Water Authority—Cayman
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June 2017
Website: www.waterauthority.ky

guidelines for onsite wastewater treatment

Wastewater Treatment Requirements for Developments Outside the West Bay Beach Sewerage System (WBBSS) Service Area

Note

The following information is provided for general reference only. Specific requirements are set out by Development Control after reviewing plans submitted via the Planning Department (hereafter referred to as Planning). Requirements set out by the Water Authority (hereafter referred to as the Authority) then become conditions of Planning Permission.

All developments outside the West Bay Beach Sewage System collection area are required to provide onsite wastewater treatment. No person shall construct, install or modify an onsite wastewater treatment system without first obtaining written approval from the Authority.

Location and Installation

All systems shall be located and installed so that with proper operation and maintenance the systems function in a manner that does not create sanitary nuisances or health hazards and does not endanger the safety of any domestic water supply, groundwater or surface water.

1. Adequate area shall be reserved for the treatment plant. Onsite systems shall be located at least 75 feet from a potable well and at least 100 feet from the mean high waterline of any water body (sea, lake, canal) . The location shall comply with the setback requirements of Planning.
2. All treated effluent shall be discharged to an effluent disposal well constructed in strict accordance with the Authority's standards.
   - Special consideration shall be given to the elevation of the treatment system:
   - Surface water shall drain away from the treatment system.
   - Effluent from the treatment system must enter the disposal well at a minimum invert level two feet above the high water level in the well, to achieve gravity discharge. Minimum invert levels are site-specific and determined by the Authority based on elevation and required depth of well casing.
   - If a lift (pump) station is proposed, full details (i.e., wet well design and dimensions, pump specifications, level controls, settings and dosing calculations) shall be submitted for the Authority's review and approval.
4. Each compartment of a treatment system shall have a manhole to allow for inspection and service. Manholes shall extend to or above grade and be fitted with covers that provide a water tight seal and that can be opened and closed by one person with standard tools.
5. All systems shall be located and installed to allow access for operation, maintenance, inspection and sampling. Systems should be installed in a secure manner to prevent tampering or accidents.
6. If more than one system is used to achieve the required capacity, they shall be of equal size and installed in parallel. Split flows to the systems shall be via gravity; details of the splitter mechanism shall be submitted to the Authority for review and approval.

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The Water Authority was established in 1983 as a statutory body responsible for supplying wholesome and affordable drinking water to the people of the Cayman Islands. The Water Authority is also responsible for the proper treatment of wastewater and for the protection of the fresh groundwater lenses that exist throughout our islands.

Guidelines for Onsite Wastewater Treatment

Design Flows

Requirements for onsite wastewater treatment systems are based on the total calculated wastewater flows for all development (proposed and existing), on a given parcel. Wastewater flows are calculated using the factors found in Appendix I.

For any given parcel where calculated wastewater flows are less than 1,800 gallons per day, a septic system may be utilized for wastewater treatment. The table in Appendix II is used to determine the capacity of septic tank required.

If wastewater flows are estimated to be 1,800 gallons per day or more, Aerobic Treatment Unit(s) (ATUs) are required for the treatment of *all wastewater generated on the given parcel.* The minimum treatment capacity of ATU required is equivalent to the calculated gallons per day. ATUs are available for a range of treatment capacities.

Septic Tanks

Septic tanks provide primary treatment; i.e., removal of solids that sink or float and are retained in the tank while effluent from the midlayer discharges to the disposal well. Requirements for septic tanks are based on the design and sizing criteria found in Appendix II.

Aerobic Treatment Units (ATUs)

ATUs, often referred to as "package plants", provide a higher level of treatment than septic tanks by mechanically introducing oxygen and mixing into the wastewater, which reduces dissolved and suspended pollutants contained in septic tank treated effluent.

ATU Requirements

Standard Systems

ATUs must have third-party certification from a recognized institution, that the system is capable of achieving ANSI/NSF Standard 40: an effluent of ≤30mg/L BOD_5 and ≤30mg/L Suspended Solids.

