WATER AUTHORITY OF FIJI

FABRICATION & INSTALLATION OF GREASE TRAPS AND UNDERGROUND GREASE INTERCEPTORS HANDBOOK

2017

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ACKNOWLEDGEMENT

This handbook is an important tool for people and businesses in the plumbing industry. This serves a great need for the restaurant industry where it is mandatory to have grease traps or grease interceptors. The success and final outcome of this handbook required guidance and assistance from many people.
We acknowledge and express our sincere gratitude towards the following people who have greatly assisted in compiling this handbook.

- Fiji National University, especially Mr Luke Diloi who is also the President for Fiji Institute of Plumbing and Mr Salabogi Mavoa who is the Associate Dean for College of Engineering, Science and Technology
- Town and City Councils
- GHD Capacity Building Consultancy.
- Sydney Water Corporation, Australia.
- Planning and Design Team of Water Authority of Fiji
- All the participants who took part in the Fabrication and Installation of grease trap consultation workshop for contributing bright ideas towards the handbook.

We would like to give our special acknowledgement to the Water Authority of Fiji's management team for making it possible to publish this handbook.

PREFACE

Grease traps and grease interceptors are devices designed to separate the Fats, Oil and Grease (FOG) and solids prior to discharge into a wastewater disposal system. It protects the wastewater system from blockages due to FOG and solid waste from food preparation areas. Through various inspections, workshops and presentations, it was found by WAF that there was poor or improper grease trap and grease interceptor designs and installations. The majority of the small restaurant owners were not aware of grease trap designs, its purpose, the size required or even the maintenance. Many restaurants had grease traps or grease interceptors but were not maintaining them, while others had undersized designs or poor pipework.

This handbook details the designs of the passive grease trap and grease interceptors. It informs the user on the fabrication, materials, sizing and manufacturing. It also outlines the installation process that includes; positioning, venting and piping. This handbook also includes; the frequency of clean outs, responsibility for clean outs and disposal, clean out methods and disposal methods of FOG.

These designs are a mandatory guideline for new Grease trap designs and are acceptable if it is inspected by Water Authority of Fiji technician and is found to be functioning and maintained properly.

1. BACKGROUND

Proper management of Fats, Oils and Grease (FOG) produced by the discharge from kitchens and food preparation areas is a problem for the Food Industry and for the Water Authority of Fiji's Wastewater Operations. The solids and FOG should not be discharged in waste water or sewer lines as it causes blockages which is an issue for WAF's sewer reticulation system and the treatment plants that eventually receive the discharge.

Grease Traps and Interceptors are designed to separate the FOG and solids from the grey water in discharge from kitchens and food preparation areas. The traps use the physical principal that fats, oils and grease are lighter than water and will rise to the top of a water surface and heavy debris will fall to the bottom of the trap when the mixture is allowed to settle for a period of time in quiet conditions. The longer the wastewater stays in the trap, the better the separation.

However, as the amount of retained grease and solids increases, the working capacity of the trap decreases, retention time decreases and physical separation decreases, resulting in the pass through of solids, fats, oils and grease. To prevent this, grease traps and interceptors have to be regularly maintained by removing both the top grease layer and the settled solids at the base of the trap.

There are two ways to remove the grease layer and settled solids. Either by
a. manually removing it or b. through pump outs

Option (b) is the approved method especially for the larger grease traps or underground grease interceptors. Pump outs must be done several times over a specified period (usually daily for small grease traps and quarterly for the larger ones) depending on the requirements of the Trade Waste Policy and local government regulations.

2. OBJECTIVE

Upgrade the current Grease Trap design used by the Restaurant Industry in Fiji and ensure the final designs and guidelines is a standard for installing new units for businesses and residents.

3. DESIGNS

STANDARD DESIGN

WAF has developed standard designs for:
1. An Under the sink Grease trap
2. An Underground Grease Interceptor

Businesses with seating of between 1 - 69 seats will need to install an underground grease interceptor with a volume of 1000 liters minimum. This interceptor can be fabricated to fit above or below ground.

