iNODE

The Point With Infinite Possibilities

WATER TREATMENT PLANT SOFTWARE

User Guide

ABOUT US

iNODE Software Company is incorporated with sole aim of developing advanced SAAS products for applications in Civil Engineering. We aim to automate the pre and post tender and the design process with efficient use of Artificial Intelligence. At the same time, the software also gives equal control on the design inputs & processes solely to humans, which develops confidence amongst the designers. In addition to this, our products also provides systematic cloud storage systems thereby providing lifelong data of civil structures.

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This document guides a user with all the necessary information required to familiarize and operate iNODE WTP Design Software.

If you have any questions not covered in this user guide, please contact our helpdesk at –
support@inodedesign.com

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INTRODUCTION

1.1 GENERAL INFORMATION

iNODE WTP is a simplified SAAS product for Hydraulic Design of Drinking Water Treatment Plants. The design is in accordance with CPHEEO and relevant IS Manuals/Codes. This product is powered by Artificial Intelligence and generates standard, detailed, and explanatory Design Reports, Hydraulic Drawings and Tender Validation Reports as output.

1.2 iNODE FEATURES

- ☑ Design Management Portal
- ☑ Design and Drawing Portal
- ☑ Proof Checking Portal
- ☑ Educational Portal

This software has been designed specifically for assisting design ease for the upcoming Government Mission to facilitate Drinking Water to the entire country by the year 2024. It will boost uniform design standards wherein ultimately design and peer review time will be saved keeping in account all the necessary standard design codal practices are maintained.

As far as time is considered, iNODE enables Hydraulic Design of WTP with generating standard Design Reports and Drawings within 45 minutes which is super speedy when compared to the average design time required currently of 15 days. Further reducing peer review time in Departments and Third-Party Reviewers to 3 days is again super speedy when compared to the current requirement of minimum 30 days (Assuming 15 days at each Office). With Cloud Data Management iNODE allows users to download only the latest design documents and drawings thereby eliminating confusion. These documents can be downloaded from any device at any place.

Since all the calculations are performed on server there is no specific requirement for hardware.

1.3 USES AND SOFTWARE BENEFITS

Following are stages that the software highlights:

- ***Pre-Tendering Stage***

iNODE will provide WTP design insight report and drawings required for the proposed Water Treatment Plant. This will help the concerned authority to estimate exact land requirement, Billing of Quantities (BOQ), & Cost estimation.

- ***Post Tendering Stage***

iNODE designs Water Treatment Plant in accordance with CPHEEO Manual and Tender requirements. Further the Proof Check Portal provided by iNODE helps departments and Third-Party Proof Checkers to perform design validations efficiently with feature enabling direct contact with the designer.

1.4 SOFTWARE OUTPUT

1. Detail Design Report
2. Tender Validation
3. Design Insight Report
4. Hydraulic General Arrangement Drawings

FEATURES

Design Pace

iNODE comes with a feature of the required design data and standard design process for designing an element, compiled in a single screen. Due to which the design of an element is quicker than ever before. In addition to this the designer can be carefree about the code compliances as iNODE makes sure the design is always within the permissible requirements of the codal provisions.

Cloud Data

Loosing design Data is not a fear anymore. iNODE being a web-based software all the content inclusive of the designer's design data in the form of reports, drawings are always saved on cloud and readily available for access from any location at any defined time. Unique feature of iNODE makes sure that the user always downloads the latest updated design documents and drawings.

Precision

iNODE provides user with validation checks at every design step thereby ensuring the designer follows all the codal recommendation. PDF generate helps reduction of errors, rework and thereby minimizing duplication of work.

AI Boost

iNODE is boosted with artificial intelligence technology giving it a unique ability to recommend values to the designers on the basis of codal provisions and past design data.

Reports

The highlight of iNODE is the generation of detailed design reports inclusive of all the formula used and all the required codal provisions. Approvals is at a clinch now due to the clarity of design conveyed through the reports.

Compatibility

iNODE is compatible with most of the leading analysis software used across industry. This helps you to upgrade the design process while still using the existing infrastructure.

Efficiency

The stake holders are now always in loop with the built-in access feature to the system. iNODE ensures that stake holders use latest design provisions, and all their comments are address accordingly, thus improving overall project efficiency.

Proof Check

Proof checking the design before its execution is the need of the hour. Taking into account the importance of proof check, iNODE is powered up with a never seen before portal to check and approve the designs with pace & precision. It also ensures all the codal requirement are take into consideration.

Drawing

iNODE can generate drawings at a single click which could be used as general arrangement (GA) / concept drawings for further development and approvals.

BENEFITS

Professionals

- Design Pace & Efficiency
- Time Optimization
- Auto Documentation
- Revision Updates in all Documents
- Online Submission of Design
- Performing Online Proof Checking

Students

- Learn Hydraulic Element Designs
- Learn Head Loss Calculations
- Learn Hydraulic Report Generation
- Learn Hydraulic Drawing Generation
- Testing & Reading - Corelating Design Reports & Drawings via Special Validation Assignments

Institutes

- Helps Students Generate Industry Standard Reports & Drawings
- Institutes can Perform Design & Drawings of WTPs
- Institutes can Proof Check More Precisely and Efficiently saving Professor's Time

SYSTEM REQUIREMENT

Operating System

WINDOWS

APPLE

LINUX

Systems Configuration

- Minimum 2 GB RAM
- Compatible with all Intel Processors
- Compatible with Apple M1 Processor
- No Requirement of Graphics Card

Browsers

SAFARI
Apple

CHROME
Google

FIREFOX
Mozilla

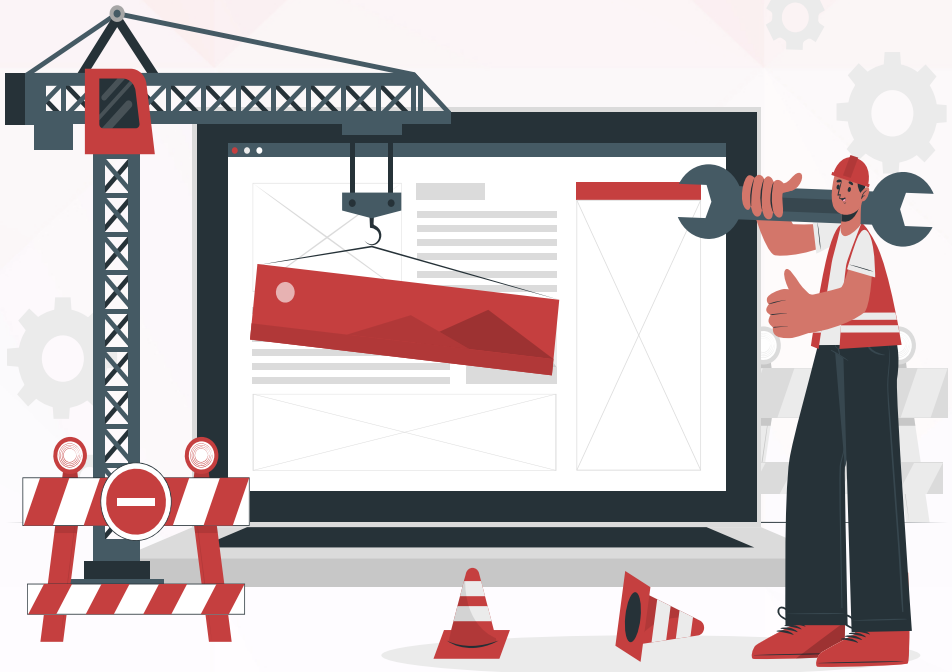
EDGE
Microsoft

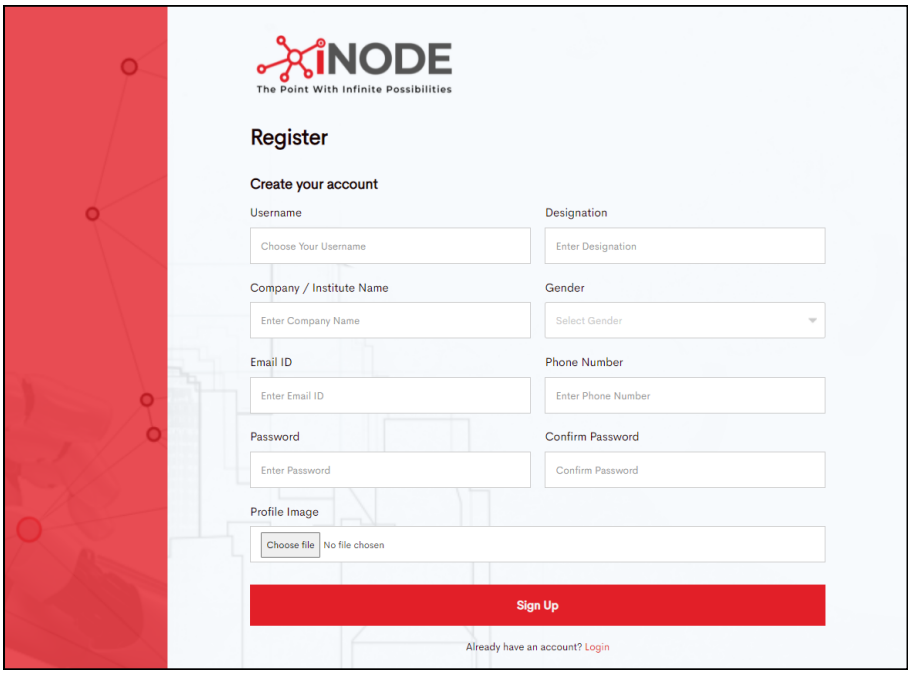
**iNODE WTP is a design software. For the best user experience it is recommended to use screens with sizes 13” and above.

iNODE

The Point With Infinite Possibilities

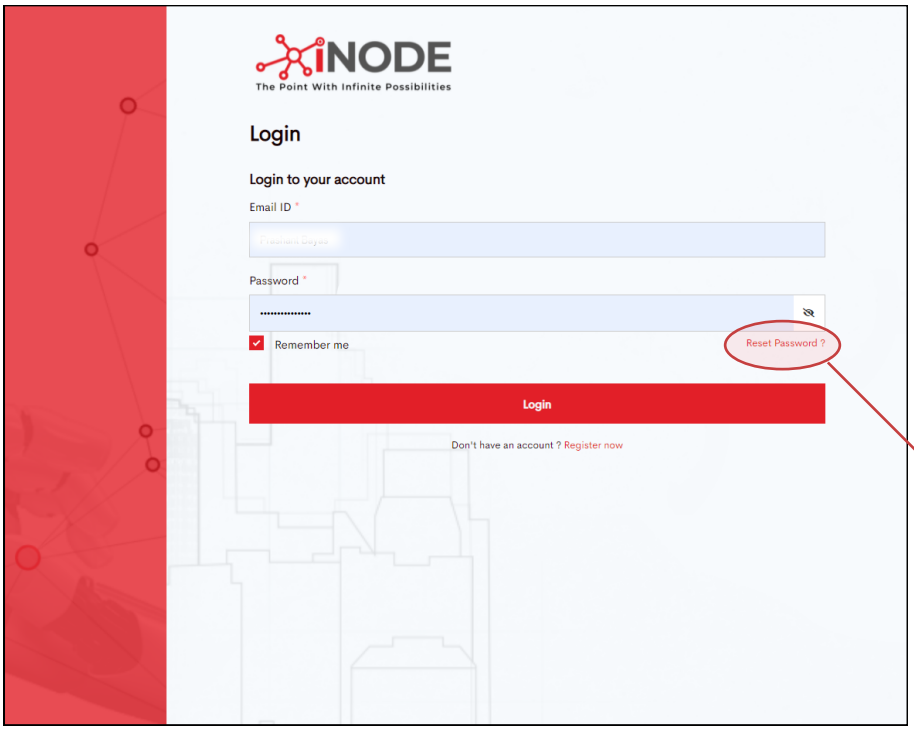
LOGIN AND DESIGN MANAGEMENT PORTAL





New Registration

New users can click on ‘Register’, enter your details and then click on ‘Sign Up’.

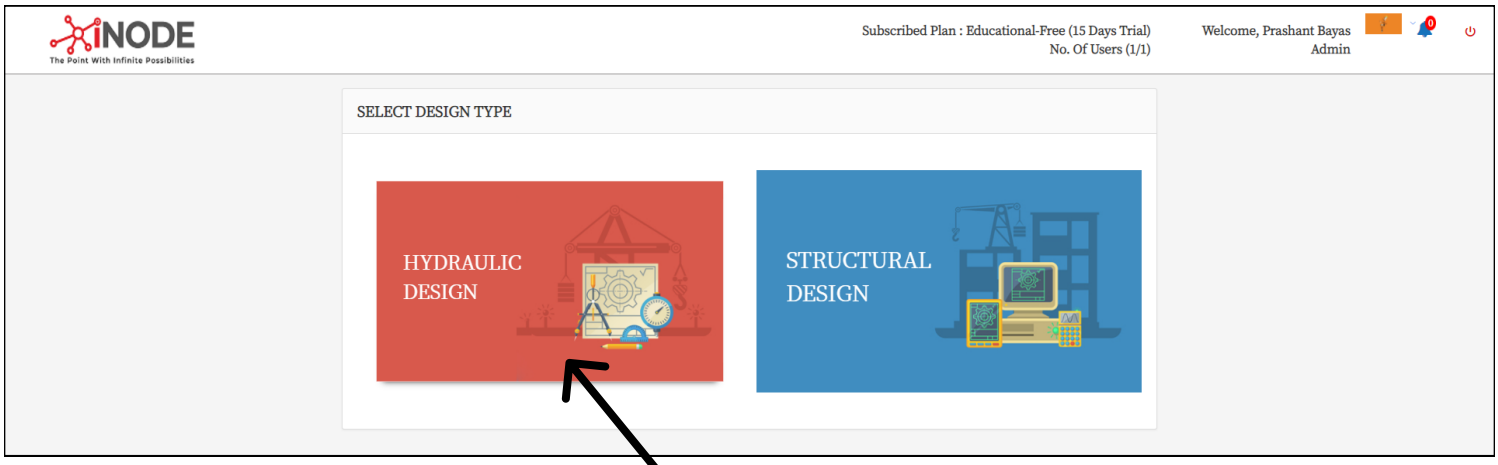


Existing Account

Enter your Email ID, Password and click on ‘Login’

In case you forget your Password, use this.

Know Your Dashboard

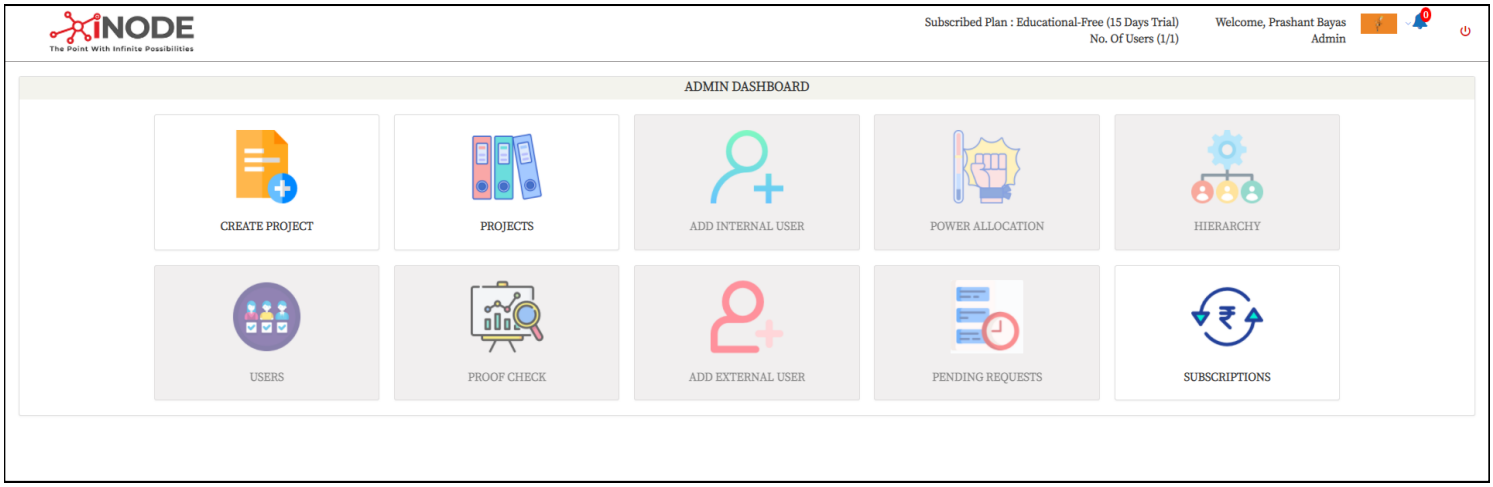


Click on
'Hydraulic Design'.

Subscription data (Free user)

User Information

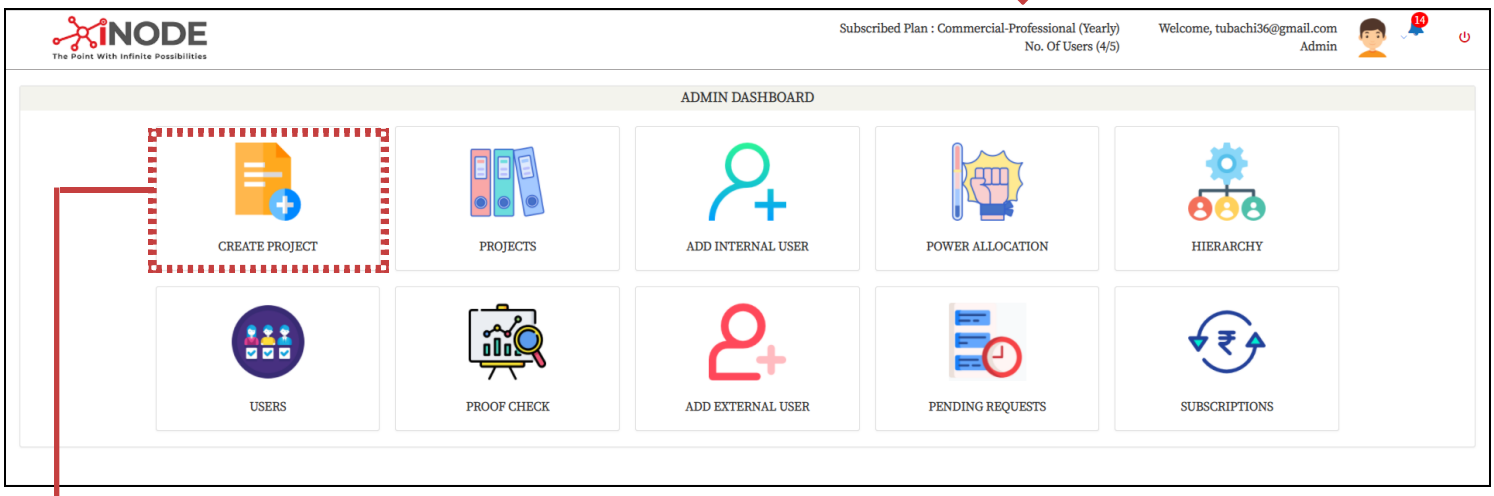
Logout

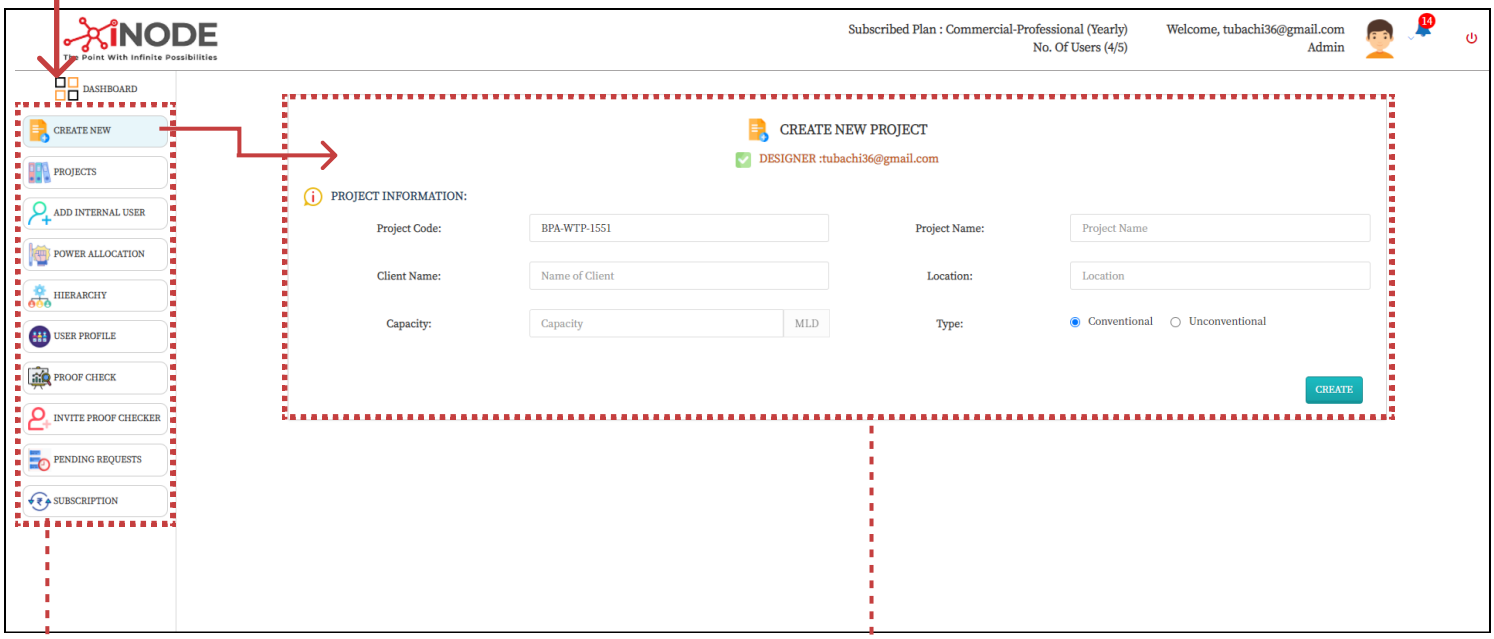


The above iNODE dashboard's user interface is specially designed for quick access and ease to view and manage data.

Knowing Individual Features

Dashboard for a Subscribed user

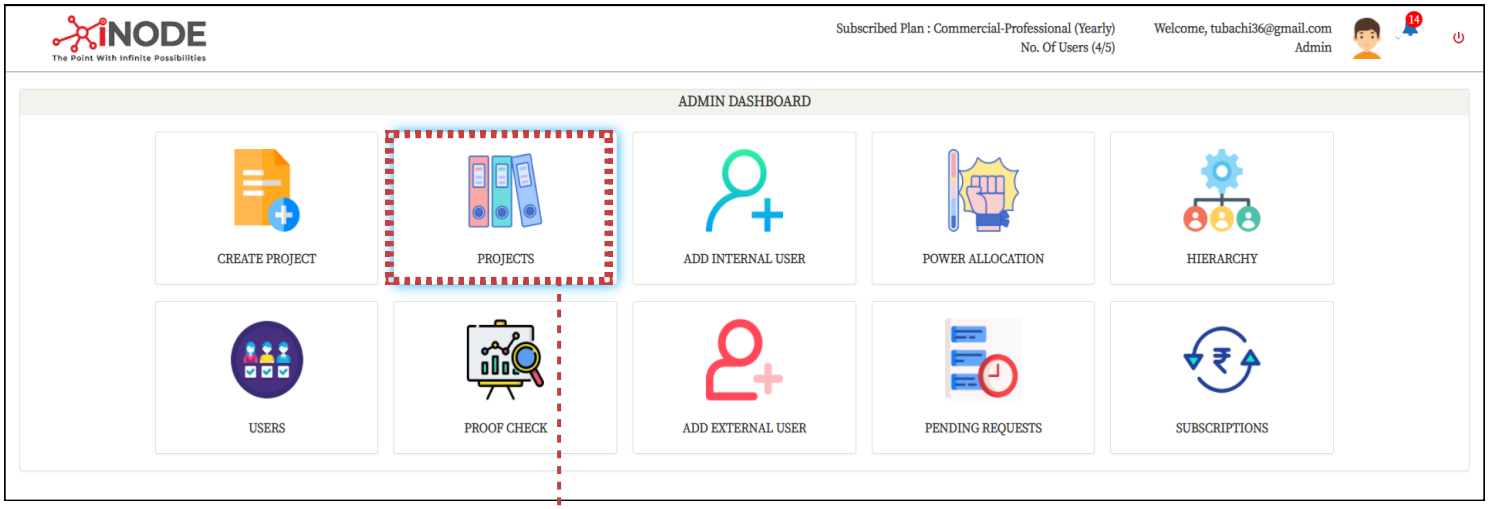


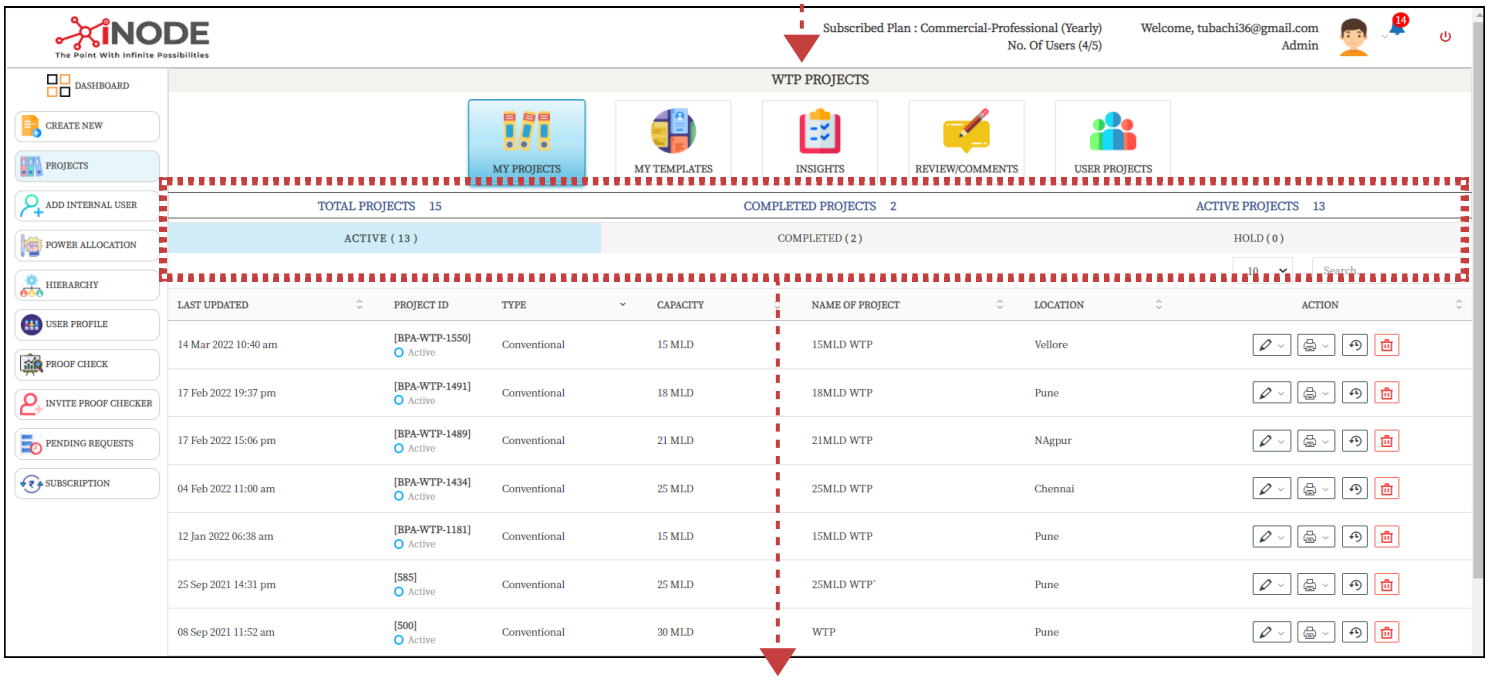


Main Options under Dashboard

Create a new project simply by filling the information required

Access your Projects (Completed/Ongoing)

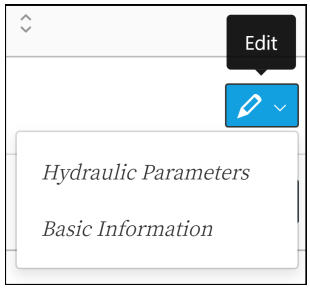




User can select the options out of these three by clicking on them for accesing active/completed or On hold projects

Understanding the Icons

EDIT

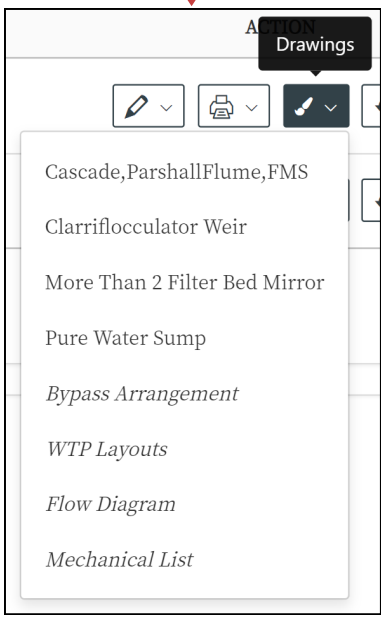


A user can edit any of the projects for its hydraulic parameters or its Basic Information by clicking on the options as shown.

PRINT

A user can print with ease by clicking on the options as shown for design reports/ methedology reports or validation reports of any particular project.

DRAWINGS



A user can print with ease by clicking on the options as shown for design drawings/ Layouts / Flow diagram or by pass arrangemnet where valid of any particular project.

NOTE:
On selection of completed project the same icon details can be referred.

HOLD

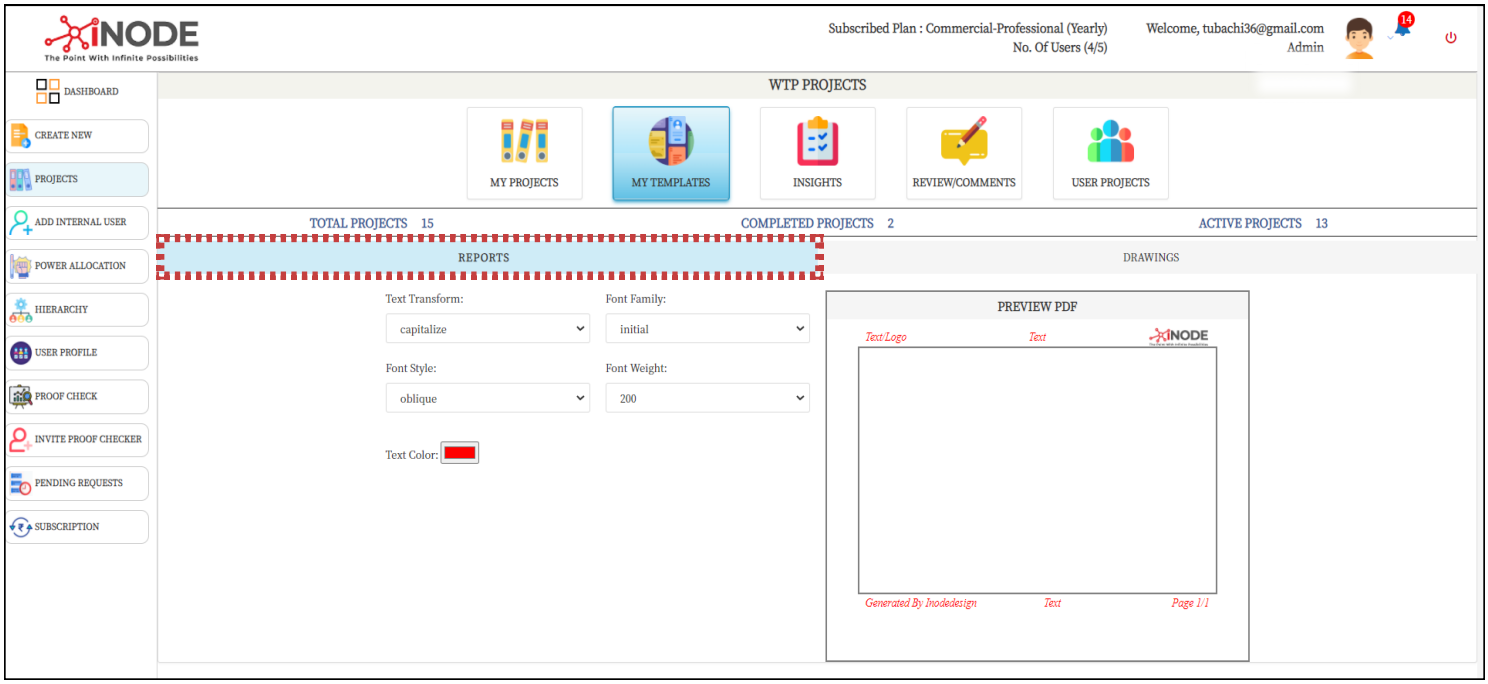
A user can assign any project on hold whenever it is needed by clicking on the icon as shown above.

