FAUCET DESIGN FOR FINE LIVING SPACES

(Households and Hospitality)

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Acknowledgement

The success and end result of this Project 2 is a cumulative outcome of a lot of guidance and assistance from my Project guide Prof. Avinash Shende and many others and I am extremely privileged to have got this all along the completion of my project.

I respect and thank my Project Guide for giving me all support and guidance which made me complete the project duly. I owe my deep gratitude to him for taking keen interest in my project and in guiding me all along till the completion of the project by providing all the necessary information for developing a good product.

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01

An Overview of faucets

- History of Faucets
- Types of Faucets
- Components of a faucet
- Manufacturing process

An overview of faucets

A faucet is a device for delivering water from a plumbing system. It can consist of the following components: spout, handle(s), lift rod, cartridge, aerator, mixing chamber, and water inlets. When the handle is turned on, the valve opens and controls the water flow adjustment under any water or temperature condition.

The faucet body is usually made of brass, though die-cast zinc and chrome-plated plastic are also used.

The **Jaison Water Tap** or **Waste Not Water Tap** is a self-closing water-saving tap invented in the early 20th century by J.P. Subramonya Iyer at Travancore, India.

They are quite popular throughout the Indian sub-continent and can still be commonly found in most of the traditional railway stations operated by Indian Railways.

The Jaison water tap is an excellent example of commercialized grass roots innovation from modern India, that went far beyond what is typically termed Jugaad or life hack. Its production was an economic activity that created wealth and helped solve the problem of water wastage in public water taps and thus brought significant benefits to the Indian society.

Source:
https://www.thehindu.com/society/Innovators-and-patent-holders/article17034917.ece

Fig: Jaison Water tap

A brief history of faucets

1700 BC
The Minoan palace, Greece used terracotta piping for plumbing. Faucets were made of **marble, gold and silver**.

1000 BC- 476 AD
Romans- had public baths featuring **silver faucets** and fixtures of gold and marble.

1913
Albert Brown invents **Quaturn Cartridge**. Starts/stops the flow of water so a faucet needs one quarter turn vs several full turns. Greatly extends life of washer.

1937
Al Moen envisions a **single-handle faucet** when he scalded himself with overheated water.

1940-1945
Moen works on his single-handed faucet design and sells his first faucet in 1947.

Source:
http://plumbinghelptoday.com/denver-plumbing-repair-blog/2011/05/the history-of-the-faucet
http://www.madehow.com/Volume-6/Faucet.html

A brief history of faucets

1946
Landis Perry designed the first **faucet ball valve**. Mixes hot and cold water with volume control.

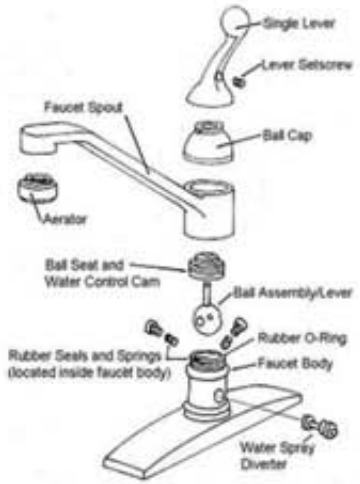
1952
Perry patents his faucet ball valve design.

1954
Alex Manoogian develops the first successful **washerless ball valve faucet** using Perry's design. He called it the 'Delta Faucet' and the Delta Faucet Company is launched.

1959
Manoogian's design was sold in over 1 million US homes and in 55 countries. He also invented the **replaceable cartridge** (to eliminate washers in the faucet)

1970s
Delta develops a t**wo-handle washerless line**. Introduced an **affordable decorative faucet** with a **high-arc spout**, texture and an antique brass finish.

1971
Delta developed the **Do-It-Yourselfer** for easy faucet installation (easy repair kit).



Source:
http://plumbinghelptoday.com/denver-plumbing-repair-blog/2011/05/the history-of-the-faucet
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A brief history of faucets

1980
Wolvering Brass patents the ceramic disk. Provides more accurate control. Lasts much longer than cartridges due to high wear resistance. Widely used used.

1980
Delta introduced the first domestically produced faucet with a pull-out spray head.

Early 1980s
Electronic faucets are introduced.
- To conserve water.
- It had sensors that detect motion and turn the water ON/OFF.

1996
Delta is the first to use Physical Vapor Deposition (PVD) for an anti-tarnish finish.

2001
Delta introduced a hands-free electronic faucet specifically for residential use.

Source:
http://plumbinghelptoday.com/denver-plumbing-repair-blog/2011/05/the history-of-the-faucet
http://www.madehow.com/Volume-6/Faucet.html

A brief history of faucets

2005
Delta introduces a Universal Valve design. Users can change the appearance, style and function of fixtures without changing the pipes.

2008
Delta introduced the touch faucet.

2013
Mood by Noken, launched a digital sink faucet that has a display showing flow rate and temperature.
It has to be plugged into a 9V transformer and has a back up battery power.

2015
Spray Faucet, uses spraying fog for washing face to give a more comfortable, and convenient feel, while also saving 50% more water.

2016
Regolo by CEA, a bathroom faucet with a sliding temperature control.

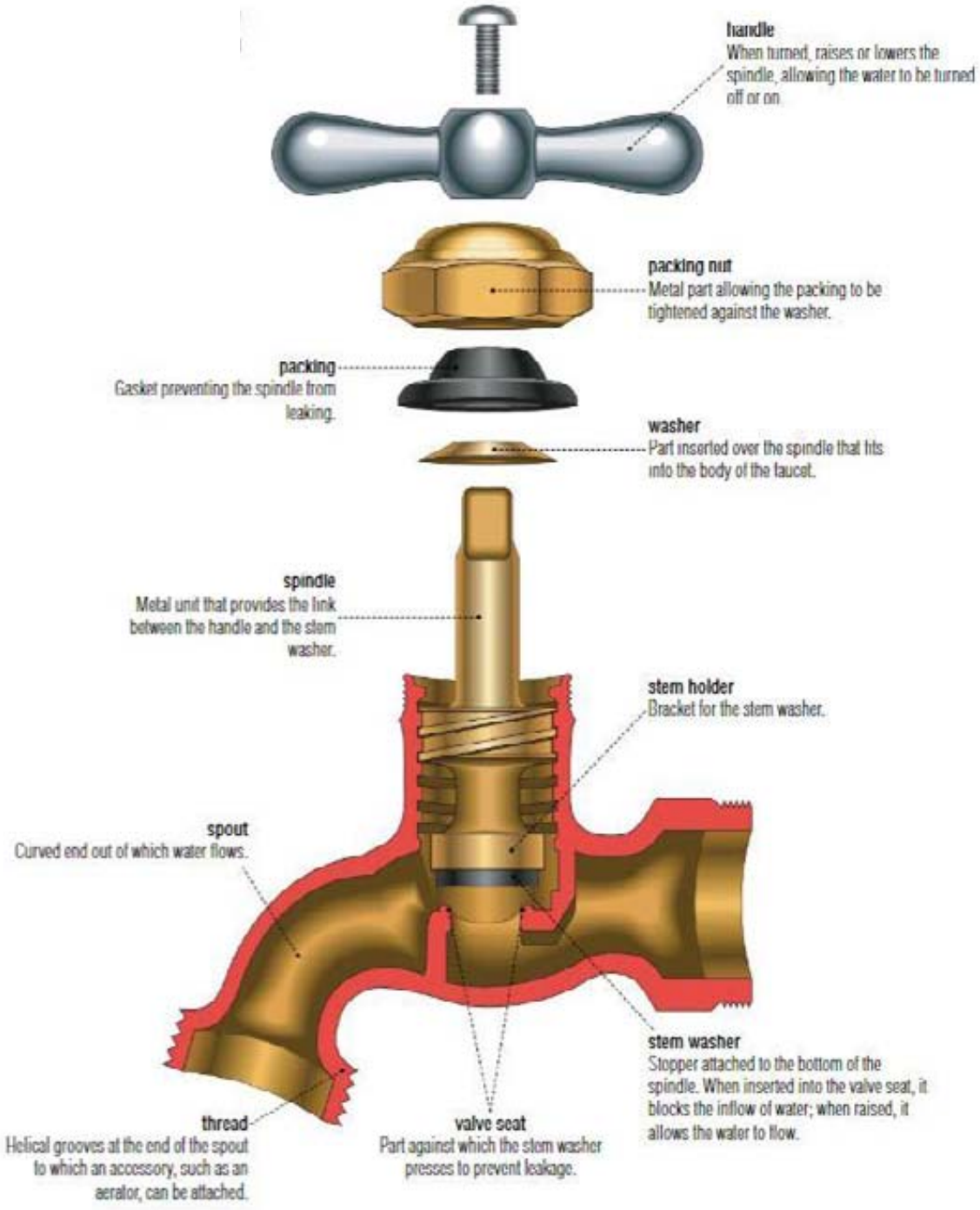
Source:
http://plumbinghelptoday.com/denver-plumbing-repair-blog/2011/05/the history-of-the-faucet
http://www.madehow.com/Volume-6/Faucet.html

Components of a faucet

Source: http://www.madehow.com/Volume-6/Faucet.html

Type of faucet

COMPRESSION FAUCET

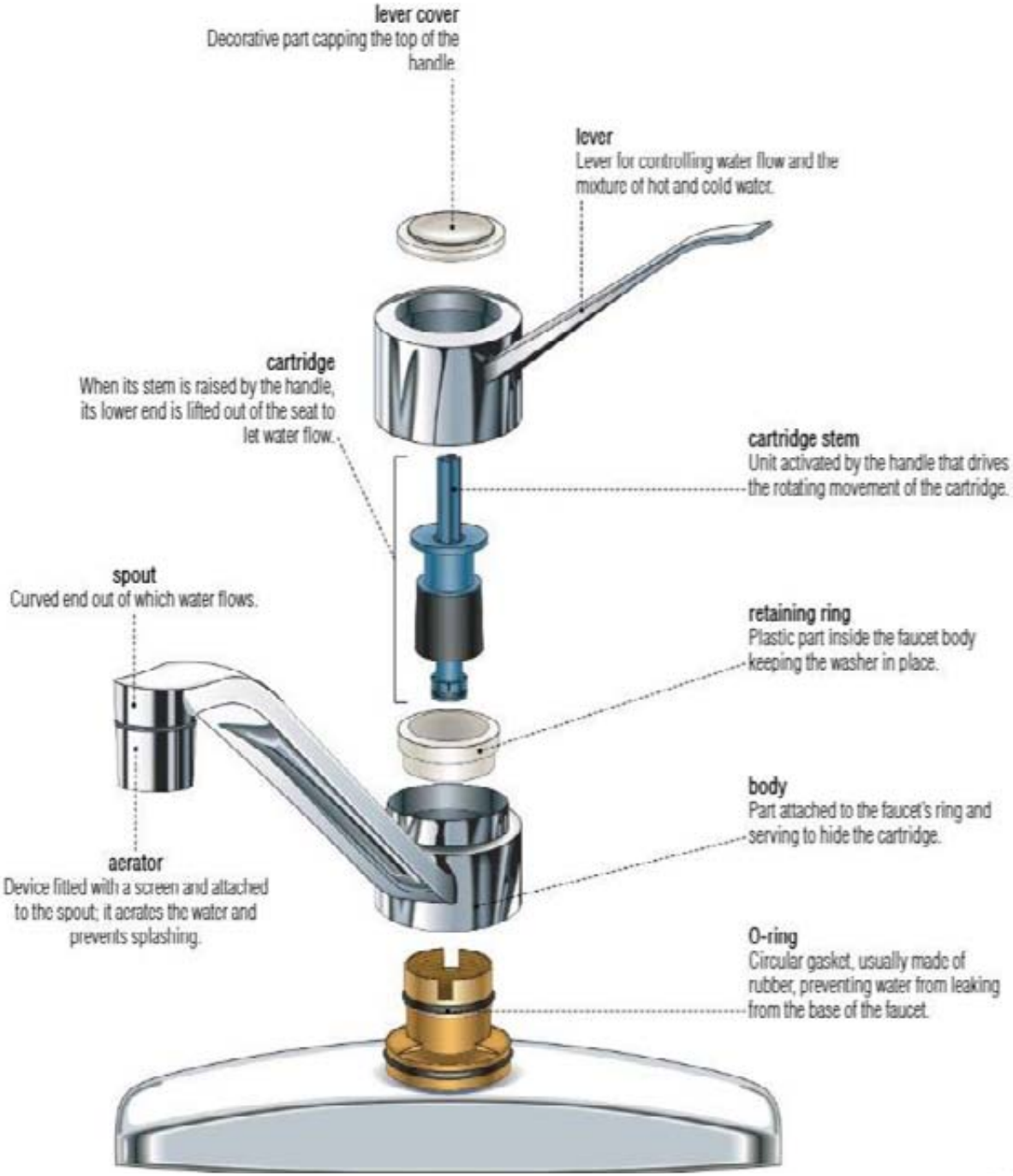


Type of faucet

CERAMIC DISC FAUCET

Type of faucet

CARTRIDGE FAUCET



Type of faucet

BALL-TYPE FAUCET

Manufacturing process of faucet

The manufacturing process for faucets has become highly automated, with computers controlling most of the machines.
Productivity and efficiency have thus improved over the years. The basic process consists of forming the main body of the faucet (some-times including the spout if no swivel is needed), applying a finish, and then assembling the various components, followed by inspection and packaging.

Following are the processes involved in the manufacture of Cartridge type faucets:

1. Collection of Raw material
2. Machining process
3. Sand casting process
4. Demoulding and cutting
5. Removal of sand
6. Machining
7. Grinding
8. Polishing
9. Quality control
10. Electroplating
11. Assembly
12. Packaging

Source:
https://www.encyclopedia.com/science-and-technology/technology/technology-terms-and-concepts/faucet

Brass- the raw material for manufacturing faucet

The raw material used for manufacturing faucets is Brass. It is an alloy of Copper and zinc. Brass is received as bar stock of 0.13-2 " (33- 50mm) in diameter depending on the size of faucet. It's valuable properties & relative ease of production have made it one of the most widely used alloys.

WHY BRASS?

1. Resistance to soft water corrosion and hard water calcification.
2. It resists corrosion, including galvanic corrosion from saltwater.
3. Brass is easy to cast. Bismuth is added for ease of processing.
4. Brass is not ferromagnetic. Thus is easier to separate from other metals for recycling.
5. Its bacteriostatic (arrest bacteria reproduction) properties have resulted in its use in bathroom fixtures and healthcare facilities.
6. It produces a protective oxide layer (patina) on its surface due to higher copper content that guards against corrosion.

Source: http://www.madehow.com/Volume-6/Faucet.html

Manufacturing process

01

RAW MATERIAL

Brass (alloy of copper and zinc). Has invaluable properties and provides ease of production.

02

MACHINING PROCESS

Cutting bars into short slugs and automatically feeding into a CNC machining centre of multi-spindle and multi-axis design. (Time- 1 min/part)

03

SAND CASTING PROCESS

Molten metal is forced into a die with a sand core, it produces near neat shape with less wastage and minor machining. (Time- 3 sec/near neat shape)

Source: https://www.youtube.com/watch?v=OdCqB-uouHA

Manufacturing process

04

DEMOULDING AND CUTTING

Excess material in the sprue after casting is removed by cutting from the finished component.

05

REMOVAL OF SAND

After the metal is cast, sand from the die is removed by slight shaking.

06

MACHINING

Blemishes and parting lines left during casting are removed by machining. Machine tools perform cutting, boring, grinding, shearing, etc.

Source: https://www.youtube.com/watch?v=OdCqB-uouHA

Manufacturing process

07

GRINDING

Grinding involves an abrasive machining process that uses a grinding wheel as the cutting tool.

