



CORE, NEXUS & HUB **BASELINE REPORT**

FOR THE *PROVISION OF*
Bulk Fuel Storage & Filtration Installation
FOR
Trevor Beelders
AT
Bidvest Facility Management Company

PREPARED BY : Jannie Havenga
EMAIL : jannieh@spoormaker.co.za
TEL : +27 (0) 12 663 3125
WEB : www.spoormaker.co.za
DATE : 26 May 2022
REVISION : 00
PROJECT NO. : 200099

**SPOORMAKER
& PARTNERS**

MECHANICAL & ELECTRICAL
CONSULTING ENGINEERS
ESTABLISHED SINCE 1964





EXECUTIVE SUMMARY

INTRODUCTION

The bulk fuel system for the Centurion campus consists of a decentralized system with an originally intended configuration that adheres to typical TIER II. With the replacement of various Dynamic Rotary machines with static UPS & generators. This report considers the upgrades required to the installed diesel configuration in order to be suitable to support mission-critical services.

FINDINGS

With mission critical support there are two objectives to be met (1) Compliance with legislation and (2) business continuity. The following concerns are prevalent on the installed system:

- None of the system layouts are concurrently maintainable (Uptime TIER 1);
- The majority of the electrical equipment associated with the installation do not adhere to the required Hazard classification as Zone 1 & 2 in terms of SANS10108.
- On-site storage capacity exceeds 85 m³ with no Environmental assessment available;
- Inadequate filtration on bulk and day tanks. Various filters system was installed on the day tanks but are not operational;
- Each bulk & day tank has a separate vent pipe.
 - Various day tanks do not have any means of venting. This means when diesel enters the day tank all the vapor is then released inside the plant room where there is a risk of ignition
 - Hub vent piping all interlinked;
- Inadequate bonding. The current bonding when measured exceeds 0,2 Ohms
- No Master Electrician COC for installation available;
- Pipe colour coding is not in accordance with SANS140-3;
- Various day tanks are not equipped with any means of a bund. Various shut off valves are not of the fire safe valve type and/or are installed outside the bunded area;
- The area is classed as a dolomite area which means all underground piping systems to be sleeved. None of the underground piping adheres to the prescribed dolomite management requirement as agreed with the local authority
- The system has reached it's the end of it's mean expected life and reliability it it will become more onerous to maintain and ensure reliability.

RECOMMENDATION

The estimated fuel demand for the 3 areas Core Nexus & Hub assuming the worse scenario with the estimated load spread the fuel demand can be summarized as follow:

Area	Demand (L/Hr)	Bulk Storage (L)
Core	1209	96700
Nexus	1034	115750
HUB	1252	118050
Total		330500

To support the mentioned fuel, demand the fuel storage for the 3 areas will comprise of typical, 1 x 1000 service tank at each generator connected to a bulk fuel storage system that consists of 1 x Receiving and 2 x Storage tank configured into an A & B supply that is concurrent maintainable.

COST ESTIMATE

The cost estimate for the new Bulk Fuel Tanks and Pumps, Fire Signage and Fire Extinguishers is: **R 29,564,877.23** (Excl VAT, Fees and Other Services) – see details in report.



TABLE OF CONTENTS

PAGE

1	INTRODUCTION.....	4
2	OBJECTIVE.....	4
3	BACKGROUND.....	5
4	PROPOSED CONCEPTUAL SOLUTIONS	8
5	COST ESTIMATE	12
6	CONCLUSION	12
7	RECOMMENDATION	12
8	APPENDIX A (PHOTO REPORT DETAIL THE ITEMS LISTED AS CONCERN	13
9	APPENDIX B (PROPOSED DECENTRALIZED DIESEL STORAGE).....	14

Jannie Havenga

John Ferreira

COMPILED BY

REVIEWED BY



1 INTRODUCTION

This report was compiled for the benefit of Mr. Trevor Beelders at Bidvest Facility Management Company. It serves to consider the upgrades recommended to the Core, Nexus & Hub Bulk Fuel Storage Systems at the Telkom Centurion Campus.

The bulk fuel system for the Centurion campus consists of a decentralized system with an originally intended configuration that adheres to typical TIER II. With the replacement of various Dynamic Rotary machines with Batteries & Generators, the installed diesel configuration is not suitable to support mission-critical service and needed to be reconfigured. Trevor Beelders from Bidvest FM has requested Spoomaker to review the existing system and make a recommendation to get the bulk fuel storage adherence to best practices that comply with legislation.

2 OBJECTIVE

There are two objectives to be met for this project

- (1) Compliance with legislation and
- (2) business continuity.

The mentioned objective differentiation is made in terms of their specific and direct relation to the core function of this facility concerning.

- Primary objective is to ensure adherence to legislation in terms of Environmental Act the National Building Regulations – Part T: Fire Protection and Occupational Health and Safety Act, Environmental Regulation for workplaces: Section 9, are met in full; and
- The secondary objective is to demonstrate the application of best practice principles to ensure the stated TIER III availability (uptime) requirements for the core services is maintained during fire emergency events. The following table summarized the goal & stakeholders' objective

Bulk Fuel Storage Goal	Stakeholders Objective
Minimize down time and prevent undue loss of fuel	Prevent the loss of fuel supply and ensure a system will be concurrent maintainable for a period of 48 hours in an emergency
Minimize fuel -related damage to the Generators	Prevent any contamination at the day tanks to prevent any microbiological growth or water (ISO4406 number of particles 18/16/13)
Minimise undue loss of operation and business-related revenue due to fire related damage	Prevent process down time with adequate means of redundancy and system availability for corrective work
Limit the environmental impact of fire and fire protection measures	Minimize environmental contamination that could result from any fuel spillage



3 BACKGROUND

3.1 GENERAL

The fuel storage system for the emergency and uninterrupted power supply consists of decentralized below-ground tanks connected to various day tanks. The tank's pump, pump controllers, filtering, and distribution manifold are configured as TIER I. The storage facility under discussion is been classed as an atmospheric tank, which means that the internal pressure ranges from 0 to 3.5 kPa. The petroleum product is a diesel with the following properties

- | | |
|---|---|
| ▪ Density in kg/m ³ at 15°C | Minimum 820
Maximum 845 |
| ▪ Minimum Flash point | 55°C |
| ▪ Kinematic viscosity at 40°C in mm ² /s | Minimum 2
Maximum 4 – 4.5 |
| ▪ Classification in terms of SANS 10131 | Class II (liquid that have a close-cup flash point of 38 °C or above but below 60.5 °C) |
| ▪ Classification in terms of SANS 10108 | class III (1) liquid that have flashpoint that exceed 55 °C but that do not exceed 100 °C and that are handled below their flashpoint |

To meet minimum national standards the tank supply and return pipe installation must comply with the following standards:

- SANS 10131 Above – ground storage tanks for petroleum products
- SANS 10089-1 The petroleum industry Part 1 Storage and distribution of petroleum products in above-ground bulk installations
- SANS 10089-2 The petroleum industry Part 2 Electrical and other installation in the distribution and marketing sector
- SANS 10108 The classification of hazardous locations for use in such locations
- SANS1253 Fire-doors and fire shutters
- SANS 10177 Part II Fire-testing of materials, components and elements used in buildings.
- SANS 10087 The handling, storage, and distribution of liquid petroleum gas in domestic, commercial, and industrial installations