The developer is required to submit detailed plans for a proposed ATU installation to the Authority for review and approval. Contact Development Control for an updated listing of approved makes and models of ATUs currently available from vendors on Island. Proposals for other ATU makes and models shall include full details including design specifications and third-party certification for review and approval by the Authority.

Custom Systems

Custom ATU designs will only be considered for applications where, due to strength or volume of wastewater generated, flows cannot be accommodated by standard , certified ATUs. Custom designs must be by a professional engineer. Complete proposals must be submitted at least 45 days prior to the date upon which a decision by the Authority is desired.

A professional engineer shall prepare the proposal documents submitted for review. The documents shall include an engineer's report, plans and specifications.

- The engineer's report shall include at a minimum, a description of the project, information regarding the volume and strength of wastewater that will be generated, the system's design loading rates (hydraulic and organic), calculations including assumptions made and factors used in the functional design of the system and each of the component units.
- Plans shall include scaled drawings that clearly show the nature of the design, dimensions, elevations, and details of all facilities and appurtenances, a schematic flow diagram showing the flow through various plant units, piping and hydraulic profiles.
- Manufacturer's specification sheets shall be included for all components; e.g. blowers, pumps, diffusers.

Proposals for custom systems will be reviewed in conformance with established design criteria.

By review of plans and specifications, the Water Authority assumes no responsibility for the successful operation of the facility so reviewed. It is the primary responsibility of the professional engineer designing such facilities as well as the owner/operator of such facilities to ensure that they will operate satisfactorily.

Guidelines for Onsite Wastewater Treatment

TRADE WASTEWATER

Wastewater treatment systems, whether central or onsite, are primarily designed to treat domestic wastewater. Trade or commercial wastewater may, due to its concentration or constituents, interfere, pass through, or upset a domestic wastewater treatment system. Food Service and Vehicle—Equipment Service facilities are required to pretreat oily—greasy wastewater by passing it through an interceptor as described below.
Determination of compatibility and type of treatment for other types of trade or commercial wastewater will be determined by the Water Authority based on facility plans and detailed production information.

GREASE INTERCEPTORS

Grease interceptors are required at commercial and institutional food service facilities (restaurants, cafes, schools, hospitals, etc.), which generate high concentrations of oil and grease in their wastewater. Grease interceptors are not required for private residences.

Grease interceptors are modified septic tanks designed to intercept (retain) grease and solids contained in wastewater from kitchen fixtures and equipment including pot sinks, pre-rinse sinks, dishwashers, soup kettles or similar devices, and floor drains.

Grease interceptors shall be water-tight tanks designed and constructed to withstand anticipated loads. Grease interceptors shall have not less than two compartments and a minimum volume of 600 US gallons. The design and dimensions shall be in accordance with Appendix III. The required capacity will be determined by the Authority based on review of plans submitted through the Planning Department. The outlet of the interceptor shall be plumbed to the sanitary sewage line leading to the wastewater treatment system serving the facility.

Exceptions:
Application for installation of “under-the-sink” or “prefabricated” grease interceptors will only be considered for change-of-use proposals in developments constructed before August 2001 (prior to exclusion of “under-sink” interceptors).

Application for conditional exemption from the grease interceptor requirement will only be considered for facilities where menu and equipment is limited to that which neither requires nor renders excessive amounts of oil or grease, and where service ware is limited to single use (disposable or consumable).

OIL-GRIT INTERCEPTORS

Also referred to as oil-water separators, these are required at vehicle service and other industrial workshops where fuels, greases, oils or solvents are stored and / or handled.