DELETE

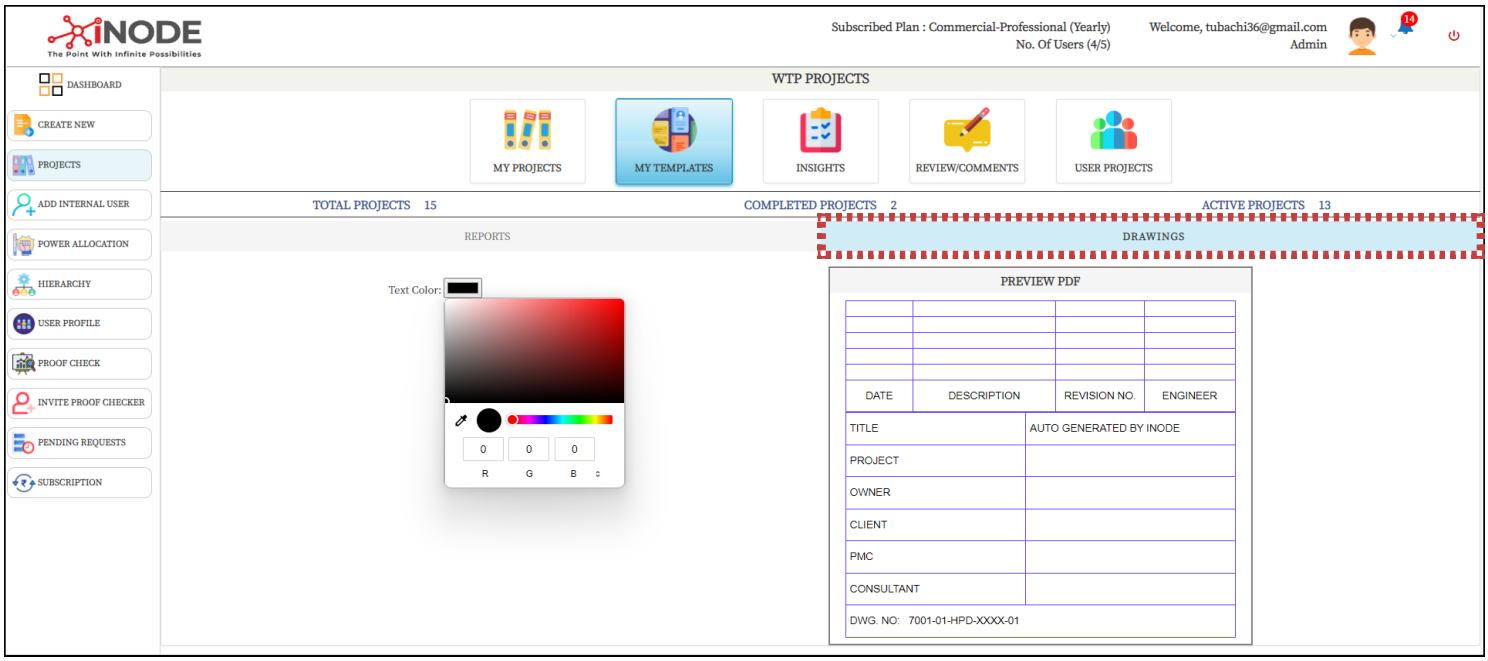
A user can delete any project by clicking on the icon as shown above whenever needed.

It is recommended for a user to use the print of reports and drawings option post completion of a report for smooth functioning.

Detail your Default Template for Reports & Drawings

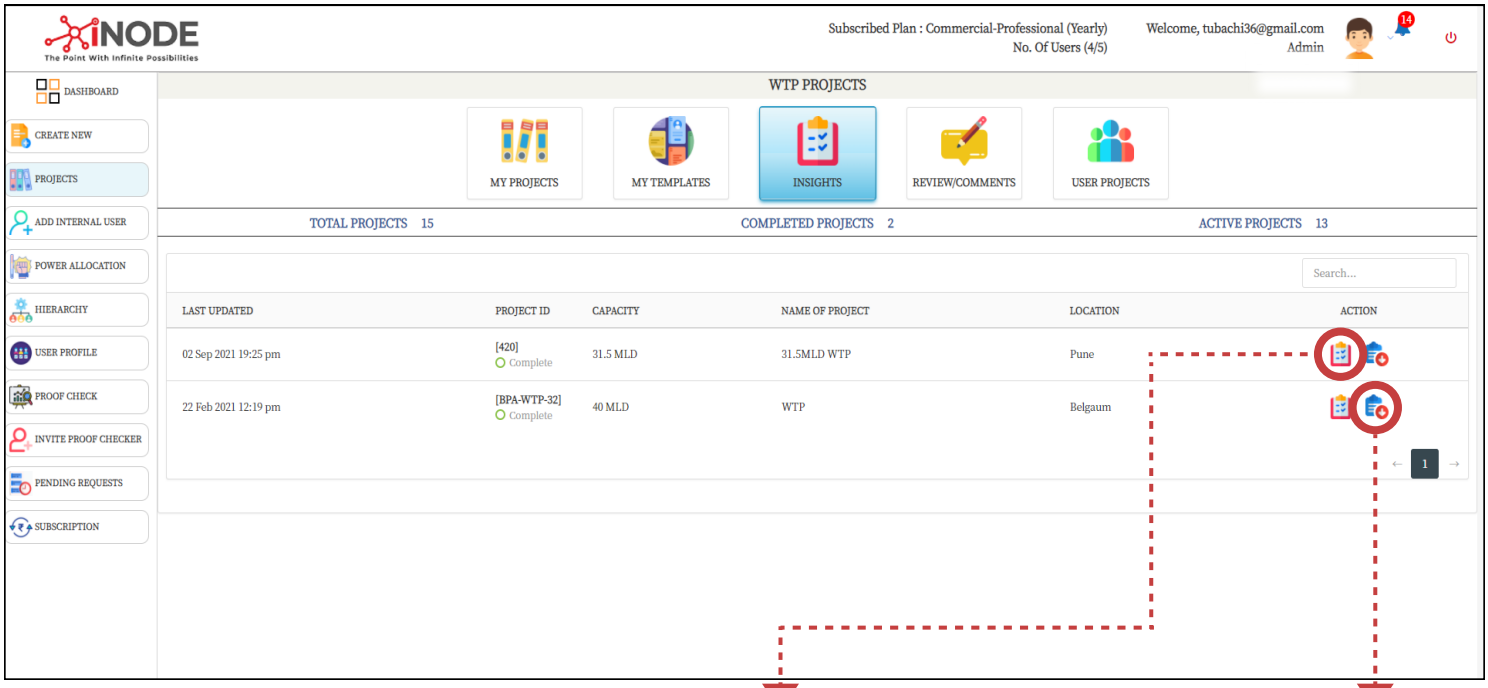


A user can design and choose specific text forms, font style, font weight and text color for the output reports of all the projects created thereafter.



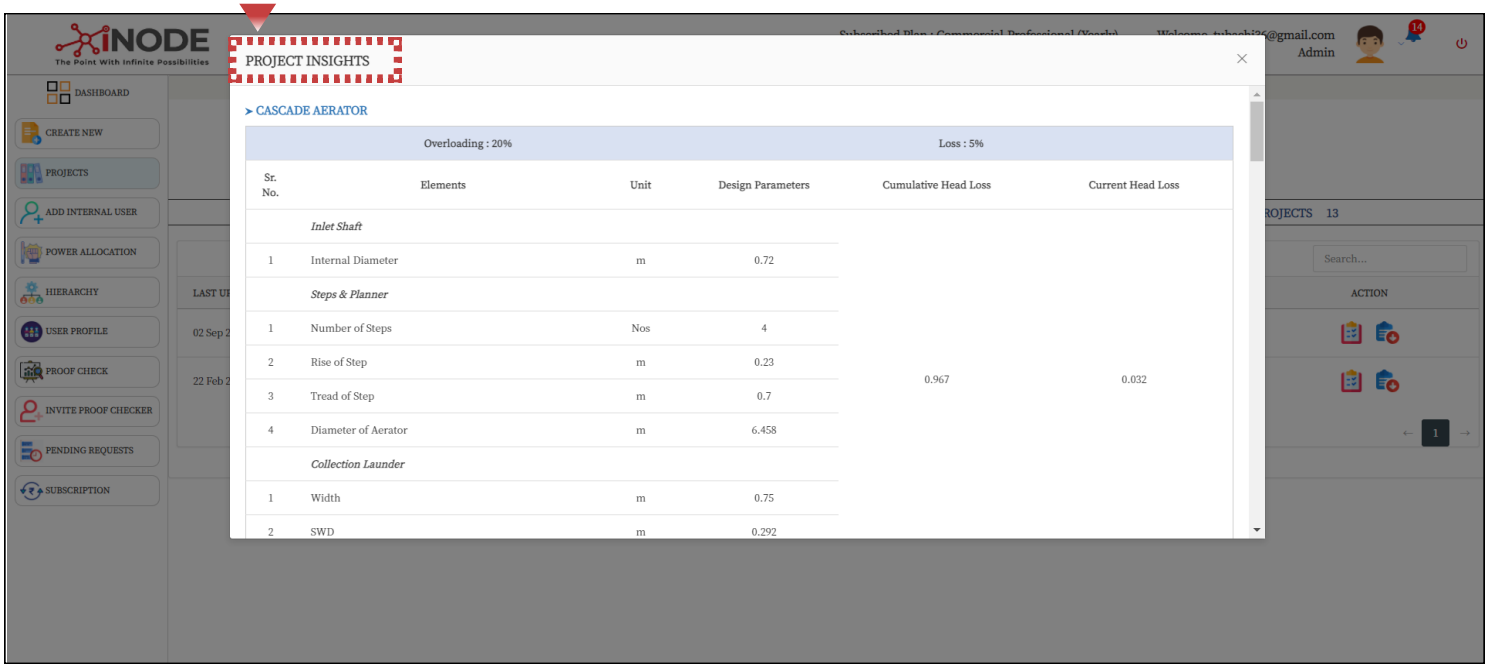
A user can choose text color for the output drawings of all the projects created thereafter. (Template data will be default as shown.)

Know your Project Insights in a Click

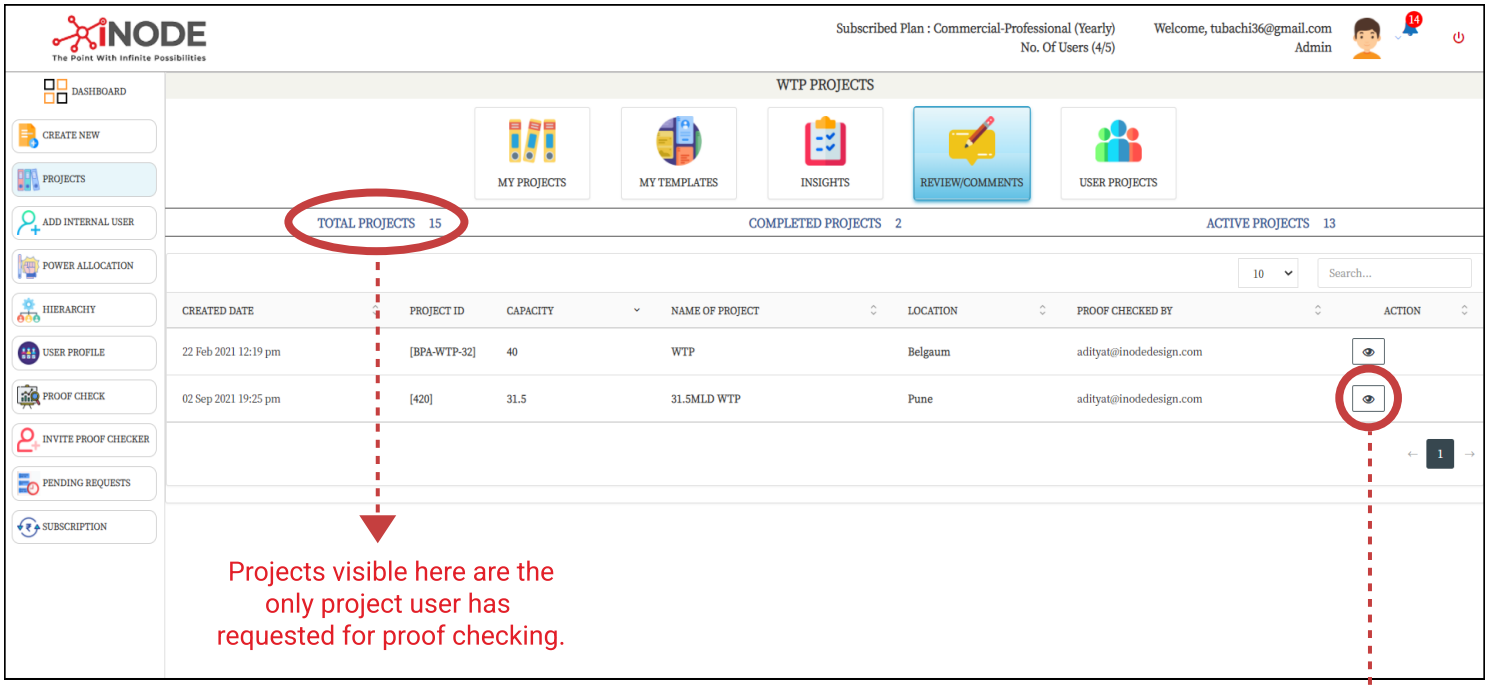


Hit on the icon indicated and view the insights indicating design overloading / loss and dimensions of each element as per the flow & their respective head losses (Current & Cumulative).

Download the particular project insights.

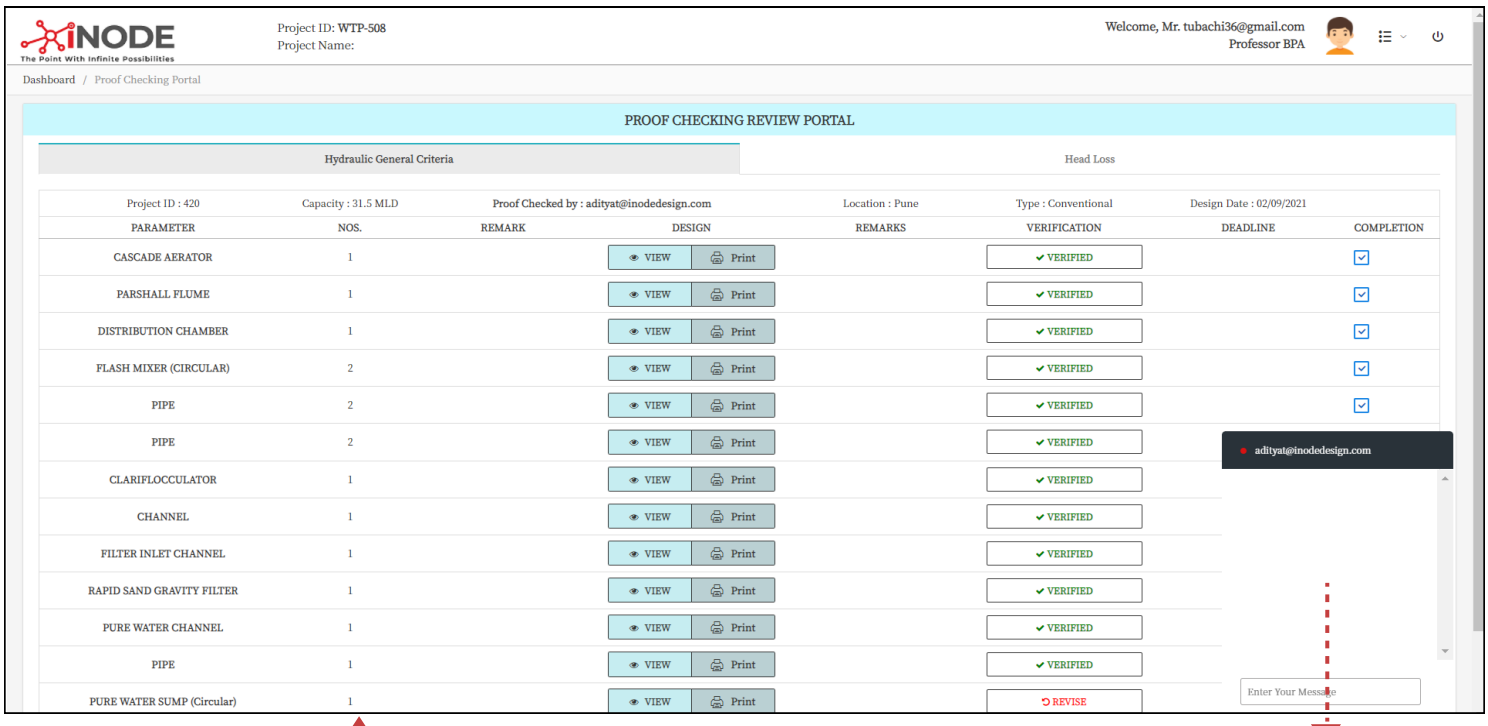


Reviews/Comments by Proof Check Authority for a Project



Projects visible here are the only project user has requested for proof checking.

A user can access the review/comments added by the proof checker by clicking on the eye icon.

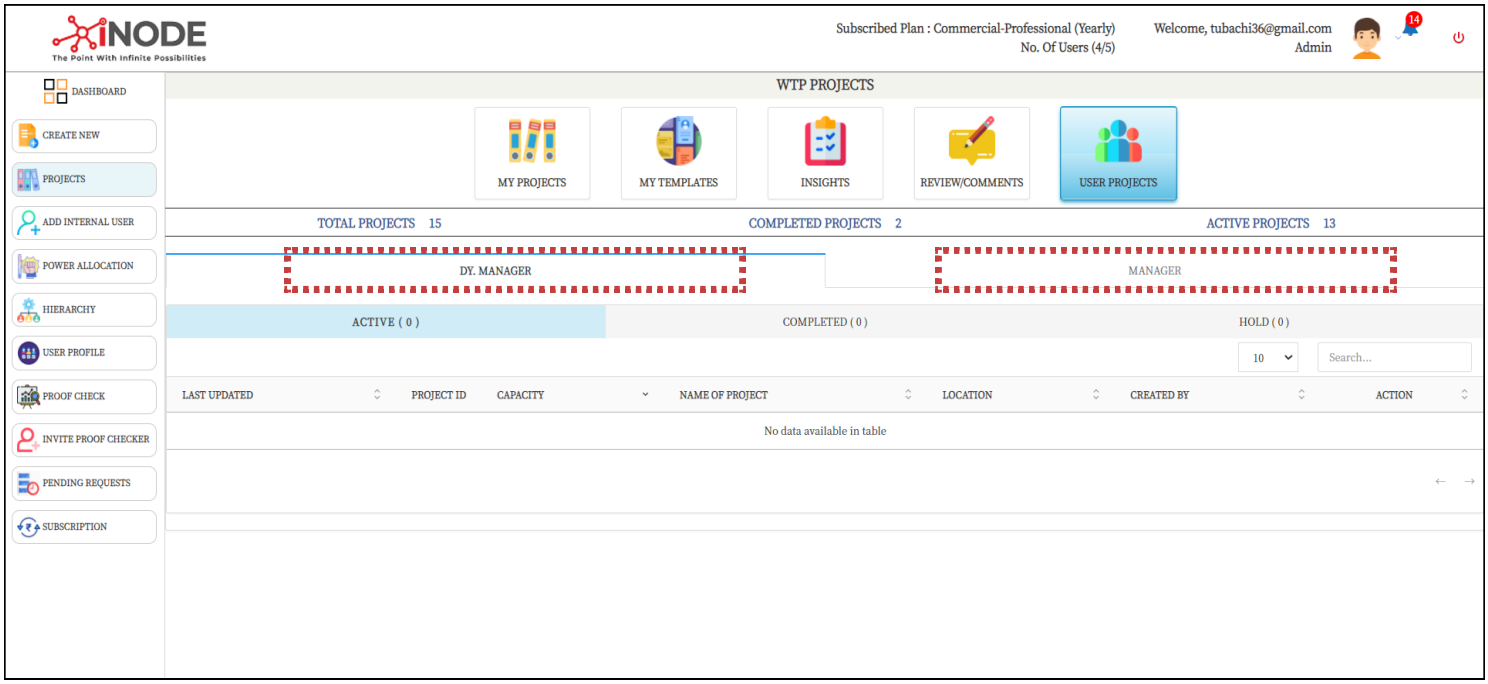


Above is a summary and further actions to be performed by the user for each individual element hydraulic design as directed by the proof checker.

User can directly have a chat with the proof checker by clicking on the bar indicated whenever the proof checker is available (Green dot will indicate the proof checker is availible / Red indicates non-availability)

View Design Projects Created by other Internal Users

(User designation plays an important role in this.)



An user can view projects created by their internal subordinates.

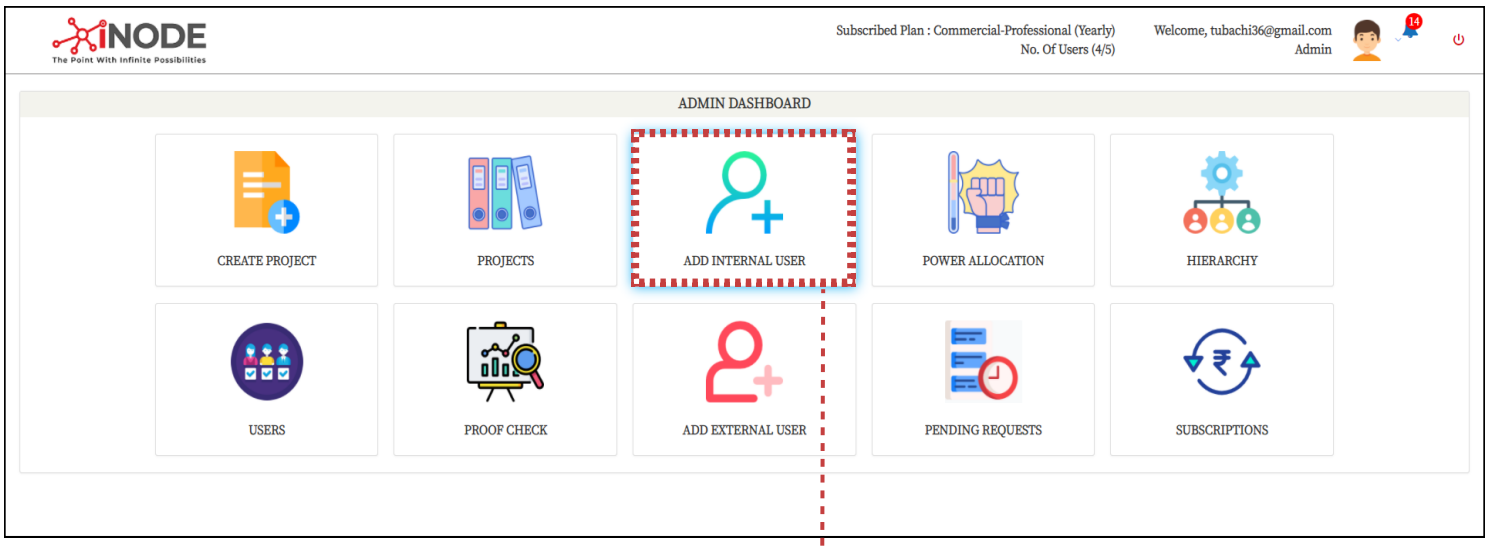
To elaborate: An user designated as "Admin" can view projects by the internal subordinates, eg. (Dy. Manager/ Manager as appointed and powered by the admin himself)

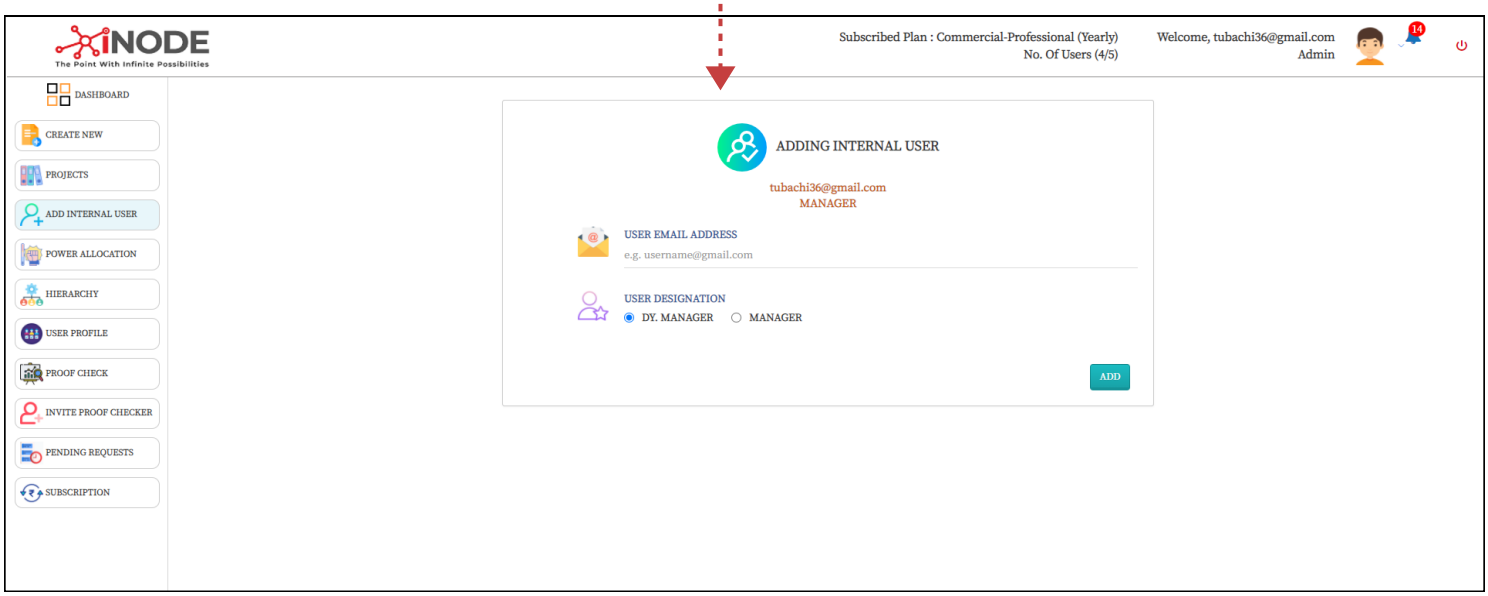
The designation of internal users and the hirerachy of internal users will be decided by the admin under "Hierarchy" as explained further.

The powers for viewing and managing the data of internal user subordinates will be decided by the admin under "Power"

Adding Internal Users

(User designation plays an important role in this)

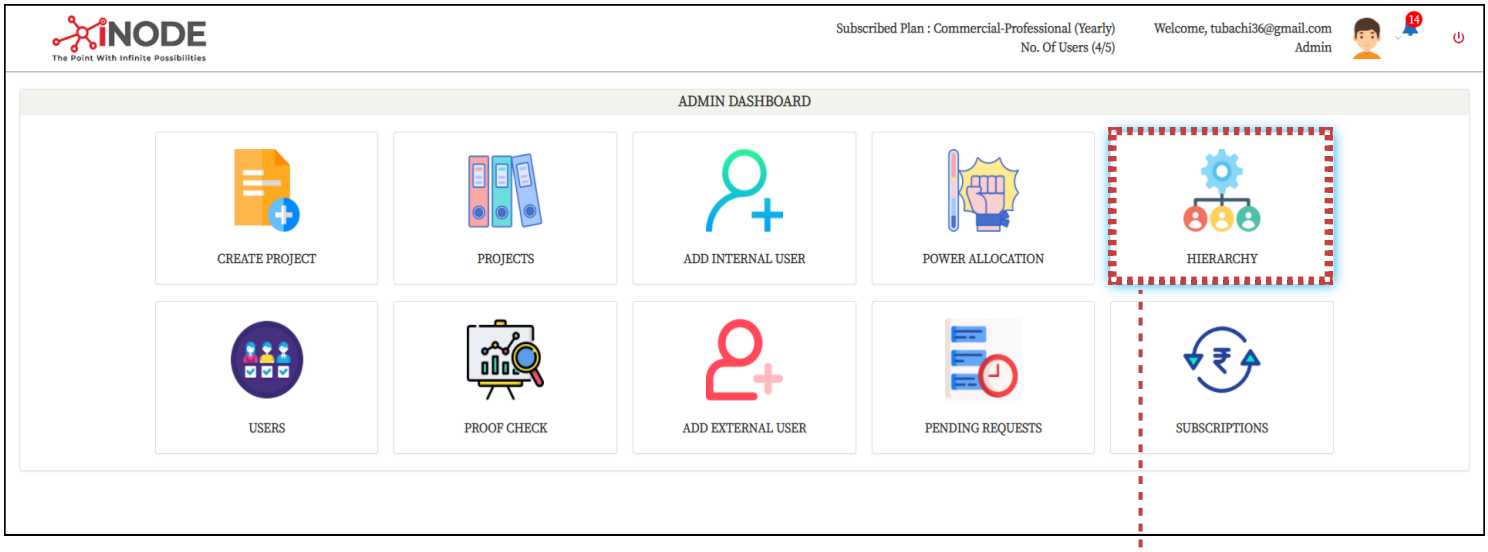




Any user designated at higher authority by the admin can add their respective subordinates by assigning them designation.

Power Allocation of Internal Users

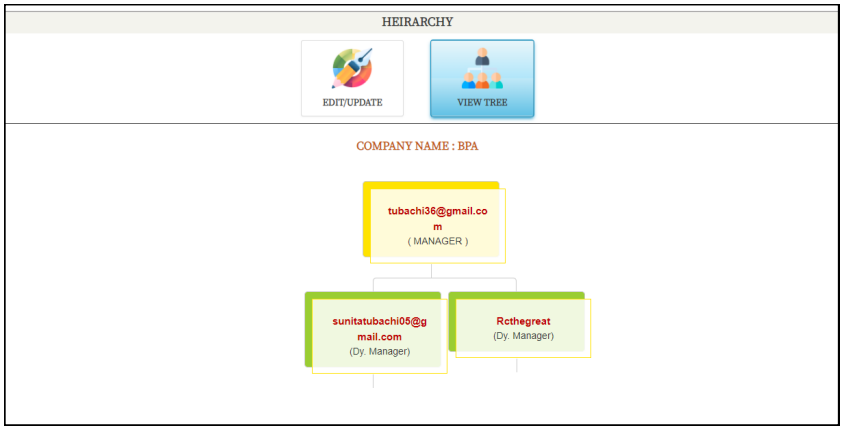
(User designation plays an important role in this)



A user designated as "Admin" at registration can choose internal authority Stages / Designations for smooth functioning of internal management.

The ticks against the authority represents the authority/ designation are selected for further management. Unticking any authority will represent the authority will be absent.

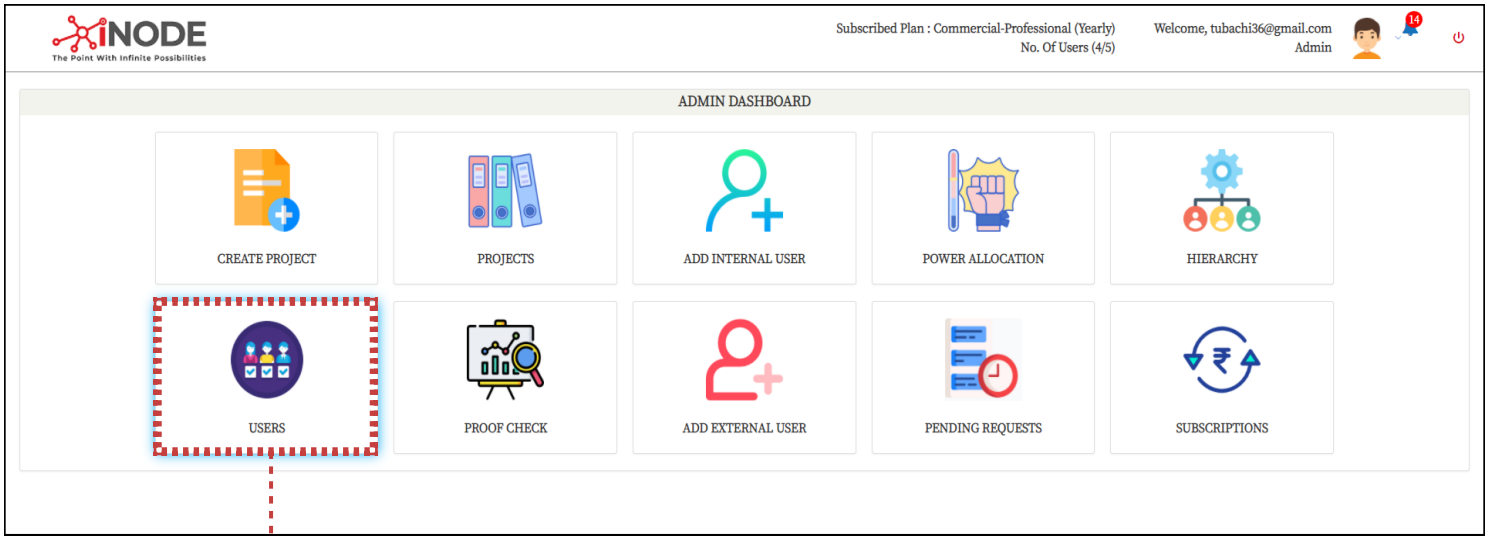
A user as "Admin" can rename the default designation name as required and hit the "Update" button for the changes to be performed.

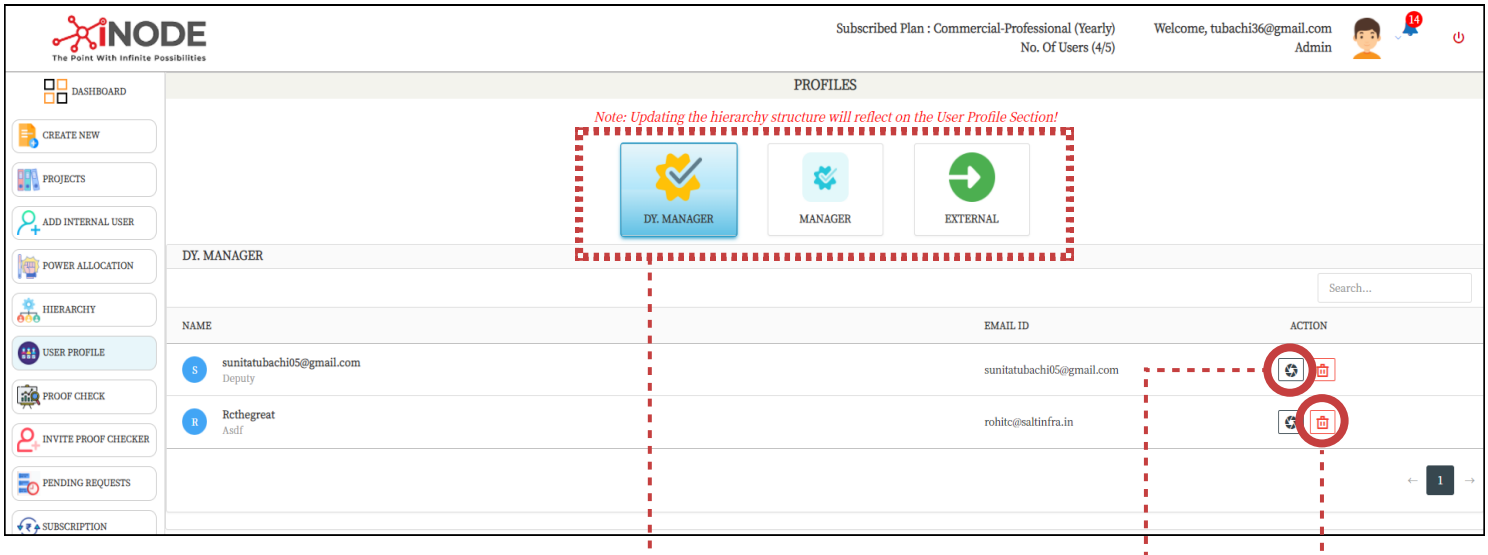


THE TREE : View the entire internal hierarchy and user identities for understanding internal authorities and subordinates avoiding further confusions.

