



Learn more about construction wastewater filter equipment system in construction sites

Points to note about wastewater discharge in construction sites

Standards of waste discharge

➤ Purpose of installation of filter equipment system

The construction sector in Macao has developed prosperously in tandem with urban development in recent years. As a large amount of “construction wastewater” containing mortar, silt and other materials is produced in the construction period, such materials are prone to coagulate in the sewers if the construction wastewater is discharged into public pipes without going through effective filtration and treatment, posing risks of pipe blockage and flooding. Furthermore, the construction wastewater will seriously damage the structure of pipes, and clearing the pipes requires a lot of time and effort, as well as public resources. In addition, inappropriate handling of construction wastewater will also lead to the damage of equipment in municipal pumping stations and undermine the purification and processing capabilities of sewage treatment plants. Wastewater discharged into natural water bodies like the sea or rivers through stormwater drains will also cause severe pollution and imbalances in aquatic ecosystems. Therefore, people in charge of construction sites are required to install wastewater filter equipment suitable for construction works in the construction areas to isolate the suspended contaminants in the wastewater before discharge into sewers, so as to greatly reduce the accumulation and coagulation of materials like mortar and silt in the sewers. With suitable checks, clearing and maintenance of pipes, the filter equipment systems can effectively perform their normal function of filtering construction wastewater and prevent pipes from being blocked and damaged.

CCTV photograph of blocked pipes in *Rua Central de T'oi Sán*:



CCTV photograph of blocked pipe in *Estrada do Canal dos Patos*:



Therefore, before drawing up the construction plan of the project, the applicant for construction works should submit a design proposal for filtration and sedimentation of construction wastewater used for the temporary discharge of construction wastewater from the construction site. The proposal should include information about the drainage capacity of construction wastewater and stormwater, detailed drawing of the installation of temporary facility for discharge of wastewater (see annexe 1), schematic diagram of filter and sedimentation equipment (see annexe 2), explanation of the time needed for wastewater filtration and sedimentation, methods and frequency of cleaning the facility, etc. to facilitate the supervisory entity's monitoring and assessment of the proposal for temporary wastewater drainage from the construction site and regulation of the public pipe network by the Municipal Affairs Bureau (IAM). The construction wastewater filter equipment system of the site should be capable of collection, sedimentation and effective filtration.

During the stage of construction, all the construction wastewater discharged from the site is required to be treated by an effective "filter equipment system" to satisfy to the requirements in Annexe 10 of "Regulation of Water and Wastewater Drainage of Macao". The applicant is also required

to apply to IAM for “License for works on trench dredging in public streets of Macao” for connection of the temporary drainage pipes of the construction site, and strictly implement the requirements and regulations in the points to note for application. Based on the above, the person in charge of the construction site should use “all-in-one construction site wastewater treatment system” with suitable specifications and chemical and physical means of filtration in order to improve the efficiency of the treatment of construction wastewater.

The picture below shows construction wastewater discharged after treatment:



➤ **Treatment process and discharge of wastewater**

1. Time for sedimentation and filtration of wastewater: wastewater must be retained and undergo sedimentation for an appropriate amount of time to satisfy the water usage needs of construction;

2. Discharge of wastewater after treatment: Wastewater can only be discharged into approved drainage outlets after the wastewater has gone through the treatment process and the water quality satisfies the requirements and regulations of “Regulation of Water and Wastewater Drainage of Macao”;

➤ **Cleaning and maintenance of filter wells**

1. The person in charge of the construction site should perform checks on the filter equipment every day before water is used in the construction process and record the operation condition of the filter equipment system (including the operation condition of the equipment and whether the reservoir or pipes suffer from any damage or leakage, etc.). Mortar or silt accumulated in the filter well must be cleared regularly, though there is no set standard for the frequency of clearing. The frequency depends on the stage of construction. In general, a larger amount of construction wastewater is produced in the substructure works stage, so the volume of accumulated sediment in the well must be checked regularly depending on the usage and the well must be cleared when needed. The wastewater discharged from a well-functioning filter system equipment should be clear, without any obvious suspended contaminants. Generally, it is recommended that the filter well should be checked no less than twice a week, and more checks should be performed during the processes in which a large amount of muddy wastewater is produced (such as pile foundation and dredging and building of basements, etc.).
2. Attention should be paid to the following points when carrying out clearing, checks and maintenance of filter wells:
 - (1) During the clearing of filter equipment, the wastewater inside the area to be cleared and construction wastewater that has not undergone treatment must not be directly discharged into public drainage pipes.
 - (2) Cement, silt and other sediment cleared from the well must be handled

in accordance with the requirements of Environmental Protection Bureau or other relevant departments before transport to landfills or other suitable locations.

