Waughter

AKTION CONSULTANCY

Volume 3 : Edition 3 – Role of Civil Engineering in Water & Waste Water Management *Apr 01, 2023*

Dear Water Warriors,

70% of planet is Water!!

In Water Management same is the significance of Civil Engineering which can be up to 70% of the project cost. So, can a Water Engineer do away with Civil Engineering?

Unfortunately – No.

This issue of 'Waughter', let's understand "Fundamentals of Civil Engineering in Water & Wastewater Management".

Nidhi Jain – Civil Engineer

What is Civil Engineering?

Civil engineering in Water and Wastewater refers to the application of engineering principles and practices to design, build, and maintain water supply and wastewater treatment systems, including construction of tanks and roof 😊, not just it.

Civil engineers working in this field must have a strong understanding of:

1. Water Chemistry
2. Environmental Regulations
3. Hydraulics.

They design and oversee the construction of pipelines, pumps, and treatment facilities, ensuring that they meet safety and environmental standards.

Role of Civil Engineering

Some of the tasks that civil engineers in Water and Wastewater may undertake include:

1. Developing plans and specifications for Water and Wastewater treatment systems
2. Evaluating the feasibility of Water and Wastewater projects
3. Designing hydraulic systems, including pipes, pumps, and treatment systems
4. Conducting environmental impact studies
5. Ensuring compliance with environmental regulations
6. Managing construction projects and overseeing the work of contractors
7. Conducting inspections and maintenance to ensure systems are functioning properly

Overall, Civil Engineering in Water and Wastewater is an important field that plays a crucial role in providing safe and sustainable water resources for communities.

Developing Plan & Specification

It is a complex process that requires the expertise of a civil engineer. The following are some general steps that a civil engineer may follow to develop a plan and specification for a water treatment plant:

PureCODe™

COD REDUCTION MEDIA

PureCODe is an absorbent media for the **lowering of recalcitrant COD** (Fine polishing of tough to treat COD) which subsequently helps in meeting stringent discharge norms in various industries such as textiles, chemicals, pharmaceuticals, etc. **This media is also regenerable on-site.**

- REGENERABLE IN NATURE
- DISCHARGE NORMS COMPLIANCE
- MINIMIZING OVERALL WASTE
- REUSE OF MORE WATER
- AVOIDING FINES & SHUTDOWNS

CURIOUS **HOW** IT WORKS?

*Try our **PureCODe lab trial kit** at your facility by and observe the COD reduction yourself!*

www.purewaterent.net
+91 7506001071
krishna@purewaterent.net

Volume 3 : Edition 3 – Role of Civil Engineering in Water & Waste Water Management Apr 01, 2023

Developing Plan & Specification

1. Assess the needs: The first step is to assess the needs of the community or area that the water treatment plant will serve. This includes analysing the water demand, water quality, and water source.

2. Select a Water Treatment Process: Once the needs have been assessed, the civil engineer will select a water treatment process that is appropriate for the specific water source and water quality.

3. Design the Water Treatment Plant: Based on the selected water treatment process, the civil engineer will design the water treatment plant. This includes determining the size of the plant, the layout of the equipment, and the piping systems.

4. Develop specifications: The civil engineer will then develop specifications that outline the requirements for the equipment and materials needed for the water treatment plant. These specifications will include details such as the type and size of pumps, the materials used for piping, and the treatment chemicals required.

5. Review and approve: The plan and specification for the water treatment plant will then be reviewed and approved by regulatory agencies, stakeholders, and other experts to ensure that the design meets all necessary standards and requirements.

6. Construction and commissioning: Once the plan and specification have been approved, the water treatment plant can be constructed and commissioned. The civil engineer will oversee the construction process and ensure that all equipment and materials meet the specifications outlined in the plan.

7. Ongoing maintenance and operation: Finally, the civil engineer will be responsible for overseeing the ongoing maintenance and operation of the water treatment plant to ensure that it continues to meet the needs of the community it serves.

Evaluating Feasibility

Civil engineers evaluate the feasibility of water and wastewater projects by considering a range of factors, including:

1. Water source: The availability and quality of the water source must be assessed to ensure that it can provide sufficient water for the project.