View your Subordinates & Externals

(User designation plays an important role in this)





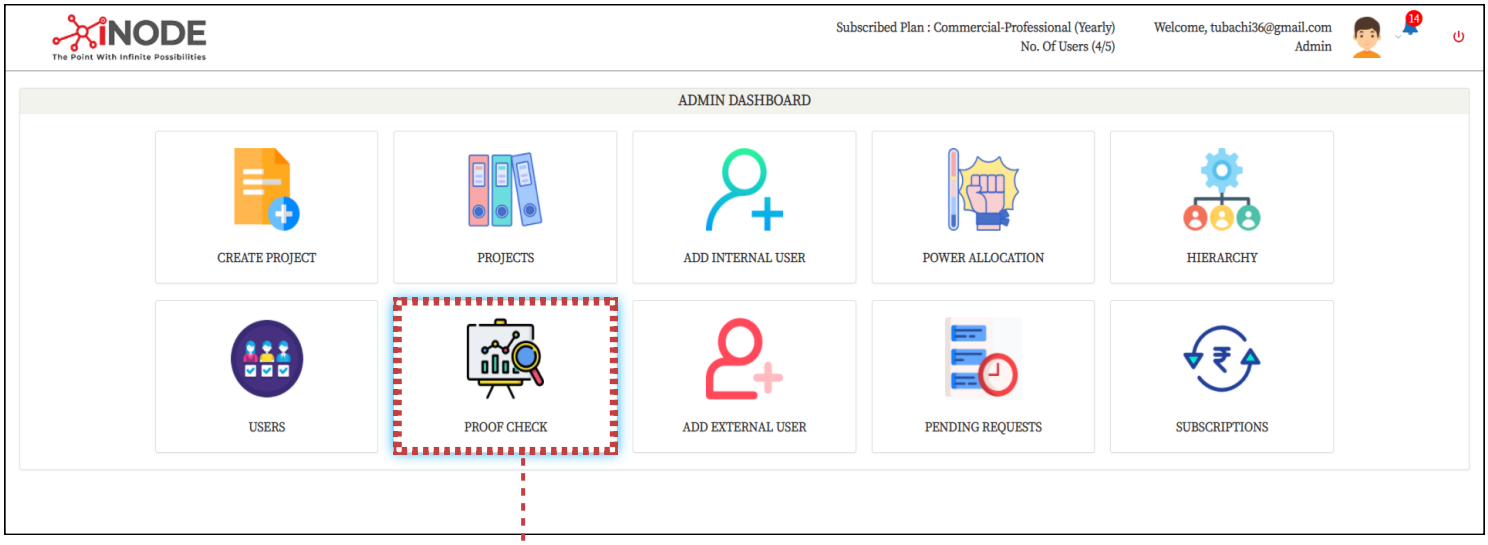
Individual subordinates of the user logged in will be displayed here and clicking the designation tabs will view the respective user list of that specific designation.

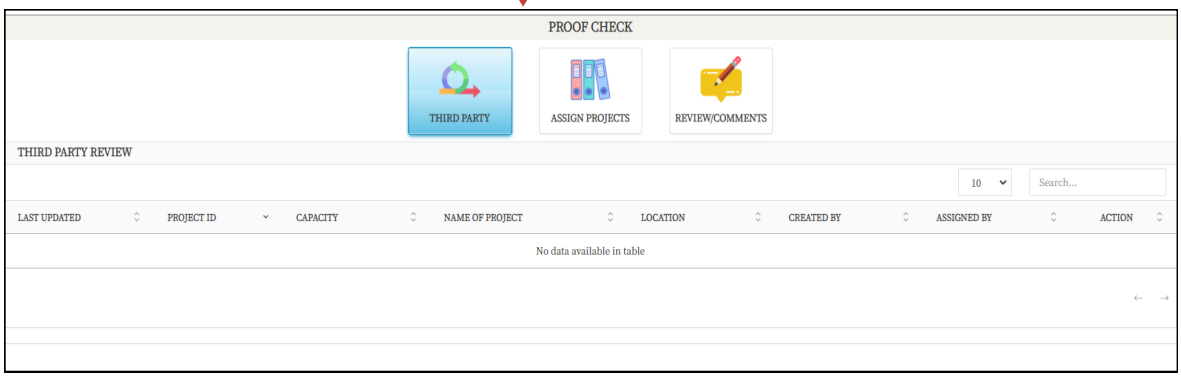
Quick access to that specific users project dashboard , profile and externals assigned.

Delete the user profile.

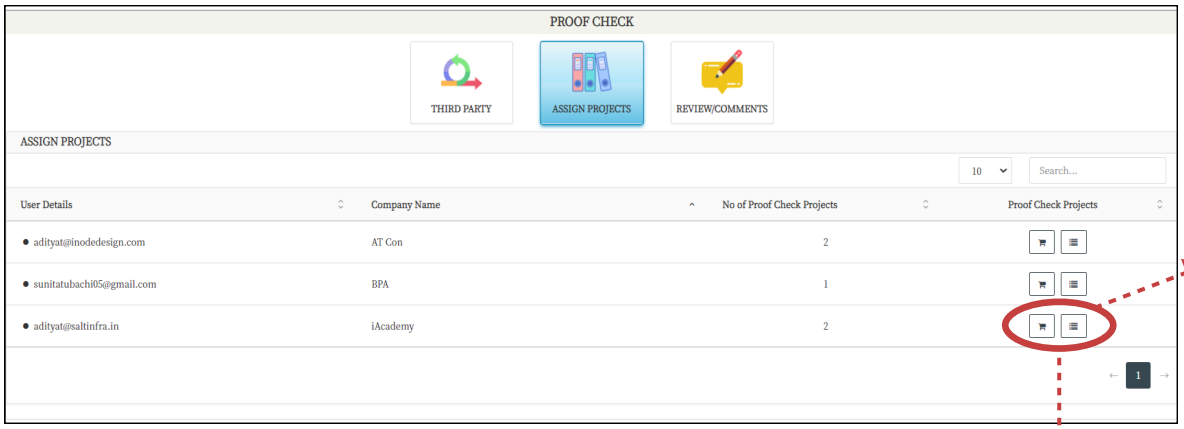
Proof Check Portal

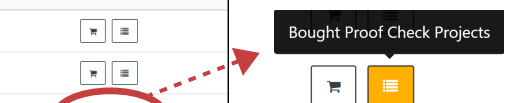
(Valid for users who have the authority to as a Proof Checker)

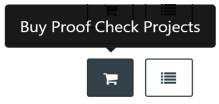




Know the list of External/ Third Party Proof check projects user has been assigned.

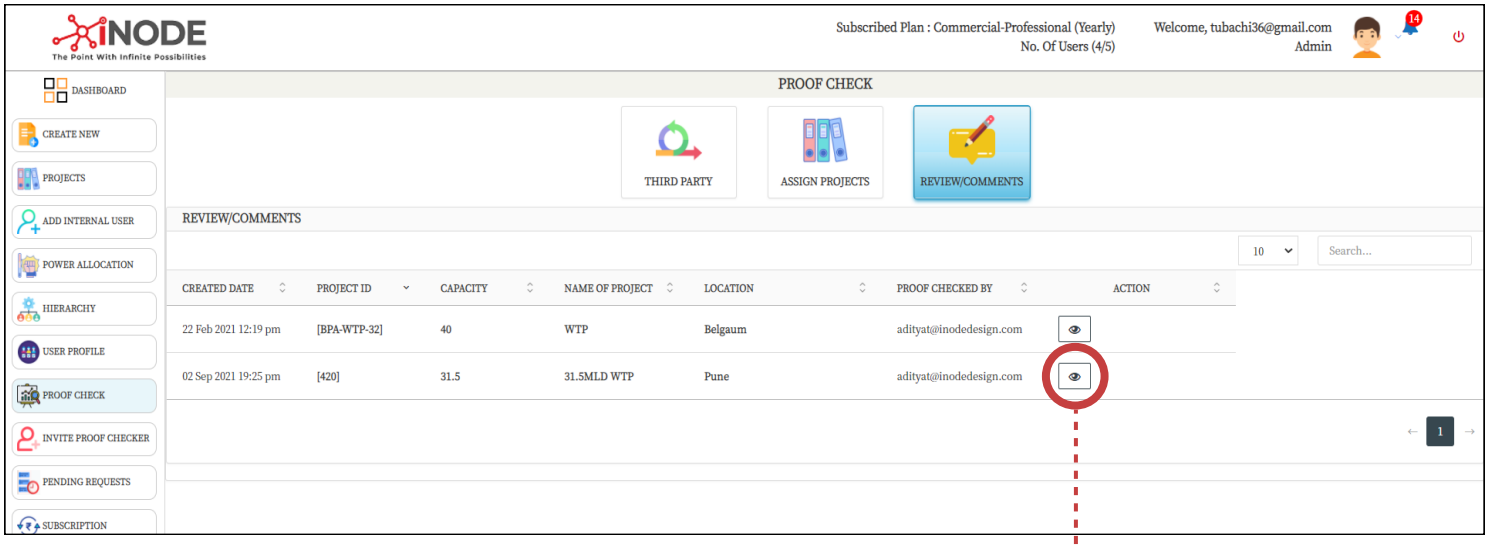


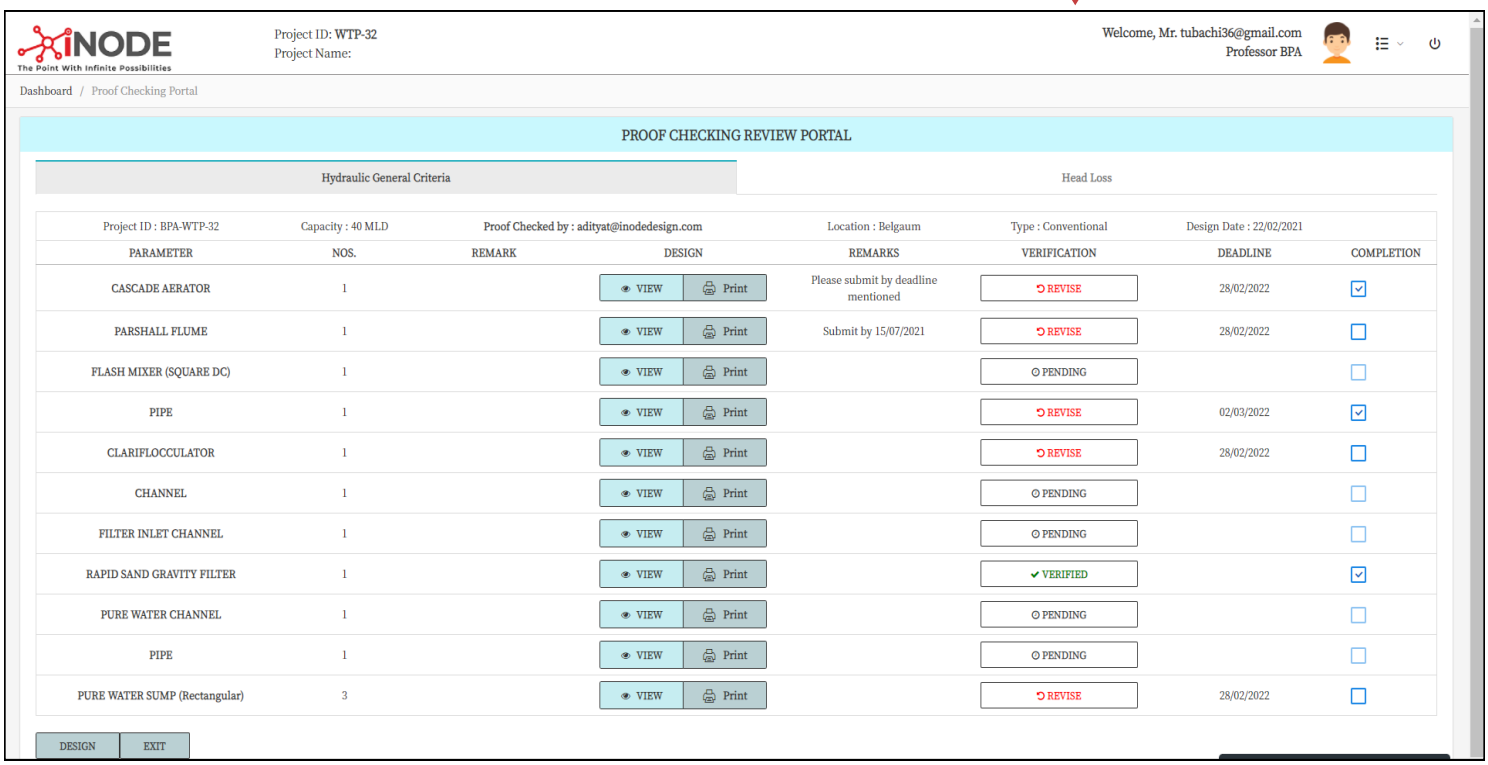




Proof Check Portal

(Valid for users who have the authority to as a Proof Checker)





✔ VERIFIED

Proof Checker has verified the particular element design.

PENDING

Proof Checker has not yet verified the particular element design and is pending.

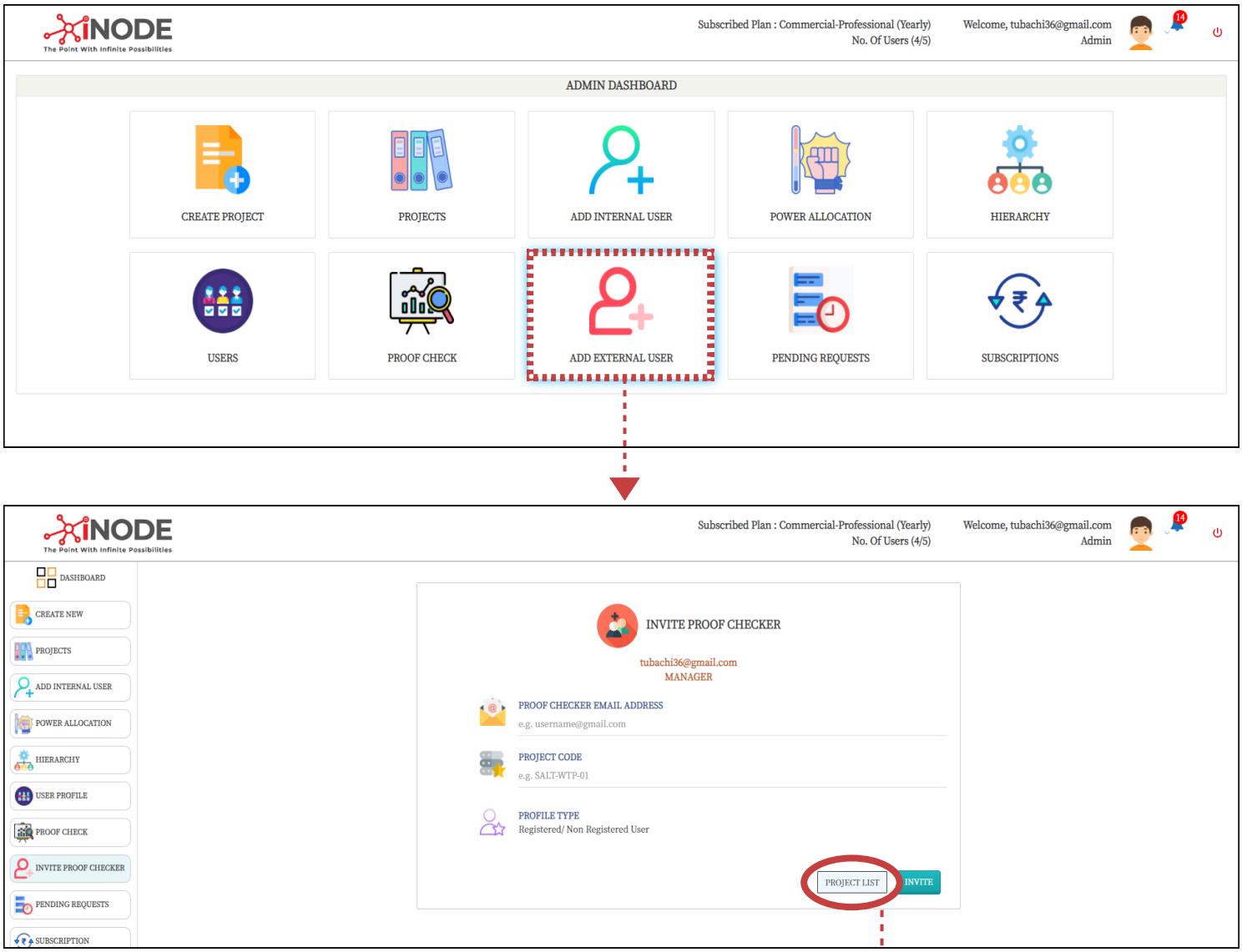
REVISE

Proof Checker wants the user to revise the design as per his mentioned remark.

Adding External User

(User designation plays an important role in this)

iNODE Feature: A user can add an existing internal user and request internal user to proof check your project by simply entering the email id of the internal user you wnat as proof checker thereby sending a request.

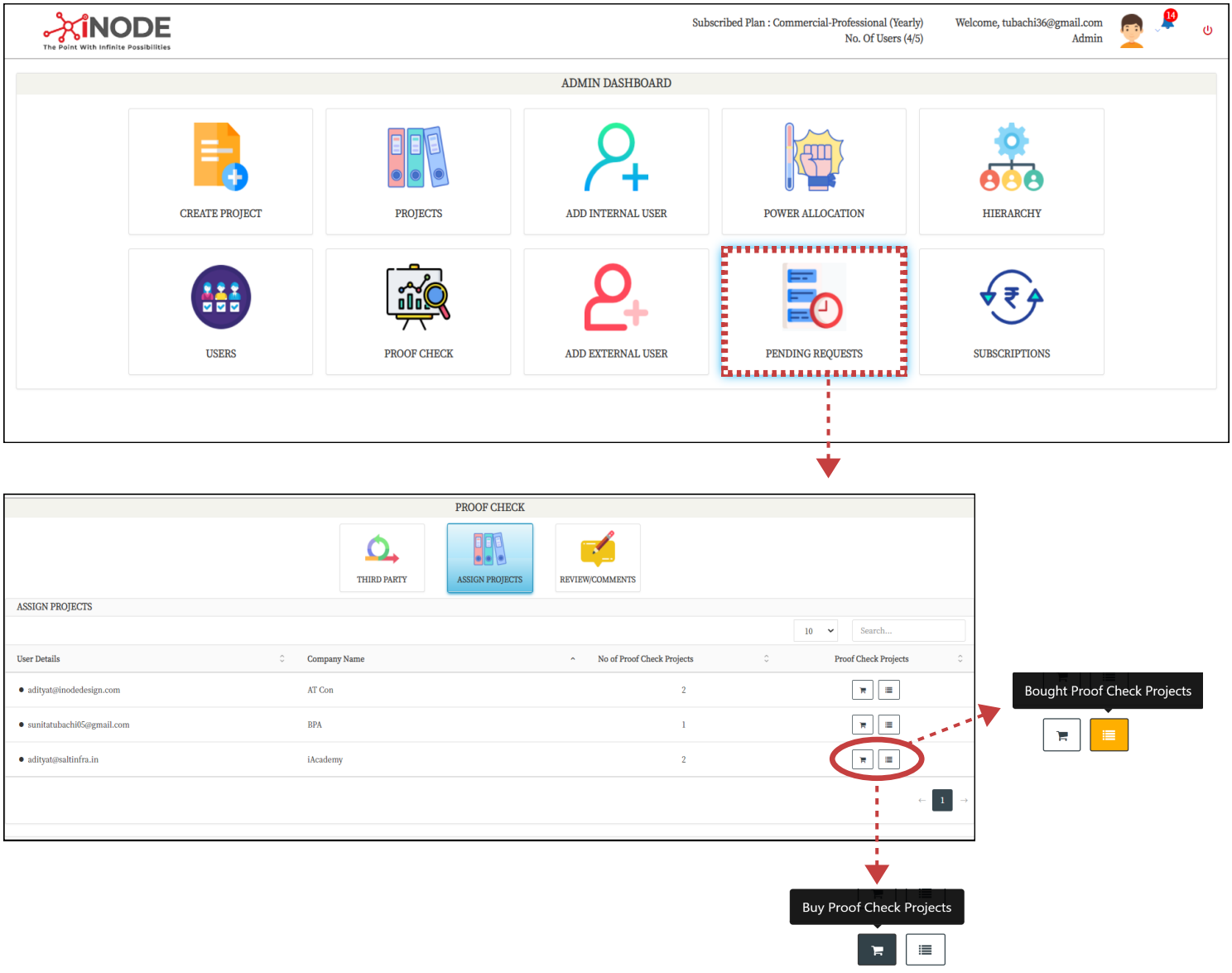


A user designated as Admin/ Subadmin & manager & if the power is allocated for the same by admin can then add an external proof checker by sending a request link to the external email id for a particular project required to be checked by simply filling the required information and paying the required amount.

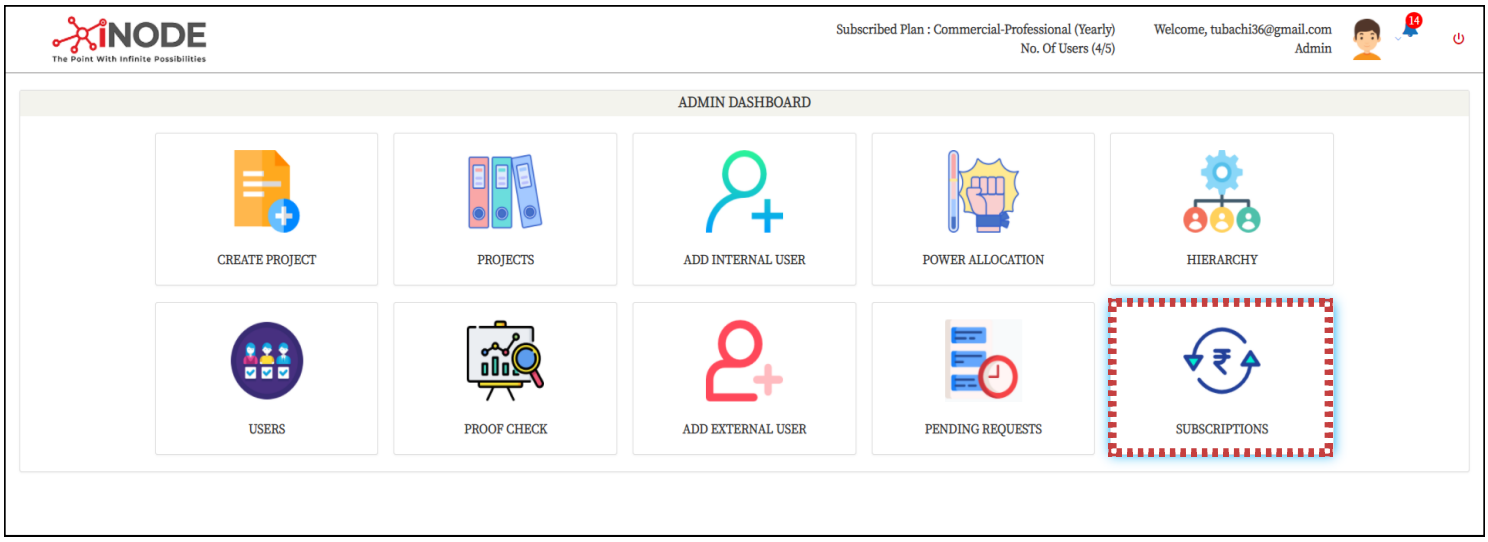
Quick access to the project list for entering the required project code.

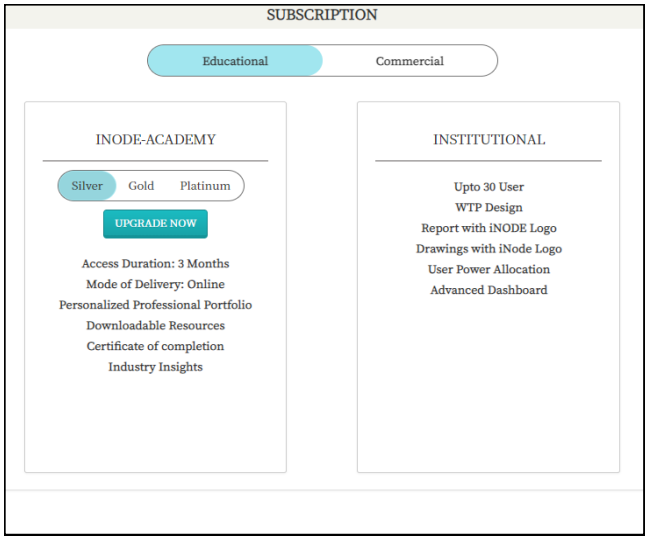
DISCLAIMER: Some of the subscription plans include specified number proof check projects for which payment will not be required.

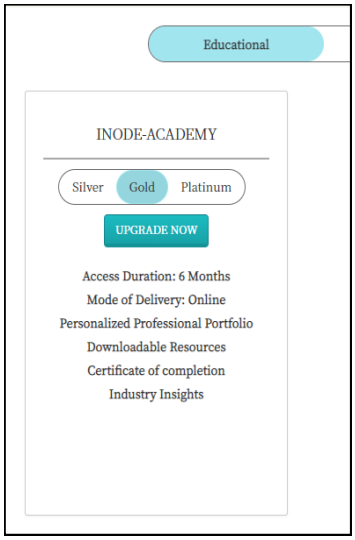
Pending Requests

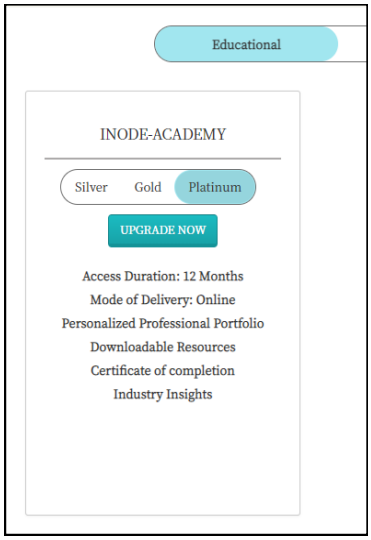


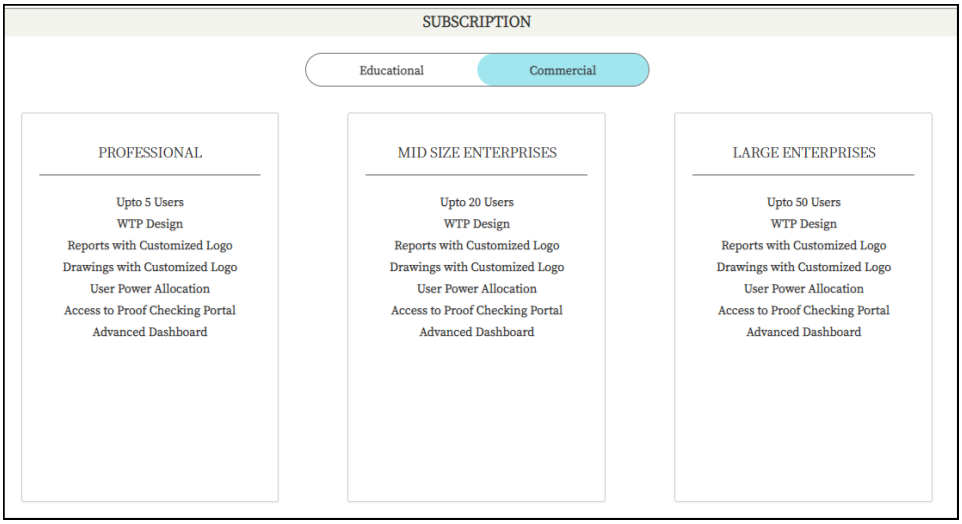
Manage Subscription











DISCLAIMER: Some of the subscription plans include specified number proof check projects for which payment will not be required.

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DESIGN PORTAL

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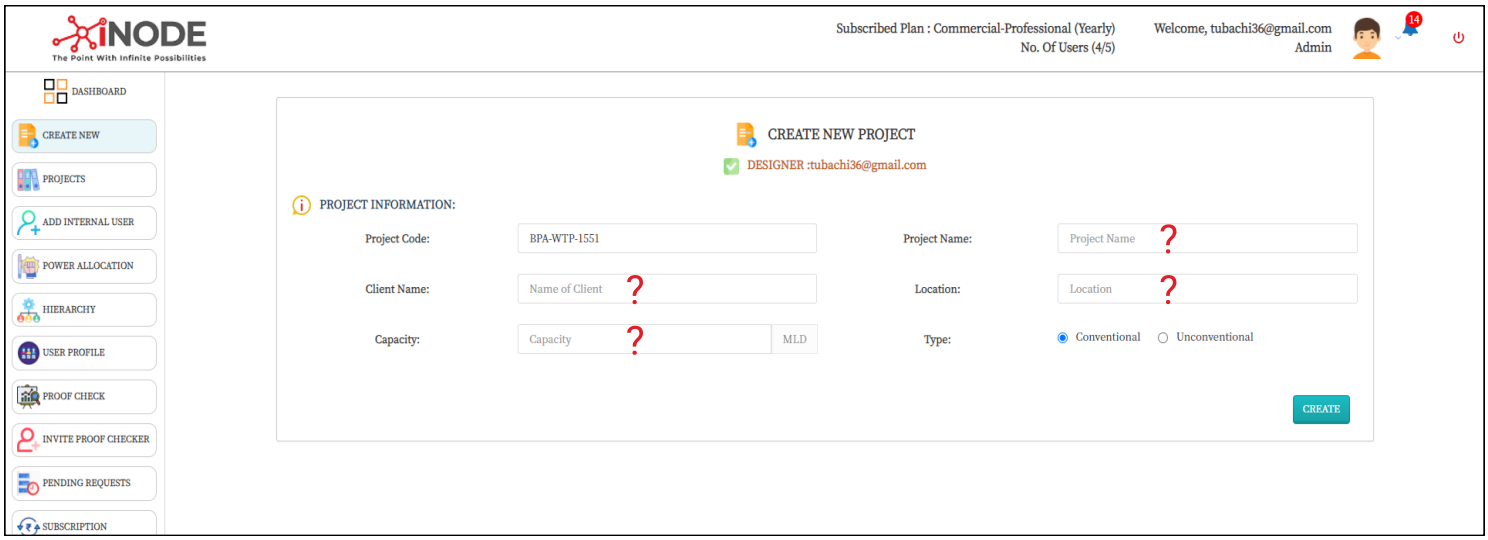
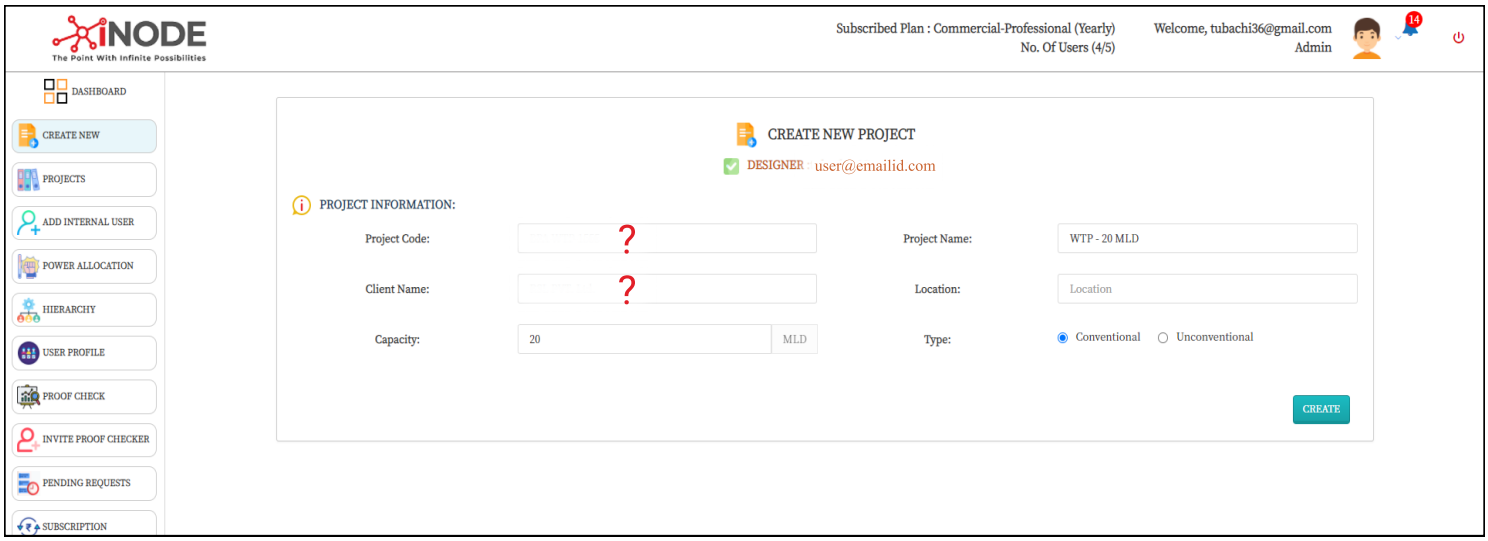
The Point With Infinite Possibilities

DESIGN ELEMENTS

Creating a Project

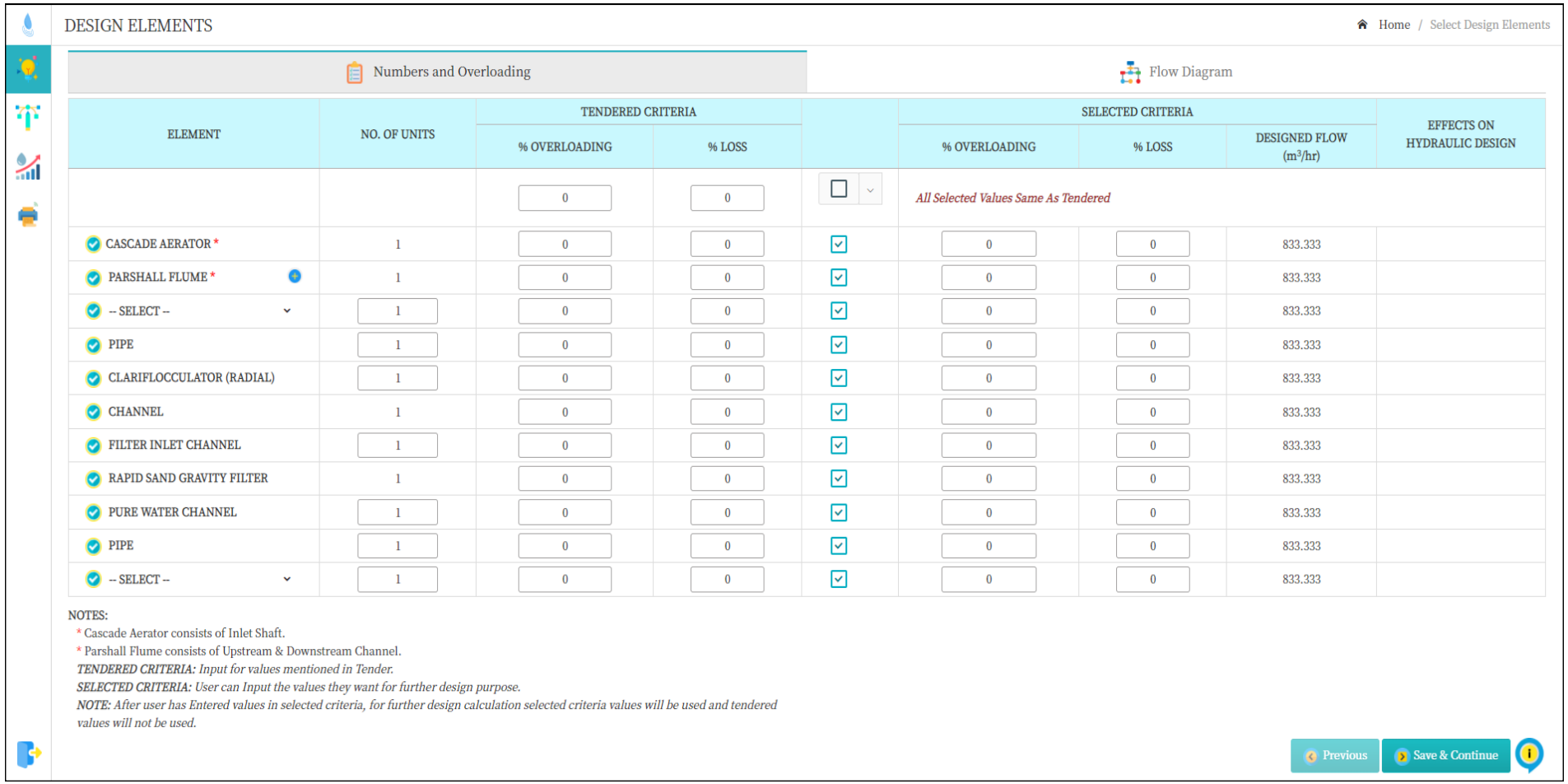


Fill out the basic information as Project Name, Client Name, Location, Capacity in MLD and Type.