➤ **Inspections of discharge of construction wastewater from construction sites**

In accordance with laws and regulations, the functions and duties of IAM include conducting inspections of discharge of construction wastewater from construction sites. In accordance with Article 36 “General Regulations Governing Public Places” and Article 21 of Law no. 9/2018 “Establishment of Municipal Affairs Bureau”, the person in charge of construction site is obligated to comply with the inspection and regulation of IAM, such as providing a passage for IAM inspection staff’s entry into the location for inspection and record taking and producing license and other documents of the premises, etc. If the person in charge refuses to cooperate or does not comply, the inspection staff will issue a notification letter and initiate relevant penalty processes in accordance with the law to follow up on visible infractions in regard to discharge of construction wastewater, without prejudice to any criminal liabilities. IAM inspection staff will also check the wastewater discharge from inspection wells and drainage pipes on the periphery of the construction site. They will immediately initiate the procedure of issuing administrative penalty against suspected offenders in the construction site if there are signs showing illegal discharge of construction wastewater from the construction site.

➤ **Applicable penalties**

In accordance with stipulations in “General Regulations Governing Public Places” and “List of Infringements”, illegal acts requiring slight censure which involves discharge of wastewater or other liquid pollutants into stormwater drains or sewage drainage system in violation of the applicable technical regulations and rules are punishable by a fine of MOP600. If the illegally

discharged wastewater is poisonous or may be harmful to public hygiene or the environment, offenders who are legal persons are punishable by a fine from MOP2,000 to MOP10,000 (individuals are punishable by a maximum fine of MOP5,000). On the other hand, IAM will also transfer the case to the corresponding regulatory entity and corresponding penalties will be imposed on offenders if they have violated other laws and regulations.

➤ **Points to note before commencement of works in construction sites**

1. Before commencement of works in construction sites (i.e. before carrying out geological prospecting and basic construction works), CCTV checks should be performed in the public drainage network adjacent to the construction site to effectively prove the actual condition of the drainage pipes before commencement of construction works. A notification to the Division of Drainage is required to be sent 7 working days before the photographs are to be taken, so that IAM can send staff to take and file record;
2. The contractor has to assess the impact of construction factors on the drainage of existing drainage pipes, and compile a case analysis to handle and tackle this impact;
3. The contractor has to perform on-site check to determine whether the existing drainage pipes have any conflict with the construction location before the works begin. If the relocation of existing drainage pipes is involved, the contractor has to provide a re-routing proposal in advance. The re-routing works can only begin after enquiring IAM and obtaining its approval. Existing drainage pipes must not be removed before the completion of laying down new drainage pipes. The Division of Drainage of IAM has to be notified in advance before the removal of drainage pipes to facilitate on-site inspections and confirmation;
4. A mechanism for checking the discharge from construction site and operation of existing drainage pipes during the construction works period

has to be provided;

5. Before planning of construction works, a proposal for handling “construction wastewater” of the construction project has to be drafted. The proposal must be designed according to the scope of the construction works, and an effective “sedimentation and filter equipment system of construction wastewater” must be installed to ensure that the water quality of the construction wastewater discharged satisfies the requirements and provisions of “Regulation of Water and Wastewater Drainage of Macao” and Points to Note for Application for “License for works on trench dredging in public streets of Macao—Connection of temporary drainage pipes of construction sites” (see Annexe 3);
6. Before commencement of works in construction sites for buildings and large-scale infrastructure construction, it is required that an “all-in-one wastewater treatment system for construction sites” with chemical and physical means with suitable specifications must be in place, so as to strengthen the effectiveness of construction wastewater treatment and prevent the accumulation of silt or blockages in public sewers;
7. Before commencement of works on smaller constructions sites with no basement or underground water supply (low-rise buildings generally smaller than 400m²) or infrastructure, a tertiary sedimentation tank must be installed. Treated construction wastewater can only be discharged if it satisfies the requirements in the regulations and is discharged into a “stormwater catch basin” with grated cover outside the enclosure of the construction site through the temporary drainage pipe connected to the construction site approved by IAM in “License for works on trench dredging in public streets of Macao”;
8. The design proposal for filter and sedimentation equipment of construction wastewater should include information such as discharge volume, detailed drawing of the installation of the facility (a vehicle wash bay can be installed if needed), time for filtration or sedimentation of wastewater, the



