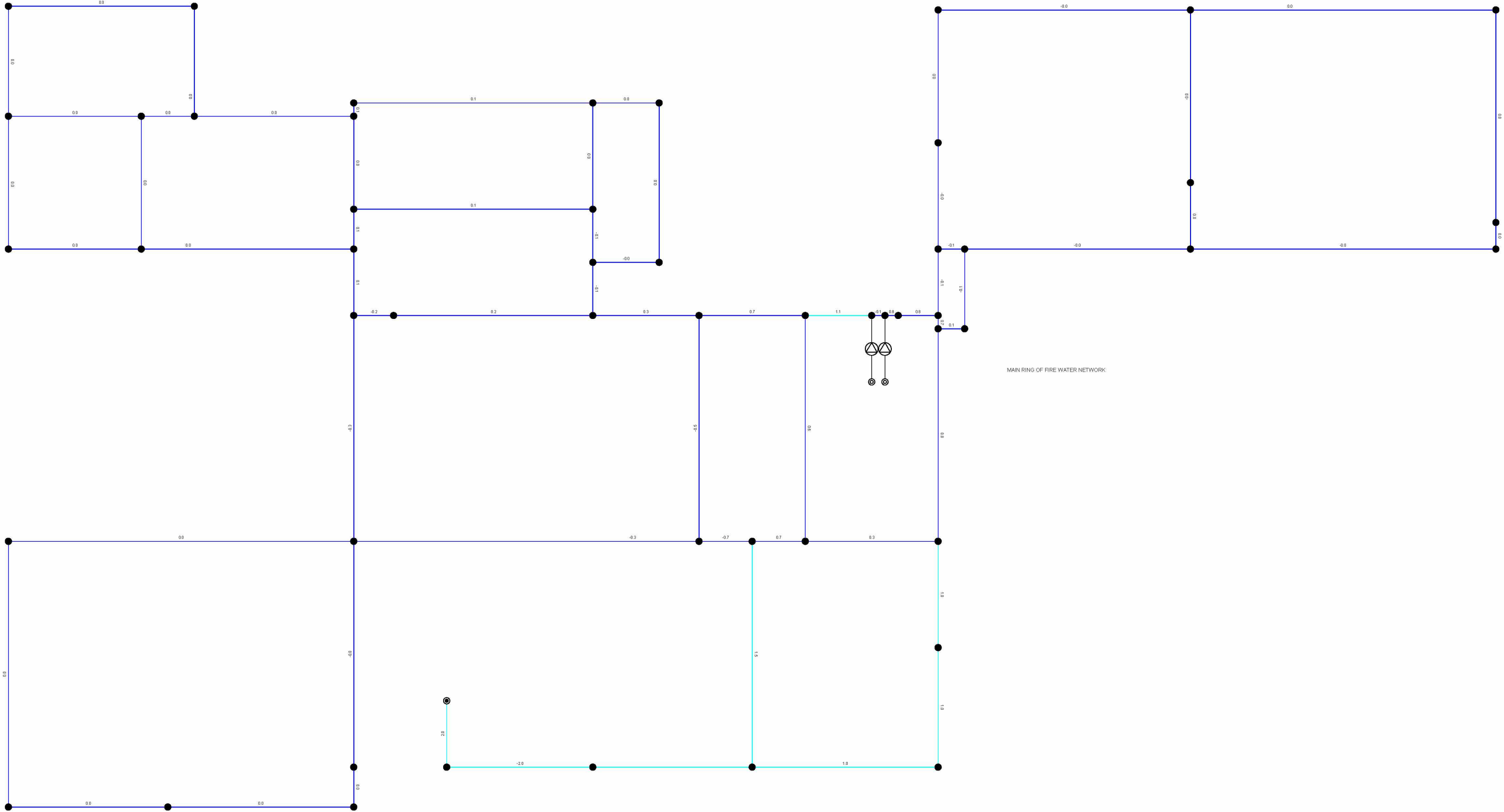
Attachment 4.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	2E	21, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		2E 21, 2021	Page 1 of 1
Pressure (Bar G)	 < 7.000000	 < 7.500000	 < 8.000000
	 < 8.500000	 < 9.000000	 > 9.000000
Pipe vol. flow (m³/h)	 < 600.000000	 < 1200.000000	 < 1800.000000
	 < 2400.000000	 < 3450.000000	 > 3450.000000



MAIN RING OF FIRE WATER NETWORK

Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	2E	21, 2021	Page 1 of 1
Pipe velocity (m/sec)	< 0.000000	< 1.000000	< 2.000000
	< 3.000000	< 3.500000	> 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

17:16 on 21-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :		
Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
53	41	42	18.00	20.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
30	2	x 4	27.13	
32	1	x 4	27.13	
33	1	x 2	7.925	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
40	1	x 2	8.230	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-380.3428	3	16.8760	18.0000	*
2	2	5	197.8274	3	13.1240	14.0000	*
3	5	4	373.9291	3	16.8760	18.0000	*
4	2	37	380.3428	3	16.8760	18.0000	*
5	37	35	142.0989	3	16.8760	18.0000	*
6	68	2	578.1702	3	16.8760	18.0000	*
7	6	37	-238.2439	3	16.8760	18.0000	*
8	67	10	438.8322	3	16.8760	18.0000	*
9	35	34	104.3539	3	16.8760	18.0000	*
10	6	9	-142.0989	3	16.8760	18.0000	*
11	9	29	-142.0989	3	16.8760	18.0000	*
12	43	1	9.7780	3	11.9380	12.0000	*
13	66	30	438.8322	3	16.8760	18.0000	*
14	14	29	37.7449	3	11.9380	12.0000	*
15	38	12	18.8880	3	11.9380	12.0000	*
16	38	23	-26.3349	3	11.9380	12.0000	*
17	12	14	27.9669	3	11.9380	12.0000	*
18	43	12	9.0790	3	11.9380	12.0000	*
19	16	15	18.8570	3	11.9380	12.0000	*
20	38	16	7.4469	3	11.9380	12.0000	*
21	17	14	9.7780	3	11.9380	12.0000	*
22	18	17	5.6846	3	11.9380	12.0000	*
23	1	18	7.4002	3	11.9380	12.0000	*
24	19	17	4.0934	3	11.9380	12.0000	*
25	20	19	4.0934	3	11.9380	12.0000	*
26	18	20	1.7155	3	11.9380	12.0000	*
27	21	20	2.3778	3	11.9380	12.0000	*
28	22	21	2.3778	3	11.9380	12.0000	*
29	1	22	2.3778	3	11.9380	12.0000	*
30	4	32	754.2718	3	16.8760	18.0000	*
31	32	24	1017.0023	3	16.8760	18.0000	*
32	63	9	-0.0000	3	16.8760	18.0000	*
33	63	25	0.0000	3	13.1240	14.0000	*
34	11	7	0.0000	3	13.1240	14.0000	*
35	7	27	0.0000	3	13.1240	14.0000	*
36	27	9	0.0000	3	13.1240	14.0000	*
37	49	26	7.9045	9	18.0000	18.0000	*
38	30	5	176.1017	3	16.8760	18.0000	*
40	56	8	262.7304	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	262.7304	3	11.9380	12.0000	*
42	33	16	11.4100	3	11.9380	12.0000	*
43	39	23	-11.4100	3	11.9380	12.0000	*
44	29	34	-104.3539	3	16.8760	18.0000	*
45	39	33	11.4100	3	11.9380	12.0000	*
47	45	10	-99.5591	9	20.0000	20.0000	*
48	23	35	-37.7449	3	11.9380	12.0000	*
49	70	66	99.5591	9	20.0000	20.0000	*
50	25	11	0.0000	3	13.1240	14.0000	*
52	41	24	-1017.0023	3	16.8760	18.0000	*
53	41	42	1017.0023	3	16.8760	18.0000	*
54	15	43	18.8570	3	11.9380	12.0000	*
56	58	45	-78.9720	9	18.0000	18.0000	*
57	59	44	20.5871	9	18.0000	18.0000	*
58	73	44	-20.5871	9	18.0000	18.0000	*
59	10	66	339.2730	3	16.8760	18.0000	*
60	73	48	7.9045	9	18.0000	18.0000	*
61	72	26	-7.9045	9	18.0000	18.0000	*
62	48	49	7.9045	9	18.0000	18.0000	*
69	30	56	262.7304	3	11.9380	12.0000	*
72	59	45	-20.5871	9	18.0000	18.0000	*
77	58	72	-20.5871	9	18.0000	18.0000	*
80	70	58	-99.5591	9	20.0000	20.0000	*
84	71	73	-12.6826	9	18.0000	18.0000	*
85	71	72	12.6826	9	18.0000	18.0000	*
90	68	3	-69.6557	3	16.8760	18.0000	*
91	3	67	438.8322	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.926	9.932	-5.5943E-03	5.5943E-03	-380.3	-0.7321
2	2	5	14.00	9.955	9.932	2.3888E-02	2.3888E-02	197.8	0.6296
3	5	4	18.00	9.932	9.926	5.5494E-03	5.5494E-03	373.9	0.7198
4	2	37	18.00	9.955	9.944	1.1928E-02	1.1928E-02	380.3	0.7321
5	37	35	18.00	9.944	9.942	1.8196E-03	1.8196E-03	142.1	0.2735
6	68	2	18.00	9.973	9.955	1.7187E-02	1.7187E-02	578.2	1.113
7	6	37	18.00	9.932	9.944	-1.1915E-02	1.1915E-02	-238.2	-0.4586
8	67	10	18.00	9.972	9.959	1.2742E-02	1.2742E-02	438.8	0.8447
9	35	34	18.00	9.942	9.940	1.5650E-03	1.5650E-03	104.4	0.2009
10	6	9	18.00	9.932	9.937	-5.0526E-03	5.0526E-03	-142.1	-0.2735
11	9	29	18.00	9.937	9.940	-2.9078E-03	2.9078E-03	-142.1	-0.2735
12	43	1	12.00	9.940	9.940	1.0300E-04	1.0300E-04	9.778	3.7612E-02
13	66	30	18.00	9.958	9.936	2.2215E-02	2.2215E-02	438.8	0.8447
14	14	29	12.00	9.940	9.940	4.8542E-04	4.8542E-04	37.74	0.1452
15	38	12	12.00	9.941	9.940	5.3024E-04	5.3024E-04	18.89	7.2654E-02
16	38	23	12.00	9.941	9.941	-2.5272E-04	2.5272E-04	-26.33	-0.1013
17	12	14	12.00	9.940	9.940	2.4414E-04	2.4414E-04	27.97	0.1076
18	43	12	12.00	9.940	9.940	2.5749E-05	2.5749E-05	9.079	3.4923E-02
19	16	15	12.00	9.941	9.940	4.2725E-04	4.2725E-04	18.86	7.2535E-02
20	38	16	12.00	9.941	9.941	2.7657E-05	2.7657E-05	7.447	2.8645E-02
21	17	14	12.00	9.940	9.940	1.2493E-04	1.2493E-04	9.778	3.7612E-02
22	18	17	12.00	9.940	9.940	2.6703E-05	2.6703E-05	5.685	2.1866E-02
23	1	18	12.00	9.940	9.940	1.5259E-05	1.5259E-05	7.400	2.8465E-02
24	19	17	12.00	9.940	9.940	1.2398E-05	1.2398E-05	4.093	1.5746E-02
25	20	19	12.00	9.940	9.940	1.2398E-05	1.2398E-05	4.093	1.5746E-02
26	18	20	12.00	9.940	9.940	1.9073E-06	0.000	1.716	6.5990E-03
27	21	20	12.00	9.940	9.940	4.7684E-06	0.000	2.378	9.1466E-03
28	22	21	12.00	9.940	9.940	7.6294E-06	0.000	2.378	9.1466E-03
29	1	22	12.00	9.940	9.940	4.7684E-06	0.000	2.378	9.1466E-03
30	4	32	18.00	9.926	9.808	0.1178	0.1178	754.3	1.452
31	32	24	18.00	9.808	9.687	0.1213	0.1213	1017.	1.958
32	63	9	18.00	9.937	9.937	0.000	0.000	-4.1889E-09	-8.0631E-12
33	63	25	14.00	9.937	9.937	0.000	0.000	4.1889E-09	1.3332E-11
34	11	7	14.00	9.937	9.937	0.000	0.000	4.1889E-09	1.3332E-11
35	7	27	14.00	9.937	9.937	0.000	0.000	4.1889E-09	1.3332E-11
36	27	9	14.00	9.937	9.937	0.000	0.000	4.1889E-09	1.3332E-11
37	49	26	18.00	9.959	9.959	0.000	0.000	7.904	1.3374E-02
38	30	5	18.00	9.936	9.932	4.0531E-03	4.0531E-03	176.1	0.3390
40	56	8	12.00	9.901	9.863	3.7664E-02	3.7664E-02	262.7	1.011
41	8	32	12.00	9.863	9.808	5.5216E-02	5.5216E-02	262.7	1.011
42	33	16	12.00	9.941	9.941	8.2970E-05	8.2970E-05	11.41	4.3890E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.941	9.941	-8.2970E-05	8.2970E-05	-11.41	-4.3890E-02
44	29	34	18.00	9.940	9.940	-5.7030E-04	5.7030E-04	-104.4	-0.2009
45	39	33	12.00	9.941	9.941	1.1444E-04	1.1444E-04	11.41	4.3890E-02
47	45	10	20.00	9.959	9.959	-1.8024E-04	1.8024E-04	-99.56	-0.1364
48	23	35	12.00	9.941	9.942	-6.2275E-04	6.2275E-04	-37.74	-0.1452
49	70	66	20.00	9.958	9.958	2.0218E-04	2.0218E-04	99.56	0.1364
50	25	11	14.00	9.937	9.937	0.000	0.000	4.1889E-09	1.3332E-11
52	41	24	18.00	9.630	9.687	-5.6727E-02	5.6727E-02	-1017.	-1.958
53	41	42	18.00	9.630	9.613	1.7455E-02	1.7455E-02	1017.	1.958
54	15	43	12.00	9.940	9.940	4.9591E-05	4.9591E-05	18.86	7.2535E-02
56	58	45	18.00	9.959	9.959	-2.0218E-04	2.0218E-04	-78.97	-0.1336
57	59	44	18.00	9.959	9.959	3.2425E-05	3.2425E-05	20.59	3.4833E-02
58	73	44	18.00	9.959	9.959	-6.2943E-05	6.2943E-05	-20.59	-3.4833E-02
59	10	66	18.00	9.959	9.958	1.0300E-03	1.0300E-03	339.3	0.6531
60	73	48	18.00	9.959	9.959	7.6294E-06	0.000	7.904	1.3374E-02
61	72	26	18.00	9.959	9.959	-7.6294E-06	0.000	-7.904	-1.3374E-02
62	48	49	18.00	9.959	9.959	7.6294E-06	0.000	7.904	1.3374E-02
69	30	56	12.00	9.936	9.901	3.4511E-02	3.4511E-02	262.7	1.011
72	59	45	18.00	9.959	9.959	-2.4796E-05	2.4796E-05	-20.59	-3.4833E-02
77	58	72	18.00	9.959	9.959	-5.9128E-05	5.9128E-05	-20.59	-3.4833E-02
80	70	58	20.00	9.958	9.959	-4.4537E-04	4.4537E-04	-99.56	-0.1364
84	71	73	18.00	9.959	9.959	-1.5259E-05	1.5259E-05	-12.68	-2.1459E-02
85	71	72	18.00	9.959	9.959	7.6294E-06	0.000	12.68	2.1459E-02
90	68	3	18.00	9.973	9.973	-4.0054E-05	4.0054E-05	-69.66	-0.1341
91	3	67	18.00	9.973	9.972	1.0748E-03	1.0748E-03	438.8	0.8447

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	508.5	0.000	9.973	9.973	10.17	9.9830E-02	1.4087E+05	100.0
2	508.5	0.000	9.973	9.973	10.17	9.9830E-02	1.4086E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 508.5	0.0000
31	0.000	* 508.5	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
42	9.613	1017. *	328.02

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 21-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

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COMMENTS

Analysis Converged in 3 Iterations

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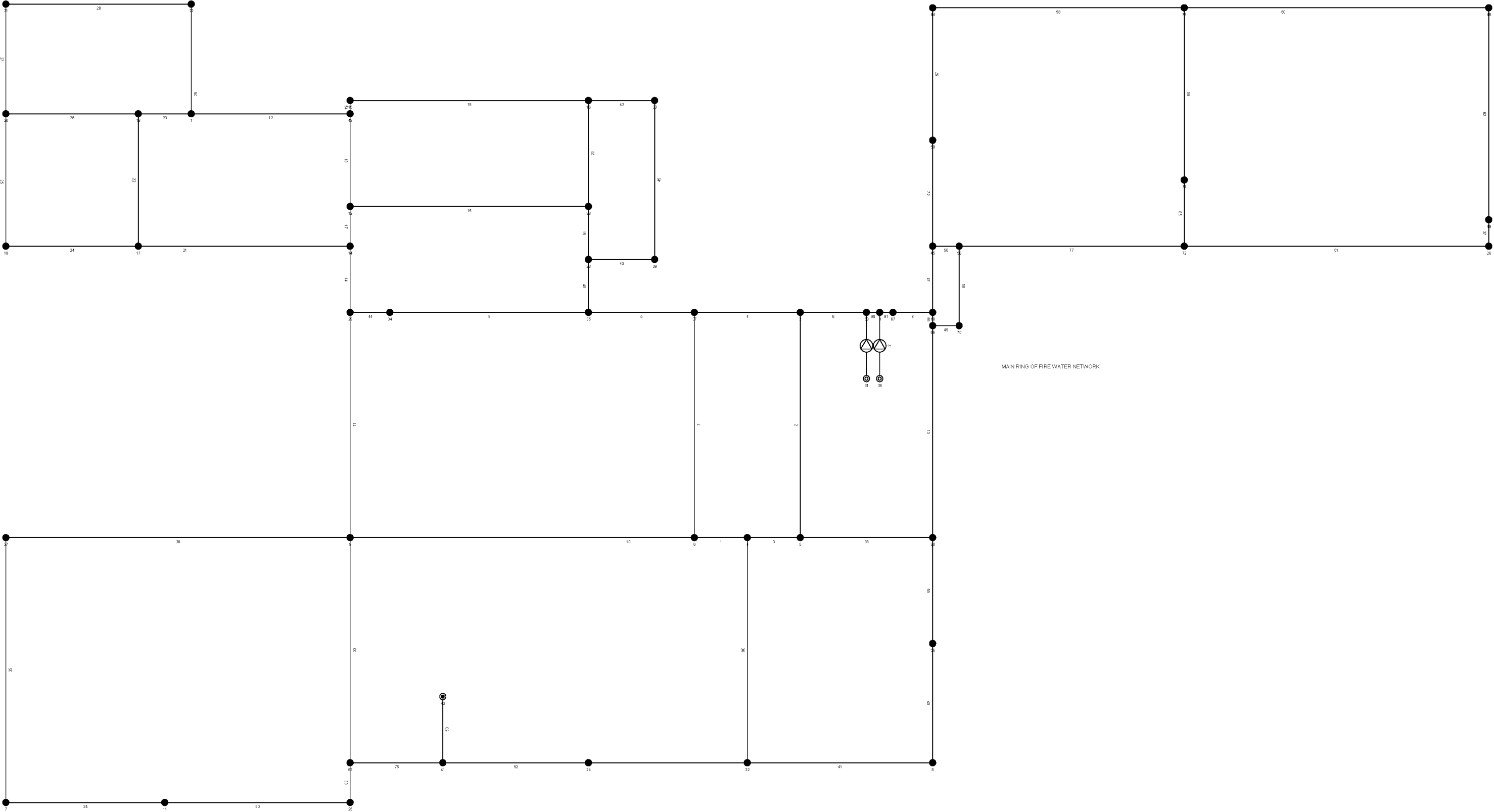
Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

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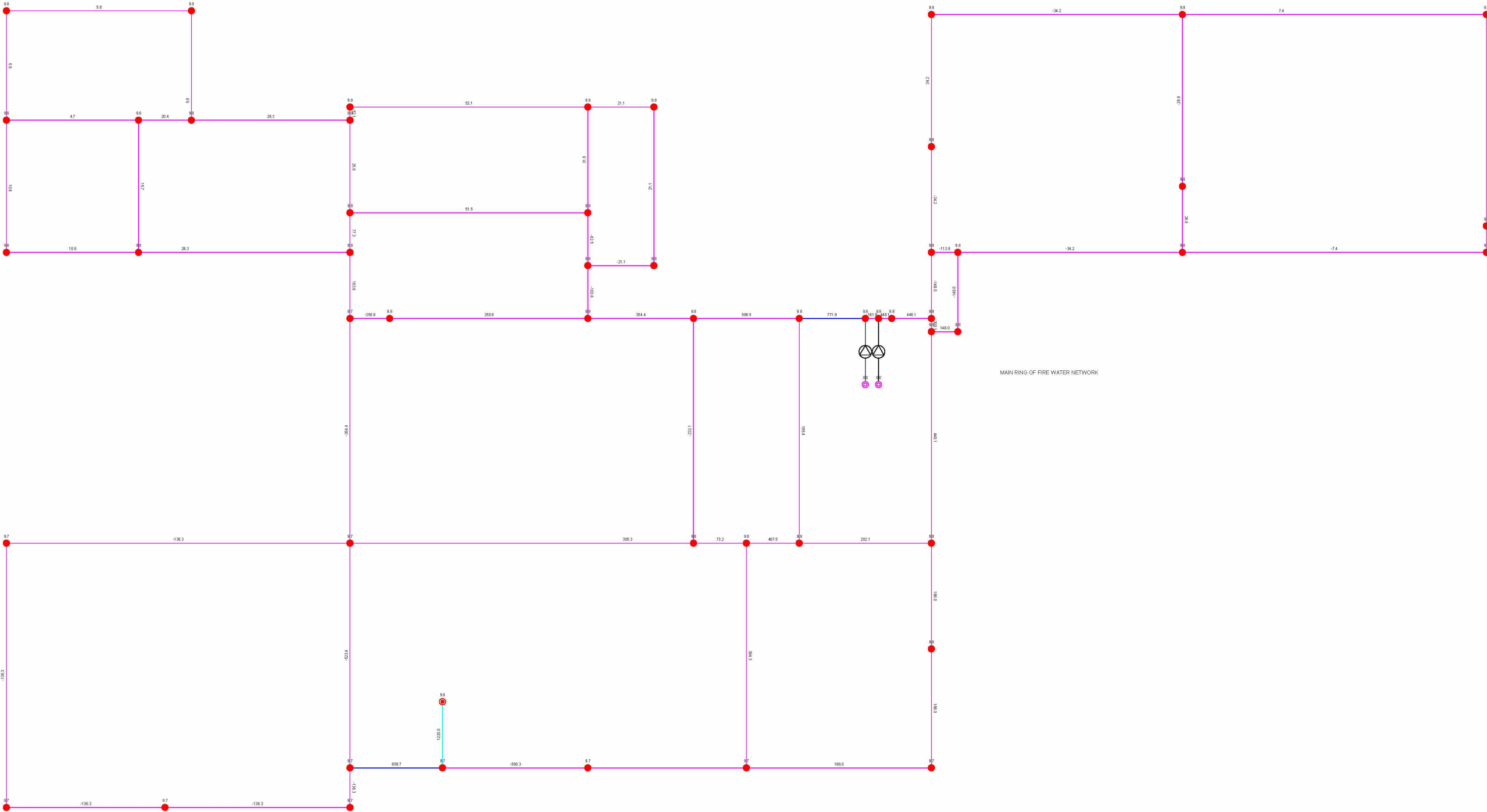
**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

Attachment	5	Fire scenario in the naphtha storage area-Tank rim fire-Case A1
	5.A	PIPENET schematic layout with piping and nodes label
	5.B	PIPENET schematic layout with flow rate and pressure results
	5.C	PIPENET schematic layout with velocity results
	5.D	PIPENET input/output printout report

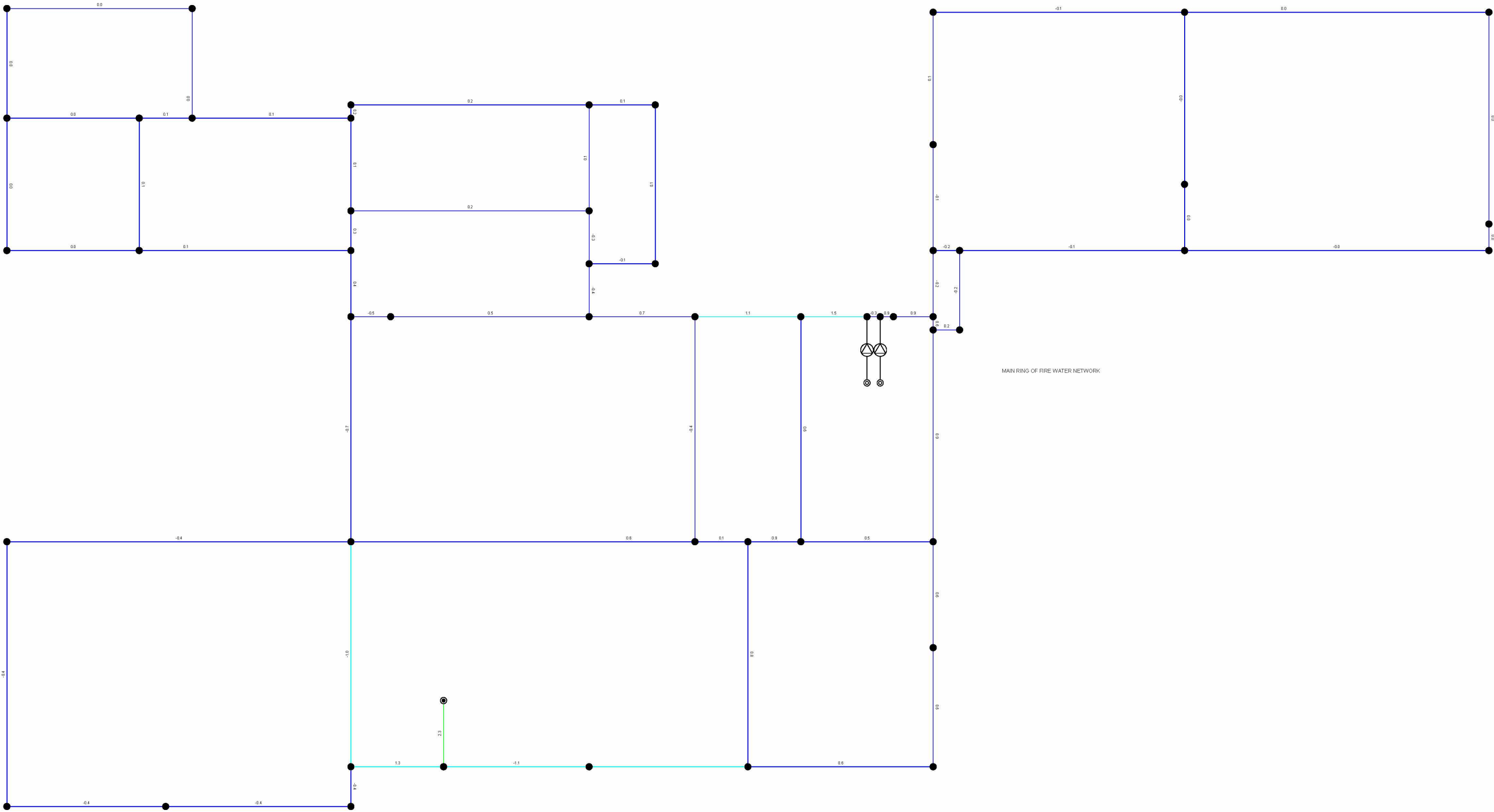
Attachment 5.A contains 1 page
Attachment 5.B contains 1 page
Attachment 5.C contains 1 page
Attachment 5.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Wednesday, May 26, 2021		Page 1 of 1
Pressure (Bar G)	< 7.000000 < 8.500000	< 7.500000 < 9.000000	< 8.000000 > 9.000000
Pipe vol. flow (m³/h)	< 600.000000 < 2400.000000	< 1200.000000 < 3450.000000	< 1800.000000 > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1
Pipe velocity (m/sec)	< 0.000000 < 3.000000	< 1.000000 < 3.500000 < 2.000000 > 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

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VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

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12:37 on 26-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
53	41	42	18.00	20.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
29	1	x 4	18.29	
30	2	x 4	27.13	
32	1	x 4	27.13	
33	1	x 2	7.925	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
40	1	x 2	8.230	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	73.2078	3	16.8760	18.0000	*
2	2	5	185.4231	3	13.1240	14.0000	*
3	5	4	467.5058	3	16.8760	18.0000	*
4	2	37	586.5260	3	16.8760	18.0000	*
5	37	35	354.4406	3	16.8760	18.0000	*
6	68	2	771.9490	3	16.8760	18.0000	*
7	6	37	-232.0854	3	16.8760	18.0000	*
8	67	10	448.0536	3	16.8760	18.0000	*
9	35	34	250.8505	3	16.8760	18.0000	*
10	6	9	305.2931	3	16.8760	18.0000	*
11	9	29	-354.4406	3	16.8760	18.0000	*
12	43	1	26.2830	3	11.9380	12.0000	*
13	66	30	448.0536	3	16.8760	18.0000	*
14	14	29	103.5901	3	11.9380	12.0000	*
15	38	12	51.4864	3	11.9380	12.0000	*
16	38	23	-82.4777	3	11.9380	12.0000	*
17	12	14	77.3071	3	11.9380	12.0000	*
18	43	12	25.8207	3	11.9380	12.0000	*
19	16	15	52.1037	3	11.9380	12.0000	*
20	38	16	30.9914	3	11.9380	12.0000	*
21	17	14	26.2830	3	11.9380	12.0000	*
22	18	17	15.7318	3	11.9380	12.0000	*
23	1	18	20.4436	3	11.9380	12.0000	*
24	19	17	10.5512	3	11.9380	12.0000	*
25	20	19	10.5512	3	11.9380	12.0000	*
26	18	20	4.7118	3	11.9380	12.0000	*
27	21	20	5.8394	3	11.9380	12.0000	*
28	22	21	5.8394	3	11.9380	12.0000	*
29	1	22	5.8394	3	11.9380	12.0000	*
30	4	32	394.2980	3	16.8760	18.0000	*
31	32	24	560.2690	3	16.8760	18.0000	*
32	63	9	-523.4290	3	16.8760	18.0000	*
33	63	25	-136.3047	3	13.1240	14.0000	*
34	11	7	-136.3047	3	13.1240	14.0000	*
35	7	27	-136.3047	3	13.1240	14.0000	*
36	27	9	-136.3047	3	13.1240	14.0000	*
37	49	26	7.4099	9	18.0000	18.0000	*
38	30	5	282.0827	3	16.8760	18.0000	*
40	56	8	165.9710	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	165.9710	3	11.9380	12.0000	*
42	33	16	21.1124	3	11.9380	12.0000	*
43	39	23	-21.1124	3	11.9380	12.0000	*
44	29	34	-250.8505	3	16.8760	18.0000	*
45	39	33	21.1124	3	11.9380	12.0000	*
47	45	10	-147.9639	9	20.0000	20.0000	*
48	23	35	-103.5901	3	11.9380	12.0000	*
49	70	66	147.9639	9	20.0000	20.0000	*
50	25	11	-136.3047	3	13.1240	14.0000	*
52	41	24	-560.2690	3	16.8760	18.0000	*
53	41	42	1220.0028	3	16.8760	18.0000	*
54	15	43	52.1037	3	11.9380	12.0000	*
56	58	45	-113.7752	9	18.0000	18.0000	*
57	59	44	34.1887	9	18.0000	18.0000	*
58	73	44	-34.1887	9	18.0000	18.0000	*
59	10	66	300.0898	3	16.8760	18.0000	*
60	73	48	7.4099	9	18.0000	18.0000	*
61	72	26	-7.4099	9	18.0000	18.0000	*
62	48	49	7.4099	9	18.0000	18.0000	*
69	30	56	165.9710	3	11.9380	12.0000	*
72	59	45	-34.1887	9	18.0000	18.0000	*
75	63	41	659.7337	3	16.8760	18.0000	*
77	58	72	-34.1887	9	18.0000	18.0000	*
80	70	58	-147.9639	9	20.0000	20.0000	*
84	71	73	-26.7788	9	18.0000	18.0000	*
85	71	72	26.7788	9	18.0000	18.0000	*
90	68	3	-161.9054	3	16.8760	18.0000	*
91	3	67	448.0536	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.757	9.757	2.4986E-04	2.4986E-04	73.21	0.1409
2	2	5	14.00	9.790	9.766	2.3730E-02	2.3730E-02	185.4	0.5902
3	5	4	18.00	9.766	9.757	9.3746E-03	9.3746E-03	467.5	0.8999
4	2	37	18.00	9.790	9.767	2.2858E-02	2.2858E-02	586.5	1.129
5	37	35	18.00	9.767	9.759	8.5421E-03	8.5421E-03	354.4	0.6823
6	68	2	18.00	9.818	9.790	2.7897E-02	2.7897E-02	771.9	1.486
7	6	37	18.00	9.757	9.767	-1.0497E-02	1.0497E-02	-232.1	-0.4467
8	67	10	18.00	9.817	9.803	1.4171E-02	1.4171E-02	448.1	0.8624
9	35	34	18.00	9.759	9.751	7.2479E-03	7.2479E-03	250.8	0.4829
10	6	9	18.00	9.757	9.735	2.1568E-02	2.1568E-02	305.3	0.5876
11	9	29	18.00	9.735	9.749	-1.3628E-02	1.3628E-02	-354.4	-0.6823
12	43	1	12.00	9.752	9.752	4.7779E-04	4.7779E-04	26.28	0.1011
13	66	30	18.00	9.802	9.777	2.4702E-02	2.4702E-02	448.1	0.8624
14	14	29	12.00	9.751	9.749	2.2974E-03	2.2974E-03	103.6	0.3985
15	38	12	12.00	9.755	9.752	2.4529E-03	2.4529E-03	51.49	0.1980
16	38	23	12.00	9.755	9.756	-1.0424E-03	1.0424E-03	-82.48	-0.3173
17	12	14	12.00	9.752	9.751	1.1549E-03	1.1549E-03	77.31	0.2974
18	43	12	12.00	9.752	9.752	1.2302E-04	1.2302E-04	25.82	9.9322E-02
19	16	15	12.00	9.755	9.753	2.0704E-03	2.0704E-03	52.10	0.2004
20	38	16	12.00	9.755	9.755	7.6294E-06	0.000	30.99	0.1192
21	17	14	12.00	9.752	9.751	5.9223E-04	5.9223E-04	26.28	0.1011
22	18	17	12.00	9.752	9.752	1.4019E-04	1.4019E-04	15.73	6.0514E-02
23	1	18	12.00	9.752	9.752	6.7711E-05	6.7711E-05	20.44	7.8638E-02
24	19	17	12.00	9.752	9.752	6.4850E-05	6.4850E-05	10.55	4.0586E-02
25	20	19	12.00	9.752	9.752	6.0081E-05	6.0081E-05	10.55	4.0586E-02
26	18	20	12.00	9.752	9.752	1.5259E-05	1.5259E-05	4.712	1.8124E-02
27	21	20	12.00	9.752	9.752	2.5749E-05	2.5749E-05	5.839	2.2462E-02
28	22	21	12.00	9.752	9.752	2.9564E-05	2.9564E-05	5.839	2.2462E-02
29	1	22	12.00	9.752	9.752	2.7657E-05	2.7657E-05	5.839	2.2462E-02
30	4	32	18.00	9.757	9.720	3.7490E-02	3.7490E-02	394.3	0.7590
31	32	24	18.00	9.720	9.677	4.2553E-02	4.2553E-02	560.3	1.078
32	63	9	18.00	9.688	9.735	-4.7174E-02	4.7174E-02	-523.4	-1.008
33	63	25	14.00	9.688	9.690	-2.2001E-03	2.2001E-03	-136.3	-0.4338
34	11	7	14.00	9.698	9.705	-6.8893E-03	6.8893E-03	-136.3	-0.4338
35	7	27	14.00	9.705	9.720	-1.4613E-02	1.4613E-02	-136.3	-0.4338
36	27	9	14.00	9.720	9.735	-1.5612E-02	1.5612E-02	-136.3	-0.4338
37	49	26	18.00	9.803	9.803	0.000	0.000	7.410	1.2537E-02
38	30	5	18.00	9.777	9.766	1.0740E-02	1.0740E-02	282.1	0.5430
40	56	8	12.00	9.762	9.745	1.7033E-02	1.7033E-02	166.0	0.6384
41	8	32	12.00	9.745	9.720	2.4967E-02	2.4967E-02	166.0	0.6384
42	33	16	12.00	9.755	9.755	3.0518E-04	3.0518E-04	21.11	8.1211E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.755	9.756	-3.0518E-04	3.0518E-04	-21.11	-8.1211E-02
44	29	34	18.00	9.749	9.751	-2.6474E-03	2.6474E-03	-250.8	-0.4829
45	39	33	12.00	9.755	9.755	4.3964E-04	4.3964E-04	21.11	8.1211E-02
47	45	10	20.00	9.803	9.803	-1.6499E-04	1.6499E-04	-148.0	-0.2028
48	23	35	12.00	9.756	9.759	-2.9478E-03	2.9478E-03	-103.6	-0.3985
49	70	66	20.00	9.802	9.802	1.8787E-04	1.8787E-04	148.0	0.2028
50	25	11	14.00	9.690	9.698	-7.8602E-03	7.8602E-03	-136.3	-0.4338
52	41	24	18.00	9.657	9.677	-1.9900E-02	1.9900E-02	-560.3	-1.078
53	41	42	18.00	9.657	9.633	2.4442E-02	2.4442E-02	1220.	2.348
54	15	43	12.00	9.753	9.752	2.5177E-04	2.5177E-04	52.10	0.2004
56	58	45	18.00	9.802	9.803	-1.8978E-04	1.8978E-04	-113.8	-0.1925
57	59	44	18.00	9.803	9.803	2.9564E-05	2.9564E-05	34.19	5.7846E-02
58	73	44	18.00	9.803	9.803	-5.8174E-05	5.8174E-05	-34.19	-5.7846E-02
59	10	66	18.00	9.803	9.802	9.5749E-04	9.5749E-04	300.1	0.5776
60	73	48	18.00	9.803	9.803	7.6294E-06	0.000	7.410	1.2537E-02
61	72	26	18.00	9.803	9.803	-7.6294E-06	0.000	-7.410	-1.2537E-02
62	48	49	18.00	9.803	9.803	6.6757E-06	0.000	7.410	1.2537E-02
69	30	56	12.00	9.777	9.762	1.5605E-02	1.5605E-02	166.0	0.6384
72	59	45	18.00	9.803	9.803	-2.4796E-05	2.4796E-05	-34.19	-5.7846E-02
75	63	41	18.00	9.688	9.657	3.0951E-02	3.0951E-02	659.7	1.270
77	58	72	18.00	9.802	9.803	-5.5313E-05	5.5313E-05	-34.19	-5.7846E-02
80	70	58	20.00	9.802	9.802	-4.1485E-04	4.1485E-04	-148.0	-0.2028
84	71	73	18.00	9.803	9.803	-1.4305E-05	1.4305E-05	-26.78	-4.5309E-02
85	71	72	18.00	9.803	9.803	7.6294E-06	0.000	26.78	4.5309E-02
90	68	3	18.00	9.818	9.818	-1.3828E-04	1.3828E-04	-161.9	-0.3116
91	3	67	18.00	9.818	9.817	1.1950E-03	1.1950E-03	448.1	0.8624

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	610.0	0.000	9.818	9.818	10.17	0.1014	1.6637E+05	100.0
2	610.0	0.000	9.818	9.818	10.17	0.1014	1.6635E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 610.0	0.0000
31	0.000	* 610.0	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
42	9.633	1220. *	393.09

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 26-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 26-May-2021

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COMMENTS

Analysis Converged in 2 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

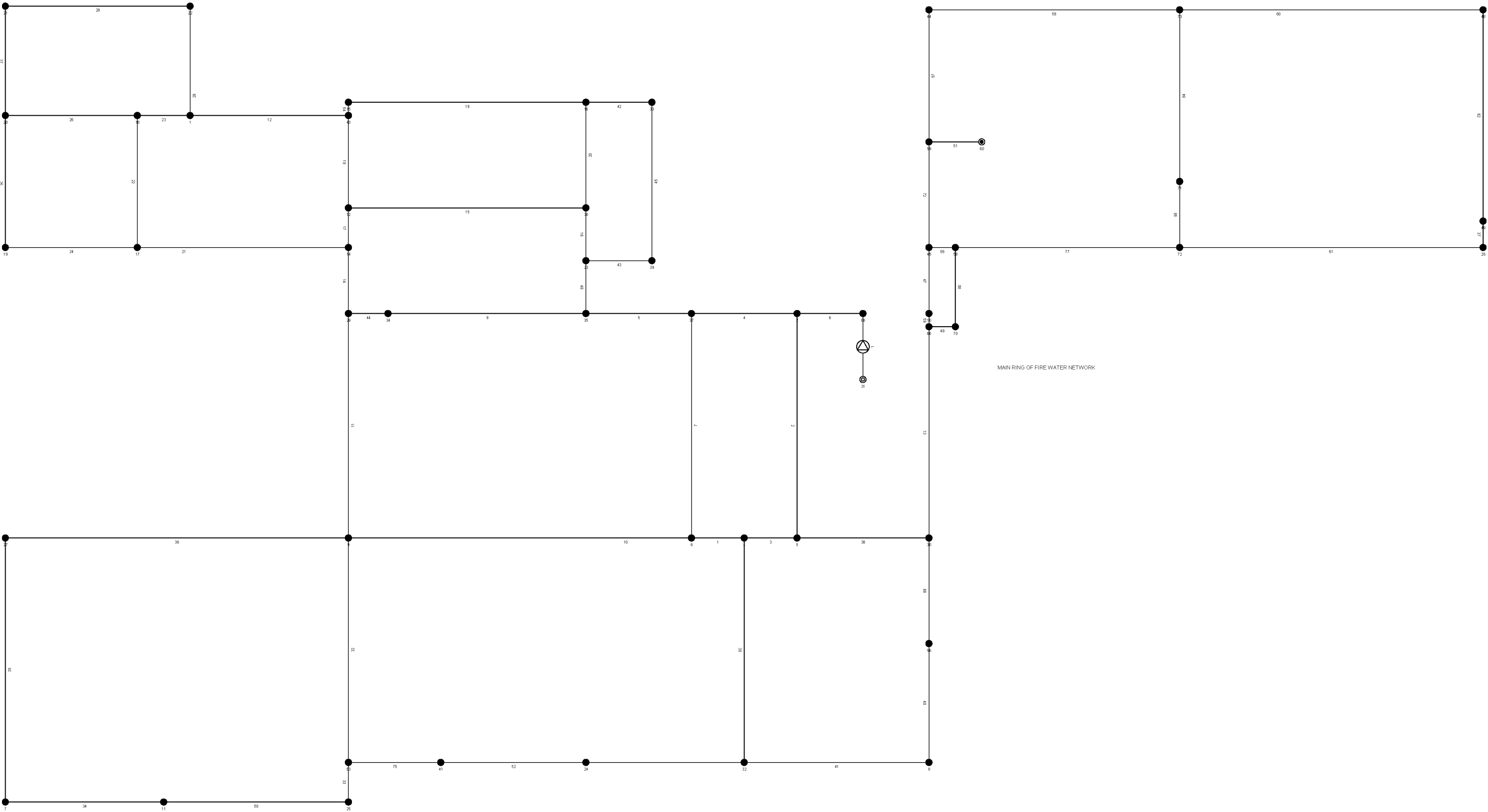
Attachment	6	Fire scenario in the RJF storage pumping area – Case A1
	6.A	PIPENET schematic layout with piping and nodes label
	6.B	PIPENET schematic layout with flow rate and pressure results
	6.C	PIPENET schematic layout with velocity results
	6.D	PIPENET input/output printout report