Diesel in South Africa has to comply with the Petroleum Product Act of 1977, Regulation 627 2(a), “diesel...must conform to... SANS 342 (23 June 2006). SANS 342 Table 1 indicates diesel having a “Flash point” of 55°C. Diesel is therefore not a “flammable liquid” (- a liquid with a flash point below 38 °C, regardless of its temperature, or a liquid with a flash point at or above 38 °C being handled at temperatures at or above its flash point) but a combustible liquid (- a liquid that has a closed-cup flash point at or above 38 °C - combustible liquids are subdivided as follows: Class II: liquids that have a closed-cup flash point at or above 38 °C and below 60,5 °C) – SANS 10089-1/2 and SANS 10108. Diesel can cause a hazardous location (SANS 10089-2 – area - any three-dimensional region at a facility where there could be a risk of the ignition of a flammable gas, vapour). Zone classification for the location and the operation in terms of SANS 10089 part 2 is zoned as follow:

- “**Zone 1**” define as a location in which an explosive gas atmosphere is likely to occur in normal operation; and
- “**Zone 2**” defined as a location in which operations concerned with flammable liquid or vapour are so well controlled that an explosive or ignitable concentration is only likely to occur under abnormal conditions

Classification in terms of the petroleum industry of a flammable liquid is determined by close-cup flashpoint. Diesel is classed as class III (1) liquid that have flashpoint that exceed 55 °C but that do not exceed 100 °C and that are handled below their flashpoint. Selection of all electrical apparatus in terms of SANS10089 part table 1 for zone 1 & 2 classification

- Non – sparking (**Ex n**) electrical apparatus that, in normal operation and in the absence of electrical or mechanical failure, cannot, because of its construction, its method of



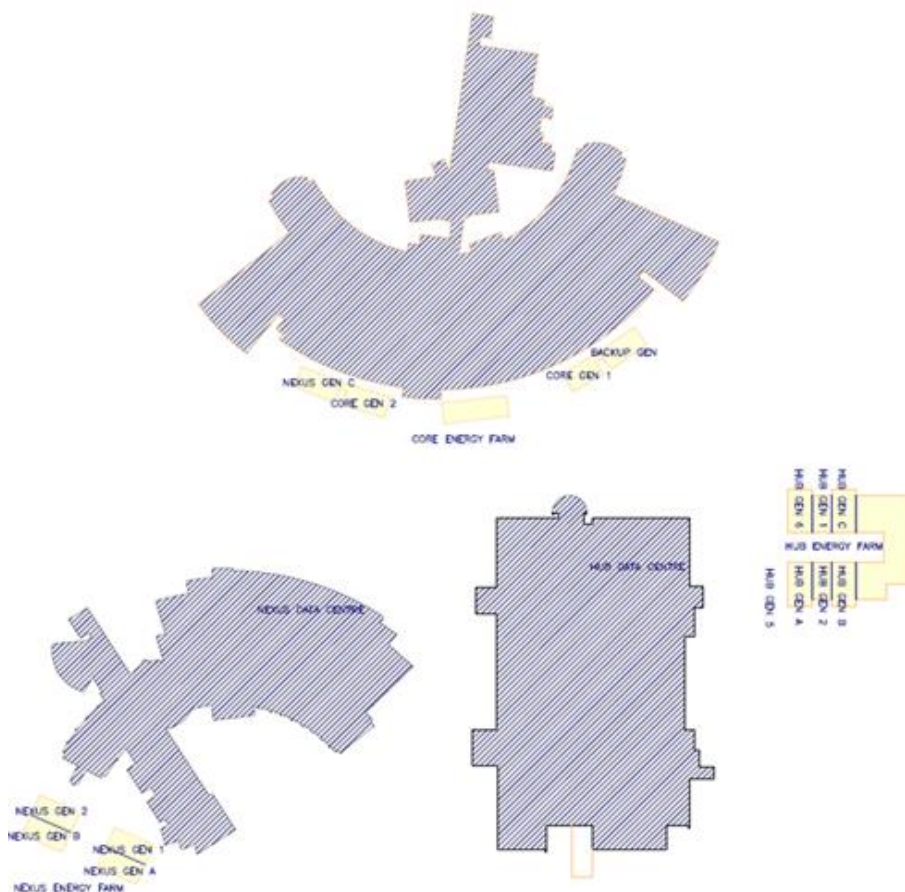
operation or because of its enclosure, ignite mixtures of air and prescribed flammable gases or vapours

- Pressurized (**Ex p**) electrical apparatus in which the entry of a surrounding atmosphere into the enclosure of the electrical apparatus is prevented by maintaining, inside the said enclosure, a protective gas at a higher pressure than that of the surroundings atmosphere

3.2 EXISTING FUEL STORAGE

The bulk fuel storage for the campus consists of a decentralized system that can be summarized as follow:

Generator Description	Power Demand		Fuel Demand		Day Tanks		Bulk Storage			Total	
	kVA	Load	(L/hr.)	(L/hr.)	(L)	(L)	QTY	(L)	(L)	(L)	
CORE 1	1500	50%	185	619	300	1200	2	23000	46000	47200	
CORE 2	1500	50%	185		300						
BACKUP	2000	0%			300						
NEXUS C	1250	66%	249		300						
NEXUS A	1250	66%	249	868	300	1200	2	1400	48800	50000	
NEXUS B	1250	66%	249		300						
NEXUS 1	1500	50%	185		300		2	23000			
NEXUS 2	1500	50%	185		300						
HUB A	1250	66%	170	1082	300	2500	3	9000	55000	57500	
HUB B	1250	66%	170		300						
HUB C	1250	66%	170		300						
HUB 1	1000	50%	158		300		2	14000			
HUB 2	1225	50%	158		300						
HUB 6	2000	50%	256		1000						
HUB5	550	100%	170		300	300				300	



Total storage on site exceeds 85 m³ with means there is a need for a basic risk assessment further to this was there also no Major Hazard assessment done

3.3 FINDINGS

The following concern was listed on the installed system:

- None of the system layouts are concurrently maintainable (Uptime TIER 1);
- Hazard classification in terms of SANS10108 for the area is classed as Zone 1 & 2. The majority of the electrical equipment classification do not adhere to the mentioned zoning requirements;
- On-site storage capacity exceeds 85 m³ with no Environmental assessment;
- Inadequate filtration on bulk and day tanks. Various filters system was installed on the service tanks but are not operational;
- Each bulk & day tank has a separate vent pipe.
 - Various day tanks do not have any means of venting. This means when diesel enters the day tank all the vapor is then released inside the plant room where there is an adequate ignition source
 - Hub vent piping all interlinked;
- Inadequate bonding the current bonding when measured exceeds 0,2 Ohms
- No Master Electrician COC for installation;
- Pipe color coding is not in accordance with SANS140-3;
- Various day tanks are not equipped with any means of the bund. Further to this are there various shut off that is not of the fire safe valve type and are installed outside the bund area;
- The area is classed as a dolomite area which means all underground piping systems to be sleeved. None of the underground piping adheres to the prescribed dolomite management requirement as agreed with the local authority.