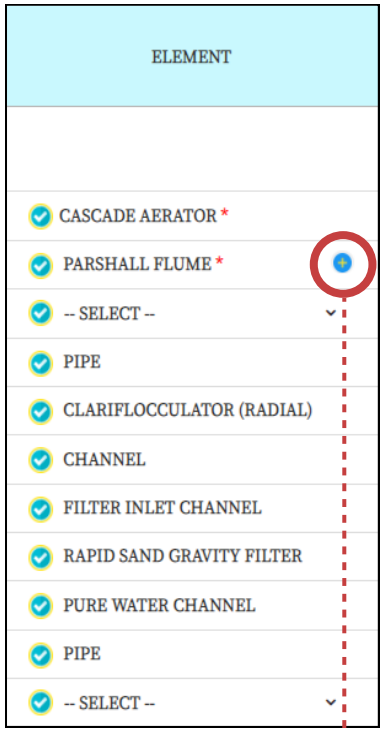
Hit the create button, and a new project is created to get started with.

Entering Number and Overloading / Loss for Design Elements

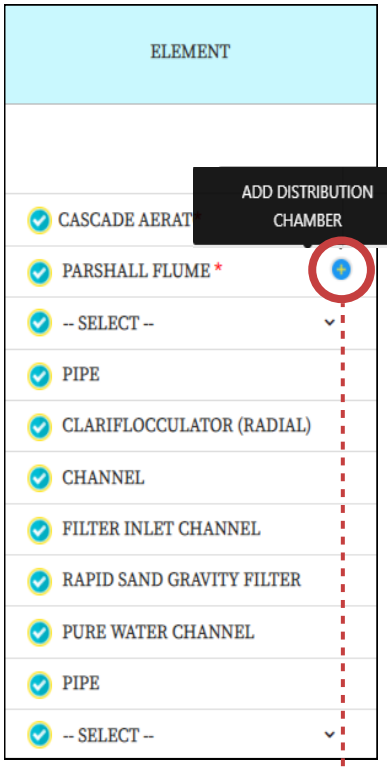


Fill out the required fields with an detail explanation for the options and values required as provided below.

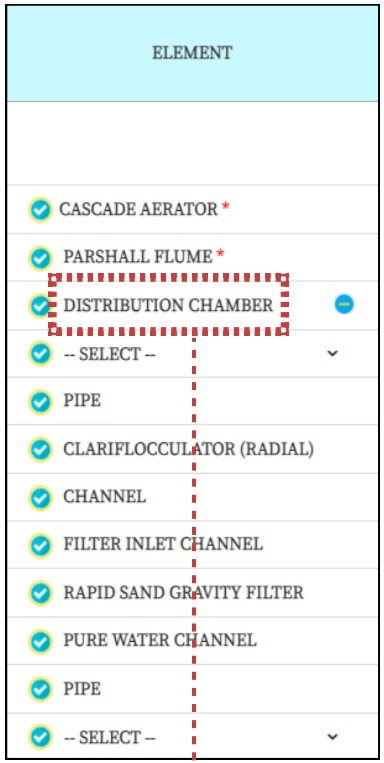
Selecting an additional Distribution Chamber as needed connecting Parshall Flume and Flash Mixer



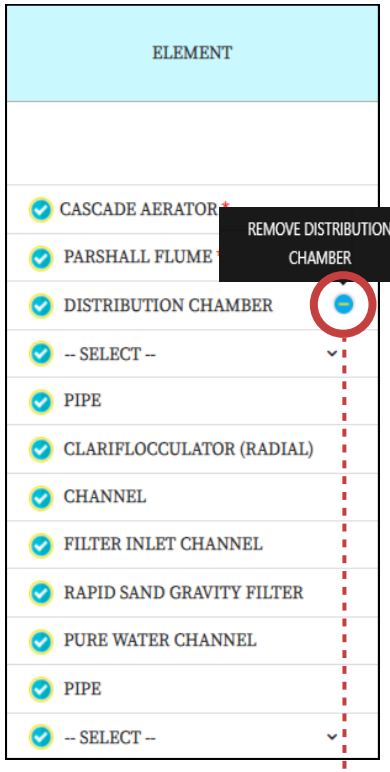
This button is used to add a distribution chamber.



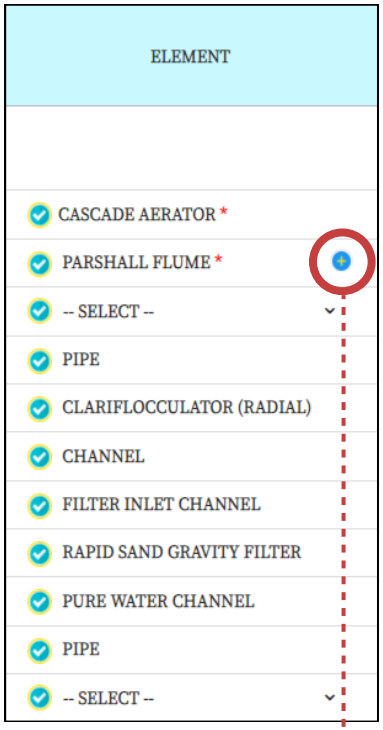
On hovering, user will be able to see the "ADD DISTRIBUTION CHAMBER" label.



After clicking it, a distribution chamber is added as requested.

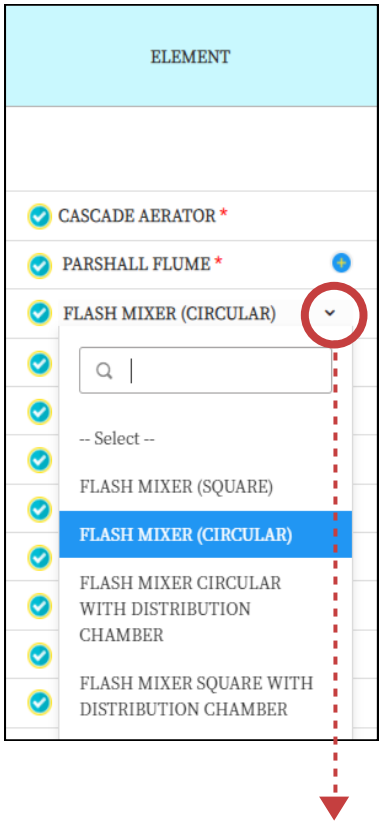


User will be able to see the "REMOVE DISTRIBUTION CHAMBER" label when hovered on this button.
After clicking it, the distribution chamber will be removed.

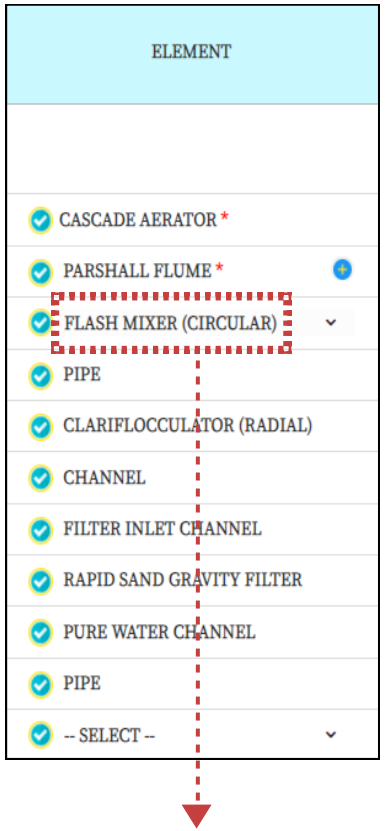


Post removing the distribution chamber, you can add it again if required.

Selecting Flash Mixer & Sump Type



Post clicking the arrow a drop down list containing 4 types of flash mixer will appear.



The user can select the flash mixer type as required for the WTP.

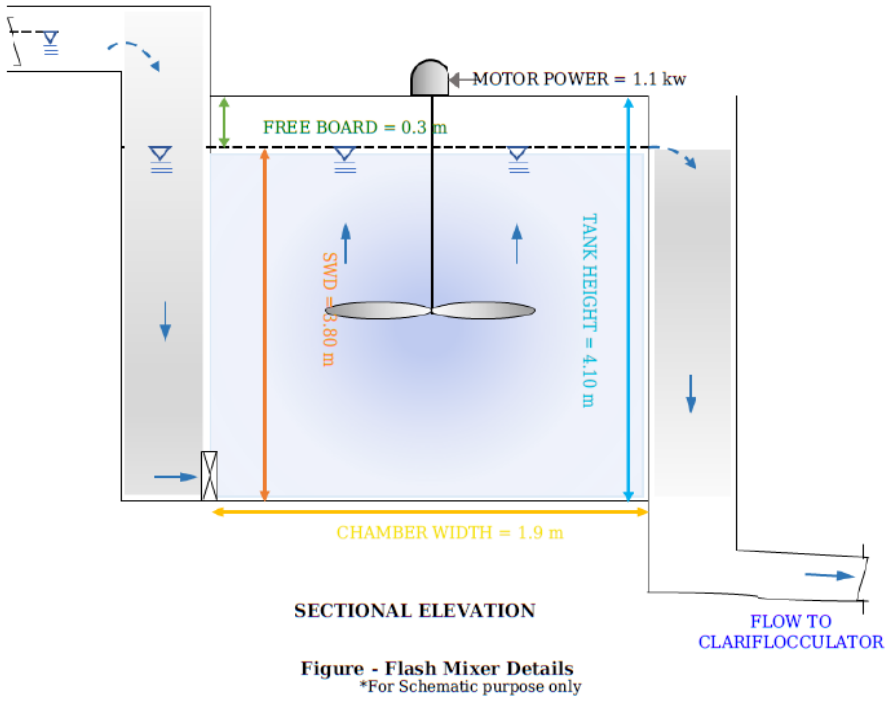
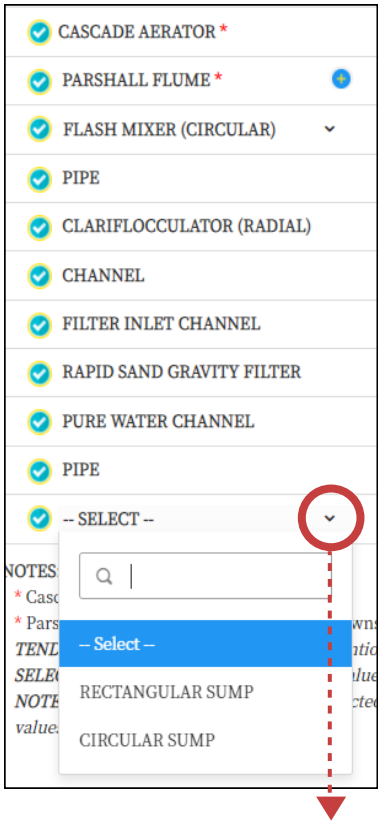
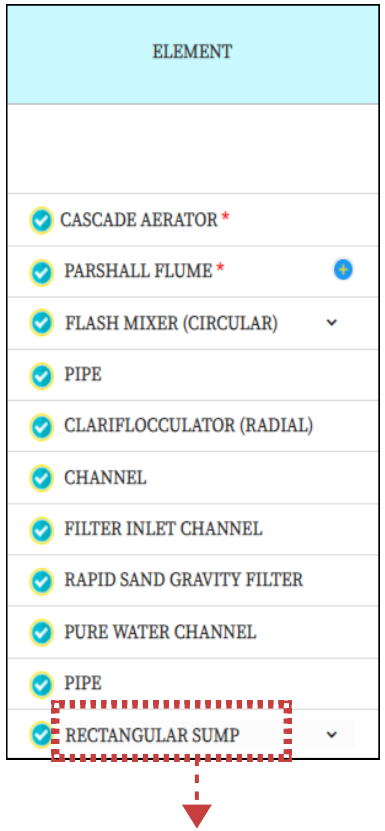


Figure - Flash Mixer Details
*For Schematic purpose only

Selecting Flash Mixer & Sump Type



Post clicking the arrow a drop down list containing 2 types of sump will appear.



The user can select the sump type as required for the WTP.

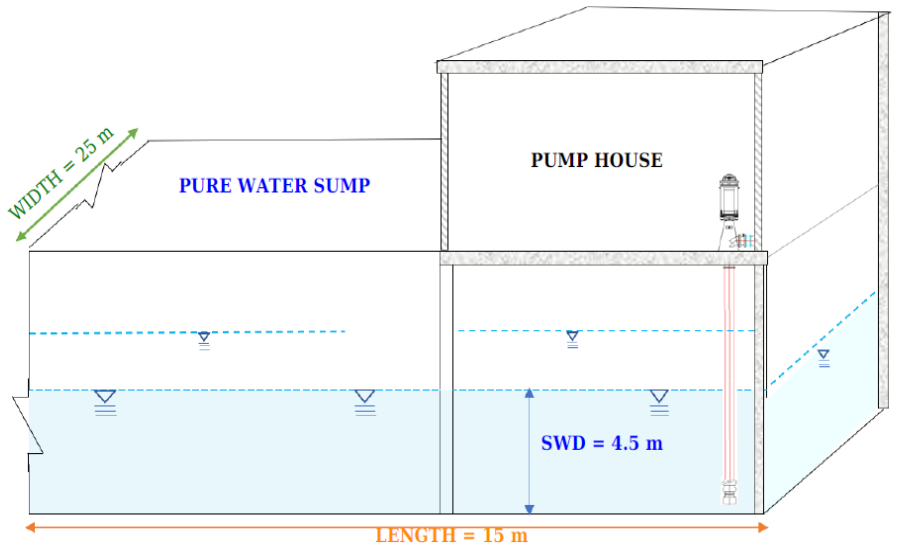


Figure - Pure Water Sump Details
*For Schematic purpose only.

Entering the Number of Units for each Element

ELEMENT	NO. OF UNITS
CASCADE AERATOR *	1
PARSHALL FLUME *	1
FLASH MIXER (CIRCULAR)	1
PIPE	1
CLARIFLOCCULATOR (RADIAL)	1
CHANNEL	1
FILTER INLET CHANNEL	1
RAPID SAND GRAVITY FILTER	1
PURE WATER CHANNEL	1
PIPE	1
RECTANGULAR SUMP	1

- By default all the elements will have number of units as 1.
- User can input numbers of units for each element as per user experience.
- Channel, after clariflocculator will have by default same number as clariflocculator.

Entering Tendered Criteria for Overloading and Loss of each Element

ELEMENT	NO. OF UNITS	TENDERED CRITERIA	
		% OVERLOADING	% LOSS
CASCADE AERATOR *	1		
PARSHALL FLUME *	1		
FLASH MIXER (CIRCULAR)	1		
PIPE	1		
CLARIFLOCCULATOR (RADIAL)	1		
CHANNEL	1		
FILTER INLET CHANNEL	1		
RAPID SAND GRAVITY FILTER	1		
PURE WATER CHANNEL	1		
PIPE	1		
RECTANGULAR SUMP	1		

- Overloading & Loss are basically an additional percentile flow value which increases the design capacity of the WTP considering unseen circumstances & losses which may occur.
- For some of the elements a defined overloading & loss value is mentioned in the the tender. User can then enter the same value mentioned in the tender for that specific element.
- In cases where the values are absent in tender or a case where a tender is not issued, user can leave such fields of overloading / loss blank of tendered criteria.
- These values will reflect in the output design / validation reports.
- Note: Enter each value carefully.

Quick-fill all the tendered Values of Overloading & Loss

CASE - I All values of overloading & Loss are same for all the elements

ELEMENT	NO. OF UNITS	TENDERED CRITERIA	
		% OVERLOADING	% LOSS
CASCADE AERATOR *	1		
PARSHALL FLUME *	1		
FLASH MIXER (CIRCULAR)	1		
PIPE	1		
CLARIFLOCCULATOR (RADIAL)	1		
CHANNEL	1		
FILTER INLET CHANNEL	1		
RAPID SAND GRAVITY FILTER	1		
PURE WATER CHANNEL	1		
PIPE	1		
RECTANGULAR SUMP	1		

Fields to enter values for carrying forward the same values for all the elements.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA	
		% OVERLOADING	% LOSS
		20	5
CASCADE AERATOR *	1	20	5
PARSHALL FLUME *	1	20	5
FLASH MIXER (CIRCULAR)	1	20	5
PIPE	1	20	5
CLARIFLOCCULATOR (RADIAL)	1	20	5
CHANNEL	1	20	5
FILTER INLET CHANNEL	1	20	5
RAPID SAND GRAVITY FILTER	1	20	5
PURE WATER CHANNEL	1	20	5
PIPE	1	20	5
RECTANGULAR SUMP	1	20	5

Autofilled Values

If the overloading & Loss values for each element are the same (Overloading & Loss can be different), then simply enter the values in these two field and all the other fields of each element will be auto filled carrying the value initially entered.

Quick-fill all the tendered Values of Overloading & Loss

CASE - II When only overloading values are same for all the elements

ELEMENT	NO. OF UNITS	TENDERED CRITERIA	
		% OVERLOADING	% LOSS
		20	
CASCADE AERATOR *	1	20	
PARSHALL FLUME *	1	20	
FLASH MIXER (CIRCULAR)	1	20	
PIPE	1	20	
CLARIFLOCCULATOR (RADIAL)	1	20	
CHANNEL	1	20	
FILTER INLET CHANNEL	1	20	
RAPID SAND GRAVITY FILTER	1	20	
PURE WATER CHANNEL	1	20	
PIPE	1	20	
RECTANGULAR SUMP	1	20	

Autofilled Values

User can enter loss only "Overloading", for the same value to be carry forwarded all the elements as shown.

CASE - III When only loss values are same for all the elements.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA	
		% OVERLOADING	% LOSS
			5
CASCADE AERATOR *	1		5
PARSHALL FLUME *	1		5
FLASH MIXER (CIRCULAR)	1		5
PIPE	1		5
CLARIFLOCCULATOR (RADIAL)	1		5
CHANNEL	1		5
FILTER INLET CHANNEL	1		5
RAPID SAND GRAVITY FILTER	1		5
PURE WATER CHANNEL	1		5
PIPE	1		5
RECTANGULAR SUMP	1		5

Autofilled Values

User can enter only "Loss" value , for the same value to be carryforwarded all the elements as shown.

Quick Trick

If values for loss and/ or overloading for maximum elements are same but for a few elements are different.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA	
		% OVERLOADING	% LOSS
		20	5
CASCADE AERATOR *	1	20	5
PARSHALL FLUME *	1	20	5
FLASH MIXER (CIRCULAR)	1	20	5
PIPE	1	20	5
CLARIFLOCCULATOR (RADIAL)	1	20	5
CHANNEL	1	20	5
FILTER INLET CHANNEL	1	20	5
RAPID SAND GRAVITY FILTER	1	20	5
PURE WATER CHANNEL	1	20	5
PIPE	1	20	5
RECTANGULAR SUMP	1	20	5

Autofilled Values

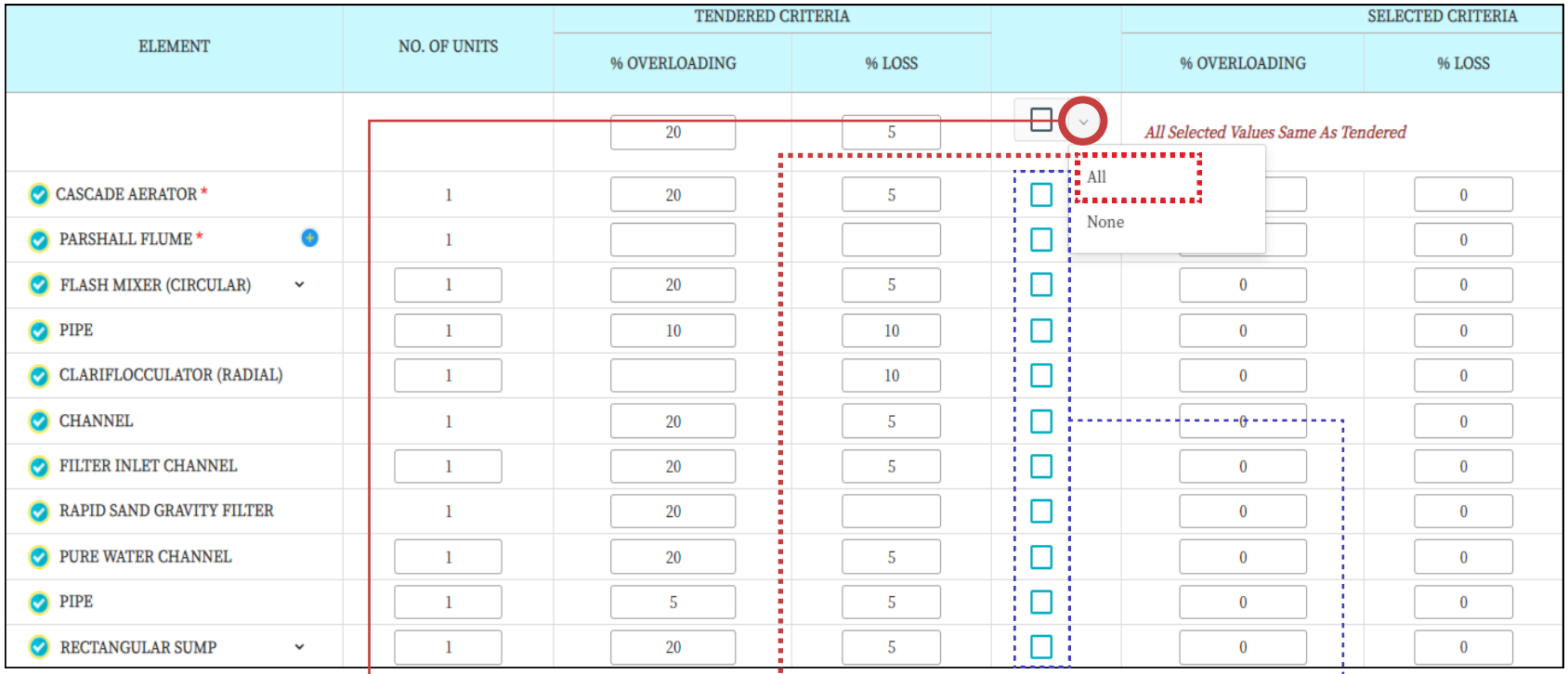
Autofilled Values

User should fill the value for overloading &/or loss which are same for maximum of the elements.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA	
		% OVERLOADING	% LOSS
		20	5
CASCADE AERATOR *	1	20	5
PARSHALL FLUME *	1	★	★
FLASH MIXER (CIRCULAR)	1	20	5
PIPE	1	10 ★	10 ★
CLARIFLOCCULATOR (RADIAL)	1	★	10 ★
CHANNEL	1	20	5
FILTER INLET CHANNEL	1	20	5
RAPID SAND GRAVITY FILTER	1	20	★
PURE WATER CHANNEL	1	20	5
PIPE	1	5 ★	5
RECTANGULAR SUMP	1	20	5

User can perform all the possible combinations required as starred by editing the values for the elements manually.

Quickly Entering Selected Criteria for Overloading and Loss of each Element.



Click the circled option and choose the "All" option from the list appeared.

User can use this option highlighted to quickly copy the similar tendered values in the selected field of the elements for both overloading & loss.

User can also use the check boxes for individual values of tendered criteria to be copied in the selected fields for overloading & loss.

Important Note: All the selected field values will be further used for design of each elements.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA			SELECTED CRITERIA		
		% OVERLOADING	% LOSS		% OVERLOADING	% LOSS	DESIGNED FLOW (m^3/hr)
		20	5	☐	*All Selected Values Same As Tendered*		
CASCADE AERATOR *	1	20	5	☑	20	5	1,041.667
PARSHALL FLUME *	1			☑			?
-- SELECT --	1	20	5	☑	20	5	1,041.667
PIPE	1	10	10	☑	10	10	1,000.000
CLARIFLOCCULATOR (RADIAL)	1		10	☑		10	?
CHANNEL	1	20	5	☑	20	5	1,041.667
FILTER INLET CHANNEL	1	20	5	☑	20	5	1,041.667
RAPID SAND GRAVITY FILTER	1	20		☑	20		?
PURE WATER CHANNEL	1	20	5	☑	20	5	1,041.667
PIPE	1	5	5	☑	5	5	916.667
-- SELECT --	1	20	5	☑	20	5	1,041.667

Post clicking the "All" option, similar values will appear in the selected field as entered in tendered.

Designed flow in **m^3/hr** will appear for each element.

Some of the values in designed flow will not appear, which is not acceptable for further element design.

Entering Selected Criteria for Overloading and Loss of each Element Manually.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA			SELECTED CRITERIA	
		% OVERLOADING	% LOSS		% OVERLOADING	% LOSS
		20	5	☐	*All Selected Values Same As Tendered*	
CASCADE AERATOR *	1			☐		
PARSHALL FLUME *	1	20	5	☐		
-- SELECT --	1	10	10	☐		
PIPE	1	0	10	☐		
CLARIFLOCCULATOR (RADIAL)	1	20	5	☐	Fill this Manually	
CHANNEL	1	20	5	☐		
FILTER INLET CHANNEL	1	20	5	☐		
RAPID SAND GRAVITY FILTER	1	20	0	☐		
PURE WATER CHANNEL	1	20	5	☐		
PIPE	1	5	5	☐		
-- SELECT --	1	20	5	☐		

- A user can enter values in the fields of overloading and loss of selected criteria for each individual element as per user experience and knowledge.
- A user must be very carefull while filling the selected criteria fields as these values will be carried forward for the design capacity each element.
- A user must not leave any fields of selected criteria blank/empty. If a user has no specified value a "zero" should be entered.

Important Note: All the selected field values will be further used for design of each elements.

Quick Trick

If values for loss and/or overloading for maximum elements are same as tendered but a few are different

ELEMENT	NO. OF UNITS	TENDERED CRITERIA			SELECTED CRITERIA	
		% OVERLOADING	% LOSS		% OVERLOADING	% LOSS
		20	5	☐	*All Selected Values Same As Tendered*	
CASCADE AERATOR *	1	20	5	☑	20	5
PARSHALL FLUME *	1			☑		
-- SELECT --	1	20	5	☑	20	5
PIPE	1	10	10	☑	10	10
CLARIFLOCCULATOR (RADIAL)	1		10	☑		10
CHANNEL	1	20	5	☑	20	5
FILTER INLET CHANNEL	1	20	5	☑	20	5
RAPID SAND GRAVITY FILTER	1	20		☑	20	
PURE WATER CHANNEL	1	20	5	☑	20	5
PIPE	1	5	5	☑	5	5
-- SELECT --	1	20	5	☑	20	5

Ticks indicate that the values are copied from tender fields

Copy all the values by using this "All" option.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA			SELECTED CRITERIA	
		% OVERLOADING	% LOSS		% OVERLOADING	% LOSS
		20	5	☑	*All Selected Values Same As Tendered*	
CASCADE AERATOR *	1			☑	0	0
PARSHALL FLUME *	1	20	5	☑	20	5
-- SELECT --	1	10	10	☑	10	10
PIPE	1	0	10	☑	0	10
CLARIFLOCCULATOR (RADIAL)	1	20	5	☑	20	5
CHANNEL	1	20	5	☑	20	5
FILTER INLET CHANNEL	1	20	5	☑	20	5
RAPID SAND GRAVITY FILTER	1	20	0	☑	20	0
PURE WATER CHANNEL	1	20	5	☑	20	5
PIPE	1	5	5	☑	5	5
-- SELECT --	1	20	5	☑	20	5

As highlighted above a user can change any of the values manually from selected criteria. In addition to this user shall make sure that none of the field are left blank/empty and a zero is enetered in such fields.

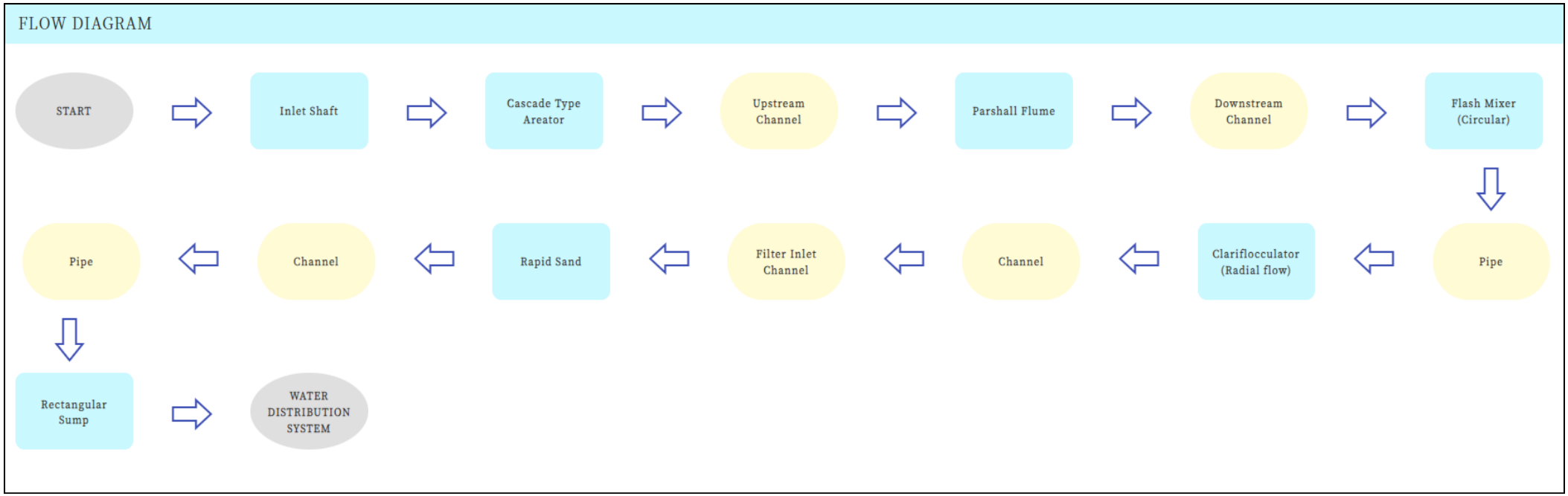
If values for loss and / or overloading for some elements are same as tendered.

ELEMENT	NO. OF UNITS	TENDERED CRITERIA			SELECTED CRITERIA	
		% OVERLOADING	% LOSS		% OVERLOADING	% LOSS
		20	5	☐	*All Selected Values Same As Tendered*	
CASCADE AERATOR *	1	0	0	☐	0	
PARSHALL FLUME *	1	20	5	☑	20	5
-- SELECT --	1	10	10	☐	10	10
PIPE	1	0	10	☐	0	10
CLARIFLOCCULATOR (RADIAL)	1	20	5	☑	20	5
CHANNEL	1	20	5	☑	20	5
FILTER INLET CHANNEL	1	20	5	☑	20	5
RAPID SAND GRAVITY FILTER	1	20	0	☐	20	0
PURE WATER CHANNEL	1	20	5	☑	20	5
PIPE	1	5	5	☐	5	5
-- SELECT --	1	20	5	☑	20	5

- A user can simply click on check boxes for the individual elements whoose values are to be copied in the selected fields.
- Rest of the fields in selected criteria can be filled manually for the remaining elements.