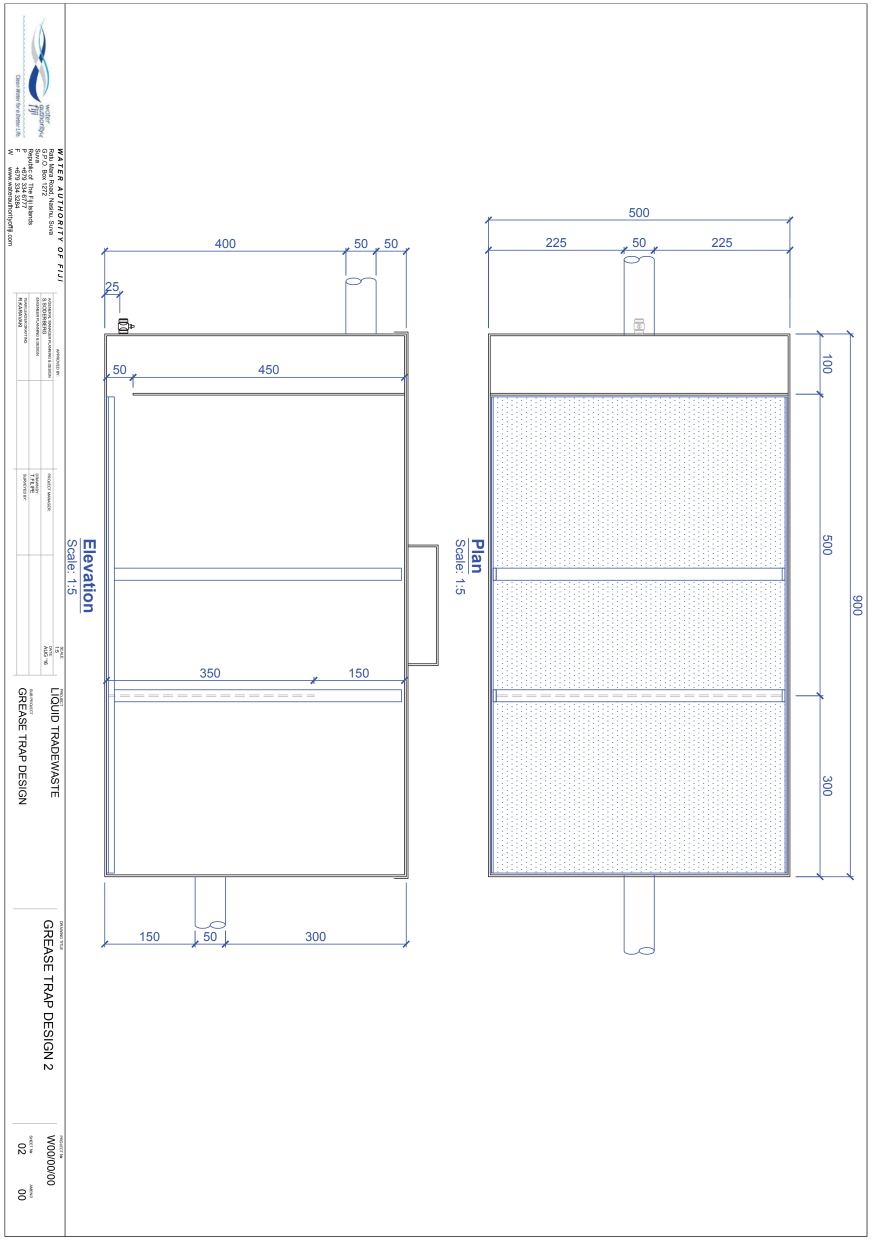
The under sink grease traps are ONLY for Coffee lounges and Snack Bars. It will have a total volume of 200 liters.

This document includes guidelines on the Fabrication, Installation and Maintenance for each design. It is the minimum requirements and can be used as a guideline for Manufacturers that wish to produce the traps in bulk for distribution.