4 PROPOSED CONCEPTUAL SOLUTIONS

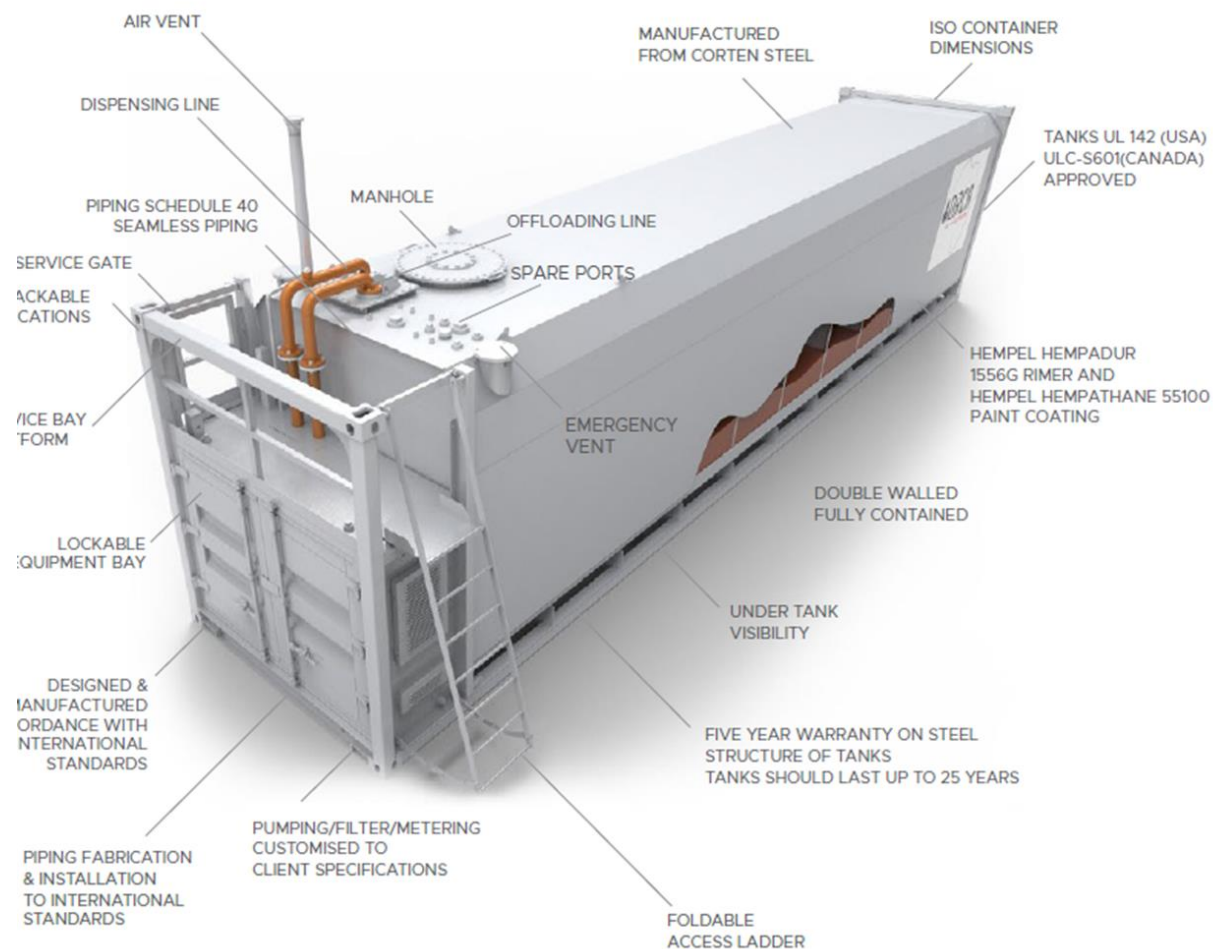
4.1 DIESEL VOLUME

The estimated fuel demand for the 3 areas Core Nexus & Hub assuming the worse scenario with the estimated load spread indicated in % the fuel demand can be summarized as follow:

Generator Description	Power Demand		Fuel Demand	(L/hr.)	Day Tanks		Bulk Storage			Total
	kVA	Normal Load	(L/hr.)		(L)	(L)		(L)	(L)	(L)
CORE 1	1500	50%	185	1209	1000	4000	3	30900	92700	96700
CORE 2	1500	50%	185		1000					
BACKUP	2000	100%	507		1000					
NEXUS C	1250	100%	332		1000					
NEXUS A	1250	100%	332	1034	1000	4000	3	37250	111750	115750
NEXUS B	1250	100%	332		1000					
NEXUS 1	1500	50%	185		1000					
NEXUS 2	1500	50%	185		1000					
HUB A	1250	66%	170	1252	1000	6000	3	37250	111750	118050
HUB B	1250	66%	170		1000					
HUB C	1250	66%	170		1000					
HUB 1	1000	50%	158		1000					
HUB 2	1225	50%	158		1000					
HUB 6	20000	50%	256		1000					
HUB 5	550	100%	170		1000	300				

To support the mentioned fuel, demand the fuel storage will comprise of 1 x 1000 service tank at each generator connected to a bulk fuel storage system, that consists of 1 x Receiving and 2 x Storage tank configured into an A & B supply that is concurrent maintainable. The mentioned bulk fuel storage will be configured into a fuel farm consisting of a self-bund containerized tanks system similar to or equal to the following image. For more detail and the position for the tanks refer to the following drawings for the detail

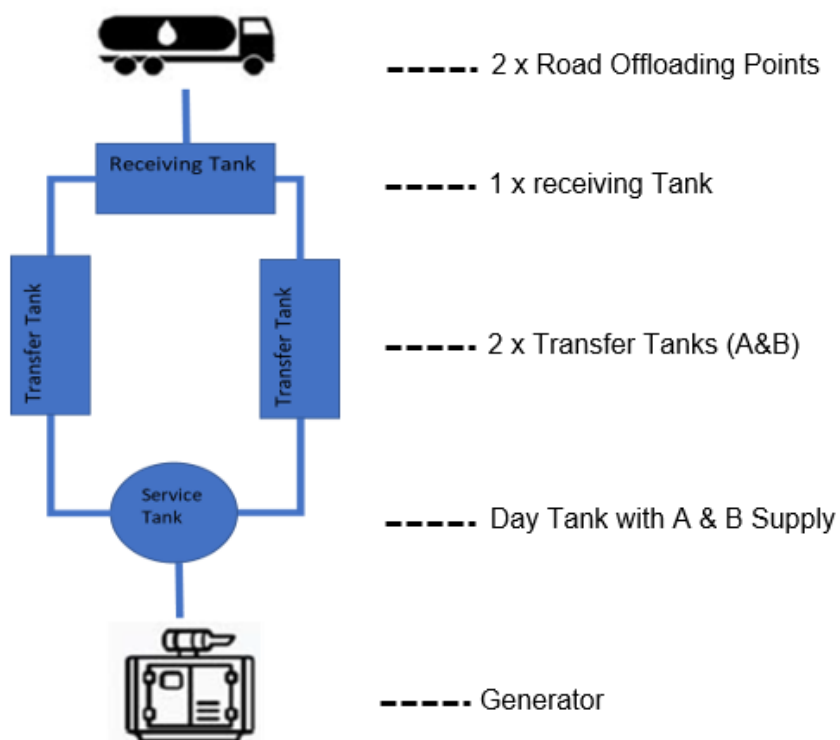
- 200099-D-D-100-D_revA (Diesel Site Plan)
- 200099-D-D-110.C-D_revA (Diesel Schematic - CORE)
- 200099-D-D-110.H-D_revA (Diesel Schematic - HUB)
- 200099-D-D-110.N-D_revA (Diesel Schematic - NEXUS)



The tank farm will be constructed as close as possible to the energy centers. The proposed positions are indicated in the attached site layout.