Attachment 6.A contains 1 page

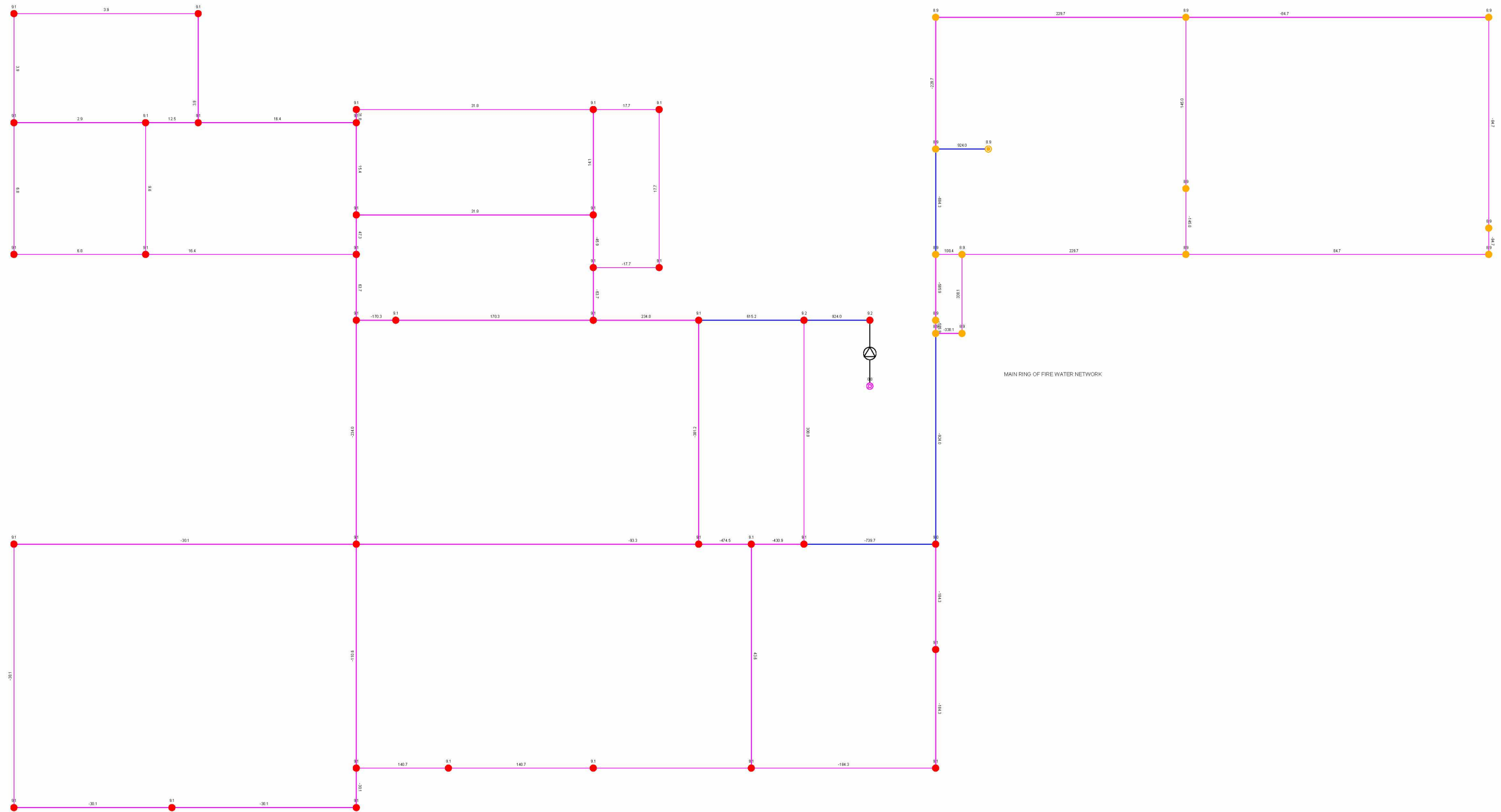
Attachment 6.B contains 1 page

Attachment 6.C contains 1 page

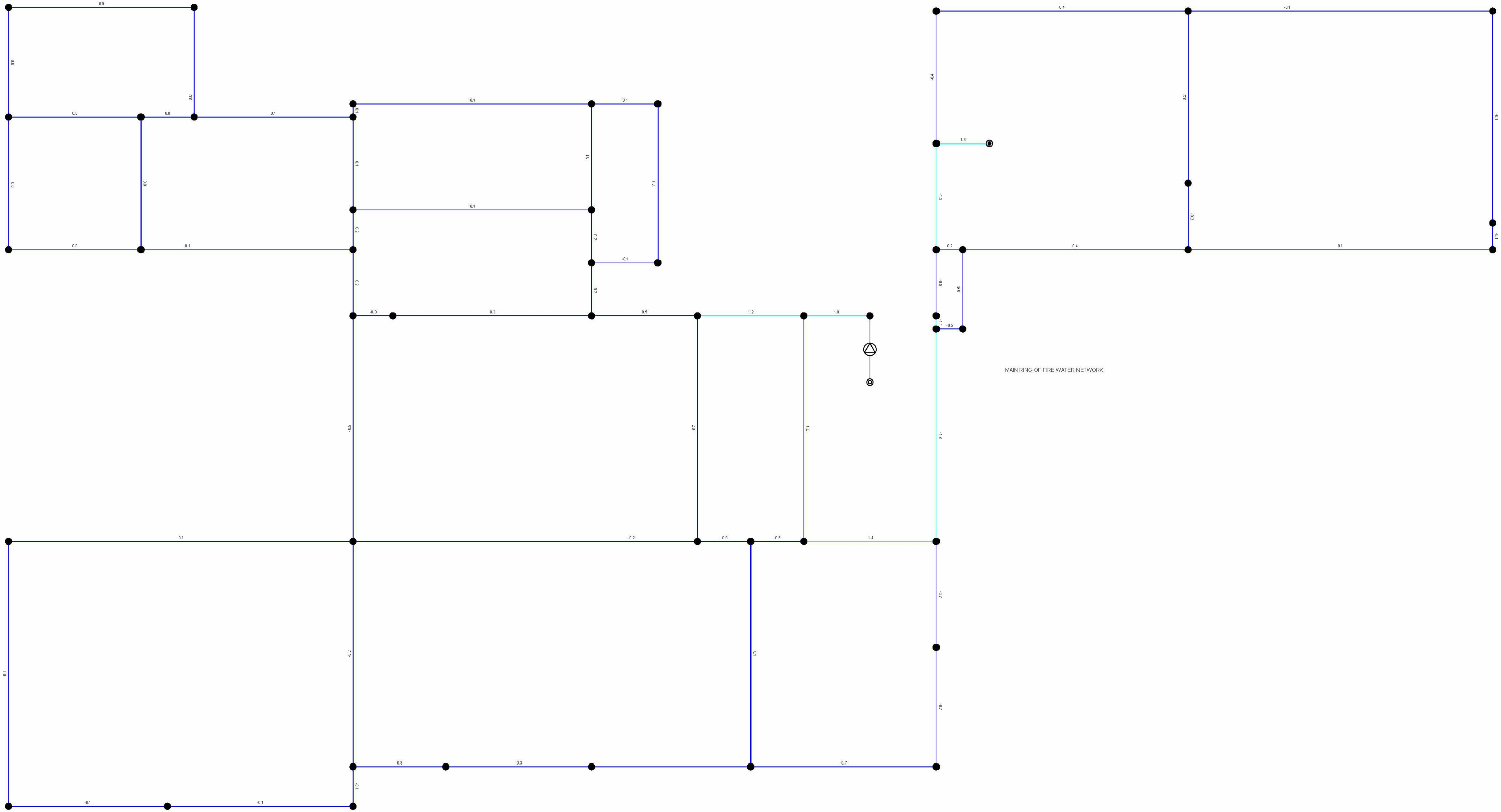
Attachment 6.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Tuesday, May 25, 2021		Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Tuesday, May 25, 2021	Page 1 of 1
Pressure (Bar G)	 < 7.000000  < 8.500000	 < 7.500000  < 9.000000	 < 8.000000  > 9.000000
Pipe vol. flow (m³/h)	 < 600.000000  < 2400.000000	 < 1200.000000  < 3450.000000	 < 1800.000000  > 3450.000000



MAIN RING OF FIRE WATER NETWORK

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PIPENET SPRAY/SPRINKLER MODULE

=====

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VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

17:22 on 25-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13
45	39	33	12.00	97.00	0.000	120.0	16.46

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13
32	1 x 4	27.13
33	1 x 2	7.925

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
40	1	x 2	8.230	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-474.5090	3	16.8760	18.0000	*
2	2	5	308.7848	3	13.1240	14.0000	*
3	5	4	-430.9336	3	16.8760	18.0000	*
4	2	37	615.2173	3	16.8760	18.0000	*
5	37	35	233.9869	3	16.8760	18.0000	*
6	68	2	924.0020	3	16.8760	18.0000	*
7	6	37	-381.2304	3	16.8760	18.0000	*
9	35	34	170.3200	3	16.8760	18.0000	*
10	6	9	-93.2786	3	16.8760	18.0000	*
11	9	29	-233.9869	3	16.8760	18.0000	*
12	43	1	16.3908	3	11.9380	12.0000	*
13	66	30	-924.0020	3	16.8760	18.0000	*
14	14	29	63.6670	3	11.9380	12.0000	*
15	38	12	31.8384	3	11.9380	12.0000	*
16	38	23	-45.9339	3	11.9380	12.0000	*
17	12	14	47.2761	3	11.9380	12.0000	*
18	43	12	15.4377	3	11.9380	12.0000	*
19	16	15	31.8286	3	11.9380	12.0000	*
20	38	16	14.0955	3	11.9380	12.0000	*
21	17	14	16.3908	3	11.9380	12.0000	*
22	18	17	9.5823	3	11.9380	12.0000	*
23	1	18	12.4711	3	11.9380	12.0000	*
24	19	17	6.8085	3	11.9380	12.0000	*
25	20	19	6.8085	3	11.9380	12.0000	*
26	18	20	2.8888	3	11.9380	12.0000	*
27	21	20	3.9197	3	11.9380	12.0000	*
28	22	21	3.9197	3	11.9380	12.0000	*
29	1	22	3.9197	3	11.9380	12.0000	*
30	4	32	43.5754	3	16.8760	18.0000	*
31	32	24	-140.7083	3	16.8760	18.0000	*
32	63	9	-110.5690	3	16.8760	18.0000	*
33	63	25	-30.1393	3	13.1240	14.0000	*
34	11	7	-30.1393	3	13.1240	14.0000	*
35	7	27	-30.1393	3	13.1240	14.0000	*
36	27	9	-30.1393	3	13.1240	14.0000	*
37	49	26	-84.6686	9	18.0000	18.0000	*
38	30	5	-739.7184	3	16.8760	18.0000	*
40	56	8	-184.2837	3	11.9380	12.0000	*
41	8	32	-184.2837	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
42	33	16	17.7331	3	11.9380	12.0000	*
43	39	23	-17.7331	3	11.9380	12.0000	*
44	29	34	-170.3200	3	16.8760	18.0000	*
45	39	33	17.7331	3	11.9380	12.0000	*
47	45	10	-585.9305	9	20.0000	20.0000	*
48	23	35	-63.6670	3	11.9380	12.0000	*
49	70	66	-338.0716	9	20.0000	20.0000	*
50	25	11	-30.1393	3	13.1240	14.0000	*
51	59	60	924.0021	9	18.0000	18.0000	*
52	41	24	140.7083	3	16.8760	18.0000	*
54	15	43	31.8286	3	11.9380	12.0000	*
56	58	45	108.3592	9	18.0000	18.0000	*
57	59	44	-229.7124	9	18.0000	18.0000	*
58	73	44	229.7124	9	18.0000	18.0000	*
59	10	66	-585.9305	3	16.8760	18.0000	*
60	73	48	-84.6686	9	18.0000	18.0000	*
61	72	26	84.6686	9	18.0000	18.0000	*
62	48	49	-84.6686	9	18.0000	18.0000	*
69	30	56	-184.2837	3	11.9380	12.0000	*
72	59	45	-694.2898	9	18.0000	18.0000	*
75	63	41	140.7083	3	16.8760	18.0000	*
77	58	72	229.7124	9	18.0000	18.0000	*
80	70	58	338.0716	9	20.0000	20.0000	*
84	71	73	145.0438	9	18.0000	18.0000	*
85	71	72	-145.0438	9	18.0000	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.103	9.110	-6.9895E-03	6.9895E-03	-474.5	-0.9134
2	2	5	14.00	9.157	9.096	6.0927E-02	6.0927E-02	308.8	0.9828
3	5	4	18.00	9.096	9.103	-6.6433E-03	6.6433E-03	-430.9	-0.8295
4	2	37	18.00	9.157	9.131	2.5817E-02	2.5817E-02	615.2	1.184
5	37	35	18.00	9.131	9.126	5.0354E-03	5.0354E-03	234.0	0.4504
6	68	2	18.00	9.197	9.157	4.0198E-02	4.0198E-02	924.0	1.779
7	6	37	18.00	9.110	9.131	-2.1478E-02	2.1478E-02	-381.2	-0.7338
9	35	34	18.00	9.126	9.122	4.3221E-03	4.3221E-03	170.3	0.3278
10	6	9	18.00	9.110	9.112	-2.5101E-03	2.5101E-03	-93.28	-0.1795
11	9	29	18.00	9.112	9.120	-8.0328E-03	8.0328E-03	-234.0	-0.4504
12	43	1	12.00	9.122	9.122	2.7752E-04	2.7752E-04	16.39	6.3049E-02
13	66	30	18.00	8.944	9.034	-9.0627E-02	9.0627E-02	-924.0	-1.779
14	14	29	12.00	9.121	9.120	1.3418E-03	1.3418E-03	63.67	0.2449
15	38	12	12.00	9.124	9.122	1.4677E-03	1.4677E-03	31.84	0.1225
16	38	23	12.00	9.124	9.124	-6.8760E-04	6.8760E-04	-45.93	-0.1767
17	12	14	12.00	9.122	9.121	6.7806E-04	6.7806E-04	47.28	0.1819
18	43	12	12.00	9.122	9.122	6.7711E-05	6.7711E-05	15.44	5.9383E-02
19	16	15	12.00	9.124	9.122	1.1826E-03	1.1826E-03	31.83	0.1224
20	38	16	12.00	9.124	9.124	7.2479E-05	7.2479E-05	14.10	5.4219E-02
21	17	14	12.00	9.122	9.121	3.4523E-04	3.4523E-04	16.39	6.3049E-02
22	18	17	12.00	9.122	9.122	8.2970E-05	8.2970E-05	9.582	3.6859E-02
23	1	18	12.00	9.122	9.122	4.0054E-05	4.0054E-05	12.47	4.7971E-02
24	19	17	12.00	9.122	9.122	3.7193E-05	3.7193E-05	6.809	2.6190E-02
25	20	19	12.00	9.122	9.122	3.5286E-05	3.5286E-05	6.809	2.6190E-02
26	18	20	12.00	9.122	9.122	1.0490E-05	1.0490E-05	2.889	1.1112E-02
27	21	20	12.00	9.122	9.122	1.5259E-05	1.5259E-05	3.920	1.5077E-02
28	22	21	12.00	9.122	9.122	1.7166E-05	1.7166E-05	3.920	1.5077E-02
29	1	22	12.00	9.122	9.122	1.8120E-05	1.8120E-05	3.920	1.5077E-02
30	4	32	18.00	9.103	9.102	5.0259E-04	5.0259E-04	43.58	8.3877E-02
31	32	24	18.00	9.102	9.105	-3.2768E-03	3.2768E-03	-140.7	-0.2708
32	63	9	18.00	9.109	9.112	-3.1376E-03	3.1376E-03	-110.6	-0.2128
33	63	25	14.00	9.109	9.109	-1.4782E-04	1.4782E-04	-30.14	-9.5927E-02
34	11	7	14.00	9.110	9.110	-4.5681E-04	4.5681E-04	-30.14	-9.5927E-02
35	7	27	14.00	9.110	9.111	-9.7084E-04	9.7084E-04	-30.14	-9.5927E-02
36	27	9	14.00	9.111	9.112	-1.0395E-03	1.0395E-03	-30.14	-9.5927E-02
37	49	26	18.00	8.931	8.932	-9.7275E-05	9.7275E-05	-84.67	-0.1433
38	30	5	18.00	9.034	9.096	-6.1675E-02	6.1675E-02	-739.7	-1.424
40	56	8	12.00	9.053	9.073	-2.0052E-02	2.0052E-02	-184.3	-0.7089
41	8	32	12.00	9.073	9.102	-2.9393E-02	2.9393E-02	-184.3	-0.7089
42	33	16	12.00	9.124	9.124	2.2221E-04	2.2221E-04	17.73	6.8212E-02
43	39	23	12.00	9.124	9.124	-2.2030E-04	2.2030E-04	-17.73	-6.8212E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
44	29	34	18.00	9.120	9.122	-1.5774E-03	1.5774E-03	-170.3	-0.3278
45	39	33	12.00	9.124	9.124	3.1757E-04	3.1757E-04	17.73	6.8212E-02
47	45	10	20.00	8.937	8.941	-3.8500E-03	3.8500E-03	-585.9	-0.8030
48	23	35	12.00	9.124	9.126	-1.7242E-03	1.7242E-03	-63.67	-0.2449
49	70	66	20.00	8.942	8.944	-1.9407E-03	1.9407E-03	-338.1	-0.4633
50	25	11	14.00	9.109	9.110	-5.2261E-04	5.2261E-04	-30.14	-9.5927E-02
51	59	60	18.00	8.922	8.915	7.0677E-03	7.0677E-03	924.0	1.563
52	41	24	18.00	9.107	9.105	1.5354E-03	1.5354E-03	140.7	0.2708
54	15	43	12.00	9.122	9.122	1.4496E-04	1.4496E-04	31.83	0.1224
56	58	45	18.00	8.937	8.937	3.6240E-04	3.6240E-04	108.4	0.1833
57	59	44	18.00	8.922	8.925	-2.7924E-03	2.7924E-03	-229.7	-0.3887
58	73	44	18.00	8.930	8.925	5.2481E-03	5.2481E-03	229.7	0.3887
59	10	66	18.00	8.941	8.944	-2.7151E-03	2.7151E-03	-585.9	-1.128
60	73	48	18.00	8.930	8.931	-9.9182E-04	9.9182E-04	-84.67	-0.1433
61	72	26	18.00	8.932	8.932	9.2316E-04	9.2316E-04	84.67	0.1433
62	48	49	18.00	8.931	8.931	-5.9509E-04	5.9509E-04	-84.67	-0.1433
69	30	56	12.00	9.034	9.053	-1.8371E-02	1.8371E-02	-184.3	-0.7089
72	59	45	18.00	8.922	8.937	-1.5250E-02	1.5250E-02	-694.3	-1.175
75	63	41	18.00	9.109	9.107	2.0523E-03	2.0523E-03	140.7	0.2708
77	58	72	18.00	8.937	8.932	4.9648E-03	4.9648E-03	229.7	0.3887
80	70	58	20.00	8.942	8.937	4.2620E-03	4.2620E-03	338.1	0.4633
84	71	73	18.00	8.932	8.930	1.7042E-03	1.7042E-03	145.0	0.2454
85	71	72	18.00	8.932	8.932	-9.0313E-04	9.0313E-04	-145.0	-0.2454

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	924.0	0.000	9.197	9.197	10.17	0.1082	2.3606E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
31	0.000	* 924.0	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	8.915	924.0 *	309.47

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 25-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

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COMMENTS

Analysis Converged in 2 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

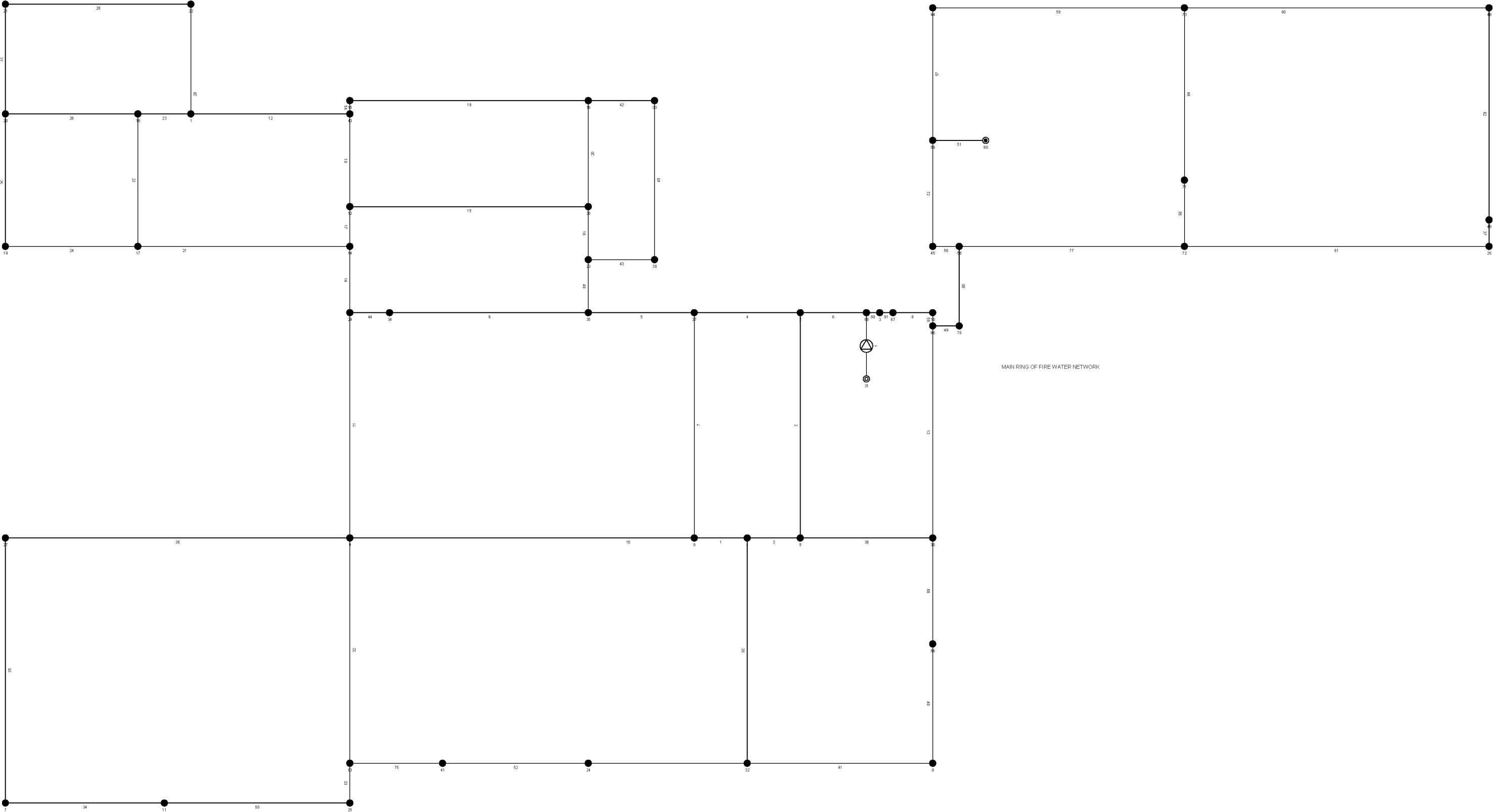
Attachment	7	Fire scenario in the RJF storage pumping area – Case A2
	7.A	PIPENET schematic layout with piping and nodes label
	7.B	PIPENET schematic layout with flow rate and pressure results
	7.C	PIPENET schematic layout with velocity results
	7.D	PIPENET input/output printout report

Attachment 7.A contains 1 page

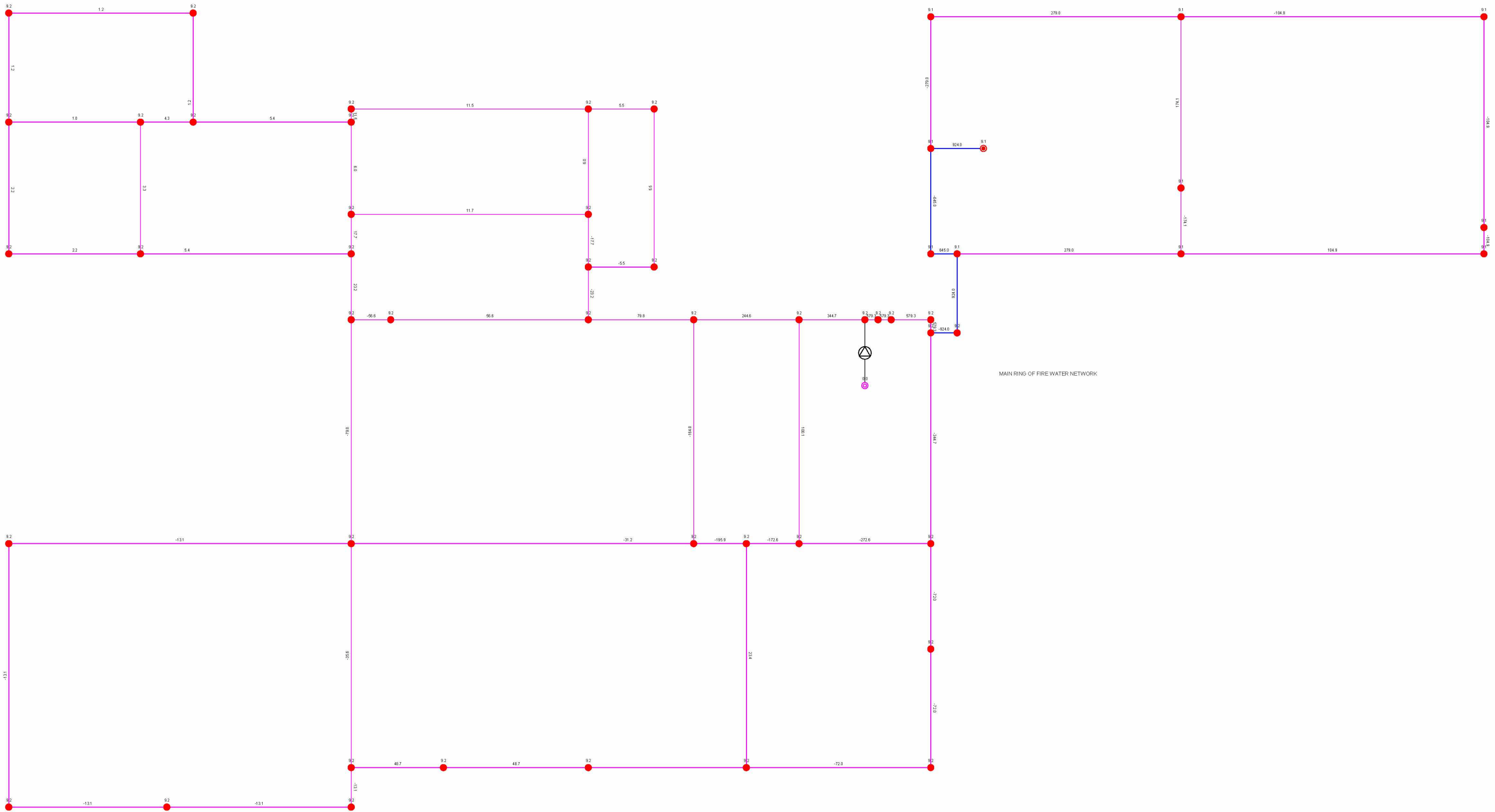
Attachment 7.B contains 1 page

Attachment 7.C contains 1 pages

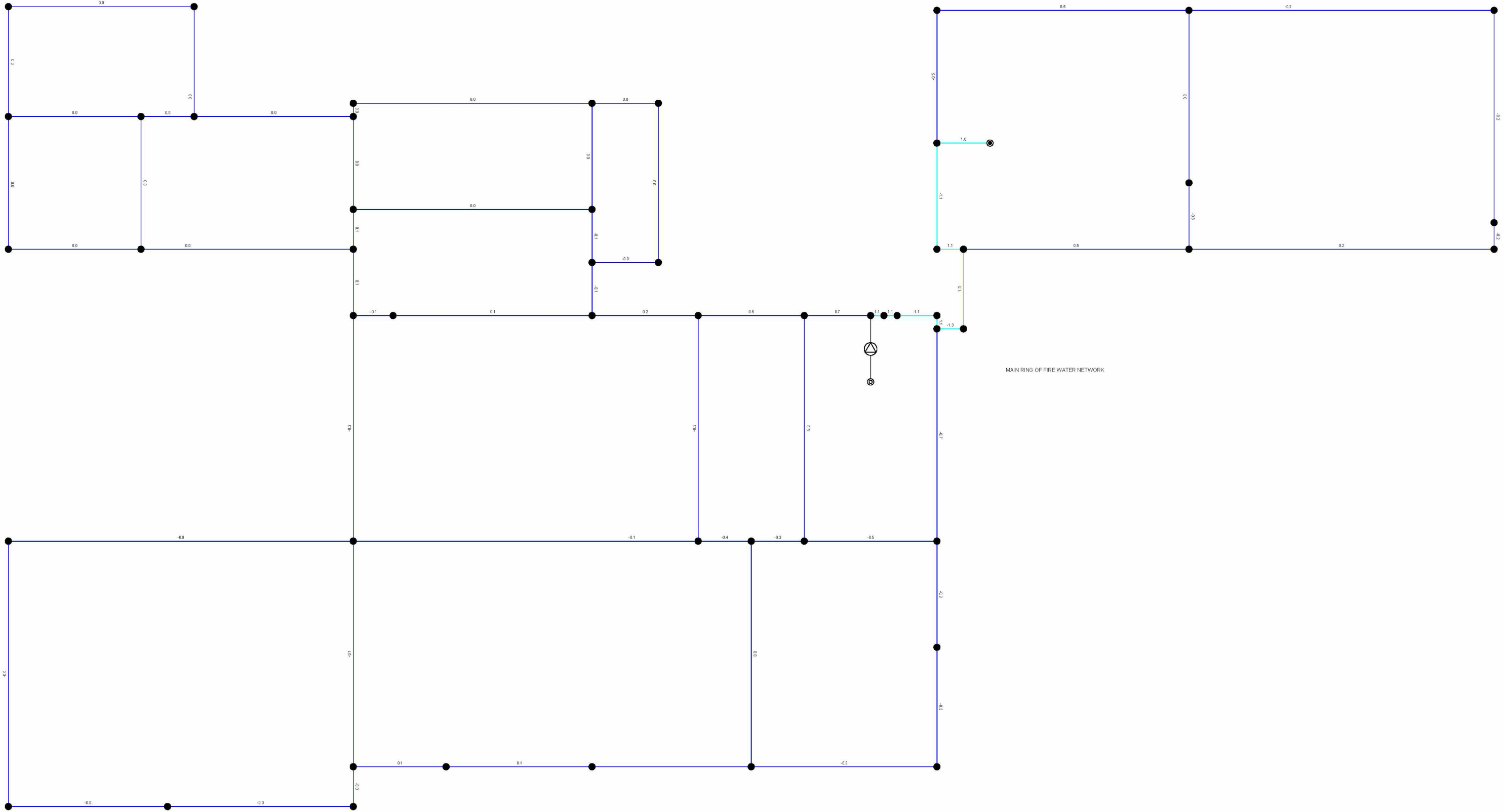
Attachment 7.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Tuesday, May 25, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Tuesday, May 25, 2021	Page 1 of 1
Pressure (Bar G)	■ < 7.000000	■ < 7.500000	■ < 8.000000
	■ < 8.500000	■ < 9.000000	■ > 9.000000
Pipe vol. flow (m³/h)	■ < 600.000000	■ < 1200.000000	■ < 1800.000000
	■ < 2400.000000	■ < 3450.000000	■ > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Tuesday, May 25, 2021	
		Page 1 of 1	
Pipe velocity	 < 0.000000	 < 1.000000	 < 2.000000
(m/sec)	 < 3.000000	 < 3.500000	 > 3.500000

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PIPENET SPRAY/SPRINKLER MODULE

=====

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VERSION 1.9.0

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Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

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18:11 on 25-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)	
30	2 x 4	27.13	
32	1 x 4	27.13	
33	1 x 2	7.925	
34	1 x 2	7.925	
35	1 x 2	7.925	
36	1 x 4	20.42	
37	1 x 2	15.66	
38	1 x 4	27.13	
40	1 x 2	8.230	
42	1 x 4	18.29	
43	1 x 4	18.29	
44	1 x 4	27.13	
45	2 x 2	8.230	
48	1 x 4	18.29	
49	1 x 4	45.60	
56	1 x 4	40.99	
57	1 x 4	40.99	
60	1 x 2	15.66	
75	1 x 4	27.13	
80	1 x 2	17.50	1 x 4 45.60
84	1 x 4	40.99	
85	1 x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-195.9460	3	16.8760	18.0000	*
2	2	5	100.0537	3	13.1240	14.0000	*
3	5	4	-172.5919	3	16.8760	18.0000	*
4	2	37	244.6062	3	16.8760	18.0000	*
5	37	35	79.8113	3	16.8760	18.0000	*
6	68	2	344.6599	3	16.8760	18.0000	*
7	6	37	-164.7949	3	16.8760	18.0000	*
8	67	10	579.3422	3	16.8760	18.0000	*
9	35	34	56.6272	3	16.8760	18.0000	*
10	6	9	-31.1511	3	16.8760	18.0000	*
11	9	29	-79.8113	3	16.8760	18.0000	*
12	43	1	5.4494	3	11.9380	12.0000	*
13	66	30	-344.6599	3	16.8760	18.0000	*
14	14	29	23.1841	3	11.9380	12.0000	*
15	38	12	11.7313	3	11.9380	12.0000	*
16	38	23	-17.7094	3	11.9380	12.0000	*
17	12	14	17.7347	3	11.9380	12.0000	*
18	43	12	6.0034	3	11.9380	12.0000	*
19	16	15	11.4528	3	11.9380	12.0000	*
20	38	16	5.9781	3	11.9380	12.0000	*
21	17	14	5.4494	3	11.9380	12.0000	*
22	18	17	3.2963	3	11.9380	12.0000	*
23	1	18	4.2574	3	11.9380	12.0000	*
24	19	17	2.1530	3	11.9380	12.0000	*
25	20	19	2.1530	3	11.9380	12.0000	*
26	18	20	0.9610	3	11.9380	12.0000	*
27	21	20	1.1920	3	11.9380	12.0000	*
28	22	21	1.1920	3	11.9380	12.0000	*
29	1	22	1.1920	3	11.9380	12.0000	*
30	4	32	23.3541	3	16.8760	18.0000	*
31	32	24	-48.6602	3	16.8760	18.0000	*
32	63	9	-35.6045	3	16.8760	18.0000	*
33	63	25	-13.0556	3	13.1240	14.0000	*
34	11	7	-13.0556	3	13.1240	14.0000	*
35	7	27	-13.0556	3	13.1240	14.0000	*
36	27	9	-13.0556	3	13.1240	14.0000	*
37	49	26	-104.9295	9	18.0000	18.0000	*
38	30	5	-272.6456	3	16.8760	18.0000	*
40	56	8	-72.0143	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-72.0143	3	11.9380	12.0000	*
42	33	16	5.4747	3	11.9380	12.0000	*
43	39	23	-5.4747	3	11.9380	12.0000	*
44	29	34	-56.6272	3	16.8760	18.0000	*
45	39	33	5.4747	3	11.9380	12.0000	*
48	23	35	-23.1841	3	11.9380	12.0000	*
49	70	66	-924.0021	9	20.0000	20.0000	*
50	25	11	-13.0556	3	13.1240	14.0000	*
51	59	60	924.0021	9	18.0000	18.0000	*
52	41	24	48.6602	3	16.8760	18.0000	*
54	15	43	11.4528	3	11.9380	12.0000	*
56	58	45	644.9838	9	18.0000	18.0000	*
57	59	44	-279.0184	9	18.0000	18.0000	*
58	73	44	279.0184	9	18.0000	18.0000	*
59	10	66	579.3422	3	16.8760	18.0000	*
60	73	48	-104.9295	9	18.0000	18.0000	*
61	72	26	104.9295	9	18.0000	18.0000	*
62	48	49	-104.9295	9	18.0000	18.0000	*
69	30	56	-72.0143	3	11.9380	12.0000	*
72	59	45	-644.9838	9	18.0000	18.0000	*
75	63	41	48.6602	3	16.8760	18.0000	*
77	58	72	279.0184	9	18.0000	18.0000	*
80	70	58	924.0021	9	20.0000	20.0000	*
84	71	73	174.0889	9	18.0000	18.0000	*
85	71	72	-174.0889	9	18.0000	18.0000	*
90	68	3	579.3422	3	16.8760	18.0000	*
91	3	67	579.3422	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.186	9.187	-8.1539E-04	8.1539E-04	-195.9	-0.3772
2	2	5	14.00	9.192	9.185	7.0400E-03	7.0400E-03	100.1	0.3184
3	5	4	18.00	9.185	9.186	-7.7724E-04	7.7724E-04	-172.6	-0.3322
4	2	37	18.00	9.192	9.189	3.0355E-03	3.0355E-03	244.6	0.4708
5	37	35	18.00	9.189	9.189	5.6934E-04	5.6934E-04	79.81	0.1536
6	68	2	18.00	9.197	9.192	4.8752E-03	4.8752E-03	344.7	0.6634
7	6	37	18.00	9.187	9.189	-2.4118E-03	2.4118E-03	-164.8	-0.3172
8	67	10	18.00	9.193	9.170	2.3202E-02	2.3202E-02	579.3	1.115
9	35	34	18.00	9.189	9.188	4.8256E-04	4.8256E-04	56.63	0.1090
10	6	9	18.00	9.187	9.187	-2.7752E-04	2.7752E-04	-31.15	-5.9962E-02
11	9	29	18.00	9.187	9.188	-9.0504E-04	9.0504E-04	-79.81	-0.1536
12	43	1	12.00	9.188	9.188	2.9564E-05	2.9564E-05	5.449	2.0961E-02
13	66	30	18.00	9.167	9.178	-1.0987E-02	1.0987E-02	-344.7	-0.6634
14	14	29	12.00	9.188	9.188	1.5259E-04	1.5259E-04	23.18	8.9180E-02
15	38	12	12.00	9.188	9.188	1.6499E-04	1.6499E-04	11.73	4.5126E-02
16	38	23	12.00	9.188	9.188	-7.5340E-05	7.5340E-05	-17.71	-6.8121E-02
17	12	14	12.00	9.188	9.188	7.4387E-05	7.4387E-05	17.73	6.8218E-02
18	43	12	12.00	9.188	9.188	7.6294E-06	0.000	6.003	2.3093E-02
19	16	15	12.00	9.188	9.188	1.3256E-04	1.3256E-04	11.45	4.4054E-02
20	38	16	12.00	9.188	9.188	7.6294E-06	0.000	5.978	2.2995E-02
21	17	14	12.00	9.188	9.188	3.7193E-05	3.7193E-05	5.449	2.0961E-02
22	18	17	12.00	9.188	9.188	9.5367E-06	0.000	3.296	1.2680E-02
23	1	18	12.00	9.188	9.188	5.7220E-06	0.000	4.257	1.6376E-02
24	19	17	12.00	9.188	9.188	4.7684E-06	0.000	2.153	8.2818E-03
25	20	19	12.00	9.188	9.188	4.7684E-06	0.000	2.153	8.2818E-03
26	18	20	12.00	9.188	9.188	0.000	0.000	0.9610	3.6968E-03
27	21	20	12.00	9.188	9.188	0.000	0.000	1.192	4.5850E-03
28	22	21	12.00	9.188	9.188	2.8610E-06	0.000	1.192	4.5850E-03
29	1	22	12.00	9.188	9.188	2.8610E-06	0.000	1.192	4.5850E-03
30	4	32	18.00	9.186	9.186	3.7193E-05	3.7193E-05	23.35	4.4954E-02
31	32	24	18.00	9.186	9.186	-3.7766E-04	3.7766E-04	-48.66	-9.3664E-02
32	63	9	18.00	9.187	9.187	-3.4237E-04	3.4237E-04	-35.60	-6.8534E-02
33	63	25	14.00	9.187	9.187	-1.4305E-05	1.4305E-05	-13.06	-4.1553E-02
34	11	7	14.00	9.187	9.187	-4.9591E-05	4.9591E-05	-13.06	-4.1553E-02
35	7	27	14.00	9.187	9.187	-1.0777E-04	1.0777E-04	-13.06	-4.1553E-02
36	27	9	14.00	9.187	9.187	-1.1253E-04	1.1253E-04	-13.06	-4.1553E-02
37	49	26	18.00	9.120	9.121	-1.4305E-04	1.4305E-04	-104.9	-0.1775
38	30	5	18.00	9.178	9.185	-7.4749E-03	7.4749E-03	-272.6	-0.5248
40	56	8	12.00	9.180	9.182	-2.4300E-03	2.4300E-03	-72.01	-0.2770
41	8	32	12.00	9.182	9.186	-3.5601E-03	3.5601E-03	-72.01	-0.2770
42	33	16	12.00	9.188	9.188	2.5749E-05	2.5749E-05	5.475	2.1059E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.188	9.188	-2.4796E-05	2.4796E-05	-5.475	-2.1059E-02
44	29	34	18.00	9.188	9.188	-1.7738E-04	1.7738E-04	-56.63	-0.1090
45	39	33	12.00	9.188	9.188	3.2425E-05	3.2425E-05	5.475	2.1059E-02
48	23	35	12.00	9.188	9.189	-1.9264E-04	1.9264E-04	-23.18	-8.9180E-02
49	70	66	20.00	9.155	9.167	-1.1761E-02	1.1761E-02	-924.0	-1.266
50	25	11	14.00	9.187	9.187	-5.8174E-05	5.8174E-05	-13.06	-4.1553E-02
51	59	60	18.00	9.106	9.099	7.0677E-03	7.0677E-03	924.0	1.563
52	41	24	18.00	9.186	9.186	1.7452E-04	1.7452E-04	48.66	9.3664E-02
54	15	43	12.00	9.188	9.188	1.7166E-05	1.7166E-05	11.45	4.4054E-02
56	58	45	18.00	9.129	9.120	8.8100E-03	8.8100E-03	645.0	1.091
57	59	44	18.00	9.106	9.111	-4.0474E-03	4.0474E-03	-279.0	-0.4721
58	73	44	18.00	9.118	9.111	7.6075E-03	7.6075E-03	279.0	0.4721
59	10	66	18.00	9.170	9.167	3.2597E-03	3.2597E-03	579.3	1.115
60	73	48	18.00	9.118	9.120	-1.4353E-03	1.4353E-03	-104.9	-0.1775
61	72	26	18.00	9.122	9.121	1.3351E-03	1.3351E-03	104.9	0.1775
62	48	49	18.00	9.120	9.120	-8.6212E-04	8.6212E-04	-104.9	-0.1775
69	30	56	12.00	9.178	9.180	-2.2249E-03	2.2249E-03	-72.01	-0.2770
72	59	45	18.00	9.106	9.120	-1.3818E-02	1.3818E-02	-645.0	-1.091
75	63	41	18.00	9.187	9.186	2.3556E-04	2.3556E-04	48.66	9.3664E-02
77	58	72	18.00	9.129	9.122	7.1974E-03	7.1974E-03	279.0	0.4721
80	70	58	20.00	9.155	9.129	2.5825E-02	2.5825E-02	924.0	1.266
84	71	73	18.00	9.121	9.118	2.4700E-03	2.4700E-03	174.1	0.2946
85	71	72	18.00	9.121	9.122	-1.3056E-03	1.3056E-03	-174.1	-0.2946
90	68	3	18.00	9.197	9.195	1.9579E-03	1.9579E-03	579.3	1.115
91	3	67	18.00	9.195	9.193	1.9579E-03	1.9579E-03	579.3	1.115