3.3 DESIGNS

3.3.1 UNDER SINK GREASE TRAP DESIGN

Please refer to the Drawings on the next page


WATER AUTHORITY OF FIJI
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GREASE TRAP DESIGN
GREASE TRAP DESIGN 2
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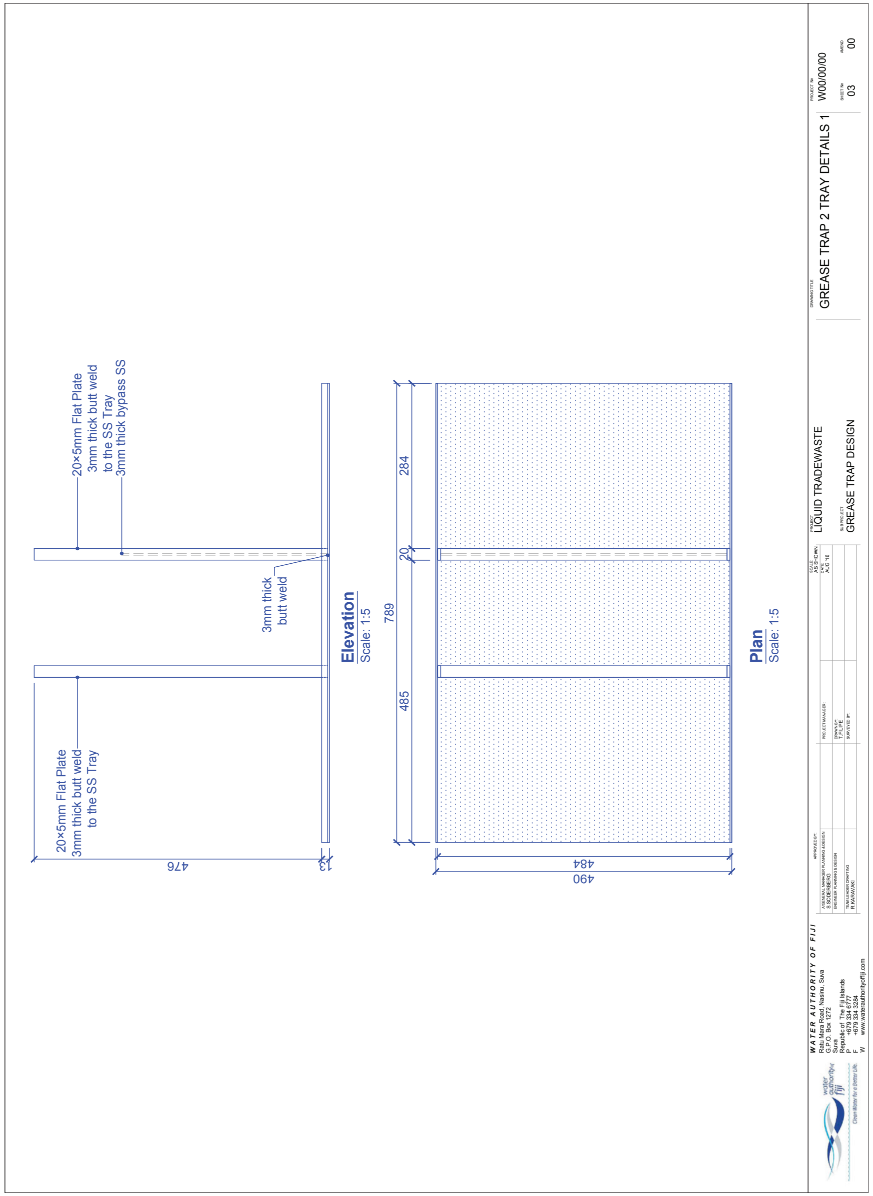
20×5mm Flat Plate
3mm thick butt weld
to the SS Tray
3mm thick bypass SS
3mm thick
butt weld
20×5mm Flat Plate
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to the SS Tray
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GREASE TRAP DESIGN
GREASE TRAP 2 TRAY DETAILS 1
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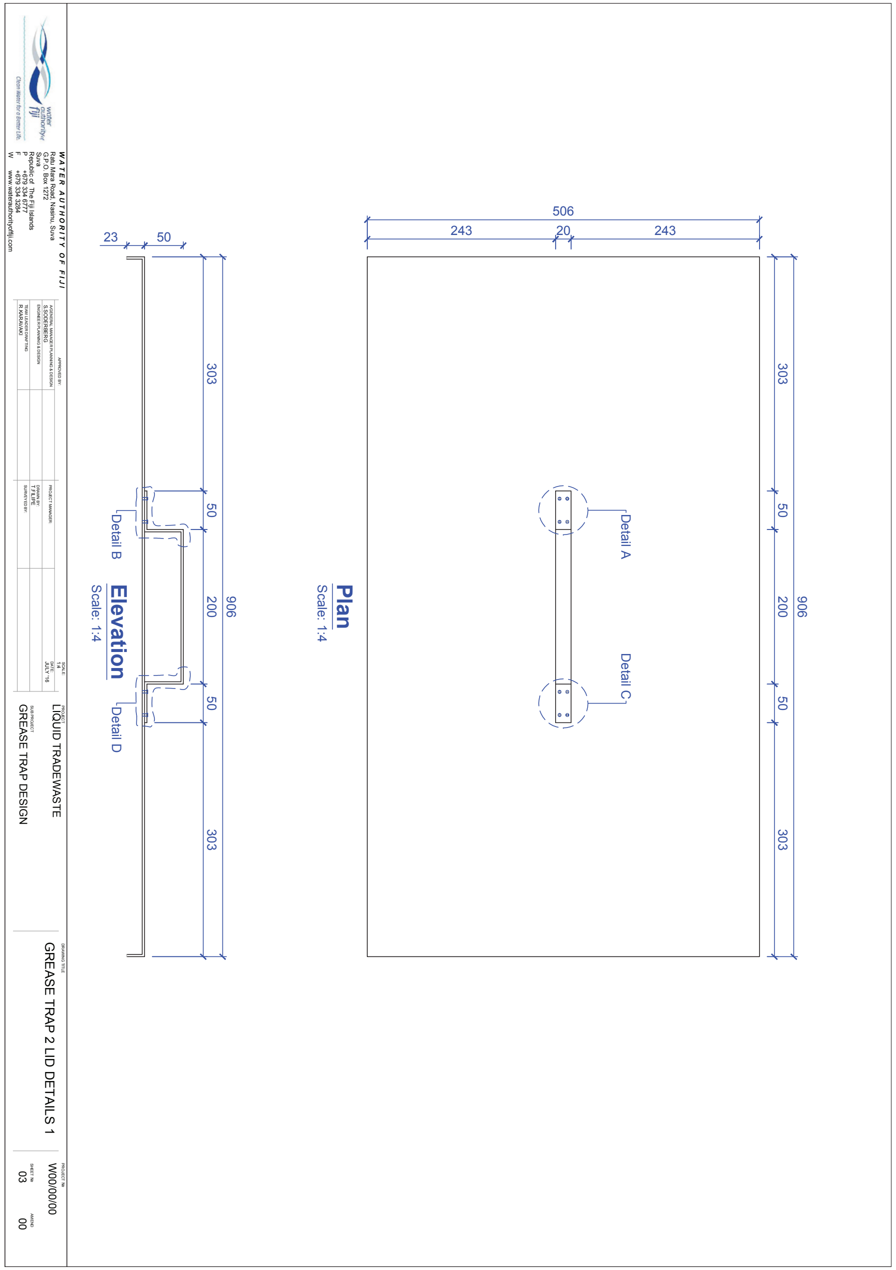