There are two basic oil/ grit interceptor designs: standard gravity separators, rated by capacity (US gallons (gal)), and enhanced gravity separators rated by flow (gallons per minute (gpm)). Standard gravity separators are designed to provide sufficient hydraulic retention time to allow oil droplets to rise to the surface where it can be removed by skimmers, pumps or absorbent pads. Enhanced gravity separators use a variety of coalescing media to enhance laminar flow and separation of oil droplets, thereby improving the efficiency and reducing the overall size of separator.

For indoor facilities, all trench and floor drains shall be plumbed to an oil / grit interceptor. Fuel Stations and other areas with high traffic volumes and high potential for spills shall drain to an oil/ grit interceptor.

The outlet of an interceptor or separator shall be plumbed to a storm drain. Facility operators shall employ Best Management Practices to minimize spills and to maintain the interceptor / oil-detection system to prevent oily discharges.

The required capacity of interceptor will be determined by the Authority based on review of plans submitted through the Planning Department and drainage details.

Hydraulic elevator shaft sump pumps shall discharge through a manufactured elevator oil interceptor, unless an elevator sump pump with an oil-detection system and alarm is installed.

APPENDIX I: FACTORS FOR ESTIMATING WASTEWATER FLOWS

FACILITY	USE	gpd/unit
RESIDENTIAL SOURCES		
Single or multi-family dwellings. If ancillary rooms (e.g., den, study, media, etc) increase SF beyond range specified, use factor based on SF.	1 bedroom 750 SF or less	150
	2 bedroom 751 – 1200 SF	225
	3 bedroom 1201 – 2000 SF	300
	each add'l bdr or each add'l 750 SF	75
COMMERCIAL SOURCES		
Bars (separate establishment, minimal food service)	floor area SF	1.0
Barber & Beauty Shop	service chair	75.0
Grocery Store, with food preparation (e.g., deli, bakery or meat cutting)	floor area SF	0.2
add for water closet	each	200
Doctor and Dentist	practitioner	250
Hotel w/o kitchen	room	100
Laundry (self-service)	machine	200
Industrial building (may include: warehouse / showroom / office / service facility) requirements are min: no high water use; e.g. food prep, laundry, etc.	gross SF ***and*** water closet	0.1 100
Office	net SF	0.15
Retail Center (not including food service, bar, or other high-water usage)	net SF	0.15
Restaurant	dining area (in and outdoor) SF	1.8
Restaurant: carry out only (i.e., single service articles)	floor area SF	1.0
Service station w/ dry goods only convenience store	water closet	250
add, for convenience store w/ food svc	floor area SF	0.2
INSTITUTIONAL & PUBLIC FACILITIES		
Day Care	occupant	20
Hospital	bed	200
Nursing home	bed	100
Prison	inmate	120
Schools	classroom area SF (for pre& nursery schools, use indoor "play, nursery, etc." SF	No cafeteria or gym 0.75 With cafeteria and/or gym 1.0
Hospital – Cat & Dog	gross SF	0.3
Kennel – Cat and/or Dog (require hair interceptor for kennel drains)	gross SF	0.1
Church * If classrooms comprise an academic school (i.e., 5 day/week; 6 hrs/day), calculate as under Schools	SF (Sanctuary + assembly hall + office + classrooms*) *and* SF (kitchen area)	0.15 1.0
Parks, Recreation Centers, Tourist Facilities: estimate peak hours (e.g., 4 for gyms, 8 for public parks & facilities near major tourist traffic, 4 for outlying parks,…) multiply peak hrs X # fixtures X gal / hour factor	water closet (3.5 g/use x 8.4 use/hr) urinal wash basin (1.4 g/use x 10 use/hr) shower (17.2 g/use x 1.7 use/hr)	30 g/hr 30 g/hr 15 g/hr 30 g/hr

APPENDIX II: SEPTIC TANKS

SIZING CRITERIA

The table below shall be used to determine the minimum effective septic tank capacity required.