08

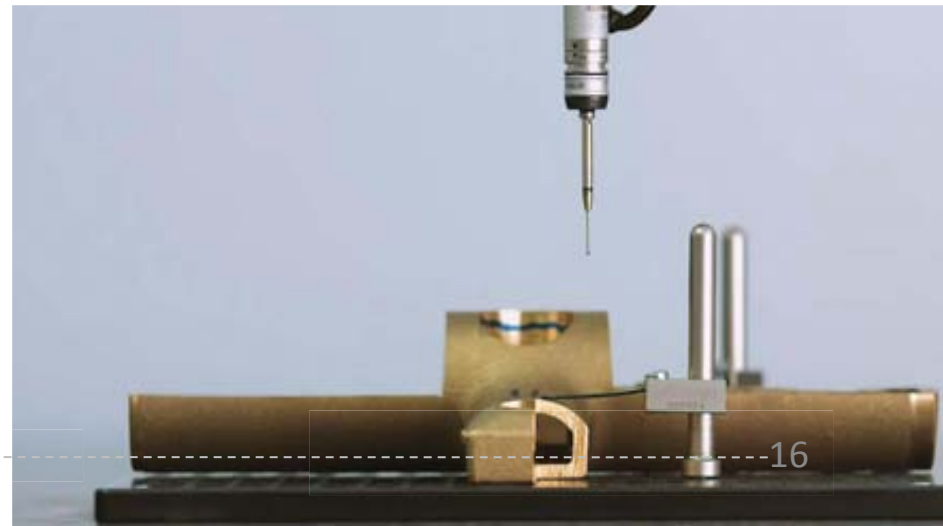
POLISHING

Polishing and buffing are finishing processes for smoothening a surface using an abrasive and work wheel.

09

QUALITY CONTROL

Parts are checked against the blueprints to ensure it matches all dimensions.



Source: https://www.youtube.com/watch?v=OdCqB-uouHA

Manufacturing process

10

ELECTROPLATING

A base coating of electroplated nickel is applied, followed by a thin coating of electroplated chromium.

11

ASSEMBLY

Finally, the faucets and other components are sent for final assembly taking place on rotary assembly machines.

12

PACKAGING

The faucets are packaged in boxes along with any other components that are needed for final installation.

Source: https://www.youtube.com/watch?v=OdCqB-uouHA

02

User study

- Studying user behavior
- User study inferences
- Time motion analysis
- Time-motion analysis inferences
- Research inferences

*Source: Author

User study

A user study is conducted to understand the following aspects:

- Usage scenario while operating the faucet for various activities
  - Activity 1: Washing hands
  - Activity 2: Washing face
  - Activity 3: Brushing teeth
  - Activity 4: Shaving
- Usage scenario while operating the faucet in various contexts
  - Urban household
  - Rural household
- Usage scenario while operating faucets of different types
  - Compression type faucet
  - Ceramic disc faucet
  - Cartridge faucet
- User behaviour and usage pattern during various purposes:
  - Utilitarian purpose
  - Psychological purpose

For the purpose of user study, users were observed while performing various faucet-using activities such as washing hands, washing face, brushing teeth and shaving. 15 users from 6 different locations, Chennai, Mumbai, Calicut, Delhi, Bareili and Patna were observed and the following aspects were noted- their usage pattern, time-motion analysis and user behaviour.

A brief of the user study with inferences from the users is described as follows.

User study inference- Washing hands

Fig: Hand washing under Faucet-3 (urban setting)
Difficult to operate knobs result in people leaving it ON throughout usage.

Fig: Washing hands under Faucet-4 (urban setting)
Ease of usage due to the long, protruding knob.

*Source: Author

User study inference- Washing hands

Fig: Hand washing under Faucet-1 (urban setting),
Aerated water outlet- feeling of more water but time-consuming to wash, due to lower pressure compared to jet flow.

Fig: Washing hands under Faucet-1 (urban setting),
Ease of operation, quicker ON/OFF functions

*Source: Author

User study inference- Washing hands

Fig: Hand washing under Faucet-3 (rural setting),
Additional accessories fit onto the fitment to increase the spread of water outlet.

Fig: Washing hands under Faucet-4 (rural setting),
ON/OFF operation, time consuming

*Source: Author

User study inference- Washing hands

Fig: Hand washing under Faucet-3 (rural setting)
Difficulty in turning on the faucet, while having lather on hands.

Fig: Washing hands under Faucet-4 (rural setting),
Faucet is left ON during the whole process of washing hands, but the water output is kept low throughout.

*Source: Author

User study inference- Face washing

Fig: Face washing under Faucet-3 (urban setting)
User is carrying liquid soap in one hand and turns the faucet ON with the other hand.

Fig: Washing face under Faucet-3 (urban setting),
Faucet is left ON during the whole process of washing face, due to the difficulty in finding the knob with the eyes closed..

*Source: Author

User study inference- Brushing teeth

Fig: Brushing (urban setting)
The faucet is Automatic shut-off kind, due to which a lot of water was flowing away unnecessarily.

Fig: Washing face under Faucet (rural setting),
For shorter durations of activities, users generally keep the faucet on.

*Source: Author

User study inference- Brushing teeth

Fig: Brushing (urban setting)
User has the tooth brush and faucet knob in one hand and is easily able to operate the knob.

Fig: Washing face under Faucet (rural setting),
Faucet is left ON while brushing, due to the difficulty in operating the knob with toothbrush and paste in hand.

*Source: Author

User study inference- Shaving

Fig: Shaving (urban setting)
The user occasionally tries to keep his one hands on the faucet while shaving.

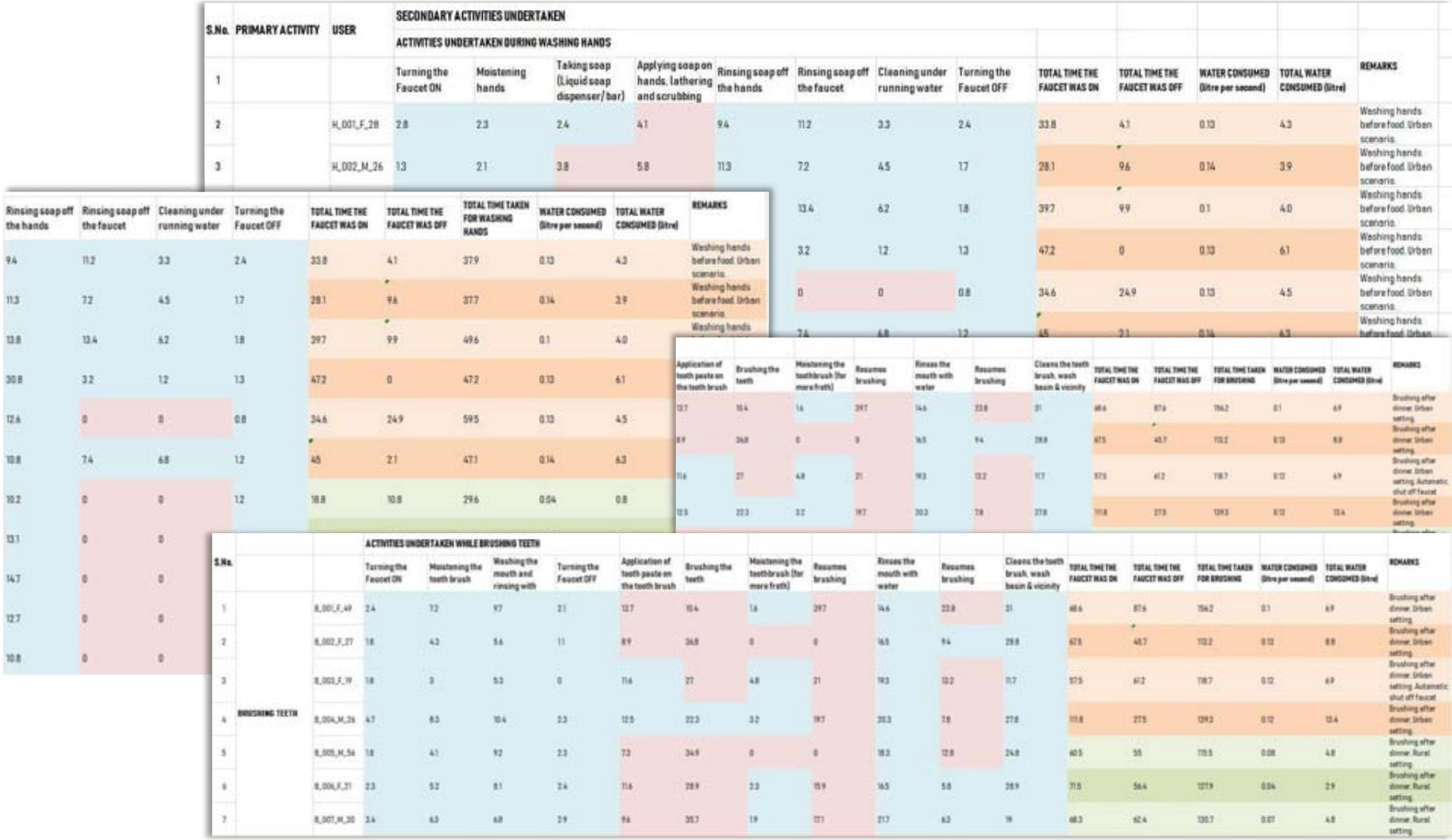
Fig: Shaving (urban setting),
Due to the requirement of extreme concentration while shaving, the user forgets to turn the faucet OFF.

*Source: Author

User study inferences

- Faucet is considered a mundane object.
- Users don't care observing/appreciating it.
- Users are mostly occupied with other activities.
- Users also have their hands occupied.
- Users are lazy or indifferent.
- Difficulty in operation is further discouraging.
- Taking out soap/cream- time consuming.
- Users avoid operating faucet with soapy hands.
- Have to clean faucet and basin after every use.
- Users like to see a lot of water.
- No feedback of how much water goes down the drain.
- Aerated water- more time consuming than a spray jet.
- Higher force of water could help in quicker cleaning.
- Compression faucets- less user friendly.
- Disc faucets- more user friendly.
- Longer faucet handles assist in easier identification.
- Ergonomics of the faucet.
- Automatic shut-off faucets have minor variations in their flow.
- Automatic shut-off faucets waste water unnecessarily.
- No means to prevent/alert about leakages.

Time-motion analysis



S.No.	PRIMARY ACTIVITY	USER	SECONDARY ACTIVITIES UNDERTAKEN												
			ACTIVITIES UNDERTAKEN DURING WASHING HANDS												
1			Turning the Faucet ON	Moistening hands	Taking soap (Liquid soap dispenser/bar)	Applying soap on hands, lathering and scrubbing	Rinsing soap off the hands	Rinsing soap off the faucet	Cleaning under running water	Turning the Faucet OFF	TOTAL TIME THE FAUCET WAS ON	TOTAL TIME THE FAUCET WAS OFF	WATER CONSUMED (litre per second)	TOTAL WATER CONSUMED (litre)	REMARKS
2		H_001_F_28	2.8	2.3	2.4	4.1	9.4	11.2	3.3	2.4	33.8	4.1	0.13	4.3	Washing hands before food. Urban scenario.
3		H_002_M_26	1.3	2.1	3.8	5.8	11.3	7.2	4.5	1.7	28.1	9.6	0.14	3.9	Washing hands before food. Urban scenario.
								13.4	6.2	1.8	39.7	9.9	0.1	4.0	Washing hands before food. Urban scenario.
								3.2	1.2	1.3	47.2	0	0.13	6.1	Washing hands before food. Urban scenario.
								0	0	0.8	34.6	24.9	0.13	4.5	Washing hands before food. Urban scenario.
								7.4	4.8	1.2	45	2.1	0.14	6.3	Washing hands before food. Urban

Rinsing soap off the hands	Rinsing soap off the faucet	Cleaning under running water	Turning the Faucet OFF	TOTAL TIME THE FAUCET WAS ON	TOTAL TIME THE FAUCET WAS OFF	TOTAL TIME TAKEN FOR WASHING HANDS	WATER CONSUMED (litre per second)	TOTAL WATER CONSUMED (litre)	REMARKS
9.4	11.2	3.3	2.4	33.8	4.1	37.9	0.13	4.3	Washing hands before food. Urban scenario.
11.3	7.2	4.5	1.7	28.1	9.6	37.7	0.14	3.9	Washing hands before food. Urban scenario.
13.8	13.4	6.2	1.8	39.7	9.9	49.6	0.1	4.0	Washing hands
30.8	3.2	1.2	1.3	47.2	0	47.2	0.13	6.1	
12.6	0	0	0.8	34.6	24.9	59.5	0.13	4.5	
10.8	7.4	6.8	1.2	45	2.1	47.1	0.14	6.3	
10.2	0	0	1.2	18.8	10.8	29.6	0.04	0.8	
13.1	0	0							
14.7	0	0							
12.7	0	0							
10.8	0	0							

Application of tooth paste on the tooth brush	Brushing the teeth	Moistening the toothbrush (for more froth)	Resumes brushing	Rinses the mouth with water	Resumes brushing	Cleans the tooth brush, wash basin & vicinity	TOTAL TIME THE FAUCET WAS ON	TOTAL TIME THE FAUCET WAS OFF	TOTAL TIME TAKEN FOR BRUSHING	WATER CONSUMED (litre per second)	TOTAL WATER CONSUMED (litre)	REMARKS
12.7	10.4	1.6	29.7	14.6	23.8	31	68.6	87.6	156.2	0.1	6.9	Brushing after dinner. Urban setting.
8.9	36.8	0	0	16.5	9.4	29.8	67.5	45.7	113.2	0.13	8.8	Brushing after dinner. Urban setting.
11.6	27	4.8	21	19.3	13.2	11.7	57.5	61.2	118.7	0.12	6.9	Brushing after dinner. Urban setting. Automatic shut off faucet
12.5	22.3	3.2	19.7	20.3	7.8	27.8	111.8	27.5	139.3	0.12	13.4	Brushing after dinner. Urban setting.

S.No.			ACTIVITIES UNDERTAKEN WHILE BRUSHING TEETH																
			Turning the Faucet ON	Moistening the tooth brush	Washing the mouth and rinsing with	Turning the Faucet OFF	Application of tooth paste on the tooth brush	Brushing the teeth	Moistening the toothbrush (for more froth)	Resumes brushing	Rinses the mouth with water	Resumes brushing	Cleans the tooth brush, wash basin & vicinity	TOTAL TIME THE FAUCET WAS ON	TOTAL TIME THE FAUCET WAS OFF	TOTAL TIME TAKEN FOR BRUSHING	WATER CONSUMED (litre per second)	TOTAL WATER CONSUMED (litre)	REMARKS
1		B_001_F_49	2.4	7.2	9.7	2.1	12.7	10.4	1.6	29.7	14.6	23.8	31	68.6	87.6	156.2	0.1	6.9	Brushing after dinner. Urban setting.
2		B_002_F_27	1.8	4.3	5.6	1.1	8.9	36.8	0	0	16.5	9.4	29.8	67.5	45.7	113.2	0.13	8.8	Brushing after dinner. Urban setting.
3		B_003_F_19	1.8	3	5.3	0	11.6	27	4.8	21	19.3	13.2	11.7	57.5	61.2	118.7	0.12	6.9	Brushing after dinner. Urban setting. Automatic shut off faucet
4	BRUSHING TEETH	B_004_M_26	4.7	8.3	10.4	2.3	12.5	22.3	3.2	19.7	20.3	7.8	27.8	111.8	27.5	139.3	0.12	13.4	Brushing after dinner. Urban setting.
5		B_005_M_56	1.8	4.1	9.2	2.3	7.3	34.9	0	0	18.3	12.8	24.8	60.5	55	115.5	0.08	4.8	Brushing after dinner. Rural setting.
6		B_006_F_21	2.3	5.2	8.1	2.4	11.6	28.9	2.3	15.9	16.5	5.8	28.9	71.5	56.4	127.9	0.04	2.9	Brushing after dinner. Rural setting.
7		B_007_M_30	3.4	6.3	6.8	2.9	9.6	35.7	1.9	17.1	21.7	6.2	19	68.3	62.4	130.7	0.07	4.8	Brushing after dinner. Rural setting.