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Detail B
Detail C
Detail D
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906
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GREASE TRAP 2 LID DETAILS 1
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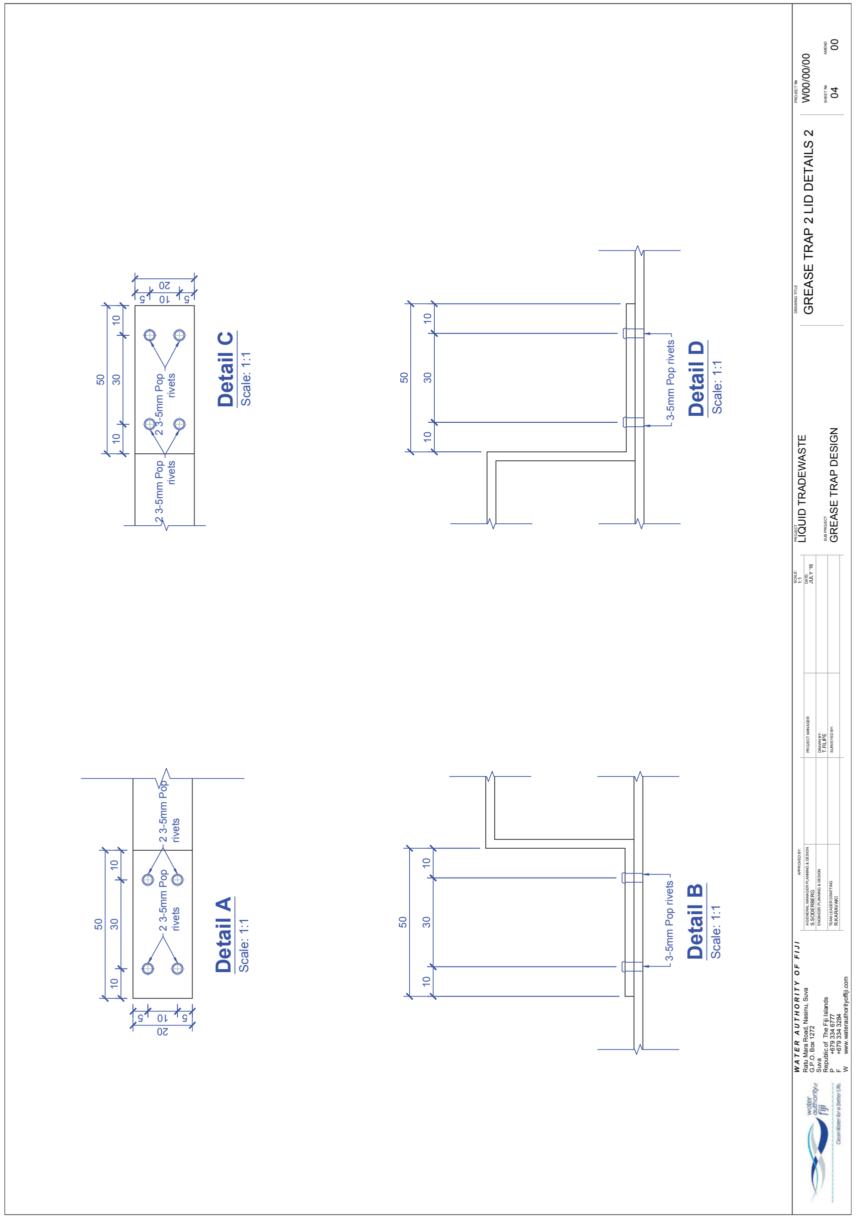

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Detail B
Scale: 1:1
Detail C
Scale: 1:1
Detail D
Scale: 1:1
2 3-5mm Pop rivets
3-5mm Pop rivets
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30
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GREASE TRAP DESIGN
GREASE TRAP 2 LID DETAILS 2
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3.3.2 GUIDELINES

3.3.2.1 Under Sink Grease Trap

A. FABRICATION:

a) Total Volume

The Under sink Grease Trap shall have a total volume of 200 Litres with a working capacity of 150 Litres and shall ONLY be used for Snack Bars and Coffee Lounges.

b) Sizing

The scaled version of the design will use a ratio of surface area to volume.