4.2 STORAGE CONFIGURATION

The storage layout and design philosophy will be developed to maintain a balance between complexity and flexibility that will adhere to TIER III. The following image depicts a typical configuration for more detail refer to the schematic.

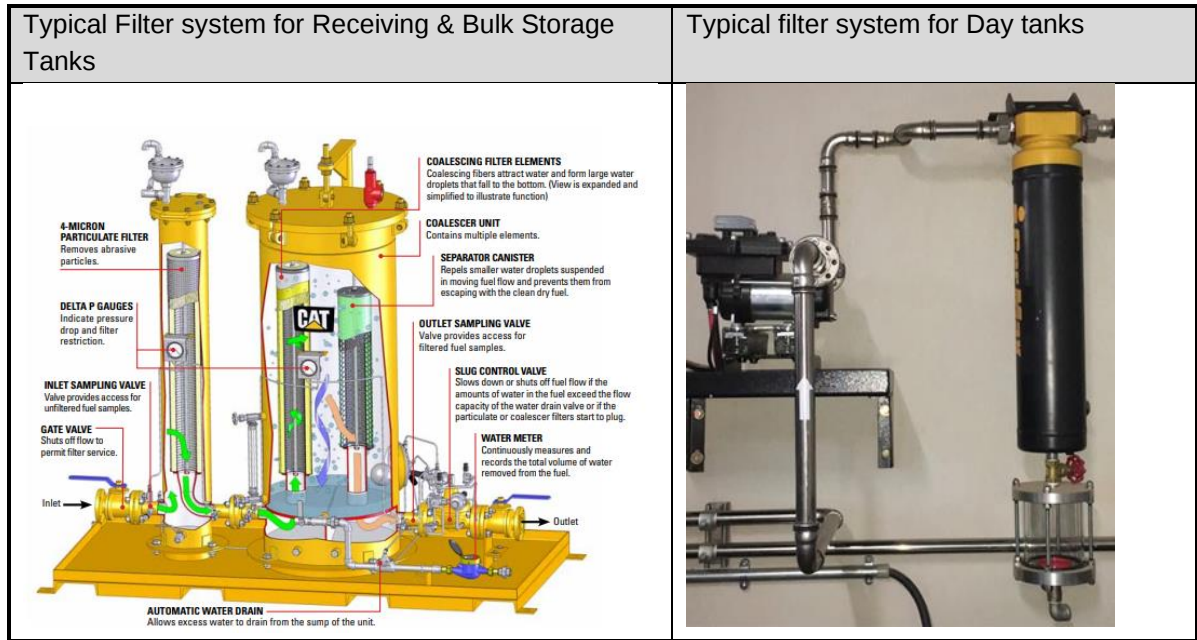


4.3 FILTRATION SYSTEM

The fuel cleanliness standard for diesel fuel delivered from the day tank to the generator as set out in ISO 4406 will be 18/16/13. The filters system shall be complete with the following component

- Transfer pump
- Shut off valve to isolate the complete filter system form the bulk fuel system
- Pressure gauge on the suction side of the pump
- Pressure gauge on before and after the ceramic bag filter elements
- Auto water separator
- Ceramic and bag filter elements
- Flow switch
- Flexible coupling on suction and discharge side of the transfer pump
- Motor control center to control and operate the transfer pump pendant on the demand

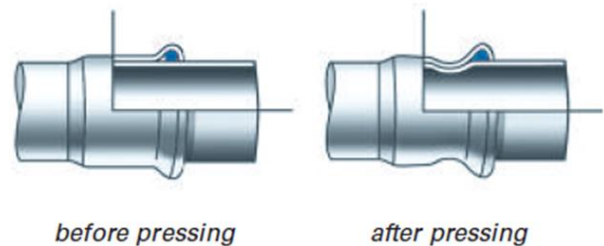
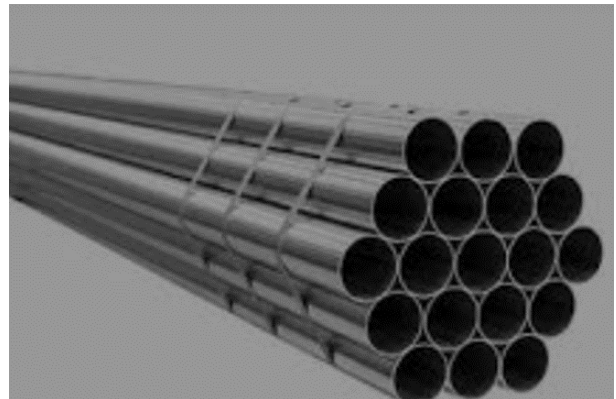
The following image depict typical filter system that will be at each diesel tank:



4.4 PIPE

Diesel Storage systems system piping will be Stainless Steel Tubes & Fittings similar or equal to schedule 40S Type 304 or 316 stainless steel pipe.

Size (mm)	Digits for Tees and reducers
22	22
28	28
35	35
42	42
54	54
76	76
89	89
108	108





5 COST ESTIMATE

The cost estimate for the diesel installation can be summarized as follow:

PRELIMINARIES	
Preliminaries (5%)	R 1,343,858.06
FIRE PROTECTION SERVICE	
BULK FUEL YANKS & PUMPS	
Piping & Valve	R 6,601,538.59
Earthing, Bonding, Power Supply & Controls	R 2,482,651.03
Sulf bund tank & accessries	R 8,520,753.00
Diesel @ R28 Litre	R 9,254,000.00
FIRE SIGNAGE	R 13,170.00
FIRE EXTINGUISHERS	R 5,048.50
CONTINGENCIES	
Contingencies (5%)	R 1,343,858.06
TOTAL COST ESTIMATE	R 29,564,877.23

The above is excluding

- VAT
- Professional Fees
- Allowance for Pre and Post Contract Escalation
- Environmental Assessment
- Civil Works and Builders Work (i.e trenching)
- Electrical Supply and Plumbing

6 CONCLUSION

- 6.1 The existing system has reached the end of it's mean service life expectancy. It will become more onerous to maintain and ensure reliability.
- 6.2 The existing system is not in line with Tier III type facilities, to be concurrently maintainable.

7 RECOMMENDATION

This report considers the Bulk Fuel System in isolation. We recommend that the client replace the existing system and immediately commence with the Environmental Assessment report to enable the earliest possible start to the project.