method and frequency of washing and cleaning the facility, so as to facilitate the regulatory entity's needs to monitor and assess the temporary discharge proposal of the construction site and the regulation and supervision of IAM on the public drainage network.

9. Discharge of any wastewater produced in construction sites into municipal drainage system through water flow on road surfaces or pipes placed on road surfaces is not allowed;
10. All original manholes of drainage pipes or drainage outlets in the construction site area must not be used for discharge of construction wastewater. Any violation found will be viewed as illegal discharge;
11. For construction sites where construction wastewater need not be discharged into municipal drainage system, IAM should be notified through the regulatory entity and a feasibility plan and proof should be provided if any wastewater is stated to be used for internal recycling;
12. If any facility used for discharge of construction wastewater produced in construction sites occupies public streets, an application must be made to the Transport Bureau.

Friendly reminder

Domestic wastewater of construction staff (such as discharge from toilets) should be stored in an independent storage toilet and removed by waste disposal vehicles, and should not be handled by the “all-in-one construction site wastewater treatment system”.

➤ **Incidents of blockage of drainage pipes caused by discharge of construction site wastewater**



Recently, heavy rainfall caused widespread flooding in *Rua Central de T'oi Sán*, which seriously affected public passage. IAM immediately investigated the issue of drainage pipes through extensive closed circuit television (CCTV) of drainage pipes, and found that a section of pipes near *Estrada do Canal dos Patos* was severely blocked, which undermined the drainage of stormwater in the area near *Rua Central de T'oi Sán* and prevented effective drainage of stormwater on road surfaces during periods of heavy rainfall.

Over the next few days, IAM sent staff to carry out inspection of the affected drainage pipes, during which they found that two stormwater drains had been almost fully blocked by cement and silt and require

emergency clearing. After about one month of non-stop work, over 120 cubic metres of cement fragments, construction waste and garbage have been cleared, which is equivalent to the transportation capacity of 50 3.5-tonne trucks. After assessment by engineering staff, the blockage of pipes is caused by illegal discharge generated by construction works recently done in the surrounding areas.

As the construction waste coagulated in drainage pipes severely affects the structure of drainage pipes and reduce the pipe volume, causing a higher difficulty in clearing blockages, use of construction means is often needed to demolish the whole drainage pipe or replace it, costing great social expense.

Download relevant documents

Project permit application form



Scan the code to browse and download the trilingual version
(Chinese, Portuguese and English)

<https://www.iam.gov.mo/e/pdf/eformDetail/PDF393>

Decree Law no. 46/96/M dated 19 August — Approval of Regulation of Water and Wastewater Drainage of Macao



(Chinese)



(Portuguese)