2. Treatment process: It must be evaluated to ensure that it is adequate to meet the required water quality standards.

3. Environmental impact: The impact of the project on the environment must be assessed. As we say we must know where to Dump Impurity Removed.

4. Cost: The cost of the project must be evaluated to ensure that it is economically feasible and fits within the project budget.

5. Regulatory compliance: Compliance with regulatory requirements, such as local, state, and federal laws and regulations, must be evaluated.

6. Public health and safety: The impact of the project on public health and safety must be assessed to ensure that the project will not pose a risk to the public.

7. Technical feasibility: It must be evaluated, including the availability of necessary equipment and resources and the ability to manage the project effectively.

Waughter

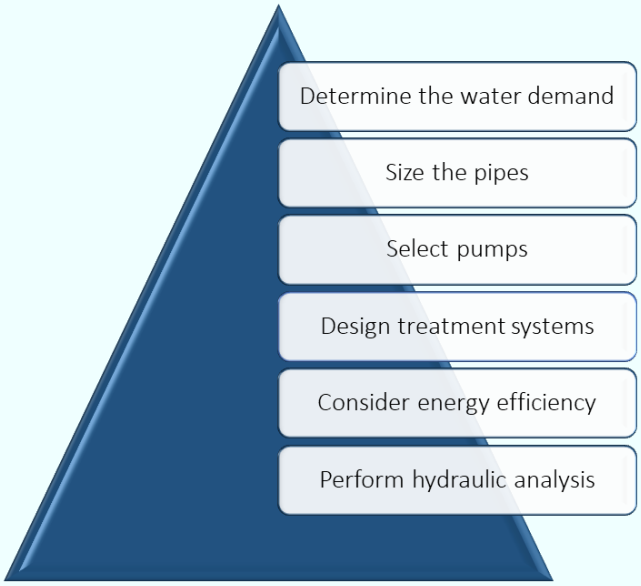
AKTION CONSULTANCY

Volume 3 : Edition 3 – Role of Civil Engineering in Water & Waste Water Management *Apr 01, 2023*

Designing Hydraulic Systems

Designing hydraulic systems for water treatment plants requires a civil engineer to have a strong understanding of fluid mechanics and the principles of hydraulic engineering. The engineer must consider factors such as flow rate, pressure, and head loss when designing the systems.

Here are some key steps a civil engineer may take to design hydraulic systems in a water treatment plant:



By following these steps, a civil engineer can design hydraulic systems that are efficient, reliable, and effective in treating water in a treatment plant.

Ensure compliance with environmental regulations

Compliance with environmental regulations is a critical aspect of designing a water treatment plant that protects public health and the environment.

Civil engineers must take into account the potential environmental impacts of their designs and ensure that the plant meets all relevant environmental regulations to minimize those impacts.

For more, you can refer "Waughter Magazine Volume 2 Edition 4".

Conduct Environmental impact study

Civil engineers conduct environmental impact studies to evaluate the potential impact of a construction project on the environment.

1. Define the Project
2. Identify potential environmental impacts
3. Assess the significance of impacts
4. Develop mitigation measures
5. Document the study
6. Monitor and report on environmental impacts

Overall, conducting an environmental impact study requires a thorough understanding of the project, the environment, and the regulatory requirements.

Manage Construction Project

Civil Engineers play an essential role in managing construction projects. Their responsibilities include:

1. Designing,
2. Planning, and
3. Supervising

construction projects from start to finish, ensuring that they are completed on time, within budget, and to the required quality standards.

Here are some key steps that a Civil Engineer can take to effectively manage a construction project:

In summary, a Civil Engineer must take a systematic approach to managing a construction project, from planning and resource management to quality control, risk management, communication, and project monitoring.

Conduct Inspections and Maintenance

Civil engineers conduct inspections and maintenance to ensure that the systems they have designed are functioning properly by following these steps:

By following these steps, you can help to ensure that the Water and Wastewater Treatment Plant is operating efficiently and effectively, and that it is meeting the required quality standards.