E.g. The trap is 0.9m x 0.5m x 0.5m and has a:

Surface Area = 2 x [(L x W) + (L x H) + (W x H)] = 2 x [(0.9 x 0.5) + (0.9 x 0.5) + (0.5 x 0.5)] = 2.3 m^2,

Total Volume = L x W x H =0.9 x 0.5x 0.5 = 0.225 m^3,

And therefore a surface area to volume ratio of

SA: V = 2.3m^2:0.225m^3 = 2.3:0.225 = 10.22:1 = 10.22/1 = 10.22 ≈ 10

The ratio must be reduced until the volume (V) is 1.

For situations where the FOG to separated exceeds the working capacity of 150 Litres and is less than 700 Litres, the design for the 1000 litre underground grease interceptor MUST be used.

c) Materials

The grease trap must be made from a material that does not corrode and is suitable for in kitchen use.
(i.e. Materials specified for food equipment such as food grade Stainless Steel Type 316 or HDPE).

If alternative materials wish to be used to fabricate the traps then approval must first be obtained from WAF.

d) Manufacturing

- The First baffle shall extend from at least 50mm above the water level to within 50mm of the inside floor of the trap.
- The Second baffle shall extend from the inside floor of the trap to within 100mm of the top of the trap.
- The Inlet shall be at least 50mm from the top on the inside of the trap and the outlet pipe at least 150mm from the inside base of the trap.

e) Alternative Designs

Any alternative designs for a under the sink grease trap that a business may wish to use for their food preparation areas must first be approved by the WAF.

B. INSTALLATION:

a) Positioning the Grease Trap

- Grease traps shall be placed as close as practical to the fixture(s) being served.
- It shall be located where it is easily accessible at all times for inspection, cleaning, and removal of accumulated grease.
- It can be placed outdoors if there is a limited amount of space inside the food preparation area.

b) Piping

- All Pipe works must be completed by a licensed plumber.
- There shall be no piping inside the Grease trap.
- Inlet and outlet piping must be as per the regulations set out by the Fiji National Building Codes and the WAF Grease Trap Design Standards and Guidelines.

c) Venting

- No Venting required

d) Access to the Trap

- Access to the grease trap shall be through the lid.
- Lids can be either left as it is on the trap or clamped down.
- For areas in which the trap may be encountered by the public, the trap lid must be securely fastened to prevent tampering.

e) Certificate of Compliance

- A certificate of compliance must be provided by the licensed plumber-safter the installation of the trap.

C. MAINTENANCE:

a) Frequency of Clean Outs

- These 200 litre grease traps should be cleaned out on a daily basis.
- Traps with a Volume greater than 200 litres and less than 500 litres must be cleaned every second or third day.
- Businesses must keep a record of the clean outs done. If pump outs are done, then the receipts for the pump out chargers must be kept as this is proof of frequent cleaning.

b) Responsibility for Clean Outs and Disposal

It is the responsibility of the **Liquid Trade Waste Permit Holders** to ensure that the clean out of the Grease traps are done on a regular basis and disposed of properly.

It is **NOT** the responsibility of WAF or the relevant authorities to do this. However, it is WAFs and other authorities' responsibility to monitor the businesses and residents to ensure that this is done regularly and properly.

c) Clean Out Methods

Clean out of the grease traps can be done manually or through pump outs.

For manual removal:

- First scrape the top layer of FOG off the surface on the inside of the trap and place in a sealed plastic bag. Continue this until all the FOG on the surface is removed.
- Using the handles of the perforated tray, gently lift the tray up and hold to allow for the effluent water to drain through it.
- Once drained remove the tray and place contents into a sealed plastic bag.
- Scrape the inside of the trap to remove FOG that is stuck to its inside surface and place into the sealed plastic bag.
- DO NOT use degreasers to clean out the grease trap.
- DO NOT use hot water to clean out the grease trap as this will only make the solidified FOG soluble and harder to remove.

For Pump outs:

- Remove lid from the top of the trap.
- Place suction hose into the trap.
- Begin pump out of the trap.