Scan to browse

Chinese: https://bo.io.gov.mo/bo/i/96/34/declei46_cn.asp

Portuguese: <https://bo.io.gov.mo/bo/i/96/34/declei46.asp>



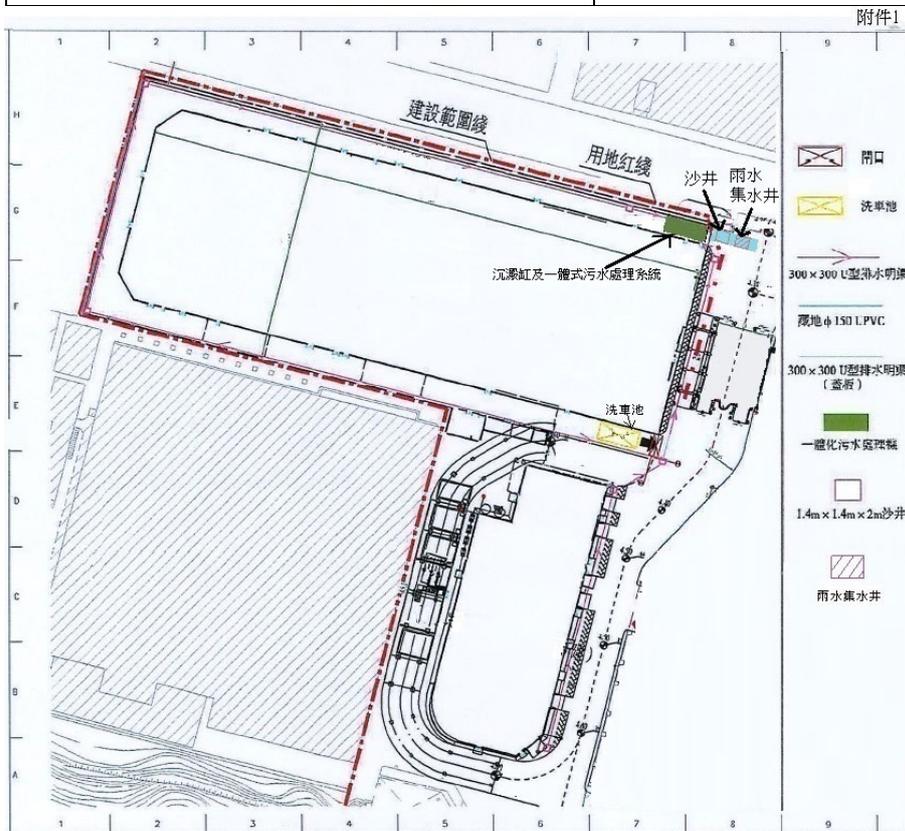
*Please read the corresponding section for more information about Annexe 10
“General regulations on discharge of domestic and industrial wastewater into
receiving water bodies”.*

Annexes:

1. Detailed drawing of the installation of temporary facility for discharge of wastewater
2. Schematic diagram of filter and sedimentation equipment
3. Points to note for application for “License for works on trench dredging in public streets of Macao – Connection of temporary drainage pipes of construction sites”



| | |
|---------------------|--|
| 附件一 | Annexe 1 |
| 建設範圍線 | Boundary of construction area |
| 用地紅線 | Property line |
| 沙井 | Manhole |
| 雨水集水井 | Stormwater catchpit |
| 沉澱缸及一體式污水處理系統 | Sedimentation tank and all-in-one sewage treatment system |
| 洗車池 | Vehicle wash bay |
| 閘口 | Gate |
| 300x300 L 型排水明渠 | 300x300 L-shaped surface channel |
| 藏地 150LPVC | Underground 150LPVC |
| 300x300 U 型排水明渠 | 300x300 U-shaped surface channel |
| 一體化污水處理機 | All-in-one sewage treatment machine |
| 1.4m x 1.4m x 2m 沙井 | 1.4m x 1.4m x 2m manhole |
| 臨時排水設施佈置大樣圖 | Detailed drawing of the installation of temporary facility for discharge of wastewater |