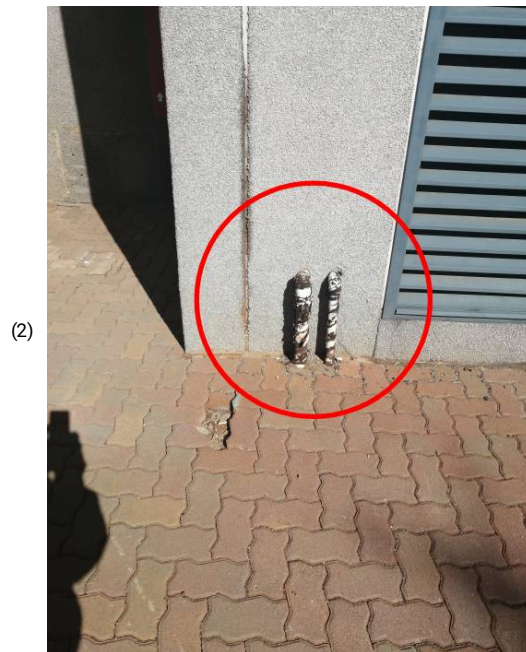
8 APPENDIX A (PHOTO REPORT DETAIL THE ITEMS LISTED AS CONCERN



HubN_52522133_220525133355.jpg

Created: Wed 25 May 13:33 2022

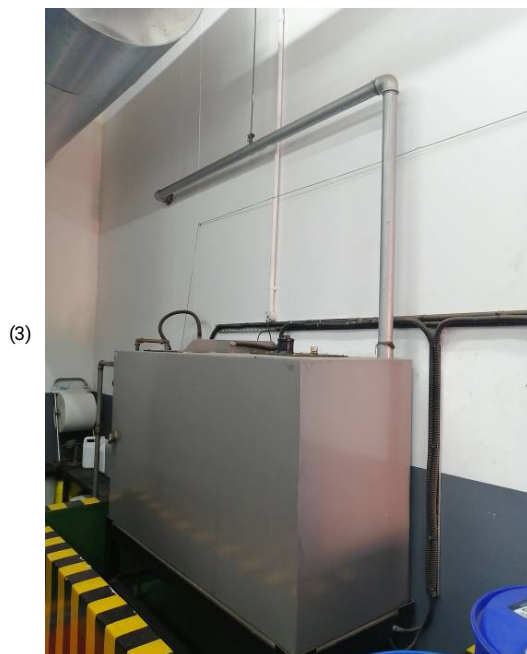
Comment header for all bulk storage tank. Each tank to be equipped with its own vent pipe.



HubN_52522133_220525133601.jpg

Created: Wed 25 May 13:36 2022

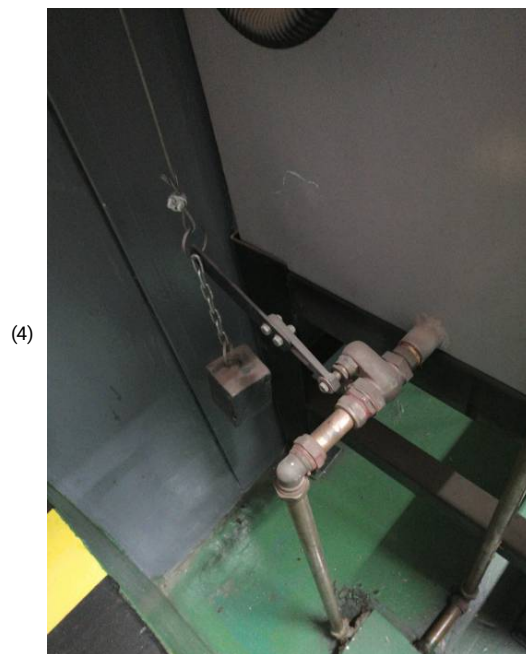
Diesel supply & return line densco wrap damage. Pipe corroded.



HubN_52522133_220525135249.jpg

Created: Wed 25 May 13:52 2022

Vent pipe reticulated to next generator room.



HubN_52522133_220525135325.jpg

Created: Wed 25 May 13:53 2022

All valve in bund area to fire safe valved

(5)



HubN_52522133_220525135358.jpg

Created: Wed 25 May 13:53 2022

Filtration system outside the bund area. Fuel leak can cause a pool fire.

(6)



HubN_52522133_220525135449.jpg

Created: Wed 25 May 13:54 2022

Filtration system outside the bund area. Fuel leak can cause a pool fire.

(7)



HubN_52522133_220525135506.jpg

Created: Wed 25 May 13:55 2022

Shut off valve to be in bund area. Valve to be fire safe valves

(8)



HubN_52522133_220525135538.jpg

Created: Wed 25 May 13:55 2022

Filter system installed outside the bund area. Plug point in zone 2 area.

(9)



HubN_52522133_220525135712.jpg

Created: Wed 25 May 13:57 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(10)

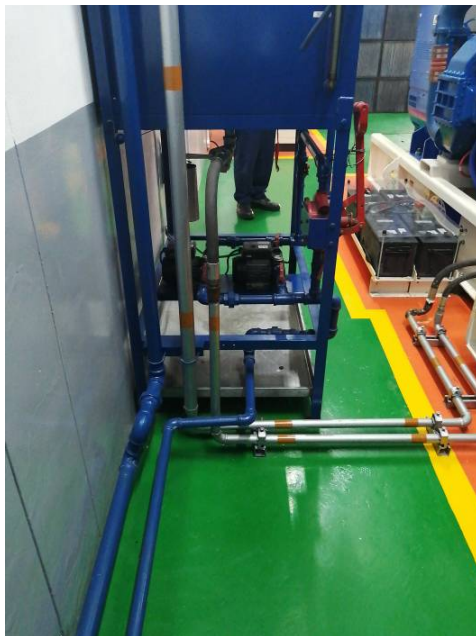


HubN_52522133_220525135717.jpg

Created: Wed 25 May 13:57 2022

Piping color to be silver & banded with correct sulfur content

(11)



HubN_52522133_220525135742.jpg

Created: Wed 25 May 13:57 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(12)



HubN_52522133_220525135823.jpg

Created: Wed 25 May 13:58 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity.

(13)

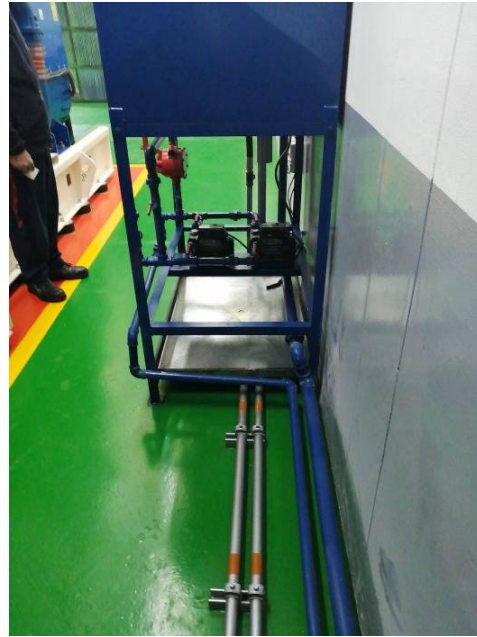


HubN_52522133_220525135833.jpg

Created: Wed 25 May 13:58 2022

Piping color to be silver & banded with correct sulfur content

(14)



HubN_52522133_220525135838.jpg

Created: Wed 25 May 13:58 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(15)



HubN_52522133_220525135918.jpg

Created: Wed 25 May 13:59 2022

Filter system installed outside the bund area. Plug point in zone 2 area.