Time-motion analysis

S.No.	PRIMARY ACTIVITY	USER	SECONDARY ACTIVITIES UNDERTAKEN												
			ACTIVITIES UNDERTAKEN DURING WASHING HANDS												
1			Turning the Faucet ON	Moistening hands	Taking soap (Liquid soap dispenser/bar)	Applying soap on hands, lathering and scrubbing	Rinsing soap off the hands	Rinsing soap off the faucet	Cleaning under running water	Turning the Faucet OFF	TOTAL TIME THE FAUCET WAS ON	TOTAL TIME THE FAUCET WAS OFF	WATER CONSUMED (litre per second)	TOTAL WATER CONSUMED (litre	REMARKS
2		H_001_F_28	2.8	2.3	2.4	4.1	9.4	11.2	3.3	2.4	33.8	4.1	0.13	4.3	Washing hands before food. Urban scenario
3		H_002_M_26	1.3	2.1	3.8	5.8	11.3	7.2	4.5	1.7	28.1	9.6	0.14	3.9	Washing hands before food. Urban scenario
4		H_003_F_25	1.4	3.1	2.3	7.6	13.8	13.4	6.2	1.8	39.7	9.9	0.1	4.0	Washing hands before food. Urban scenario
5		H_004_M_32	2.1	1.1	5.4	2.1	30.8	3.2	1.2	1.3	47.2	0	0.13	6.1	Washing hands before food. Urban scenario
6		H_004_M_23	1.3	19.9	10.7	14.2	12.6	0	0	0.8	34.6	24.9	0.13	4.5	Washing hands before food. Urban scenario
7		H_005_F_47	1.2	2.5	2.1	15.1	10.8	7.4	6.8	1.2	45	2.1	0.14	6.3	Washing hands before food. Urban scenario
8	WASHING HANDS	H_005_F_20	0.9	6.5	7.4	3.4	10.2	0	0	1.2	18.8	10.8	0.04	0.8	Washing hands before food. Rural scenario
9		H_006_F_43	1.8	4.2	5.4	2.8	13.1	0	0	1.2	20.3	8.2	0.05	1.0	Washing hands before food. Rural scenario
10		H_007_M_15	4.8	0	5.2	2.3	14.7	0	0	2	29	0	0.04	1.2	Washing hands before food. Rural scenario
11		H_008_M_13	0.9	3	3.4	7.2	12.7	0	0	0.8	28	0	0.07	2.0	Washing hands before food. Rural scenario
12		H_009_M_16	4.2	1.7	5.3	11.9	10.8	0	0	2.3	19	17.2	0.08	1.5	Washing hands before food. Rural scenario
															Washing hands

Water being utilized/wasted

Water not used, faucet turned OFF

Urban user

Rural user

Inferences from Time-Motion Analysis

- Time-motion analysis shows the time period for which water is being used (in blue) and the time for which water is not being used.
- It is inferred that water is left to flow while taking and applying soap on the hands.
- A general trend is observed wherein Rural users turn the tap off more often than their urban counterparts for the same activity.
- Highest amount of water is wasted while lathering with soap during the process of washing hands and face

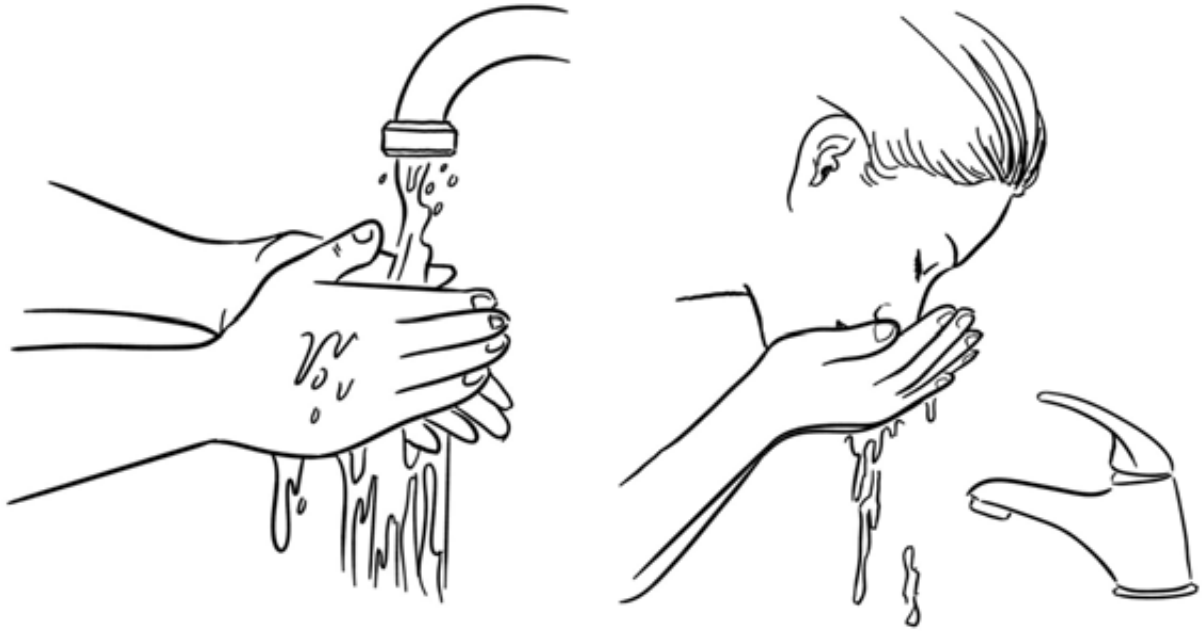
Research inferences

- Usage of a Faucet-

  Utilitarian purposes- for cleaning

  Psychological purposes- for tranquility, calmness, refreshment and relaxation

- Bathroom fixtures and fittings are a matter of pride and prestige (in luxury spaces)
- Faucets are a vanity product than just a utilitarian one.
- Users seek- easy to operate, large/ long protruding knobs.
- Ease of operation even with hands occupied/ lathered, etc.
- Efficiency of downward and upward flow of water.



03

Study of Forms

- Psychological purpose
- Forms (giving calming, tranquil & relaxing feeling)
- Waterfall- an element of tranquility

Study of forms

PRODUCT FORMS 1: CALM, RELAXING AND TRANQUIL FEELING

Studying the forms of products that give calm, relaxing and tranquil feeling to the user. This is done in order to understand the aspects that give forms various expressions and provide a specific psychological association to it.

Study of forms

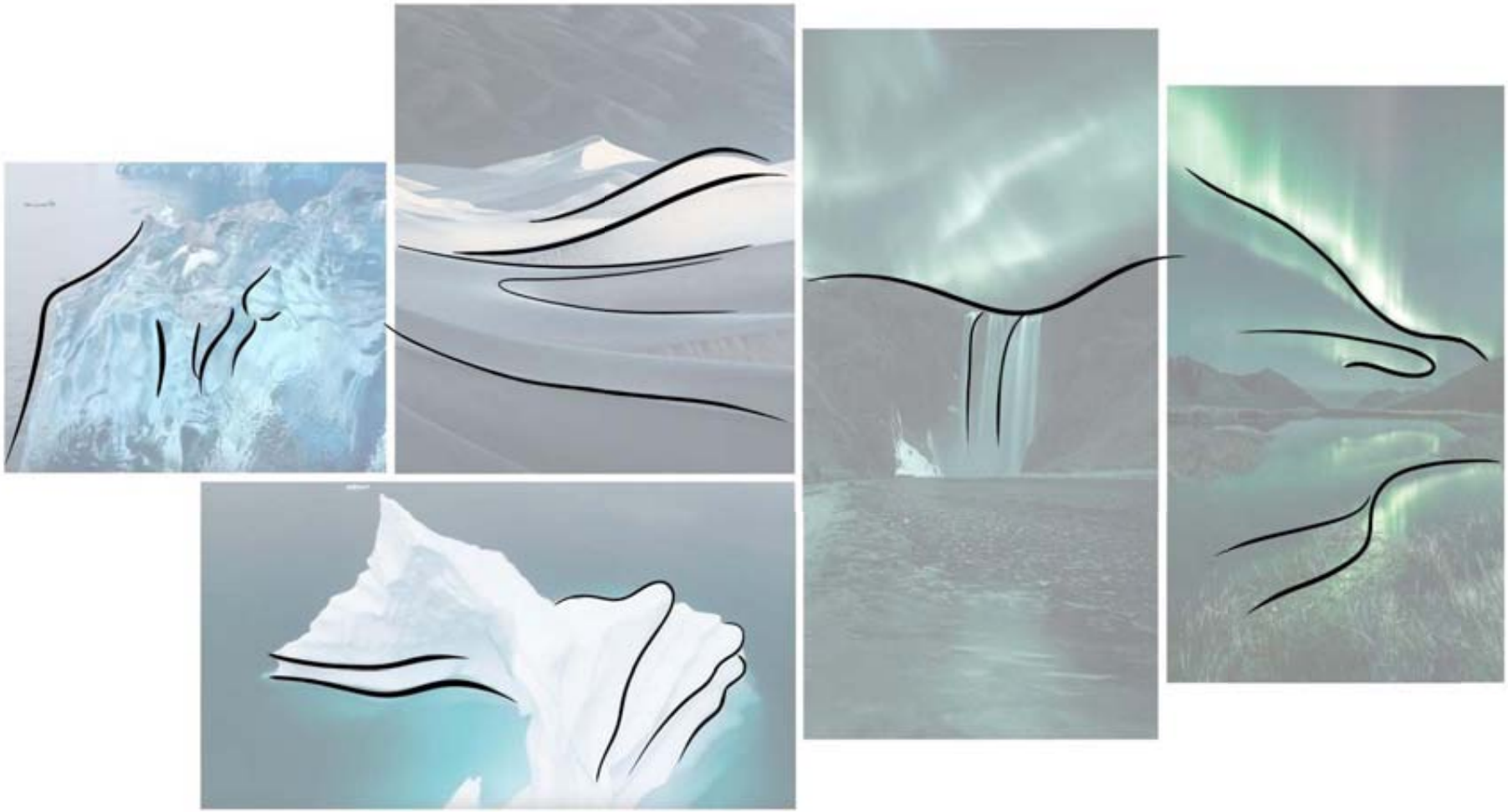
PRODUCT FORMS 2: CALM, RELAXING AND TRANQUIL FEELING

Studying the forms of products that give calm, relaxing and tranquil feeling to the user. This is done in order to understand the aspects that give forms various expressions and provide a specific psychological association to it.

Study of forms

NATURAL FORMS: CALM, RELAXING AND TRANQUIL FEELING

Studying the forms in Nature that give calm, relaxing and tranquil feeling to the user. This is done in order to understand the aspects that give forms various expressions and provide a specific psychological association to it.



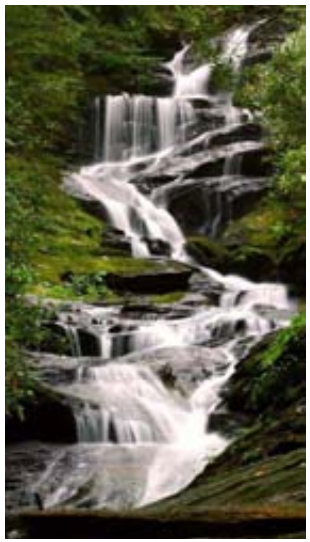
Study of waterfalls (TYPES AND FLOWING PATTERNS)

Waterfalls are Nature's marvels that captivates our minds & hearts and provides a great sense of awe, peace, calmness and tranquility. Since each waterfall, by virtue of its geographical location, geology, amount of water, height of fall, etc., has different flow or falling pattern, the same is studied in order to be incorporated into the faucet.



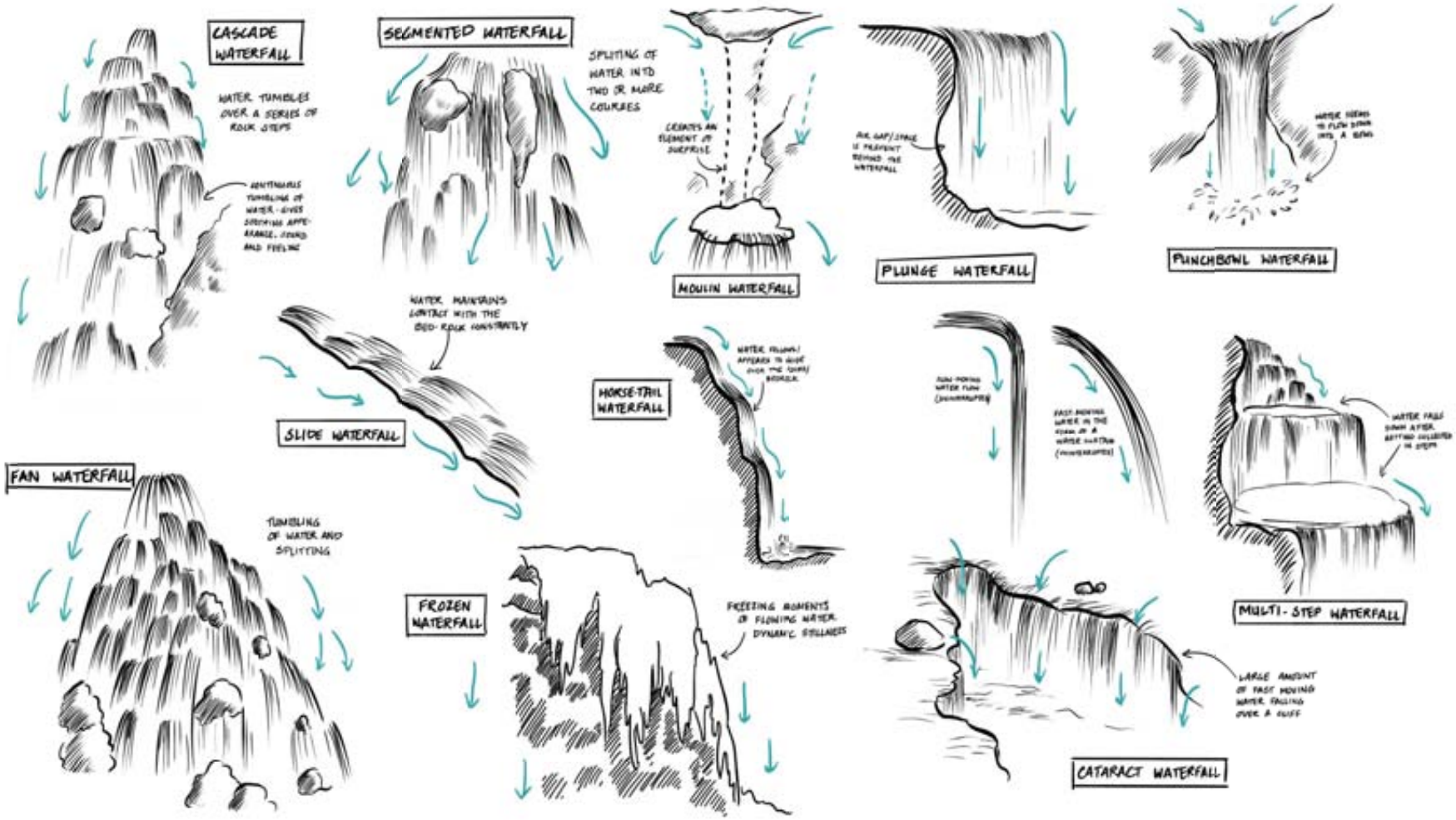




Waterfalls- types and forms

For understanding the waterfall pattern, line diagrams are made to identify the flow patterns. Classification of waterfalls: Cascade waterfall | Segmented waterfall | Mouin waterfall | Plunge waterfall | Punchbowl waterfall | Fan waterfall | Slide waterfall | Frozen waterfall | Horse-tail waterfall | Cataract waterfall | Multi-step waterfall



04 Design brief

DESIGN BRIEF

To design a bathroom Faucet exploring the Form of the faucet and water flow for a tranquil, calming and relaxing experience and providing ease of usage for fine living in Households and Hospitality spaces.