AVERAGE WASTEWATER FLOW (U.S. gallons / day)	MINIMUM EFFECTIVE CAPACITY (U.S. gallons)
0-375	750
376 – 550	1,000
551 – 725	1,250
726 – 900	1,500
901 – 1,100	1,750
1,101 – 1,300	2,000
1,301 – 1,550	2,250
1,551 – 1,800	2,500

DESIGN CRITERIA

1. The design of the septic tank shall be such as to assure uniform horizontal flow throughout its entire length, permitting adequate retention and access for cleaning.

2. Septic tanks shall be watertight and constructed of sound and durable materials not subject to excessive corrosion, decay or to cracking or buckling due to settlement or backfilling. Septic tanks shall be constructed in a workmanlike manner and designed to support the superimposed load without failure.

3. Septic tanks shall have two (2) or more compartments to achieve the required liquid capacity. The first chamber shall have a minimum effective liquid capacity of at least two-thirds of the total required liquid capacity. Additional chambers shall have a minimum effective capacity equal to or greater than one-half of the liquid capacity of the first chamber.

4. The total length of the septic tank shall not be less than two times the width. The minimum inside width of a septic tank shall not be less than 42 inches.

5. The total inside depth of the septic tank shall not be less than sixty (60) inches. The liquid depth of compartments shall be at least forty-eight (48) inches. Liquid depths greater than seventy-two (72) inches shall not be considered in determining the effective liquid capacity.

6. A minimum freeboard or airspace of twelve (12) inches between the liquid level and the underside of the cover slab shall be provided.

7. The normal dimensions for the required septic tank capacities shall be as stated in the table shown on Drawing I. Variation of these dimensions will be allowed

provided that the requirements as detailed in the sub-clauses 2 through 5 are still satisfied.

8. Each compartment shall have access provided by a twenty-four (24) inch wide square opening manhole or a twenty-four (24) inch diameter circular opening manhole. The manholes shall be located so as to allow access to the inlet and outlet devices. The manholes shall extend to finished grade.

9. The inlet invert shall enter the tank (2) to three (3) inches above the liquid level of the tank. A vented inlet tee shall be provided to divert the incoming sewage. The inlet tee shall have a minimum diameter of three (4) inches and shall extend at least sixteen (16) inches below the liquid surface, but not more than one-third of the liquid depth.

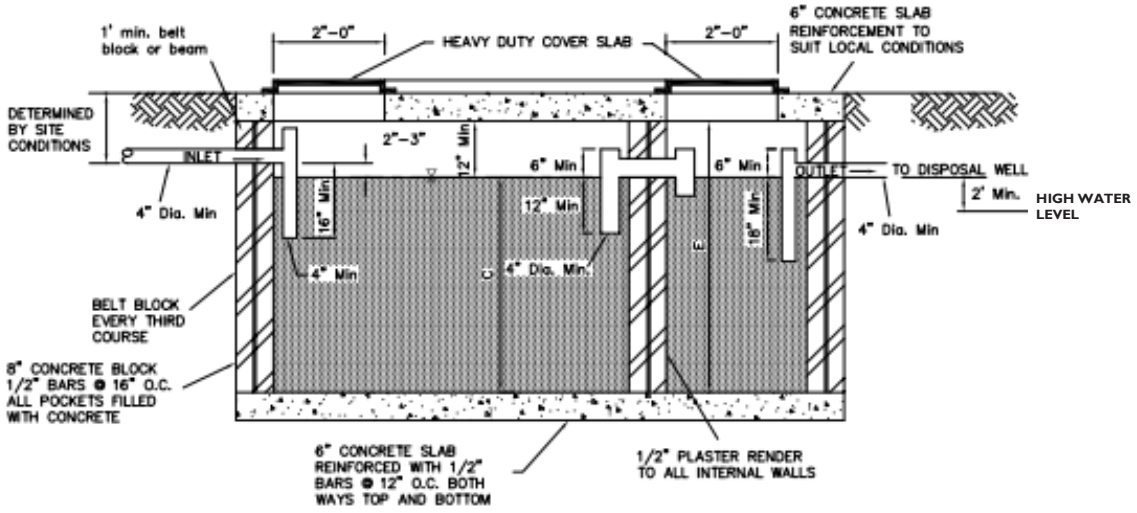
10. A minimum three (3) inch diameter vented outlet tee shall extend at least eighteen (18) inches below the liquid level of the tank, but not more than forty (40) percent of the liquid depth, and shall extend at least six (6) inches above the liquid level. The outlet tee shall be two (2) to three (3) inches below the invert of the inlet tee.

