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Kennedy Solutions, Inc.

Benefits

Of a

FOG Ordinance

For

FOG Management & Control

2

Giant "fatberg" found in Macomb County sewer pipe

Sept. 12, 2018

3

Grease floods yard of Garden City home

Sept. 14, 2018

GARDEN CITY, Mich. - Renee Fondaw said she couldn't believe what she was seeing or smelling after her yard was filled with grease.

Efforts to clean the yard on Friday didn't get the job done.

The house is located on Harrison Street near Ford Road. A smelly mixture of grease and muck pooled under the deck.

"I don't even know what you would call it other than a mess," Fondaw said. "A greasy mess."

Fondaw said there were plumbing trucks at a nearby KFC restaurant cleaning the pipes when something went wrong, filling her yard with grease.

It's not the first time this has happened.

"The first time it happened they tore out my whole backyard and replaced the pipe," Fondaw said.

That was in November of 2015

"I never ever thought this would happen again," Fondaw said.

This time, city staff worked hard to clean up the majority of the mess in the yard but the grease under the deck still remains. Fondaw said she was told to call her insurance company to deal with the rest of the grease.

"I'm stuck with this smelly, yucky grease everywhere," Fondaw said.

Local 4 called the Garden City city manager, Doc Doughtery, and he said Fondaw's sewer line is connected to the KFC restaurant's. The city is investigating to see if the restaurant is responsible.

"I just want the problem fixed," Fondaw said. "My house is my haven."

Fondaw hopes this will be the last time her haven is invaded by grease.

A representative from KFC said they are investigating the possible cause.

Authorities believe it's possible KFC employees could have poured grease down the drains, rather than using grease traps.

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Sewer backup dumps overflow onto Main Street, Paint Creek

Feb. 5, 2018

By: Mary Beth Almond | Rochester Post | Published February 5, 2018

An estimated 3,000 to 5,000 gallons of raw sewage was released into the Paint Creek in Rochester due to an unforeseen sewer blockage Feb. 3.

Rochester city officials received notice that there was a sewer overflow occurring on Main Street in downtown Rochester at approximately 11 a.m. Saturday, Feb. 3.

Rochester Department of Public Works employees responded to the call by 11:30 a.m. and determined that the sanitary sewer was blocked in the vicinity of 613 N. Main St., causing the sewer to back up and overflow from an upstream manhole onto Main Street and into the city's storm sewer system, which discharges into the Paint Creek.

"The city's departments acted quickly," City Manager Blaine Wing said in an email. "DPW, police and fire responded. Oakland County was also called in."

Southbound Main Street was closed for about two hours while crews worked to fix the problem. Rochester Streets and Sewers Foreman Jason Dickinson said the DPW was able to clear the blockage in the pipe and restore standard flow by 1 p.m.

"It was plugged pretty bad with grease and paper towels," he said.

City officials said two businesses were affected by the blockage, Lipuma's Coney Island and the Paint Creek Tavern, which were each cleared and able to reopen for business hours later that day.

"The city hired a company to come in and do environmental cleanup and sanitation to make sure there were no health issues," Dickinson explained.

Rochester officials reported the sanitary sewer overflow to the Michigan Department of Environmental Quality and the Oakland County Health Department, according to Wing.

"The MDEQ will identify if there is any additional work that needs to be done on the Paint Creek, but due to the city's quick response, I'm not expecting any," Wing said in an email.

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FOG Program Impacts

- Federal, State and Local Impacts
- Best reaction is proactive approach from Local Level
  - Wastewater Department
  - Building/Codes Department
  - Health Department
  - Stormwater

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Local POTW

- Wastewater Department
  - SSOs
  - Sewer line cleaning, repair & replacement costs
  - Sewer Pumping Station equipment & maintenance impacts
  - WWTP equipment & maintenance impacts
  - Odors & contribution to hydrogen sulfide generation

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Other Local and State Agencies

- Building Codes Department
  - Frontline of communication with new Food Service Establishments (FSE) and existing facilities that undergo renovations
  - FOG program awareness increases FSE awareness and grease control equipment installation requirements
- Health Department
  - Established authority for facility's ongoing operation
  - Helps prevent contact with wastewater due to kitchen sewer backups and SSO's
  - FSEs fear the Health Department

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Questions to consider

- What is my basis (legal authority) for establishing a FOG ordinance?
- What is current decision-making process for plumbing plan approval for new FSEs or existing FSEs that upgrade?
- What are the requirements for grease control equipment installation?
- What agencies or city departments should I contact? (WWTP, DPS/DPW, Building Dept., Planning Dept., Engineering Dept., Finance Dept. and Township Supervisor/City Manager/Mayor)
- How many FSEs do we have?