KEY WORDS

Form exploration

Tranquil experience

Luxury house-hold and hospitality

Relooking user interface

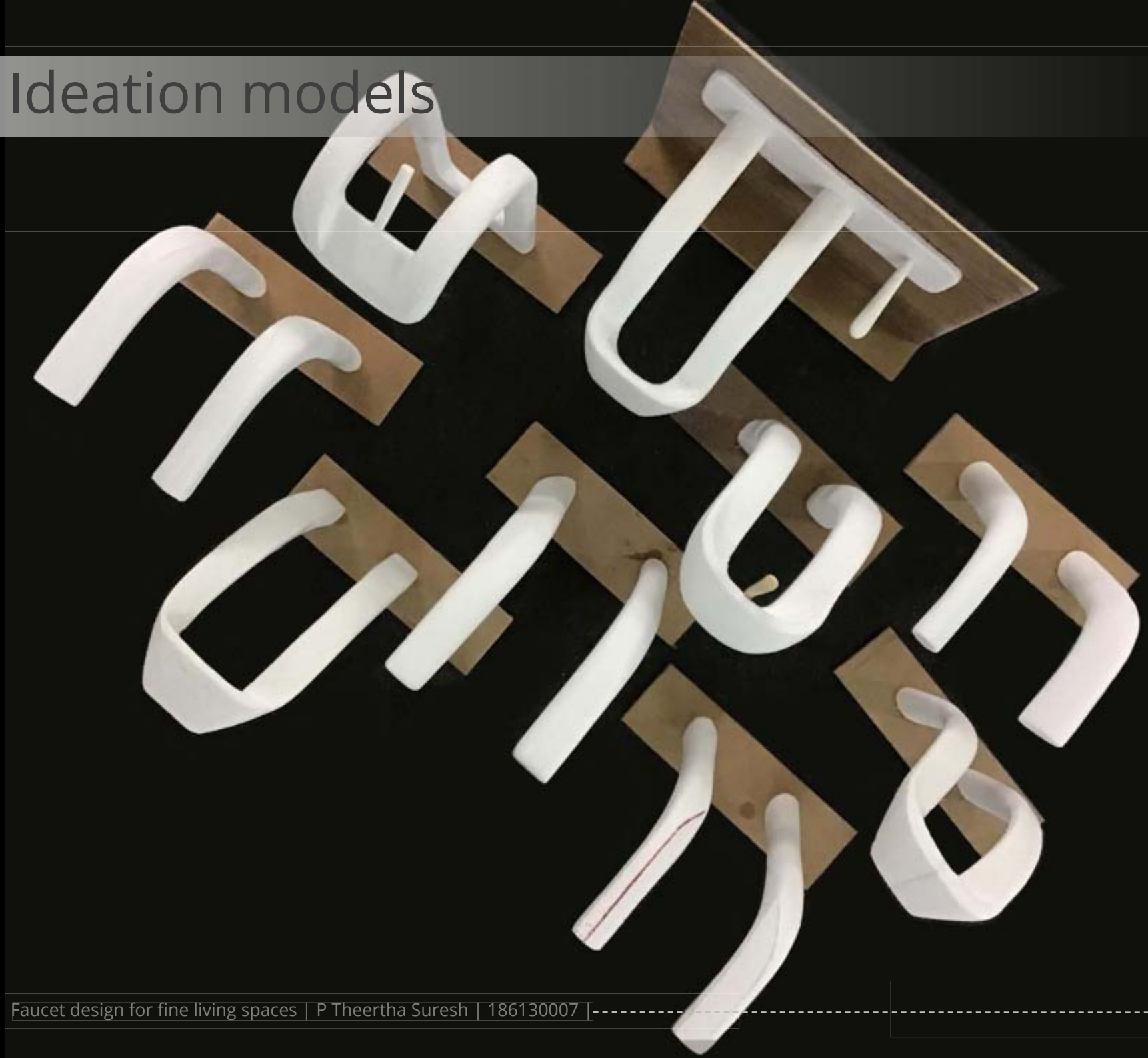
05

Design ideation

Ideating various faucet designs by exploring the Form of the faucet and water flow for a tranquil, calming and relaxing experience and providing ease of usage for fine living in Households and Hospitality spaces.

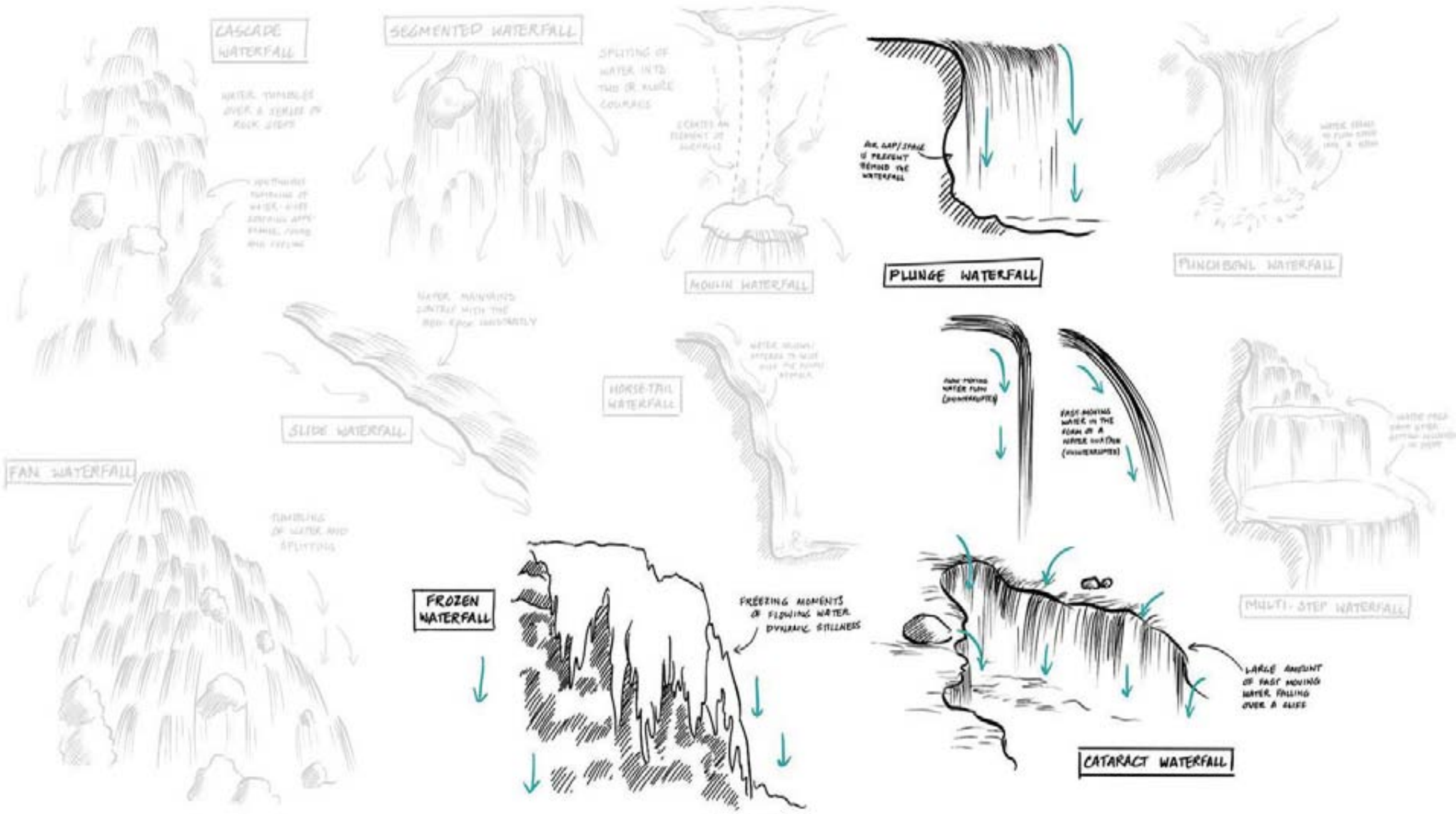
Ideation sketches

Ideation models



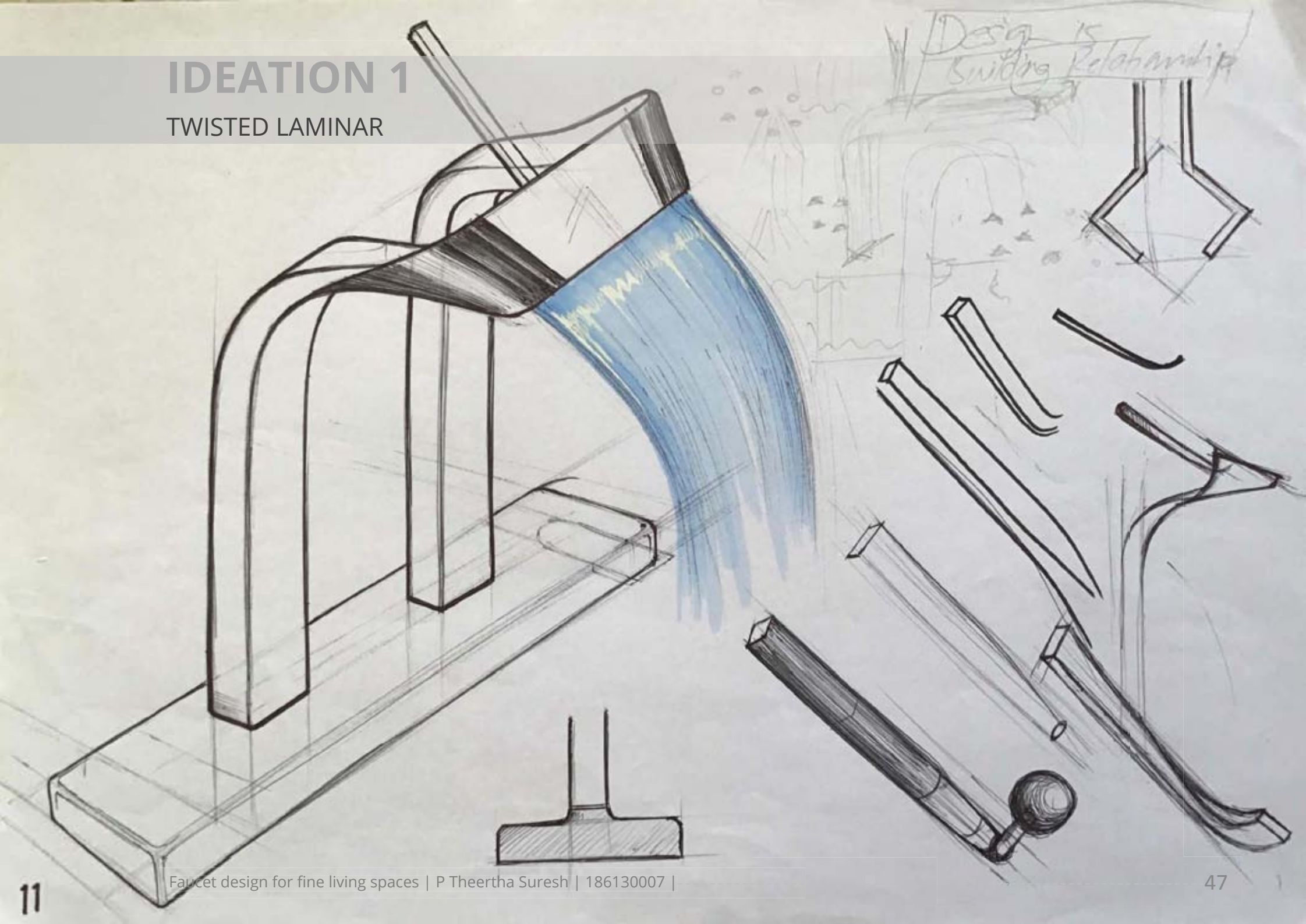
Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Plunge waterfall | Frozen waterfall | Cataract waterfall



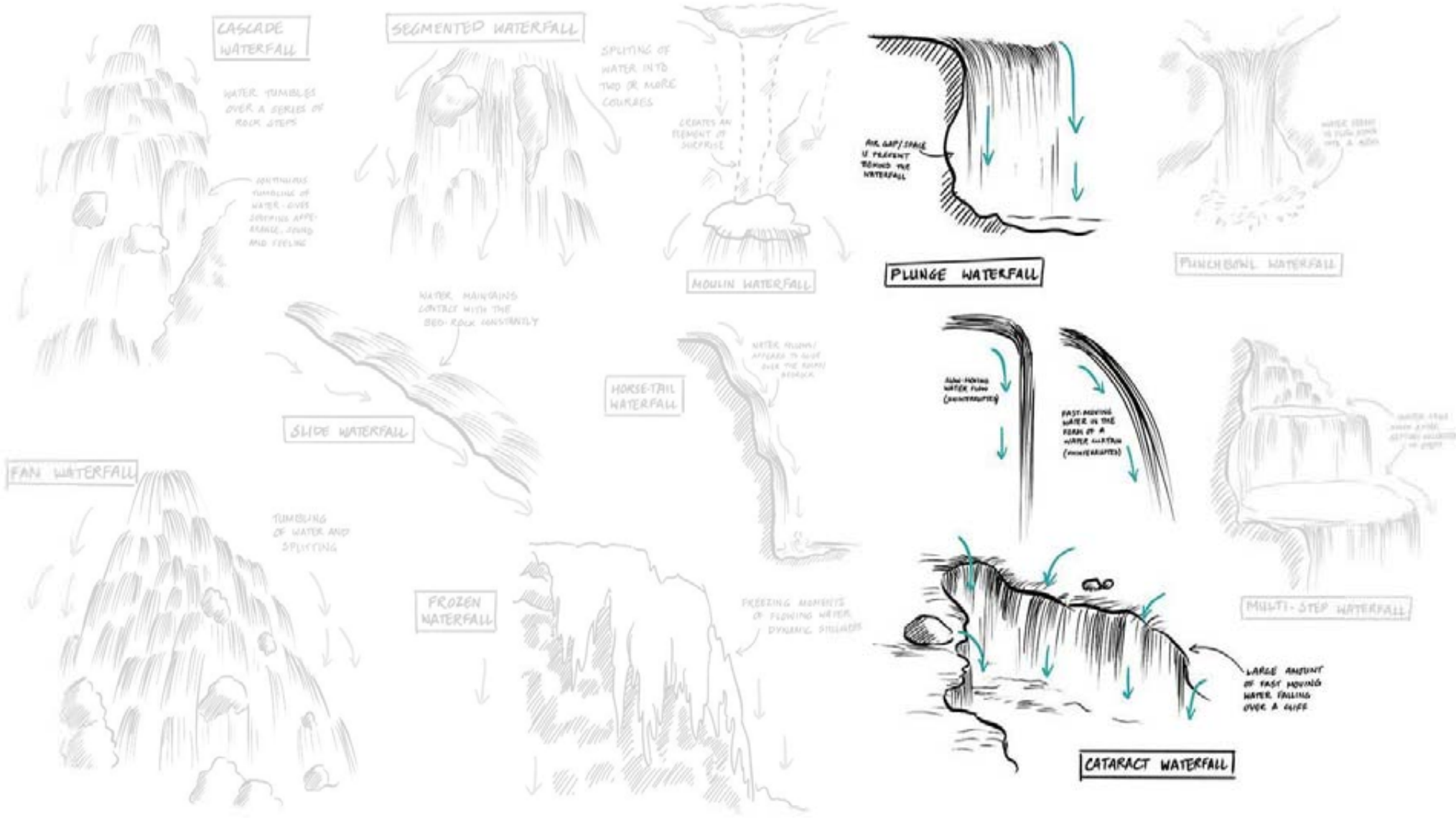
IDEATION 1

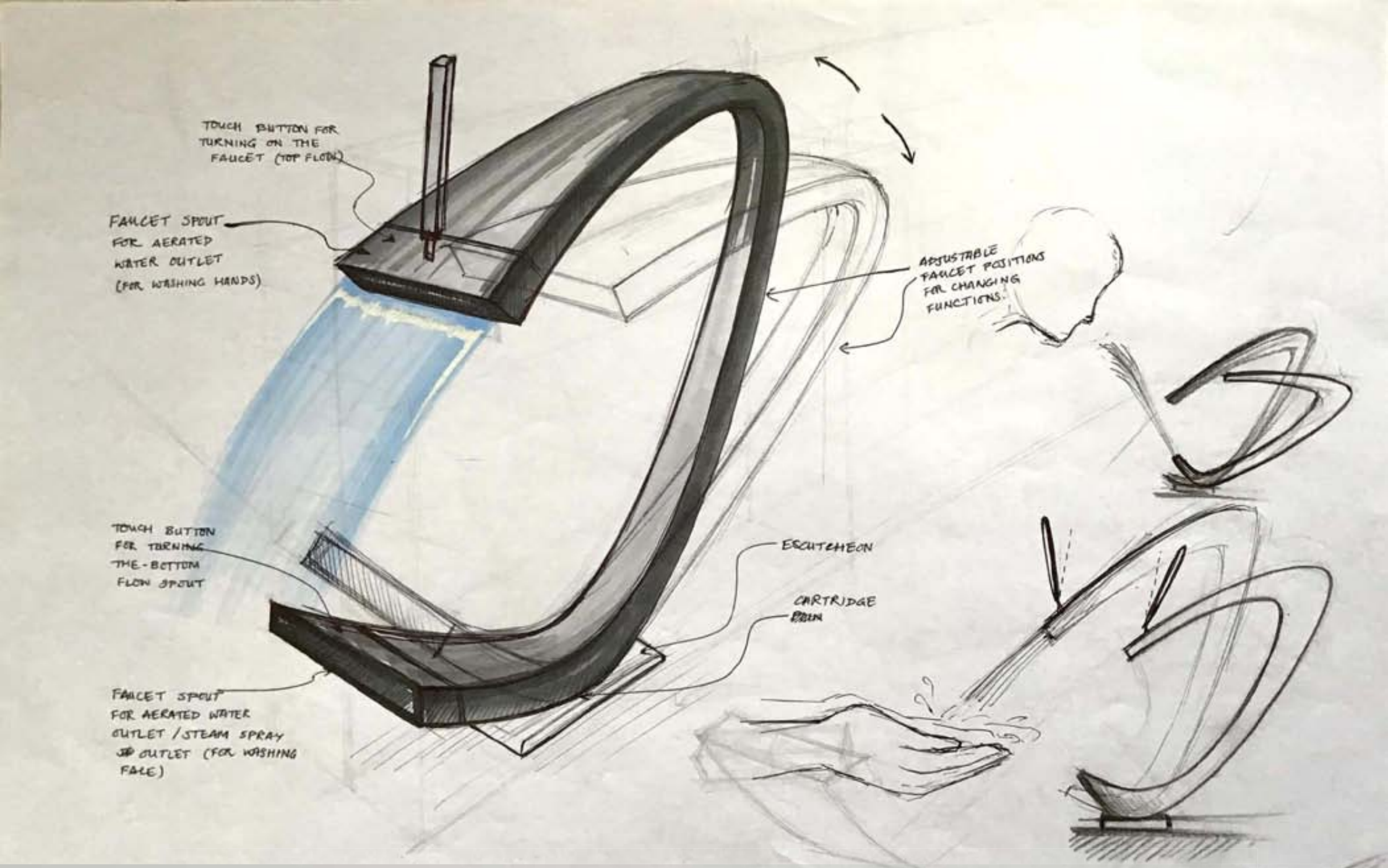
TWISTED LAMINAR



Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Plunge waterfall | Cataract waterfall