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	924.0	0.000	9.197	9.197	10.17	0.1082	2.3606E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
31	0.000	* 924.0	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	9.099	924.0 *	306.31

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 25-May-2021

PAGE 15 OF 16

IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 25-May-2021

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COMMENTS

Analysis Converged in 2 Iterations

=====

Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

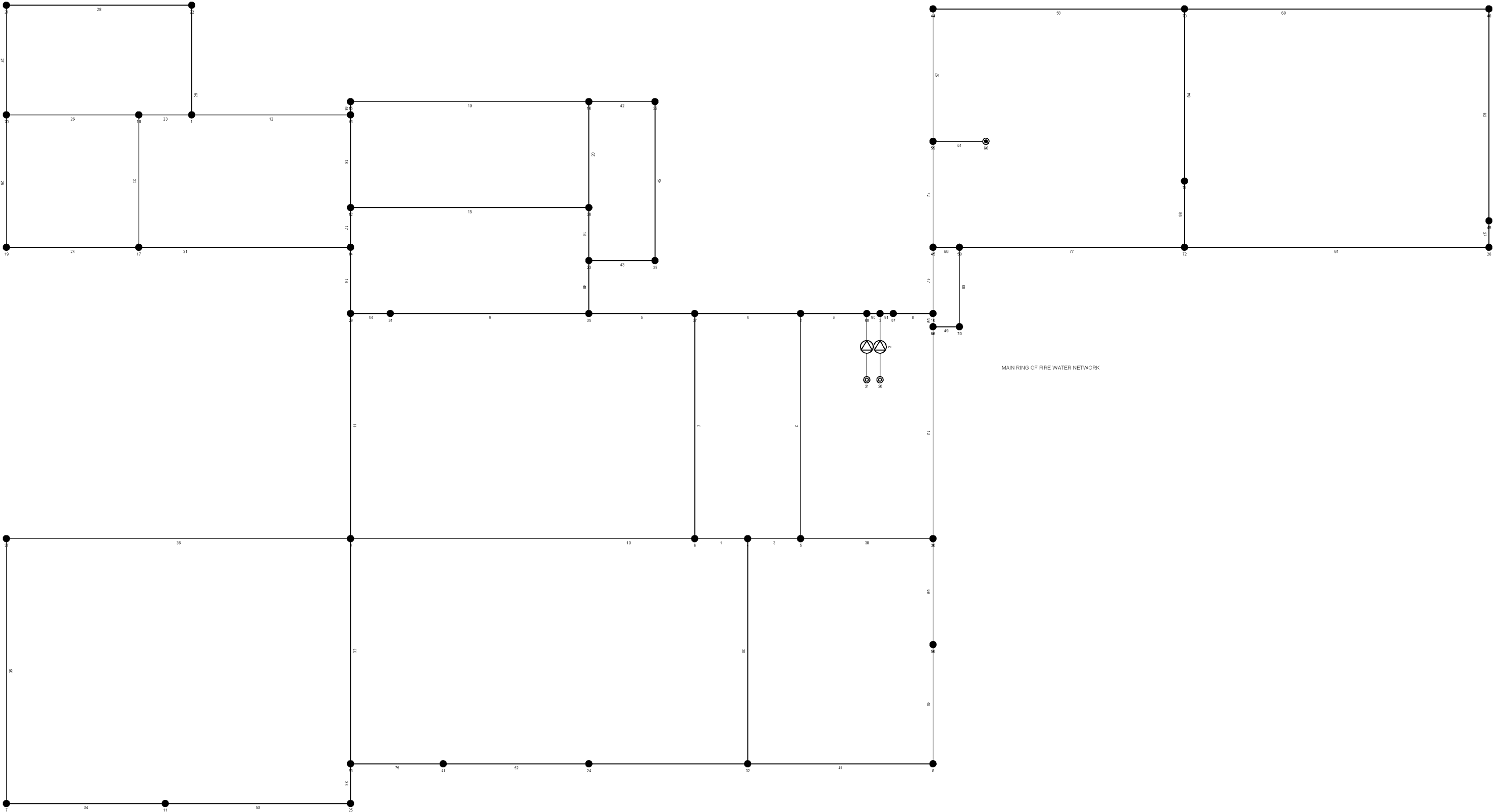
Attachment	8	Fire scenario in the RJF storage pumping area – Case B
	8.A	PIPENET schematic layout with piping and nodes label
	8.B	PIPENET schematic layout with flow rate and pressure results
	8.C	PIPENET schematic layout with velocity results
	8.D	PIPENET input/output printout report

Attachment 8.A contains 1 page

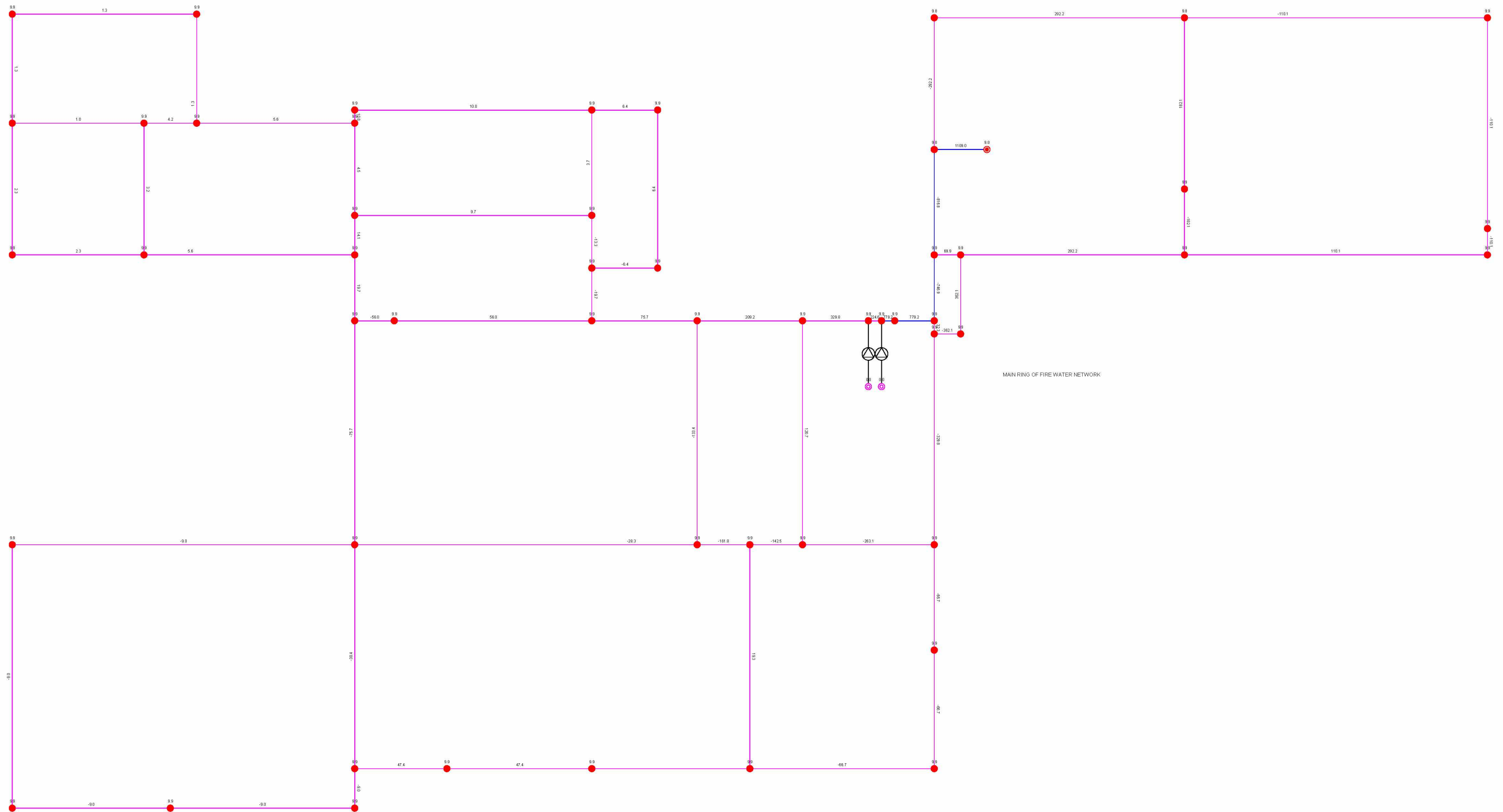
Attachment 8.B contains 1 page

Attachment 8.C contains 1 page

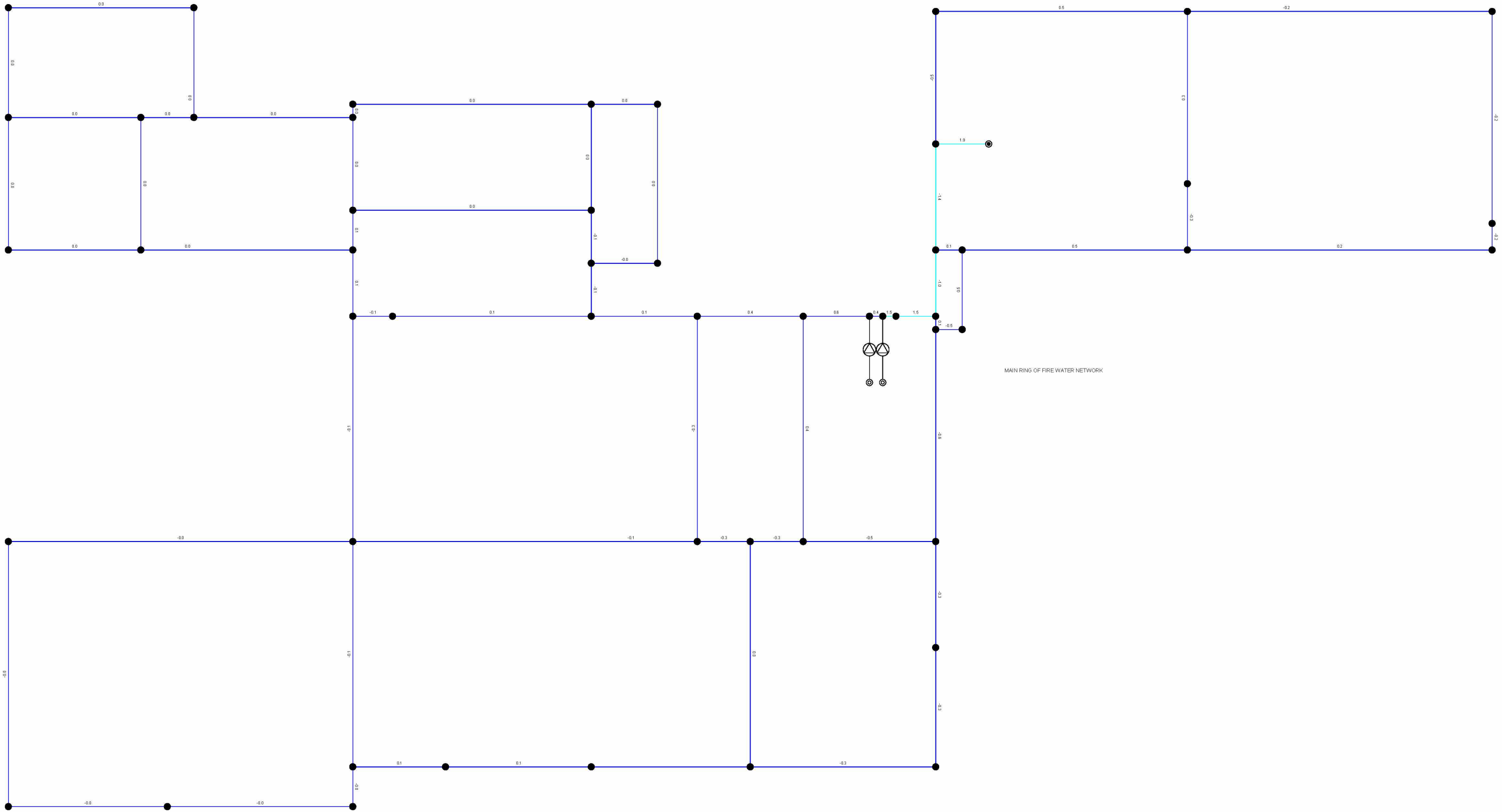
Attachment 8.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Wednesday, May 26, 2021	
		Page 1 of 1	
Pressure	< 7.000000	< 7.500000	< 8.000000
(Bar G)	< 8.500000	< 9.000000	> 9.000000
Pipe vol. flow	< 600.000000	< 1200.000000	< 1800.000000
(m³/h)	< 2400.000000	< 3450.000000	> 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Wednesday, May 26, 2021		Page 1 of 1
Pipe velocity (m/sec)	< 0.000000	< 1.000000	< 2.000000
	< 3.000000	< 3.500000	> 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

12:43 on 26-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
29	1	x 4	18.29	
30	2	x 4	27.13	
32	1	x 4	27.13	
33	1	x 2	7.925	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
40	1	x 2	8.230	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-161.7586	3	16.8760	18.0000	*
2	2	5	120.6515	3	13.1240	14.0000	*
3	5	4	-142.4507	3	16.8760	18.0000	*
4	2	37	209.1513	3	16.8760	18.0000	*
5	37	35	75.7067	3	16.8760	18.0000	*
6	68	2	329.8027	3	16.8760	18.0000	*
7	6	37	-133.4446	3	16.8760	18.0000	*
8	67	10	779.1997	3	16.8760	18.0000	*
9	35	34	56.0005	3	16.8760	18.0000	*
10	6	9	-28.3139	3	16.8760	18.0000	*
11	9	29	-75.7067	3	16.8760	18.0000	*
12	43	1	5.5631	3	11.9380	12.0000	*
13	66	30	-329.8027	3	16.8760	18.0000	*
14	14	29	19.7062	3	11.9380	12.0000	*
15	38	12	9.6671	3	11.9380	12.0000	*
16	38	23	-13.3350	3	11.9380	12.0000	*
17	12	14	14.1431	3	11.9380	12.0000	*
18	43	12	4.4760	3	11.9380	12.0000	*
19	16	15	10.0391	3	11.9380	12.0000	*
20	38	16	3.6679	3	11.9380	12.0000	*
21	17	14	5.5631	3	11.9380	12.0000	*
22	18	17	3.2362	3	11.9380	12.0000	*
23	1	18	4.2468	3	11.9380	12.0000	*
24	19	17	2.3270	3	11.9380	12.0000	*
25	20	19	2.3270	3	11.9380	12.0000	*
26	18	20	1.0106	3	11.9380	12.0000	*
27	21	20	1.3163	3	11.9380	12.0000	*
28	22	21	1.3163	3	11.9380	12.0000	*
29	1	22	1.3163	3	11.9380	12.0000	*
30	4	32	19.3078	3	16.8760	18.0000	*
31	32	24	-47.3927	3	16.8760	18.0000	*
32	63	9	-38.4134	3	16.8760	18.0000	*
33	63	25	-8.9793	3	13.1240	14.0000	*
34	11	7	-8.9793	3	13.1240	14.0000	*
35	7	27	-8.9793	3	13.1240	14.0000	*
36	27	9	-8.9793	3	13.1240	14.0000	*
37	49	26	-110.0763	9	18.0000	18.0000	*
38	30	5	-263.1022	3	16.8760	18.0000	*
40	56	8	-66.7006	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-66.7006	3	11.9380	12.0000	*
42	33	16	6.3712	3	11.9380	12.0000	*
43	39	23	-6.3712	3	11.9380	12.0000	*
44	29	34	-56.0005	3	16.8760	18.0000	*
45	39	33	6.3712	3	11.9380	12.0000	*
47	45	10	-746.8766	9	20.0000	20.0000	*
48	23	35	-19.7062	3	11.9380	12.0000	*
49	70	66	-362.1259	9	20.0000	20.0000	*
50	25	11	-8.9793	3	13.1240	14.0000	*
51	59	60	1109.0027	9	18.0000	18.0000	*
52	41	24	47.3927	3	16.8760	18.0000	*
54	15	43	10.0391	3	11.9380	12.0000	*
56	58	45	69.9238	9	18.0000	18.0000	*
57	59	44	-292.2021	9	18.0000	18.0000	*
58	73	44	292.2021	9	18.0000	18.0000	*
59	10	66	32.3232	3	16.8760	18.0000	*
60	73	48	-110.0763	9	18.0000	18.0000	*
61	72	26	110.0763	9	18.0000	18.0000	*
62	48	49	-110.0763	9	18.0000	18.0000	*
69	30	56	-66.7006	3	11.9380	12.0000	*
72	59	45	-816.8004	9	18.0000	18.0000	*
75	63	41	47.3927	3	16.8760	18.0000	*
77	58	72	292.2021	9	18.0000	18.0000	*
80	70	58	362.1259	9	20.0000	20.0000	*
84	71	73	182.1258	9	18.0000	18.0000	*
85	71	72	-182.1258	9	18.0000	18.0000	*
90	68	3	224.6344	3	16.8760	18.0000	*
91	3	67	779.1997	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.892	9.892	-8.8978E-04	8.8978E-04	-161.8	-0.3114
2	2	5	14.00	9.899	9.891	7.9069E-03	7.9069E-03	120.7	0.3840
3	5	4	18.00	9.891	9.892	-8.8215E-04	8.8215E-04	-142.5	-0.2742
4	2	37	18.00	9.899	9.895	3.6650E-03	3.6650E-03	209.2	0.4026
5	37	35	18.00	9.895	9.894	5.8460E-04	5.8460E-04	75.71	0.1457
6	68	2	18.00	9.905	9.899	6.3629E-03	6.3629E-03	329.8	0.6348
7	6	37	18.00	9.892	9.895	-2.4700E-03	2.4700E-03	-133.4	-0.2569
8	67	10	18.00	9.902	9.867	3.5120E-02	3.5120E-02	779.2	1.500
9	35	34	18.00	9.894	9.894	4.9496E-04	4.9496E-04	56.00	0.1078
10	6	9	18.00	9.892	9.893	-2.8038E-04	2.8038E-04	-28.31	-5.4501E-02
11	9	29	18.00	9.893	9.894	-9.2983E-04	9.2983E-04	-75.71	-0.1457
12	43	1	12.00	9.894	9.894	2.9564E-05	2.9564E-05	5.563	2.1399E-02
13	66	30	18.00	9.867	9.881	-1.4347E-02	1.4347E-02	-329.8	-0.6348
14	14	29	12.00	9.894	9.894	1.5545E-04	1.5545E-04	19.71	7.5802E-02
15	38	12	12.00	9.894	9.894	1.7071E-04	1.7071E-04	9.667	3.7185E-02
16	38	23	12.00	9.894	9.894	-7.4387E-05	7.4387E-05	-13.33	-5.1294E-02
17	12	14	12.00	9.894	9.894	7.4387E-05	7.4387E-05	14.14	5.4403E-02
18	43	12	12.00	9.894	9.894	7.6294E-06	0.000	4.476	1.7217E-02
19	16	15	12.00	9.894	9.894	1.3733E-04	1.3733E-04	10.04	3.8616E-02
20	38	16	12.00	9.894	9.894	7.6294E-06	0.000	3.668	1.4109E-02
21	17	14	12.00	9.894	9.894	4.0054E-05	4.0054E-05	5.563	2.1399E-02
22	18	17	12.00	9.894	9.894	6.6757E-06	0.000	3.236	1.2448E-02
23	1	18	12.00	9.894	9.894	5.7220E-06	0.000	4.247	1.6336E-02
24	19	17	12.00	9.894	9.894	1.9073E-06	0.000	2.327	8.9508E-03
25	20	19	12.00	9.894	9.894	4.7684E-06	0.000	2.327	8.9508E-03
26	18	20	12.00	9.894	9.894	0.000	0.000	1.011	3.8874E-03
27	21	20	12.00	9.894	9.894	2.8610E-06	0.000	1.316	5.0635E-03
28	22	21	12.00	9.894	9.894	0.000	0.000	1.316	5.0635E-03
29	1	22	12.00	9.894	9.894	2.8610E-06	0.000	1.316	5.0635E-03
30	4	32	18.00	9.892	9.892	-5.0545E-05	5.0545E-05	19.31	3.7165E-02
31	32	24	18.00	9.892	9.892	-3.8242E-04	3.8242E-04	-47.39	-9.1225E-02
32	63	9	18.00	9.892	9.893	-3.2043E-04	3.2043E-04	-38.41	-7.3941E-02
33	63	25	14.00	9.892	9.892	-1.5259E-05	1.5259E-05	-8.979	-2.8579E-02
34	11	7	14.00	9.893	9.893	-4.7684E-05	4.7684E-05	-8.979	-2.8579E-02
35	7	27	14.00	9.893	9.893	-9.7275E-05	9.7275E-05	-8.979	-2.8579E-02
36	27	9	14.00	9.893	9.893	-1.0777E-04	1.0777E-04	-8.979	-2.8579E-02
37	49	26	18.00	9.851	9.851	-1.4210E-04	1.4210E-04	-110.1	-0.1862
38	30	5	18.00	9.881	9.891	-9.7656E-03	9.7656E-03	-263.1	-0.5064
40	56	8	12.00	9.884	9.887	-3.1624E-03	3.1624E-03	-66.70	-0.2566
41	8	32	12.00	9.887	9.892	-4.6358E-03	4.6358E-03	-66.70	-0.2566
42	33	16	12.00	9.894	9.894	2.4796E-05	2.4796E-05	6.371	2.4507E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.894	9.894	-2.4796E-05	2.4796E-05	-6.371	-2.4507E-02
44	29	34	18.00	9.894	9.894	-1.8024E-04	1.8024E-04	-56.00	-0.1078
45	39	33	12.00	9.894	9.894	3.2425E-05	3.2425E-05	6.371	2.4507E-02
47	45	10	20.00	9.860	9.867	-6.9628E-03	6.9628E-03	-746.9	-1.024
48	23	35	12.00	9.894	9.894	-2.0027E-04	2.0027E-04	-19.71	-7.5802E-02
49	70	66	20.00	9.865	9.867	-2.0952E-03	2.0952E-03	-362.1	-0.4963
50	25	11	14.00	9.892	9.893	-5.2452E-05	5.2452E-05	-8.979	-2.8579E-02
51	59	60	18.00	9.837	9.827	9.9049E-03	9.9049E-03	1109.	1.876
52	41	24	18.00	9.892	9.892	1.7738E-04	1.7738E-04	47.39	9.1225E-02
54	15	43	12.00	9.894	9.894	1.8120E-05	1.8120E-05	10.04	3.8616E-02
56	58	45	18.00	9.860	9.860	1.6022E-04	1.6022E-04	69.92	0.1183
57	59	44	18.00	9.837	9.841	-4.0751E-03	4.0751E-03	-292.2	-0.4944
58	73	44	18.00	9.849	9.841	7.6599E-03	7.6599E-03	292.2	0.4944
59	10	66	18.00	9.867	9.867	1.0490E-04	1.0490E-04	32.32	6.2218E-02
60	73	48	18.00	9.849	9.850	-1.4524E-03	1.4524E-03	-110.1	-0.1862
61	72	26	18.00	9.853	9.851	1.3504E-03	1.3504E-03	110.1	0.1862
62	48	49	18.00	9.850	9.851	-8.7547E-04	8.7547E-04	-110.1	-0.1862
69	30	56	12.00	9.881	9.884	-2.9001E-03	2.9001E-03	-66.70	-0.2566
72	59	45	18.00	9.837	9.860	-2.2642E-02	2.2642E-02	-816.8	-1.382
75	63	41	18.00	9.892	9.892	2.3937E-04	2.3937E-04	47.39	9.1225E-02
77	58	72	18.00	9.860	9.853	7.2470E-03	7.2470E-03	292.2	0.4944
80	70	58	20.00	9.865	9.860	4.6024E-03	4.6024E-03	362.1	0.4963
84	71	73	18.00	9.851	9.849	2.4996E-03	2.4996E-03	182.1	0.3082
85	71	72	18.00	9.851	9.853	-1.3208E-03	1.3208E-03	-182.1	-0.3082
90	68	3	18.00	9.905	9.905	1.9550E-04	1.9550E-04	224.6	0.4324
91	3	67	18.00	9.905	9.902	2.9621E-03	2.9621E-03	779.2	1.500

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	554.4	0.000	9.905	9.905	10.17	0.1005	1.5255E+05	100.0
2	554.6	0.000	9.905	9.905	10.17	0.1005	1.5258E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 554.6	0.0000
31	0.000	* 554.4	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	9.827	1109. *	353.77

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 26-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 26-May-2021

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COMMENTS

Analysis Converged in 3 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

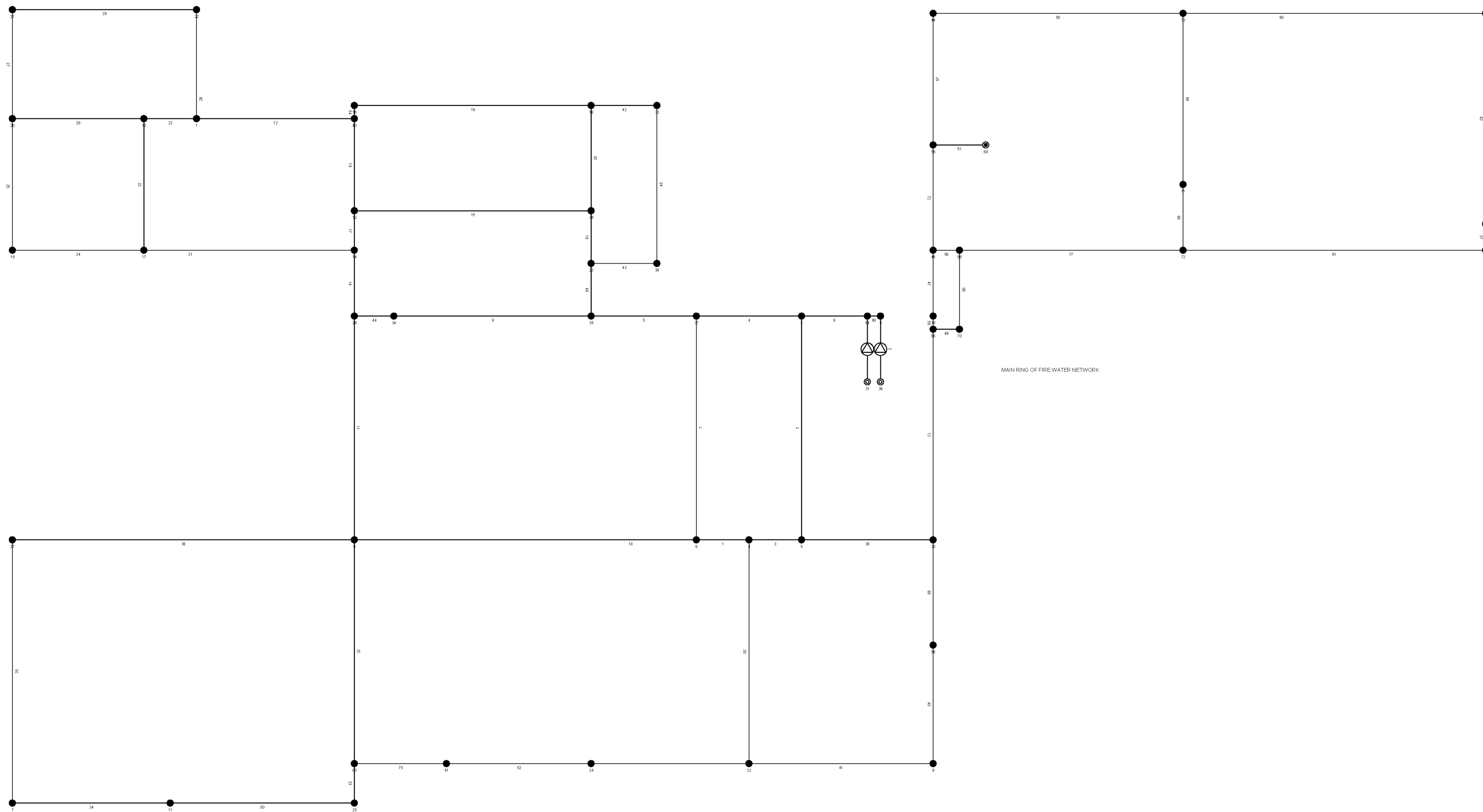
Attachment	9	Fire scenario in the RJF storage area-Tank fire-Case A1
	9.A	PIPENET schematic layout with piping and nodes label
	9.B	PIPENET schematic layout with flow rate and pressure results
	9.C	PIPENET schematic layout with velocity results
	9.D	PIPENET input/output printout report

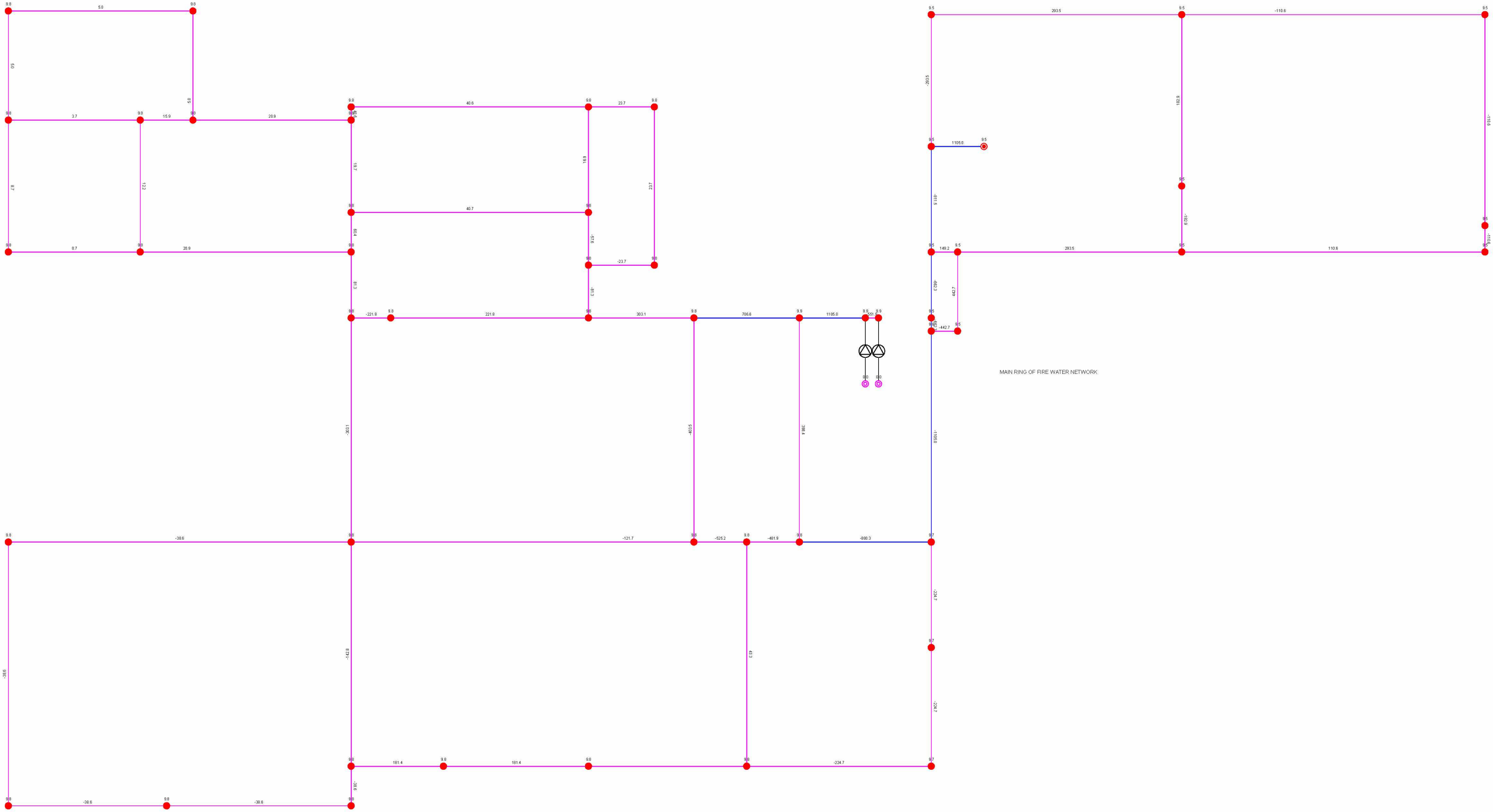
Attachment 9.A contains 1 page

Attachment 9.B contains 1 page

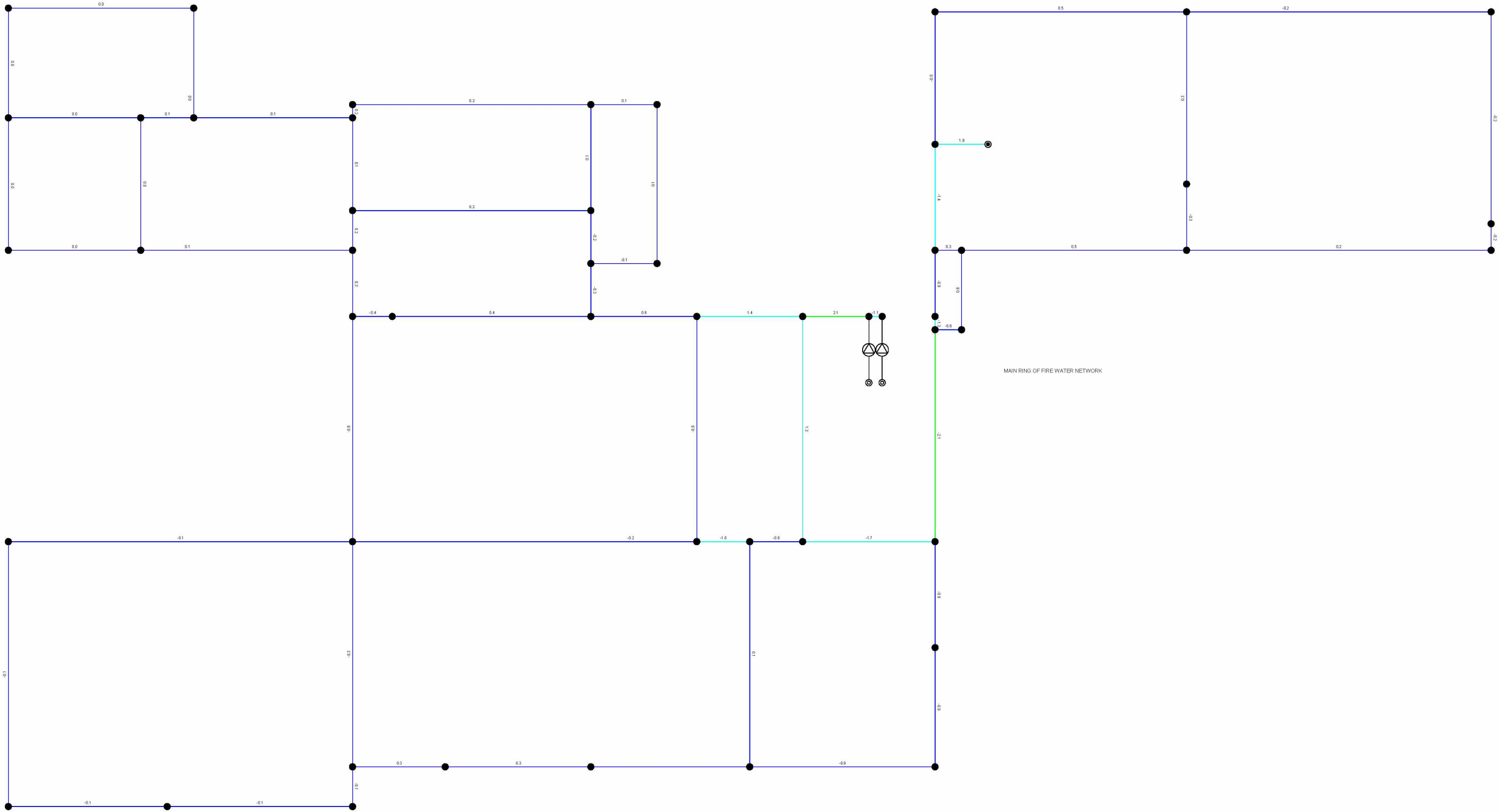
Attachment 9.C contains 1 page

Attachment 9.D contains 19 pages





Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Thursday, May 27, 2021		Page 1 of 1
Pressure (Bar G)	< 7.000000 < 8.500000	< 7.500000 < 9.000000	< 8.000000 > 9.000000
Pipe vol. flow (m³/h)	< 600.000000 < 2400.000000	< 1200.000000 < 3450.000000	< 1800.000000 > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Thursday, May 27, 2021	Page 1 of 1
Pipe velocity (m/sec)	< 0.000000	< 1.000000	< 2.000000
	< 3.000000	< 3.500000	> 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

17:47 on 27-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13
45	39	33	12.00	97.00	0.000	120.0	16.46

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13
32	1 x 4	27.13

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)			
33	1	x 2	7.925			
34	1	x 2	7.925			
35	1	x 2	7.925			
36	1	x 4	20.42			
37	1	x 2	15.66			
38	1	x 4	27.13			
40	1	x 2	8.230			
42	1	x 4	18.29			
43	1	x 4	18.29			
44	1	x 4	27.13			
45	2	x 2	8.230			
48	1	x 4	18.29			
49	1	x 4	45.60			
56	1	x 4	40.99			
57	1	x 4	40.99			
60	1	x 2	15.66			
75	1	x 4	27.13			
80	1	x 2	17.50	1	x 4	45.60
84	1	x 4	40.99			
85	1	x 4	40.99			