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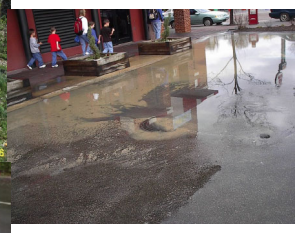
SSOs caused by FOG discharge of a Nondomestic User



Distinguish between POTW system SSO or private SSO.

Commercial or Residential?

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Analyzing Grease Interceptors

Analyze Grease Interceptors based on the following main 4 design parameters:

- Structural Performance
- Volume Performance
- Vessel Water Tightness Performance
- Chemical Resistance

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2018 Michigan Plumbing Code

1003.3.7 Gravity grease interceptors and gravity grease interceptors with fats, oils, and greases disposal systems. The required capacity of gravity grease interceptors and gravity grease interceptors with fats, oils, and greases disposal systems shall be determined by multiplying the peak drain flow into the interceptor in gallons per minute by a retention time of 30 minutes. Gravity grease interceptors shall be designed and tested in accordance with IAPMO/ANSI Z1001. Gravity grease interceptors with fats, oils, and greases disposal systems shall be designed and tested in accordance with ASME A112.14.6 and IAPMO/ANSI Z1001. Gravity grease interceptors and gravity grease interceptors with fats, oils, and greases disposal systems shall be installed in accordance with manufacturer's instructions. Where manufacturer's instructions are not provided, gravity grease interceptors and gravity grease interceptors with fats, oils, and greases disposal systems shall be installed in compliance with ASME A112.14.6 and IAPMO/ANSI Z1001.

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GREASE INTERCEPTOR PERFORMANCE CRITERIA COMPARISON CHART

CODE	STRUCTURAL	VOLUME SIZING	WATER TIGHTNESS	CHEMICAL RESISTANCE	MAINTENANCE	REMOVAL PERFORMANCE
Hydromechanical						
2018 MPC, TABLE 1003.3.4.1, note a		2#/1 GPM				
Gravity Grease Interceptor						
2018 MPC, 1003.3.7		peak flow x 30 min. retention				
IAMPO/ANSI Z1001	Section 4.2		Z1000 9.1.2-9.1.4			
ASME A112.14.6				Section 2.3.6		Section 4.3.1-4.3.3
EPA Chapter 8						> 90% efficiency
ASTM F2649	Section 6.1.3 ≥H20 truck load	local requirement or actual x SF of 1.5	Section 7.5.3 & 9.1.1 & 9.1.2			
FOG ORDINANCE	greenbelt = H20 parking lot = HS-25	2#/gpm (full flow) 25% rule 90 day pump out cycle	section 3	section 4	goal = 90 days with pH > 3	> 90% efficiency or <100 mg/L

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Before we start discussing the FOG Ordinance components, we need to define some things we will be discussing.

- Brown Grease
- Yellow Grease
- Triglycerides
- FSEs
- Grease Interceptors
- Grease Traps

What is important about triglycerides?

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Food Service Establishment's fats, oils & grease – 2 types…

- "Yellow" grease: inedible and unadulterated spent FOG removed from FSE. Major source of yellow grease is deep frying. Put this type grease in the grease recycle bins, normally at the back of the FSE.
- "Brown" grease: floatable FOG, settled solids and associated wastewater retained by grease interceptors and grease traps.

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Defining Fats, Oils & Grease (FOG)

FOG: Organic polar compounds derived from vegetable/plant or animal sources that are composed of long chain triglycerides

Triglyceride: 3 fatty acid molecules with one glycerol

Glycerol: also referred to as glycerin; syrupy, trihydroxy alcohol (1,2,3 propanetriol) that exists in natural oils as the base



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Key Elements of a FOG Ordinance

- Legal Authority
- Plan Review & Design Standards
- Performance Measures
- Permitting/Control Mechanisms
- Inspections
- Enforcement
- Communication
- Public Education

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Legal Authority

- Sewer Use Ordinance
  - General and Specific Prohibitions
    - Prevent obstruction to the sewer system / POTW
    - Refer to FOG Ordinance or FOG Management Policy
- FOG Ordinance or Department of FOG Management Policy
- Approved by City Attorney

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Grease Control Equipment

Identification of 2 basic types

Grease Interceptor
Or
"Outside underground tank"

NO Concrete Grease Interceptors!