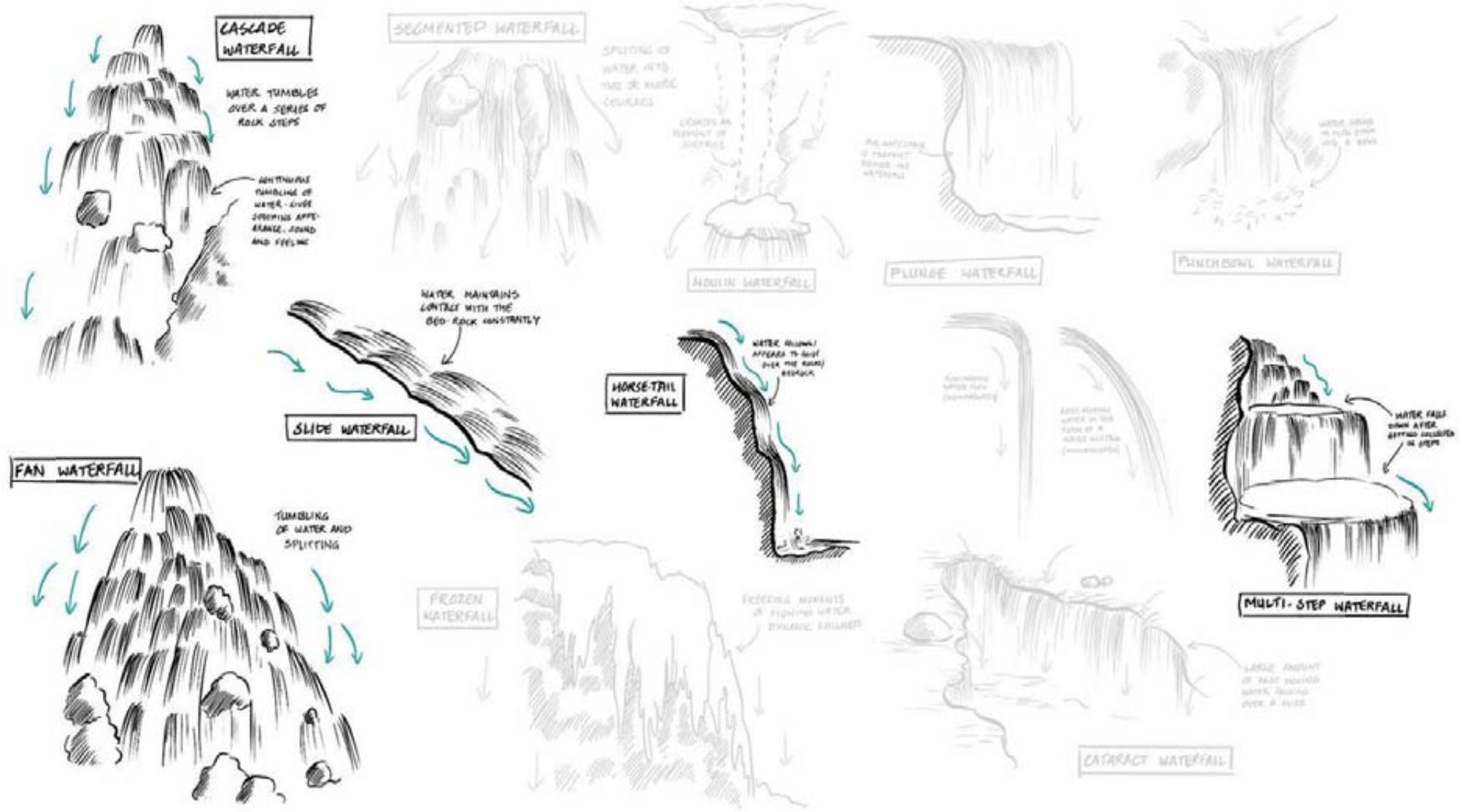


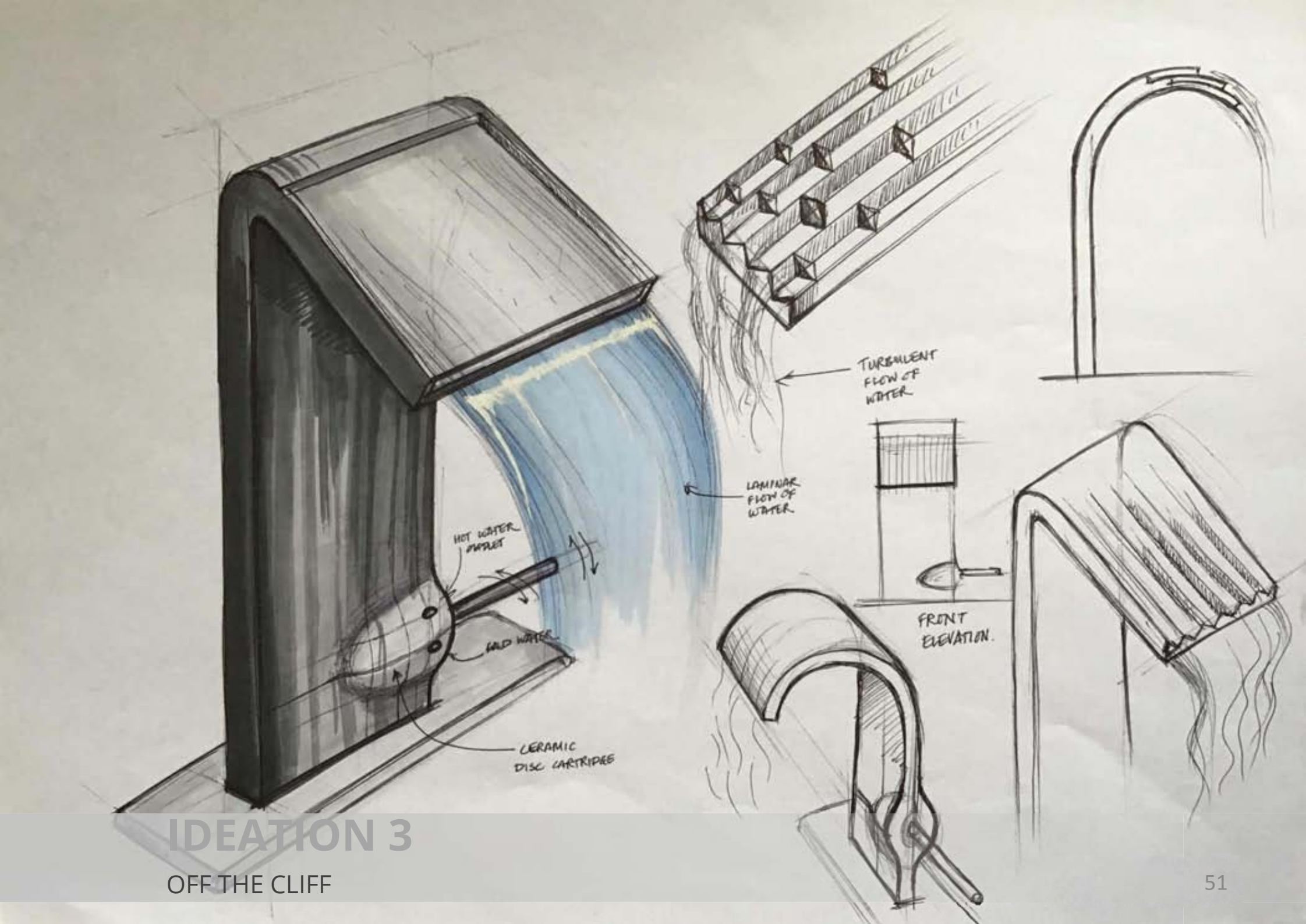
IDEATION 2

ALONG THE CURVE

Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Fan waterfall | Cascade waterfall | Slide waterfall | Horse-tail waterfall | Multi-step waterfall



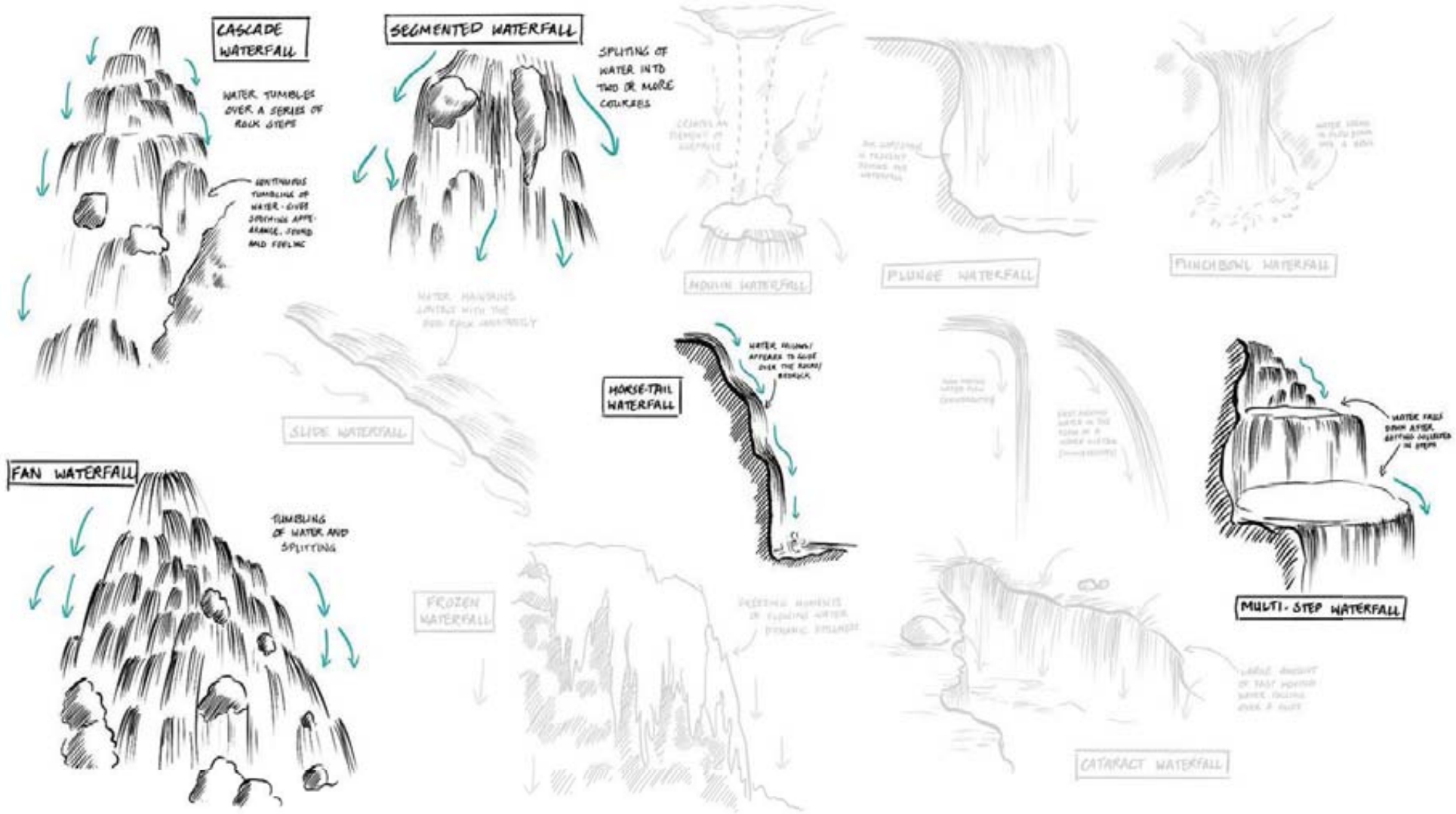


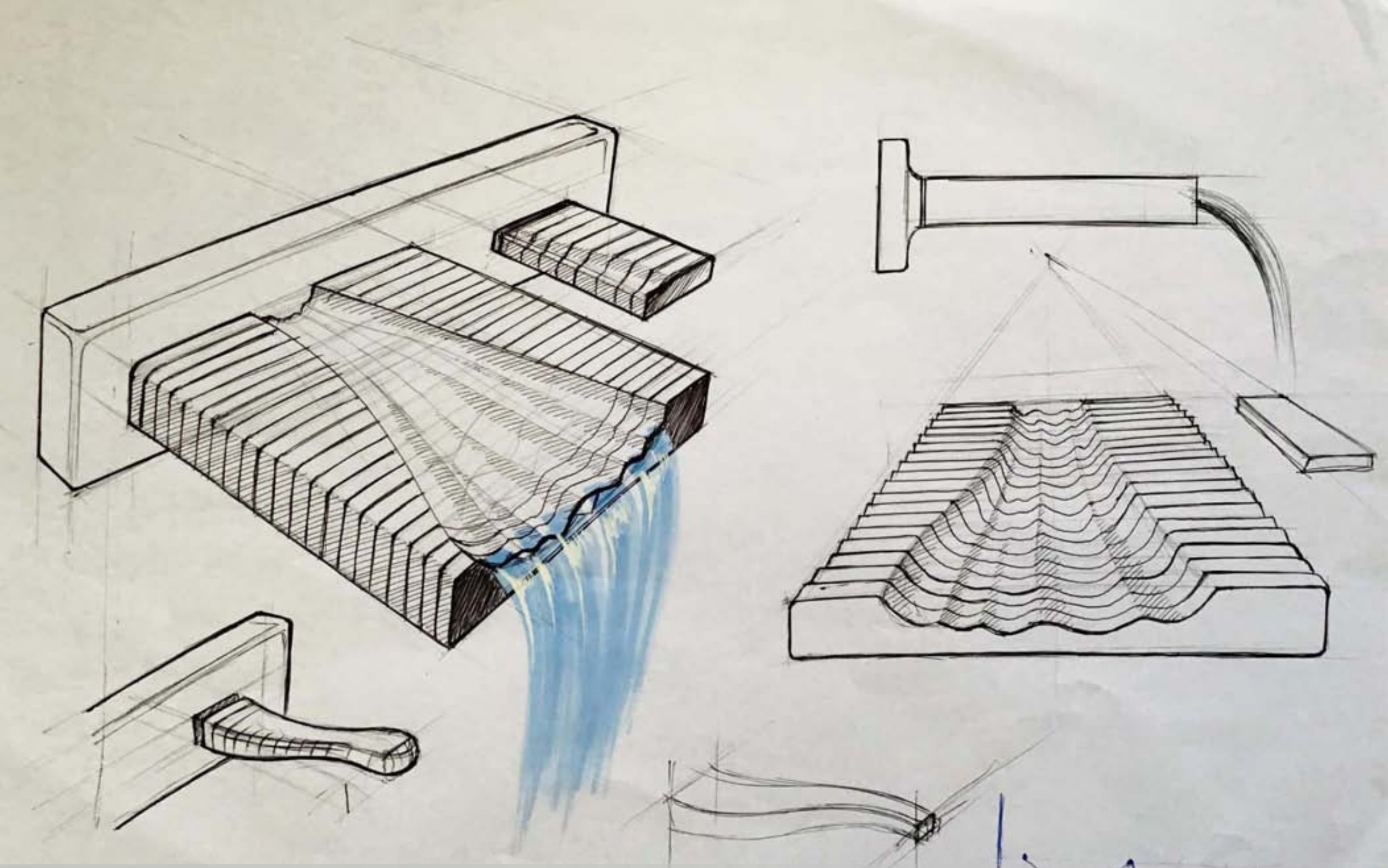
IDEATION 3

OFF THE CLIFF

Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Fan waterfall | Cascade waterfall | Segmented waterfall | Horse-tail waterfall | Multi-step waterfall