11. The inlet and outlet tees shall be located at opposite ends of the tank so as to be separated by the maximum distance possible and shall be attached in a watertight manner.

12. The first and second chamber shall be interconnected utilizing a tee with a minimum diameter of four (4) inches. The intake of the outlet tee shall extend at least twelve (12) inches below the liquid surface, but not more than one-third of the liquid depth, and shall extend at least six (6) inches above the liquid level.

APPENDIX II: SEPTIC TANK

DETAIL DRAWING : Septic Tank



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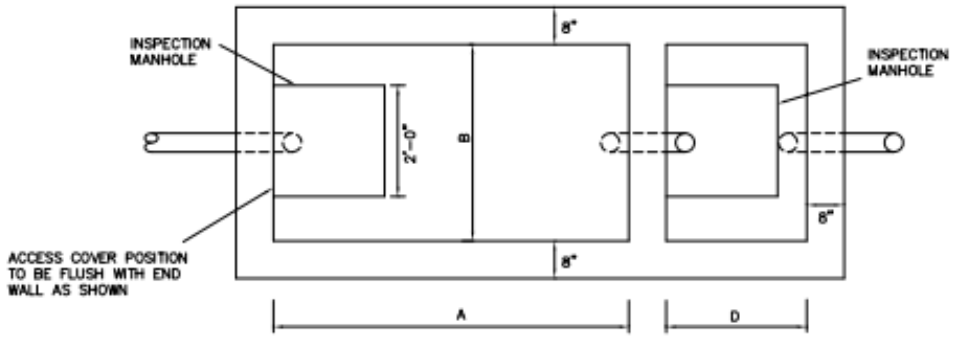


SEPTIC TANKS					
Normal Dimensions					
Gal.	A	B	C	D	E
750	5'0"	3'6"	4'0"	2'6"	5'0"
1000	6'0"	3'6"	4'6"	3'0"	5'6"
1250	6'6"	4'0"	4'6"	3'6"	5'6"
1500	7'0"	4'6"	4'6"	3'6"	5'6"
1750	7'0"	5'0"	4'6"	4'0"	5'6"
2000	8'6"	5'0"	4'6"	4'6"	5'6"
2250	8'6"	5'6"	4'6"	4'6"	5'6"
2500	8'6"	5'6"	5'0"	4'6"	6'0"

Date :Feb 2013

APPENDIX III: GREASE INTERCEPTORS

SIZING CRITERIA

The design capacity of a grease interceptor shall be as specified by the Water Authority- Cayman, based on review of plans submitted through the Planning Department. The minimum volume of any grease interceptor shall be 600 US gallons and a maximum volume of a single grease interceptor shall be 1500 US gallons. When the required effective capacity of the grease interceptor is greater than 1500 US gallons, installation of grease interceptors in series is required, up to a maximum of (2) 1500 US gallon interceptors in series (if two tanks in series of unequal volume, larger tank shall precede smaller tank.)

Restaurants: The required effective capacity of grease interceptor in US gallons shall be equal to the total floor area in square foot (SF) of the dining area, including bar and patio. For take-out restaurants, the requirement can be based on square footage of the facility.