(16)



HubN_52522133_220525135927.jpg

Created: Wed 25 May 13:59 2022

Filter system installed outside the bund area

(17)



HubN_52522133_220525140016.jpg

Created: Wed 25 May 14:00 2022

Filter system installed outside the bund area

(18)



HubN_52522133_220525140025.jpg

Created: Wed 25 May 14:00 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity. Plug point in zone 2 area.

(19)



HubN_52522133_220525140037.jpg

Created: Wed 25 May 14:00 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity. Plug point in zone 2 area.

(20)



HubN_52522133_220525140044.jpg

Created: Wed 25 May 14:00 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(21)



HubN_52522133_220525140400.jpg

Created: Wed 25 May 14:04 2022

Fuel supply from on board service tank. No bulk feed connected

(22)



HubN_52522133_220525140410.jpg

Created: Wed 25 May 14:04 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(23)



HubN_52522133_220525140423.jpg

Created: Wed 25 May 14:04 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(24)



HubN_52522133_220525140533.jpg

Created: Wed 25 May 14:05 2022

Filter system installed outside the bund area

(25)



HubN_52522133_220525140544.jpg

Created: Wed 25 May 14:05 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(26)



HubN_52522133_220525140742.jpg

Created: Wed 25 May 14:07 2022

Filter system installed outside the bund area

(27)



HubN_52522133_220525140812.jpg

Created: Wed 25 May 14:08 2022

Filter system installed outside the bund area

(28)



HubN_52522133_220525141240.jpg

Created: Wed 25 May 14:12 2022

Shut off valve outside bund area. All tank shut off valve to be fire safe.

(29)



HubN_52522133_220525141317.jpg

Created: Wed 25 May 14:13 2022

All shut off valve to be fire safe valves

(30)

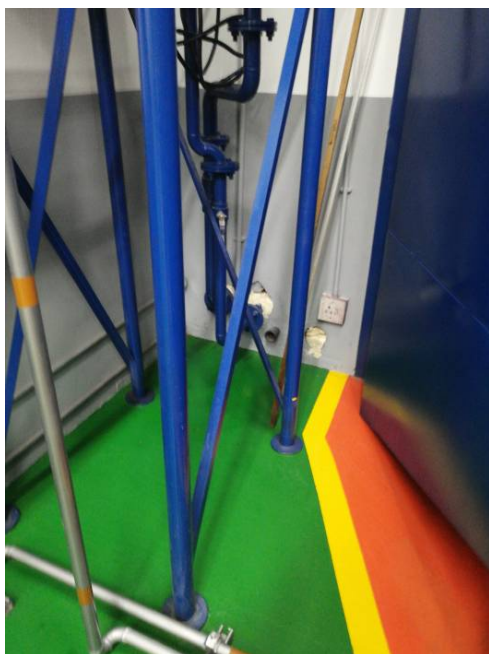


HubN_52522133_220525141342.jpg

Created: Wed 25 May 14:13 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity

(31)



HubN_52522133_220525141450.jpg

Created: Wed 25 May 14:14 2022

Plug point in zone 2 area.

(32)



HubN_52522133_220525141506.jpg

Created: Wed 25 May 14:15 2022

Plug point in zone 2 area.

(33)



HubN_52522133_220525141535.jpg

Created: Wed 25 May 14:15 2022

Plug point in zone 2 area.

(34)



HubN_52522133_220525141559.jpg

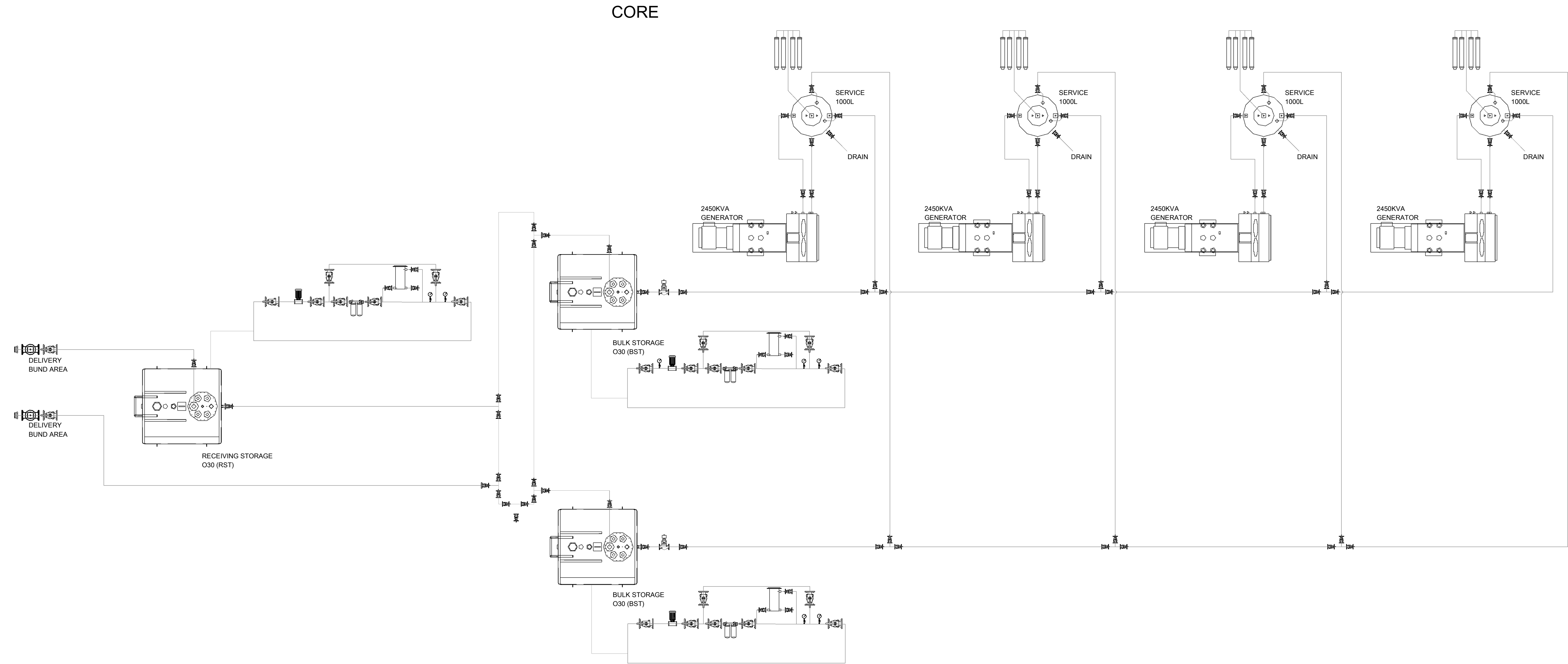
Created: Wed 25 May 14:15 2022

Area under tank to be bund. Bund volume to be 110% of stored capacity



9 APPENDIX B (PROPOSED DECENTRALIZED DIESEL STORAGE)

\\drawing-sv\Drawings\Wg\2020\200099 - BCX Diesel Fire\Revit Models\200099 - BCX Diesel (Fire)_V2.rvt
27/05/2022 11:42:37



Revisions:

Rev	Description	Date	By
A	Issued for Information	25.05.2022	NH
B	Issued for Information	27.05.2022	NH

Standard Mechanical Notes:

This drawing shall not be used as a construction/ installation drawing.