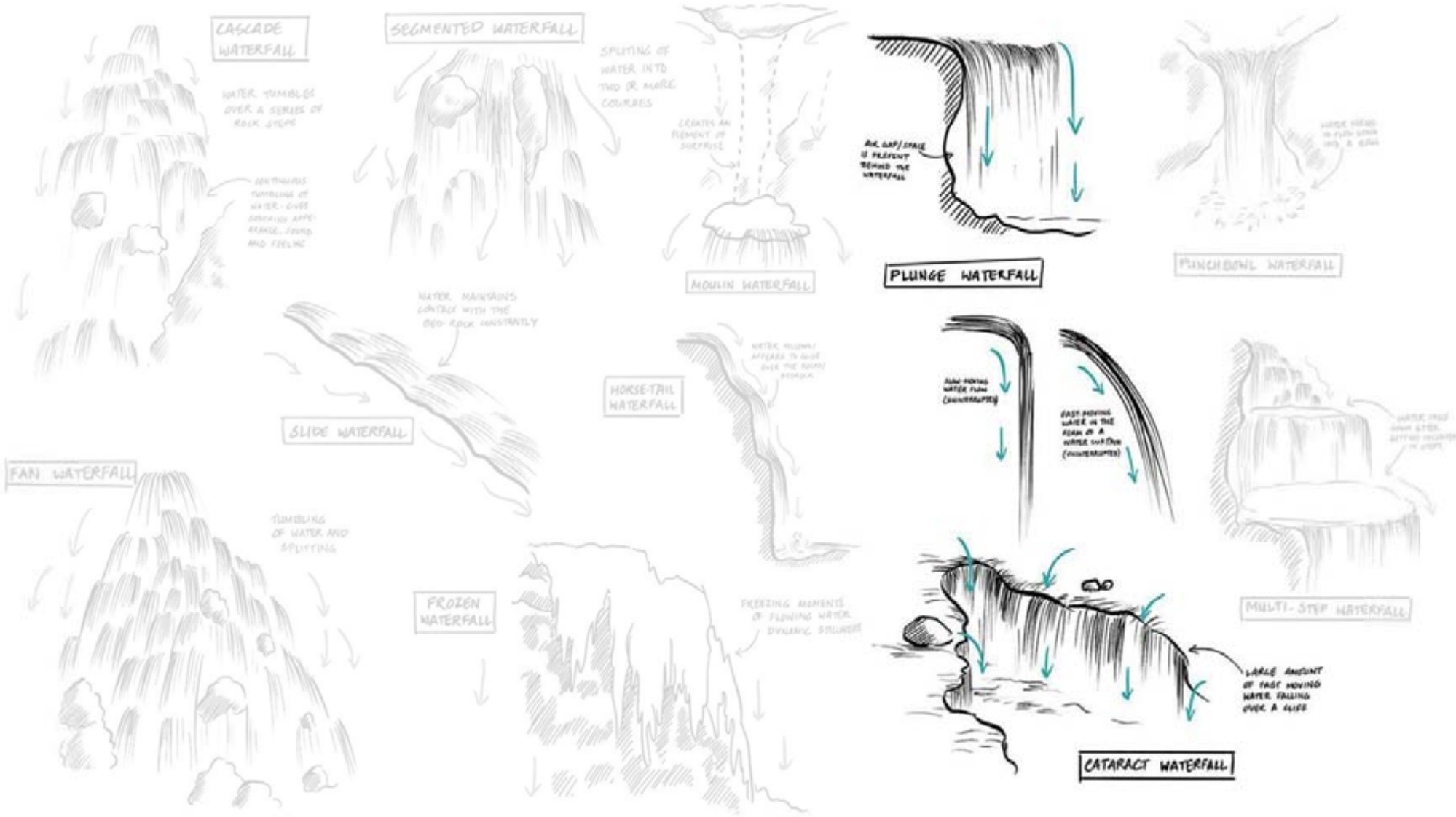


IDEATION 4

CALMING TURBULENCE

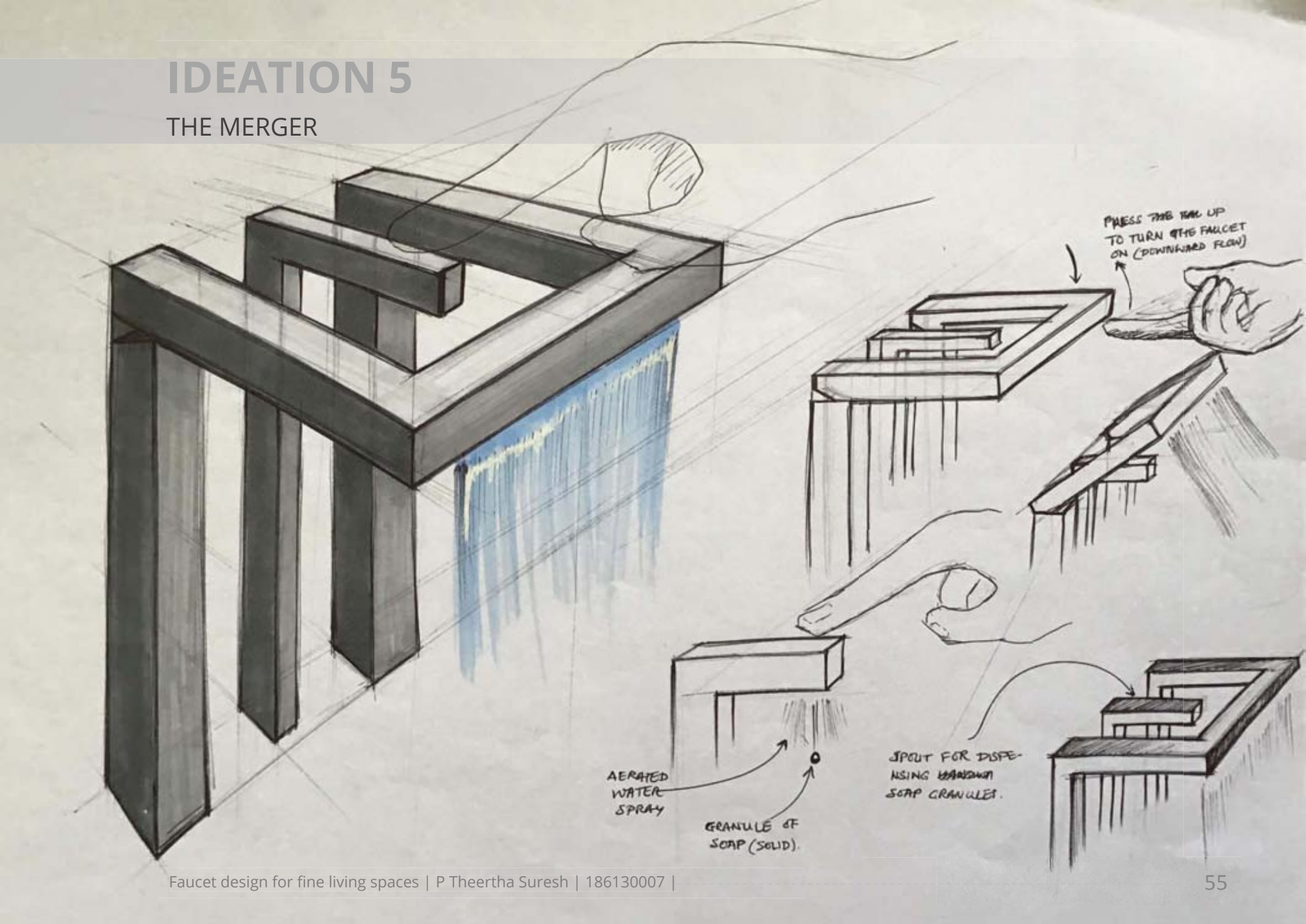
Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Plunge waterfall | Cataract waterfall



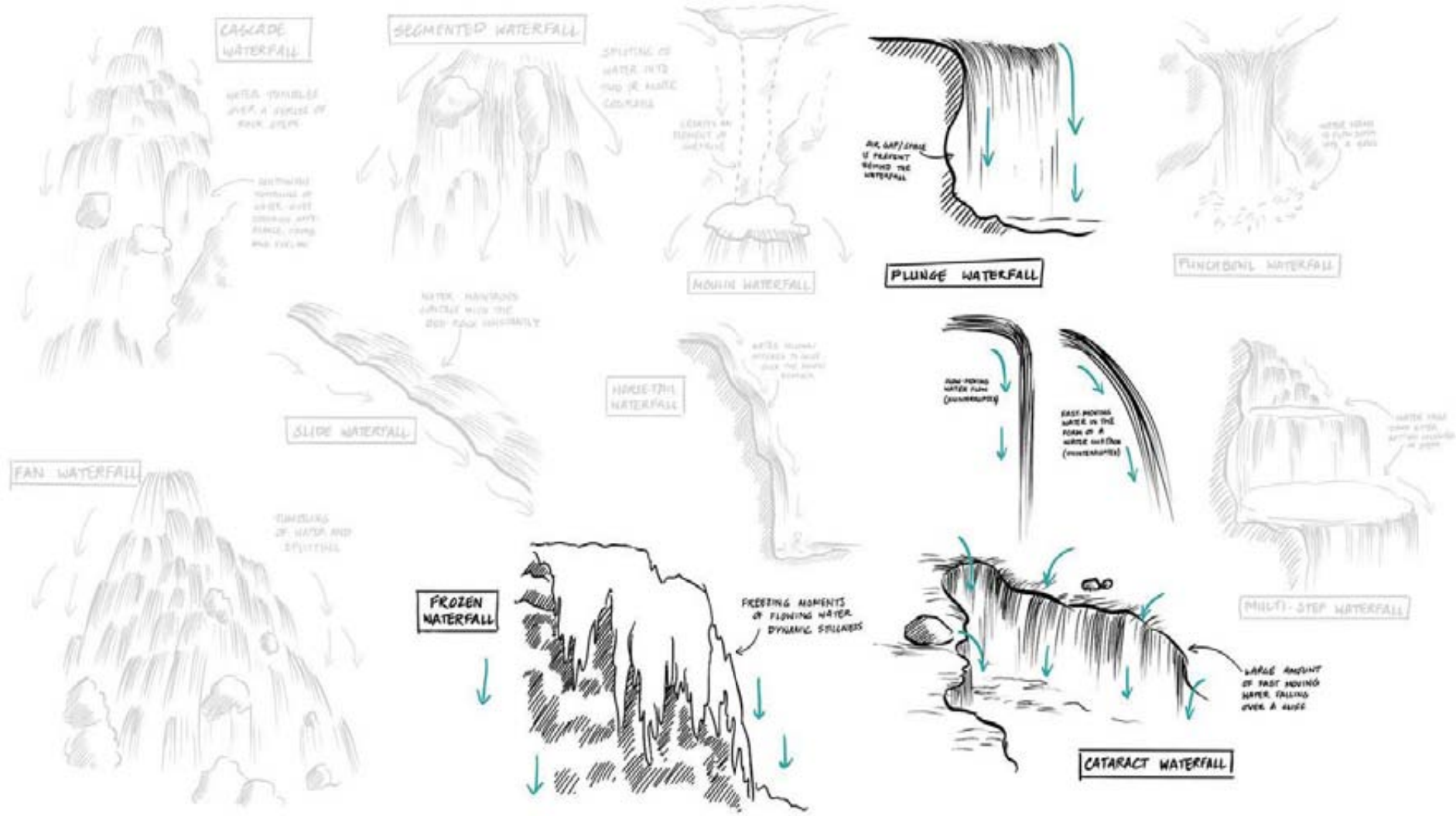
IDEATION 5

THE MERGER



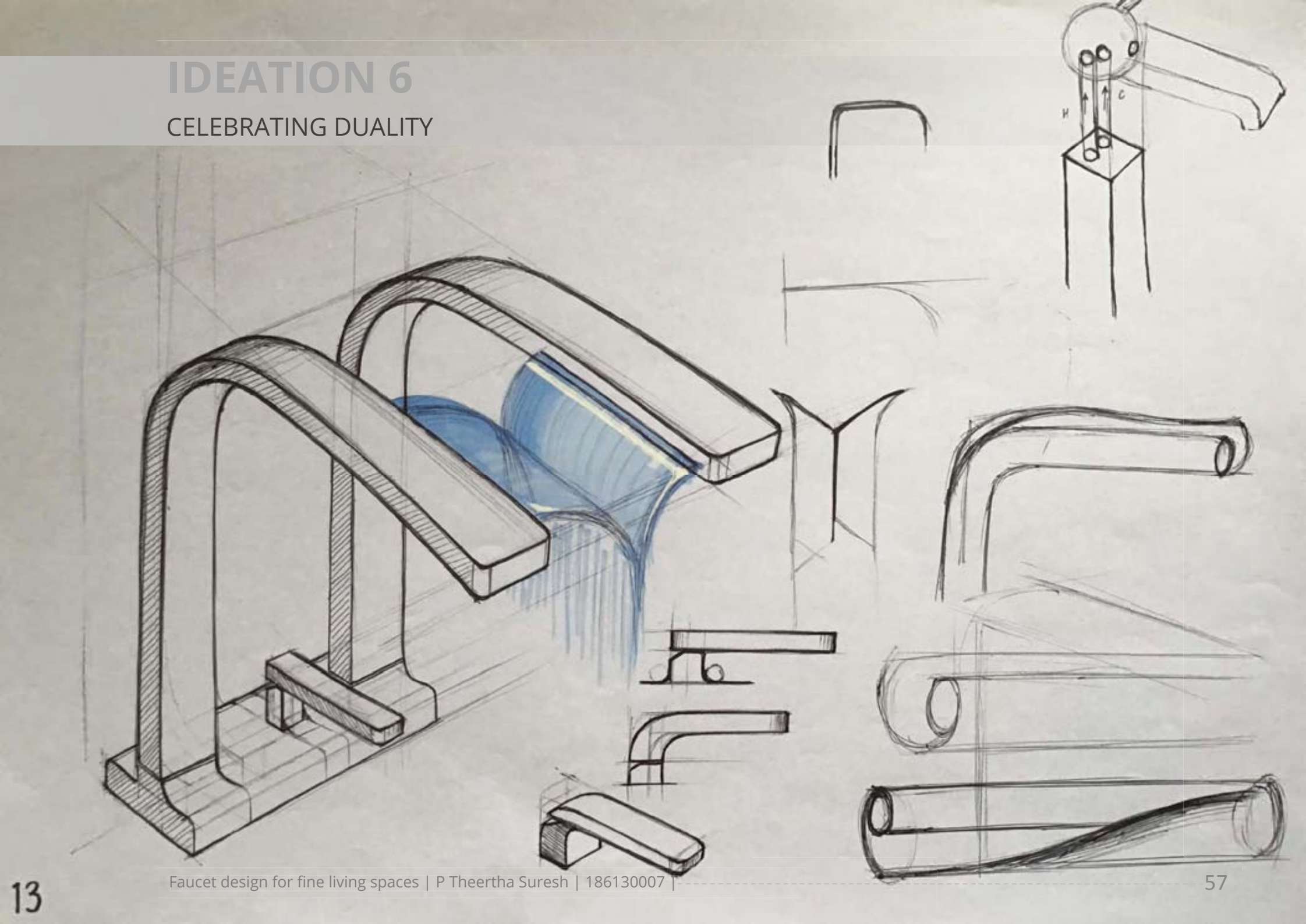
Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Plunge waterfall | Frozen waterfall | Cataract waterfall



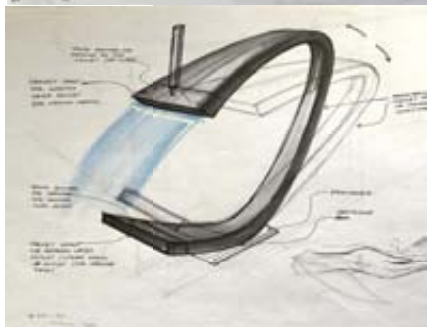
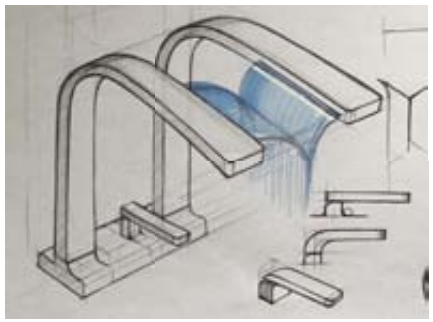
IDEATION 6