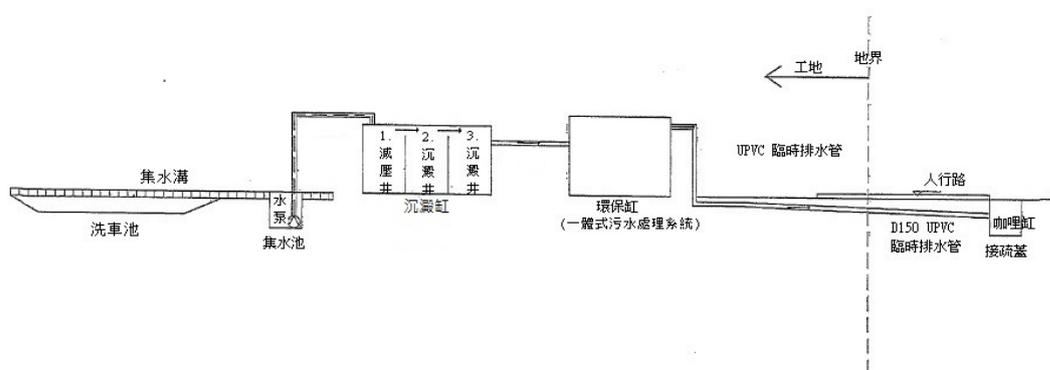


臨時排水設施佈置大樣圖



| | |
|-----------------|--|
| 附件二 | Annexe 2 |
| 集水溝 | Gully |
| 洗車池 | Vehicle wash bay |
| 集水池 | Catchpit |
| 水泵 | Water pump |
| 減壓井 | Bleeder well |
| 沉澱井 | Sedimentation well |
| 沉澱缸 | Sedimentation tank |
| 環保缸 (一體式污水處理系統) | Wastewater treatment tank (All-in-one sewage treatment system) |
| UPVC 臨時排水管 | UPVC temporary drainage pipe |
| 工地 | Construction site |
| 地界 | Boundary of the construction site |
| 人行路 | Pavement |
| D150UPVC 臨時排水管 | D150UPVC temporary drainage pipe |
| 咖喱缸 | Gully trap |
| 接疏蓋 | Grated cover |
| 過濾沉澱設備示意圖 | Schematic diagram of filter and sedimentation equipment |

附件2



過濾沉澱設備示意圖

Points to note for application

“License for works on trench dredging in public streets of Macao – Connection of temporary drainage pipes of construction sites”

1. Installation of an adequate and suitable “filter equipment system” in the construction site is required, so that the discharged “construction wastewater” satisfies the requirements and regulations of “Regulation of Water and Wastewater Drainage of Macao”. In addition, the information, drawings and explanation about the system must also be submitted during application for license. Furthermore, during the period when the license is utilised, daily testing at a fixed time is required, and a “Third Party Water Quality Test Report” satisfying the requirements in the mentioned regulation relevant to discharge of wastewater must be submitted to the division every half month. The cover page of the test report must be printed using the format of the annex;
2. If the total suspended solids in the mentioned “water quality test report” is in the range of 60.1-180mg/L (stormwater drain), the situation must be improved timely within 3 days. If the total suspended solids exceed 180mg/L (stormwater drain), the division can declare the relevant license “invalid”, and the applicant must remove the relevant pipes and restore all facilities;
3. Application for installation of a “temporary pipe” with suitable measurements is required, so that “construction wastewater” is discharged into the grated wall part of the “stormwater catch basin” (gully trap) (water must enter by gravity flow before drainage into the catch basin) of the stormwater system outside the enclosure of the construction site. If there is also discharge of “domestic wastewater” from the construction site, another “temporary pipe” must be installed and connected to the wastewater system of drainage pipes in public streets;
4. Applicants must note that the “work period/validity period of use” of the license spans the whole period from trench dredging to the time the “temporary pipes” are properly removed after completion of use;
5. All “temporary pipes” must be removed upon the end of the “validity period of use” of the license, so as to reach the basic requirements of inspection and acceptance of the construction project;

6. The applicant must state the corresponding measures to be taken to prevent wastewater with mud and silt from entering the public drainage network when heavy rainfall causes rapid accumulation of a large volume of wastewater in the construction site which exceeds the capacity of the mentioned “filter equipment system”;
7. The applicant must provide the design proposal of the wastewater filter system with the operating principles (including the drainage capacity, layout drawing of the installation of the facility, drainage capacity of the wastewater processing installation in general circumstances, methods and frequency of cleaning the facility, etc.) and other technical information for reference;
8. The applicant must note that all rules not listed above must be in accordance with the requirements and regulations of “General Regulations Governing Public Places”;
9. The person in charge of the construction site must comply with the random inspection work of the Municipal Affairs Bureau (IAM), including opening the manhole covers on public streets and providing safe passage for entry into the location of the filter equipment system in the construction site;
10. If the former or original water drainage/collection system still exists in the construction site, the drainage outlet of the original water collection/discharge catch basin or drainage pipes must be completely closed or removed before the construction works start (photographic proof is needed), so as to prevent the wastewater of the construction site from discharging into the public street drainage pipes directly through the mentioned system.

Division of Public Roads / Department of Public Roads and Drainage

25 June 2021