After entering the values, click on Save & Continue to see the flow diagram.

Know the Entire Flow of Elements of your Water Treatment Plants



- After selecting the elemnet types & filling all the necessary information user, will then be able to see the flow diagram.
- This flow diagram will be the exact representation of the user inputs and selection performed at the Number & Overloading screen.

After entering the values, click on Save & Continue to see the flow diagram.

In any case the user is in doubt or wants to change anything in the numbers & overloading screen, user can click Previous & perform the necessary changes.

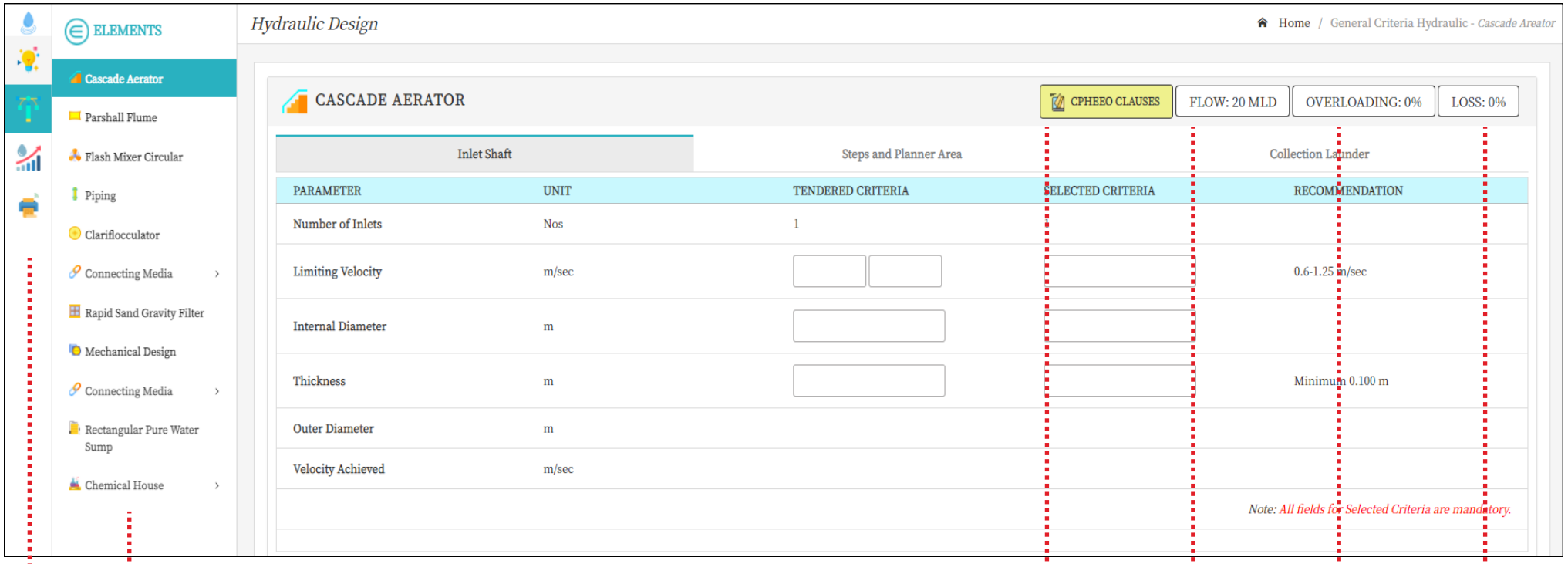
iNODE

The Point With Infinite Possibilities

START DESIGNING THE ELEMENTS

Know your Element Design Screen Icons/Features

Part 1



Main Options

Element Options

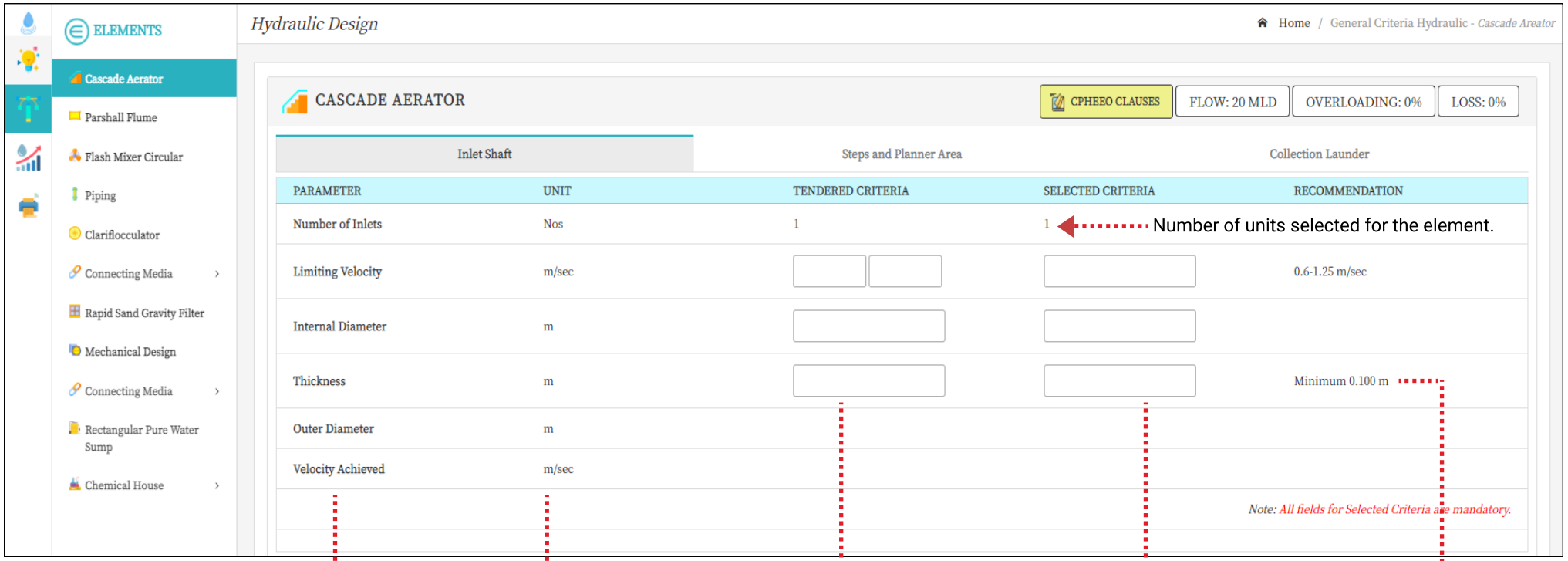
Quick access to the user for clauses mentioned in the CPEEHO Manual design clauses for each specific element.

Capacity Value entered by user during project creation.

Design Overloading & Loss values user entered / copied in selected criteria of respective fields.

Know your Element Design Screen Icons/Features

Part 2



Parameters required to be filled for the design of specific element.

Units of each individual element.

Input fields user shall enter a value if the tender has mentioned value for that specific parameter. In case of values not present in tender user can leave such fields empty / blank.

Input fields where user shall enter value for that specific parameter based on experience & knowledge of design or as mentioned in tender. These values will be further used for design of that element.In any case user cannot leave any of the field blank/empty.

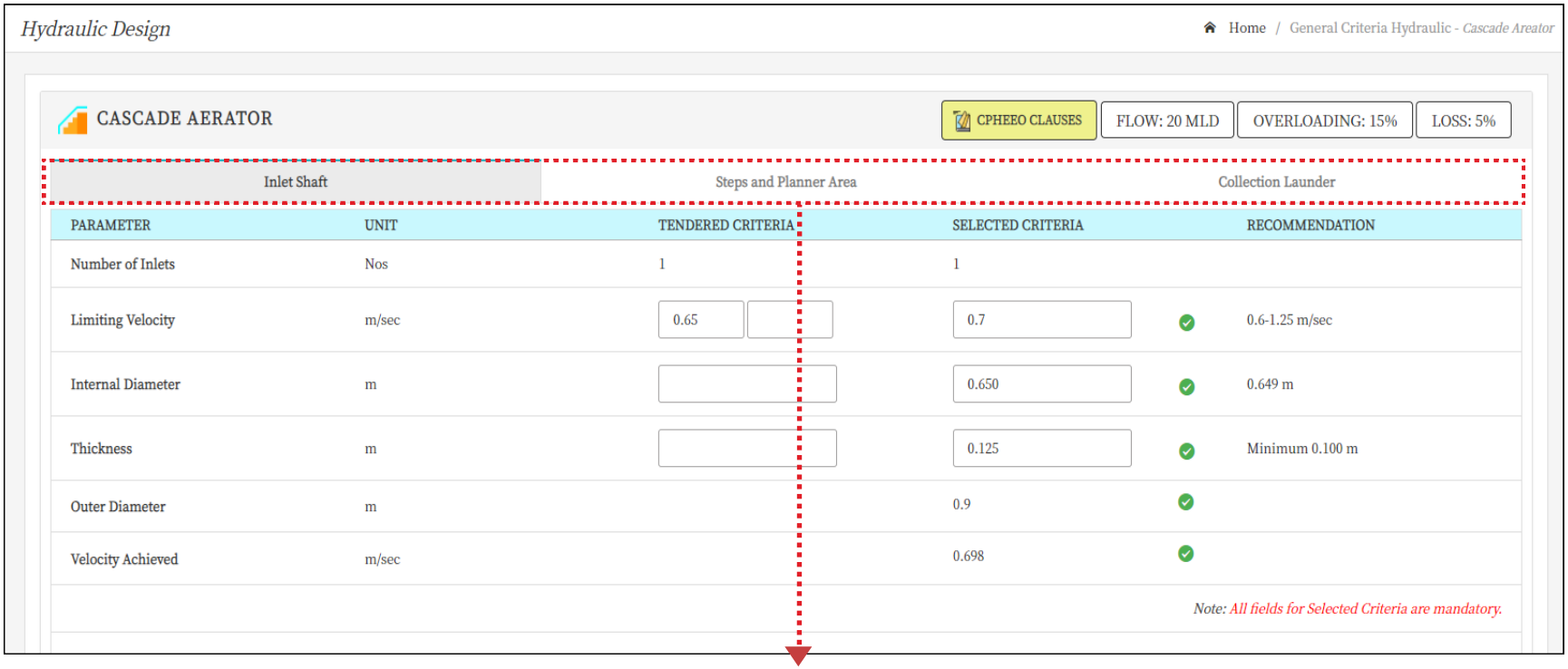
This is the recommended value/ range based on either standard design/CPEEHO Manual/Reverse calculations. This ensures user input values are within standard design practices.

Detailed Icon Explanation

	**DESIGN ELEMENTS**	Choose design elements, numbers, overloading & losses for each element.
	**HYDRAULIC DESIGN**	Standard step by step hydraulic design of each element.
	**HEAD LOSSES**	Performing step by step head loss calculations for each element.
	**PRINT**	Create templates and download/ print outputs for design reports and design drawings.
	**ELEMENTS LIST**	Represents the flow of elements selected for further designs.

	List of CPHEEO manual clauses for the specific screen.
	
	Displays the selected capacity of WTP, overloading and loss for the design element.
	
	This specific input field is for the value mentioned in the tender for that particular element.
	This specific input field is for the value the designer wants to design the particular parameter.
	These are the values displayed post standard reverse calculations and/ or CPHEEO manual values.

Start Designing an Element



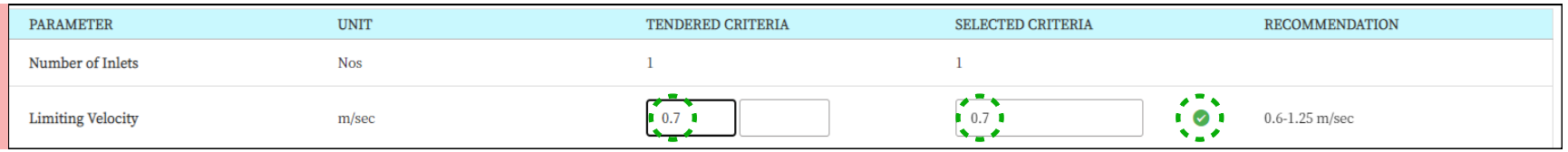
Sub Element Tabs, grey fill represents the selected sub element tab.

For the start we would like to draw your attention towards the simple designing experience for which one sub - element i.e.Inlet Shaft will be designed and explained. The other elements can be designed on the same line using iNode software. In all the design elements the highlights will be mentioned further for better understanding.

Note: The screen values in the input fields are only for explaining the working of the software and in no case are recommended for actual design purpose.

Know how to fill values in tendered and selected criteria

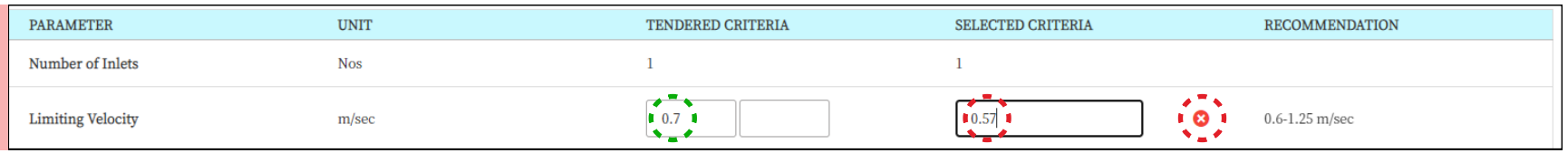
CASE 1



Here selected value i.e. 0.7 is verified whether it is in the recommended range of 0.6 - 1.25 m/sec.

When a value of a specific parameter is mentioned in tender, user can enter the value in the tendered criteria and use the same value for further design by entering the value in selected criteria field. The value then entered in the selected criteria will be verified against the standard design / CPEEHO recommended range.

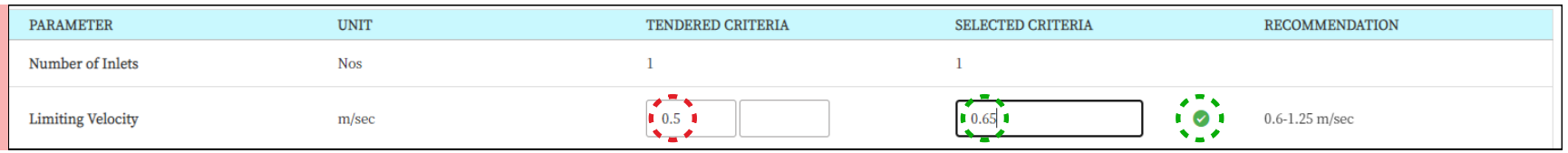
CASE 1



Here selected value i.e. 0.57 is not in the recommended range of 0.6 -1.25 m/sec and needs to be revised.

When a value of a specific parameter is mentioned in tender, user can enter the value in the tendered criteria but in selected criteria field user can enter any other value than tendered mentioned as per user experience & knowledge and use the value for further design. The value then entered in the selected criteria will be verified against the standard design / CPEEHO recommended range. Here the software ensures user is within the Codal/standard design practice values.

CASE 1



Here selected value i.e. 0.65 is verified whether it is in the recommended range of 0.6 - 1.25 m/sec.

When a value of a specific parameter is mentioned in tender, but user can notice the value not being in the recommended ranges, user can thereby input the value as per user experience & knowledge by taking an additional help of recommended ranges and use the value for further design. The value then entered in the selected criteria will be verified against the standard design / CPEEHO recommended range. Here the software ensures user is within the Codal/standard design practice values.

The above mentioned user input ways with verification of the selected values can be followed for all the other input fields of tendered and selected criteria as specified

Know how the values entered in selected criteria affect the next parameter and reverse calculation works .

CASCADE AERATOR

CPHEEO CLAUSES | FLOW: 20 MLD | OVERLOADING: 15% | LOSS: 5%

Inlet Shaft | Steps and Planner Area | Collection Launder

PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
Number of Inlets	Nos	1	1	
Limiting Velocity	m/sec	0.65	0.7	0.6-1.25 m/sec
Internal Diameter	m		0.650	0.649 m

After the user has entered limiting velocity value, iNODE will perform reverse calculation for minimum required diameter as shown below:

Number of Units, Overloading and Loss user has entered for Cascade Aerator.
In this case **Number of Units = 1, Overloading = 15% and Loss = 5%**

PARAMETER	FORMULAE USED
Designed Flow per Unit	$Designed\ Flow\ per\ Unit = \frac{\left[Flow \times \left[\frac{Overloading}{100} + \frac{Loss}{100}\right]\right] + Flow}{No\ of\ Units}$
Designed Flow per Unit	$Q = \frac{Designed\ Flow\ per\ Unit \times 10^3}{24 \times 60 \times 60}$
$A_{shaft\ required}$	$A_{Shaft\ Required} = \frac{Q}{V_{Limiting}}$
$D_{shaft\ required}$	$D_{Shaft\ Required} = \sqrt{\frac{A \times 4}{\pi}}$
$D_{shaft\ provided}$	$D_{Shaft\ Provided} = Internal\ Diameter\ (provided) + 2 \times Thickness$

1.1 ASSUMPTIONS:

- Assume velocity of flow through Inlet Shaft (Recommended Range 0.6-1.25 m/sec)
- Assume thickness of Inlet Shaft

1.2 CALCULATIONS:

$$\text{Diameter of Inlet Shaft Required} = \left[\frac{4 \times Designed\ Flow\ (m^3/sec)}{\pi \times \text{Velocity (m/s)}}\right]^{0.5}$$

Provide Internal Diameter of Inlet Shaft preferably greater or equal to the required value.

$$\text{Outer Diameter of Inlet Shaft Provided} = Internal\ Diameter + (2 \times Thickness)$$

The above mentioned user input ways with verification of the selected values can be followed for all the other input fields of tendered and selected criteria as specified

Know what is the minimum standard value, calculated Dimensions based on user inputs and also how user inputs effects on the parameter validations by reverse calculations

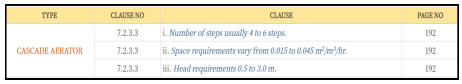
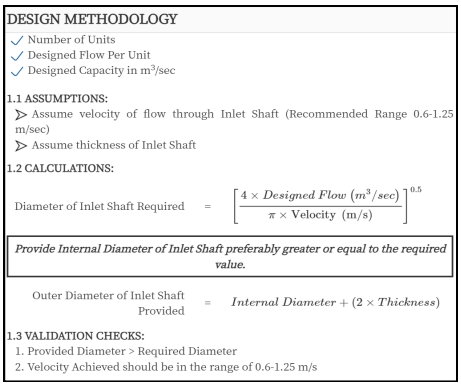
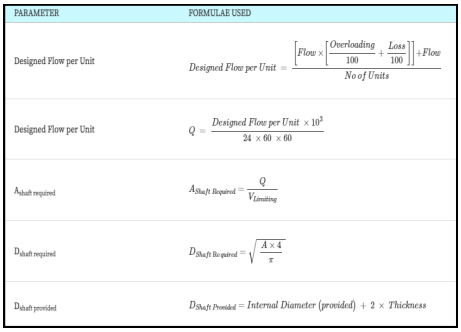
PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
Thickness	m		0.125	Minimum 0.100 m
Outer Diameter	m		0.9	
Velocity Achieved	m/sec		0.698	

iNODE reverse calculates the value on its own using standard formula. Values considered will be from selected/calculated values.

iNODE calculates the value on its own using standard formula. All the values considered will be from selected criteria.

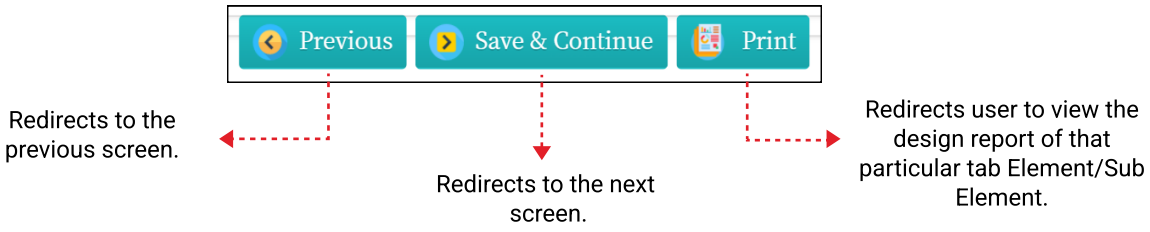
Minimum required thickness as per design standards. Outer diameter will be further calculated by the thickness the user inputs.

Additional Screen Features

ICON	DESCRIPTION	DETAILS	SCREEN EXAMPLE
	**CORRECT DESIGN VALUE**	This represents that the value user entered in the selected field for the parameter is within the permissible range of standard design/codal provisions.	
	**INCORRECT DESIGN VALUE**	This represents that the value user entered in the selected field for the parameter is not within the permissible range of standard design/codal provisions.	
	**CPHEEO MANUAL CLAUSES**	This represents quick access to the user for noting the manual clauses for that specific element which includes clauses and page numbers. Each element has its own specific display of clauses for that element.	
	**DESIGN METHODOLOGY**	On clicking this icon the entire step by step design methodology for the particular element/sub-element appears for quick reference. It includes the theory and assumptions with all the required units to be considered. In addition to this it also helps the user to perform manual calculation for a quick heads up, building confidence in the design procedure.	
	**DESIGN CALCULATIONS**	Simply scroll down & the icon appears. This will give the user a detailed step by step formulae and the output value obtained by performing back calculation of a particular parameter. The calculated values appear in the recommendations or in non-editable fields. This will ensure that the user has no confusion and is in the correct flow of standard design calculations.	

Output Reports and going to the next element/ Sub Element Design

This option will appear at the end of the design of the elememt, only when an element is inclusive of multiple sub elements.



Standard sample Design Output Report

HYDRAULIC DESIGN OF CASCADE AERATOR

The role of Aeration is to remove undesirable dissolved gases in water and to add oxygen to water to convert undesirable substances to a more manageable form.

INLET SHAFT

(Reference Table No. 1)

- ✓ *Number of Units = 1 No*
- ✓ *Designed Flow Per Unit = 24.000 MLD*
- ✓ *Designed Capacity in m^3/sec = 0.278 m^3/sec*

ASSUMPTIONS & CALCULATIONS:

- ➢ *Assumed velocity of flow through Inlet Shaft = 0.7 m/sec*
- ➢ *Assumed Thickness = 0.125 m*

$$\text{Diameter of Inlet Shaft Required} = \left[\frac{4 \times \text{Designed Flow } (m^3/sec)}{\pi \times \text{Velocity (m/s)}}\right]^{0.5}$$

$$= \left[\frac{4 \times 0.278}{3.14 \times 0.7}\right]^{0.5}$$

$$D_{Required} = 0.711 \text{ m}$$

Provided Internal Diameter of Inlet Shaft = 0.75 m

- ➢ *Assumed thickness of Inlet Shaft = 0.125 m*

Hence, Outer Diameter = 1.000 m

VALIDATION CHECKS:

1. *Provided Diameter 0.75 > Required Diameter = 0.711 m*

Diameter Provided > Diameter Required.

2. *Velocity Achieved = 0.629 m/sec*

Hence, Velocity achieved is within the permissible Range (0.6-1.25 m/sec)

DESIGN SUMMARY - INLET SHAFT

Velocity	=	*0.629 m/sec*
Internal Diameter of Inlet Shaft	=	*0.75 m*
Thickness of Inlet Shaft	=	*0.125 m*
Outer Diameter of Inlet Shaft	=	*1.000 m*

Standard sample Design Output Report when user eneters incorrect values, which will be reflected in the report.

PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
Number of Inlets	Nos	1	1	
Limiting Velocity	m/sec	0.65	0.5	0.6-1.25 m/sec
Internal Diameter	m		0.4	0.841 m
Thickness	m		0.09	Minimum 0.100 m
Outer Diameter	m		0.580	
Velocity Achieved	m/sec		2.212	

Design Output Report for the above screen

HYDRAULIC DESIGN OF CASCADE AERATOR

The role of Aeration is to remove undesirable dissolved gases in water and to add oxygen to water to convert undesirable substances to a more manageable form.

INLET SHAFT

(Reference Table No. 1)

- ✓ *Number of Units = 1 No*
- ✓ *Designed Flow Per Unit = 24.000 MLD*
- ✓ *Designed Capacity in m^3/sec = 0.278 m^3/sec*

ASSUMPTIONS & CALCULATIONS:

- ➢ *Assumed velocity of flow through Inlet Shaft = 0.5 m/sec*
- ➢ *Assumed Thickness = 0.09 m*

$$\text{Diameter of Inlet Shaft Required} = \left[\frac{4 \times \text{Designed Flow } (m^3/sec)}{\pi \times \text{Velocity (m/s)}}\right]^{0.5}$$

$$= \left[\frac{4 \times 0.278}{3.14 \times 0.5}\right]^{0.5}$$

$$D_{Required} = 0.841 \text{ m}$$

Provided Internal Diameter of Inlet Shaft = 0.4 m

- ➢ *Assumed thickness of Inlet Shaft = 0.09 m*

Hence, Outer Diameter = 0.580 m

VALIDATION CHECKS:

1. *Provided Diameter 0.4 < Required Diameter = 0.841 m*

Hence Revise.

2. *Velocity Achieved = 2.212 m/sec*

Hence, Velocity is not achieved within the permissible Range (0.6-1.25 m/sec)

DESIGN SUMMARY - INLET SHAFT

Velocity	=	*2.212 m/sec*
Internal Diameter of Inlet Shaft	=	*0.4 m*
Thickness of Inlet Shaft	=	*0.09 m*
Outer Diameter of Inlet Shaft	=	*0.580 m*

Additional Features of Report

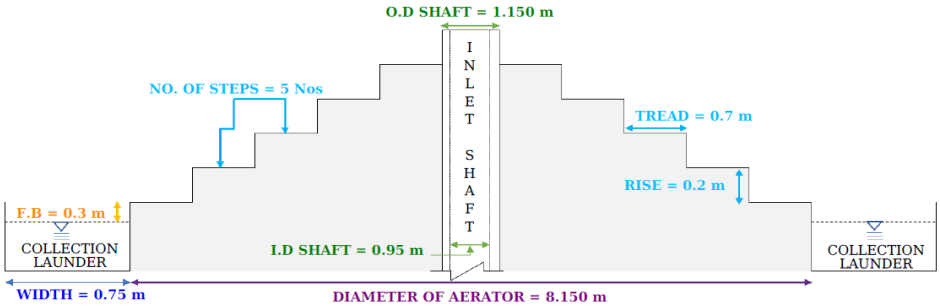
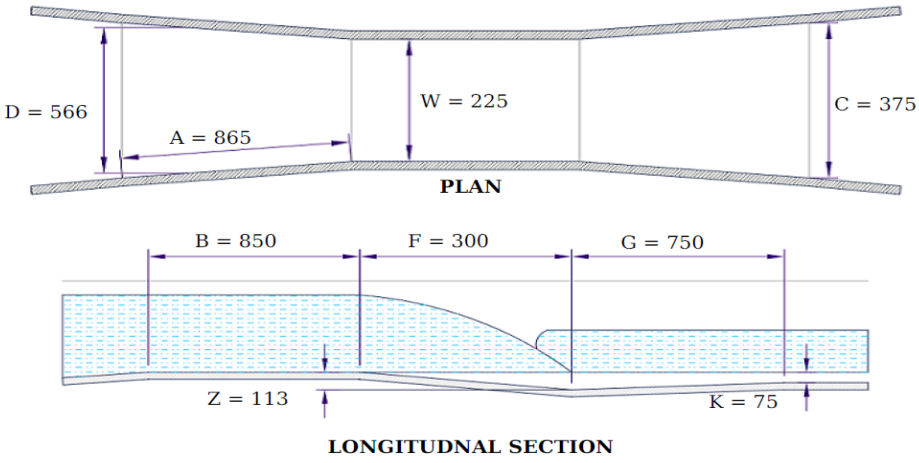


Figure - Cascade Aerator Details
*For Schematic purpose only



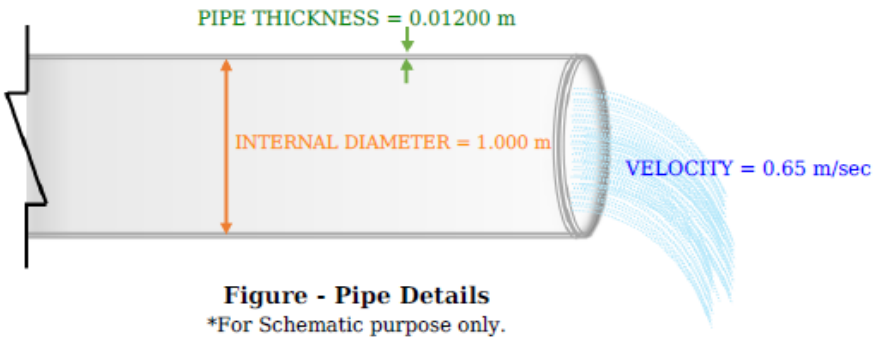


Figure - Pipe Details
*For Schematic purpose only.

Additional Features of Report

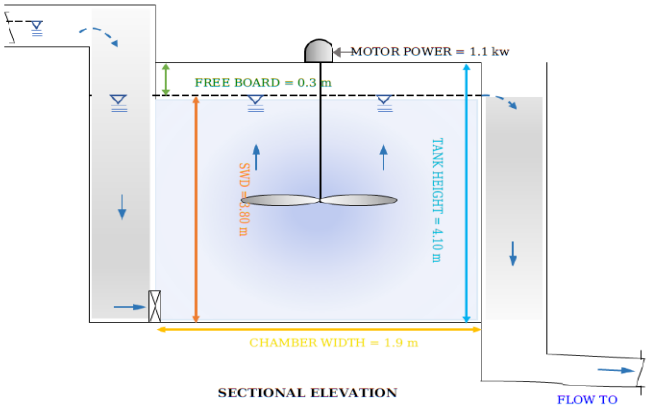


Figure - Flash Mixer Details
*For Schematic purpose only

TYPICAL CLARIFLOCCULATOR SKETCH

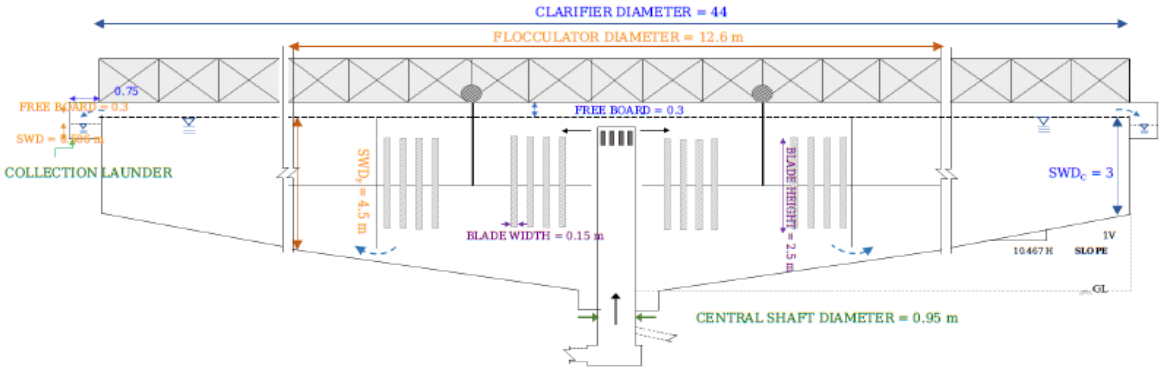


Figure - Clarifloculator Details
*For Schematic purpose only.