CELEBRATING DUALITY



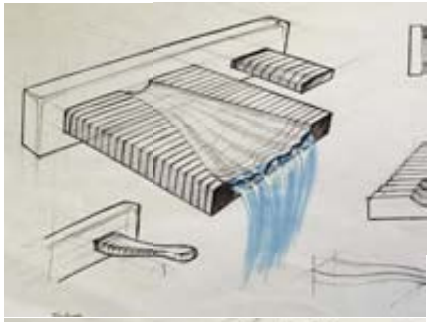
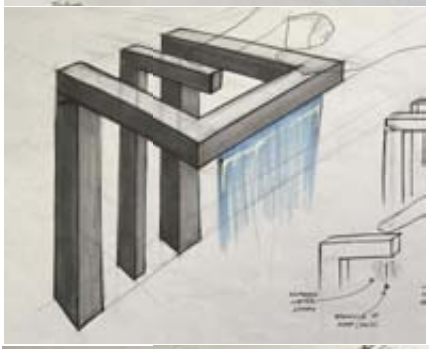
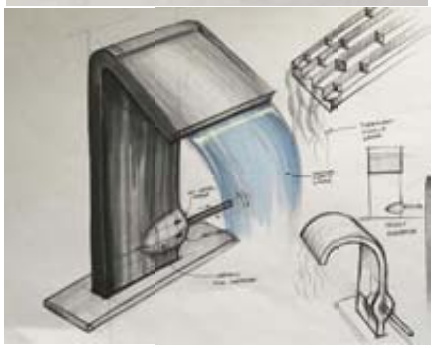
Design evaluation

Evaluating the above mentioned design Ideations of Faucet based on the factors such as: relevance to theme, type of flow of water, user interface, its salient features and product limitations

CONCEPT MODEL	RELEVANCE TO THE THEME	TYPE OF FLOW	USER INTERFACE	SALIENT FEATURES	LIMITATIONS
	Incorporates the flow pattern of a Plunge waterfall.	Laminar or Multi-stream flow	Long and protruding handles for ease of usage.	Form is a replica of laminar flow of water frozen in time.	Interface for controlling water temperature isn't intuitive. Higher tooling required.
	The form is that of a flowing curve. Is less relevant to the waterfall theme.	Laminar flow	Confusing and not intuitive interface.	The faucet allows for a knob-less design. Where the faucet itself is the knob.	Interface is very confusing. Functionality is complex and not robust.
	Inspired by a Cascade waterfall, with two water curtains colliding and merging together.	Laminar flow with misty steam.	Intuitive and easy interface with separate knobs for temperature control.	User can see the merging of cold and hot water curtains along with misty steam.	Requires two separate spouts for water outlet.

Design evaluation

Evaluating the above mentioned design Ideations of Faucet based on the factors such as: relevance to theme, type of flow of water, user interface, its salient features and product limitations

CONCEPT MODEL	RELEVANCE TO THE THEME	TYPE OF FLOW	USER INTERFACE	SALIENT FEATURES	LIMITATIONS
	The design is a direct impression of waterfall, creating turbulent flow.	Turbulent flow	Easy and intuitive interface	This faucet gives the experience of having a waterfall at reach.	Cleaning could be difficult in case of intricate grooves.
	The form is too rectilinear and is not close to the theme.	Laminar or Multi-stream flow	Confusing and difficult interface	It is a hand-wash integrated faucet.	Confusing and difficult interface
	The form incorporates a calm waterfall that is falling off a cliff.	Laminar or Multi-stream flow	Easy but not intuitive interface	The faucet handle seamlessly integrates with the faucet body.	Not intuitive interface. Too bulky-looking

06

Development of design

Theme of Faucet design range:
RARE IMPRESSIONS OF FINE LIVING

RARE IMPRESSIONS OF FINE LIVING

This series of Faucet design is a celebration of water, its form, nature and brilliance for unique & elevated living.

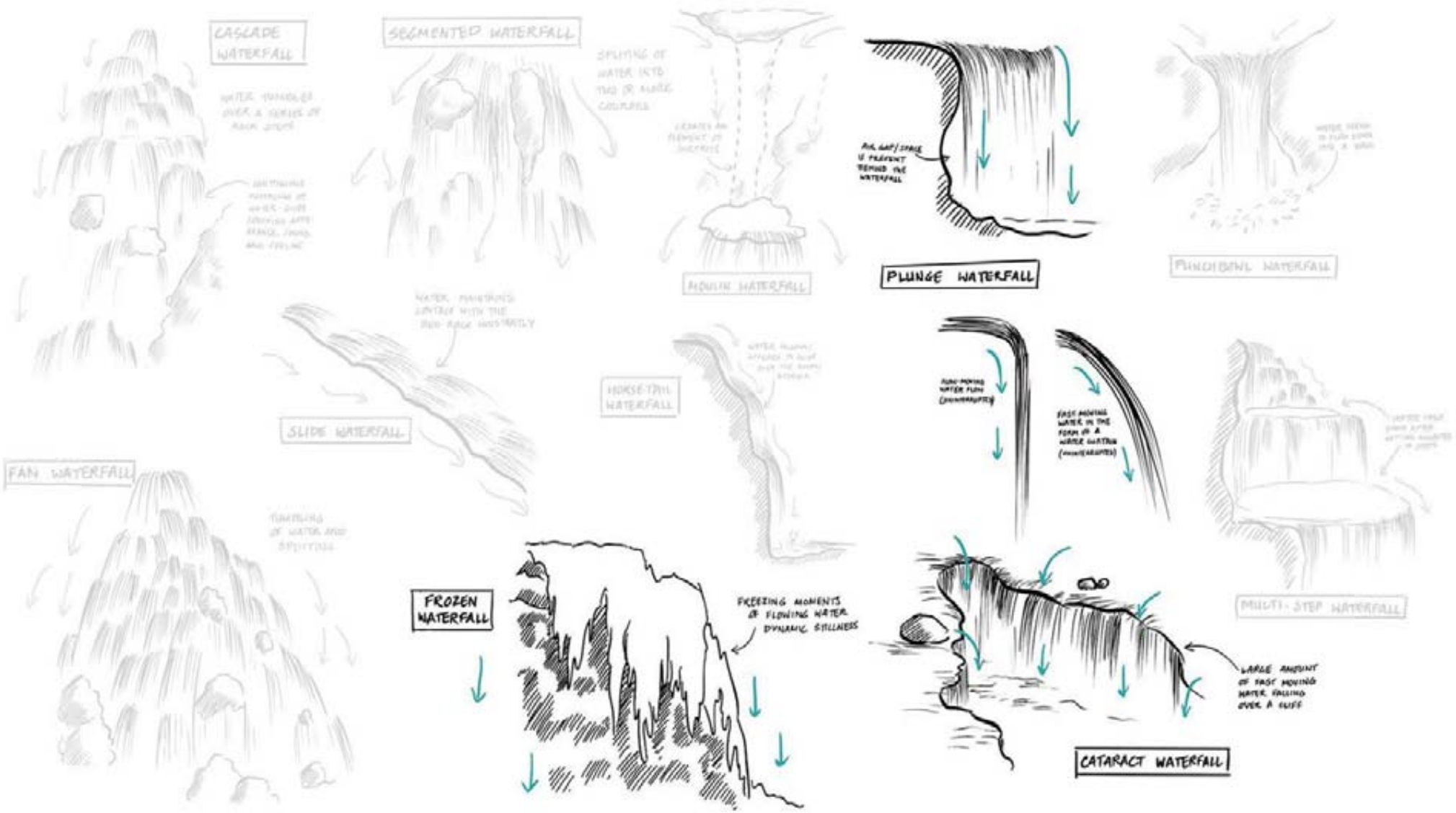
07

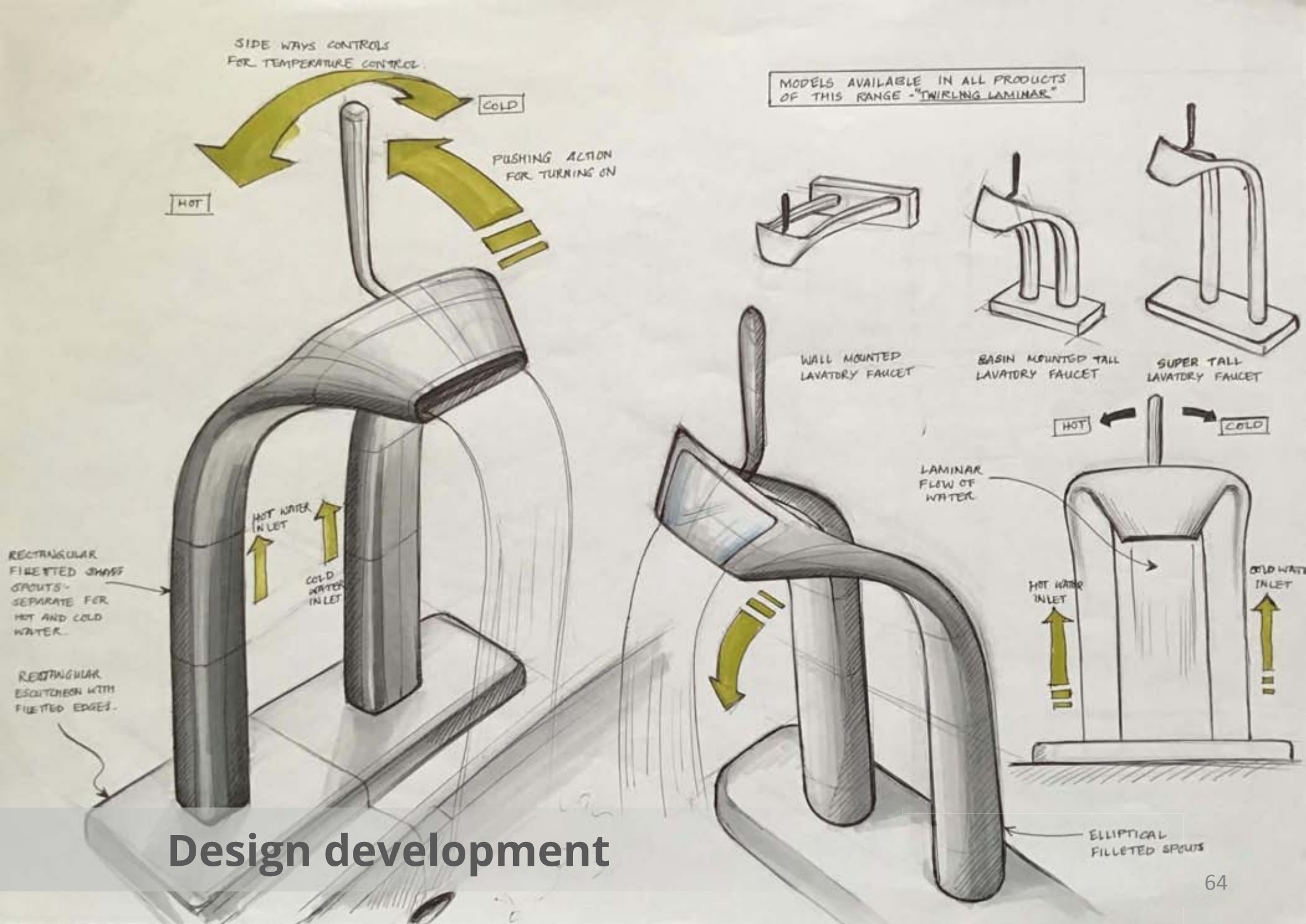
RANGE 1:

Twisted laminar faucet design

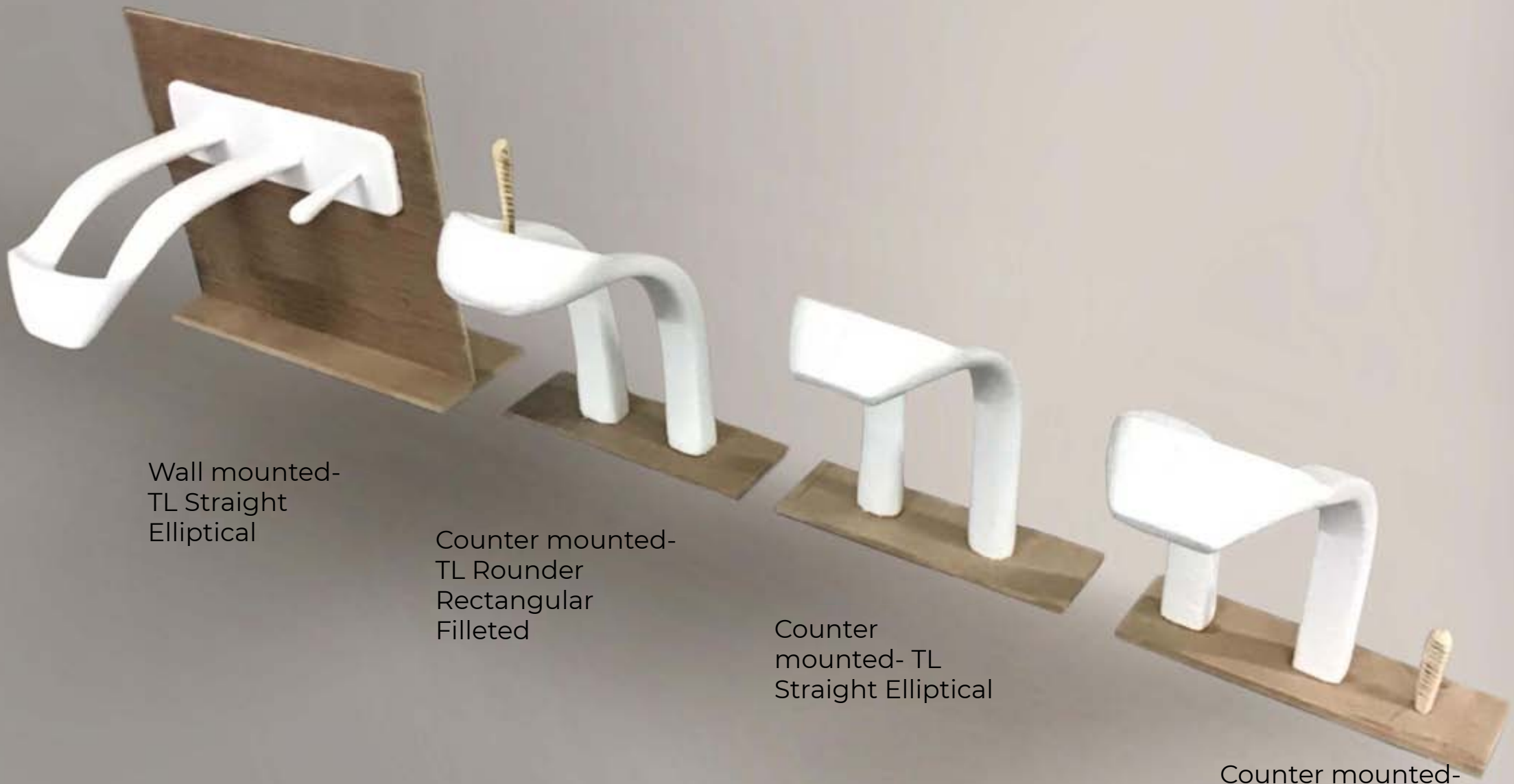
Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Plunge waterfall | Frozen waterfall | Cataract waterfall