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-525.1869	3	16.8760	18.0000	*
2	2	5	398.4117	3	13.1240	14.0000	*
3	5	4	-481.9145	3	16.8760	18.0000	*
4	2	37	706.5909	3	16.8760	18.0000	*
5	37	35	303.1305	3	16.8760	18.0000	*
6	68	2	1105.0026	3	16.8760	18.0000	*
7	6	37	-403.4603	3	16.8760	18.0000	*
9	35	34	221.8233	3	16.8760	18.0000	*
10	6	9	-121.7266	3	16.8760	18.0000	*
11	9	29	-303.1305	3	16.8760	18.0000	*
12	43	1	20.9250	3	11.9380	12.0000	*
13	66	30	-1105.0026	3	16.8760	18.0000	*
14	14	29	81.3072	3	11.9380	12.0000	*
15	38	12	40.7133	3	11.9380	12.0000	*
16	38	23	-57.6190	3	11.9380	12.0000	*
17	12	14	60.3821	3	11.9380	12.0000	*
18	43	12	19.6688	3	11.9380	12.0000	*
19	16	15	40.5938	3	11.9380	12.0000	*
20	38	16	16.9057	3	11.9380	12.0000	*
21	17	14	20.9250	3	11.9380	12.0000	*
22	18	17	12.2181	3	11.9380	12.0000	*
23	1	18	15.8955	3	11.9380	12.0000	*
24	19	17	8.7069	3	11.9380	12.0000	*
25	20	19	8.7069	3	11.9380	12.0000	*
26	18	20	3.6774	3	11.9380	12.0000	*
27	21	20	5.0295	3	11.9380	12.0000	*
28	22	21	5.0295	3	11.9380	12.0000	*
29	1	22	5.0295	3	11.9380	12.0000	*
30	4	32	43.2724	3	16.8760	18.0000	*
31	32	24	-181.4039	3	16.8760	18.0000	*
32	63	9	-142.8214	3	16.8760	18.0000	*
33	63	25	-38.5826	3	13.1240	14.0000	*
34	11	7	-38.5826	3	13.1240	14.0000	*
35	7	27	-38.5826	3	13.1240	14.0000	*
36	27	9	-38.5826	3	13.1240	14.0000	*
37	49	26	-110.5651	9	18.0000	18.0000	*
38	30	5	-880.3262	3	16.8760	18.0000	*
40	56	8	-224.6764	3	11.9380	12.0000	*
41	8	32	-224.6764	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
42	33	16	23.6882	3	11.9380	12.0000	*
43	39	23	-23.6882	3	11.9380	12.0000	*
44	29	34	-221.8233	3	16.8760	18.0000	*
45	39	33	23.6882	3	11.9380	12.0000	*
47	45	10	-662.2626	9	20.0000	20.0000	*
48	23	35	-81.3072	3	11.9380	12.0000	*
49	70	66	-442.7401	9	20.0000	20.0000	*
50	25	11	-38.5826	3	13.1240	14.0000	*
51	59	60	1105.0027	9	18.0000	18.0000	*
52	41	24	181.4039	3	16.8760	18.0000	*
54	15	43	40.5938	3	11.9380	12.0000	*
56	58	45	149.2401	9	18.0000	18.0000	*
57	59	44	-293.5000	9	18.0000	18.0000	*
58	73	44	293.5000	9	18.0000	18.0000	*
59	10	66	-662.2625	3	16.8760	18.0000	*
60	73	48	-110.5651	9	18.0000	18.0000	*
61	72	26	110.5651	9	18.0000	18.0000	*
62	48	49	-110.5651	9	18.0000	18.0000	*
69	30	56	-224.6764	3	11.9380	12.0000	*
72	59	45	-811.5027	9	18.0000	18.0000	*
75	63	41	181.4039	3	16.8760	18.0000	*
77	58	72	293.5000	9	18.0000	18.0000	*
80	70	58	442.7401	9	20.0000	20.0000	*
84	71	73	182.9348	9	18.0000	18.0000	*
85	71	72	-182.9348	9	18.0000	18.0000	*
90	68	3	-551.9412	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.773	9.783	-1.0115E-02	1.0115E-02	-525.2	-1.011
2	2	5	14.00	9.851	9.763	8.7834E-02	8.7834E-02	398.4	1.268
3	5	4	18.00	9.763	9.773	-9.7075E-03	9.7075E-03	-481.9	-0.9276
4	2	37	18.00	9.851	9.814	3.6727E-02	3.6727E-02	706.6	1.360
5	37	35	18.00	9.814	9.807	7.3204E-03	7.3204E-03	303.1	0.5835
6	68	2	18.00	9.907	9.851	5.5965E-02	5.5965E-02	1105.	2.127
7	6	37	18.00	9.783	9.814	-3.1285E-02	3.1285E-02	-403.5	-0.7766
9	35	34	18.00	9.807	9.801	6.2923E-03	6.2923E-03	221.8	0.4270
10	6	9	18.00	9.783	9.787	-3.6955E-03	3.6955E-03	-121.7	-0.2343
11	9	29	18.00	9.787	9.798	-1.1677E-02	1.1677E-02	-303.1	-0.5835
12	43	1	12.00	9.801	9.801	4.0531E-04	4.0531E-04	20.92	8.0490E-02
13	66	30	18.00	9.551	9.677	-0.1262	0.1262	-1105.	-2.127
14	14	29	12.00	9.800	9.798	1.9531E-03	1.9531E-03	81.31	0.3128
15	38	12	12.00	9.804	9.801	2.1372E-03	2.1372E-03	40.71	0.1566
16	38	23	12.00	9.804	9.805	-1.0176E-03	1.0176E-03	-57.62	-0.2216
17	12	14	12.00	9.801	9.800	9.8228E-04	9.8228E-04	60.38	0.2323
18	43	12	12.00	9.801	9.801	1.0014E-04	1.0014E-04	19.67	7.5658E-02
19	16	15	12.00	9.803	9.802	1.7147E-03	1.7147E-03	40.59	0.1561
20	38	16	12.00	9.804	9.803	1.1730E-04	1.1730E-04	16.91	6.5029E-02
21	17	14	12.00	9.801	9.800	4.9973E-04	4.9973E-04	20.92	8.0490E-02
22	18	17	12.00	9.801	9.801	1.2016E-04	1.2016E-04	12.22	4.6998E-02
23	1	18	12.00	9.801	9.801	5.7220E-05	5.7220E-05	15.90	6.1143E-02
24	19	17	12.00	9.801	9.801	5.5313E-05	5.5313E-05	8.707	3.3492E-02
25	20	19	12.00	9.801	9.801	5.2452E-05	5.2452E-05	8.707	3.3492E-02
26	18	20	12.00	9.801	9.801	1.2398E-05	1.2398E-05	3.677	1.4145E-02
27	21	20	12.00	9.801	9.801	2.0027E-05	2.0027E-05	5.030	1.9346E-02
28	22	21	12.00	9.801	9.801	2.4796E-05	2.4796E-05	5.030	1.9346E-02
29	1	22	12.00	9.801	9.801	2.4796E-05	2.4796E-05	5.030	1.9346E-02
30	4	32	18.00	9.773	9.772	6.3515E-04	6.3515E-04	43.27	8.3294E-02
31	32	24	18.00	9.772	9.777	-4.7350E-03	4.7350E-03	-181.4	-0.3492
32	63	9	18.00	9.782	9.787	-4.5300E-03	4.5300E-03	-142.8	-0.2749
33	63	25	14.00	9.782	9.782	-2.1172E-04	2.1172E-04	-38.58	-0.1228
34	11	7	14.00	9.783	9.784	-6.5994E-04	6.5994E-04	-38.58	-0.1228
35	7	27	14.00	9.784	9.785	-1.4029E-03	1.4029E-03	-38.58	-0.1228
36	27	9	14.00	9.785	9.787	-1.5001E-03	1.5001E-03	-38.58	-0.1228
37	49	26	18.00	9.533	9.533	-1.4496E-04	1.4496E-04	-110.6	-0.1871
38	30	5	18.00	9.677	9.763	-8.5817E-02	8.5817E-02	-880.3	-1.695
40	56	8	12.00	9.703	9.731	-2.8058E-02	2.8058E-02	-224.7	-0.8642
41	8	32	12.00	9.731	9.772	-4.1127E-02	4.1127E-02	-224.7	-0.8642
42	33	16	12.00	9.804	9.803	3.2997E-04	3.2997E-04	23.69	9.1119E-02
43	39	23	12.00	9.804	9.805	-3.3188E-04	3.3188E-04	-23.69	-9.1119E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
44	29	34	18.00	9.798	9.801	-2.3003E-03	2.3003E-03	-221.8	-0.4270
45	39	33	12.00	9.804	9.804	4.7302E-04	4.7302E-04	23.69	9.1119E-02
47	45	10	20.00	9.542	9.547	-5.7249E-03	5.7249E-03	-662.3	-0.9076
48	23	35	12.00	9.805	9.807	-2.5024E-03	2.5024E-03	-81.31	-0.3128
49	70	66	20.00	9.548	9.551	-2.8830E-03	2.8830E-03	-442.7	-0.6068
50	25	11	14.00	9.782	9.783	-7.5531E-04	7.5531E-04	-38.58	-0.1228
51	59	60	18.00	9.519	9.509	9.8381E-03	9.8381E-03	1105.	1.870
52	41	24	18.00	9.779	9.777	2.2125E-03	2.2125E-03	181.4	0.3492
54	15	43	12.00	9.802	9.801	2.0504E-04	2.0504E-04	40.59	0.1561
56	58	45	18.00	9.542	9.542	5.5695E-04	5.5695E-04	149.2	0.2525
57	59	44	18.00	9.519	9.523	-4.1018E-03	4.1018E-03	-293.5	-0.4966
58	73	44	18.00	9.531	9.523	7.7057E-03	7.7057E-03	293.5	0.4966
59	10	66	18.00	9.547	9.551	-4.0398E-03	4.0398E-03	-662.3	-1.275
60	73	48	18.00	9.531	9.532	-1.4620E-03	1.4620E-03	-110.6	-0.1871
61	72	26	18.00	9.535	9.533	1.3571E-03	1.3571E-03	110.6	0.1871
62	48	49	18.00	9.532	9.533	-8.8024E-04	8.8024E-04	-110.6	-0.1871
69	30	56	12.00	9.677	9.703	-2.5704E-02	2.5704E-02	-224.7	-0.8642
72	59	45	18.00	9.519	9.542	-2.2388E-02	2.2388E-02	-811.5	-1.373
75	63	41	18.00	9.782	9.779	2.9678E-03	2.9678E-03	181.4	0.3492
77	58	72	18.00	9.542	9.535	7.2927E-03	7.2927E-03	293.5	0.4966
80	70	58	20.00	9.548	9.542	6.3248E-03	6.3248E-03	442.7	0.6068
84	71	73	18.00	9.533	9.531	2.5167E-03	2.5167E-03	182.9	0.3095
85	71	72	18.00	9.533	9.535	-1.3275E-03	1.3275E-03	-182.9	-0.3095
90	68	3	18.00	9.907	9.909	-1.6899E-03	1.6899E-03	-551.9	-1.062

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	553.1	0.000	9.907	9.907	10.17	0.1005	1.5220E+05	100.0
2	551.9	0.000	9.909	9.909	10.17	0.1005	1.5192E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 551.9	0.0000
31	0.000	* 553.1	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	9.509	1105. *	358.33

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 27-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

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COMMENTS

Analysis Converged in 3 Iterations

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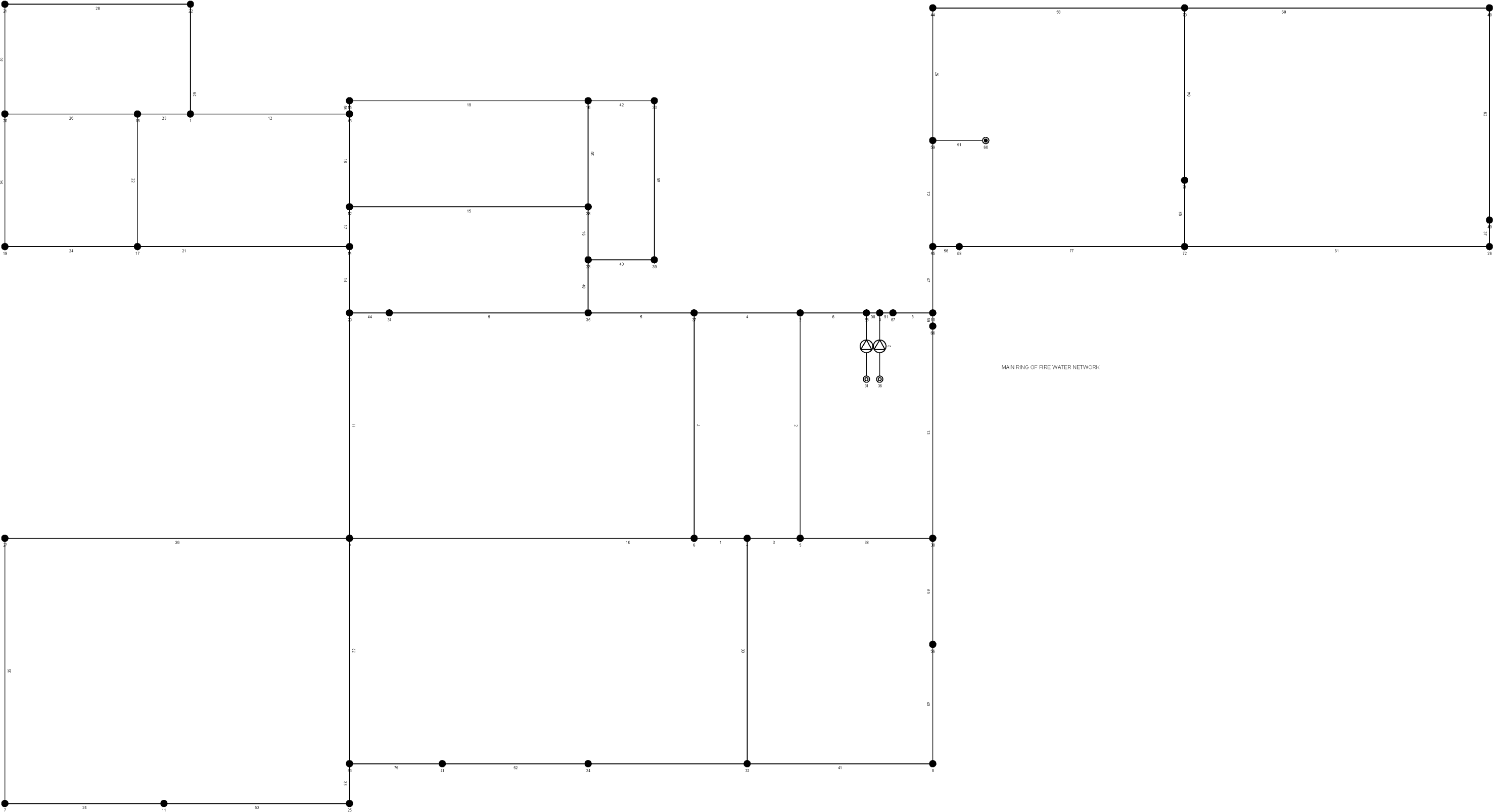
Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

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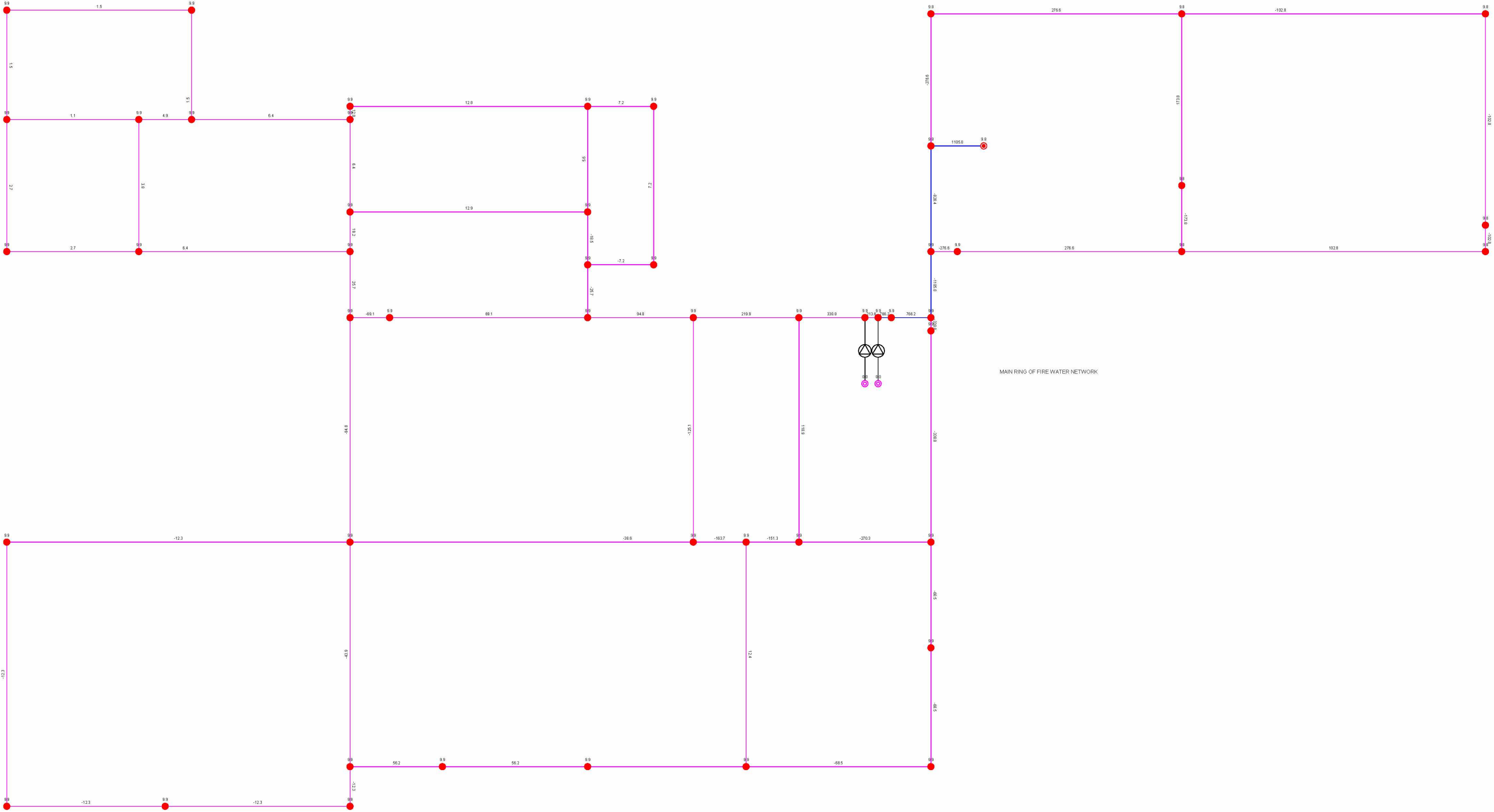
**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

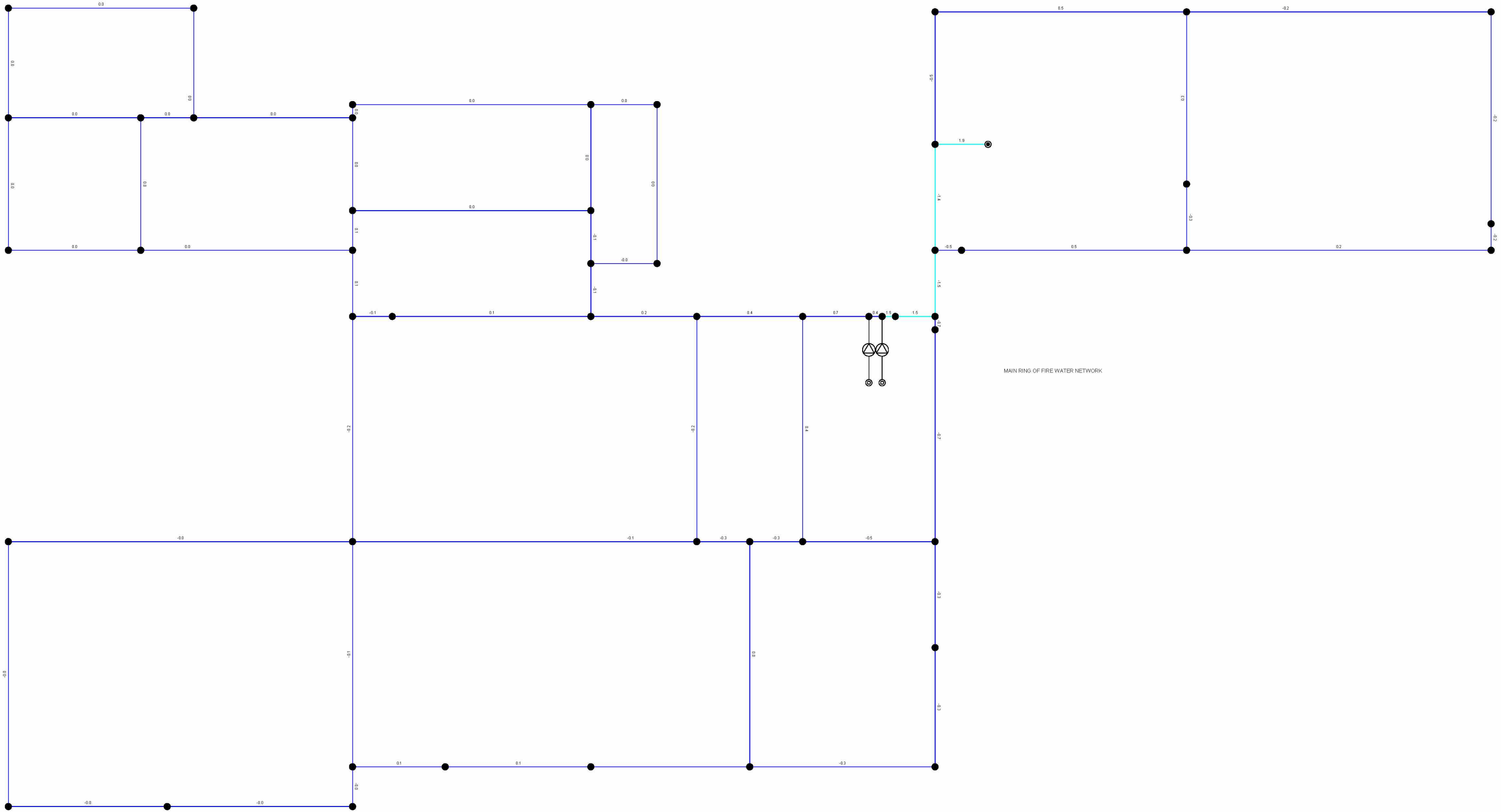
Attachment	10	Fire scenario in the RJF storage area-Tank fire–Case A2
	10.A	PIPENET schematic layout with piping and nodes label
	10.B	PIPENET schematic layout with flow rate and pressure results
	10.C	PIPENET schematic layout with velocity results
	10.D	PIPENET input/output printout report

Attachment 10.A contains 1 page
Attachment 10.B contains 1 page
Attachment 10.C contains 1 page
Attachment 10.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Tuesday, May 25, 2021	Page 1 of 1





Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Thursday, May 27, 2021	Page 1 of 1
Pipe velocity (m/sec)	 < 0.000000	 < 1.000000	 < 2.000000
	 < 3.000000	 < 3.500000	 > 3.500000

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PIPENET SPRAY/SPRINKLER MODULE

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VERSION 1.9.0

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Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

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17:52 on 27-May-2021

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Pump Configuration.....	7
Designed Diameters & Flowrates.....	8
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Flow at Inlets.....	13
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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
32	1 x 4	27.13
33	1 x 2	7.925
34	1 x 2	7.925
35	1 x 2	7.925
36	1 x 4	20.42
37	1 x 2	15.66
38	1 x 4	27.13
40	1 x 2	8.230
42	1 x 4	18.29
43	1 x 4	18.29
44	1 x 4	27.13
45	2 x 2	8.230
48	1 x 4	18.29
56	1 x 4	40.99
57	1 x 4	40.99
60	1 x 2	15.66
75	1 x 4	27.13
84	1 x 4	40.99
85	1 x 4	40.99

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-163.7016	3	16.8760	18.0000	*
2	2	5	118.9253	3	13.1240	14.0000	*
3	5	4	-151.3360	3	16.8760	18.0000	*
4	2	37	219.8737	3	16.8760	18.0000	*
5	37	35	94.7887	3	16.8760	18.0000	*
6	68	2	338.7989	3	16.8760	18.0000	*
7	6	37	-125.0850	3	16.8760	18.0000	*
8	67	10	766.2037	3	16.8760	18.0000	*
9	35	34	69.1086	3	16.8760	18.0000	*
10	6	9	-38.6166	3	16.8760	18.0000	*
11	9	29	-94.7887	3	16.8760	18.0000	*
12	43	1	6.4316	3	11.9380	12.0000	*
13	66	30	-338.7989	3	16.8760	18.0000	*
14	14	29	25.6801	3	11.9380	12.0000	*
15	38	12	12.8912	3	11.9380	12.0000	*
16	38	23	-18.4867	3	11.9380	12.0000	*
17	12	14	19.2485	3	11.9380	12.0000	*
18	43	12	6.3573	3	11.9380	12.0000	*
19	16	15	12.7889	3	11.9380	12.0000	*
20	38	16	5.5955	3	11.9380	12.0000	*
21	17	14	6.4316	3	11.9380	12.0000	*
22	18	17	3.7717	3	11.9380	12.0000	*
23	1	18	4.8900	3	11.9380	12.0000	*
24	19	17	2.6599	3	11.9380	12.0000	*
25	20	19	2.6599	3	11.9380	12.0000	*
26	18	20	1.1183	3	11.9380	12.0000	*
27	21	20	1.5416	3	11.9380	12.0000	*
28	22	21	1.5416	3	11.9380	12.0000	*
29	1	22	1.5416	3	11.9380	12.0000	*
30	4	32	12.3656	3	16.8760	18.0000	*
31	32	24	-56.1720	3	16.8760	18.0000	*
32	63	9	-43.8934	3	16.8760	18.0000	*
33	63	25	-12.2787	3	13.1240	14.0000	*
34	11	7	-12.2787	3	13.1240	14.0000	*
35	7	27	-12.2787	3	13.1240	14.0000	*
36	27	9	-12.2787	3	13.1240	14.0000	*
37	49	26	-102.7877	9	18.0000	18.0000	*
38	30	5	-270.2613	3	16.8760	18.0000	*
40	56	8	-68.5377	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-68.5377	3	11.9380	12.0000	*
42	33	16	7.1933	3	11.9380	12.0000	*
43	39	23	-7.1933	3	11.9380	12.0000	*
44	29	34	-69.1086	3	16.8760	18.0000	*
45	39	33	7.1933	3	11.9380	12.0000	*
47	45	10	-1105.0026	9	20.0000	20.0000	*
48	23	35	-25.6801	3	11.9380	12.0000	*
50	25	11	-12.2787	3	13.1240	14.0000	*
51	59	60	1105.0027	9	18.0000	18.0000	*
52	41	24	56.1720	3	16.8760	18.0000	*
54	15	43	12.7889	3	11.9380	12.0000	*
56	58	45	-276.6205	9	18.0000	18.0000	*
57	59	44	-276.6205	9	18.0000	18.0000	*
58	73	44	276.6205	9	18.0000	18.0000	*
59	10	66	-338.7989	3	16.8760	18.0000	*
60	73	48	-102.7877	9	18.0000	18.0000	*
61	72	26	102.7877	9	18.0000	18.0000	*
62	48	49	-102.7877	9	18.0000	18.0000	*
69	30	56	-68.5377	3	11.9380	12.0000	*
72	59	45	-828.3821	9	18.0000	18.0000	*
75	63	41	56.1720	3	16.8760	18.0000	*
77	58	72	276.6205	9	18.0000	18.0000	*
84	71	73	173.8328	9	18.0000	18.0000	*
85	71	72	-173.8328	9	18.0000	18.0000	*
90	68	3	213.6035	3	16.8760	18.0000	*
91	3	67	766.2037	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined
9	-- Reinforced Fiber Gla	Not Lined

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.893	9.894	-1.1225E-03	1.1225E-03	-163.7	-0.3151
2	2	5	14.00	9.902	9.892	9.7399E-03	9.7399E-03	118.9	0.3785
3	5	4	18.00	9.892	9.893	-1.0777E-03	1.0777E-03	-151.3	-0.2913
4	2	37	18.00	9.902	9.898	4.0617E-03	4.0617E-03	219.9	0.4232
5	37	35	18.00	9.898	9.897	8.1539E-04	8.1539E-04	94.79	0.1825
6	68	2	18.00	9.908	9.902	6.1750E-03	6.1750E-03	338.8	0.6521
7	6	37	18.00	9.894	9.898	-3.4781E-03	3.4781E-03	-125.1	-0.2408
8	67	10	18.00	9.905	9.868	3.7012E-02	3.7012E-02	766.2	1.475
9	35	34	18.00	9.897	9.896	6.9714E-04	6.9714E-04	69.11	0.1330
10	6	9	18.00	9.894	9.895	-4.1294E-04	4.1294E-04	-38.62	-7.4332E-02
11	9	29	18.00	9.895	9.896	-1.2970E-03	1.2970E-03	-94.79	-0.1825
12	43	1	12.00	9.896	9.896	4.4823E-05	4.4823E-05	6.432	2.4740E-02
13	66	30	18.00	9.869	9.883	-1.3927E-02	1.3927E-02	-338.8	-0.6521
14	14	29	12.00	9.896	9.896	2.1744E-04	2.1744E-04	25.68	9.8781E-02
15	38	12	12.00	9.897	9.896	2.3746E-04	2.3746E-04	12.89	4.9587E-02
16	38	23	12.00	9.897	9.897	-1.1253E-04	1.1253E-04	-18.49	-7.1111E-02
17	12	14	12.00	9.896	9.896	1.0777E-04	1.0777E-04	19.25	7.4041E-02
18	43	12	12.00	9.896	9.896	1.2398E-05	1.2398E-05	6.357	2.4454E-02
19	16	15	12.00	9.897	9.896	1.8978E-04	1.8978E-04	12.79	4.9194E-02
20	38	16	12.00	9.897	9.897	1.2398E-05	1.2398E-05	5.596	2.1524E-02
21	17	14	12.00	9.896	9.896	5.5313E-05	5.5313E-05	6.432	2.4740E-02
22	18	17	12.00	9.896	9.896	1.2398E-05	1.2398E-05	3.772	1.4508E-02
23	1	18	12.00	9.896	9.896	7.6294E-06	0.000	4.890	1.8810E-02
24	19	17	12.00	9.896	9.896	4.7684E-06	0.000	2.660	1.0231E-02
25	20	19	12.00	9.896	9.896	7.6294E-06	0.000	2.660	1.0231E-02
26	18	20	12.00	9.896	9.896	0.000	0.000	1.118	4.3016E-03
27	21	20	12.00	9.896	9.896	0.000	0.000	1.542	5.9297E-03
28	22	21	12.00	9.896	9.896	4.7684E-06	0.000	1.542	5.9297E-03
29	1	22	12.00	9.896	9.896	2.8610E-06	0.000	1.542	5.9297E-03
30	4	32	18.00	9.893	9.893	6.0081E-05	6.0081E-05	12.37	2.3802E-02
31	32	24	18.00	9.893	9.894	-5.2261E-04	5.2261E-04	-56.17	-0.1081
32	63	9	18.00	9.894	9.895	-5.0068E-04	5.0068E-04	-43.89	-8.4489E-02
33	63	25	14.00	9.894	9.894	-2.2888E-05	2.2888E-05	-12.28	-3.9080E-02
34	11	7	14.00	9.894	9.894	-7.2479E-05	7.2479E-05	-12.28	-3.9080E-02
35	7	27	14.00	9.894	9.895	-1.5545E-04	1.5545E-04	-12.28	-3.9080E-02
36	27	9	14.00	9.895	9.895	-1.6499E-04	1.6499E-04	-12.28	-3.9080E-02
37	49	26	18.00	9.843	9.843	-1.3256E-04	1.3256E-04	-102.8	-0.1739
38	30	5	18.00	9.883	9.892	-9.4671E-03	9.4671E-03	-270.3	-0.5202
40	56	8	12.00	9.886	9.889	-3.0994E-03	3.0994E-03	-68.54	-0.2636
41	8	32	12.00	9.889	9.893	-4.5452E-03	4.5452E-03	-68.54	-0.2636
42	33	16	12.00	9.897	9.897	3.7193E-05	3.7193E-05	7.193	2.7670E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.897	9.897	-3.5286E-05	3.5286E-05	-7.193	-2.7670E-02
44	29	34	18.00	9.896	9.896	-2.5558E-04	2.5558E-04	-69.11	-0.1330
45	39	33	12.00	9.897	9.897	5.2452E-05	5.2452E-05	7.193	2.7670E-02
47	45	10	20.00	9.853	9.868	-1.4430E-02	1.4430E-02	-1105.	-1.514
48	23	35	12.00	9.897	9.897	-2.7752E-04	2.7752E-04	-25.68	-9.8781E-02
50	25	11	14.00	9.894	9.894	-8.4877E-05	8.4877E-05	-12.28	-3.9080E-02
51	59	60	18.00	9.830	9.820	9.8400E-03	9.8400E-03	1105.	1.870
52	41	24	18.00	9.894	9.894	2.4509E-04	2.4509E-04	56.17	0.1081
54	15	43	12.00	9.896	9.896	2.2888E-05	2.2888E-05	12.79	4.9194E-02
56	58	45	18.00	9.851	9.853	-1.9426E-03	1.9426E-03	-276.6	-0.4680
57	59	44	18.00	9.830	9.834	-3.7727E-03	3.7727E-03	-276.6	-0.4680
58	73	44	18.00	9.841	9.834	7.0925E-03	7.0925E-03	276.6	0.4680
59	10	66	18.00	9.868	9.869	-1.1225E-03	1.1225E-03	-338.8	-0.6521
60	73	48	18.00	9.841	9.842	-1.3447E-03	1.3447E-03	-102.8	-0.1739
61	72	26	18.00	9.845	9.843	1.2522E-03	1.2522E-03	102.8	0.1739
62	48	49	18.00	9.842	9.843	-8.1062E-04	8.1062E-04	-102.8	-0.1739
69	30	56	12.00	9.883	9.886	-2.8400E-03	2.8400E-03	-68.54	-0.2636
72	59	45	18.00	9.830	9.853	-2.3058E-02	2.3058E-02	-828.4	-1.402
75	63	41	18.00	9.894	9.894	3.2711E-04	3.2711E-04	56.17	0.1081
77	58	72	18.00	9.851	9.845	6.7101E-03	6.7101E-03	276.6	0.4680
84	71	73	18.00	9.843	9.841	2.3174E-03	2.3174E-03	173.8	0.2941
85	71	72	18.00	9.843	9.845	-1.2226E-03	1.2226E-03	-173.8	-0.2941
90	68	3	18.00	9.908	9.908	2.9755E-04	2.9755E-04	213.6	0.4112
91	3	67	18.00	9.908	9.905	3.1223E-03	3.1223E-03	766.2	1.475

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	552.4	0.000	9.908	9.908	10.17	0.1005	1.5203E+05	100.0
2	552.6	0.000	9.908	9.908	10.17	0.1005	1.5208E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 552.6	0.0000
31	0.000	* 552.4	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	9.820	1105. *	352.61

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 27-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 27-May-2021

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COMMENTS

Analysis Converged in 4 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

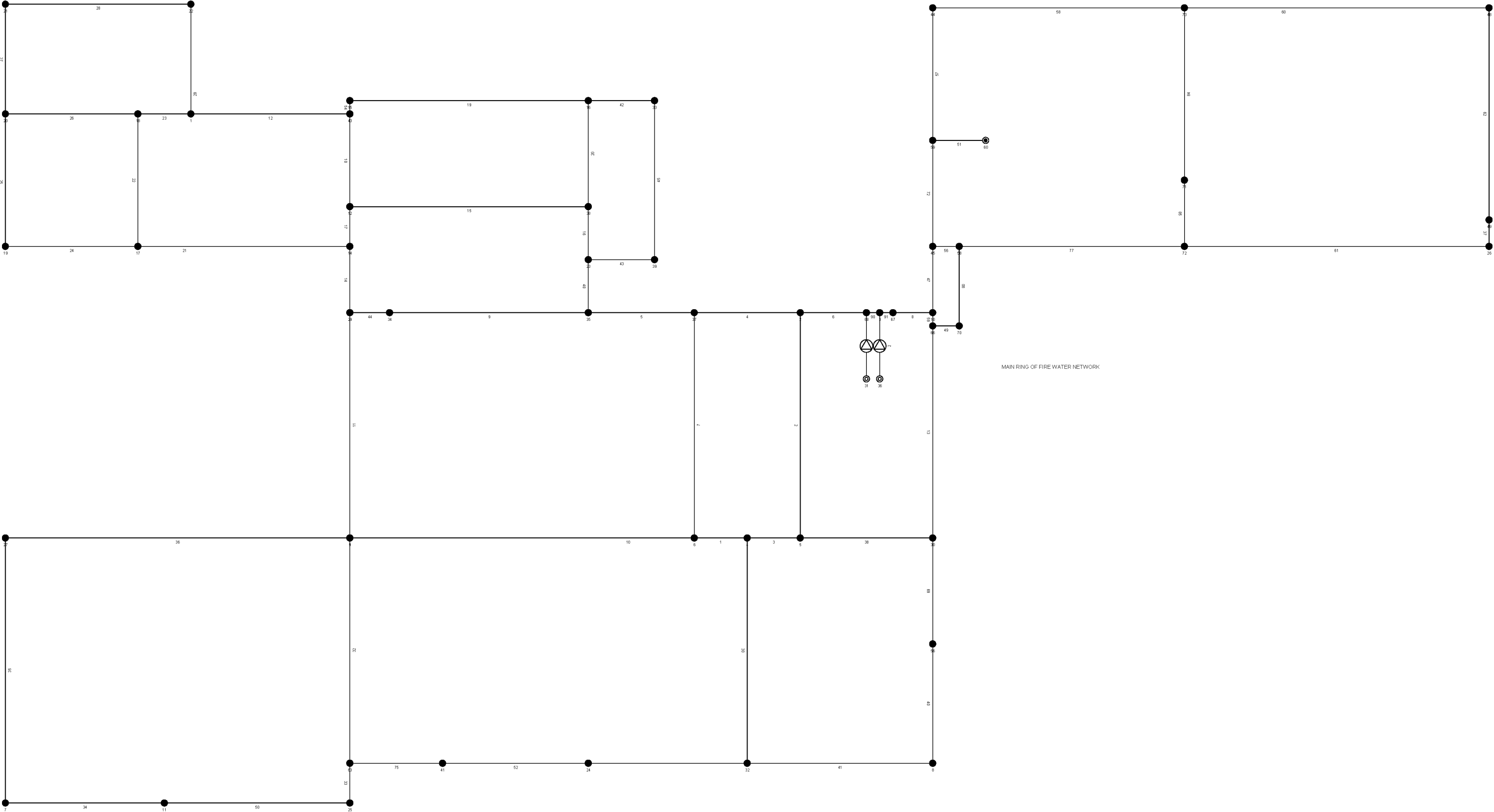
Attachment	11	Fire scenario in the RJF storage area-Tank fire–Case B
	11.A	PIPENET schematic layout with piping and nodes label
	11.B	PIPENET schematic layout with flow rate and pressure results
	11.C	PIPENET schematic layout with velocity results
	11.D	PIPENET input/output printout report

Attachment 11.A contains 1 page

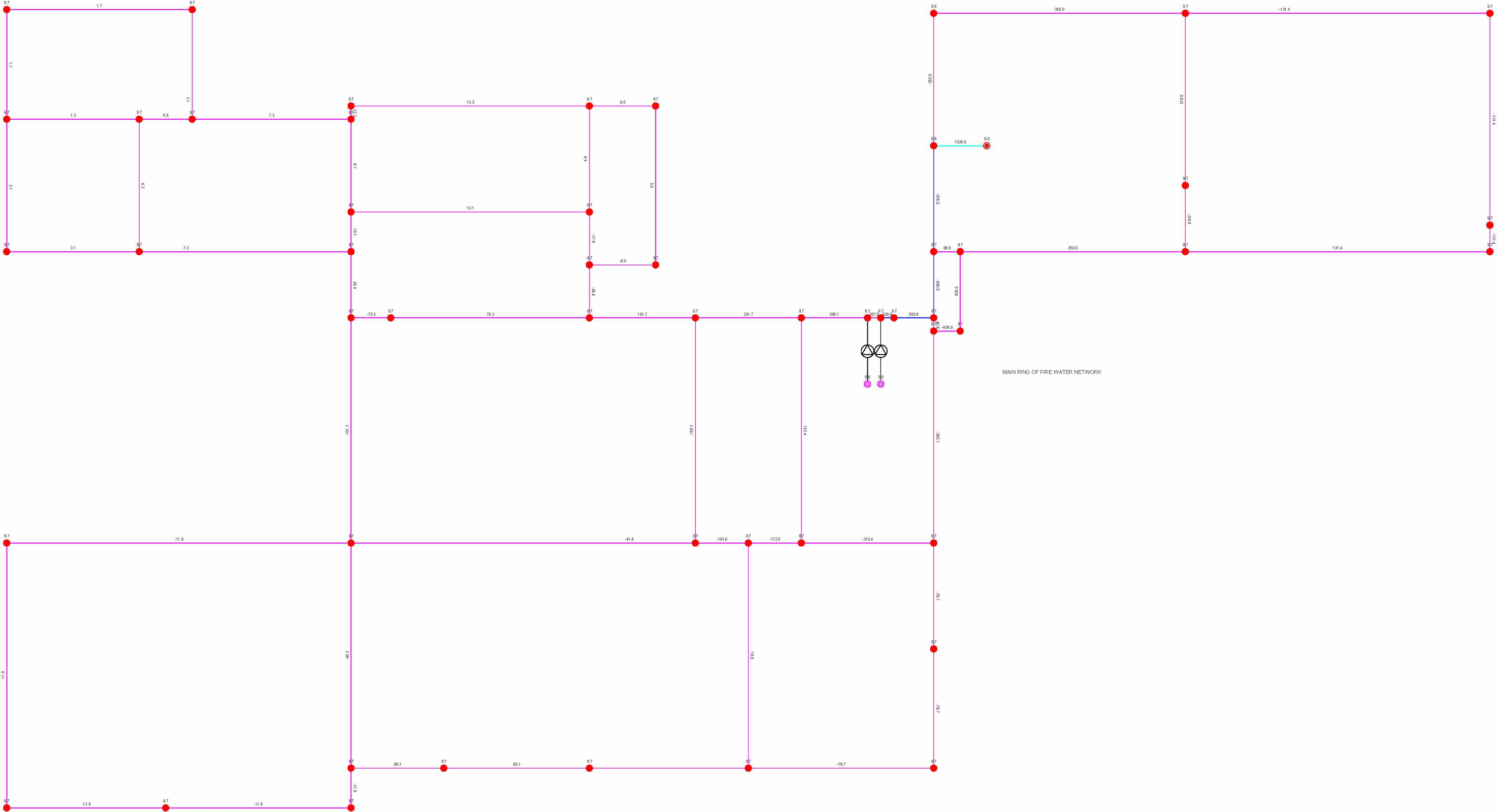
Attachment 11.B contains 1 page

Attachment 11.C contains 1 page

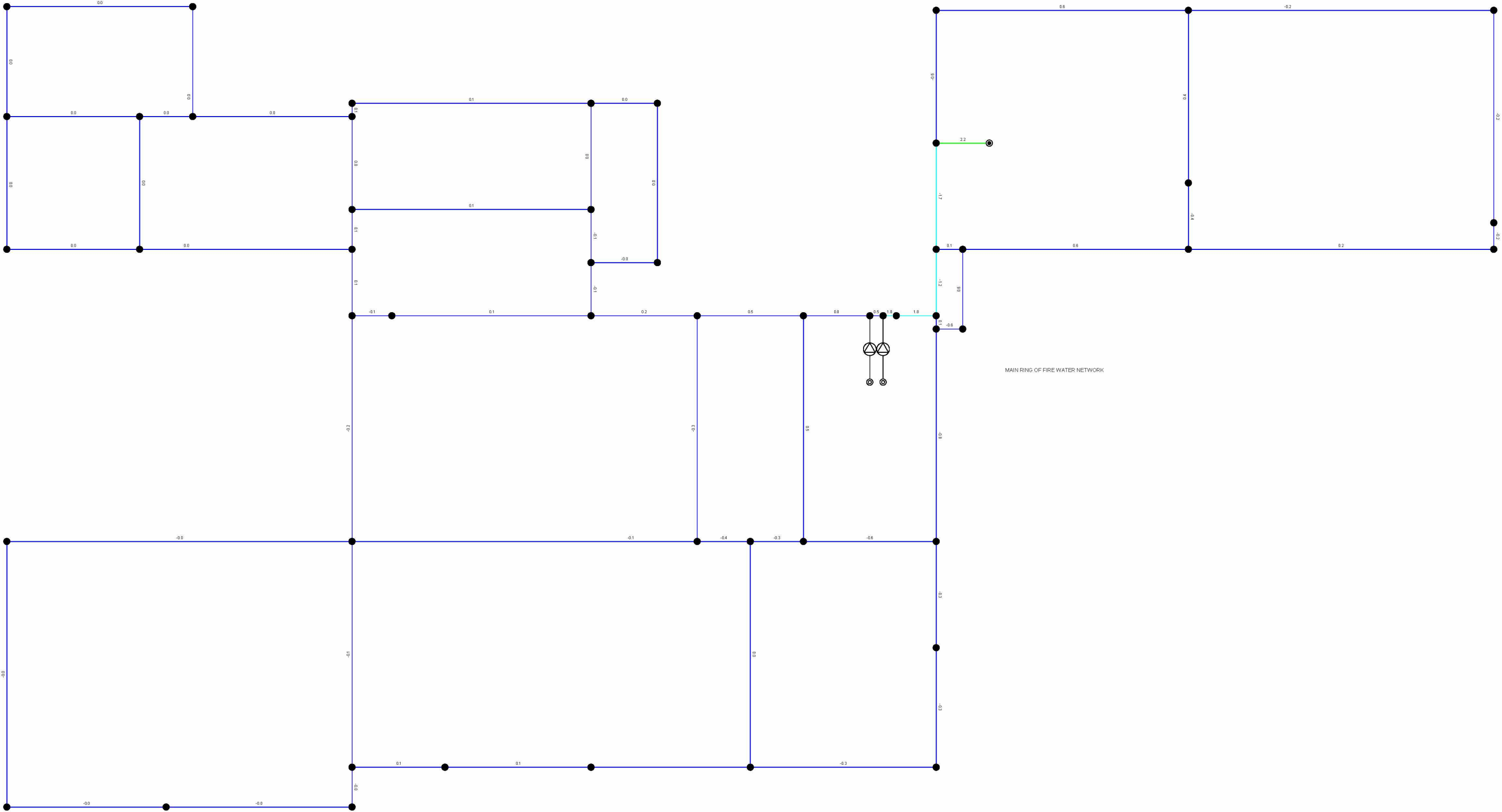
Attachment 11.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Thursday, May 27, 2021		Page 1 of 1
Pressure (Bar G)	< 7.000000 < 8.500000	< 7.500000 < 9.000000	< 8.000000 > 9.000000
Pipe vol. flow (m³/h)	< 600.000000 < 2400.000000	< 1200.000000 < 3450.000000	< 1800.000000 > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Thursday, May 27, 2021	Page 1 of 1
Pipe velocity (m/sec)	< 0.000000	< 1.000000	< 2.000000
	< 3.000000	< 3.500000	> 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