Scope of Civil Engineer

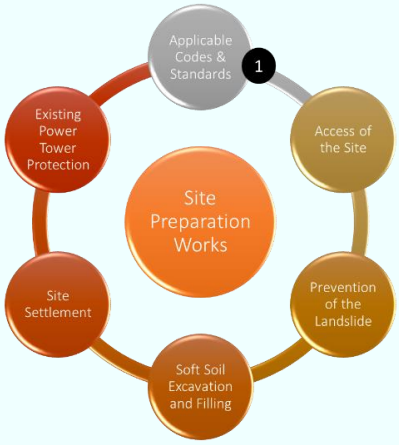
Civil engineers play a vital role in the design, construction, and maintenance of Water and Wastewater Treatment Facilities.

They are responsible for ensuring that these facilities are designed to meet the necessary standards, are built safely and efficiently, and can provide the required level of service.

To that extent as a Civil Engineer, they are Equally responsible for Site Preparation as well as Architectural design of the Water and Wastewater Treatment Plant.

1. Site Preparation Works

For Detailed Design of the Water & Wastewater Treatment Plant you must take care of these steps as a good Civil Engineer.



2. Civil Works

This Section treats the detailed design of Civil Works of Water & Wastewater Treatment Plant.

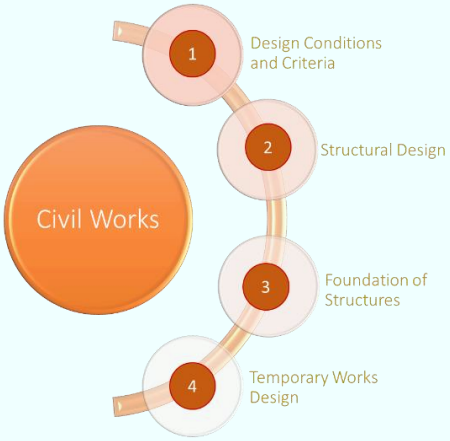
Civil works consists of:

1. Structure Works
2. Earth Works and
3. Temporary Works.

The Civil Works cover the substructure design, and the architectural works cover the superstructure design.

All structures are designed by reinforced concrete except effluent pipe by pre-cast concrete or Engineered Plastics or GRP.

There are below steps to follow while design of Water & Wastewater Treatment Plant:



Waughter

AKTION CONSULTANCY

Volume 3 : Edition 3 – Role of Civil Engineering in Water & Waste Water Management *Apr 01, 2023*

3. Architectural Works

Architecture of the WWTP is responsible to provide:

- Functional Requirement of every equipment
- Floor Plan
- Sections & Elevation
- Finishing material

They are equally responsible for the structural works and that may include:

1. General Specification of Column, Slab and Wall
2. Design Condition & Specification of Structural Component
3. Foundation detailing.
4. Maximizing Volume in Minimum RCC (Cost Control)
5. Optimum and Judicial use of Space
6. Use Common Walls to the extent possible – remember for every 4 Rectangular Tank, the 5th is free.
7. All tanks shall have a slope to facilitate emptying a tank fully.
8. Always have a corner where everything can flow and dewatering sump pump do the rest.
9. If all the tanks are kept at same height – construction and man movement is easy.
10. For hydraulic levels – the position of puddle point is important and not necessarily different height.
11. For aesthetics, even all puddles can be at same height (least) and the levels can be maintained by inverted Elbow.
12. Line tanks that are expected to have corrosive fluids.
13. If Tanks contain item that are submerged e.g. clarifier, Aeration Tank etc. engineer the civil design to access all points by walking on Slabs and removal of all inserted items without emptying tank – with minimum efforts. Remember now a days even shop shutters are operated by switches and not be human labour.
14. Ensure Process drains do not receive rain water – it's a big environmental non-compliance observed by PCB officials.
15. Several estate have not completed abolished the practice of UG Tanks and expect everything to be above FFL, so architectural view and easy to walk in plant is important.

जल जीवन जननी !!

Our world is Waughter

The technical knowledge share attempt of Aktion Consultancy and the contents in the magazine shall be qualified by Sanjeev Srivastava our Technology Lead.

Our next edition focuses on: "Innovations and Ideas that are Different but need a Consideration"

Please feel free to contact Ms Nidhi Jain 95128 55227

Aktion Consultancy
C 1305, Rajyash Rise
New Vasana,
Nr Vishala Circle,
NH-08,
Ahmedabad - 380 051 India

Alka Srivastava – Founder