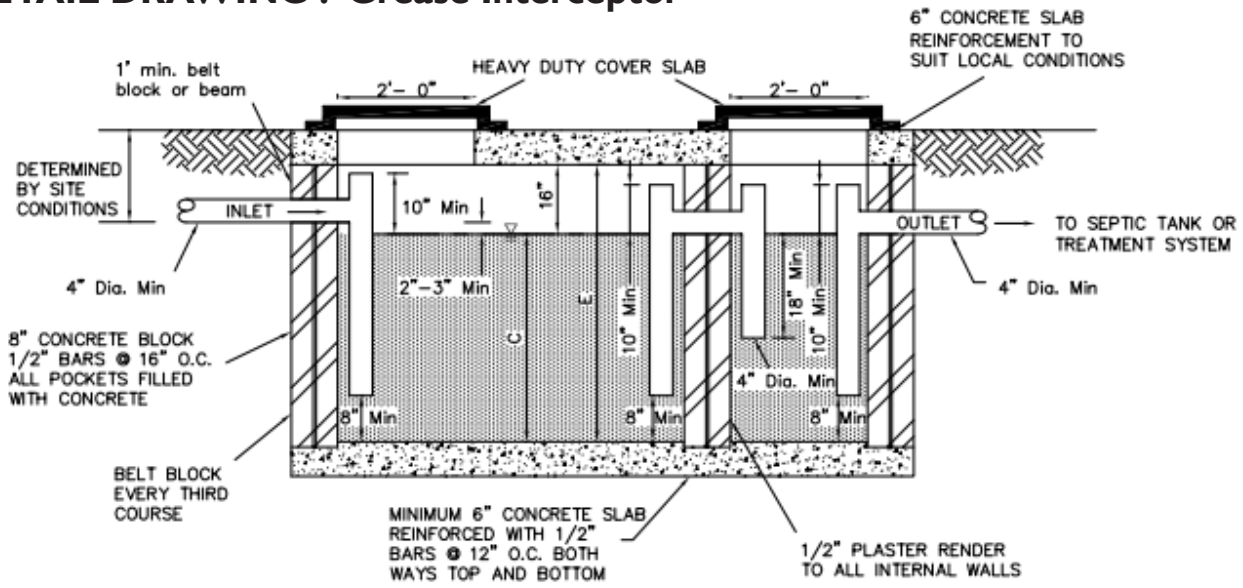
Liquid Volume = (SF) x (1 gal/SF)

DESIGN CRITERIA

1. Grease interceptors shall be watertight and have at least 2 compartments to achieve the required liquid capacity. The first chamber shall have a minimum effective liquid capacity of at least 2/3 of the total required liquid capacity. Additional chambers shall have a minimum effective capacity equal to or greater than one-half of the liquid capacity of the first.
2. The grease interceptor's length shall not be less than two times the width. The minimum inside width of the interceptor shall not be less than forty-two (42) inches.
3. The grease interceptor total inside depth shall not be less than fifty-two (52) inches. The liquid depth of compartments shall be at least thirty-six (36) inches.
4. A minimum freeboard of airspace of sixteen (16) inches between the liquid level and the underside of the cover slab shall be provided.
5. The dimensions for the required grease interceptor capacity are shown on the standard detail drawing.
6. Interceptors must be located so as to provide easy access for routine inspection, cleaning and maintenance. Each compartment shall have access provided by a twenty-four (24) inch wide square opening manhole or a twenty-four (24) inch diameter circular opening manhole. These manholes shall be located over the inlet and outlet of each interceptor and brought to finished grade.
7. A minimum four (4) inch diameter vented inlet tee invert shall enter the tank two (2) to three (3) inches above the liquid level of the tank and shall extend below the liquid surface up to eight (8) inches from the interceptor bottom. The inlet tee shall extend at lease ten (10) inches above the liquid level.
8. A minimum three inch diameter vented outlet tee shall extend below the liquid level up to eight (8) inches from the interceptor bottom, and shall extend at least ten (10) inches above the liquid level. The outlet tee shall be two (2) to three (3) inches below the invert of the inlet tee.
9. The inlet and outlet devices shall be located on opposite ends of the tank so as to be separated by the maximum distance possible and shall be attached in a watertight manner.
10. The first and second chamber shall be interconnected utilizing a tee with maximum diameter of four (4) inches. The bottom of the tee shall extended below the liquid surface up to eight (8) inches from the interceptor bottom, and shall extend at least ten (10) inches above the liquid level.
11. Where a grease interceptor is required, kitchen wastewater shall first pass through the interceptor and then be discharged into the main wastewater line leading to the approved wastewater treatment system.