17:54 on 27-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :		
Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
29	1	x 4	18.29	
30	2	x 4	27.13	
32	1	x 4	27.13	
33	1	x 2	7.925	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
40	1	x 2	8.230	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-191.6201	3	16.8760	18.0000	*
2	2	5	143.3849	3	13.1240	14.0000	*
3	5	4	-172.0039	3	16.8760	18.0000	*
4	2	37	251.7292	3	16.8760	18.0000	*
5	37	35	101.6627	3	16.8760	18.0000	*
6	68	2	395.1141	3	16.8760	18.0000	*
7	6	37	-150.0665	3	16.8760	18.0000	*
8	67	10	930.8889	3	16.8760	18.0000	*
9	35	34	75.2672	3	16.8760	18.0000	*
10	6	9	-41.5536	3	16.8760	18.0000	*
11	9	29	-101.6627	3	16.8760	18.0000	*
12	43	1	7.2842	3	11.9380	12.0000	*
13	66	30	-395.1141	3	16.8760	18.0000	*
14	14	29	26.3955	3	11.9380	12.0000	*
15	38	12	13.0505	3	11.9380	12.0000	*
16	38	23	-17.9076	3	11.9380	12.0000	*
17	12	14	19.1113	3	11.9380	12.0000	*
18	43	12	6.0607	3	11.9380	12.0000	*
19	16	15	13.3449	3	11.9380	12.0000	*
20	38	16	4.8570	3	11.9380	12.0000	*
21	17	14	7.2842	3	11.9380	12.0000	*
22	18	17	4.2309	3	11.9380	12.0000	*
23	1	18	5.5392	3	11.9380	12.0000	*
24	19	17	3.0533	3	11.9380	12.0000	*
25	20	19	3.0533	3	11.9380	12.0000	*
26	18	20	1.3083	3	11.9380	12.0000	*
27	21	20	1.7450	3	11.9380	12.0000	*
28	22	21	1.7450	3	11.9380	12.0000	*
29	1	22	1.7450	3	11.9380	12.0000	*
30	4	32	19.6162	3	16.8760	18.0000	*
31	32	24	-60.1091	3	16.8760	18.0000	*
32	63	9	-48.3232	3	16.8760	18.0000	*
33	63	25	-11.7859	3	13.1240	14.0000	*
34	11	7	-11.7859	3	13.1240	14.0000	*
35	7	27	-11.7859	3	13.1240	14.0000	*
36	27	9	-11.7859	3	13.1240	14.0000	*
37	49	26	-131.3933	9	18.0000	18.0000	*
38	30	5	-315.3888	3	16.8760	18.0000	*
40	56	8	-79.7253	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-79.7253	3	11.9380	12.0000	*
42	33	16	8.4879	3	11.9380	12.0000	*
43	39	23	-8.4879	3	11.9380	12.0000	*
44	29	34	-75.2672	3	16.8760	18.0000	*
45	39	33	8.4879	3	11.9380	12.0000	*
47	45	10	-889.9897	9	20.0000	20.0000	*
48	23	35	-26.3955	3	11.9380	12.0000	*
49	70	66	-436.0133	9	20.0000	20.0000	*
50	25	11	-11.7859	3	13.1240	14.0000	*
51	59	60	1326.0031	9	18.0000	18.0000	*
52	41	24	60.1091	3	16.8760	18.0000	*
54	15	43	13.3449	3	11.9380	12.0000	*
56	58	45	85.9780	9	18.0000	18.0000	*
57	59	44	-350.0353	9	18.0000	18.0000	*
58	73	44	350.0353	9	18.0000	18.0000	*
59	10	66	40.8992	3	16.8760	18.0000	*
60	73	48	-131.3933	9	18.0000	18.0000	*
61	72	26	131.3933	9	18.0000	18.0000	*
62	48	49	-131.3933	9	18.0000	18.0000	*
69	30	56	-79.7253	3	11.9380	12.0000	*
72	59	45	-975.9678	9	18.0000	18.0000	*
75	63	41	60.1091	3	16.8760	18.0000	*
77	58	72	350.0353	9	18.0000	18.0000	*
80	70	58	436.0133	9	20.0000	20.0000	*
84	71	73	218.6420	9	18.0000	18.0000	*
85	71	72	-218.6420	9	18.0000	18.0000	*
90	68	3	267.7911	3	16.8760	18.0000	*
91	3	67	930.8889	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.710	9.712	-1.4801E-03	1.4801E-03	-191.6	-0.3688
2	2	5	14.00	9.721	9.709	1.2210E-02	1.2210E-02	143.4	0.4564
3	5	4	18.00	9.709	9.710	-1.4305E-03	1.4305E-03	-172.0	-0.3311
4	2	37	18.00	9.721	9.715	5.5723E-03	5.5723E-03	251.7	0.4845
5	37	35	18.00	9.715	9.714	8.9264E-04	8.9264E-04	101.7	0.1957
6	68	2	18.00	9.730	9.721	8.8654E-03	8.8654E-03	395.1	0.7605
7	6	37	18.00	9.712	9.715	-3.7270E-03	3.7270E-03	-150.1	-0.2889
8	67	10	18.00	9.725	9.675	4.9999E-02	4.9999E-02	930.9	1.792
9	35	34	18.00	9.714	9.714	7.6199E-04	7.6199E-04	75.27	0.1449
10	6	9	18.00	9.712	9.712	-3.7003E-04	3.7003E-04	-41.55	-7.9985E-02
11	9	29	18.00	9.712	9.713	-1.4219E-03	1.4219E-03	-101.7	-0.1957
12	43	1	12.00	9.714	9.714	4.7684E-05	4.7684E-05	7.284	2.8019E-02
13	66	30	18.00	9.675	9.695	-1.9987E-02	1.9987E-02	-395.1	-0.7605
14	14	29	12.00	9.714	9.713	2.3746E-04	2.3746E-04	26.40	0.1015
15	38	12	12.00	9.714	9.714	2.5749E-04	2.5749E-04	13.05	5.0200E-02
16	38	23	12.00	9.714	9.714	-1.2302E-04	1.2302E-04	-17.91	-6.8883E-02
17	12	14	12.00	9.714	9.714	1.2016E-04	1.2016E-04	19.11	7.3513E-02
18	43	12	12.00	9.714	9.714	1.0490E-05	1.0490E-05	6.061	2.3313E-02
19	16	15	12.00	9.714	9.714	2.0981E-04	2.0981E-04	13.34	5.1332E-02
20	38	16	12.00	9.714	9.714	1.2398E-05	1.2398E-05	4.857	1.8683E-02
21	17	14	12.00	9.714	9.714	6.0081E-05	6.0081E-05	7.284	2.8019E-02
22	18	17	12.00	9.714	9.714	1.5259E-05	1.5259E-05	4.231	1.6274E-02
23	1	18	12.00	9.714	9.714	7.6294E-06	0.000	5.539	2.1307E-02
24	19	17	12.00	9.714	9.714	7.6294E-06	0.000	3.053	1.1745E-02
25	20	19	12.00	9.714	9.714	4.7684E-06	0.000	3.053	1.1745E-02
26	18	20	12.00	9.714	9.714	2.8610E-06	0.000	1.308	5.0326E-03
27	21	20	12.00	9.714	9.714	2.8610E-06	0.000	1.745	6.7124E-03
28	22	21	12.00	9.714	9.714	4.7684E-06	0.000	1.745	6.7124E-03
29	1	22	12.00	9.714	9.714	2.8610E-06	0.000	1.745	6.7124E-03
30	4	32	18.00	9.710	9.710	1.0490E-05	1.0490E-05	19.62	3.7759E-02
31	32	24	18.00	9.710	9.711	-6.1798E-04	6.1798E-04	-60.11	-0.1157
32	63	9	18.00	9.711	9.712	-5.6553E-04	5.6553E-04	-48.32	-9.3016E-02
33	63	25	14.00	9.711	9.711	-2.4796E-05	2.4796E-05	-11.79	-3.7512E-02
34	11	7	14.00	9.712	9.712	-8.2970E-05	8.2970E-05	-11.79	-3.7512E-02
35	7	27	14.00	9.712	9.712	-1.7452E-04	1.7452E-04	-11.79	-3.7512E-02
36	27	9	14.00	9.712	9.712	-1.8787E-04	1.8787E-04	-11.79	-3.7512E-02
37	49	26	18.00	9.654	9.654	-2.0027E-04	2.0027E-04	-131.4	-0.2223
38	30	5	18.00	9.695	9.709	-1.3585E-02	1.3585E-02	-315.4	-0.6071
40	56	8	12.00	9.699	9.704	-4.4374E-03	4.4374E-03	-79.73	-0.3067
41	8	32	12.00	9.704	9.710	-6.5022E-03	6.5022E-03	-79.73	-0.3067
42	33	16	12.00	9.714	9.714	4.0054E-05	4.0054E-05	8.488	3.2649E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.714	9.714	-4.0054E-05	4.0054E-05	-8.488	-3.2649E-02
44	29	34	18.00	9.713	9.714	-2.8038E-04	2.8038E-04	-75.27	-0.1449
45	39	33	12.00	9.714	9.714	5.5313E-05	5.5313E-05	8.488	3.2649E-02
47	45	10	20.00	9.666	9.675	-9.6779E-03	9.6779E-03	-890.0	-1.220
48	23	35	12.00	9.714	9.714	-3.0422E-04	3.0422E-04	-26.40	-0.1015
49	70	66	20.00	9.672	9.675	-2.9249E-03	2.9249E-03	-436.0	-0.5976
50	25	11	14.00	9.711	9.712	-9.5367E-05	9.5367E-05	-11.79	-3.7512E-02
51	59	60	18.00	9.634	9.620	1.3785E-02	1.3785E-02	1326.	2.244
52	41	24	18.00	9.711	9.711	2.8992E-04	2.8992E-04	60.11	0.1157
54	15	43	12.00	9.714	9.714	2.4796E-05	2.4796E-05	13.34	5.1332E-02
56	58	45	18.00	9.666	9.666	2.3460E-04	2.3460E-04	85.98	0.1455
57	59	44	18.00	9.634	9.640	-5.6725E-03	5.6725E-03	-350.0	-0.5923
58	73	44	18.00	9.650	9.640	1.0660E-02	1.0660E-02	350.0	0.5923
59	10	66	18.00	9.675	9.675	9.5367E-05	9.5367E-05	40.90	7.8726E-02
60	73	48	18.00	9.650	9.652	-2.0247E-03	2.0247E-03	-131.4	-0.2223
61	72	26	18.00	9.656	9.654	1.8797E-03	1.8797E-03	131.4	0.2223
62	48	49	18.00	9.652	9.654	-1.2178E-03	1.2178E-03	-131.4	-0.2223
69	30	56	12.00	9.695	9.699	-4.0655E-03	4.0655E-03	-79.73	-0.3067
72	59	45	18.00	9.634	9.666	-3.1507E-02	3.1507E-02	-976.0	-1.651
75	63	41	18.00	9.711	9.711	3.8719E-04	3.8719E-04	60.11	0.1157
77	58	72	18.00	9.666	9.656	1.0087E-02	1.0087E-02	350.0	0.5923
80	70	58	20.00	9.672	9.666	6.4230E-03	6.4230E-03	436.0	0.5976
84	71	73	18.00	9.654	9.650	3.4847E-03	3.4847E-03	218.6	0.3699
85	71	72	18.00	9.654	9.656	-1.8377E-03	1.8377E-03	-218.6	-0.3699
90	68	3	18.00	9.730	9.729	3.3283E-04	3.3283E-04	267.8	0.5155
91	3	67	18.00	9.729	9.725	4.2200E-03	4.2200E-03	930.9	1.792

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	662.9	0.000	9.730	9.730	10.17	0.1023	1.7916E+05	100.0
2	663.1	0.000	9.729	9.729	10.17	0.1023	1.7921E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 663.1	0.0000
31	0.000	* 662.9	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	9.620	1326. *	427.51

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 27-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 27-May-2021

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COMMENTS

Analysis Converged in 3 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

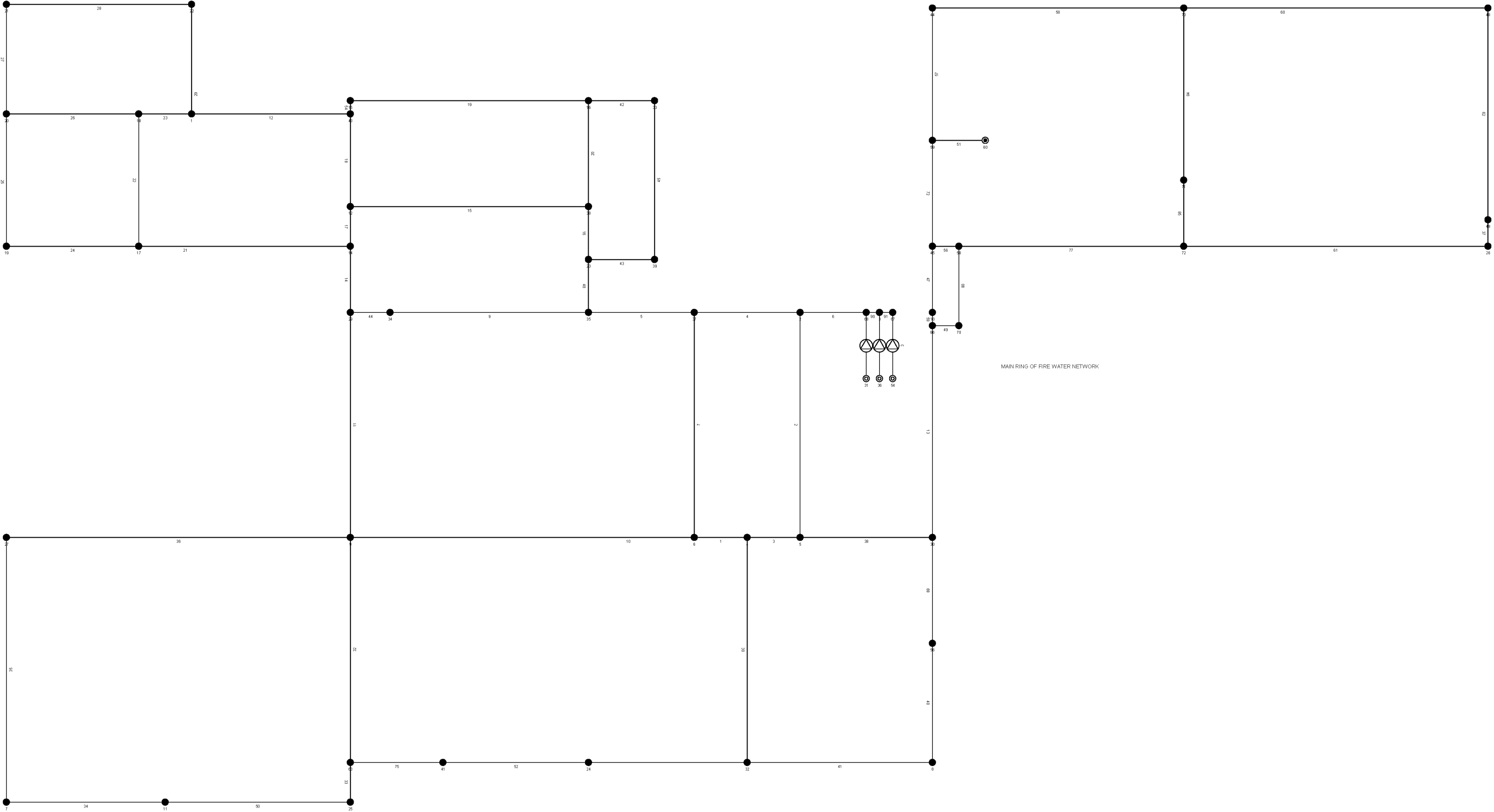
Attachment	12	Fire scenario in the RJF storage area-bund fire–Case A1
	12.A	PIPENET schematic layout with piping and nodes label
	12.B	PIPENET schematic layout with flow rate and pressure results
	12.C	PIPENET schematic layout with velocity results
	12.D	PIPENET input/output printout report

Attachment 12.A contains 1 page

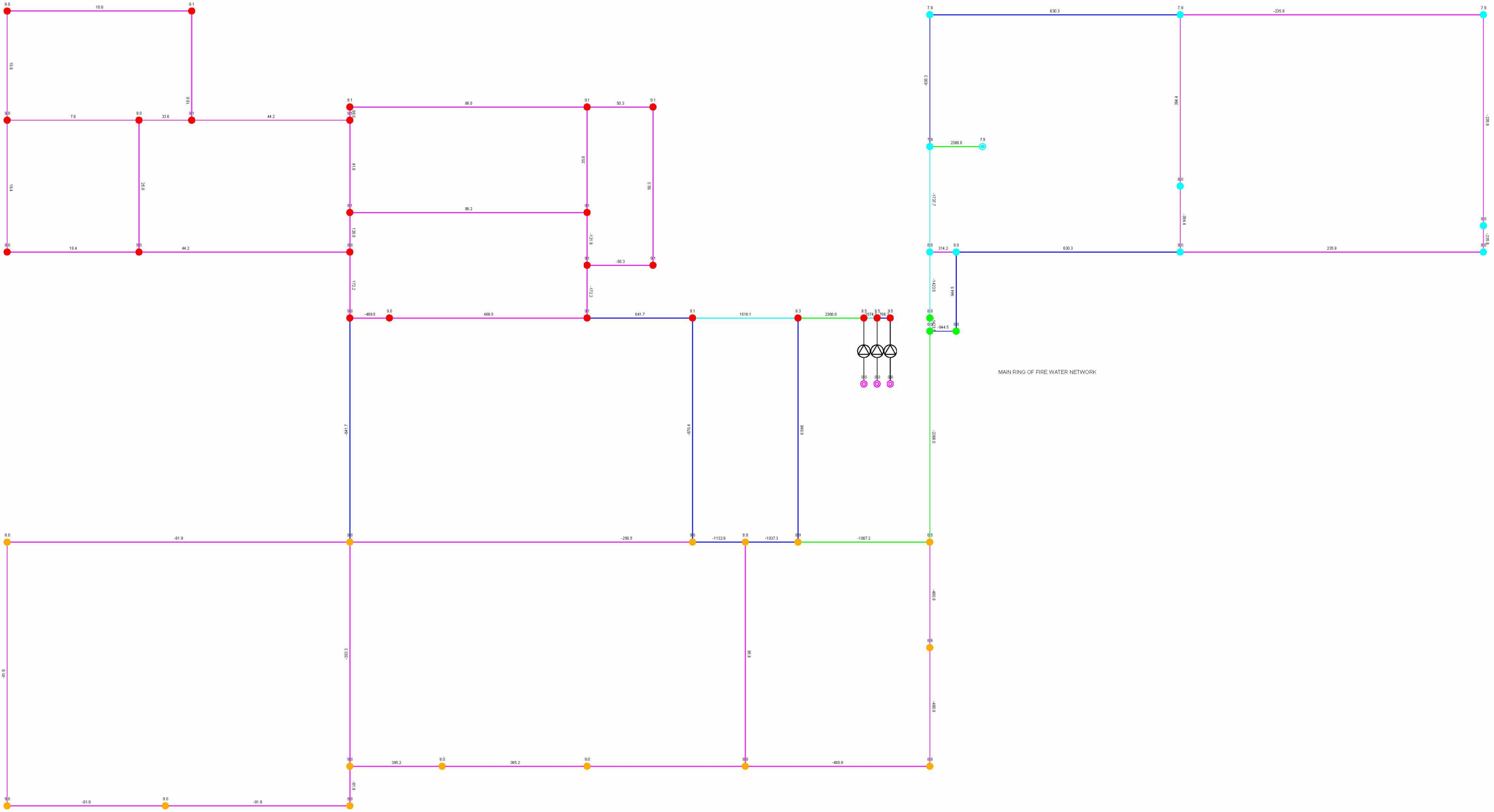
Attachment 12.B contains 1 page

Attachment 12.C contains 1 page

Attachment 12.D contains 20 pages

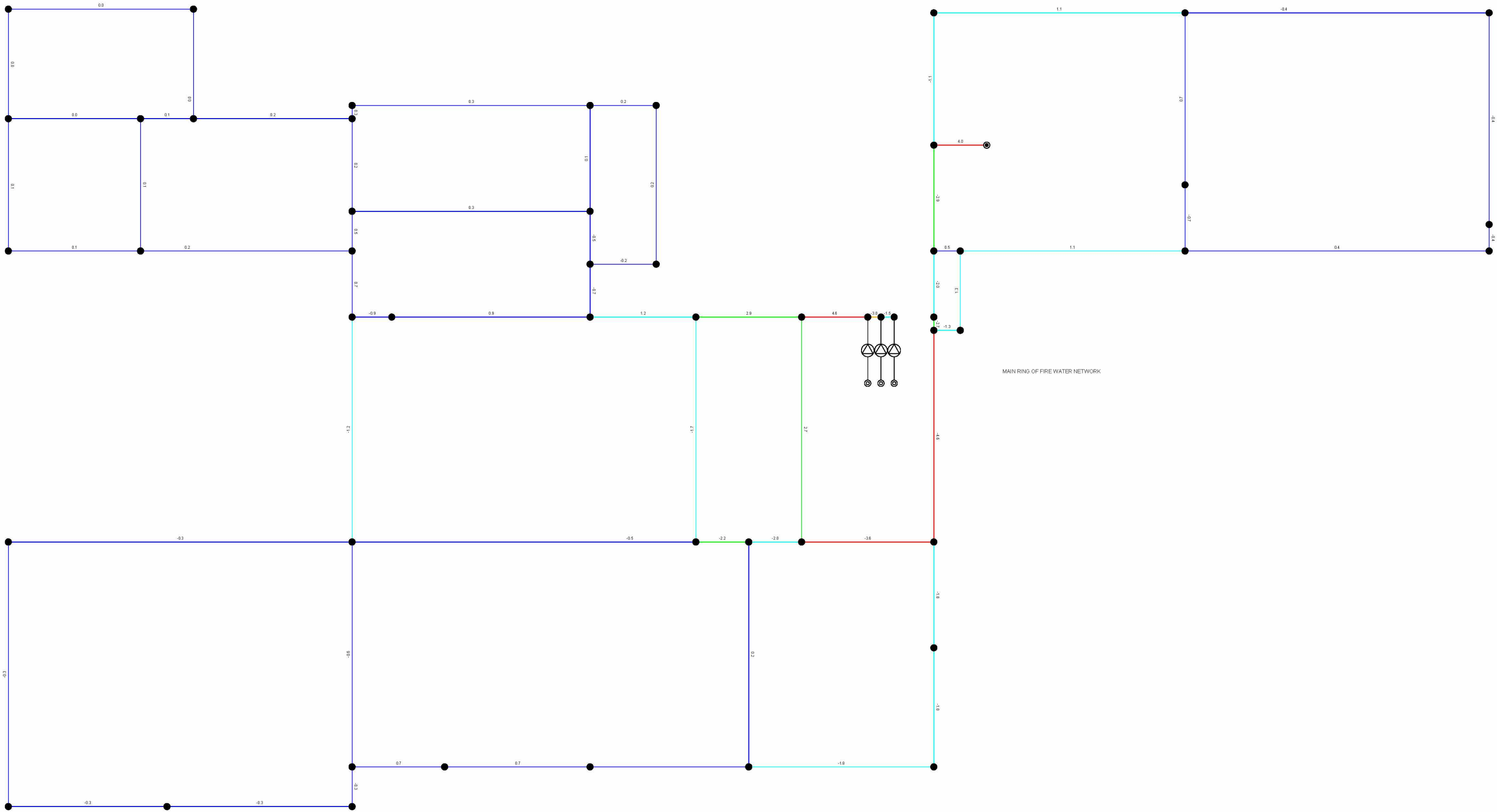


Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Tuesday, May 25, 2021		Page 1 of 1



MAIN RING OF FIRE WATER NETWORK

Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Tuesday, May 25, 2021	Page 1 of 1
Pressure (Bar G)	< 7.000000 < 8.500000	< 7.500000 < 9.000000	< 8.000000 > 9.000000
Pipe vol. flow (m³/h)	< 600.000000 < 2400.000000	< 1200.000000 < 3450.000000	< 1800.000000 > 3450.000000



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PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

18:03 on 25-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13
45	39	33	12.00	97.00	0.000	120.0	16.46

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)	
32	1 x 4	27.13	
33	1 x 2	7.925	
34	1 x 2	7.925	
35	1 x 2	7.925	
36	1 x 4	20.42	
37	1 x 2	15.66	
38	1 x 4	27.13	
40	1 x 2	8.230	
42	1 x 4	18.29	
43	1 x 4	18.29	
44	1 x 4	27.13	
45	2 x 2	8.230	
48	1 x 4	18.29	
49	1 x 4	45.60	
56	1 x 4	40.99	
57	1 x 4	40.99	
60	1 x 2	15.66	
75	1 x 4	27.13	
80	1 x 2	17.50	1 x 4 45.60
84	1 x 4	40.99	
85	1 x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
3	54	67	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-1132.9408	3	16.8760	18.0000	*
2	2	5	849.8763	3	13.1240	14.0000	*
3	5	4	-1037.3157	3	16.8760	18.0000	*
4	2	37	1518.1293	3	16.8760	18.0000	*
5	37	35	641.6997	3	16.8760	18.0000	*
6	68	2	2368.0054	3	16.8760	18.0000	*
7	6	37	-876.4295	3	16.8760	18.0000	*
9	35	34	469.4937	3	16.8760	18.0000	*
10	6	9	-256.5114	3	16.8760	18.0000	*
11	9	29	-641.6997	3	16.8760	18.0000	*
12	43	1	44.2451	3	11.9380	12.0000	*
13	66	30	-2368.0054	3	16.8760	18.0000	*
14	14	29	172.2061	3	11.9380	12.0000	*
15	38	12	86.1703	3	11.9380	12.0000	*
16	38	23	-121.9325	3	11.9380	12.0000	*
17	12	14	127.9609	3	11.9380	12.0000	*
18	43	12	41.7906	3	11.9380	12.0000	*
19	16	15	86.0358	3	11.9380	12.0000	*
20	38	16	35.7622	3	11.9380	12.0000	*
21	17	14	44.2451	3	11.9380	12.0000	*
22	18	17	25.8490	3	11.9380	12.0000	*
23	1	18	33.6157	3	11.9380	12.0000	*
24	19	17	18.3961	3	11.9380	12.0000	*
25	20	19	18.3961	3	11.9380	12.0000	*
26	18	20	7.7666	3	11.9380	12.0000	*
27	21	20	10.6294	3	11.9380	12.0000	*
28	22	21	10.6294	3	11.9380	12.0000	*
29	1	22	10.6294	3	11.9380	12.0000	*
30	4	32	95.6251	3	16.8760	18.0000	*
31	32	24	-385.1884	3	16.8760	18.0000	*
32	63	9	-303.3303	3	16.8760	18.0000	*
33	63	25	-81.8580	3	13.1240	14.0000	*
34	11	7	-81.8580	3	13.1240	14.0000	*
35	7	27	-81.8580	3	13.1240	14.0000	*
36	27	9	-81.8580	3	13.1240	14.0000	*
37	49	26	-235.8976	9	18.0000	18.0000	*
38	30	5	-1887.1919	3	16.8760	18.0000	*
40	56	8	-480.8134	3	11.9380	12.0000	*
41	8	32	-480.8134	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
42	33	16	50.2735	3	11.9380	12.0000	*
43	39	23	-50.2735	3	11.9380	12.0000	*
44	29	34	-469.4937	3	16.8760	18.0000	*
45	39	33	50.2735	3	11.9380	12.0000	*
47	45	10	-1423.5492	9	20.0000	20.0000	*
48	23	35	-172.2061	3	11.9380	12.0000	*
49	70	66	-944.4563	9	20.0000	20.0000	*
50	25	11	-81.8580	3	13.1240	14.0000	*
51	59	60	2368.0056	9	18.0000	18.0000	*
52	41	24	385.1884	3	16.8760	18.0000	*
54	15	43	86.0358	3	11.9380	12.0000	*
56	58	45	314.1833	9	18.0000	18.0000	*
57	59	44	-630.2730	9	18.0000	18.0000	*
58	73	44	630.2730	9	18.0000	18.0000	*
59	10	66	-1423.5492	3	16.8760	18.0000	*
60	73	48	-235.8976	9	18.0000	18.0000	*
61	72	26	235.8976	9	18.0000	18.0000	*
62	48	49	-235.8976	9	18.0000	18.0000	*
69	30	56	-480.8134	3	11.9380	12.0000	*
72	59	45	-1737.7325	9	18.0000	18.0000	*
75	63	41	385.1884	3	16.8760	18.0000	*
77	58	72	630.2730	9	18.0000	18.0000	*
80	70	58	944.4563	9	20.0000	20.0000	*
84	71	73	394.3755	9	18.0000	18.0000	*
85	71	72	-394.3755	9	18.0000	18.0000	*
90	68	3	-1574.2610	3	16.8760	18.0000	*
91	3	67	-786.3229	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	8.934	8.976	-4.1545E-02	4.1545E-02	-1133.	-2.181
2	2	5	14.00	9.256	8.894	0.3613	0.3613	849.9	2.705
3	5	4	18.00	8.894	8.934	-3.9813E-02	3.9813E-02	-1037.	-1.997
4	2	37	18.00	9.256	9.105	0.1504	0.1504	1518.	2.922
5	37	35	18.00	9.105	9.075	3.0295E-02	3.0295E-02	641.7	1.235
6	68	2	18.00	9.485	9.256	0.2293	0.2293	2368.	4.558
7	6	37	18.00	8.976	9.105	-0.1295	0.1295	-876.4	-1.687
9	35	34	18.00	9.075	9.049	2.6039E-02	2.6039E-02	469.5	0.9037
10	6	9	18.00	8.976	8.991	-1.5360E-02	1.5360E-02	-256.5	-0.4938
11	9	29	18.00	8.991	9.039	-4.8327E-02	4.8327E-02	-641.7	-1.235
12	43	1	12.00	9.052	9.050	1.6699E-03	1.6699E-03	44.25	0.1702
13	66	30	18.00	8.026	8.543	-0.5169	0.5169	-2368.	-4.558
14	14	29	12.00	9.047	9.039	8.0748E-03	8.0748E-03	172.2	0.6624
15	38	12	12.00	9.060	9.051	8.8520E-03	8.8520E-03	86.17	0.3315
16	38	23	12.00	9.060	9.064	-4.2048E-03	4.2048E-03	-121.9	-0.4690
17	12	14	12.00	9.051	9.047	4.0655E-03	4.0655E-03	128.0	0.4922
18	43	12	12.00	9.052	9.051	4.1199E-04	4.1199E-04	41.79	0.1608
19	16	15	12.00	9.060	9.053	7.0925E-03	7.0925E-03	86.04	0.3309
20	38	16	12.00	9.060	9.060	4.9019E-04	4.9019E-04	35.76	0.1376
21	17	14	12.00	9.049	9.047	2.0752E-03	2.0752E-03	44.25	0.1702
22	18	17	12.00	9.050	9.049	4.9019E-04	4.9019E-04	25.85	9.9431E-02
23	1	18	12.00	9.050	9.050	2.4223E-04	2.4223E-04	33.62	0.1293
24	19	17	12.00	9.050	9.049	2.2793E-04	2.2793E-04	18.40	7.0762E-02
25	20	19	12.00	9.050	9.050	2.0981E-04	2.0981E-04	18.40	7.0762E-02
26	18	20	12.00	9.050	9.050	5.2452E-05	5.2452E-05	7.767	2.9875E-02
27	21	20	12.00	9.050	9.050	8.4877E-05	8.4877E-05	10.63	4.0887E-02
28	22	21	12.00	9.050	9.050	1.0967E-04	1.0967E-04	10.63	4.0887E-02
29	1	22	12.00	9.050	9.050	1.0014E-04	1.0014E-04	10.63	4.0887E-02
30	4	32	18.00	8.934	8.931	2.7132E-03	2.7132E-03	95.62	0.1841
31	32	24	18.00	8.931	8.951	-1.9538E-02	1.9538E-02	-385.2	-0.7414
32	63	9	18.00	8.972	8.991	-1.8698E-02	1.8698E-02	-303.3	-0.5839
33	63	25	14.00	8.972	8.973	-8.7261E-04	8.7261E-04	-81.86	-0.2605
34	11	7	14.00	8.976	8.979	-2.7332E-03	2.7332E-03	-81.86	-0.2605
35	7	27	14.00	8.979	8.985	-5.7898E-03	5.7898E-03	-81.86	-0.2605
36	27	9	14.00	8.985	8.991	-6.1874E-03	6.1874E-03	-81.86	-0.2605
37	49	26	18.00	7.952	7.953	-5.8985E-04	5.8985E-04	-235.9	-0.3991
38	30	5	18.00	8.543	8.894	-0.3516	0.3516	-1887.	-3.633
40	56	8	12.00	8.648	8.763	-0.1149	0.1149	-480.8	-1.849
41	8	32	12.00	8.763	8.931	-0.1685	0.1685	-480.8	-1.849
42	33	16	12.00	9.061	9.060	1.3676E-03	1.3676E-03	50.27	0.1934
43	39	23	12.00	9.063	9.064	-1.3666E-03	1.3666E-03	-50.27	-0.1934

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
44	29	34	18.00	9.039	9.049	-9.5129E-03	9.5129E-03	-469.5	-0.9037
45	39	33	12.00	9.063	9.061	1.9608E-03	1.9608E-03	50.27	0.1934
47	45	10	20.00	7.986	8.009	-2.3495E-02	2.3495E-02	-1424.	-1.951
48	23	35	12.00	9.064	9.075	-1.0355E-02	1.0355E-02	-172.2	-0.6624
49	70	66	20.00	8.014	8.026	-1.1815E-02	1.1815E-02	-944.5	-1.294
50	25	11	14.00	8.973	8.976	-3.1147E-03	3.1147E-03	-81.86	-0.2605
51	59	60	18.00	7.894	7.854	4.0303E-02	4.0303E-02	2368.	4.007
52	41	24	18.00	8.960	8.951	9.1372E-03	9.1372E-03	385.2	0.7414
54	15	43	12.00	9.053	9.052	8.5735E-04	8.5735E-04	86.04	0.3309
56	58	45	18.00	7.988	7.986	2.3079E-03	2.3079E-03	314.2	0.5316
57	59	44	18.00	7.894	7.911	-1.6798E-02	1.6798E-02	-630.3	-1.066
58	73	44	18.00	7.942	7.911	3.1562E-02	3.1562E-02	630.3	1.066
59	10	66	18.00	8.009	8.026	-1.6570E-02	1.6570E-02	-1424.	-2.740
60	73	48	18.00	7.942	7.948	-5.9977E-03	5.9977E-03	-235.9	-0.3991
61	72	26	18.00	7.958	7.953	5.5699E-03	5.5699E-03	235.9	0.3991
62	48	49	18.00	7.948	7.952	-3.6025E-03	3.6025E-03	-235.9	-0.3991
69	30	56	12.00	8.543	8.648	-0.1053	0.1053	-480.8	-1.849
72	59	45	18.00	7.894	7.986	-9.1677E-02	9.1677E-02	-1738.	-2.940
75	63	41	18.00	8.972	8.960	1.2245E-02	1.2245E-02	385.2	0.7414
77	58	72	18.00	7.988	7.958	2.9865E-02	2.9865E-02	630.3	1.066
80	70	58	20.00	8.014	7.988	2.5942E-02	2.5942E-02	944.5	1.294
84	71	73	18.00	7.953	7.942	1.0315E-02	1.0315E-02	394.4	0.6673
85	71	72	18.00	7.953	7.958	-5.4450E-03	5.4450E-03	-394.4	-0.6673
90	68	3	18.00	9.485	9.497	-1.1752E-02	1.1752E-02	-1574.	-3.030
91	3	67	18.00	9.497	9.500	-3.2530E-03	3.2530E-03	-786.3	-1.514

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	793.7	0.000	9.485	9.485	10.17	0.1050	2.0912E+05	100.0
2	787.9	0.000	9.497	9.497	10.17	0.1048	2.0785E+05	100.0
3	786.3	0.000	9.500	9.500	10.17	0.1048	2.0750E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 787.9	0.0000
54	0.000	* 786.3	0.0000
31	0.000	* 793.7	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	7.854	2368. *	844.97

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 25-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 25-May-2021

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COMMENTS

Analysis Converged in 3 Iterations

WARNINGS

*** WARNING - Velocity in pipe	6	exceeds specified maximum
*** WARNING - Velocity in pipe	13	exceeds specified maximum
*** WARNING - Velocity in pipe	38	exceeds specified maximum
*** WARNING - Velocity in pipe	51	exceeds specified maximum

=====

Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

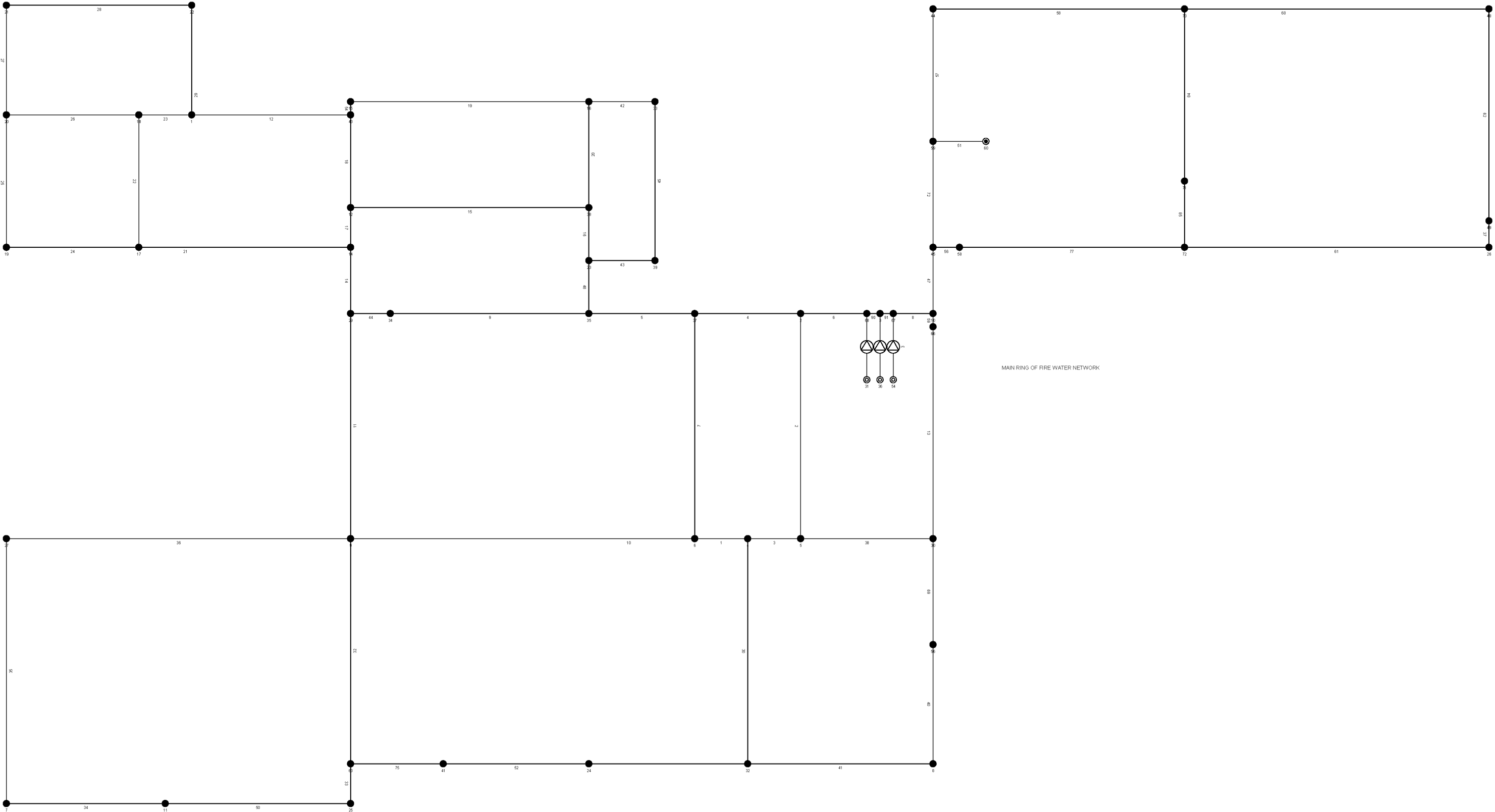
Attachment	13	Fire scenario in the RJF storage area- bund fire–Case A2
	13.A	PIPENET schematic layout with piping and nodes label
	13.B	PIPENET schematic layout with flow rate and pressure results
	13.C	PIPENET schematic layout with velocity results
	13.D	PIPENET input/output printout report