Hydro mechanical/Grease Trap
Or
"Inside, under-the-sink units", "floor traps", and "outdoor floor traps"

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Indoor Grease Traps or Hydro Mechanical Grease Interceptors

KSI does not recommend any grease trap or hydro mechanical grease interceptor located inside the building – They work just fine outside.
Indoors – they are just a
public health and safety headache

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Automated grease recycle container overflow due to faulty level indicators

GGGI with automated FOG removal devices are not always the way to go.
"Keep it simple" the less moving mechanical parts the better.

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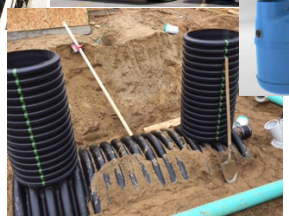
Gravity Grease Interceptors
Plastic, Steel & Fiberglass Options

Ave. pH in GI is 1.5-6



HDPE has a pH range of 1.5-14

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Precast Concrete Gravity Grease Interceptors Prematurely Fail

This tank arrived to the jobsite with the rebar already exposed – poor quality manufacturing

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Interceptor Certification

The main reason for interceptor certification is due to deterioration or leaking tanks.

Center baffle has deteriorated down to the rebar. There is a large hole in the bottom center of the baffle where the wastewater is flowing through from the other side.

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Center baffle of a concrete interceptor that has deteriorated down to the rebar.

Inlet baffle of same tank as above… photo taken from the outlet side of the tank. That is the inlet pipe extending down into the tank.

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Plan Review & Design Standards

- There are dozens of grease interceptor sizing formulas – most of which are not very good.
- Recommend adopting a minimum grease interceptor size for types of food service establishments (FSEs)
  - Example: Fast Food Facilities – 1000 gallons; Full-Service Restaurants – 1500 gallons; Prisons, hospitals – 2000 gallons.
- Select a sizing formula that uses the full flow of the pipe and provides an additional volume storage size for FOG/grit/food solids (respecting the 25% rule) until the GI unit is pump out (maintenance cycle is 90 days).
- Details on the design, installation and maintenance of the interceptor should be in the FOG Ordinance or FOG Mgt. Policy.

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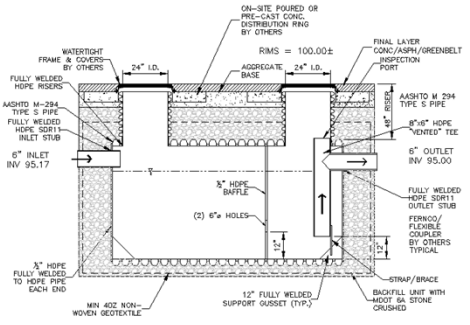
Based on field experience, this grease interceptor design has worked best.



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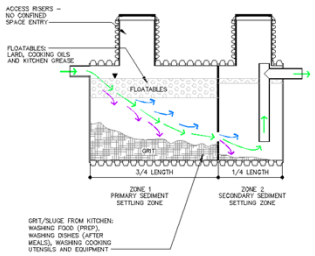
FLOW SCHEMATIC
HOW GRAVITY GREASE/GRIT SEPARATORS WORK



The top layer is the FOG layer, bottom layer is food solids layer. Normally the foods solids layer will be 1x to 2x the FOG layer, unless the FSE cooks/prepares chicken,, fish or rice, then the food layer may be 3x to 4x the FOG layer. Thus, some FSEs may need to pump more often than others. The 25% rule should be observed: When the FOG layer and Food Solids layer are 25% or greater than the depth of the tank then it needs to be pumped. Why? Reduced removal efficiency and short circuiting.

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Inspections

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Sometimes you cannot access interceptor manholes!

And Sometimes you may not be able to find interceptor manholes…..

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Kitchen Equipment & Menu

- Deep Fryers, Wok, grill, numerous pots for cooking, etc… indicate FOG potential vs. a facility with just a hot dog roller or steamer for deli sandwiches
- What is on their menu?
- Most FSE manager will automatically say "We don't have any grease"

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Inspection Checklist

- Facility Information
- Education of FSE
- Grease Control Equipment Information
- Downstream Manhole Inspection
- Comments
  - Education emphasis
  - Corrective Action
  - Warning
  - Noncompliance Notification