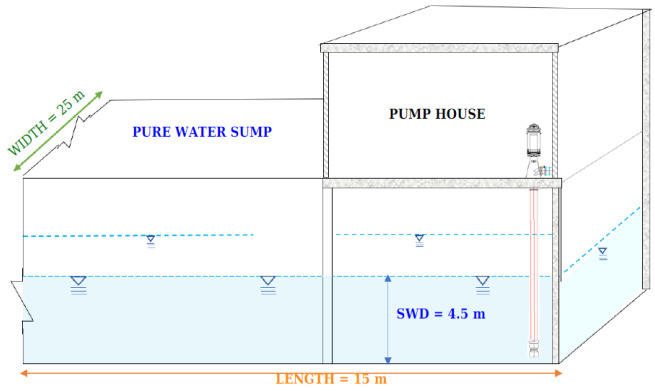


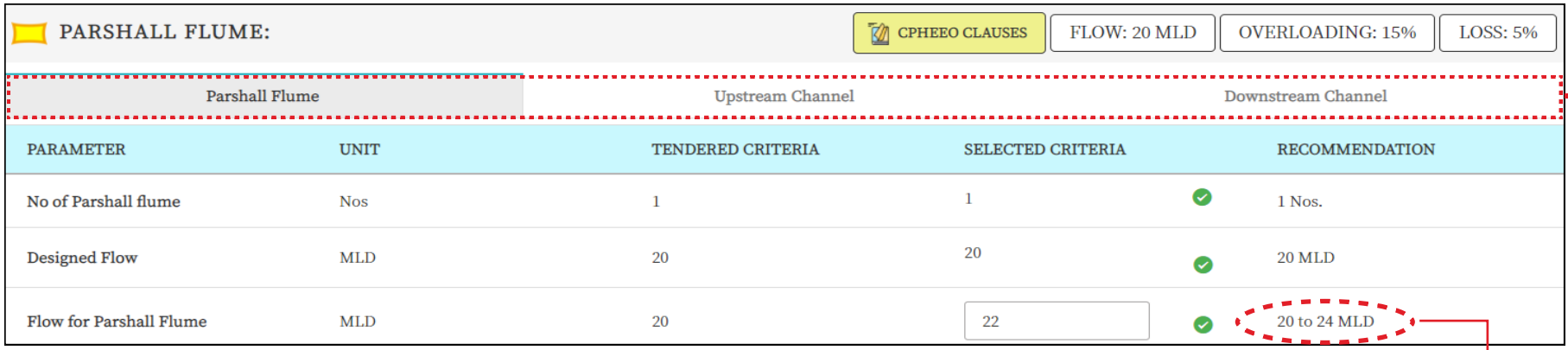
Figure - Pure Water Sump Details
*For Schematic purpose only.

iNODE

The Point With Infinite Possibilities

UNIQUE DESIGN ELEMENT FEATURES

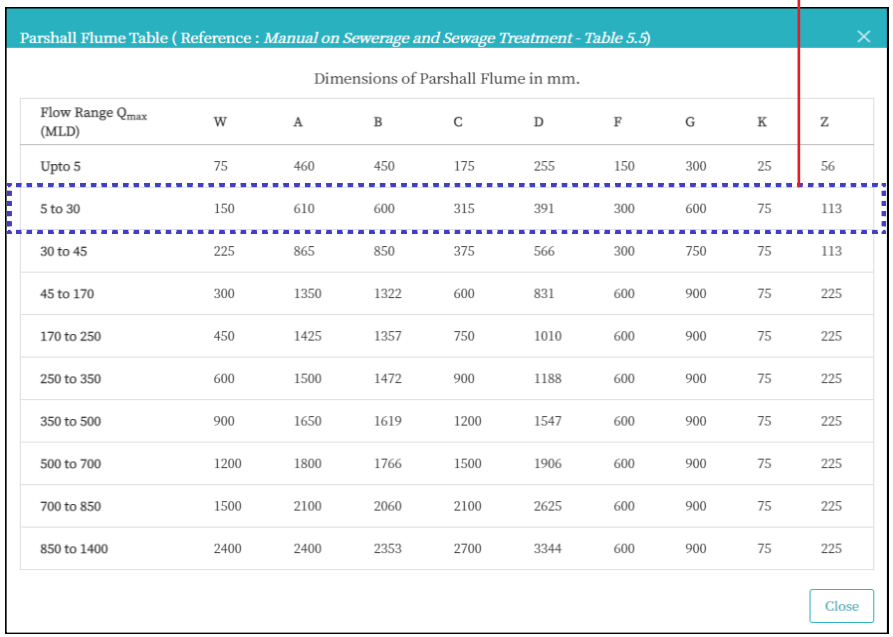
Parshall Flume Screen Features



Sub-elements: Upstream & Downstream

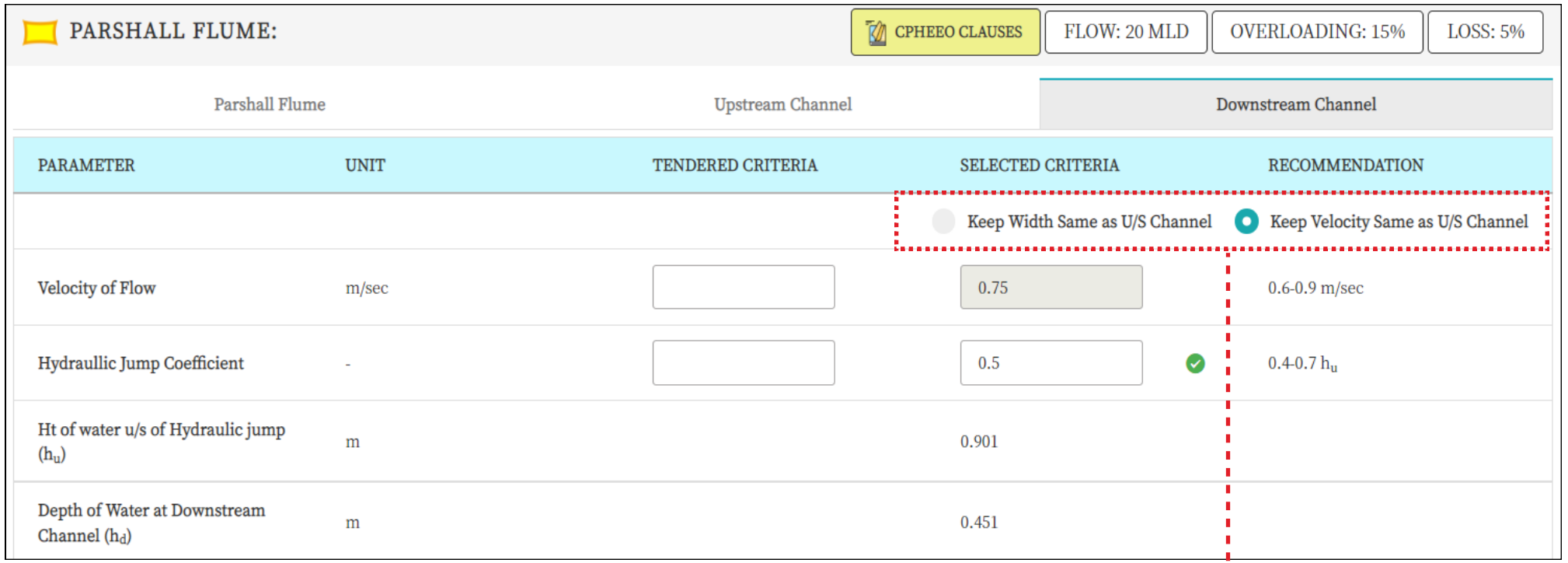
In above case when user enters the value 22, the lower limit and its set of dimensions will be selected for the Parshall Flume.

A user should always be carefull while entering a value for parshall flume after noting the assumed overloading/Loss and the space requirements availibility.



Parshall Flume Screen Features

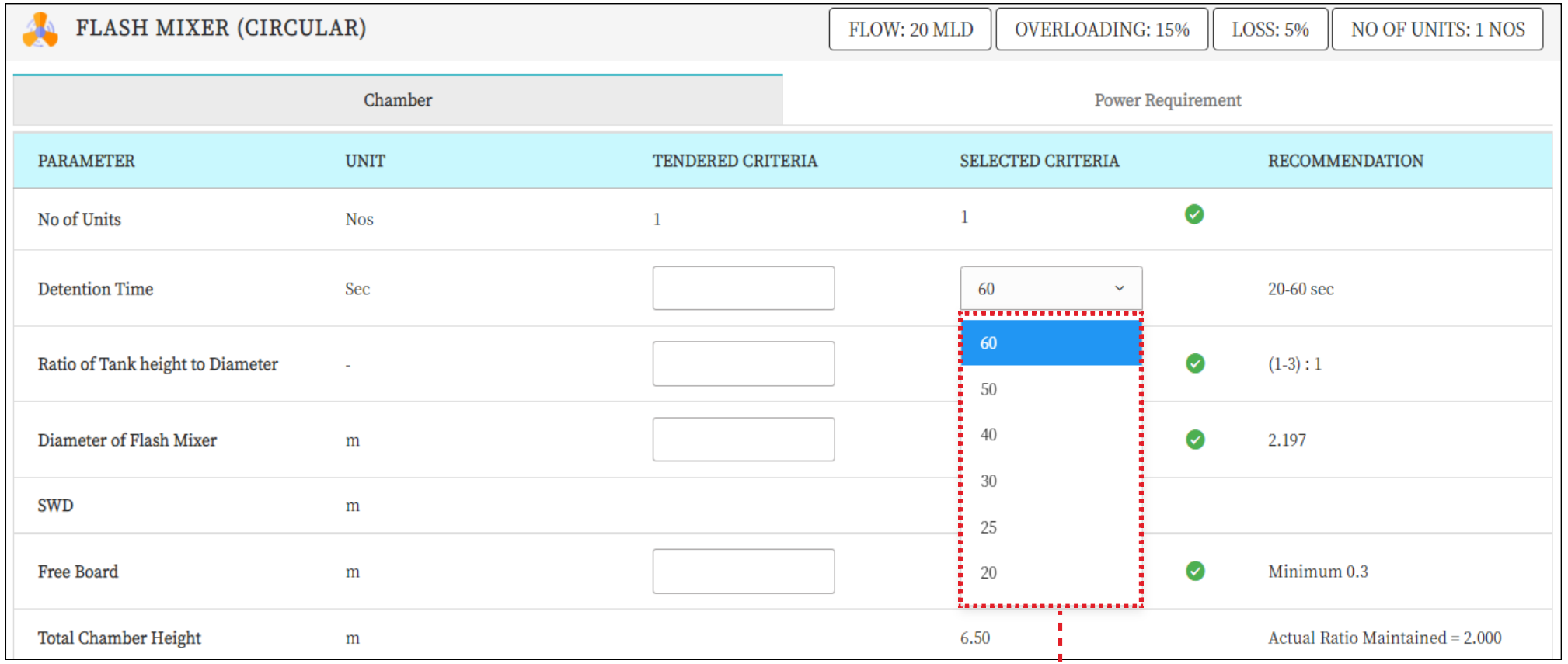
DOWNSTREAM CHANNEL FEATURES



For downstream channel design user can select either to keep width or velocity as upstream channel.

Flash Mixer Features

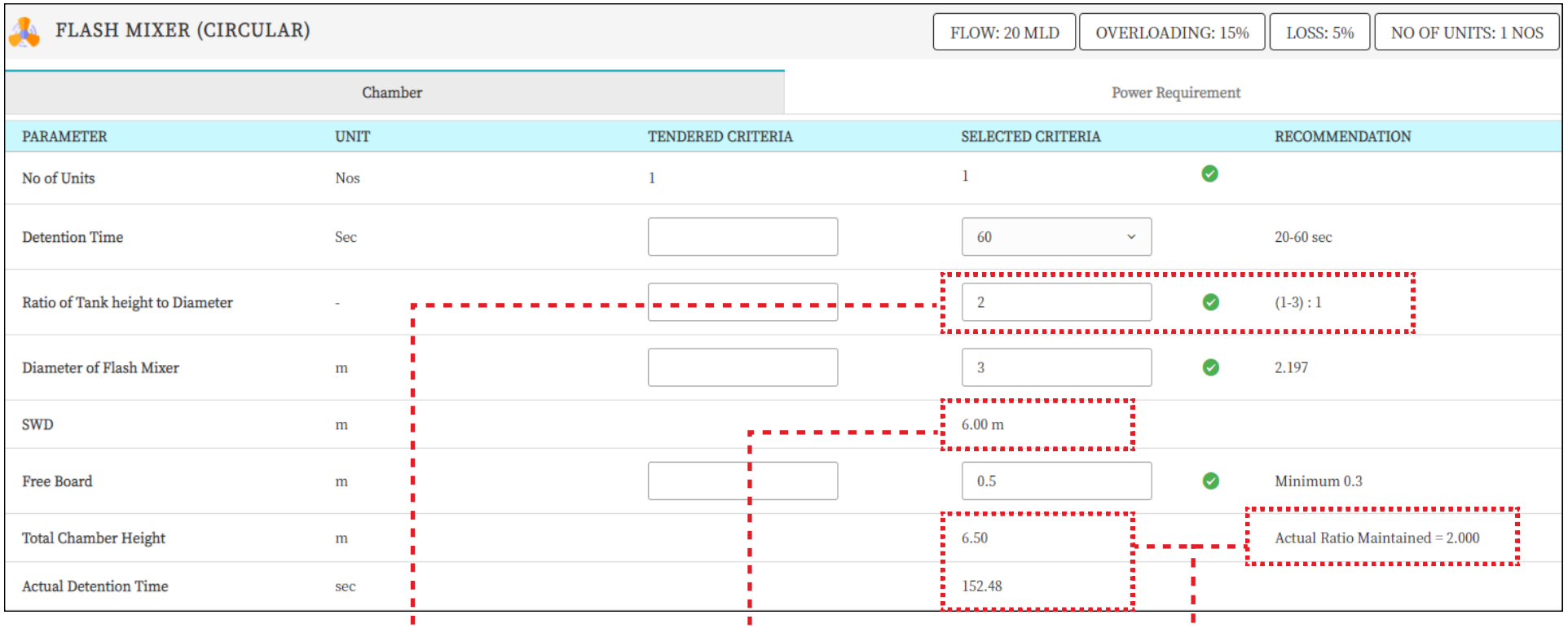
All types of Flash Mixers



Standard detention time list to be selected from.

Flash Mixer Features

All types of Flash Mixers



FLASH MIXER (CIRCULAR)

FLOW: 20 MLD | OVERLOADING: 15% | LOSS: 5% | NO OF UNITS: 1 NOS

Chamber | Power Requirement

PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
No of Units	Nos	1	1	
Detention Time	Sec		60	20-60 sec
Ratio of Tank height to Diameter	-		2	(1-3) : 1
Diameter of Flash Mixer	m		3	2.197
SWD	m		6.00 m	
Free Board	m		0.5	Minimum 0.3
Total Chamber Height	m		6.50	Actual Ratio Maintained = 2.000
Actual Detention Time	sec		152.48	

Standard Ratio to be maintained.

SWD calculated in accordance to diameter entered and ratio.

Auto calculated for the user design clarity.

Flash Mixer Features

FLASH MIXER (CIRCULAR)

FLOW: 20 MLD | OVERLOADING: 15% | LOSS: 5% | NO OF UNITS: 1 NOS

Chamber			Power Requirement	
PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
No of Units	Nos	1	1	
Velocity Gradient	Sec^{-1}		300	300
Detention Time	Sec		60	60
Absolute Viscosity	kg/m/s		0.00089	0.89 x 10^{-3} kg/m.s
Power	kw		4	3.395 kw

Note: All fields for Selected Criteria are mandatory.

Detention time pulled from the previous screen as user enetered & corresponding standard Velocity gradient pulled.

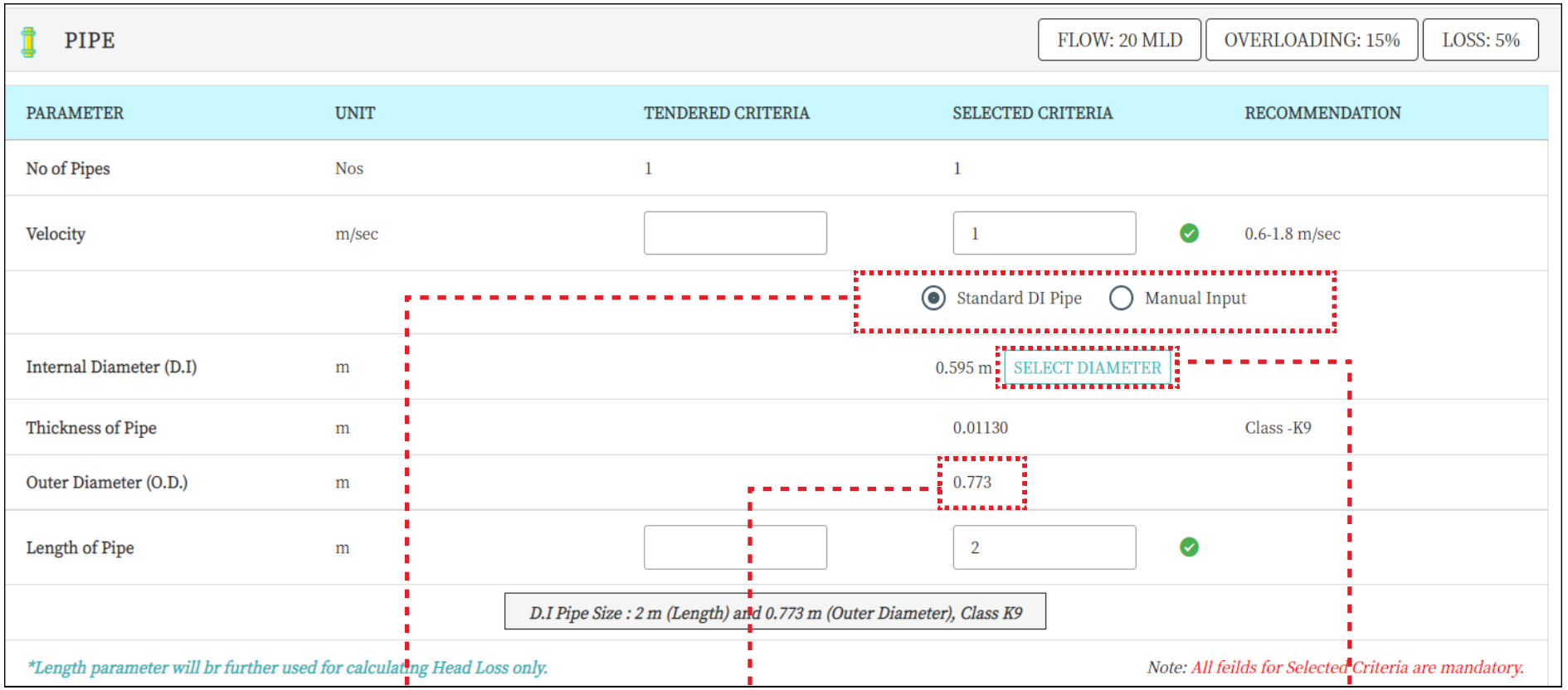
Standard Value

DESIGN CALCULATIONS

PARAMETER	FORMULAE USED	CALCULATED VALUES
Volume of Each Flash Mixer	$Volume = \frac{\pi}{4} \times diameter\ provided^2 \times SWD\ provided$	42.39 m^3
Power Requirement(Range 1)	$G = \sqrt{\left[\frac{P}{\mu(Vol)}\right]}$	3.395 kw
Power Requirement(Range 2)		3.052 kw
Power Provided		4 kw

Maximum value of the two. (Value pulled from standard table provided by CPEEHO manual)

Pipe Screen Features



A user has the option to select a standard DI pipe conforming to codal provisions or can enter a pipe diameter manually as per availability.

Automatically Calculated

Pop Up will appear post clicking the "SELECT DIAMETER"

Pipe Screen Features

Recommended Diameter = 595 mm

All dimensions in millimetres.

NOMINAL DIAMETER	BARREL WALL THICKNESS 'E'			
	○	○	◉	○
DN	K7	K8	K9	K10
○ 600	7.7	8.8	9.9	11.0
○ 700	9.0	9.6	10.8	12.0
◉ 750	9.7	10.0	11.3	12.5
○ 800	10.4	10.4	11.7	13.0
○ 900	11.2	11.2	12.6	14.0
○ 1000	12.0	12.0	13.5	15.0
○ 1100	14.4	14.4	14.4	16.0
○ 1200	15.3	15.3	15.3	17.0

CASE 1: When user selcts "Standard DI Pipe"

User has to select diameter and barrel wall thickess class.

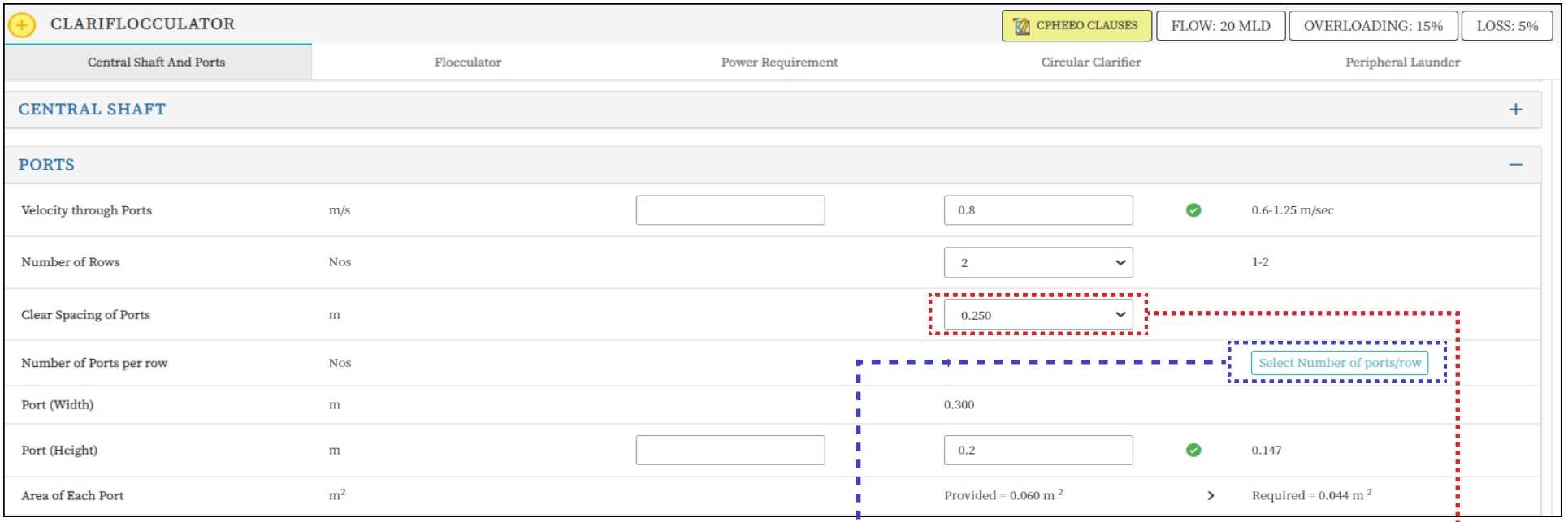
Diameters are displayed only greater to recommended (minimum required diameter calcuated)

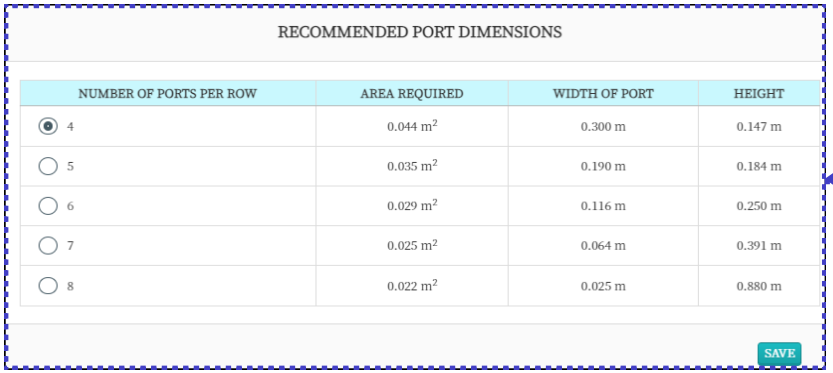
PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
No of Pipes	Nos	1	1	
Velocity	m/sec		1	✓ 0.6-1.8 m/sec
			○ Standard DI Pipe ◉ Manual Input	
Internal Diameter (D.I)	m		0.6	✓ 0.595 m
Thickness of Pipe	m		0.2	✓
Outer Diameter (O.D.)	m		1.000	
Length of Pipe	m		2	✓

CASE 2: When user selects "Manual Input"

When user selects "Manual Input" , an input field will appear, where th user can enter value for internal diameter referring to the recommended diameter. In addition to this user also needs to enter the thickness of the pipe.

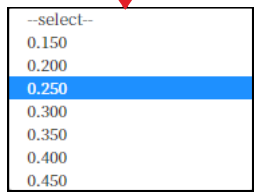
Clariflocculator Screen Features





Default calculated values for selected number of rows and clear spacing of ports.

Standard Spacing drop down list.



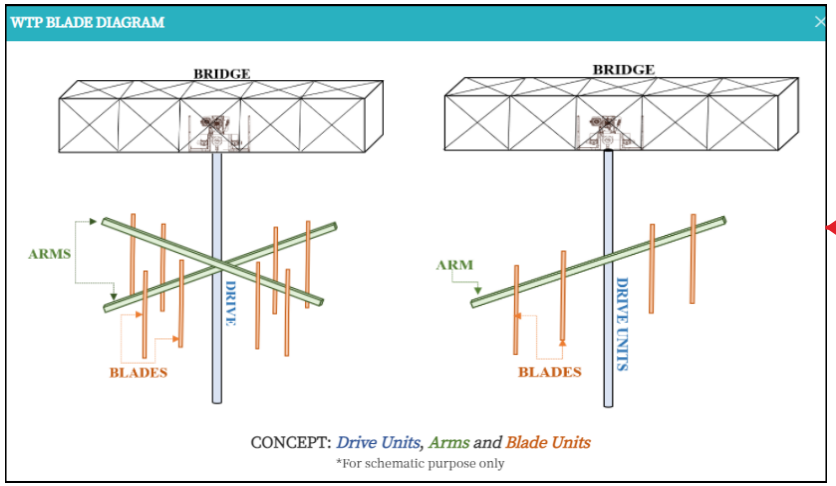
Clariflocculator Screen Features

CLARIFLOCCULATOR

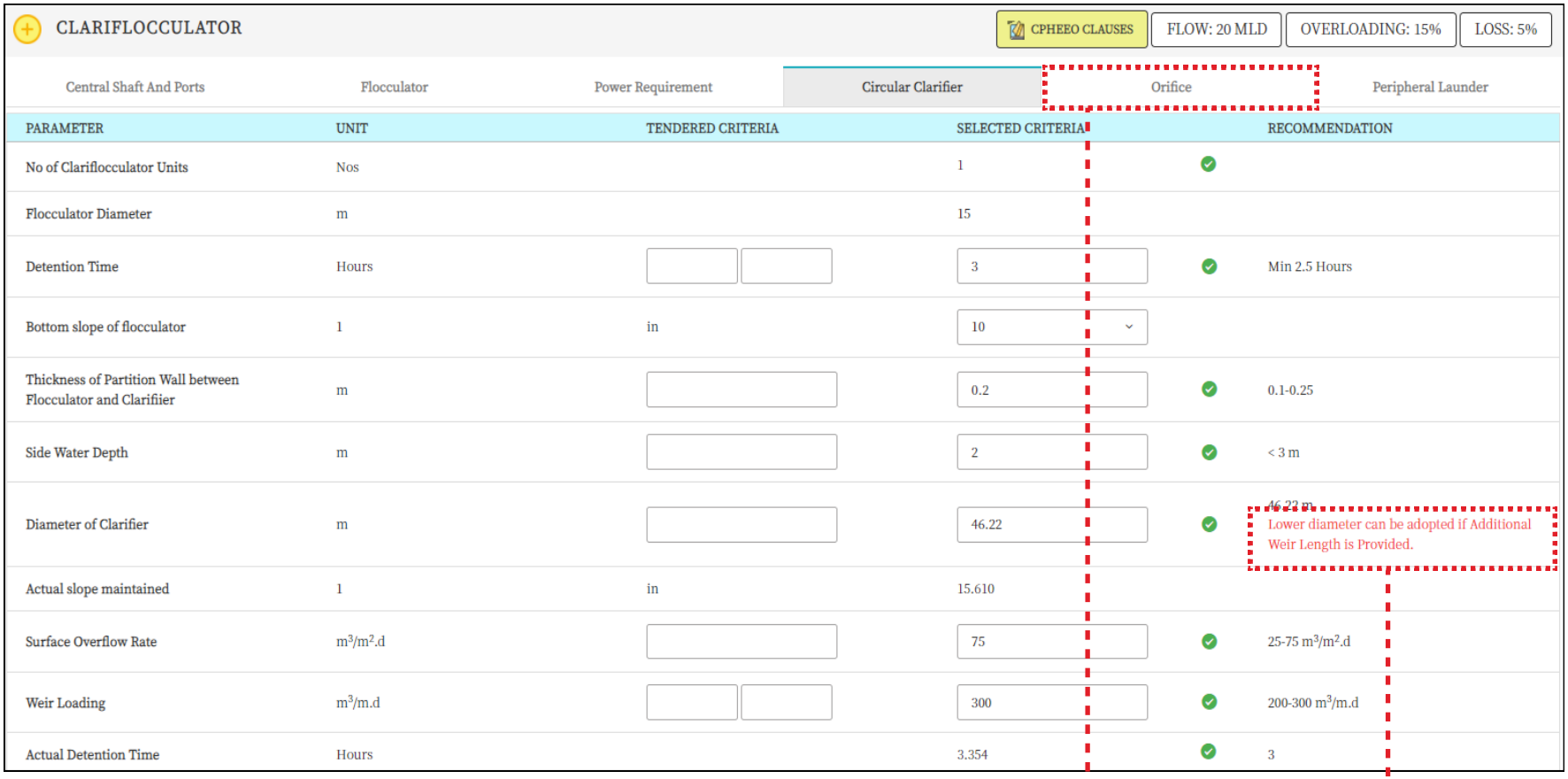
CPHEEO CLAUSES | FLOW: 20 MLD | OVERLOADING: 15% | LOSS: 5%

Central Shaft And Ports | Flocculator | Power Requirement | Circular Clarifier | Peripheral Launder

PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
No of Clariflocculators Units	Nos	1	1	
Velocity Gradient	sec^{-1}		60	
Paddle Tip Velocity	m / Sec		0.5	0.2-0.6 m /sec
Water velocity at Paddle Tip	m / Sec		0.125	0.125 m/sec
Absolute Viscosity	kg/m/s		0.00089	0.89×10^{-3} kg/m.s
Power Required	kw		1.685	
Drag Coefficient			1.8	0.8-2.3
Area Of Paddle Required	m^2		35.879	BLADE DIAGRAM
No. of Drive Units			4	Minimum 2 And Even Number



Clariflocculator Screen Features



CLARIFLOCCULATOR

CPHEEO CLAUSES | FLOW: 20 MLD | OVERLOADING: 15% | LOSS: 5%

Central Shaft And Ports | Flocculator | Power Requirement | Circular Clarifier | Orifice | Peripheral Launder

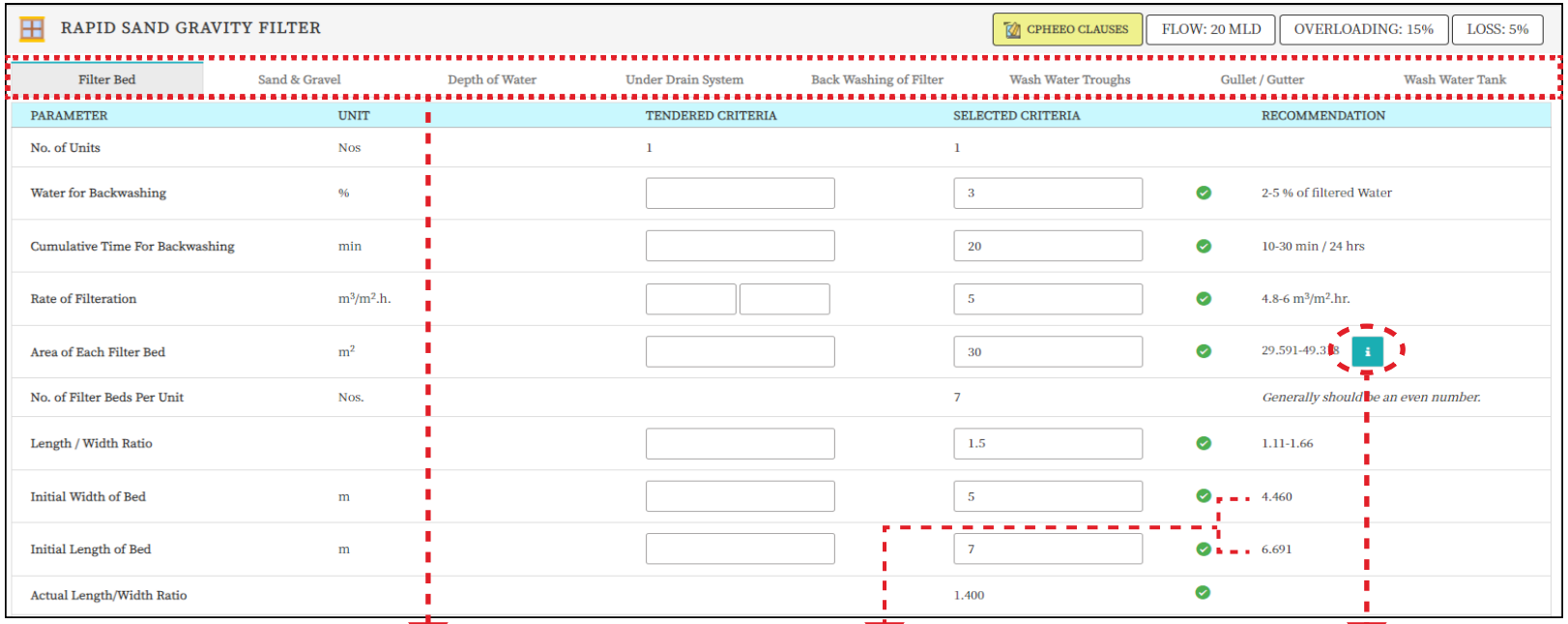
PARAMETER	UNIT	TENDERED CRITERIA	SELECTED CRITERIA	RECOMMENDATION
No of Clariflocculator Units	Nos		1	
Flocculator Diameter	m		15	
Detention Time	Hours		3	Min 2.5 Hours
Bottom slope of flocculator	1	in	10	
Thickness of Partition Wall between Flocculator and Clarifiier	m		0.2	0.1-0.25
Side Water Depth	m		2	< 3 m
Diameter of Clarifier	m		46.22	46.22 m Lower diameter can be adopted if Additional Weir Length is Provided.
Actual slope maintained	1	in	15.610	
Surface Overflow Rate	$m^3/m^2.d$		75	25-75 $m^3/m^2.d$
Weir Loading	$m^3/m.d$		300	200-300 $m^3/m.d$
Actual Detention Time	Hours		3.354	3

Default sub design Tabs of "ORIFICE" when additional weir loading is not required.

Additional weir can be provided.