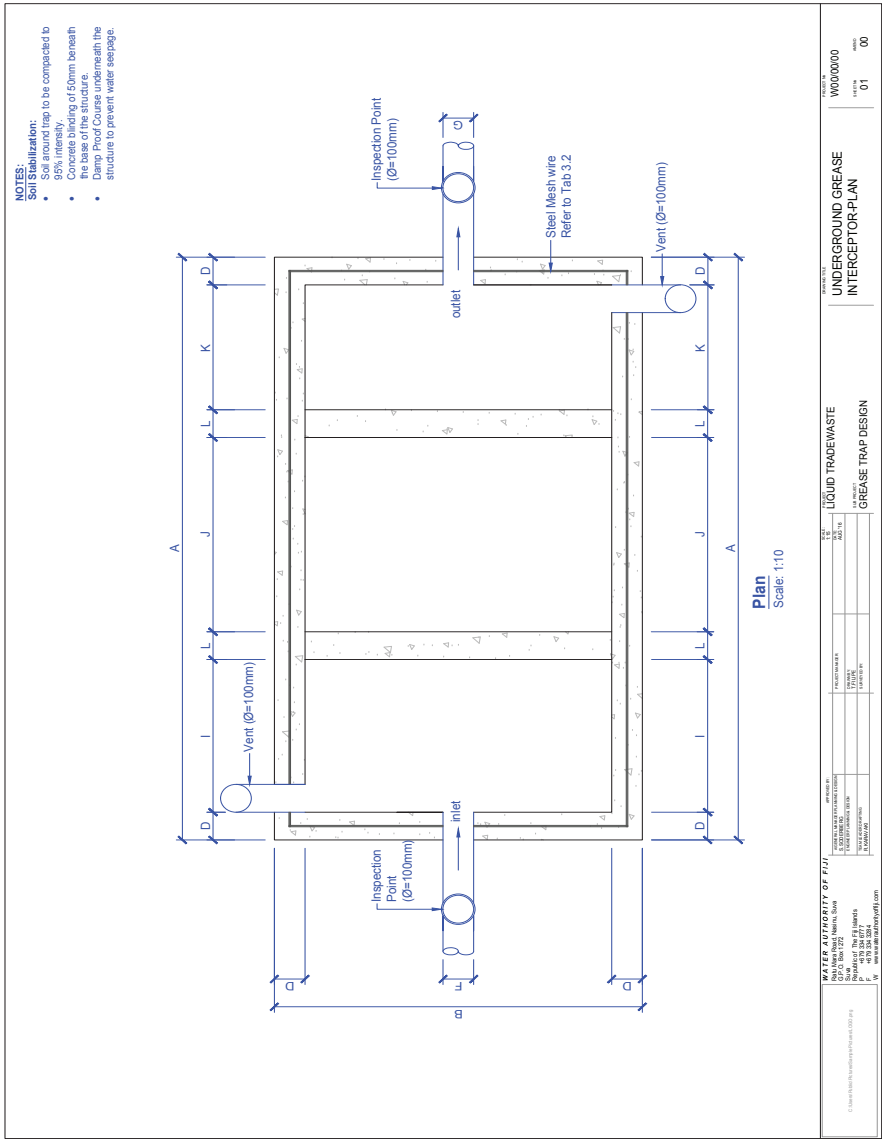
- Scrape the inside of the trap to remove FOG that is stuck to its inside surface.
- Continue pump out until all FOG is removed
- DO NOT use degreasers to clean out the grease trap.
- DO NOT use hot water to clean out the grease trap as this will only make the solidified FOG soluble and harder to remove.

d) Disposal of FOG

If businesses incorporate the under the sink grease trap with an underground grease interceptor, then the removed FOG from the smaller units can be put into the underground interceptor and pumped out when the underground interceptor needs to be cleaned. The removed FOG can then be taken to the Sewerage Treatment Plant for disposal.

3.3.3 UNDERGROUND GREASE INTERCEPTOR

Please refer to the Drawings on the next page



Steel Mesh wire
Refer to Tab 3.2
Vent (H) (Ø=100mm)
Inspection Point
(Ø=100mm)
C
Q
E2
O1
F
E1
inlet
WL
LID
R
M2
M1
N1
N2
outlet
G
P
O2
A
B
Elevation
Scale: 1:15
End Elevation
Scale: 1:15
NOTES:
Soil Stabilization:
Soil around trap to be compacted to 95% intensity.
Concrete blinding of 50mm beneath the base of the structure.
Damp Proof Course underneath the structure to prevent water seepage.
WATER AUTHORITY OF FIJI
LIQUID TRADEWASTE
GREASE TRAP DESIGN
UNDERGROUND GREASE INTERCEPTOR-ELEVATIONS
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NOTES:
Soil Stabilization:
Soil around trap to be compacted to 95% intensity.
Concrete blinding of 50mm beneath the base of the structure.
Damp Proof Course underneath the structure to prevent water seepage.
A
Vent (Ø=100mm)
D
LID COVER
LID COVER
LID COVER
outlet
inlet
T
B
Vent (Ø=100mm)
Plan
Scale: 1:10
WATER AUTHORITY OF FIJI
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GREASE TRAP DESIGN
UNDERGROUND GREASE INTERCEPTOR-ELEVATIONS
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Type	Total Volume (Litres)	Dimension on Grease Interceptor	A (mm)	B (mm)	C (mm)	D (mm)	E2 / E1 (mm)	F (mm)	G (mm)	H (mm)	Rebar Type	Rebar Thickness (mm)	Concrete Strength (MPa)
1	1000	Inside	1000	800	750	100	100 / 50	100	100	100	665 mesh	5.3	25
		Outside	1200	1000	900								
2	2000	Inside	1300	1000	900	100	100 / 100	100	100	100	F81 mesh	8	25
		Outside	1500	1200	1100								
3	3000	Inside	1700	1000	950	150	150 / 100	100	100	100	F81 Mesh	8	32
		Outside	2000	1300	1200								
4	4000	Inside	1700	1200	1100	150	150 / 100	100	100	100	F81 Mesh	8	32
		Outside	2000	1500	1350								
5	5000	Inside	1700	1400	1250	150	150 / 100	100	100	100	F81 Mesh	8	32
		Outside	2000	1700	1500								