Routes and zones have been allocated to this service, locations dimensions are indicated of these.

To prepare his construction/ installation drawing, the (sub) contractor shall adhere to this co-ordination principle and shall inspect all the architect's drawings, including structural and other services design drawings pertaining to the works. The (sub) contractor shall acquaint him/herself with the general arrangement of all other services and ensure that in fixing his/her work it shall not obstruct the fixing of future maintenance of other services.

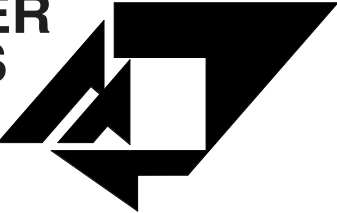
The (sub) contractor shall be responsible for the correct field dimensions: clearances and heights, quantities, fabrication processes and techniques of construction co-ordination of his/her work with that of all other trades, providing all devices necessary for safe and satisfactory operation.

LEGEND

- AIR VENTS
- SHUT-OFF VALVE
- DIESEL FILTER
- WATER SEPARATOR
- PRESSURE GAGE
- FLOW SWITH
- SOLENOID VALVE
- TRANSFER OR CIRCULATION PUMP

This drawing is based on Architects drawing No:
N/A

SPOORMAKER & PARTNERS
MECHANICAL & ELECTRICAL
CONSULTING ENGINEERS



GAUTENG
Box 7270, Centurion, 0046, RSA
S&P House, 1284 South Street,
Centurion, South Africa

WESTERN CAPE
+27 (0) 21 423-6955/6
drawing@spoomaker-cape.co.za

KWAZULU NATAL
+27 (0) 12 663 3125/6/7
drawing@spoomaker.co.za
www.spoomaker.co.za

KWAZULU NATAL
+27 (0) 31 202-6244/6394
drawing@spoomaker-kzn.co.za

THIS DRAWING IS COPY RIGHT© PROTECTED

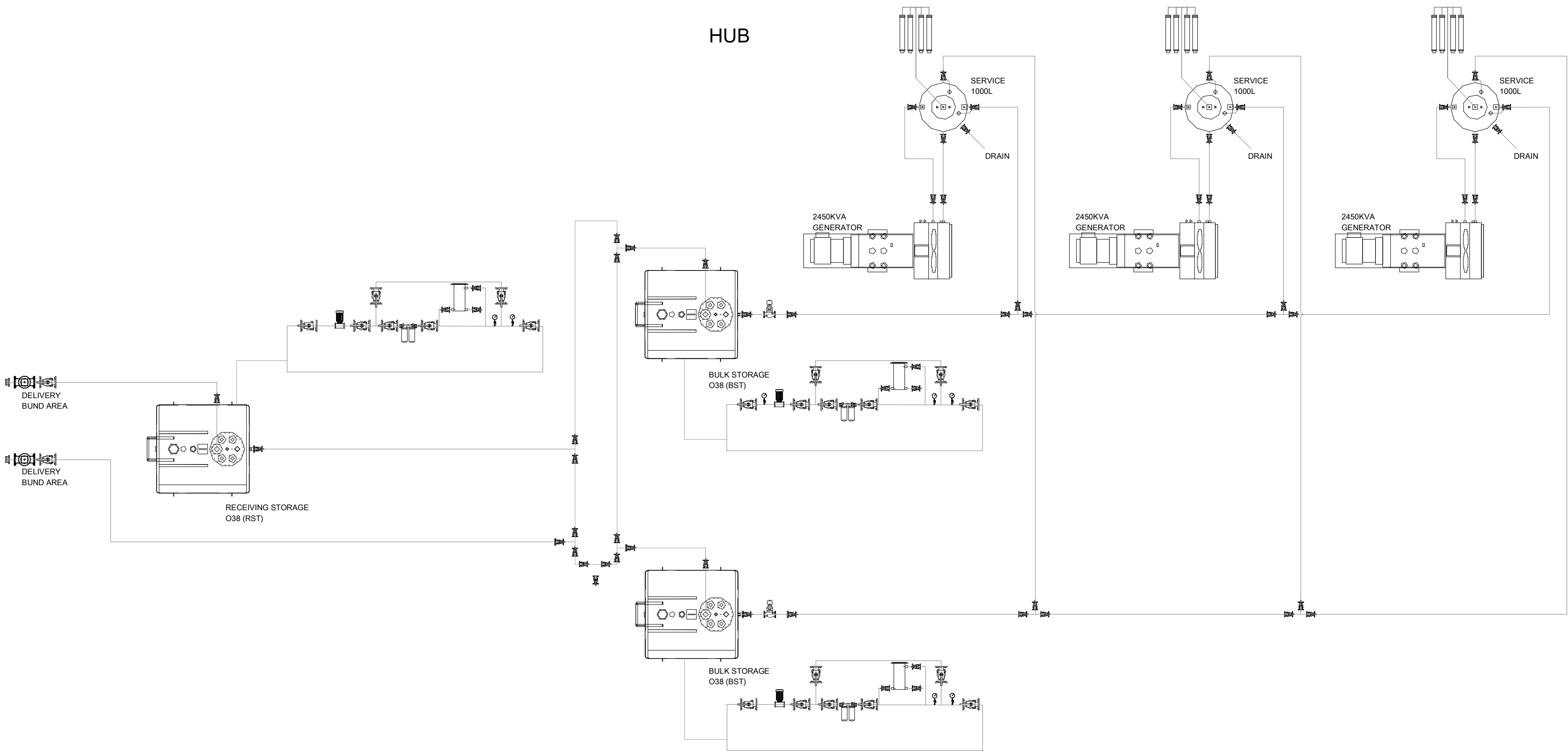
Project:

BCX DIESEL

Drawing Title:

Diesel Schematic
CORE

Designed	Drawn	Checked		Passed	Date	Size
		Quality	Design	PR Eng		A1
JH	NH	SE	JH	JF	26.05.2022	Scale
Drawing Status : Issued for Information						1 : 1
Project Number	Division	Service	Drawing Number	Revision		
200099	D	D	110.C-D	B		



Revisions:

Rev	Description	Date	By
A	Issued for information	25.05.2022	NH

Standard Mechanical Notes:

This drawing shall not be used as a construction/ installation drawing.
Routes and zones have been allocated to this service, locations dimensions are indicated of these.
To prepare his construction/ installation drawing, the (sub) contractor shall adhere to this co-ordination principle and shall inspect all the architect's drawings, including structural and other services design drawings pertaining to the works. The (sub) contractor shall acquaint his/herself with the general arrangement of all other services and ensure that in fixing his/her work it shall not obstruct the fixing of future maintenance of other services.
The (sub) contractor shall be responsible for the correct field dimensions: clearances and heights, quantities, fabrication processes and techniques of construction co-ordination of his/her work with that of all other trades, providing all devices necessary for safe and satisfactory operation.