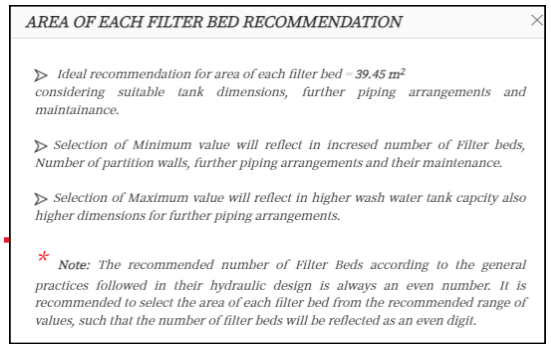
Rapid Sand Gravity Filter Screen Features

Filter Bed



Sub tabs elements for RSGF

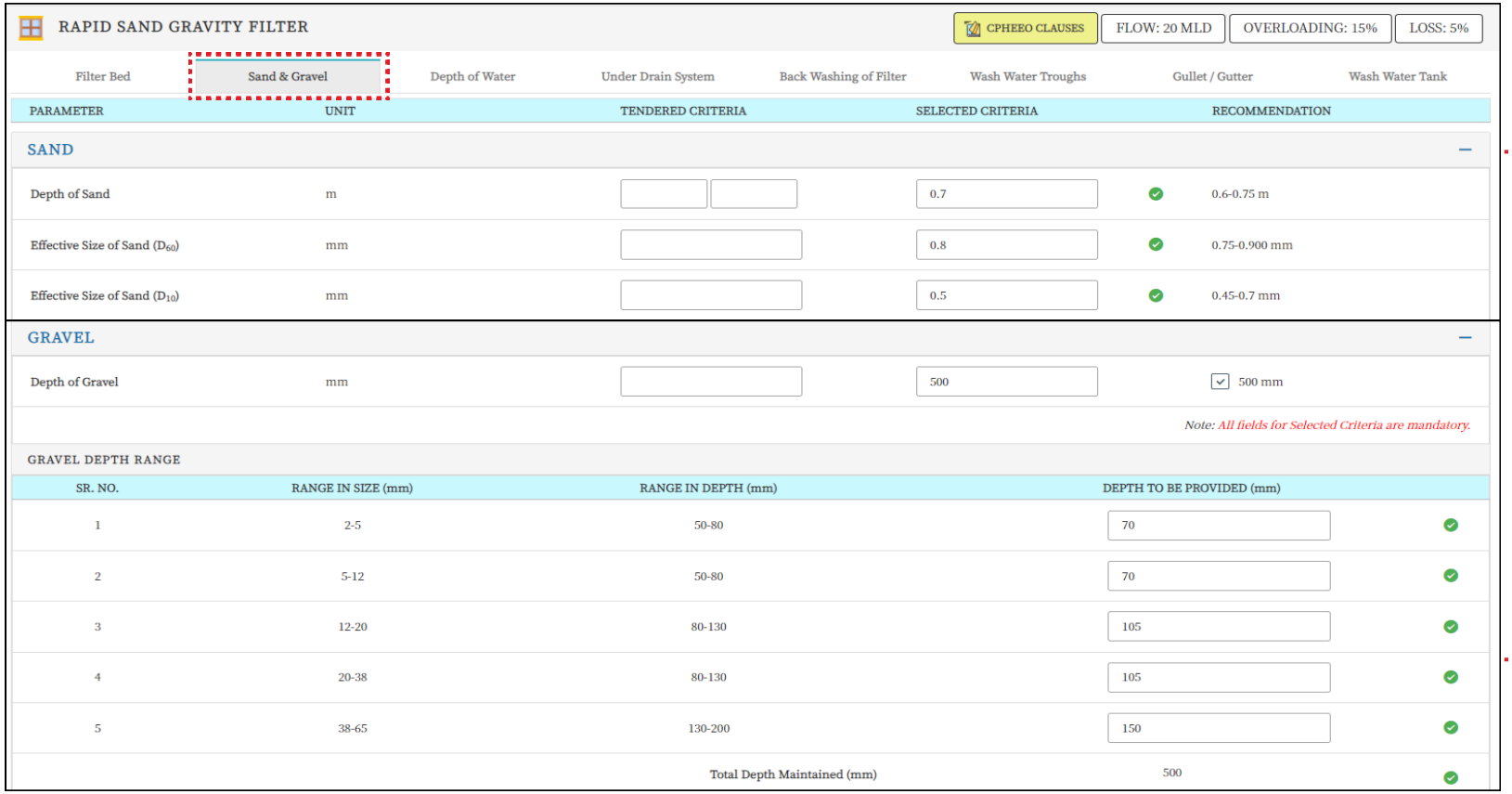
Minimum dimensions requirements.



Each design case has its own calculated ideal area recommendation.

Rapid Sand Gravity Filter Screen Features

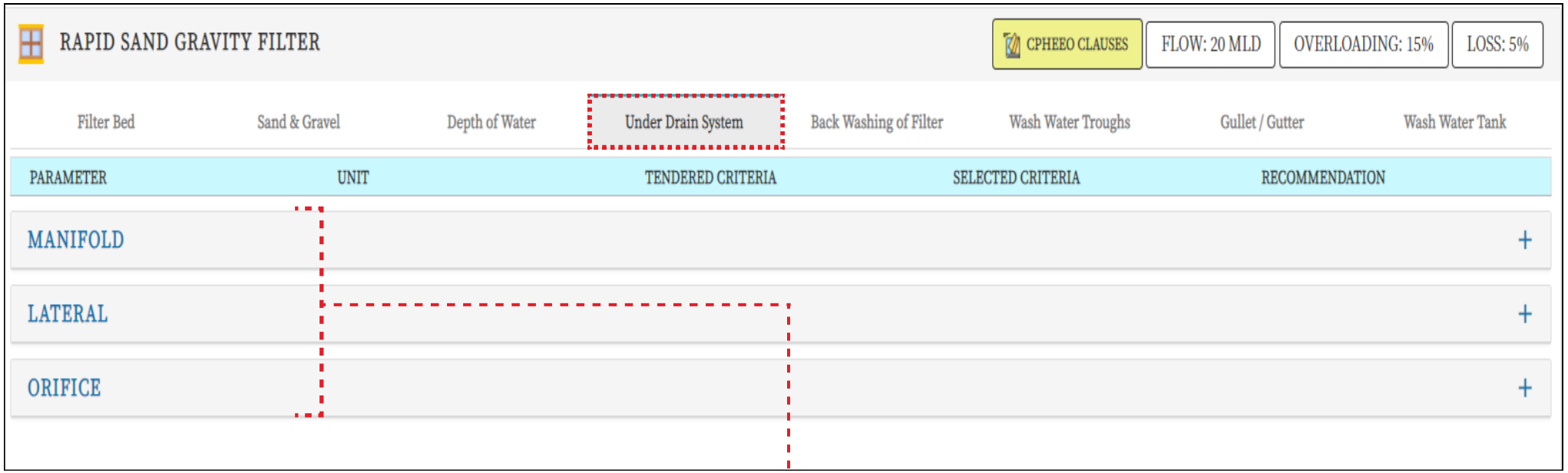
Sand and Gravel



Detailed Design for Sand and Gravel.

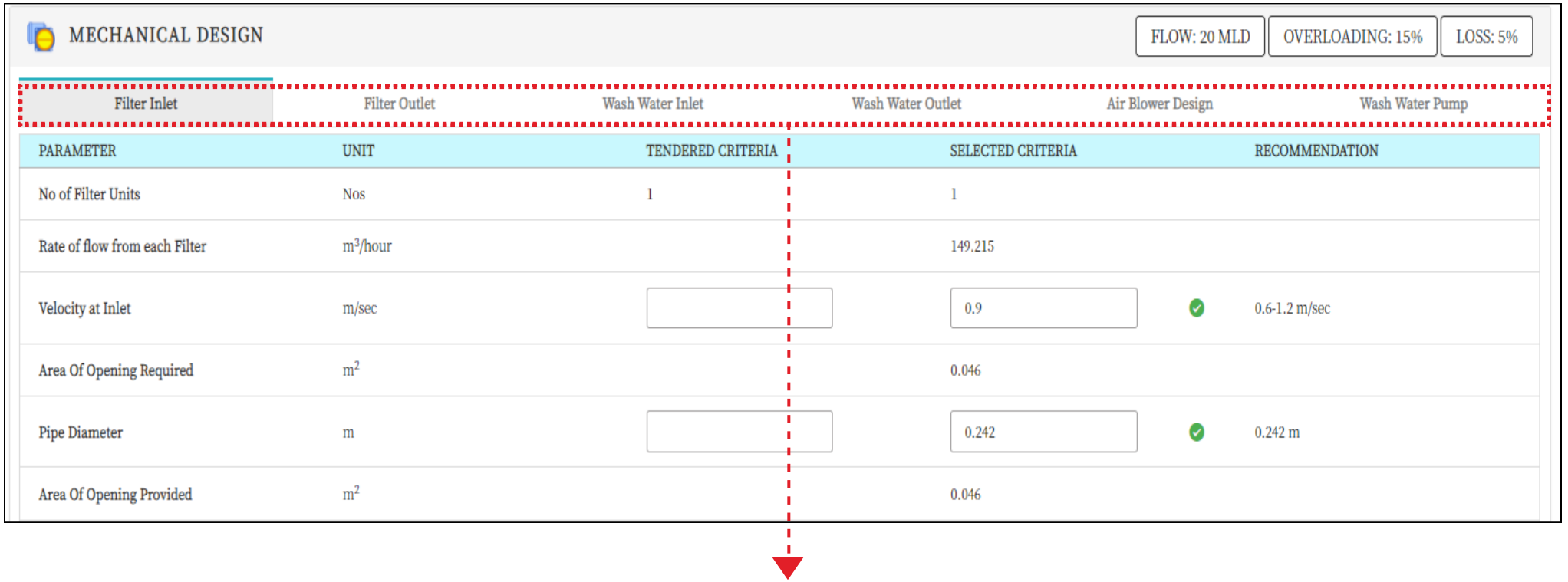
Rapid Sand Gravity Filter Screen Features

Under Drain System



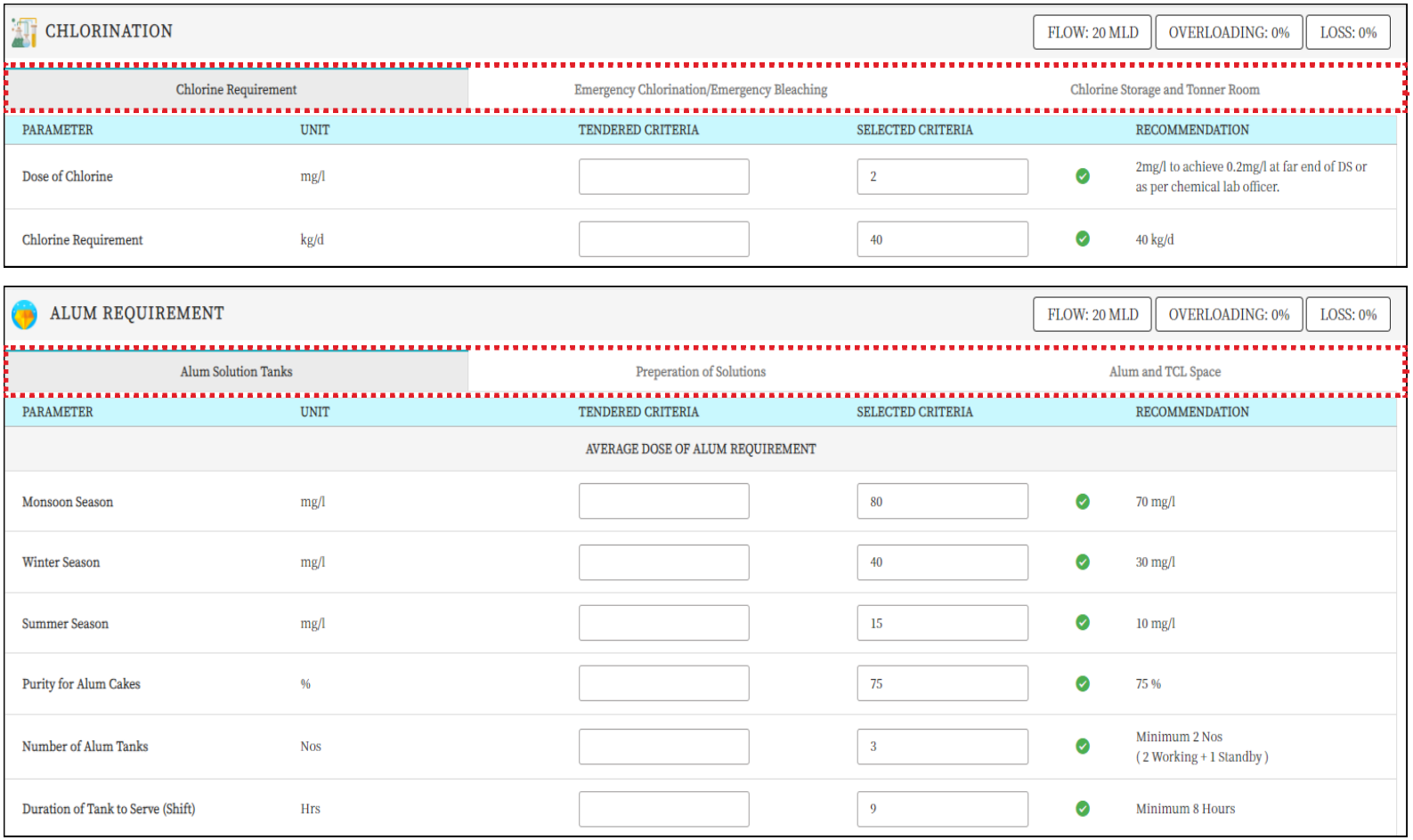
Individual detailed Design of Manifold, Laterals and Orifice.

Mechanical Design Screen Features



Sub tabs elements for Mechanical Design.

Chemical House Screen Features



Sub tabs elements for Chlorination.

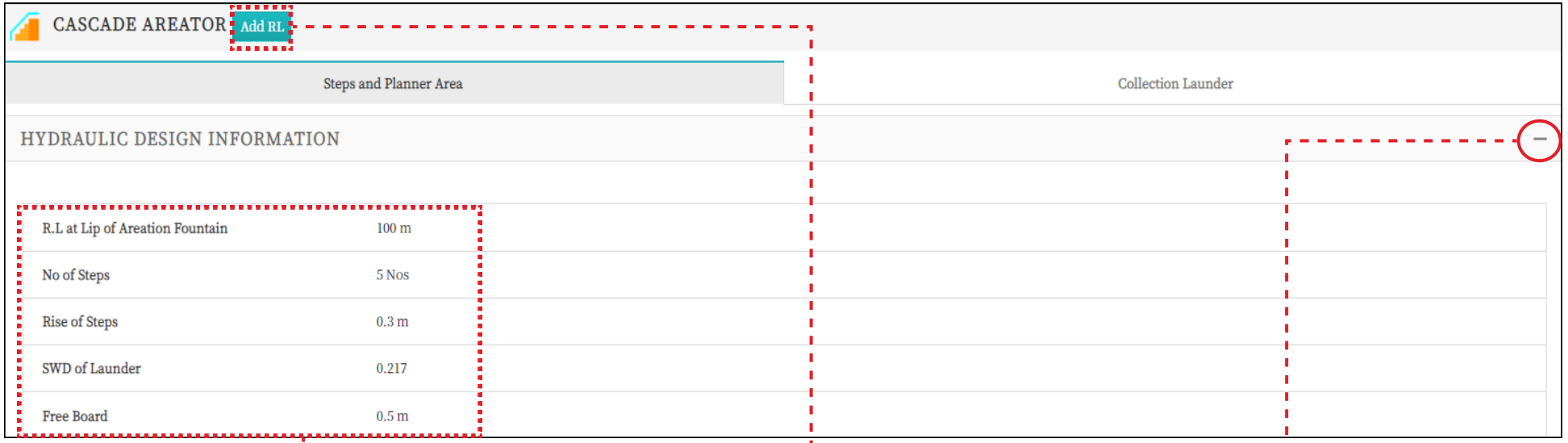
Sub tabs elements for Alum requirement.

iNODE

The Point With Infinite Possibilities

HEAD LOSSES

Understanding How to fill the Values & Highlights

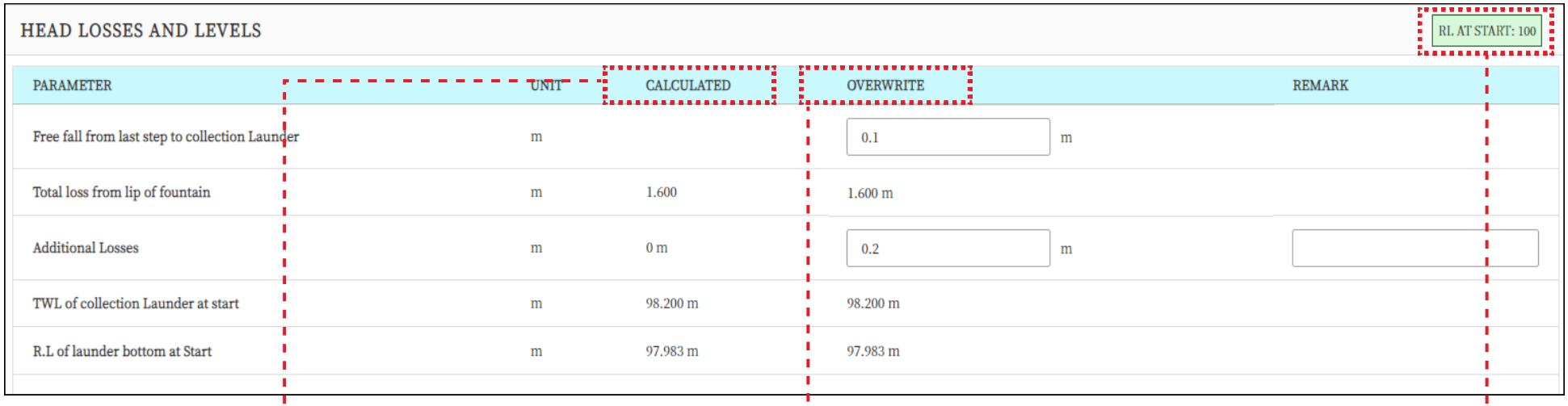


Quickly review your design hydraulic parameters entered during the design of the element.

A user at any instance can add/ change the RL at start or ground levels of elements.

Minimize the hydraulic information.

Understanding How to fill the Values & Highlights



Values calculated by iNODE software using standard formulae.

User can overwrite the calculated values as per user knowledge which will be used for further calculations of head loss.

Note: It is not necessary for the user to overwrite values. User can use the software calculated values and proceed further in all the cases, except when a value needs to be entered for further calculations.

Know the RL at the start of your each element.

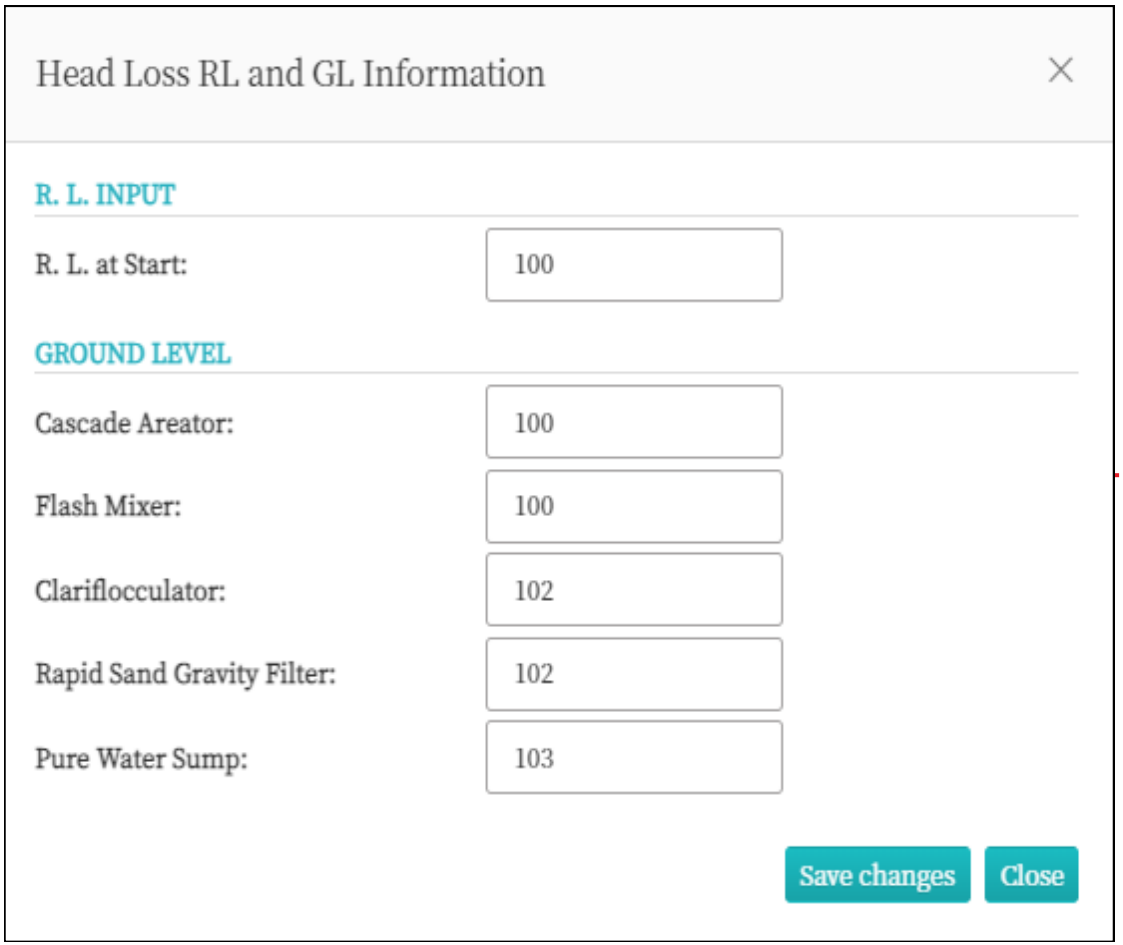
User can know these updated levels on each screen at a glance.

User can print individual Head loss Report.

User can enter "Additional Loss" for an assumed value with a justification to be entered in remarks.

Head Loss Features

Starting Head Loss



Start with filling the basic information i.e. RL at start or assuming a value. If the user has additional information regarding ground levels of each element, they can fill the same as shown.

Head Loss Features

Design Methodology for Cascade Aerator

ASSUMPTIONS:

- R.L at Lip of Aeration Fountain
- RL of top at Start
- Free Fall from last step to collection launder
- Assume Total Loss from Lip of Fountain
- Assume Additional Head Losses Remark
- Frictional Loss in Launder, Using Manning's Formula and taking Manning's Coefficient for R.C.C as n
- Assume Frictional Loss in Launder
- Assume Additional Head Losses Remark

CALCULATIONS:

$$\text{Total Loss from lip of fountain} = (No\ of\ Steps \times Rise_{Step}) + Free\ Fall$$

$$\text{TWL of Collection Launder at start} = RL\ of\ Lip - (Total\ Loss + Additional\ Losses)$$

$$\text{R.L of Collection Launder at Bottom} = TWL\ of\ Collection\ Launder - SWD\ of\ Launder$$

$$\text{R.L of Collection Launder at Top} = TWL\ of\ Collection\ Launder + Free\ Board$$

$$\text{Length of Launder} = \frac{\pi}{2} \times Diameter_{Aerator} + Width_{Launder}$$

RL ---▶ Reduced Level

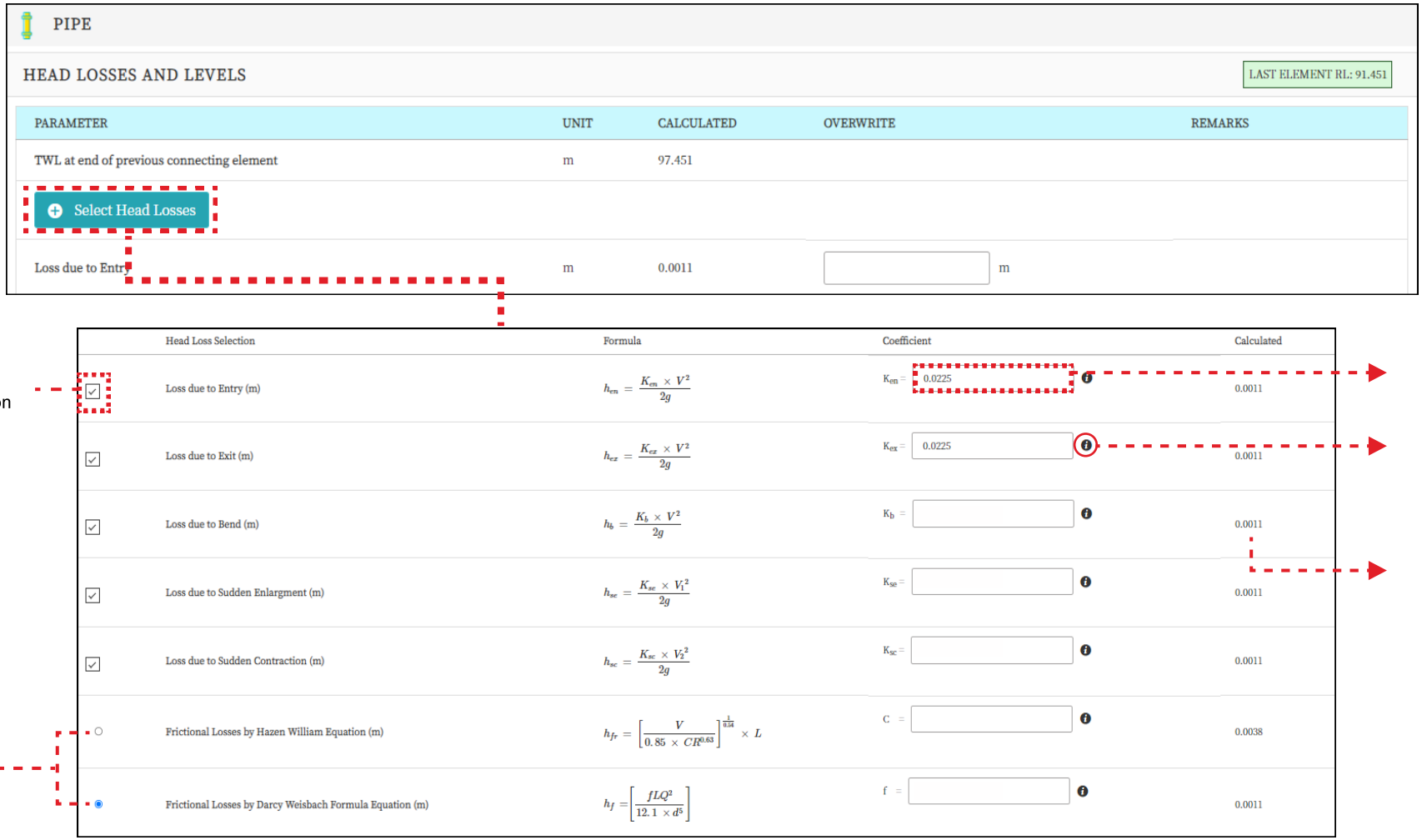
TWL ---▶ Total Water Level

CUMMULATIVE HEAD LOSS ---▶ Successive additions of Head Losses

CURRENT HEAD LOSS ---▶ Current element/sub-element Head Loss

CURRENT ELEMENT LAST RL ---▶ Reduced Level at the end of current element

Head Loss in Pipe



A user has to select the loss by clicking on the check box.

A user has to enter a coeffiicient for further calculations

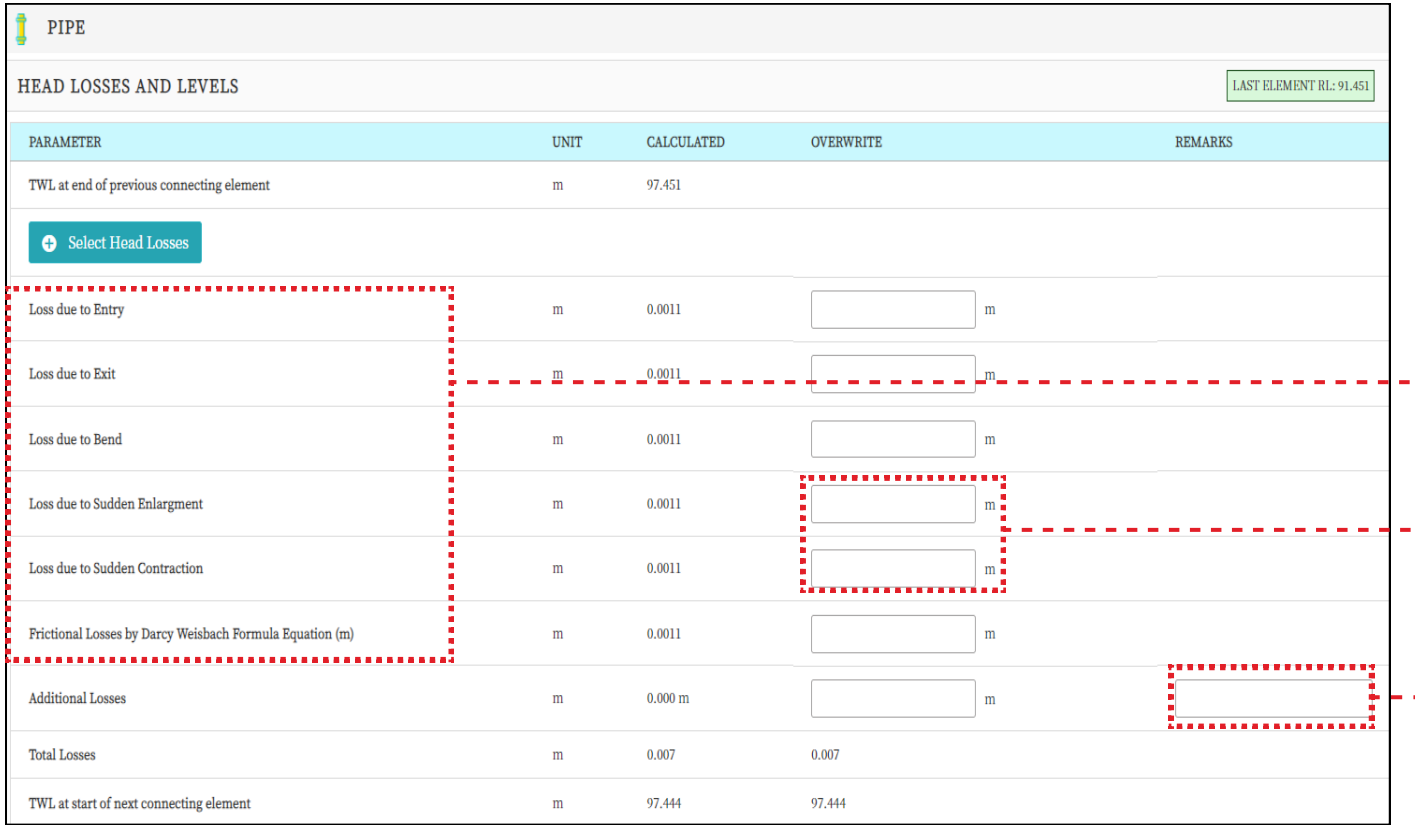
A user can click the "i" for standard coefficient value table.

After entering the value, the software auto calculates the value for that specific head loss by taking the coefficient entered by the user.

A user can select either of these two frictional losses.

Head Loss in Pipe

Post selecting head losses



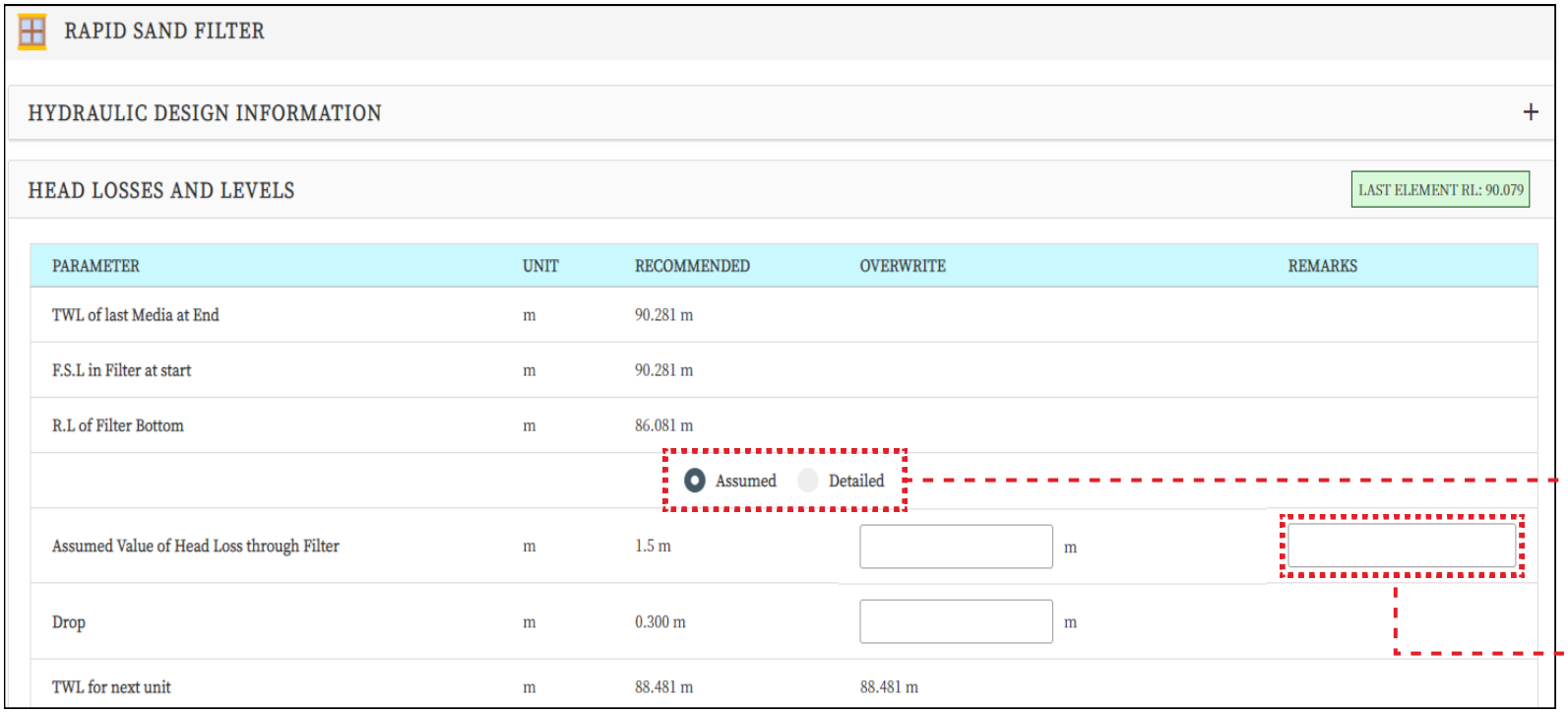
Selected head losses will reflect on the screen.

User can overwrite the values as needed.

User can enter additional loss as needed with a remark which will reflect further in the calculation and in the report.

Head Loss in Rapid Sand Gravity Filter

Detailed



A user has two options of assuming a head loss through filter or calculate in detail.