Table 3.2 - Dimensions for Underground Grease Interceptors (1000 - 5000 Liters)

Table 3.2 (continued)

Type	I (mm)	J (mm)	K (mm)	L (mm)	M1 / M2 (mm)	N1 / N2 (mm)	O1 / O2 (mm)	P (mm)	Q (mm)	WL (mm)
1	250	350	300	50	650 / 100	550 / 200	100 / 100	200	250	550 - 600
2	300	450	350	100	700 / 200	600 / 300	150 / 150	200	250	800 - 850
3	350	700	450	100	750 / 200	650 / 300	150 / 150	200	250	750 - 800
4	350	700	450	100	900 / 200	800 / 300	150 / 150	200	250	900 - 950
5	350	700	450	100	1050 / 200	950 / 300	150 / 150	200	250	1050 - 1100

Note: Soil Stabilization

- Soil around the Grease Interceptor is to be compacted to 95% Density.
- Concrete binding of 50mm beneath the base of the Grease Interceptor.
- Damp proof course underneath the Grease Interceptor to prevent seepage.

3.3.4 GUIDELINES

3.3.4.1 Underground Grease Interceptor

A. FABRICATION:

a) Total Volume

The underground grease interceptor shall have minimum total volume of 1000 litres.

Larger interceptors, that have a volume greater than 1000 litres and up to 5000 litres, can use the dimensions provided in Table 3.2.

b) Sizing

For situations where the volume of FOG to be separated exceeds the working capacity of the 1000 litre grease interceptor and is less than that of the 5000 litre grease interceptor:

- A larger sized grease interceptor can be used. For further specifications please refer to the dimensions provided in Table 3.2 to suit the requirements of the situation

  Or
- Two or more grease interceptors can be installed in series to cater for the load.

c) Materials

The Interceptor will be made of concrete and be either precast or constructed from the ground up.

Other materials can be used but these must be approved by WAF before it can be manufactured or built.

d) Manufacturing

The first baffle shall extend from the cover above the water level and down to be at least 100mm away from the inside floor of the interceptor and be spaced 250mm away from the inlet.

The second baffle shall extend from the inside floor of the interceptor and up to be at least 200mm away from the cover above and be spaced 300mm away from the outlet.

The vent shall be positioned at opposite sides of the interceptor and be at least 50mm above the water level.

(Refer to INSTALLATION part(c) Vents for minimum Vent size)

The above mentioned specifications is for the 1000 litre underground grease interceptor. Refer to Table 3.2 for specifications for larger Grease Interceptors.

e) Alternative Designs

Any alternative designs for underground Grease Interceptors that a business wishes to use on their property must first be approved by the WAF.

B. INSTALLATION:

a) Positioning of the Underground Grease Interceptor

The underground grease interceptor shall be placed as close as practical to the fixture(s) being served.

It shall be located where it is easily accessible at all times for inspection, cleaning, and removal of accumulated grease.

It can be installed indoors or outdoors.

In situations where the interceptor is placed outdoors:

- Ensure that it is as close as possible to the building.
- Ensure that it can withstand the external loads being placed on it (vehicles and people).
- If it is buried and the top of the interceptor is level with the ground then all piping for vents and inspection points must not disrupt other utility connections, hinder vehicles or people.
- A protective wall must be erected around it at least 200mm above the ground level to prevent water run offs from seeping into the interceptor.
- It must be at least 200mm above the ground level to prevent water run offs from seeping into it (if they grease interceptor will not be.

In situations where the interceptor is placed indoors:

- Ensure that it can withstand the external loads being placed on it (vehicles or people).

- A protective wall must be erected around it at least 200mm above the ground level to prevent water runoff from seeping into the interceptor (If the top of the interceptor is level with the ground).

- If it is partially buried then it must be at least 200mm above the ground level to prevent water run offs from seeping into its compartments.

- If it is placed in an area with limited space then ensure that it has gas tight lids and proper venting.

b) Piping

There shall be no piping inside the underground grease interceptor.

All pipe works must be completed by a licensed plumber.

The inlet pipe will be submerged and therefore the water level inside the trap will be determined by the level of the outlet pipe.

The piping will be completed according to the WAF Fabrication & installation of Grease Traps and Underground Grease interceptors' guidelines.

Inspection points must be included on the inlet pipe before the interceptor and on the outlet pipe after the interceptor

The inspection points must be a minimum of 100mm in diameter and should be teed off from the inlet and outlet pipes to at least 200mm above the ground level.

c) Venting

All Underground Grease Interceptors must have:

- Two vents, a minimum of 100mm in diameter, open to the atmosphere to allow for cross ventilation.
- An induct vent, at low or high level directly off the interceptor at the inlet compartment.
- An educt vent, at a high level also directly off the interceptor at the outlet compartment.
- The educt Vent diverted to at least 2 meters above the highest point of the building (where necessary).
- Exterior flaps on the openings of the induct and educt vents.