Attachment 13.A contains 1 page

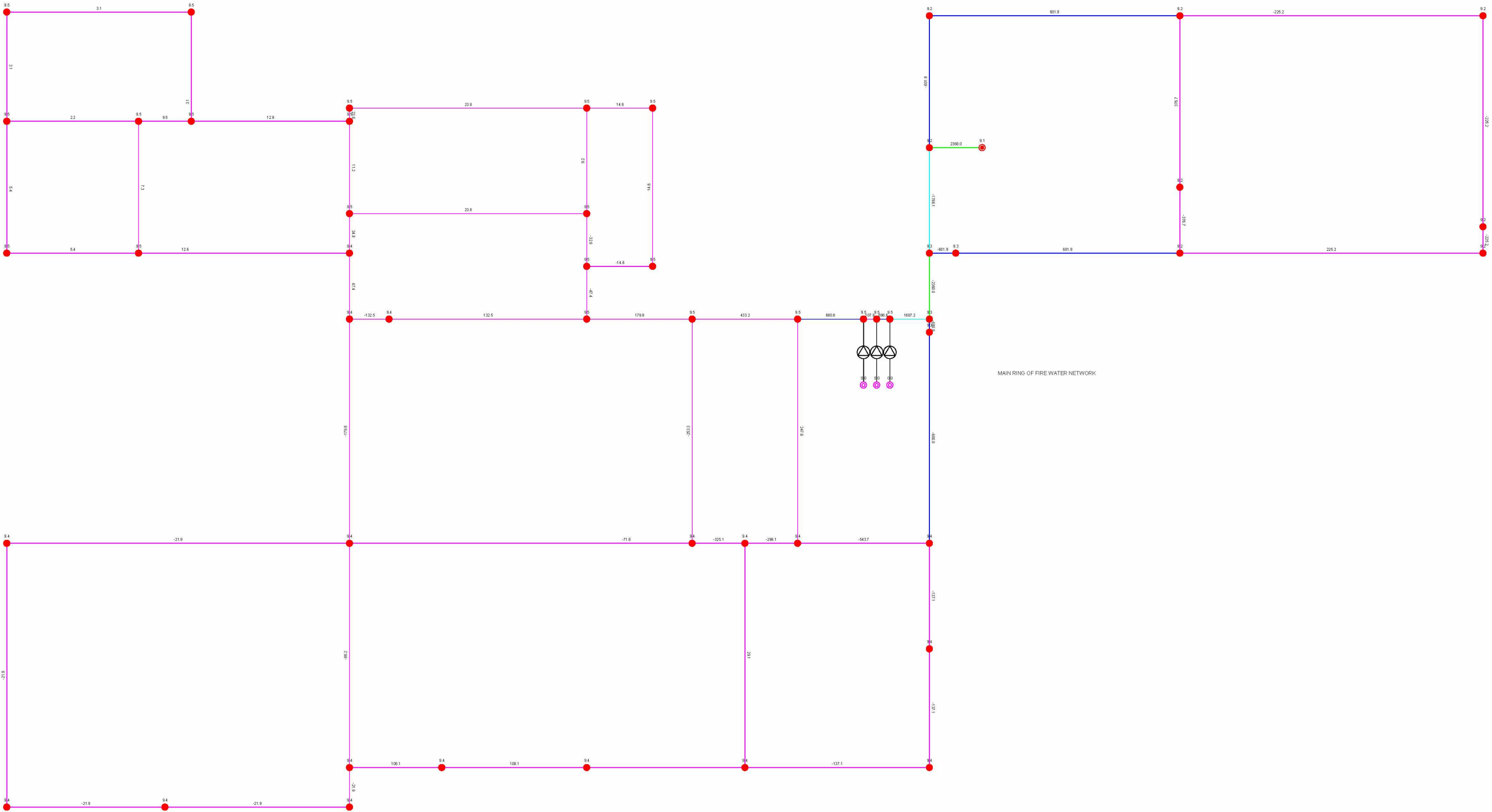
Attachment 13.B contains 1 page

Attachment 13.C contains 1 page

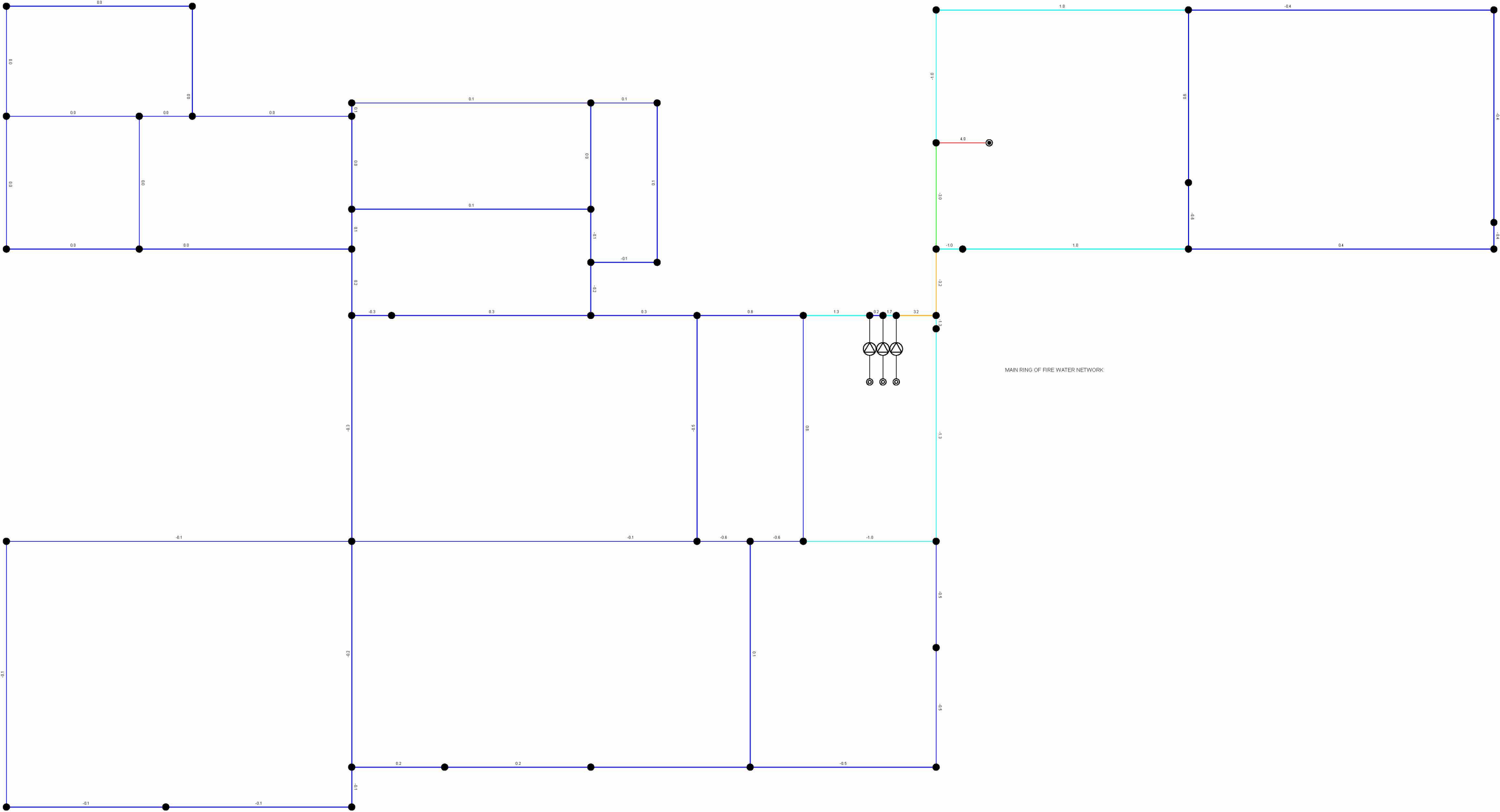
Attachment 13.D contains 20 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Wednesday, May 26, 2021	Page 1 of 1
Pressure (Bar G)	< 7.000000	< 7.500000	< 8.000000
	< 8.500000	< 9.000000	> 9.000000
Pipe vol. flow (m³/h)	< 600.000000	< 1200.000000	< 1800.000000
	< 2400.000000	< 3450.000000	> 3450.000000



MAIN RING OF FIRE WATER NETWORK

Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Wednesday, May 26, 2021		Page 1 of 1
Pipe velocity (m/sec)	 < 0.000000	 < 1.000000	 < 2.000000
	 < 3.000000	 < 3.500000	 > 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

12:18 on 26-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
32	1 x 4	27.13
33	1 x 2	7.925
34	1 x 2	7.925
35	1 x 2	7.925
36	1 x 4	20.42
37	1 x 2	15.66
38	1 x 4	27.13
40	1 x 2	8.230
42	1 x 4	18.29
43	1 x 4	18.29
44	1 x 4	27.13
45	2 x 2	8.230
48	1 x 4	18.29
56	1 x 4	40.99
57	1 x 4	40.99
60	1 x 2	15.66
75	1 x 4	27.13
84	1 x 4	40.99
85	1 x 4	40.99

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
3	54	67	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-325.1298	3	16.8760	18.0000	*
2	2	5	247.6402	3	13.1240	14.0000	*
3	5	4	-296.0605	3	16.8760	18.0000	*
4	2	37	433.2056	3	16.8760	18.0000	*
5	37	35	179.8793	3	16.8760	18.0000	*
6	68	2	680.8458	3	16.8760	18.0000	*
7	6	37	-253.3263	3	16.8760	18.0000	*
8	67	10	1687.1595	3	16.8760	18.0000	*
9	35	34	132.4752	3	16.8760	18.0000	*
10	6	9	-71.8035	3	16.8760	18.0000	*
11	9	29	-179.8793	3	16.8760	18.0000	*
12	43	1	12.6393	3	11.9380	12.0000	*
13	66	30	-680.8458	3	16.8760	18.0000	*
14	14	29	47.4041	3	11.9380	12.0000	*
15	38	12	23.5704	3	11.9380	12.0000	*
16	38	23	-32.7666	3	11.9380	12.0000	*
17	12	14	34.7648	3	11.9380	12.0000	*
18	43	12	11.1944	3	11.9380	12.0000	*
19	16	15	23.8337	3	11.9380	12.0000	*
20	38	16	9.1962	3	11.9380	12.0000	*
21	17	14	12.6393	3	11.9380	12.0000	*
22	18	17	7.2892	3	11.9380	12.0000	*
23	1	18	9.5154	3	11.9380	12.0000	*
24	19	17	5.3502	3	11.9380	12.0000	*
25	20	19	5.3502	3	11.9380	12.0000	*
26	18	20	2.2262	3	11.9380	12.0000	*
27	21	20	3.1239	3	11.9380	12.0000	*
28	22	21	3.1239	3	11.9380	12.0000	*
29	1	22	3.1239	3	11.9380	12.0000	*
30	4	32	29.0693	3	16.8760	18.0000	*
31	32	24	-108.0758	3	16.8760	18.0000	*
32	63	9	-86.1559	3	16.8760	18.0000	*
33	63	25	-21.9199	3	13.1240	14.0000	*
34	11	7	-21.9199	3	13.1240	14.0000	*
35	7	27	-21.9199	3	13.1240	14.0000	*
36	27	9	-21.9199	3	13.1240	14.0000	*
37	49	26	-225.2241	9	18.0000	18.0000	*
38	30	5	-543.7007	3	16.8760	18.0000	*
40	56	8	-137.1451	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-137.1451	3	11.9380	12.0000	*
42	33	16	14.6375	3	11.9380	12.0000	*
43	39	23	-14.6375	3	11.9380	12.0000	*
44	29	34	-132.4752	3	16.8760	18.0000	*
45	39	33	14.6375	3	11.9380	12.0000	*
47	45	10	-2368.0056	9	20.0000	20.0000	*
48	23	35	-47.4041	3	11.9380	12.0000	*
50	25	11	-21.9199	3	13.1240	14.0000	*
51	59	60	2368.0056	9	18.0000	18.0000	*
52	41	24	108.0758	3	16.8760	18.0000	*
54	15	43	23.8337	3	11.9380	12.0000	*
56	58	45	-601.9163	9	18.0000	18.0000	*
57	59	44	-601.9163	9	18.0000	18.0000	*
58	73	44	601.9163	9	18.0000	18.0000	*
59	10	66	-680.8458	3	16.8760	18.0000	*
60	73	48	-225.2241	9	18.0000	18.0000	*
61	72	26	225.2241	9	18.0000	18.0000	*
62	48	49	-225.2241	9	18.0000	18.0000	*
69	30	56	-137.1451	3	11.9380	12.0000	*
72	59	45	-1766.0894	9	18.0000	18.0000	*
75	63	41	108.0758	3	16.8760	18.0000	*
77	58	72	601.9163	9	18.0000	18.0000	*
84	71	73	376.6921	9	18.0000	18.0000	*
85	71	72	-376.6921	9	18.0000	18.0000	*
90	68	3	107.8332	3	16.8760	18.0000	*
91	3	67	896.5522	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined
9	-- Reinforced Fiber Gla	Not Lined

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.439	9.443	-4.2048E-03	4.2048E-03	-325.1	-0.6258
2	2	5	14.00	9.471	9.435	3.6236E-02	3.6236E-02	247.6	0.7882
3	5	4	18.00	9.435	9.439	-4.0531E-03	4.0531E-03	-296.1	-0.5699
4	2	37	18.00	9.471	9.455	1.5500E-02	1.5500E-02	433.2	0.8339
5	37	35	18.00	9.455	9.453	2.9306E-03	2.9306E-03	179.9	0.3462
6	68	2	18.00	9.495	9.471	2.4137E-02	2.4137E-02	680.8	1.311
7	6	37	18.00	9.443	9.455	-1.2478E-02	1.2478E-02	-253.3	-0.4876
8	67	10	18.00	9.491	9.339	0.1523	0.1523	1687.	3.248
9	35	34	18.00	9.453	9.450	2.5072E-03	2.5072E-03	132.5	0.2550
10	6	9	18.00	9.443	9.444	-1.4496E-03	1.4496E-03	-71.80	-0.1382
11	9	29	18.00	9.444	9.449	-4.6730E-03	4.6730E-03	-179.9	-0.3462
12	43	1	12.00	9.450	9.450	1.6212E-04	1.6212E-04	12.64	4.8618E-02
13	66	30	18.00	9.343	9.398	-5.4420E-02	5.4420E-02	-680.8	-1.311
14	14	29	12.00	9.450	9.449	7.8201E-04	7.8201E-04	47.40	0.1823
15	38	12	12.00	9.451	9.450	8.5258E-04	8.5258E-04	23.57	9.0666E-02
16	38	23	12.00	9.451	9.451	-3.9768E-04	3.9768E-04	-32.77	-0.1260
17	12	14	12.00	9.450	9.450	3.9005E-04	3.9005E-04	34.76	0.1337
18	43	12	12.00	9.450	9.450	4.0054E-05	4.0054E-05	11.19	4.3060E-02
19	16	15	12.00	9.451	9.450	6.8760E-04	6.8760E-04	23.83	9.1679E-02
20	38	16	12.00	9.451	9.451	4.1962E-05	4.1962E-05	9.196	3.5374E-02
21	17	14	12.00	9.450	9.450	1.9741E-04	1.9741E-04	12.64	4.8618E-02
22	18	17	12.00	9.450	9.450	4.7684E-05	4.7684E-05	7.289	2.8039E-02
23	1	18	12.00	9.450	9.450	2.2888E-05	2.2888E-05	9.515	3.6602E-02
24	19	17	12.00	9.450	9.450	2.2888E-05	2.2888E-05	5.350	2.0580E-02
25	20	19	12.00	9.450	9.450	2.0027E-05	2.0027E-05	5.350	2.0580E-02
26	18	20	12.00	9.450	9.450	4.7684E-06	0.000	2.226	8.5634E-03
27	21	20	12.00	9.450	9.450	7.6294E-06	0.000	3.124	1.2016E-02
28	22	21	12.00	9.450	9.450	1.2398E-05	1.2398E-05	3.124	1.2016E-02
29	1	22	12.00	9.450	9.450	7.6294E-06	0.000	3.124	1.2016E-02
30	4	32	18.00	9.439	9.439	1.3542E-04	1.3542E-04	29.07	5.5955E-02
31	32	24	18.00	9.439	9.441	-1.9178E-03	1.9178E-03	-108.1	-0.2080
32	63	9	18.00	9.443	9.444	-1.7767E-03	1.7767E-03	-86.16	-0.1658
33	63	25	14.00	9.443	9.443	-8.4877E-05	8.4877E-05	-21.92	-6.9766E-02
34	11	7	14.00	9.443	9.443	-2.6035E-04	2.6035E-04	-21.92	-6.9766E-02
35	7	27	14.00	9.443	9.444	-5.4932E-04	5.4932E-04	-21.92	-6.9766E-02
36	27	9	14.00	9.444	9.444	-5.8746E-04	5.8746E-04	-21.92	-6.9766E-02
37	49	26	18.00	9.239	9.239	-5.4550E-04	5.4550E-04	-225.2	-0.3811
38	30	5	18.00	9.398	9.435	-3.6980E-02	3.6980E-02	-543.7	-1.047
40	56	8	12.00	9.409	9.421	-1.2093E-02	1.2093E-02	-137.1	-0.5275
41	8	32	12.00	9.421	9.439	-1.7725E-02	1.7725E-02	-137.1	-0.5275
42	33	16	12.00	9.451	9.451	1.2970E-04	1.2970E-04	14.64	5.6305E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.451	9.451	-1.2779E-04	1.2779E-04	-14.64	-5.6305E-02
44	29	34	18.00	9.449	9.450	-9.1743E-04	9.1743E-04	-132.5	-0.2550
45	39	33	12.00	9.451	9.451	1.8215E-04	1.8215E-04	14.64	5.6305E-02
47	45	10	20.00	9.280	9.339	-5.9107E-02	5.9107E-02	-2368.	-3.245
48	23	35	12.00	9.451	9.453	-1.0023E-03	1.0023E-03	-47.40	-0.1823
50	25	11	14.00	9.443	9.443	-2.9469E-04	2.9469E-04	-21.92	-6.9766E-02
51	59	60	18.00	9.185	9.145	4.0300E-02	4.0300E-02	2368.	4.007
52	41	24	18.00	9.441	9.441	8.9455E-04	8.9455E-04	108.1	0.2080
54	15	43	12.00	9.450	9.450	8.2970E-05	8.2970E-05	23.83	9.1679E-02
56	58	45	18.00	9.272	9.280	-7.9575E-03	7.9575E-03	-601.9	-1.018
57	59	44	18.00	9.185	9.201	-1.5448E-02	1.5448E-02	-601.9	-1.018
58	73	44	18.00	9.230	9.201	2.9025E-02	2.9025E-02	601.9	1.018
59	10	66	18.00	9.339	9.343	-4.3907E-03	4.3907E-03	-680.8	-1.311
60	73	48	18.00	9.230	9.235	-5.5151E-03	5.5151E-03	-225.2	-0.3811
61	72	26	18.00	9.244	9.239	5.1193E-03	5.1193E-03	225.2	0.3811
62	48	49	18.00	9.235	9.239	-3.3121E-03	3.3121E-03	-225.2	-0.3811
69	30	56	12.00	9.398	9.409	-1.1080E-02	1.1080E-02	-137.1	-0.5275
72	59	45	18.00	9.185	9.280	-9.4388E-02	9.4388E-02	-1766.	-2.988
75	63	41	18.00	9.443	9.441	1.2007E-03	1.2007E-03	108.1	0.2080
77	58	72	18.00	9.272	9.244	2.7466E-02	2.7466E-02	601.9	1.018
84	71	73	18.00	9.239	9.230	9.4872E-03	9.4872E-03	376.7	0.6374
85	71	72	18.00	9.239	9.244	-5.0049E-03	5.0049E-03	-376.7	-0.6374
90	68	3	18.00	9.495	9.495	8.0109E-05	8.0109E-05	107.8	0.2076
91	3	67	18.00	9.495	9.491	3.8176E-03	3.8176E-03	896.6	1.726

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	788.7	0.000	9.495	9.495	10.17	0.1049	2.0802E+05	100.0
2	788.7	0.000	9.495	9.495	10.17	0.1049	2.0802E+05	100.0
3	790.6	0.000	9.491	9.491	10.17	0.1049	2.0844E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 788.7	0.0000
54	0.000	* 790.6	0.0000
31	0.000	* 788.7	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	9.145	2368. *	783.05

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 26-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 26-May-2021

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COMMENTS

Analysis Converged in 3 Iterations

WARNINGS

*** WARNING - Velocity in pipe 51 exceeds specified maximum

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

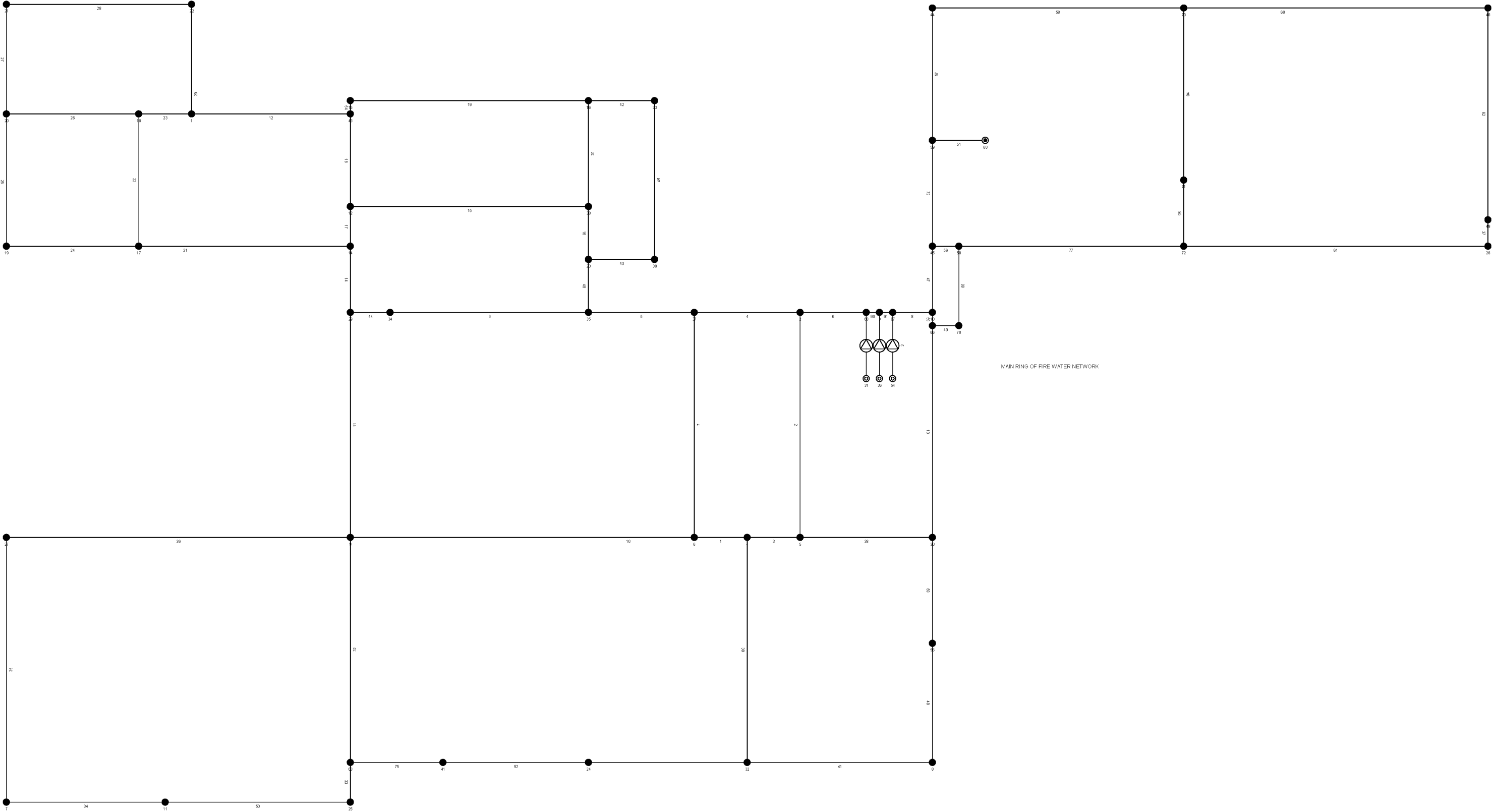
Attachment	14	Fire scenario in the RJF storage area- bund fire–Case B
	14.A	PIPENET schematic layout with piping and nodes label
	14.B	PIPENET schematic layout with flow rate and pressure results
	14.C	PIPENET schematic layout with velocity results
	14.D	PIPENET input/output printout report

Attachment 14.A contains 1 page

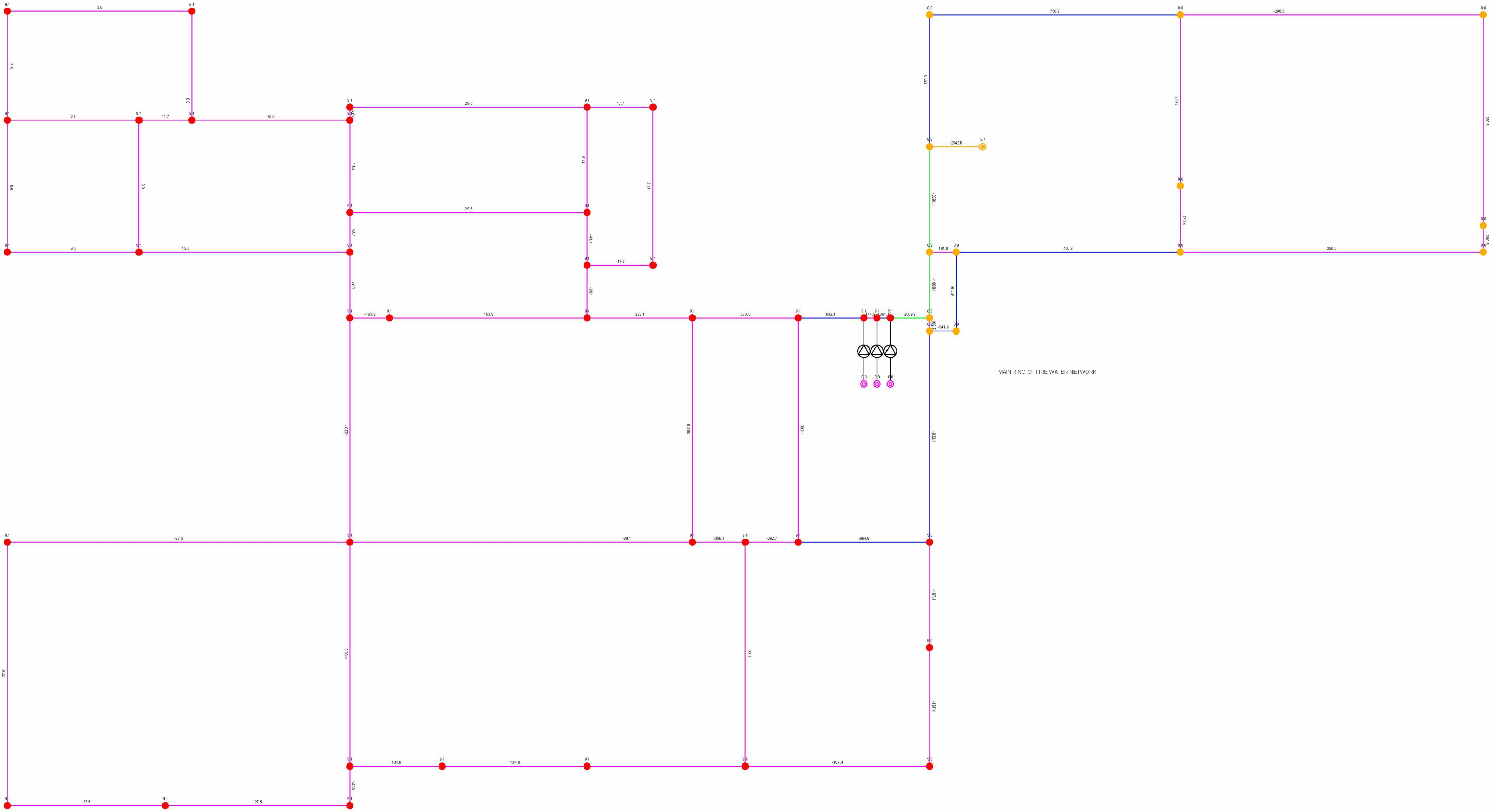
Attachment 14.B contains 1 page

Attachment 14.C contains 1 page

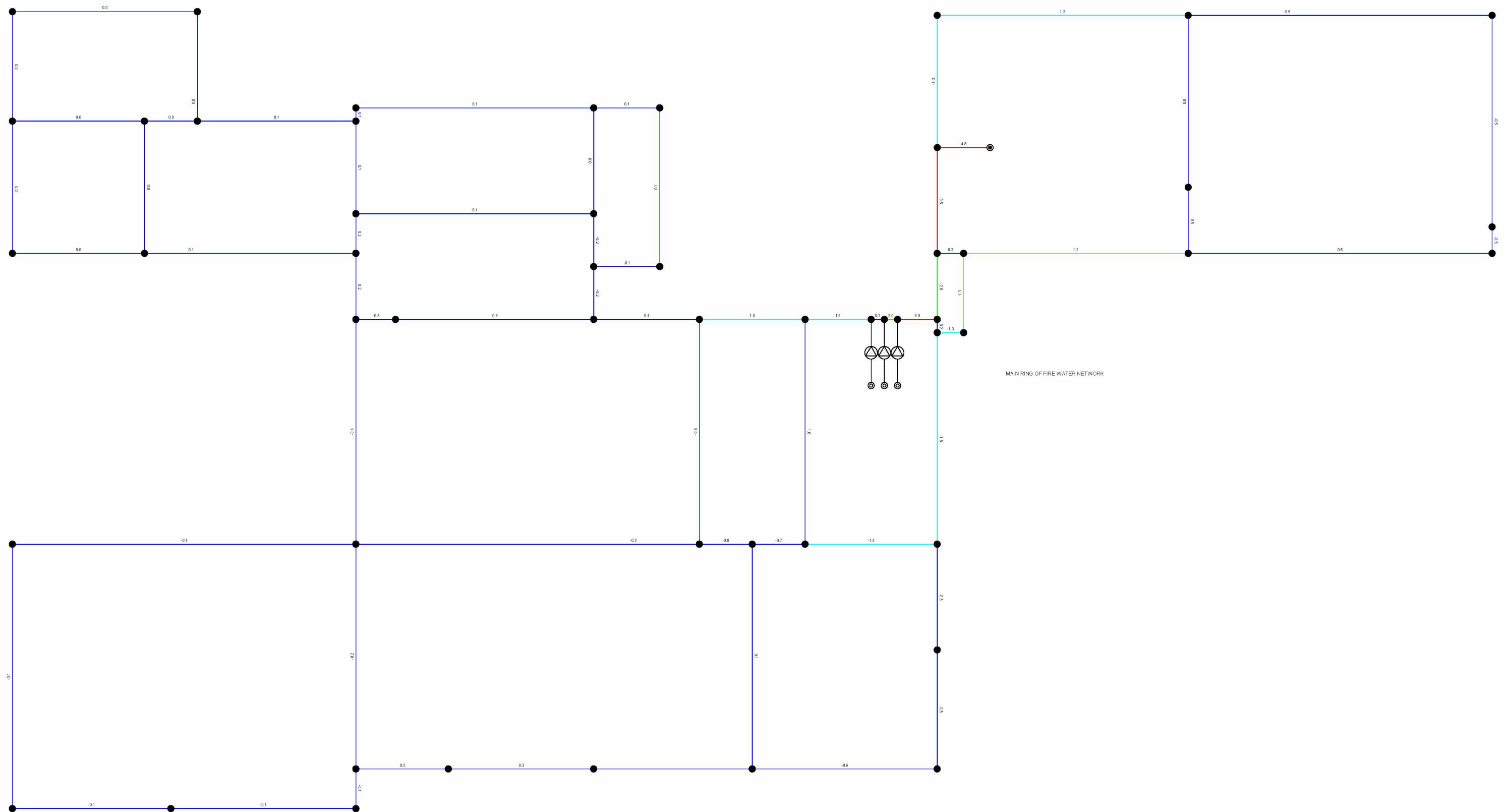
Attachment 14.D contains 20 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Wednesday, May 26, 2021		Page 1 of 1
Pressure (Bar G)	< 7.000000 < 8.500000	< 7.500000 < 9.000000	< 8.000000 > 9.000000
Pipe vol. flow (m³/h)	< 600.000000 < 2400.000000	< 1200.000000 < 3450.000000	< 1800.000000 > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Wednesday, May 26, 2021	
		Page 1 of 1	
Pipe velocity (m/sec) ■ < 0.000000 ■ < 1.000000 ■ < 2.000000 ■ < 3.000000 ■ < 3.500000 ■ > 3.500000			

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

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VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

14:04 on 26-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
51	59	60	18.00	20.00	0.000	150.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)	
29	1 x 4	18.29	
30	2 x 4	27.13	
32	1 x 4	27.13	
33	1 x 2	7.925	
34	1 x 2	7.925	
35	1 x 2	7.925	
36	1 x 4	20.42	
37	1 x 2	15.66	
38	1 x 4	27.13	
40	1 x 2	8.230	
42	1 x 4	18.29	
43	1 x 4	18.29	
44	1 x 4	27.13	
45	2 x 2	8.230	
48	1 x 4	18.29	
49	1 x 4	45.60	
56	1 x 4	40.99	
57	1 x 4	40.99	
60	1 x 2	15.66	
75	1 x 4	27.13	
80	1 x 2	17.50	1 x 4 45.60
84	1 x 4	40.99	
85	1 x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
3	54	67	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-396.0843	3	16.8760	18.0000	*
2	2	5	302.1030	3	13.1240	14.0000	*
3	5	4	-362.6665	3	16.8760	18.0000	*
4	2	37	530.0409	3	16.8760	18.0000	*
5	37	35	223.0575	3	16.8760	18.0000	*
6	68	2	832.1440	3	16.8760	18.0000	*
7	6	37	-306.9835	3	16.8760	18.0000	*
8	67	10	2009.8624	3	16.8760	18.0000	*
9	35	34	163.9454	3	16.8760	18.0000	*
10	6	9	-89.1008	3	16.8760	18.0000	*
11	9	29	-223.0575	3	16.8760	18.0000	*
12	43	1	15.4565	3	11.9380	12.0000	*
13	66	30	-832.1440	3	16.8760	18.0000	*
14	14	29	59.1121	3	11.9380	12.0000	*
15	38	12	29.4812	3	11.9380	12.0000	*
16	38	23	-41.3679	3	11.9380	12.0000	*
17	12	14	43.6556	3	11.9380	12.0000	*
18	43	12	14.1744	3	11.9380	12.0000	*
19	16	15	29.6309	3	11.9380	12.0000	*
20	38	16	11.8867	3	11.9380	12.0000	*
21	17	14	15.4565	3	11.9380	12.0000	*
22	18	17	8.9534	3	11.9380	12.0000	*
23	1	18	11.6598	3	11.9380	12.0000	*
24	19	17	6.5031	3	11.9380	12.0000	*
25	20	19	6.5031	3	11.9380	12.0000	*
26	18	20	2.7064	3	11.9380	12.0000	*
27	21	20	3.7967	3	11.9380	12.0000	*
28	22	21	3.7967	3	11.9380	12.0000	*
29	1	22	3.7967	3	11.9380	12.0000	*
30	4	32	33.4178	3	16.8760	18.0000	*
31	32	24	-133.9566	3	16.8760	18.0000	*
32	63	9	-106.4887	3	16.8760	18.0000	*
33	63	25	-27.4680	3	13.1240	14.0000	*
34	11	7	-27.4680	3	13.1240	14.0000	*
35	7	27	-27.4680	3	13.1240	14.0000	*
36	27	9	-27.4680	3	13.1240	14.0000	*
37	49	26	-280.4942	9	18.0000	18.0000	*
38	30	5	-664.7695	3	16.8760	18.0000	*
40	56	8	-167.3744	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-167.3744	3	11.9380	12.0000	*
42	33	16	17.7442	3	11.9380	12.0000	*
43	39	23	-17.7442	3	11.9380	12.0000	*
44	29	34	-163.9454	3	16.8760	18.0000	*
45	39	33	17.7442	3	11.9380	12.0000	*
47	45	10	-1900.1218	9	20.0000	20.0000	*
48	23	35	-59.1121	3	11.9380	12.0000	*
49	70	66	-941.8844	9	20.0000	20.0000	*
50	25	11	-27.4680	3	13.1240	14.0000	*
51	59	60	2842.0068	9	18.0000	18.0000	*
52	41	24	133.9566	3	16.8760	18.0000	*
54	15	43	29.6309	3	11.9380	12.0000	*
56	58	45	190.9568	9	18.0000	18.0000	*
57	59	44	-750.9276	9	18.0000	18.0000	*
58	73	44	750.9276	9	18.0000	18.0000	*
59	10	66	109.7405	3	16.8760	18.0000	*
60	73	48	-280.4942	9	18.0000	18.0000	*
61	72	26	280.4942	9	18.0000	18.0000	*
62	48	49	-280.4942	9	18.0000	18.0000	*
69	30	56	-167.3744	3	11.9380	12.0000	*
72	59	45	-2091.0791	9	18.0000	18.0000	*
75	63	41	133.9566	3	16.8760	18.0000	*
77	58	72	750.9276	9	18.0000	18.0000	*
80	70	58	941.8844	9	20.0000	20.0000	*
84	71	73	470.4334	9	18.0000	18.0000	*
85	71	72	-470.4334	9	18.0000	18.0000	*
90	68	3	114.4586	3	16.8760	18.0000	*
91	3	67	1061.0720	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.060	9.066	-6.1722E-03	6.1722E-03	-396.1	-0.7624
2	2	5	14.00	9.108	9.054	5.3562E-02	5.3562E-02	302.1	0.9615
3	5	4	18.00	9.054	9.060	-5.9223E-03	5.9223E-03	-362.7	-0.6981
4	2	37	18.00	9.108	9.085	2.2470E-02	2.2470E-02	530.0	1.020
5	37	35	18.00	9.085	9.081	4.4498E-03	4.4498E-03	223.1	0.4294
6	68	2	18.00	9.142	9.108	3.4553E-02	3.4553E-02	832.1	1.602
7	6	37	18.00	9.066	9.085	-1.8997E-02	1.8997E-02	-307.0	-0.5909
8	67	10	18.00	9.137	8.923	0.2134	0.2134	2010.	3.869
9	35	34	18.00	9.081	9.077	3.8147E-03	3.8147E-03	163.9	0.3156
10	6	9	18.00	9.066	9.068	-2.2430E-03	2.2430E-03	-89.10	-0.1715
11	9	29	18.00	9.068	9.075	-7.0972E-03	7.0972E-03	-223.1	-0.4294
12	43	1	12.00	9.077	9.077	2.4509E-04	2.4509E-04	15.46	5.9455E-02
13	66	30	18.00	8.923	9.001	-7.7897E-02	7.7897E-02	-832.1	-1.602
14	14	29	12.00	9.077	9.075	1.1845E-03	1.1845E-03	59.11	0.2274
15	38	12	12.00	9.079	9.077	1.2980E-03	1.2980E-03	29.48	0.1134
16	38	23	12.00	9.079	9.079	-6.0940E-04	6.0940E-04	-41.37	-0.1591
17	12	14	12.00	9.077	9.077	5.9509E-04	5.9509E-04	43.66	0.1679
18	43	12	12.00	9.077	9.077	6.0081E-05	6.0081E-05	14.17	5.4523E-02
19	16	15	12.00	9.078	9.077	1.0424E-03	1.0424E-03	29.63	0.1140
20	38	16	12.00	9.079	9.078	7.0572E-05	7.0572E-05	11.89	4.5723E-02
21	17	14	12.00	9.077	9.077	3.0327E-04	3.0327E-04	15.46	5.9455E-02
22	18	17	12.00	9.077	9.077	7.2479E-05	7.2479E-05	8.953	3.4440E-02
23	1	18	12.00	9.077	9.077	3.4332E-05	3.4332E-05	11.66	4.4850E-02
24	19	17	12.00	9.077	9.077	3.4332E-05	3.4332E-05	6.503	2.5015E-02
25	20	19	12.00	9.077	9.077	3.0518E-05	3.0518E-05	6.503	2.5015E-02
26	18	20	12.00	9.077	9.077	7.6294E-06	0.000	2.706	1.0410E-02
27	21	20	12.00	9.077	9.077	1.2398E-05	1.2398E-05	3.797	1.4604E-02
28	22	21	12.00	9.077	9.077	1.5259E-05	1.5259E-05	3.797	1.4604E-02
29	1	22	12.00	9.077	9.077	1.4305E-05	1.4305E-05	3.797	1.4604E-02
30	4	32	18.00	9.060	9.060	3.3474E-04	3.3474E-04	33.42	6.4325E-02
31	32	24	18.00	9.060	9.062	-2.8820E-03	2.8820E-03	-134.0	-0.2578
32	63	9	18.00	9.066	9.068	-2.7151E-03	2.7151E-03	-106.5	-0.2050
33	63	25	14.00	9.066	9.066	-1.2684E-04	1.2684E-04	-27.47	-8.7424E-02
34	11	7	14.00	9.066	9.067	-3.9482E-04	3.9482E-04	-27.47	-8.7424E-02
35	7	27	14.00	9.067	9.067	-8.4019E-04	8.4019E-04	-27.47	-8.7424E-02
36	27	9	14.00	9.067	9.068	-9.0027E-04	9.0027E-04	-27.47	-8.7424E-02
37	49	26	18.00	8.835	8.836	-8.1730E-04	8.1730E-04	-280.5	-0.4746
38	30	5	18.00	9.001	9.054	-5.2963E-02	5.2963E-02	-664.8	-1.280
40	56	8	12.00	9.017	9.034	-1.7312E-02	1.7312E-02	-167.4	-0.6438
41	8	32	12.00	9.034	9.060	-2.5378E-02	2.5378E-02	-167.4	-0.6438
42	33	16	12.00	9.079	9.078	2.0027E-04	2.0027E-04	17.74	6.8255E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.079	9.079	-1.9741E-04	1.9741E-04	-17.74	-6.8255E-02
44	29	34	18.00	9.075	9.077	-1.3924E-03	1.3924E-03	-163.9	-0.3156
45	39	33	12.00	9.079	9.079	2.8229E-04	2.8229E-04	17.74	6.8255E-02
47	45	10	20.00	8.884	8.923	-3.9573E-02	3.9573E-02	-1900.	-2.604
48	23	35	12.00	9.079	9.081	-1.5202E-03	1.5202E-03	-59.11	-0.2274
49	70	66	20.00	8.911	8.923	-1.2025E-02	1.2025E-02	-941.9	-1.291
50	25	11	14.00	9.066	9.066	-4.5300E-04	4.5300E-04	-27.47	-8.7424E-02
51	59	60	18.00	8.755	8.698	5.6482E-02	5.6482E-02	2842.	4.809
52	41	24	18.00	9.064	9.062	1.3475E-03	1.3475E-03	134.0	0.2578
54	15	43	12.00	9.077	9.077	1.2493E-04	1.2493E-04	29.63	0.1140
56	58	45	18.00	8.885	8.884	1.0004E-03	1.0004E-03	191.0	0.3231
57	59	44	18.00	8.755	8.778	-2.3248E-02	2.3248E-02	-750.9	-1.271
58	73	44	18.00	8.822	8.778	4.3680E-02	4.3680E-02	750.9	1.271
59	10	66	18.00	8.923	8.923	1.3733E-04	1.3733E-04	109.7	0.2112
60	73	48	18.00	8.822	8.830	-8.2998E-03	8.2998E-03	-280.5	-0.4746
61	72	26	18.00	8.843	8.836	7.7076E-03	7.7076E-03	280.5	0.4746
62	48	49	18.00	8.830	8.835	-4.9877E-03	4.9877E-03	-280.5	-0.4746
69	30	56	12.00	9.001	9.017	-1.5861E-02	1.5861E-02	-167.4	-0.6438
72	59	45	18.00	8.755	8.884	-0.1291	0.1291	-2091.	-3.538
75	63	41	18.00	9.066	9.064	1.8053E-03	1.8053E-03	134.0	0.2578
77	58	72	18.00	8.885	8.843	4.1332E-02	4.1332E-02	750.9	1.271
80	70	58	20.00	8.911	8.885	2.6410E-02	2.6410E-02	941.9	1.291
84	71	73	18.00	8.836	8.822	1.4277E-02	1.4277E-02	470.4	0.7960
85	71	72	18.00	8.836	8.843	-7.5350E-03	7.5350E-03	-470.4	-0.7960
90	68	3	18.00	9.142	9.142	2.7657E-05	2.7657E-05	114.5	0.2203
91	3	67	18.00	9.142	9.137	5.3778E-03	5.3778E-03	1061.	2.042