If user selects "Assume", user can enter a value for the same & give a remark or by default will be 1.5m

Head Loss in Rapid Sand Gravity Filter

Detailed

RAPID SAND FILTER

HEAD LOSSES AND LEVELS

LAST ELEMENT RL: 90.079

PARAMETER	UNIT	RECOMMENDED	OVERWRITE	REMARKS
TWL of last Media at End	m	90.281 m		
F.S.L in Filter at start	m	90.281 m		
R.L of Filter Bottom	m	86.081 m		
			Assumed / Detailed	
Depth of Sand	m	0.7 m		
% Expansion of Sand	%	50		25-50%
Depth of Gravel (lg)	m	0.500 m		
Porosity (fe)		0.6		
Back Wash Velocity	m/hr	0.011		
Density of Sand	kg/m^3	2650	SELECT DENSITY	
Density of Water	kg/m^3	998		
Orifice Coefficient (a)		0.6		0.6 to 0.8
Orifice/ Filter Bed Area (b)		0.005		

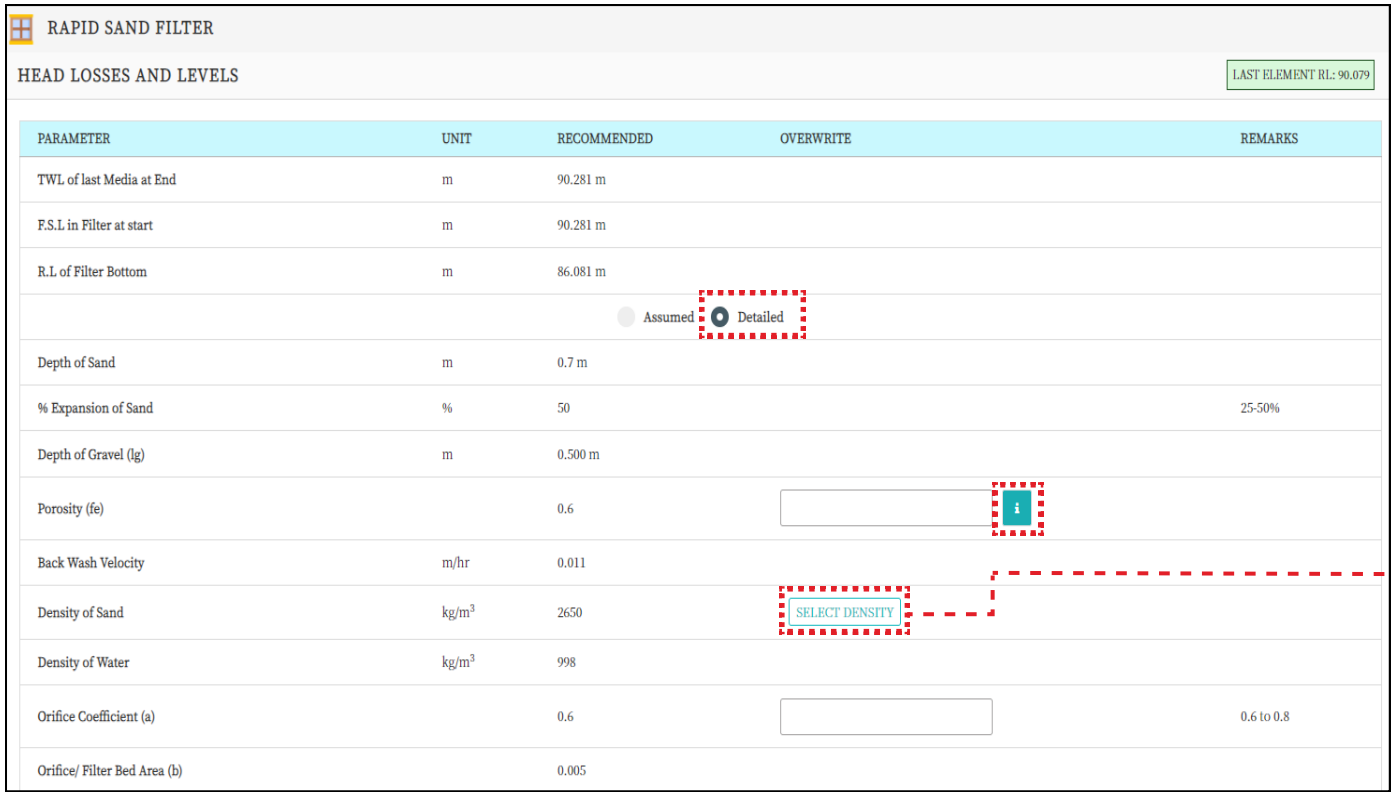
Porosity (f_e)

DESCRIPTION	*POROSITY*
Sand; Coarse	*0.26-0.43*
Sand; Fine	*0.29-0.46*
Sand/Gravelly Sand; Well Graded; Little to No Fines	*0.22-0.42*
Sand/Gravelly Sand; Poorly Graded; Little to No Fines	*0.23-0.43*
Silty Sands	*0.25-0.49*
Clayey Sands	*0.15-0.37*
Inorganic Silt/Silty Sand; Slight Plasticity	*0.21-0.56*
Gravel	*0.23-0.38*
Gravel/Sandy Gravel; Well Graded; Little to No Fines	*0.21-0.32*
Gravel/Sandy Gravel; Poorly Graded; Little to No Fines	*0.21-0.32*
Gravel/Silty Sandy Gravel	*0.15-0.22*
Clayey Gravel/Clayey Sandy Gravel	*0.17-0.27*
Inorganic Silt; Uniform	*0.29-0.52*
Organic Silt/Silty Clay; Low Plasticity	*0.42-0.68*

When the user selects detailed option, these details will appear for further calculations.

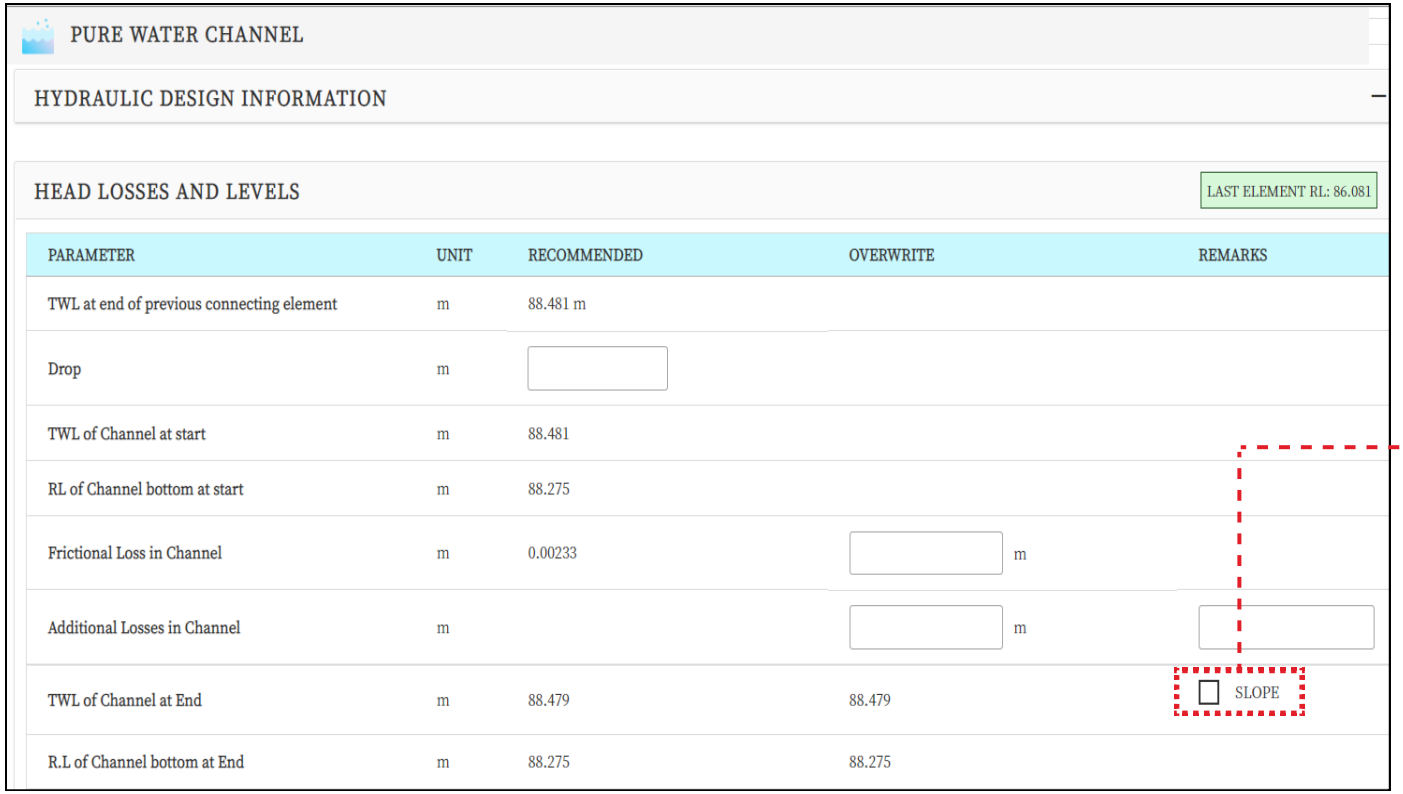
Head Loss in Rapid Sand Gravity Filter

Detailed



A user can perform detailed calculations for head loss through filters. After selecting the porosity,density & Orifice coeffiecient, the software will calculate the required losses using standard formulae.

Head Loss in Channel



When slope is not considered, only TWL will be affected by frictional loss, whereas, RL at start of the Channel and at the end of the Channel will be equal considering no slope.

Head Loss in Channel

PURE WATER CHANNEL

HYDRAULIC DESIGN INFORMATION

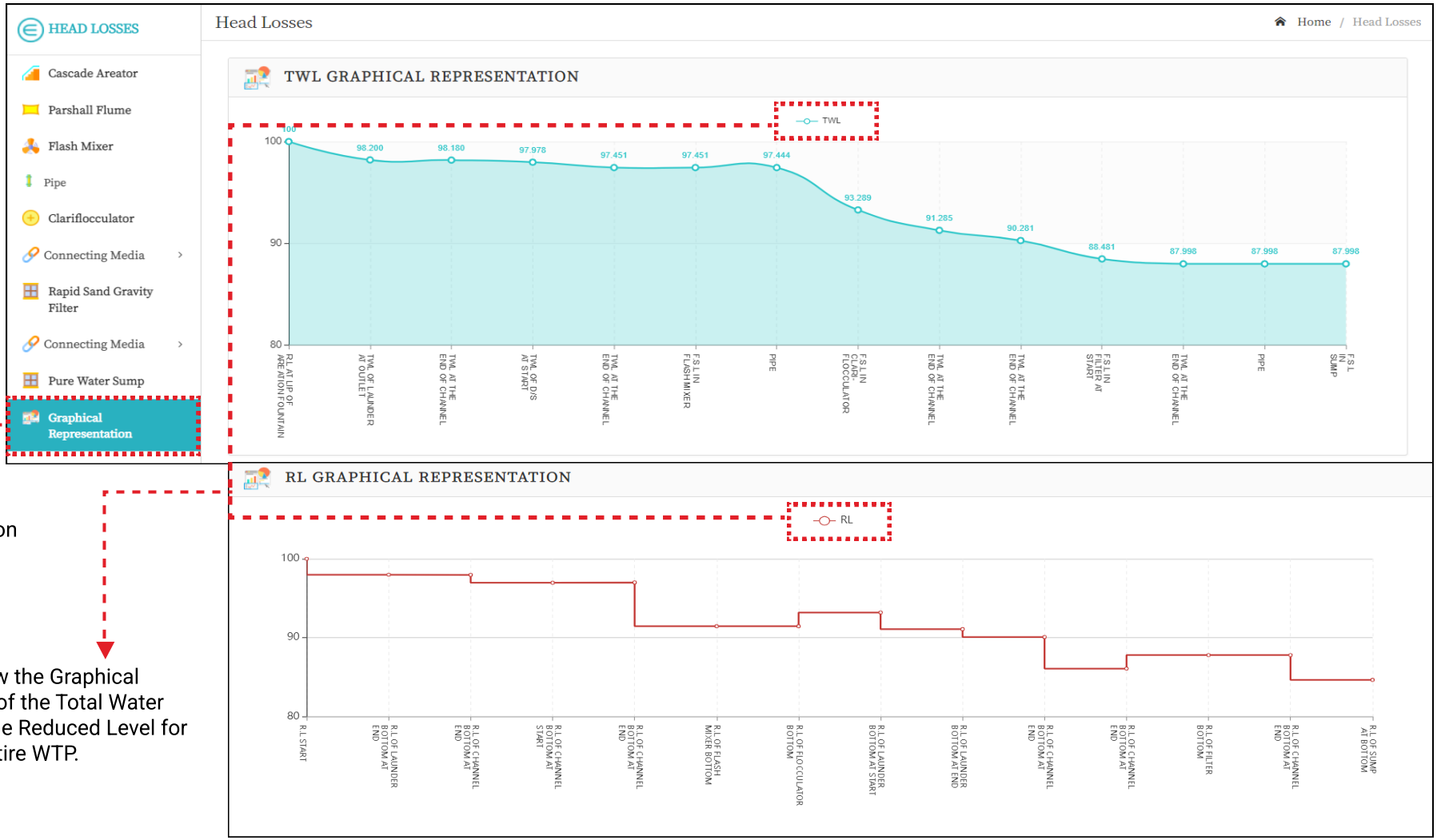
HEAD LOSSES AND LEVELS

LAST ELEMENT RL: 86.081

PARAMETER	UNIT	RECOMMENDED	OVERWRITE	REMARKS
TWL at end of previous connecting element	m	88.481 m		
Drop	m			
TWL of Channel at start	m	88.481		
RL of Channel bottom at start	m	88.275		
Frictional Loss in Channel	m	0.00233	m	
Additional Losses in Channel	m		m	
TWL of Channel at End	m	88.479	88.479	☑ SLOPE
R.L of Channel bottom at End	m	88.273	88.273	

When slope is considered, only TWL & RL at end will be affected by frictional loss. RL at start and end of the channel will be unequal considering slope.

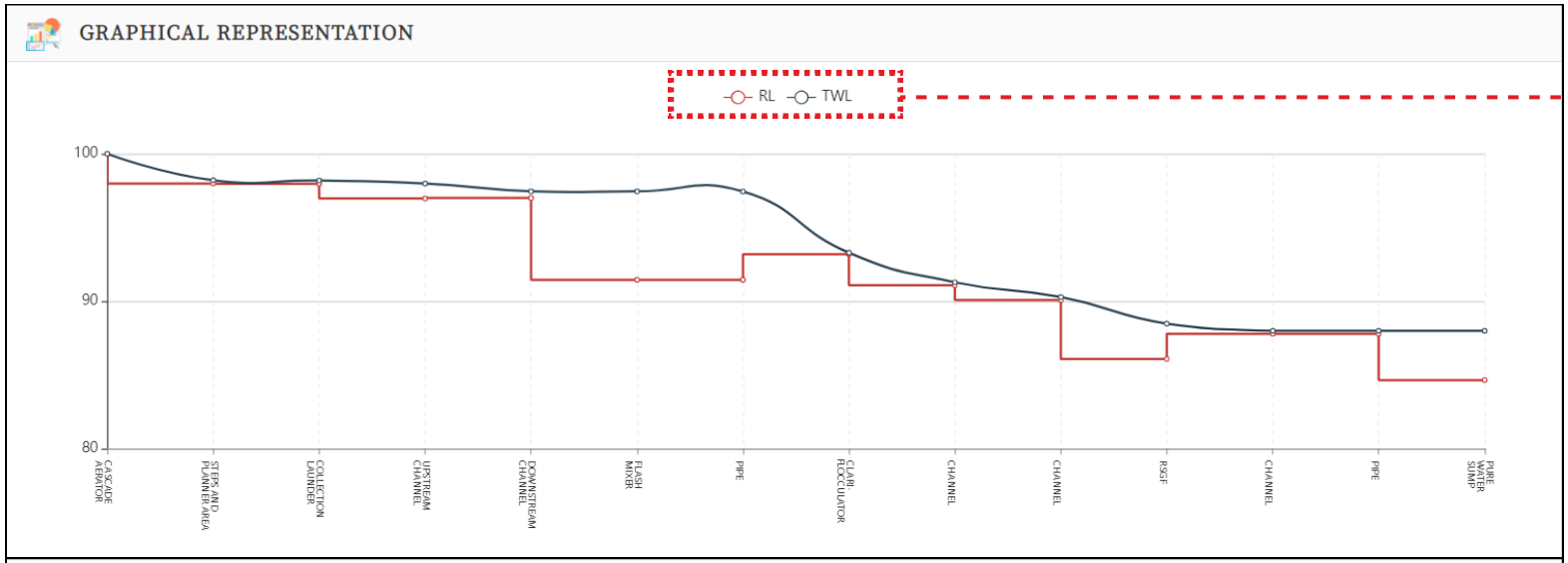
Graphical Representation of Head Loss



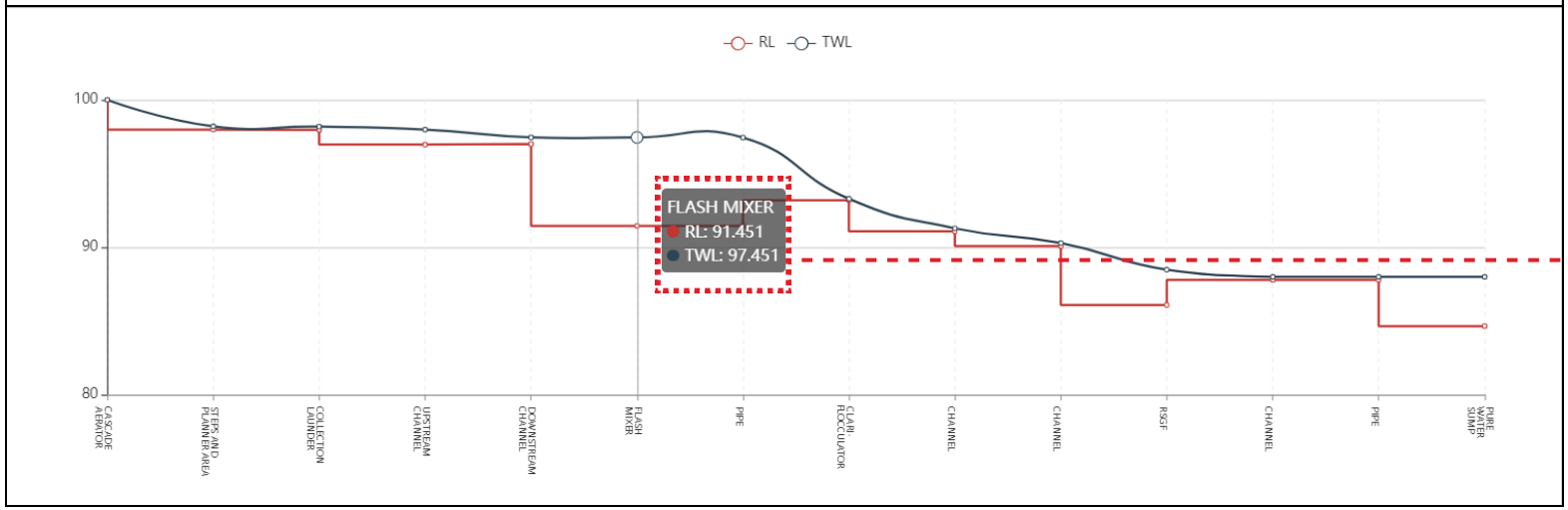
User can view the Graphical representation using this option

User can view the Graphical representation of the Total Water Level as well as the Reduced Level for the entire WTP.

Graphical Representation of Head Loss



User can view the Graphical representation of Reduced Level & Total Water Level for the entire WTP.



User can hover the cursor over the graph and know the level of any point of any element.

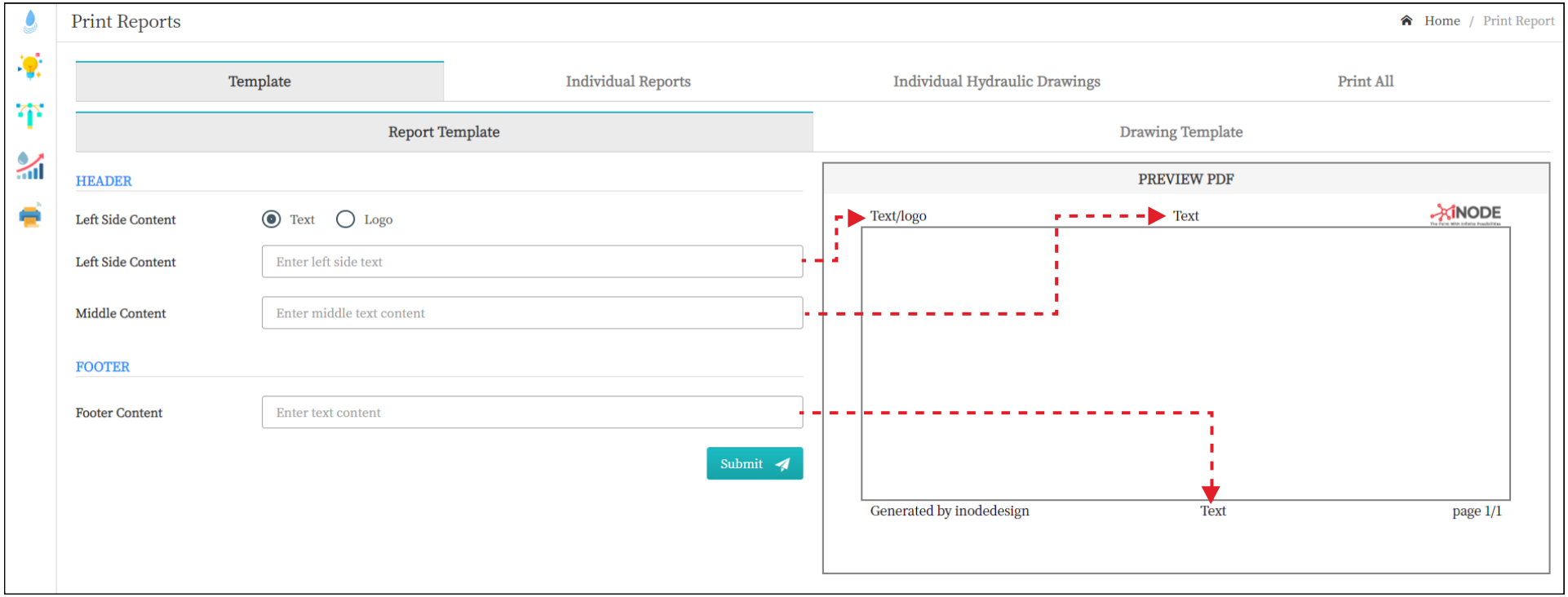
iNODE

The Point With Infinite Possibilities

PRINTING

Printing Design Reports & Drawings

Creating a custom report template

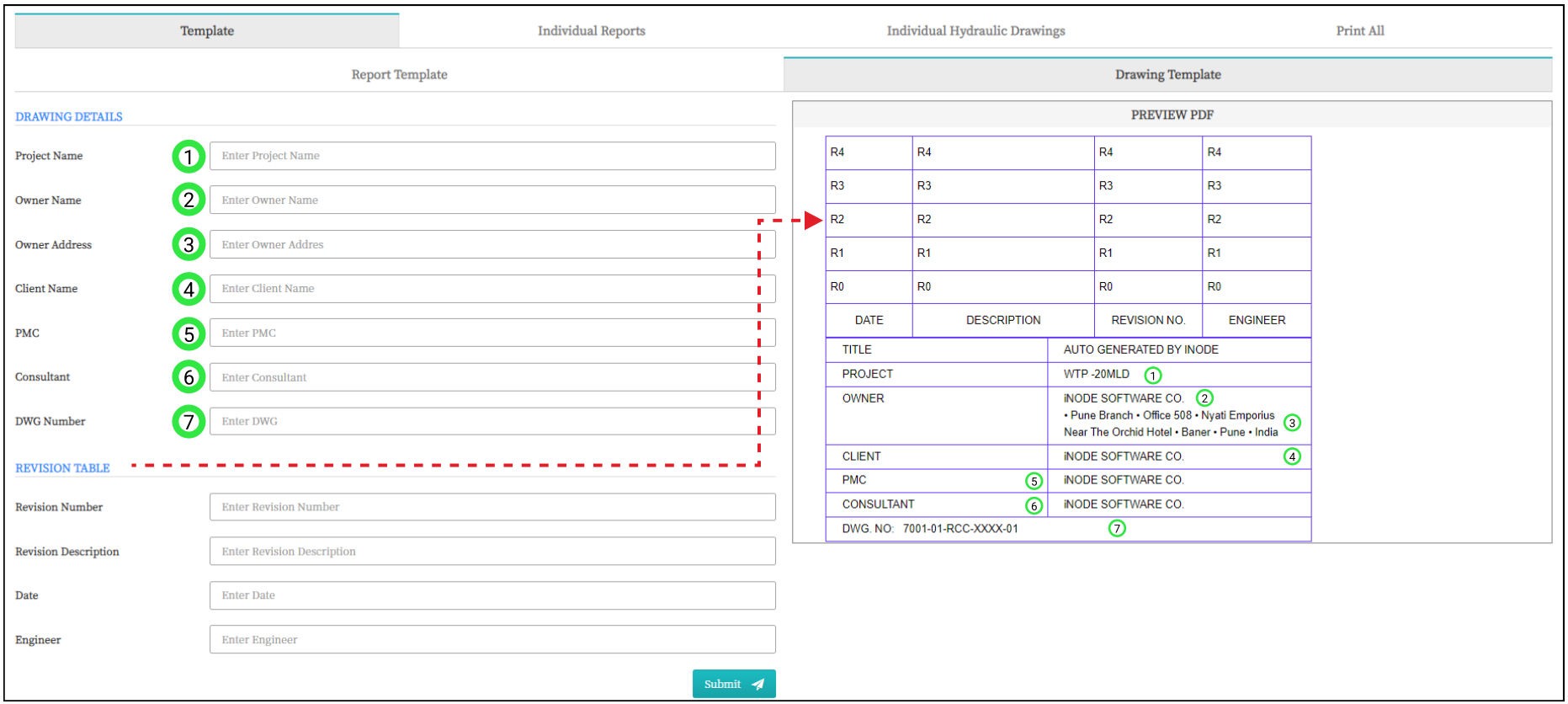


In this template option, user can create custom format in which all the element reports are to be saved/printed/downloaded for the project.

A user can download/view output reports of any element on their individual design screen. Here, is another option for customized report.

Printing Design Reports & Drawings

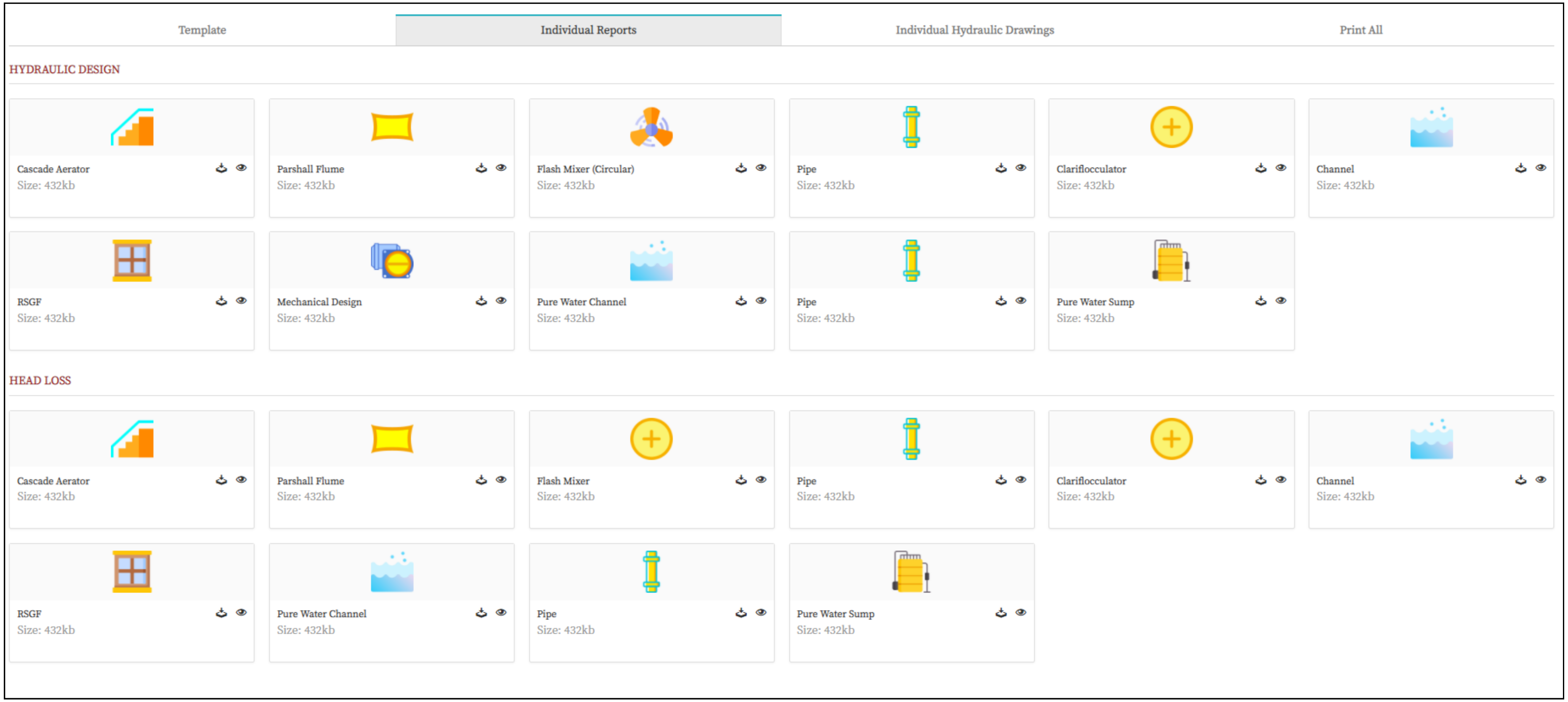
Creating a custom drawing template

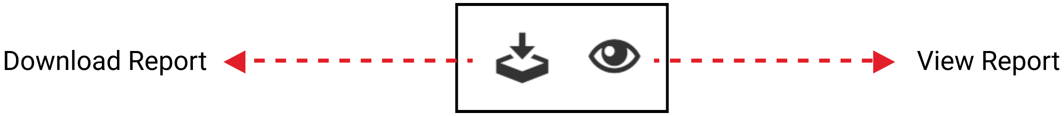


User can fill all the necessary information and create their own individual template for Drawings output generated for the project.

Printing Design Reports & Drawings

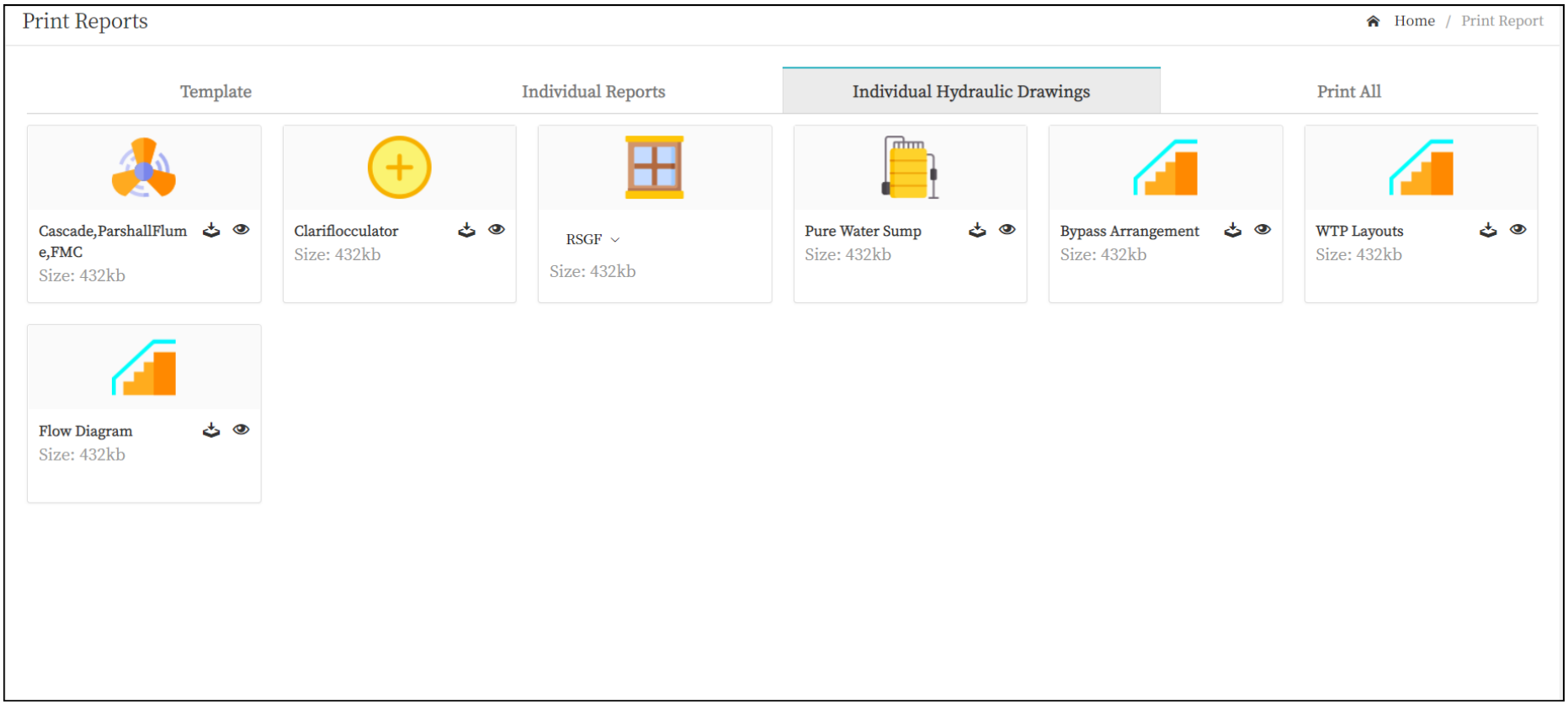
Viewing/ Downloading Individual Element Design Report





Printing Design Reports & Drawings

Viewing/ Downloading Individual Hydraulic Drawing



Sample Drawing

Contains all the design details and dimensions.