Plumbers must ensure that the vents are installed properly so that siphoning does not occur within the chambers of the interceptor.

d) Access to the Interceptor

Access to the Grease interceptor shall be though one of three lids above the:

- Inlet compartment
- Separation compartment
  and
- Outlet compartment.

e) Certificate of Compliance

A certificate of compliance must be provided by the licensed plumbers after the installation of the trap.

C. MAINTENANCE:

a) Frequency of Clean Outs

The interceptor should be cleaned on a fortnightly basis through pump outs.

Grease interceptors with a volume greater than 1000 litres and less than 3000 litres must be cleaned out at least every month.

If business owner(s) wish to pump out their underground grease interceptors more frequently (such as weekly) they are allowed to do so.

b) Responsibility for Clean outs and Disposals

It is the responsibility of the Trade Waste Permit Holders to ensure that the clean outs of the Grease traps/interceptors are done on a regular basis and disposed of properly.

It is NOT the responsibility of WAF or the relevant authorities to clean out the traps/interceptors. However, it is WAFs and other authorities' responsibility to monitor the businesses or residents to ensure that this is done regularly and properly.

c) Clean out Methods

a) Clean out of Underground grease interceptors can be done through pump outs.

For Pump outs:

- Remove lid from the top of the interceptor.
- Place suction hose into the compartment.
- Begin pump out.
- Scrape the inside of the compartment to remove FOG that is stuck to its inside surface.
- Continue pump out until all FOG is removed.
- DO NOT use degreasers to clean out the grease trap.
- DO NOT use hot water to clean out the grease trap as this will only make the solidified FOG soluble and harder to remove.

d) Disposal of FOG

FOG that is removed through pump outs can be disposed by the bailing trucks.

4. APPENDICES

4.1 FOG MANAGEMENT

CHECKLIST FOR MANAGING FAT, OILS AND GREASE IN THE KITCHEN			
DO's		DON'Ts	
✓	Wipe and scrape plates, pots, pans and utensils before washing it in the sink (place all these food scrapings into the rubbish bin)	✗	Do not pour Cooking Oil, Fat or Grease down the sinks
✓	Collect Waste Oil in a suitable secure container.	✗	Do not pour Waste Oil, Fat or Grease down the drains
✓	Use sink strainers in sink holes and empty solid contents from the strainer into the rubbish bin.	✗	Do not put food scrapings into the sink. Put it into the rubbish bin.
✓	Regularly clean out and maintain grease traps.	✗	Do not sweep waste into floor drains. Collect and place it in the rubbish bin.
✓	Get a licensed waste management company to collect and dispose of FOG from grease traps	✗	Do not pour boiling hot water down the sink to dissolve fat and grease.

4.2 MINIMUM PRETREATMENT REQUIREMENTS FOR FOOD PROCESSES

Commercial process	Seats/beds	Minimum pre-treatment	in floor and in sink bucket traps
Cafeteria, canteen (and school hot meals)		1000 L	yes
Take-away, including food court shops		1000 L	yes
Snack bar – coffee lounge		Under sink	yes
Restaurant	1-69	1000 L	yes
Restaurant	70-199	1500 L	yes
Restaurant	200-399	2000 L	yes
Restaurant	400-599	3000 L	yes
Restaurant	600-799	4000 L	yes
Restaurant	800-1000	5000 L	yes
Kitchen – hospital, nursing home	1-69	1000 L	yes
Kitchen – hospital, nursing home	70-199	1500 L	yes
Kitchen – hospital, nursing home	200-399	2000 L	yes
Kitchen – hospital, nursing home	400-599	3000 L	yes
Kitchen – hospital, nursing home	600-799	4000 L	yes
Kitchen – hospital, nursing home	800-1000	5000 L	yes
McDonalds		1500 L – 3000 L	yes
Pizza Hut Restaurant		1000 L	yes
Function centre	1-69	1000 L	yes
Function centre	70-199	1500 L	yes
Function centre	200-399	2000 L	yes
Function centre	400-599	3000 L	yes
Function centre	600-799	4000 L	yes
Function centre	800-1000	5000 L	yes
Supermarket with chicken cooker		1500 L	yes
BBQ wholesale (chicken)		1500 L	yes
BBQ wholesale (pork, duck)		2000 L	yes
BBQ restaurant		2000 L	yes
Hotel/motel kitchen	1-69	1000 L	yes
Hotel/motel kitchen	70-199	1500 L	yes
Hotel/motel kitchen	200-399	2000 L	yes
Hotel/motel kitchen	400-599	3000 L	yes
Hotel/motel kitchen	600-799	4000 L	yes
Hotel/motel kitchen	800-1000	5000 L	yes
Butchers – retail (no cooking)		1000 L	yes
Fish (fresh outlet) no cooking		Large basket trap with fixed screen and removable basket	yes
Chicken (fresh retail) no cooking		1000 L	yes
Bakery retail –hot bread - cakes		No grease trap	yes
Bakery retail – pies – sausage rolls		1000 L	