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	946.6	0.000	9.142	9.142	10.17	0.1089	2.4039E+05	100.0
2	946.6	0.000	9.142	9.142	10.17	0.1089	2.4039E+05	100.0
3	948.8	0.000	9.137	9.137	10.17	0.1090	2.4080E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 946.6	0.0000
54	0.000	* 948.8	0.0000
31	0.000	* 946.6	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
60	8.698	2842. *	963.63

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 26-May-2021

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 26-May-2021

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COMMENTS

Analysis Converged in 3 Iterations

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 26-May-2021

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WARNINGS

*** WARNING - Velocity in pipe 8 exceeds specified maximum
*** WARNING - Velocity in pipe 51 exceeds specified maximum
*** WARNING - Velocity in pipe 72 exceeds specified maximum

=====

Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

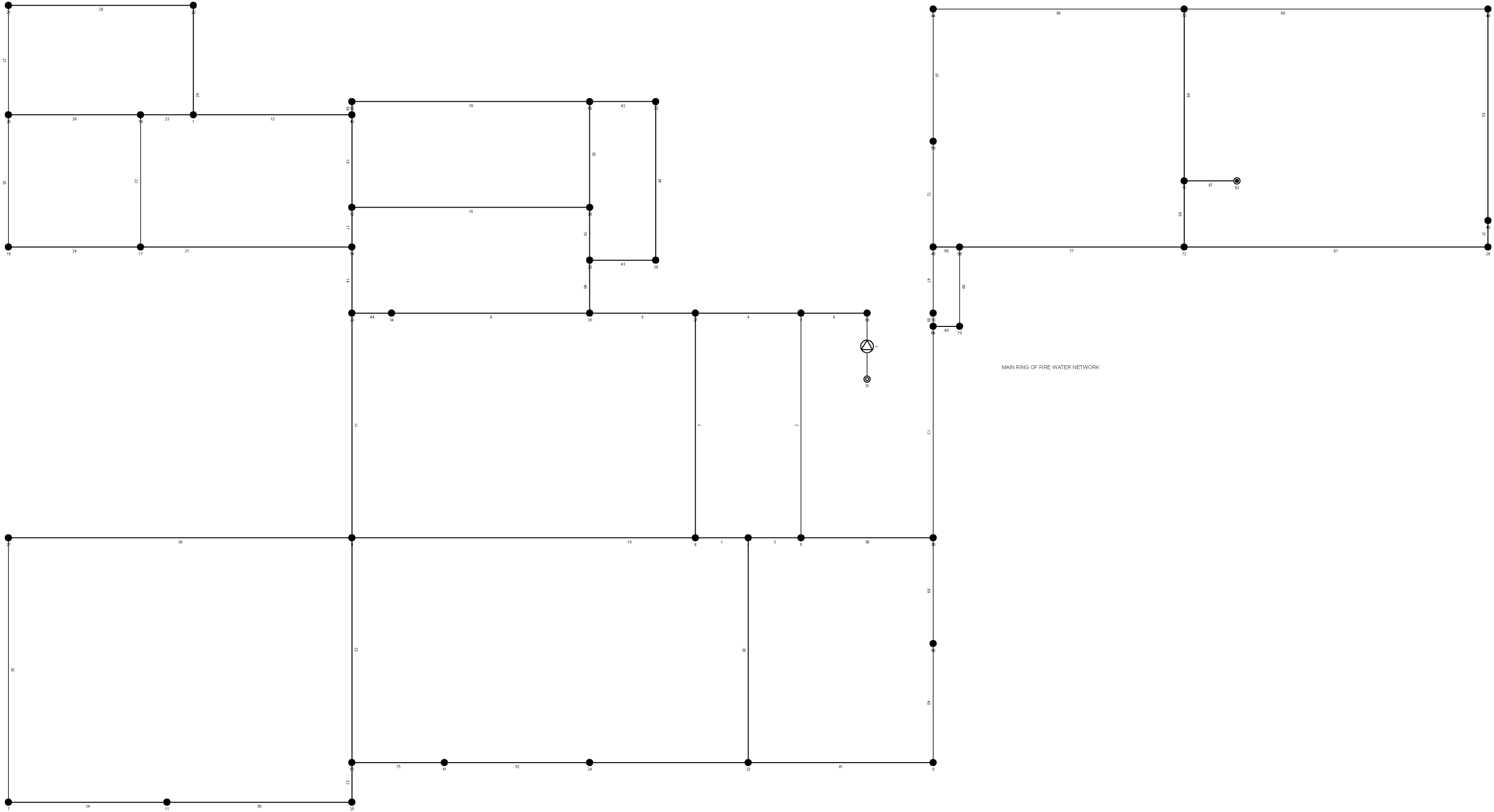
Attachment	15	Fire scenario in the diesel storage pumping area – Case A1
	15.A	PIPENET schematic layout with piping and nodes label
	15.B	PIPENET schematic layout with flow rate and pressure results
	15.C	PIPENET schematic layout with velocity results
	15.D	PIPENET input/output printout report

Attachment 15.A contains 1 page

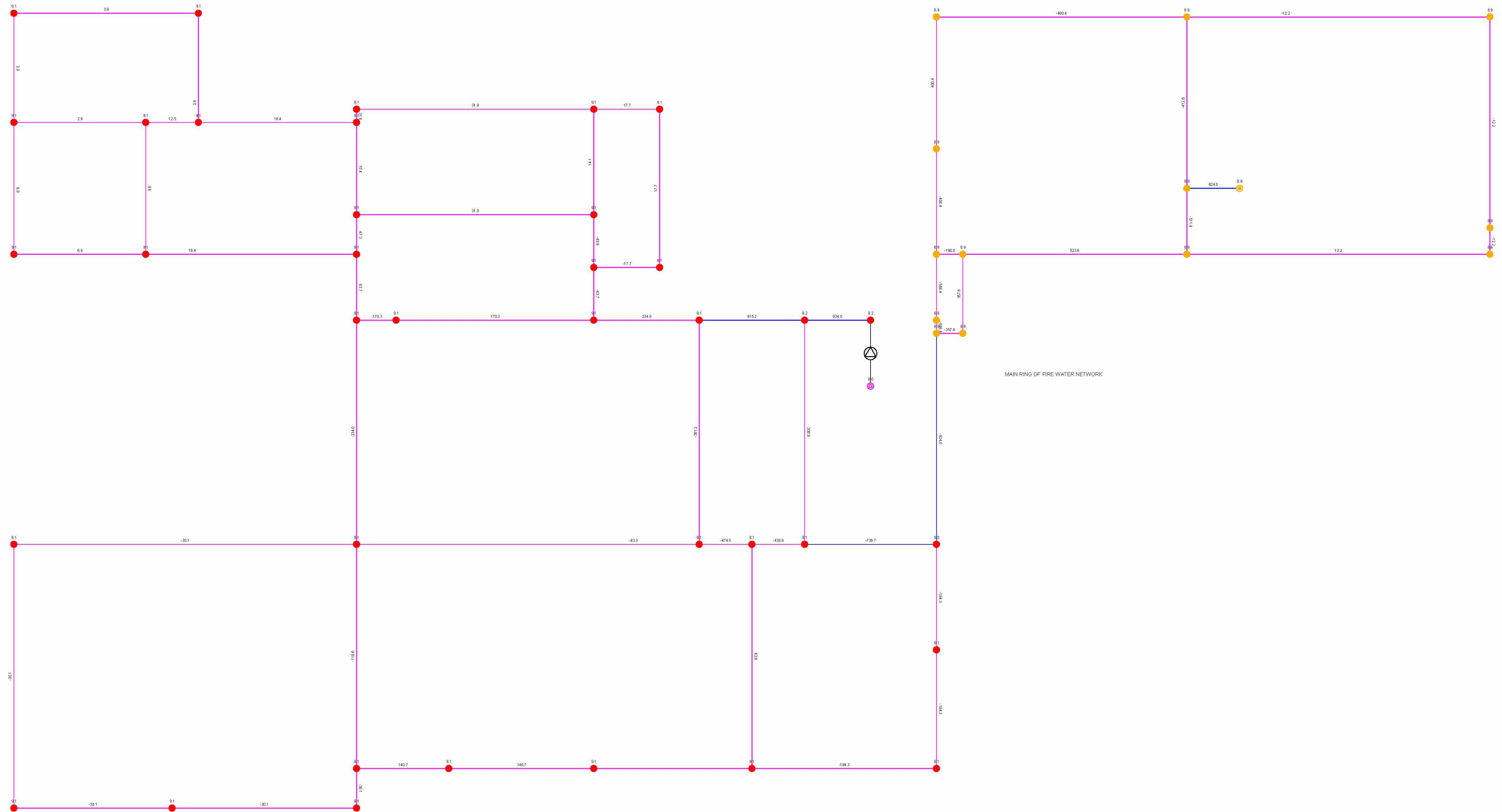
Attachment 15.B contains 1 page

Attachment 15.C contains 1 page

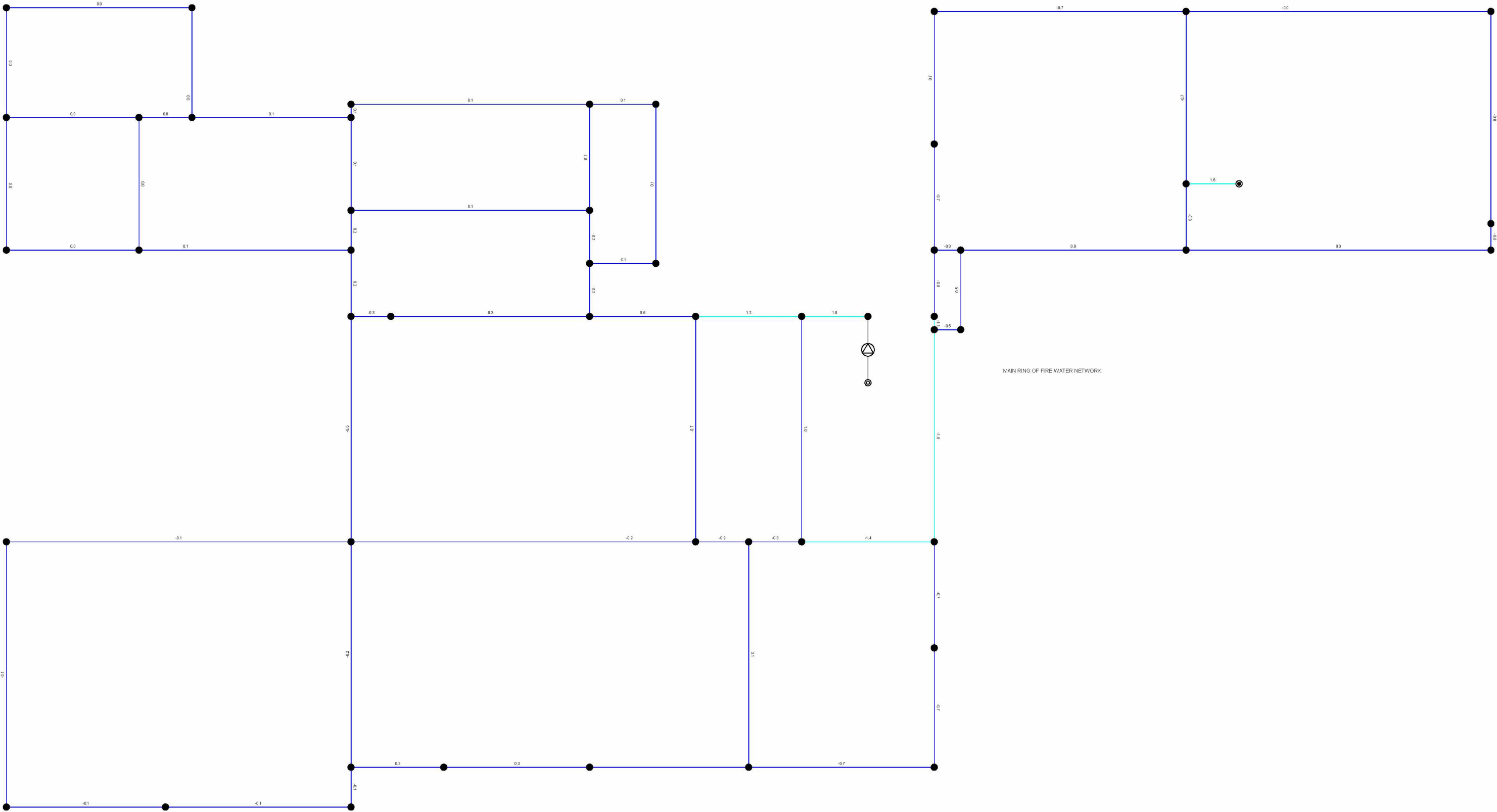
Attachment 15.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Tuesday, May 25, 2021		Page 1 of 1



Proj.082755C - ROTTERDAM - NexBTL PLANT			
PIPENET Schematic		Tuesday, May 25, 2021	Page 1 of 1
Pressure (Bar G)	 < 7.000000	 < 7.500000	 < 8.000000
	 < 8.500000	 < 9.000000	 > 9.000000
Pipe vol. flow (m³/h)	 < 600.000000	 < 1200.000000	 < 1800.000000
	 < 2400.000000	 < 3450.000000	 > 3450.000000



MAIN RING OF FIRE WATER NETWORK

Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Tuesday, May 25, 2021	
		Page 1 of 1	
Pipe velocity	 < 0.000000	 < 1.000000	 < 2.000000
(m/sec)	 < 3.000000	 < 3.500000	 > 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

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17:47 on 25-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13
45	39	33	12.00	97.00	0.000	120.0	16.46

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
67	71	62	18.00	20.00	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29
30	2 x 4	27.13
32	1 x 4	27.13
33	1 x 2	7.925

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
40	1	x 2	8.230	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-474.5090	3	16.8760	18.0000	*
2	2	5	308.7848	3	13.1240	14.0000	*
3	5	4	-430.9336	3	16.8760	18.0000	*
4	2	37	615.2173	3	16.8760	18.0000	*
5	37	35	233.9869	3	16.8760	18.0000	*
6	68	2	924.0020	3	16.8760	18.0000	*
7	6	37	-381.2304	3	16.8760	18.0000	*
9	35	34	170.3200	3	16.8760	18.0000	*
10	6	9	-93.2786	3	16.8760	18.0000	*
11	9	29	-233.9869	3	16.8760	18.0000	*
12	43	1	16.3908	3	11.9380	12.0000	*
13	66	30	-924.0020	3	16.8760	18.0000	*
14	14	29	63.6670	3	11.9380	12.0000	*
15	38	12	31.8384	3	11.9380	12.0000	*
16	38	23	-45.9339	3	11.9380	12.0000	*
17	12	14	47.2761	3	11.9380	12.0000	*
18	43	12	15.4377	3	11.9380	12.0000	*
19	16	15	31.8286	3	11.9380	12.0000	*
20	38	16	14.0955	3	11.9380	12.0000	*
21	17	14	16.3908	3	11.9380	12.0000	*
22	18	17	9.5823	3	11.9380	12.0000	*
23	1	18	12.4711	3	11.9380	12.0000	*
24	19	17	6.8085	3	11.9380	12.0000	*
25	20	19	6.8085	3	11.9380	12.0000	*
26	18	20	2.8888	3	11.9380	12.0000	*
27	21	20	3.9197	3	11.9380	12.0000	*
28	22	21	3.9197	3	11.9380	12.0000	*
29	1	22	3.9197	3	11.9380	12.0000	*
30	4	32	43.5754	3	16.8760	18.0000	*
31	32	24	-140.7083	3	16.8760	18.0000	*
32	63	9	-110.5690	3	16.8760	18.0000	*
33	63	25	-30.1393	3	13.1240	14.0000	*
34	11	7	-30.1393	3	13.1240	14.0000	*
35	7	27	-30.1393	3	13.1240	14.0000	*
36	27	9	-30.1393	3	13.1240	14.0000	*
37	49	26	-12.2010	9	18.0000	18.0000	*
38	30	5	-739.7184	3	16.8760	18.0000	*
40	56	8	-184.2837	3	11.9380	12.0000	*
41	8	32	-184.2837	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
42	33	16	17.7331	3	11.9380	12.0000	*
43	39	23	-17.7331	3	11.9380	12.0000	*
44	29	34	-170.3200	3	16.8760	18.0000	*
45	39	33	17.7331	3	11.9380	12.0000	*
47	45	10	-566.4290	9	20.0000	20.0000	*
48	23	35	-63.6670	3	11.9380	12.0000	*
49	70	66	-357.5731	9	20.0000	20.0000	*
50	25	11	-30.1393	3	13.1240	14.0000	*
52	41	24	140.7083	3	16.8760	18.0000	*
54	15	43	31.8286	3	11.9380	12.0000	*
56	58	45	-166.0165	9	18.0000	18.0000	*
57	59	44	400.4125	9	18.0000	18.0000	*
58	73	44	-400.4125	9	18.0000	18.0000	*
59	10	66	-566.4291	3	16.8760	18.0000	*
60	73	48	-12.2010	9	18.0000	18.0000	*
61	72	26	12.2010	9	18.0000	18.0000	*
62	48	49	-12.2010	9	18.0000	18.0000	*
67	71	62	924.0021	9	18.0000	18.0000	*
69	30	56	-184.2837	3	11.9380	12.0000	*
72	59	45	-400.4125	9	18.0000	18.0000	*
75	63	41	140.7083	3	16.8760	18.0000	*
77	58	72	523.5897	9	18.0000	18.0000	*
80	70	58	357.5731	9	20.0000	20.0000	*
84	71	73	-412.6135	9	18.0000	18.0000	*
85	71	72	-511.3887	9	18.0000	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined
9	-- Reinforced Fiber Gla	Not Lined

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.103	9.110	-6.9895E-03	6.9895E-03	-474.5	-0.9134
2	2	5	14.00	9.157	9.096	6.0927E-02	6.0927E-02	308.8	0.9828
3	5	4	18.00	9.096	9.103	-6.6433E-03	6.6433E-03	-430.9	-0.8295
4	2	37	18.00	9.157	9.131	2.5817E-02	2.5817E-02	615.2	1.184
5	37	35	18.00	9.131	9.126	5.0354E-03	5.0354E-03	234.0	0.4504
6	68	2	18.00	9.197	9.157	4.0198E-02	4.0198E-02	924.0	1.779
7	6	37	18.00	9.110	9.131	-2.1478E-02	2.1478E-02	-381.2	-0.7338
9	35	34	18.00	9.126	9.122	4.3221E-03	4.3221E-03	170.3	0.3278
10	6	9	18.00	9.110	9.112	-2.5101E-03	2.5101E-03	-93.28	-0.1795
11	9	29	18.00	9.112	9.120	-8.0328E-03	8.0328E-03	-234.0	-0.4504
12	43	1	12.00	9.122	9.122	2.7752E-04	2.7752E-04	16.39	6.3049E-02
13	66	30	18.00	8.944	9.034	-9.0627E-02	9.0627E-02	-924.0	-1.779
14	14	29	12.00	9.121	9.120	1.3418E-03	1.3418E-03	63.67	0.2449
15	38	12	12.00	9.124	9.122	1.4677E-03	1.4677E-03	31.84	0.1225
16	38	23	12.00	9.124	9.124	-6.8760E-04	6.8760E-04	-45.93	-0.1767
17	12	14	12.00	9.122	9.121	6.7806E-04	6.7806E-04	47.28	0.1819
18	43	12	12.00	9.122	9.122	6.7711E-05	6.7711E-05	15.44	5.9383E-02
19	16	15	12.00	9.124	9.122	1.1826E-03	1.1826E-03	31.83	0.1224
20	38	16	12.00	9.124	9.124	7.2479E-05	7.2479E-05	14.10	5.4219E-02
21	17	14	12.00	9.122	9.121	3.4523E-04	3.4523E-04	16.39	6.3049E-02
22	18	17	12.00	9.122	9.122	8.2970E-05	8.2970E-05	9.582	3.6859E-02
23	1	18	12.00	9.122	9.122	4.0054E-05	4.0054E-05	12.47	4.7971E-02
24	19	17	12.00	9.122	9.122	3.7193E-05	3.7193E-05	6.809	2.6190E-02
25	20	19	12.00	9.122	9.122	3.5286E-05	3.5286E-05	6.809	2.6190E-02
26	18	20	12.00	9.122	9.122	1.0490E-05	1.0490E-05	2.889	1.1112E-02
27	21	20	12.00	9.122	9.122	1.5259E-05	1.5259E-05	3.920	1.5077E-02
28	22	21	12.00	9.122	9.122	1.7166E-05	1.7166E-05	3.920	1.5077E-02
29	1	22	12.00	9.122	9.122	1.8120E-05	1.8120E-05	3.920	1.5077E-02
30	4	32	18.00	9.103	9.102	5.0259E-04	5.0259E-04	43.58	8.3877E-02
31	32	24	18.00	9.102	9.105	-3.2768E-03	3.2768E-03	-140.7	-0.2708
32	63	9	18.00	9.109	9.112	-3.1376E-03	3.1376E-03	-110.6	-0.2128
33	63	25	14.00	9.109	9.109	-1.4782E-04	1.4782E-04	-30.14	-9.5927E-02
34	11	7	14.00	9.110	9.110	-4.5681E-04	4.5681E-04	-30.14	-9.5927E-02
35	7	27	14.00	9.110	9.111	-9.7084E-04	9.7084E-04	-30.14	-9.5927E-02
36	27	9	14.00	9.111	9.112	-1.0395E-03	1.0395E-03	-30.14	-9.5927E-02
37	49	26	18.00	8.914	8.914	7.2479E-05	7.2479E-05	-12.20	-2.0644E-02
38	30	5	18.00	9.034	9.096	-6.1675E-02	6.1675E-02	-739.7	-1.424
40	56	8	12.00	9.053	9.073	-2.0052E-02	2.0052E-02	-184.3	-0.7089
41	8	32	12.00	9.073	9.102	-2.9393E-02	2.9393E-02	-184.3	-0.7089
42	33	16	12.00	9.124	9.124	2.2221E-04	2.2221E-04	17.73	6.8212E-02
43	39	23	12.00	9.124	9.124	-2.2030E-04	2.2030E-04	-17.73	-6.8212E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
44	29	34	18.00	9.120	9.122	-1.5774E-03	1.5774E-03	-170.3	-0.3278
45	39	33	12.00	9.124	9.124	3.1757E-04	3.1757E-04	17.73	6.8212E-02
47	45	10	20.00	8.937	8.941	-3.6125E-03	3.6125E-03	-566.4	-0.7763
48	23	35	12.00	9.124	9.126	-1.7242E-03	1.7242E-03	-63.67	-0.2449
49	70	66	20.00	8.941	8.944	-2.1601E-03	2.1601E-03	-357.6	-0.4901
50	25	11	14.00	9.109	9.110	-5.2261E-04	5.2261E-04	-30.14	-9.5927E-02
52	41	24	18.00	9.107	9.105	1.5354E-03	1.5354E-03	140.7	0.2708
54	15	43	12.00	9.122	9.122	1.4496E-04	1.4496E-04	31.83	0.1224
56	58	45	18.00	8.937	8.937	-7.3814E-04	7.3814E-04	-166.0	-0.2809
57	59	44	18.00	8.933	8.927	5.9347E-03	5.9347E-03	400.4	0.6775
58	73	44	18.00	8.916	8.927	-1.1152E-02	1.1152E-02	-400.4	-0.6775
59	10	66	18.00	8.941	8.944	-2.5501E-03	2.5501E-03	-566.4	-1.090
60	73	48	18.00	8.916	8.915	7.3528E-04	7.3528E-04	-12.20	-2.0644E-02
61	72	26	18.00	8.914	8.914	-6.8283E-04	6.8283E-04	12.20	2.0644E-02
62	48	49	18.00	8.915	8.914	4.3964E-04	4.3964E-04	-12.20	-2.0644E-02
67	71	62	18.00	8.904	8.897	7.0658E-03	7.0658E-03	924.0	1.563
69	30	56	12.00	9.034	9.053	-1.8371E-02	1.8371E-02	-184.3	-0.7089
72	59	45	18.00	8.933	8.937	-4.7979E-03	4.7979E-03	-400.4	-0.6775
75	63	41	18.00	9.109	9.107	2.0523E-03	2.0523E-03	140.7	0.2708
77	58	72	18.00	8.937	8.914	2.3077E-02	2.3077E-02	523.6	0.8859
80	70	58	20.00	8.941	8.937	4.7407E-03	4.7407E-03	357.6	0.4901
84	71	73	18.00	8.904	8.916	-1.1100E-02	1.1100E-02	-412.6	-0.6981
85	71	72	18.00	8.904	8.914	-9.1696E-03	9.1696E-03	-511.4	-0.8653

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	924.0	0.000	9.197	9.197	10.17	0.1082	2.3606E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
31	0.000	* 924.0	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
62	8.897	924.0 *	309.77

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 25-May-2021

PAGE 15 OF 16

IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 25-May-2021

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COMMENTS

Analysis Converged in 2 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

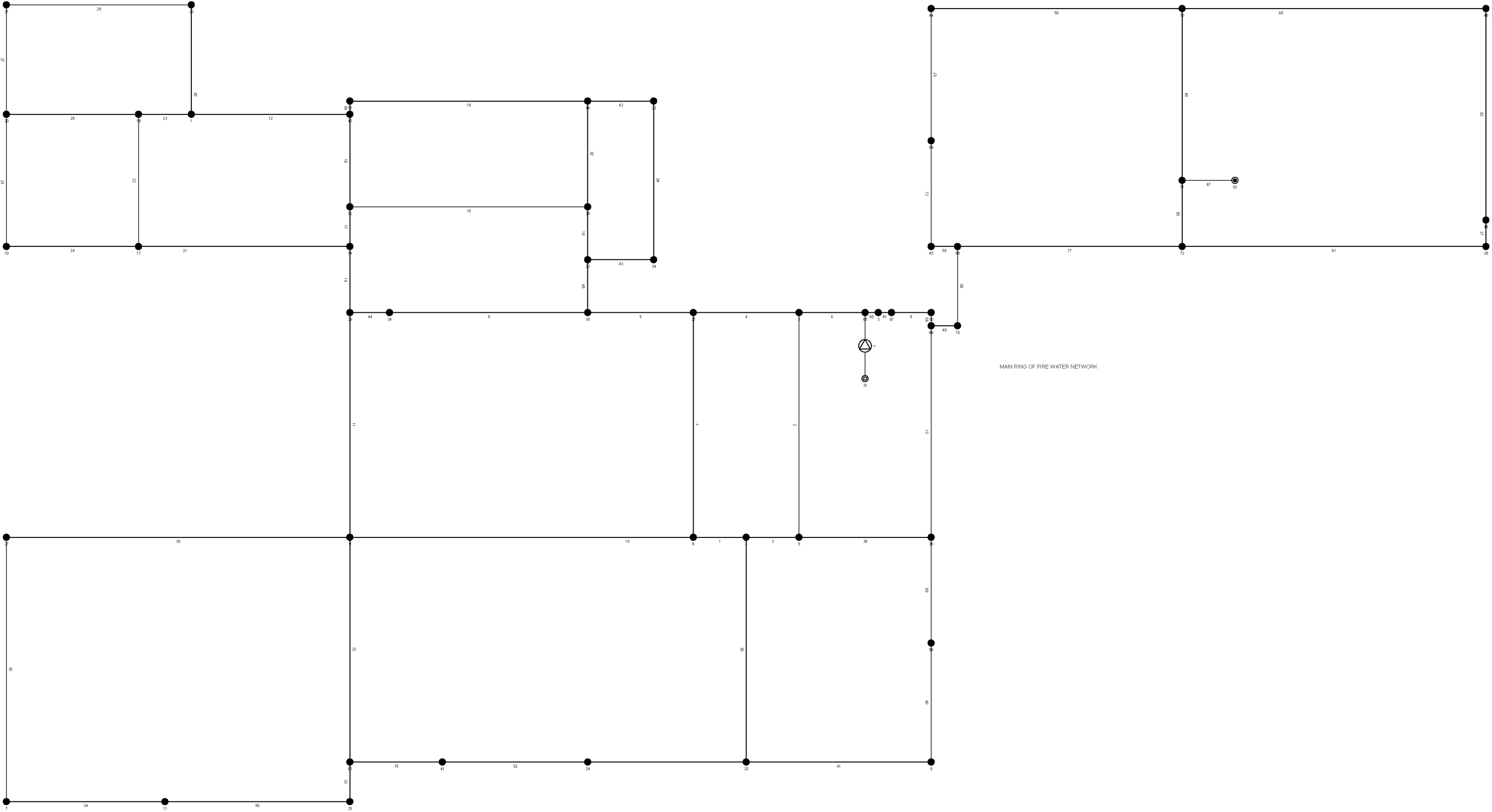
Attachment	16	Fire scenario in the diesel storage pumping area – Case A2
	16.A	PIPENET schematic layout with piping and nodes label
	16.B	PIPENET schematic layout with flow rate and pressure results
	16.C	PIPENET schematic layout with velocity results
	16.D	PIPENET input/output printout report

Attachment 16.A contains 1 page

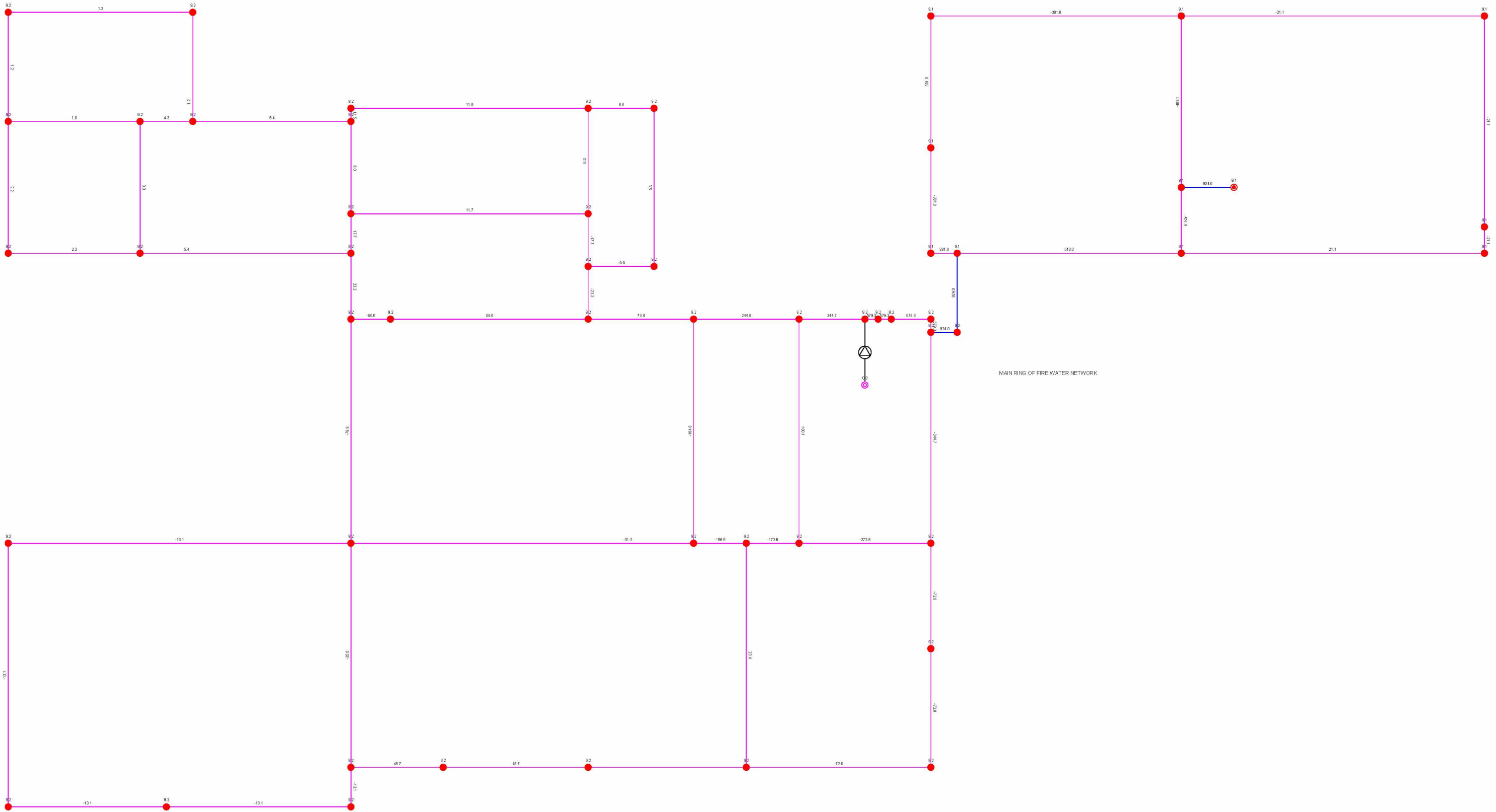
Attachment 16.B contains 1 page

Attachment 16.C contains 1 page

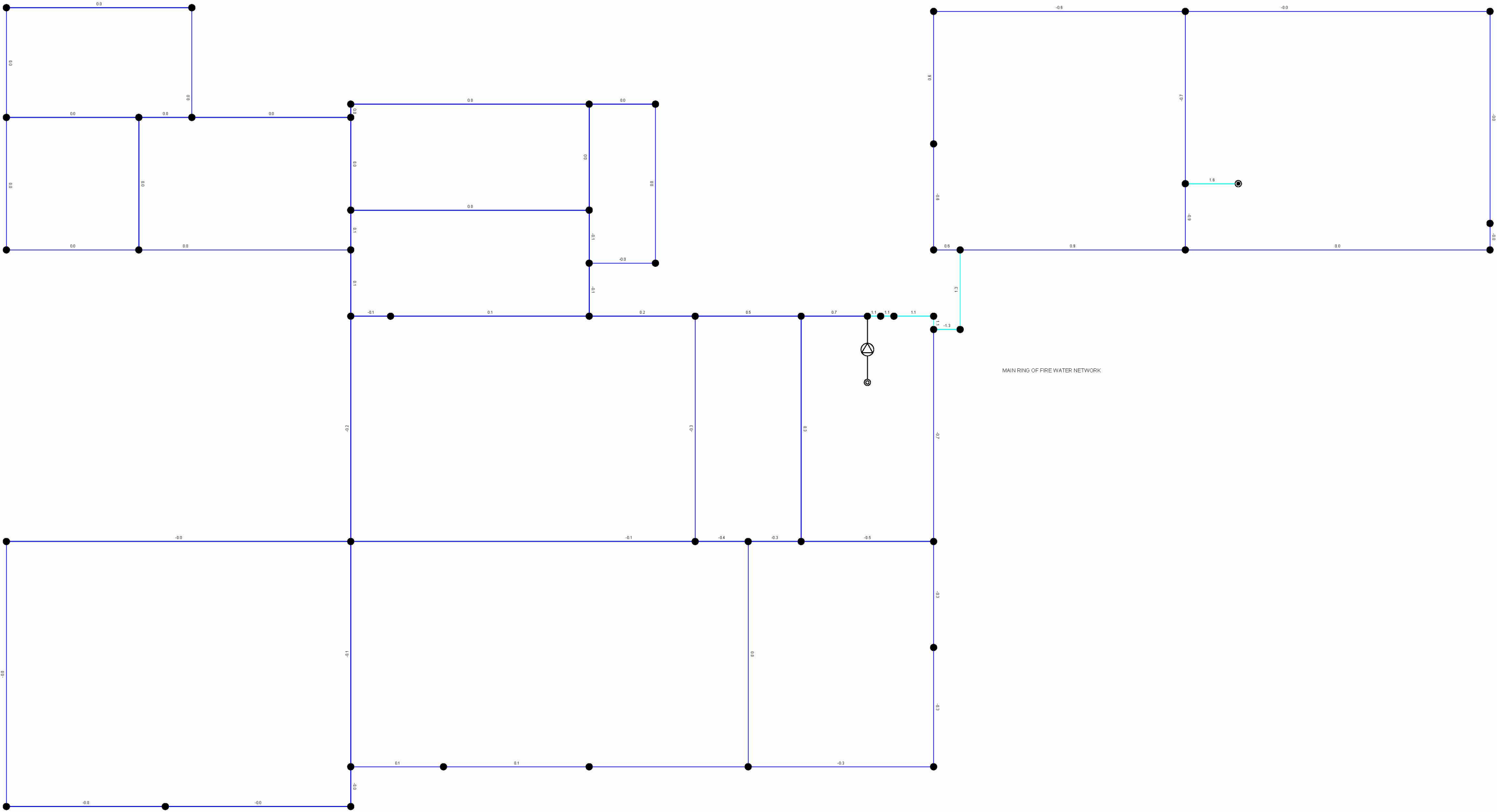
Attachment 16.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Tuesday, May 25, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic	Tuesday, May 25, 2021		Page 1 of 1
Pressure (Bar G)	< 7.000000 < 8.500000	< 7.500000 < 9.000000	< 8.000000 > 9.000000
Pipe vol. flow (m³/h)	< 600.000000 < 2400.000000	< 1200.000000 < 3450.000000	< 1800.000000 > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT			
PIPENET Schematic		Tuesday, May 25, 2021	Page 1 of 1
Pipe velocity (m/sec)	 < 0.000000	 < 1.000000	 < 2.000000
	 < 3.000000	 < 3.500000	 > 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

18:41 on 25-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
67	71	62	18.00	20.00	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230
29	1 x 4	18.29

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)	
30	2 x 4	27.13	
32	1 x 4	27.13	
33	1 x 2	7.925	
34	1 x 2	7.925	
35	1 x 2	7.925	
36	1 x 4	20.42	
37	1 x 2	15.66	
38	1 x 4	27.13	
40	1 x 2	8.230	
42	1 x 4	18.29	
43	1 x 4	18.29	
44	1 x 4	27.13	
45	2 x 2	8.230	
48	1 x 4	18.29	
49	1 x 4	45.60	
56	1 x 4	40.99	
57	1 x 4	40.99	
60	1 x 2	15.66	
75	1 x 4	27.13	
80	1 x 2	17.50	1 x 4 45.60
84	1 x 4	40.99	
85	1 x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-195.9461	3	16.8760	18.0000	*
2	2	5	100.0537	3	13.1240	14.0000	*
3	5	4	-172.5928	3	16.8760	18.0000	*
4	2	37	244.6062	3	16.8760	18.0000	*
5	37	35	79.8113	3	16.8760	18.0000	*
6	68	2	344.6599	3	16.8760	18.0000	*
7	6	37	-164.7950	3	16.8760	18.0000	*
8	67	10	579.3422	3	16.8760	18.0000	*
9	35	34	56.6272	3	16.8760	18.0000	*
10	6	9	-31.1512	3	16.8760	18.0000	*
11	9	29	-79.8113	3	16.8760	18.0000	*
12	43	1	5.4492	3	11.9380	12.0000	*
13	66	30	-344.6599	3	16.8760	18.0000	*
14	14	29	23.1841	3	11.9380	12.0000	*
15	38	12	11.7314	3	11.9380	12.0000	*
16	38	23	-17.7094	3	11.9380	12.0000	*
17	12	14	17.7349	3	11.9380	12.0000	*
18	43	12	6.0035	3	11.9380	12.0000	*
19	16	15	11.4527	3	11.9380	12.0000	*
20	38	16	5.9780	3	11.9380	12.0000	*
21	17	14	5.4492	3	11.9380	12.0000	*
22	18	17	3.2962	3	11.9380	12.0000	*
23	1	18	4.2572	3	11.9380	12.0000	*
24	19	17	2.1530	3	11.9380	12.0000	*
25	20	19	2.1530	3	11.9380	12.0000	*
26	18	20	0.9610	3	11.9380	12.0000	*
27	21	20	1.1919	3	11.9380	12.0000	*
28	22	21	1.1919	3	11.9380	12.0000	*
29	1	22	1.1919	3	11.9380	12.0000	*
30	4	32	23.3533	3	16.8760	18.0000	*
31	32	24	-48.6601	3	16.8760	18.0000	*
32	63	9	-35.6048	3	16.8760	18.0000	*
33	63	25	-13.0553	3	13.1240	14.0000	*
34	11	7	-13.0553	3	13.1240	14.0000	*
35	7	27	-13.0553	3	13.1240	14.0000	*
36	27	9	-13.0553	3	13.1240	14.0000	*
37	49	26	-21.0593	9	18.0000	18.0000	*
38	30	5	-272.6465	3	16.8760	18.0000	*
40	56	8	-72.0133	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-72.0133	3	11.9380	12.0000	*
42	33	16	5.4747	3	11.9380	12.0000	*
43	39	23	-5.4747	3	11.9380	12.0000	*
44	29	34	-56.6272	3	16.8760	18.0000	*
45	39	33	5.4747	3	11.9380	12.0000	*
48	23	35	-23.1841	3	11.9380	12.0000	*
49	70	66	-924.0021	9	20.0000	20.0000	*
50	25	11	-13.0553	3	13.1240	14.0000	*
52	41	24	48.6601	3	16.8760	18.0000	*
54	15	43	11.4527	3	11.9380	12.0000	*
56	58	45	381.0294	9	18.0000	18.0000	*
57	59	44	381.0294	9	18.0000	18.0000	*
58	73	44	-381.0294	9	18.0000	18.0000	*
59	10	66	579.3422	3	16.8760	18.0000	*
60	73	48	-21.0593	9	18.0000	18.0000	*
61	72	26	21.0593	9	18.0000	18.0000	*
62	48	49	-21.0593	9	18.0000	18.0000	*
67	71	62	924.0021	9	18.0000	18.0000	*
69	30	56	-72.0133	3	11.9380	12.0000	*
72	59	45	-381.0294	9	18.0000	18.0000	*
75	63	41	48.6601	3	16.8760	18.0000	*
77	58	72	542.9727	9	18.0000	18.0000	*
80	70	58	924.0021	9	20.0000	20.0000	*
84	71	73	-402.0887	9	18.0000	18.0000	*
85	71	72	-521.9134	9	18.0000	18.0000	*
90	68	3	579.3422	3	16.8760	18.0000	*
91	3	67	579.3422	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined
9	-- Reinforced Fiber Gla	Not Lined