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Inspector Equipment

- MH pullers (w/pry bars, or large screwdrivers)
- Badge/ID for clear recognition
- Flashlight
- Digital Camera
- pH meter or pH paper
- Safety vest
- Wrench to open cleanouts
- Long blade shovel, pole, or tube to check FOG depth
- Road Safety Cones
- Gloves
- Sanitary wipes, paper towels
- Clipboard
- Storage are in vehicle for shovel, MH pullers (bag, pipe)

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Inspection – Materials

- Brochure or information sheet or letter is critical
  - Will save time on explanation if you have picture of interceptor and BMP's, contact information and other info
  - Allows the FSE something to refer to after you leave.
- Inspection Sheet
  - Leave a copy of inspection sheet with FSE

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Major FOG sources:

90% of FOG discharged to the sewer system is from:

- 3 compartment pot wash sink
- Floors
- Pre-rinse sink to dishwasher

If the FSE has a pre-rinse sink to the dishwasher, then there will only be 1% to 2% of the total FOG discharged to the sewer coming from the dishwasher. Many cities have in the FOG Mgt. Policy to not have the dishwasher connected to the grease interceptor. This is due to high temperatures (130-180° F), soaps and surfactants that can allow FOG to pass through the interceptor.

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Outlet T of Interceptor – Most important part!

Two outlet Ts on left have FOG residual in them. Outlet T below is clear. Some FOG residual can be in outlet T but it should not be a lot. If FOG in outlet T, then need to verify outlet T length, also check downstream manhole because likely will have moderate FOG impact.

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No Outlet Filters

A few cities have required installation of filters on the outlet T of the interceptor. This has been contested by some FSEs that have had wastewater back-ups in their kitchens and has been questioned by some health department officials.

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Cleaning Frequency

- Depends on facility's service volume
- Depends on size of grease interceptor
- At a minimum, pump complete contents of interceptor every 90 day
  - Based on studies conducted for pollutant concentrations, depth of FOG layer and food solids layer effecting efficiency of interceptor
  - Some facilities will have to pump every 60 days or every 30 days
  - For facilities that have excess flour, dough, batter.. Will need to pump interceptor more often. Observe the 25% rule
  - Also, food grinders are definitely discouraged. They contribute to pipe blockages and fill up the interceptor with food solids and make it inefficient

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Interceptor Pumping

- Pump complete contents of interceptor
  - WHY? Studies have shown that partial pumps of interceptors allow for food solids buildup that can cause short circuiting and increase in the tank deterioration and decrease in pH. Pump and treat onsite vendors have been sampled and results show a pump back waster water with concentrations ranging from 9,000 mg/L to 17,000 mg/L oil and grease.
- Pump at least every 90 days or as needed in order to meet the 25% rule (FOG layer and food solids layer combined are 25% or more of the total wastewater depth in the interceptor)

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Cost of Interceptor Maintenance

Example: FSE pumps 1500 gallon interceptor every 10 months. Thus, heavy FOG layer and food solids layer. This caused the grease waste hauler to spend much more time to clean which equals high cost (estimated $1000-$1500 plus the cost of sewer line jetting due to no regular maintenance).
Versus 90 day cleaning.. Easier maintenance and prevention of FOG clog in sewer lines. (estimated $250-$350 per visit)

10 years at once every 10 months
12 pump outs at $1250 = $15,000 plus sewer jetting costs

10 years at 4 times a year
40 pump outs at $300 = $12,000

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Summary of FOG Ordinance Benefits

Gives FOG Manager (Plumbing Inspector, Building Official, Health Dept. Inspector) the authority to address FSE reactive (existing) issues and address proactively (future plan review) needs of the municipality. Specifically give FOG Manager various tools to address their communities needs

Reactive:
Existing FSEs that have experienced SSO's, line blockages, frequent tank pumping and line jetting of sanitary line will be given a time period to fix their problem (180 days?) Whether it's installing a GI where none exists or getting a properly sized GI installed.

- Benefit: This frees up DPS pumper/maintenance crew to solve other issues within the community. Shifts FSE maintenance costs & GI installation costs to the FSE not the taxpayers.

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Proactive:
Plan Review Process: The FOG Manager can address minimum design requirements that the GI designer must achieve for proper plan review (i.e., structural design, volume sizing, water tightness, chemical resistance and maintenance frequency).

- Goal: Sizing – Full pipe flow, 90 day pump out cycle, 25% rule (SF>4) and pH >3

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Bottom Line

- Better grease interceptor standards for public health and safety going forward.
- Can address short comings of the Michigan Plumbing Code and IAPMO Z1001 (Z1000) standard…… Specifically, chemical resistance requirement of the grease interceptor tank due to the many tank failures.

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Thank You!

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