APPENDIX III: GREASE INTERCEPTOR

DETAIL DRAWING : Grease Interceptor



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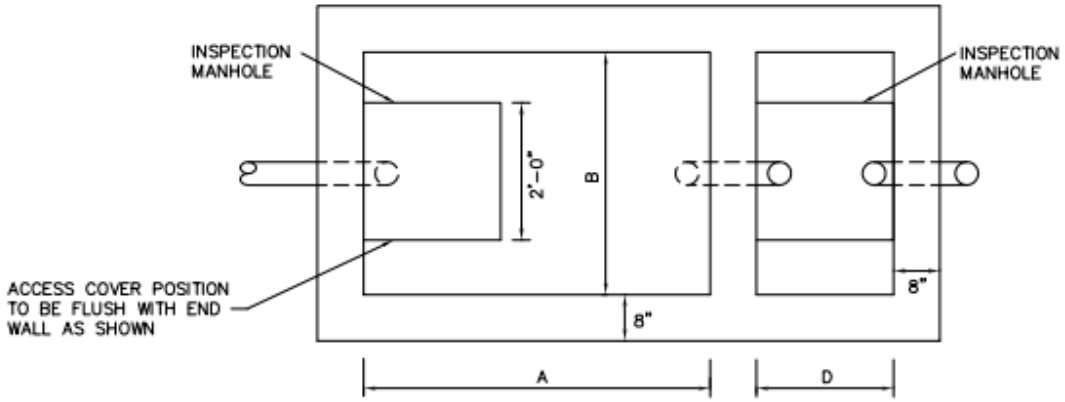
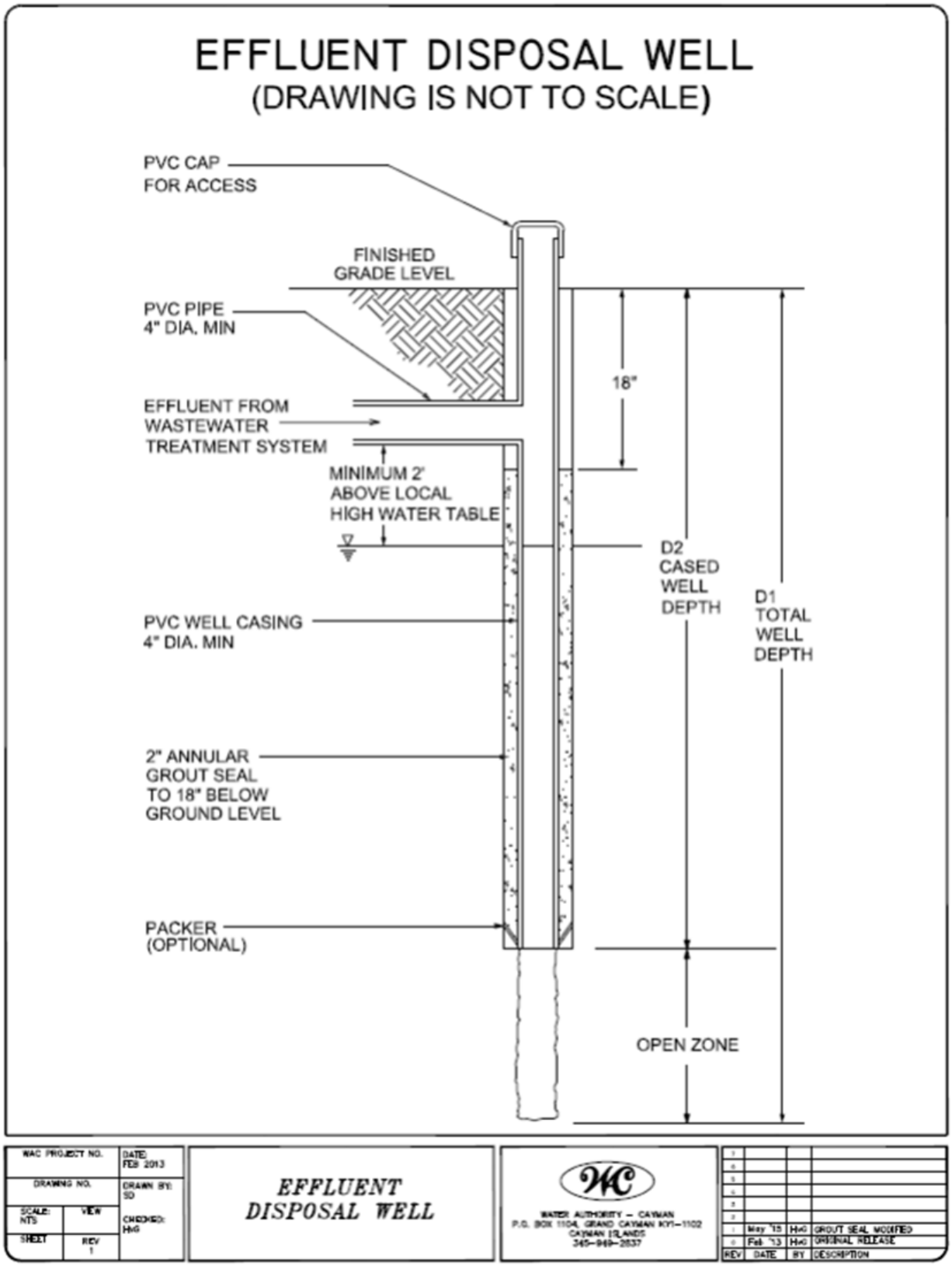