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.186	9.187	-8.1539E-04	8.1539E-04	-195.9	-0.3772
2	2	5	14.00	9.192	9.185	7.0400E-03	7.0400E-03	100.1	0.3184
3	5	4	18.00	9.185	9.186	-7.7724E-04	7.7724E-04	-172.6	-0.3322
4	2	37	18.00	9.192	9.189	3.0355E-03	3.0355E-03	244.6	0.4708
5	37	35	18.00	9.189	9.189	5.6934E-04	5.6934E-04	79.81	0.1536
6	68	2	18.00	9.197	9.192	4.8752E-03	4.8752E-03	344.7	0.6634
7	6	37	18.00	9.187	9.189	-2.4118E-03	2.4118E-03	-164.8	-0.3172
8	67	10	18.00	9.193	9.170	2.3202E-02	2.3202E-02	579.3	1.115
9	35	34	18.00	9.189	9.188	4.8256E-04	4.8256E-04	56.63	0.1090
10	6	9	18.00	9.187	9.187	-2.7752E-04	2.7752E-04	-31.15	-5.9962E-02
11	9	29	18.00	9.187	9.188	-9.0504E-04	9.0504E-04	-79.81	-0.1536
12	43	1	12.00	9.188	9.188	2.9564E-05	2.9564E-05	5.449	2.0961E-02
13	66	30	18.00	9.167	9.178	-1.0987E-02	1.0987E-02	-344.7	-0.6634
14	14	29	12.00	9.188	9.188	1.5259E-04	1.5259E-04	23.18	8.9180E-02
15	38	12	12.00	9.188	9.188	1.6499E-04	1.6499E-04	11.73	4.5126E-02
16	38	23	12.00	9.188	9.188	-7.5340E-05	7.5340E-05	-17.71	-6.8121E-02
17	12	14	12.00	9.188	9.188	7.4387E-05	7.4387E-05	17.73	6.8219E-02
18	43	12	12.00	9.188	9.188	7.6294E-06	0.000	6.004	2.3093E-02
19	16	15	12.00	9.188	9.188	1.3256E-04	1.3256E-04	11.45	4.4054E-02
20	38	16	12.00	9.188	9.188	7.6294E-06	0.000	5.978	2.2995E-02
21	17	14	12.00	9.188	9.188	3.7193E-05	3.7193E-05	5.449	2.0961E-02
22	18	17	12.00	9.188	9.188	9.5367E-06	0.000	3.296	1.2679E-02
23	1	18	12.00	9.188	9.188	5.7220E-06	0.000	4.257	1.6376E-02
24	19	17	12.00	9.188	9.188	4.7684E-06	0.000	2.153	8.2815E-03
25	20	19	12.00	9.188	9.188	4.7684E-06	0.000	2.153	8.2815E-03
26	18	20	12.00	9.188	9.188	0.000	0.000	0.9610	3.6966E-03
27	21	20	12.00	9.188	9.188	0.000	0.000	1.192	4.5849E-03
28	22	21	12.00	9.188	9.188	2.8610E-06	0.000	1.192	4.5849E-03
29	1	22	12.00	9.188	9.188	2.8610E-06	0.000	1.192	4.5849E-03
30	4	32	18.00	9.186	9.186	3.7193E-05	3.7193E-05	23.35	4.4952E-02
31	32	24	18.00	9.186	9.186	-3.7766E-04	3.7766E-04	-48.66	-9.3664E-02
32	63	9	18.00	9.187	9.187	-3.4237E-04	3.4237E-04	-35.60	-6.8535E-02
33	63	25	14.00	9.187	9.187	-1.4305E-05	1.4305E-05	-13.06	-4.1552E-02
34	11	7	14.00	9.187	9.187	-4.9591E-05	4.9591E-05	-13.06	-4.1552E-02
35	7	27	14.00	9.187	9.187	-1.0777E-04	1.0777E-04	-13.06	-4.1552E-02
36	27	9	14.00	9.187	9.187	-1.1253E-04	1.1253E-04	-13.06	-4.1552E-02
37	49	26	18.00	9.105	9.105	4.0054E-05	4.0054E-05	-21.06	-3.5632E-02
38	30	5	18.00	9.178	9.185	-7.4749E-03	7.4749E-03	-272.6	-0.5248
40	56	8	12.00	9.180	9.182	-2.4300E-03	2.4300E-03	-72.01	-0.2770
41	8	32	12.00	9.182	9.186	-3.5601E-03	3.5601E-03	-72.01	-0.2770
42	33	16	12.00	9.188	9.188	2.5749E-05	2.5749E-05	5.475	2.1059E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.188	9.188	-2.4796E-05	2.4796E-05	-5.475	-2.1059E-02
44	29	34	18.00	9.188	9.188	-1.7738E-04	1.7738E-04	-56.63	-0.1090
45	39	33	12.00	9.188	9.188	3.2425E-05	3.2425E-05	5.475	2.1059E-02
48	23	35	12.00	9.188	9.189	-1.9264E-04	1.9264E-04	-23.18	-8.9180E-02
49	70	66	20.00	9.155	9.167	-1.1761E-02	1.1761E-02	-924.0	-1.266
50	25	11	14.00	9.187	9.187	-5.8174E-05	5.8174E-05	-13.06	-4.1552E-02
52	41	24	18.00	9.186	9.186	1.7452E-04	1.7452E-04	48.66	9.3664E-02
54	15	43	12.00	9.188	9.188	1.7166E-05	1.7166E-05	11.45	4.4054E-02
56	58	45	18.00	9.129	9.126	2.8801E-03	2.8801E-03	381.0	0.6447
57	59	44	18.00	9.122	9.116	5.5904E-03	5.5904E-03	381.0	0.6447
58	73	44	18.00	9.106	9.116	-1.0505E-02	1.0505E-02	-381.0	-0.6447
59	10	66	18.00	9.170	9.167	3.2597E-03	3.2597E-03	579.3	1.115
60	73	48	18.00	9.106	9.105	4.0722E-04	4.0722E-04	-21.06	-3.5632E-02
61	72	26	18.00	9.105	9.105	-3.7956E-04	3.7956E-04	21.06	3.5632E-02
62	48	49	18.00	9.105	9.105	2.4509E-04	2.4509E-04	-21.06	-3.5632E-02
67	71	62	18.00	9.095	9.088	7.0677E-03	7.0677E-03	924.0	1.563
69	30	56	12.00	9.178	9.180	-2.2249E-03	2.2249E-03	-72.01	-0.2770
72	59	45	18.00	9.122	9.126	-4.5176E-03	4.5176E-03	-381.0	-0.6447
75	63	41	18.00	9.187	9.186	2.3556E-04	2.3556E-04	48.66	9.3664E-02
77	58	72	18.00	9.129	9.105	2.4565E-02	2.4565E-02	543.0	0.9187
80	70	58	20.00	9.155	9.129	2.5825E-02	2.5825E-02	924.0	1.266
84	71	73	18.00	9.095	9.106	-1.0585E-02	1.0585E-02	-402.1	-0.6803
85	71	72	18.00	9.095	9.105	-9.5129E-03	9.5129E-03	-521.9	-0.8831
90	68	3	18.00	9.197	9.195	1.9579E-03	1.9579E-03	579.3	1.115
91	3	67	18.00	9.195	9.193	1.9579E-03	1.9579E-03	579.3	1.115

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	924.0	0.000	9.197	9.197	10.17	0.1082	2.3606E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
31	0.000	* 924.0	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
62	9.088	924.0 *	306.51

Note: A * after a value indicates that this is a specification

TITLE : Proj.082755C - ROTTERDAM - NEXBTL PLANT

DATE : 25-May-2021

PAGE 15 OF 16

IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

TITLE : Proj.082755C - ROTTERDAM - NExBTL PLANT

DATE : 25-May-2021

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COMMENTS

Analysis Converged in 2 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

=====

**RDCG (Rotterdam Capacity Growth) – DEFINITION PHASE
NESTE**

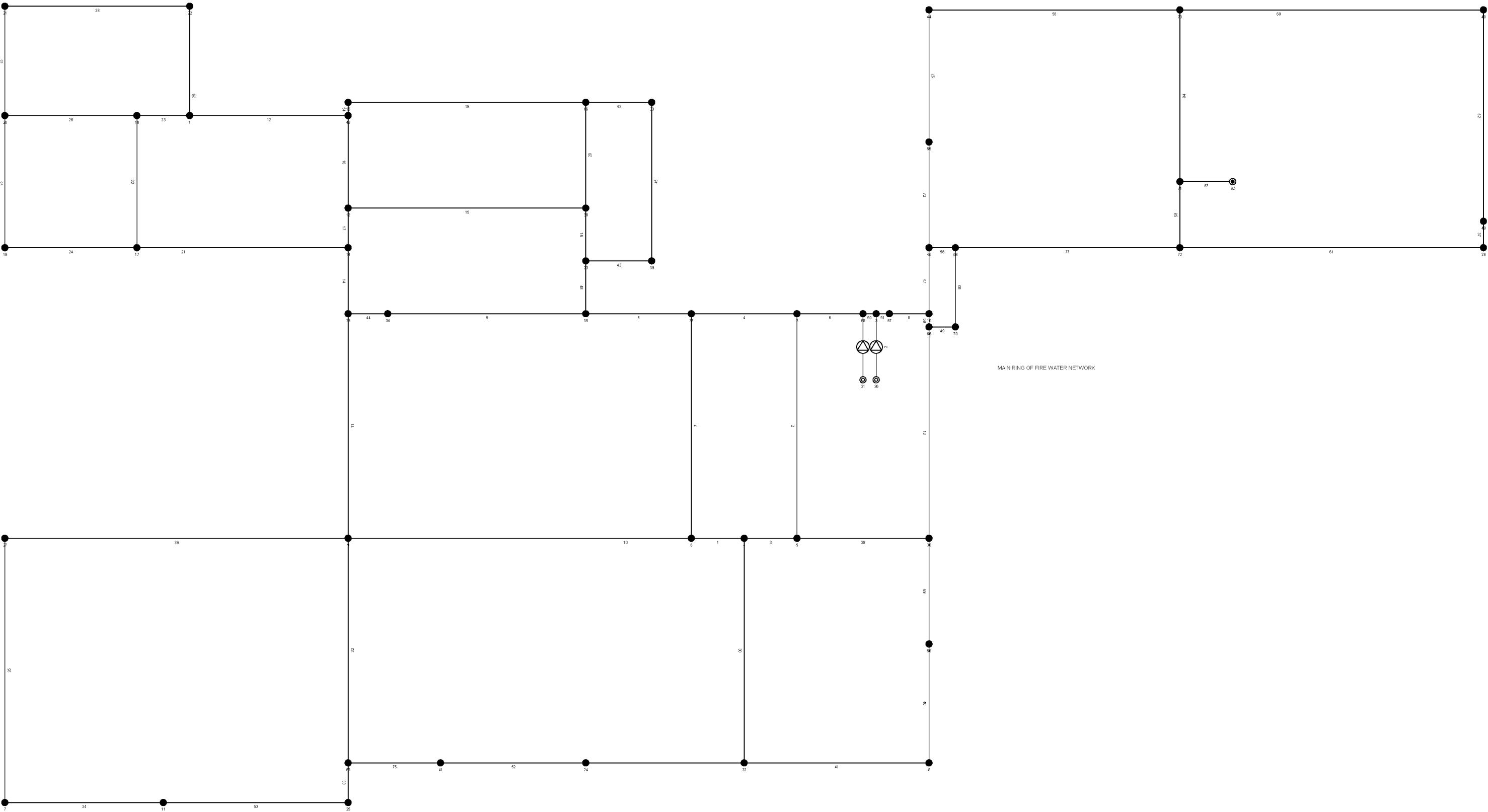
Attachment	17	Fire scenario in the diesel storage pumping area – Case B
	17.A	PIPENET schematic layout with piping and nodes label
	17.B	PIPENET schematic layout with flow rate and pressure results
	17.C	PIPENET schematic layout with velocity results
	17.D	PIPENET input/output printout report

Attachment 17.A contains 1 page

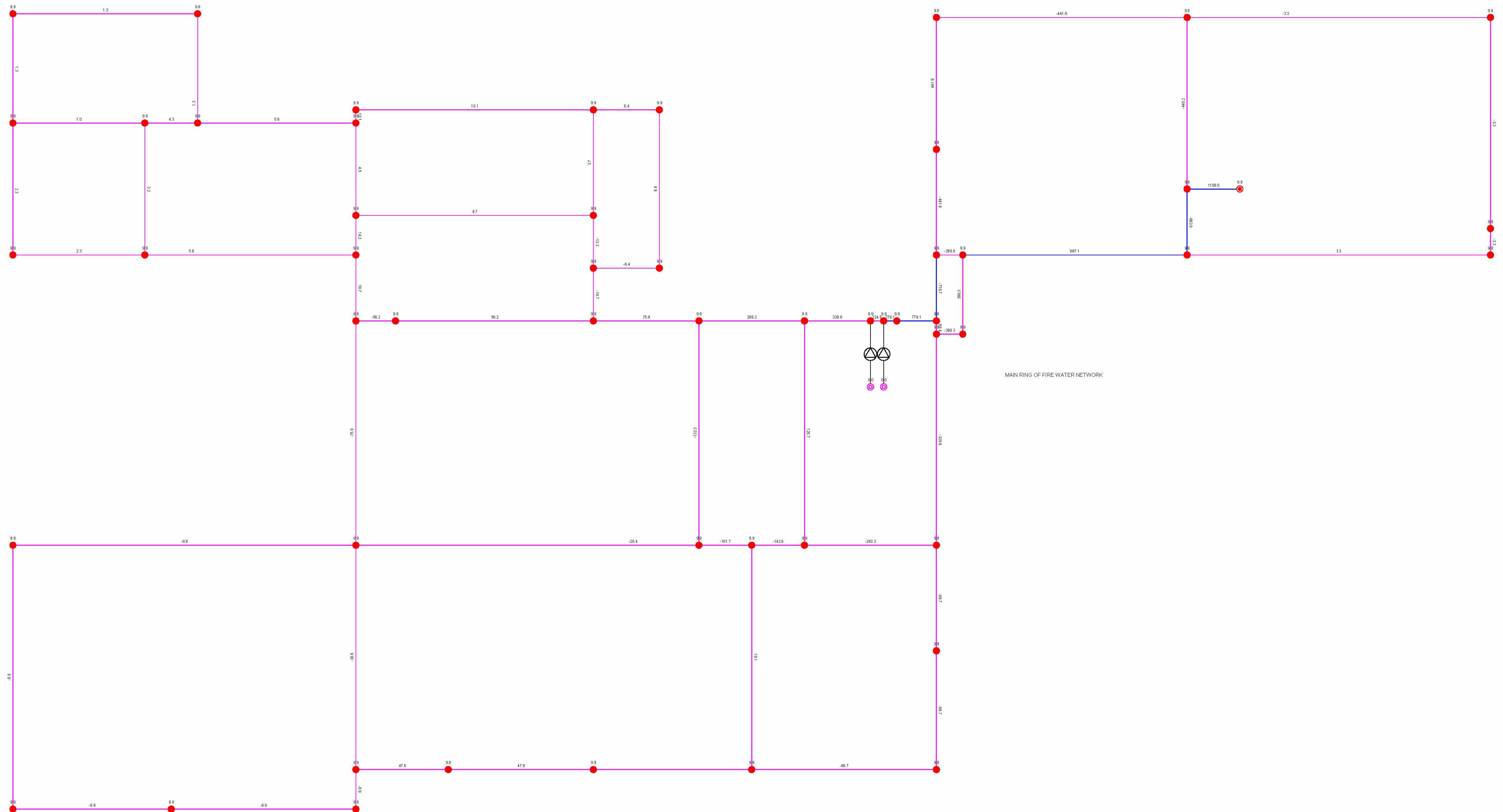
Attachment 17.B contains 1 page

Attachment 17.C contains 1 page

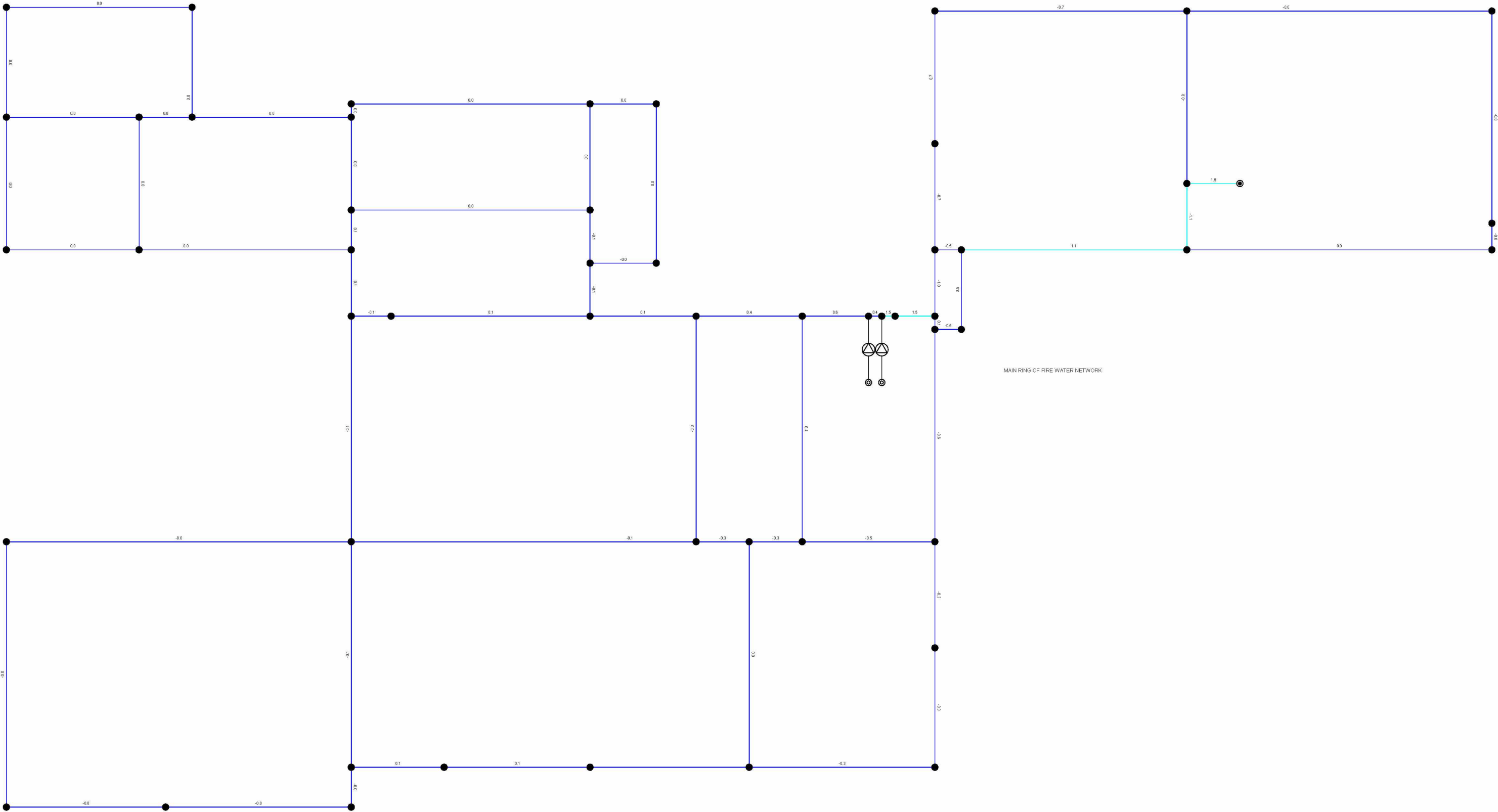
Attachment 17.D contains 19 pages



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1



Proj.082755C - ROTTERDAM - NexBTL PLANT			
PIPENET Schematic		Wednesday, May 26, 2021	
Page 1 of 1			
Pressure	 < 7.000000	 < 7.500000	 < 8.000000
(Bar G)	 < 8.500000	 < 9.000000	 > 9.000000
Pipe vol. flow	 < 600.000000	 < 1200.000000	 < 1800.000000
(m³/h)	 < 2400.000000	 < 3450.000000	 > 3450.000000



Proj.082755C - ROTTERDAM - NExBTL PLANT		
PIPENET Schematic	Wednesday, May 26, 2021	Page 1 of 1
Pipe velocity (m/sec)	< 0.000000 < 3.000000	< 1.000000 < 3.500000 < 2.000000 > 3.500000

=====

PIPENET SPRAY/SPRINKLER MODULE

=====

=====

VERSION 1.9.0

=====

Results for : Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

Licence Owner from key: Technip Italy spa

Licence Type: Network

Key number: Unavailable

MUS Date: 10/02/2022

=====

12:47 on 26-May-2021

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CONTROL INFORMATION

Convergence accuracy = 0.20
Maximum no. of iterations = 800
Elevation Check Tolerance = 0.50 m
Warnings Control Option = 2
***** Diagnostic level = 2

FLUID SYSTEM

Fluid Class = 1 (Liquid)
Density = 998.2 kg/cu.m
Viscosity = 1.0000E-09 Pa.s

DESIGN INFORMATION

Waterspray System

Pipe Materials are :			
Pipe Type		Lining Type	Thickness(in)
3	-- ANSI B36.10 Sch.40	Not Lined	
9	-- Reinforced Fiber Gla	Not Lined	

Design to NFPA Rules
Using the Hazen-Williams Equation

Velocity Pressure Model: Ignore velocity pressure

Pressure loss at entrance: Ignore

Pressure loss at exit: Ignore

AVAILABLE PIPE SIZES AND MAXIMUM VELOCITIES USED FOR PIPE SIZING

ANSI B36.10 Sch.40 Not lined			Reinforced Fiber Gla Not lined					
Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)	Nom.Bore (in)	Act.Diam (in)	Max.Vel. (m/s)
0.5000	0.6220	3.5000	0.5000	Not acceptable				
0.7500	0.8240	3.5000	0.7500	0.7500	3.5000			
1.0000	1.0490	3.5000	1.0000	1.0000	3.5000			
1.2500	1.3800	3.5000	1.2500	1.2500	3.5000			
1.5000	1.6100	3.5000	1.5000	1.5000	3.5000			
2.0000	2.0670	3.5000	2.0000	2.0000	3.5000			
2.5000	2.4690	3.5000	2.5000	2.5000	3.5000			
3.0000	3.0680	3.5000	3.0000	3.0000	3.5000			
3.5000	3.5480	3.5000	3.5000	3.5000	3.5000			
4.0000	4.0260	3.5000	4.0000	4.0000	3.5000			
5.0000	5.0470	3.5000	5.0000	5.0000	3.5000			
6.0000	6.0650	3.5000	6.0000	6.0000	3.5000			
8.0000	7.9810	3.5000	8.0000	8.0000	3.5000			
10.0000	10.0200	3.5000	10.0000	10.0000	3.5000			
12.0000	11.9380	3.5000	12.0000	12.0000	3.5000			
14.0000	13.1240	3.5000	14.0000	14.0000	3.5000			
16.0000	15.0000	3.5000	16.0000	16.0000	3.5000			
18.0000	16.8760	3.5000	18.0000	18.0000	3.5000			
20.0000	18.8120	3.5000	20.0000	20.0000	3.5000			
24.0000	22.6240	3.5000	24.0000	24.0000	3.5000			

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
1	4	6	18.00	38.00	0.000	120.0	0.000
2	2	5	14.00	134.0	0.000	120.0	40.84
3	5	4	18.00	43.00	0.000	120.0	0.000
4	2	37	18.00	81.00	0.000	120.0	0.000
5	37	35	18.00	84.00	0.000	120.0	0.000
6	68	2	18.00	55.00	0.000	120.0	0.000
7	6	37	18.00	134.0	0.000	120.0	54.25
8	67	10	18.00	44.00	0.000	120.0	27.13
9	35	34	18.00	129.0	0.000	120.0	0.000
10	6	9	18.00	233.0	0.000	120.0	0.000
11	9	29	18.00	134.0	0.000	120.0	0.000
12	43	1	12.00	102.0	0.000	120.0	18.29
13	66	30	18.00	124.0	0.000	120.0	0.000
14	14	29	12.00	47.00	0.000	120.0	0.000
15	38	12	12.00	149.0	0.000	120.0	36.58
16	38	23	12.00	46.00	0.000	120.0	0.000
17	12	14	12.00	41.00	0.000	120.0	0.000
18	43	12	12.00	33.00	0.000	120.0	0.000
19	16	15	12.00	149.0	0.000	120.0	0.000
20	38	16	12.00	51.00	0.000	120.0	0.000
21	17	14	12.00	131.0	0.000	120.0	18.29
22	18	17	12.00	77.00	0.000	120.0	18.29
23	1	18	12.00	29.00	0.000	120.0	0.000
24	19	17	12.00	75.00	0.000	120.0	8.230
25	20	19	12.00	77.00	0.000	120.0	0.000
26	18	20	12.00	75.00	0.000	120.0	18.29
27	21	20	12.00	78.00	0.000	120.0	8.230
28	22	21	12.00	104.0	0.000	120.0	8.230
29	1	22	12.00	81.00	0.000	120.0	18.29
30	4	32	18.00	180.0	0.000	120.0	54.25
31	32	24	18.00	139.0	0.000	120.0	0.000
32	63	9	18.00	180.0	0.000	120.0	27.13
33	63	25	14.00	24.00	0.000	120.0	7.925
34	11	7	14.00	92.00	0.000	120.0	7.925
35	7	27	14.00	204.0	0.000	120.0	7.925
36	27	9	14.00	206.0	0.000	120.0	20.42
37	49	26	18.00	6.000	0.000	150.0	15.66
38	30	5	18.00	101.0	0.000	120.0	27.13
40	56	8	12.00	90.00	0.000	120.0	8.230
41	8	32	12.00	144.0	0.000	120.0	0.000
42	33	16	12.00	61.00	0.000	120.0	18.29
43	39	23	12.00	61.00	0.000	120.0	18.29
44	29	34	18.00	20.00	0.000	120.0	27.13

PIPE CONFIGURATION

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Length (m)	Elevation (m)	C Factor	Fitt.eq.lnth (m)
45	39	33	12.00	97.00	0.000	120.0	16.46
47	45	10	20.00	49.00	0.000	150.0	0.000
48	23	35	12.00	42.00	0.000	120.0	18.29
49	70	66	20.00	10.00	0.000	150.0	45.60
50	25	11	14.00	114.0	0.000	120.0	0.000
52	41	24	18.00	65.00	0.000	120.0	0.000
54	15	43	12.00	18.00	0.000	120.0	0.000
56	58	45	18.00	10.00	0.000	150.0	40.99
57	59	44	18.00	58.00	0.000	150.0	40.99
58	73	44	18.00	186.0	0.000	150.0	0.000
59	10	66	18.00	10.00	0.000	120.0	0.000
60	73	48	18.00	204.0	0.000	150.0	15.66
61	72	26	18.00	204.0	0.000	150.0	0.000
62	48	49	18.00	132.0	0.000	150.0	0.000
67	71	62	18.00	20.00	0.000	150.0	0.000
69	30	56	12.00	90.00	0.000	120.0	0.000
72	59	45	18.00	80.00	0.000	150.0	0.000
75	63	41	18.00	60.00	0.000	120.0	27.13
77	58	72	18.00	176.0	0.000	150.0	0.000
80	70	58	20.00	59.00	0.000	150.0	63.10
84	71	73	18.00	103.0	0.000	150.0	40.99
85	71	72	18.00	35.00	0.000	150.0	40.99
90	68	3	18.00	6.000	0.000	120.0	0.000
91	3	67	18.00	6.000	0.000	120.0	0.000

PIPE FITTINGS

Pipe Label	Number x Type	Equivalent Length (m)
2	2 x 4	20.42
7	2 x 4	27.13
8	1 x 4	27.13
12	1 x 4	18.29
15	2 x 4	18.29
21	1 x 4	18.29
22	1 x 4	18.29
24	1 x 2	8.230
26	1 x 4	18.29
27	1 x 2	8.230
28	1 x 2	8.230

PIPE FITTINGS

Pipe Label	Number x Type		Equivalent Length (m)	
29	1	x 4	18.29	
30	2	x 4	27.13	
32	1	x 4	27.13	
33	1	x 2	7.925	
34	1	x 2	7.925	
35	1	x 2	7.925	
36	1	x 4	20.42	
37	1	x 2	15.66	
38	1	x 4	27.13	
40	1	x 2	8.230	
42	1	x 4	18.29	
43	1	x 4	18.29	
44	1	x 4	27.13	
45	2	x 2	8.230	
48	1	x 4	18.29	
49	1	x 4	45.60	
56	1	x 4	40.99	
57	1	x 4	40.99	
60	1	x 2	15.66	
75	1	x 4	27.13	
80	1	x 2	17.50	1 x 4 45.60
84	1	x 4	40.99	
85	1	x 4	40.99	

- Fitting types are :
- 1 -- 45 Deg Elbow
 - 2 -- 90 Deg Standard Elbow
 - 3 -- 90 Deg Long Radius Elbow
 - 4 -- Tee or Cross (Flow Turned Thro 90 Deg)
 - 5 -- Gate Valve
 - 6 -- Swing Check Valve
 - 7 -- Non-Return Valve
 - 8 -- Ball Valve
 - 9 -- Butterfly Valve

PUMP CONFIGURATION

Pump Label	Input Node	Output Node	Pump Descriptor	Coeffs. of Press Drop (bar)				Min flow (cu.m/hr)	Max flow (cu.m/hr)	ON	Sensor Type
				Cubic	Quadratic	Linear	Constant				
1	31	68	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None
2	36	3	85GA-01 A/B/ C	-5.743E-10	7.831E-08	-1.070E-03	10.6	250.	1.600E+03	YES	None

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
1	4	6	-161.6799	3	16.8760	18.0000	*
2	2	5	120.6907	3	13.1240	14.0000	*
3	5	4	-142.5746	3	16.8760	18.0000	*
4	2	37	209.2391	3	16.8760	18.0000	*
5	37	35	75.9098	3	16.8760	18.0000	*
6	68	2	329.9297	3	16.8760	18.0000	*
7	6	37	-133.3293	3	16.8760	18.0000	*
8	67	10	779.0728	3	16.8760	18.0000	*
9	35	34	56.1860	3	16.8760	18.0000	*
10	6	9	-28.3507	3	16.8760	18.0000	*
11	9	29	-75.9098	3	16.8760	18.0000	*
12	43	1	5.5709	3	11.9380	12.0000	*
13	66	30	-329.9297	3	16.8760	18.0000	*
14	14	29	19.7238	3	11.9380	12.0000	*
15	38	12	9.6689	3	11.9380	12.0000	*
16	38	23	-13.3351	3	11.9380	12.0000	*
17	12	14	14.1529	3	11.9380	12.0000	*
18	43	12	4.4839	3	11.9380	12.0000	*
19	16	15	10.0548	3	11.9380	12.0000	*
20	38	16	3.6661	3	11.9380	12.0000	*
21	17	14	5.5709	3	11.9380	12.0000	*
22	18	17	3.2408	3	11.9380	12.0000	*
23	1	18	4.2524	3	11.9380	12.0000	*
24	19	17	2.3301	3	11.9380	12.0000	*
25	20	19	2.3301	3	11.9380	12.0000	*
26	18	20	1.0116	3	11.9380	12.0000	*
27	21	20	1.3185	3	11.9380	12.0000	*
28	22	21	1.3185	3	11.9380	12.0000	*
29	1	22	1.3185	3	11.9380	12.0000	*
30	4	32	19.1053	3	16.8760	18.0000	*
31	32	24	-47.5592	3	16.8760	18.0000	*
32	63	9	-38.6496	3	16.8760	18.0000	*
33	63	25	-8.9096	3	13.1240	14.0000	*
34	11	7	-8.9096	3	13.1240	14.0000	*
35	7	27	-8.9096	3	13.1240	14.0000	*
36	27	9	-8.9096	3	13.1240	14.0000	*
37	49	26	-3.3355	9	18.0000	18.0000	*
38	30	5	-263.2653	3	16.8760	18.0000	*
40	56	8	-66.6644	3	11.9380	12.0000	*

DESIGNED DIAMETERS & FLOWRATES

Pipe Label	Input Node	Output Node	Flowrate (cu.m/hr)	Pipe Type	Act. Bore (in)	Nom. Size (in)	Pipe Group
41	8	32	-66.6644	3	11.9380	12.0000	*
42	33	16	6.3887	3	11.9380	12.0000	*
43	39	23	-6.3887	3	11.9380	12.0000	*
44	29	34	-56.1860	3	16.8760	18.0000	*
45	39	33	6.3887	3	11.9380	12.0000	*
47	45	10	-710.6755	9	20.0000	20.0000	*
48	23	35	-19.7238	3	11.9380	12.0000	*
49	70	66	-398.3270	9	20.0000	20.0000	*
50	25	11	-8.9096	3	13.1240	14.0000	*
52	41	24	47.5592	3	16.8760	18.0000	*
54	15	43	10.0548	3	11.9380	12.0000	*
56	58	45	-268.7773	9	18.0000	18.0000	*
57	59	44	441.8982	9	18.0000	18.0000	*
58	73	44	-441.8982	9	18.0000	18.0000	*
59	10	66	68.3972	3	16.8760	18.0000	*
60	73	48	-3.3355	9	18.0000	18.0000	*
61	72	26	3.3355	9	18.0000	18.0000	*
62	48	49	-3.3355	9	18.0000	18.0000	*
67	71	62	1109.0027	9	18.0000	18.0000	*
69	30	56	-66.6644	3	11.9380	12.0000	*
72	59	45	-441.8982	9	18.0000	18.0000	*
75	63	41	47.5592	3	16.8760	18.0000	*
77	58	72	667.1042	9	18.0000	18.0000	*
80	70	58	398.3270	9	20.0000	20.0000	*
84	71	73	-445.2338	9	18.0000	18.0000	*
85	71	72	-663.7688	9	18.0000	18.0000	*
90	68	3	224.5064	3	16.8760	18.0000	*
91	3	67	779.0728	3	16.8760	18.0000	*

A * indicates that this is a SET diameter

Pipe Materials are :

Pipe Type	Lining Type	Thickness(in)
3 -- ANSI B36.10 Sch.40	Not Lined	
9 -- Reinforced Fiber Gla	Not Lined	

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
1	4	6	18.00	9.892	9.892	-8.8978E-04	8.8978E-04	-161.7	-0.3112
2	2	5	14.00	9.899	9.891	7.9145E-03	7.9145E-03	120.7	0.3841
3	5	4	18.00	9.891	9.892	-8.8501E-04	8.8501E-04	-142.6	-0.2744
4	2	37	18.00	9.899	9.895	3.6802E-03	3.6802E-03	209.2	0.4028
5	37	35	18.00	9.895	9.894	5.7983E-04	5.7983E-04	75.91	0.1461
6	68	2	18.00	9.905	9.899	6.3705E-03	6.3705E-03	329.9	0.6351
7	6	37	18.00	9.892	9.895	-2.4595E-03	2.4595E-03	-133.3	-0.2566
8	67	10	18.00	9.902	9.867	3.5147E-02	3.5147E-02	779.1	1.500
9	35	34	18.00	9.894	9.894	4.9210E-04	4.9210E-04	56.19	0.1082
10	6	9	18.00	9.892	9.893	-2.7943E-04	2.7943E-04	-28.35	-5.4571E-02
11	9	29	18.00	9.893	9.894	-9.2506E-04	9.2506E-04	-75.91	-0.1461
12	43	1	12.00	9.894	9.894	3.2425E-05	3.2425E-05	5.571	2.1429E-02
13	66	30	18.00	9.867	9.881	-1.4360E-02	1.4360E-02	-329.9	-0.6351
14	14	29	12.00	9.894	9.894	1.5831E-04	1.5831E-04	19.72	7.5869E-02
15	38	12	12.00	9.894	9.894	1.6785E-04	1.6785E-04	9.669	3.7192E-02
16	38	23	12.00	9.894	9.894	-7.4387E-05	7.4387E-05	-13.34	-5.1295E-02
17	12	14	12.00	9.894	9.894	7.4387E-05	7.4387E-05	14.15	5.4440E-02
18	43	12	12.00	9.894	9.894	7.6294E-06	0.000	4.484	1.7248E-02
19	16	15	12.00	9.894	9.894	1.3733E-04	1.3733E-04	10.05	3.8677E-02
20	38	16	12.00	9.894	9.894	7.6294E-06	0.000	3.666	1.4102E-02
21	17	14	12.00	9.894	9.894	3.7193E-05	3.7193E-05	5.571	2.1429E-02
22	18	17	12.00	9.894	9.894	9.5367E-06	0.000	3.241	1.2466E-02
23	1	18	12.00	9.894	9.894	2.8610E-06	0.000	4.252	1.6357E-02
24	19	17	12.00	9.894	9.894	4.7684E-06	0.000	2.330	8.9629E-03
25	20	19	12.00	9.894	9.894	2.8610E-06	0.000	2.330	8.9629E-03
26	18	20	12.00	9.894	9.894	1.9073E-06	0.000	1.012	3.8913E-03
27	21	20	12.00	9.894	9.894	1.9073E-06	0.000	1.318	5.0716E-03
28	22	21	12.00	9.894	9.894	2.8610E-06	0.000	1.318	5.0716E-03
29	1	22	12.00	9.894	9.894	0.000	0.000	1.318	5.0716E-03
30	4	32	18.00	9.892	9.892	-4.9591E-05	4.9591E-05	19.11	3.6775E-02
31	32	24	18.00	9.892	9.892	-3.8052E-04	3.8052E-04	-47.56	-9.1545E-02
32	63	9	18.00	9.892	9.893	-3.2425E-04	3.2425E-04	-38.65	-7.4395E-02
33	63	25	14.00	9.892	9.892	-1.4305E-05	1.4305E-05	-8.910	-2.8357E-02
34	11	7	14.00	9.892	9.893	-4.7684E-05	4.7684E-05	-8.910	-2.8357E-02
35	7	27	14.00	9.893	9.893	-1.0014E-04	1.0014E-04	-8.910	-2.8357E-02
36	27	9	14.00	9.893	9.893	-1.0681E-04	1.0681E-04	-8.910	-2.8357E-02
37	49	26	18.00	9.826	9.826	4.7684E-06	0.000	-3.336	-5.6436E-03
38	30	5	18.00	9.881	9.891	-9.7752E-03	9.7752E-03	-263.3	-0.5068
40	56	8	12.00	9.884	9.887	-3.1672E-03	3.1672E-03	-66.66	-0.2564
41	8	32	12.00	9.887	9.892	-4.6425E-03	4.6425E-03	-66.66	-0.2564
42	33	16	12.00	9.894	9.894	2.4796E-05	2.4796E-05	6.389	2.4575E-02

FLOW IN PIPES

Pipe Label	Input Node	Output Node	Nom.Bore (in)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Drop in Pr. (bar)	Frict. Loss (bar)	Flowrate (cu.m/hr)	Velocity (m/s)
43	39	23	12.00	9.894	9.894	-2.4796E-05	2.4796E-05	-6.389	-2.4575E-02
44	29	34	18.00	9.894	9.894	-1.8311E-04	1.8311E-04	-56.19	-0.1082
45	39	33	12.00	9.894	9.894	3.2425E-05	3.2425E-05	6.389	2.4575E-02
47	45	10	20.00	9.860	9.867	-6.3829E-03	6.3829E-03	-710.7	-0.9740
48	23	35	12.00	9.894	9.894	-2.0027E-04	2.0027E-04	-19.72	-7.5869E-02
49	70	66	20.00	9.864	9.867	-2.4748E-03	2.4748E-03	-398.3	-0.5459
50	25	11	14.00	9.892	9.892	-5.5313E-05	5.5313E-05	-8.910	-2.8357E-02
52	41	24	18.00	9.892	9.892	1.7738E-04	1.7738E-04	47.56	9.1545E-02
54	15	43	12.00	9.894	9.894	1.5259E-05	1.5259E-05	10.05	3.8677E-02
56	58	45	18.00	9.859	9.860	-1.6403E-03	1.6403E-03	-268.8	-0.4548
57	59	44	18.00	9.853	9.843	9.2955E-03	9.2955E-03	441.9	0.7477
58	73	44	18.00	9.826	9.843	-1.7465E-02	1.7465E-02	-441.9	-0.7477
59	10	66	18.00	9.867	9.867	1.1063E-04	1.1063E-04	68.40	0.1317
60	73	48	18.00	9.826	9.826	4.7684E-05	4.7684E-05	-3.336	-5.6436E-03
61	72	26	18.00	9.826	9.826	-4.4823E-05	4.4823E-05	3.336	5.6436E-03
62	48	49	18.00	9.826	9.826	2.7657E-05	2.7657E-05	-3.336	-5.6436E-03
67	71	62	18.00	9.812	9.802	9.9049E-03	9.9049E-03	1109.	1.876
69	30	56	12.00	9.881	9.884	-2.9001E-03	2.9001E-03	-66.66	-0.2564
72	59	45	18.00	9.853	9.860	-7.5121E-03	7.5121E-03	-441.9	-0.7477
75	63	41	18.00	9.892	9.892	2.3746E-04	2.3746E-04	47.56	9.1545E-02
77	58	72	18.00	9.859	9.826	3.2757E-02	3.2757E-02	667.1	1.129
80	70	58	20.00	9.864	9.859	5.4379E-03	5.4379E-03	398.3	0.5459
84	71	73	18.00	9.812	9.826	-1.3855E-02	1.3855E-02	-445.2	-0.7533
85	71	72	18.00	9.812	9.826	-1.3730E-02	1.3730E-02	-663.8	-1.123
90	68	3	18.00	9.905	9.905	1.9836E-04	1.9836E-04	224.5	0.4321
91	3	67	18.00	9.905	9.902	2.9650E-03	2.9650E-03	779.1	1.500

FLOW THROUGH PUMPS

Pump	Flowrate (cu.m/hr)	Inlet Pr. (bar G)	Outlet Pr. (bar G)	Press Drop (bar)	NPSHA (m)	Cavitation Parameter	Power Req. (W)	Setting (%)
1	554.4	0.000	9.905	9.905	10.17	0.1005	1.5255E+05	100.0
2	554.6	0.000	9.905	9.905	10.17	0.1005	1.5258E+05	100.0

Note: The calculation of NPSHA and cavitation parameter is based on
the vapour pressure of water at 60 F (15.6 C) --> -0.9956 bar G

FLOW AT INLETS

Inlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
36	0.000	* 554.6	0.0000
31	0.000	* 554.4	0.0000

Note: A * after a value indicates that this is a specification

FLOW AT OUTLETS

Outlet Node	Pressure (bar G)	Flowrate (cu.m/hr)	Equivalent K-factor (cu.m/hr , bar G)
62	9.802	1109. *	354.22

Note: A * after a value indicates that this is a specification

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IMPORTANT NOTICE

Your attention is drawn to the need to maintain adequate standards. SUNRISE SYSTEMS Ltd has itself taken steps to ensure that this program produces valid results when properly used. Users are reminded of their responsibilities in the application of program results and, in particular, you should ensure that pertinent output documents are examined and approved by qualified staff prior to use.

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COMMENTS

Analysis Converged in 3 Iterations

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Proj.082755C - ROTTERDAM - NExBTL PLANT
GENERAL FIRE WATER MAIN NETWORK
HYDRAULIC CALCULATION REPORT
CALCULATION NUMBER : BUND FIRE SCENARIO INSIDE NAPHTHA STORA

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