LEGEND

- AIR VENTS
- SHUT-OFF VALVE
- DIESEL FILTER
- WATER SEPARATOR
- PRESSURE GAGE
- FLOW SWITH
- SOLENOID VALVE
- TRANSFER OR CIRCULATION PUMP

This drawing is based on Architects drawing No:
N/A

SPOORMAKER & PARTNERS
MECHANICAL & ELECTRICAL
CONSULTING ENGINEERS

GAUTENG
Box 7270, Centurion, 0046, RSA
S&P House, 1284 South Street,
Centurion, South Africa

+27 (0) 12 663 3125/6/7
drawing@spoomaker.co.za
www.spoomaker.co.za

WESTERN CAPE
+27 (0) 21 423-6955/6
drawing@spoomaker-cape.co.za

KWAZULU NATAL
+27 (0) 31 202-6244/6394
drawing@spoomaker-kzn.co.za

THIS DRAWING IS COPY RIGHT© PROTECTED

Project:

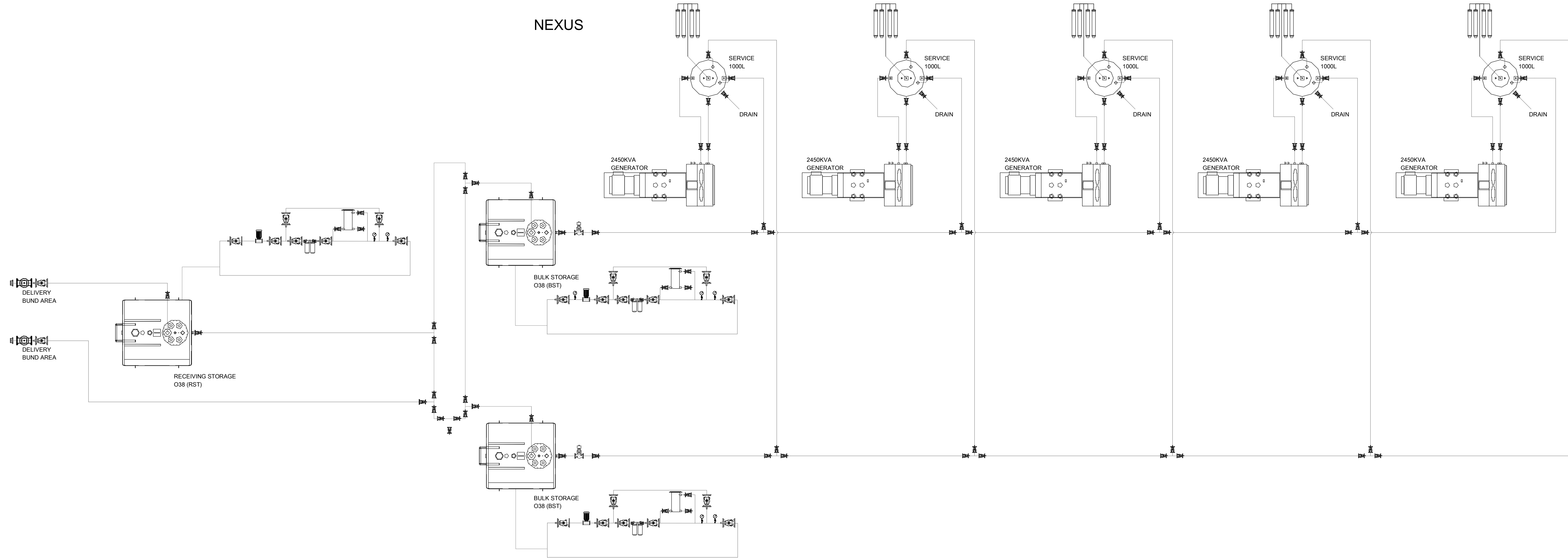
BCX DIESEL

Drawing Title:

**Diesel Schematic
HUB**

Designed	Drawn	Checked		Passed	Date	Size
		Quality	Design	PR Eng		A1
JH	NH	SE	JH	JF	25.05.2022	Scale 1 : 1
Drawing Status : Issued for Information						
Project Number	Division	Service	Drawing Number	Revision		
200099	D	D	110.H-D	A		

H:\Dwg\2020\20099 - BCX Diesel\FireRevit Model\20099 - BCX Diesel (Fire)_V22.rvt
26/05/2022 12:29:26



Revisions:			
Rev	Description	Date	By
A	Issued for Information	25.05.2022	NH

Standard Mechanical Notes:

This drawing shall not be used as a construction/ installation drawing.

Routes and zones have been allocated to this service, locations dimensions are indicated of these.

To prepare his construction/ installation drawing, the (sub) contractor shall adhere to this co-ordination principle and shall inspect all the architect's drawings, including structural and other services design drawings pertaining to the works. The (sub) contractor shall acquaint him/herself with the general arrangement of all other services and ensure that in fixing his/her work it shall not obstruct the fixing of future maintenance of other services.

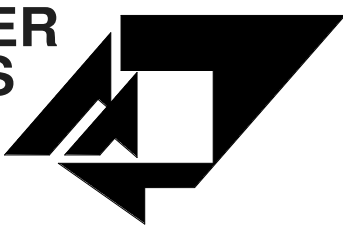
The (sub) contractor shall be responsible for the correct field dimensions: clearances and heights, quantities, fabrication processes and techniques of construction co-ordination of his/her work with that of all other trades, providing all devices necessary for safe and satisfactory operation.

LEGEND

- AIR VENTS
- SHUT-OFF VALVE
- DIESEL FILTER
- WATER SEPARATOR
- PRESSURE GAGE
- FLOW SWITCH
- SOLENOID VALVE
- TRANSFER OR CIRCULATION PUMP

This drawing is based on Architects drawing No: N/A

SPOORMAKER & PARTNERS
MECHANICAL & ELECTRICAL
CONSULTING ENGINEERS



GAUTENG
Box 7270, Centurion, 0046, RSA
S&P House, 1284 South Street,
Centurion, South Africa

WESTERN CAPE
+27 (0) 21 423-6955/6
drawing@spoomaker-cape.co.za

KWAZULU NATAL
+27 (0) 31 202-6244/6394
drawing@spoomaker-kzn.co.za

THIS DRAWING IS COPY RIGHT© PROTECTED

Project:

BCX DIESEL

Drawing Title:

**Diesel Schematic
Nexus**

Designed	Drawn	Checked Quality	Design PR Eng	Passed PR Eng	Date	Size
JH	NH	SE	JH	JF	26.05.2022	A1 Scale 1 : 1
Drawing Status : Issued for Information						
Project Number	Division	Service	Drawing Number	Revision		
200099	D	D	110.N-D	A		