COMMERCIAL GREASE INTERCEPTOR					
Normal Dimensions					
Gal.	A	B	C	D	E
600	5'6"	3'6"	3'0"	3'0"	2'8"
750	6'0"	3'6"	3'6"	3'0"	4'10"
1000	6'0"	4'0"	4'0"	3'0"	5'4"
1250	6'6"	4'0"	4'6"	3'6"	5'10"
1500	7'0"	4'6"	4'6"	3'6"	5'6"

APPENDIX IV:


EFFLUENT DISPOSAL WELL
(DRAWING IS NOT TO SCALE)
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FOR ACCESS
FINISHED
GRADE LEVEL
PVC PIPE
4" DIA. MIN
EFFLUENT FROM
WASTEWATER
TREATMENT SYSTEM
MINIMUM 2'
ABOVE LOCAL
HIGH WATER TABLE
18"
D2
CASED
WELL
DEPTH
D1
TOTAL
WELL
DEPTH
PVC WELL CASING
4" DIA. MIN
2" ANNULAR
GROUT SEAL
TO 18" BELOW
GROUND LEVEL
PACKER
(OPTIONAL)
OPEN ZONE
WAC PROJECT NO.
DATE: FEB 2013
DRAWING NO.
DRAWN BY: SD
SCALE: NTS
VIEW
CHECKED: HMG
SHEET
REV 1
EFFLUENT
DISPOSAL WELL
WATER AUTHORITY – CAYMAN
P.O. BOX 1104, GRAND CAYMAN KY1–1102
CAYMAN ISLANDS
345–949–2837
1 May '15 HMG GROUT SEAL MODIFIED
0 Feb '13 HMG ORIGINAL RELEASE
REV DATE BY DESCRIPTION