Design development



Wall mounted- TL Straight Elliptical

Counter mounted- TL Rounder Rectangular Filleted

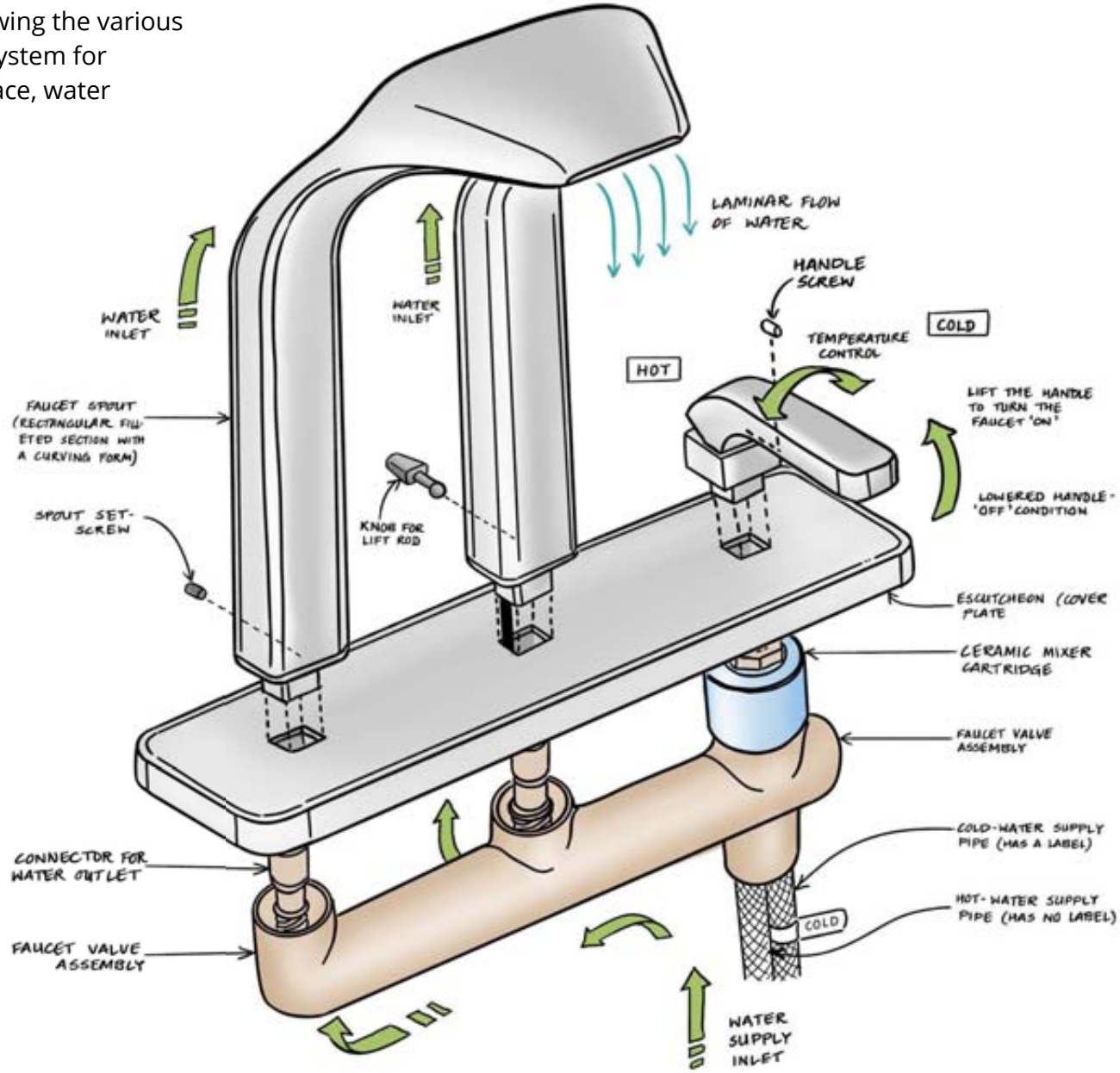
Counter mounted- TL Straight Elliptical

Counter mounted- TL Straight Rectangular Filleted

Range of Faucets- Twisted laminar

Exploded view of faucet

Exploded view of the faucet showing the various components and fixing details, system for operating the faucet, user interface, water inlet valves and connections



TWISTED LAMINAR

Faucet design series inspired by the laminar flow of water and capturing moments of frozen laminar flows.

Fig: Rendered view of the faucet design series 'Twisted Laminar' showing the faucet form, flow of water from it and the operating handle with blue lighting indicating 'ON' position

Fig: Rendered view of the faucet design series 'Twisted Laminar' showing the faucet form and the operating handle with red lighting indicating 'OFF' position

Fig: Rendered view of the faucet design series 'Twisted Laminar' showing the faucet form, flow of water from it and the operating handle with blue lighting indicating 'ON' position

Fig: Rendered view of the faucet design 'Twisted Laminar' showing the faucet form fitted on a wash basin counter along with other accessories.

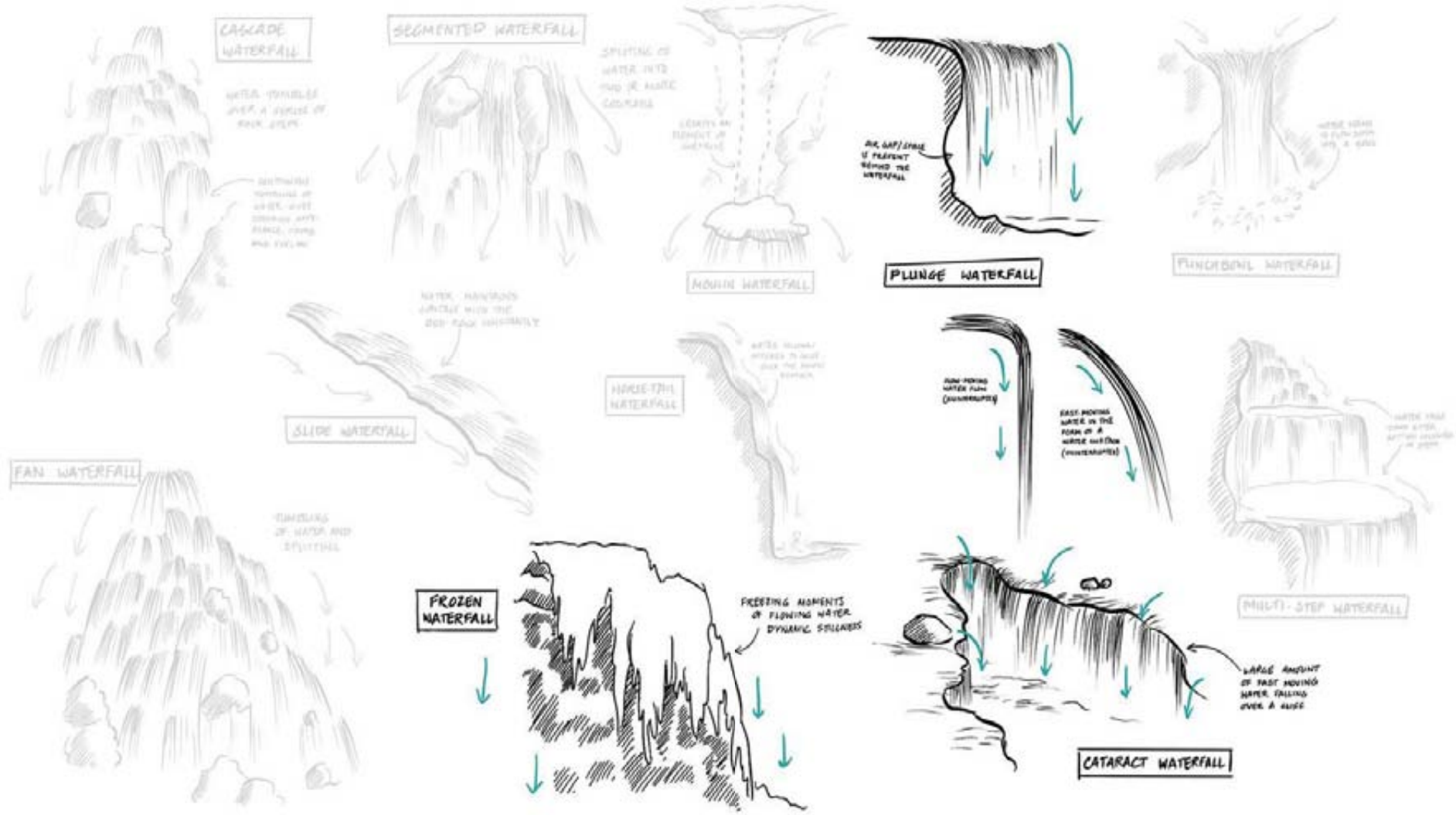
08

RANGE 2:

Celebrating duality faucet

Ideation inspired from waterfall

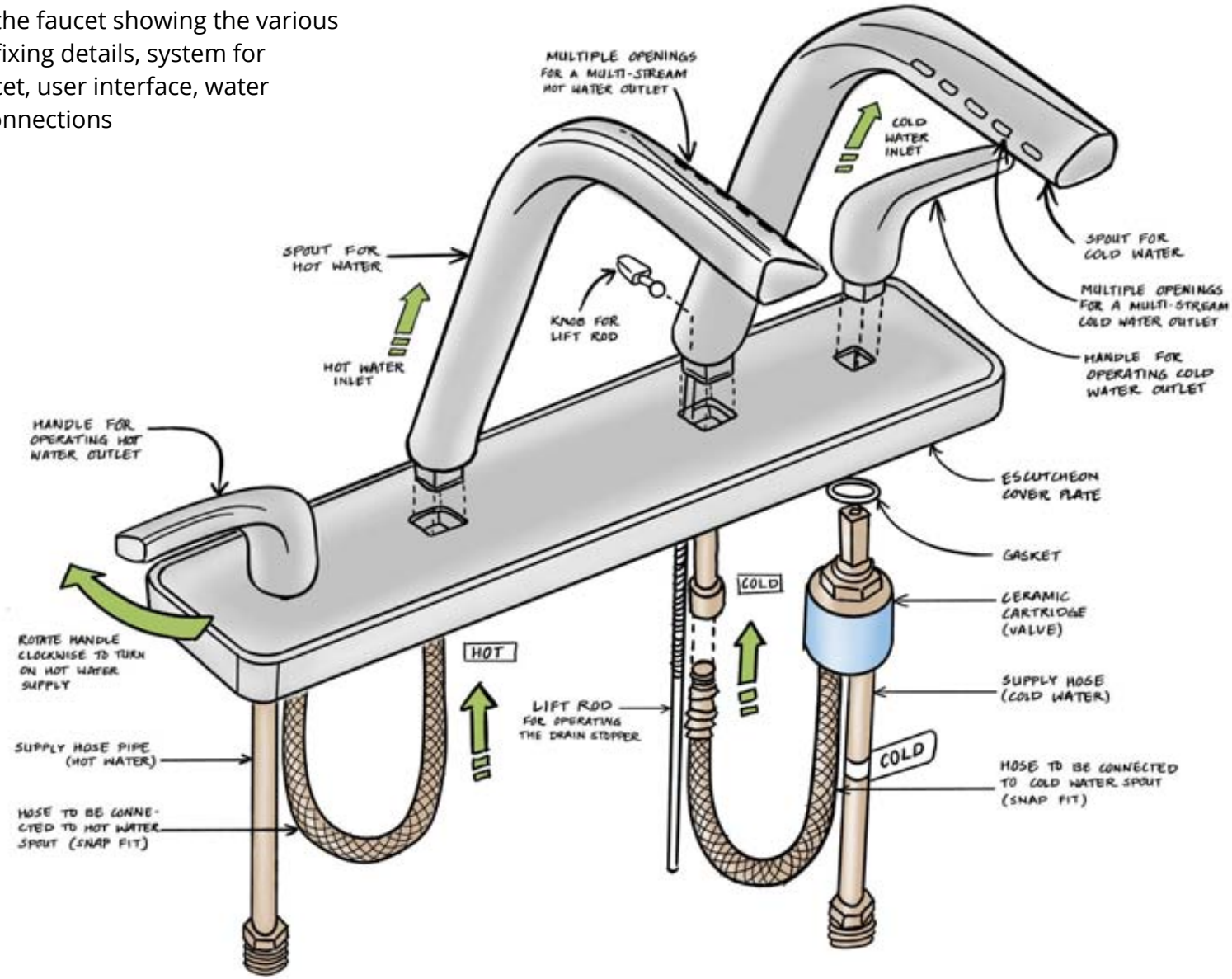
Faucet design and form inspired by the following waterfalls:
Plunge waterfall | Frozen waterfall | Cataract waterfall



Range of Faucets- Celebrating duality

Exploded view of faucet

Exploded view of the faucet showing the various components and fixing details, system for operating the faucet, user interface, water inlet valves and connections



CELEBRATING DUALITY

Celebrating the beauty of opposites colliding and mixing to create what was never in either.

Fig: Rendered view of the faucet design series ‘Celebrating duality’ showing the faucet form, flow of water from it and the operating handle with blue lighting indicating ‘COLD’ and red indicating ‘HOT’ water discharge.

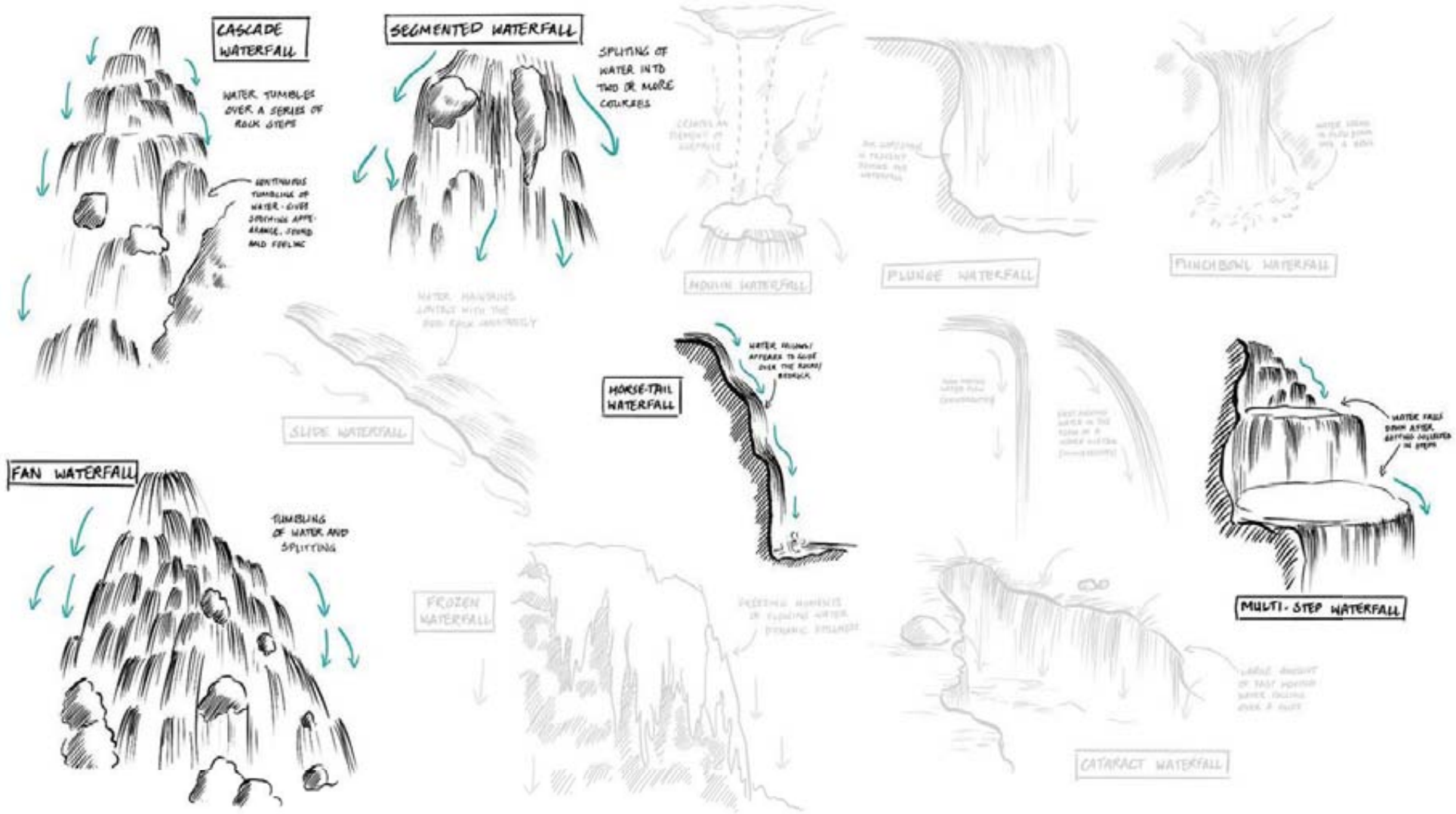
09

RANGE 3:

Calming turbulence faucet design

Ideation inspired from waterfall

Faucet design and form inspired by the following waterfalls:
Fan waterfall | Cascade waterfall | Segmented waterfall | Horse-tail waterfall | Multi-step waterfall

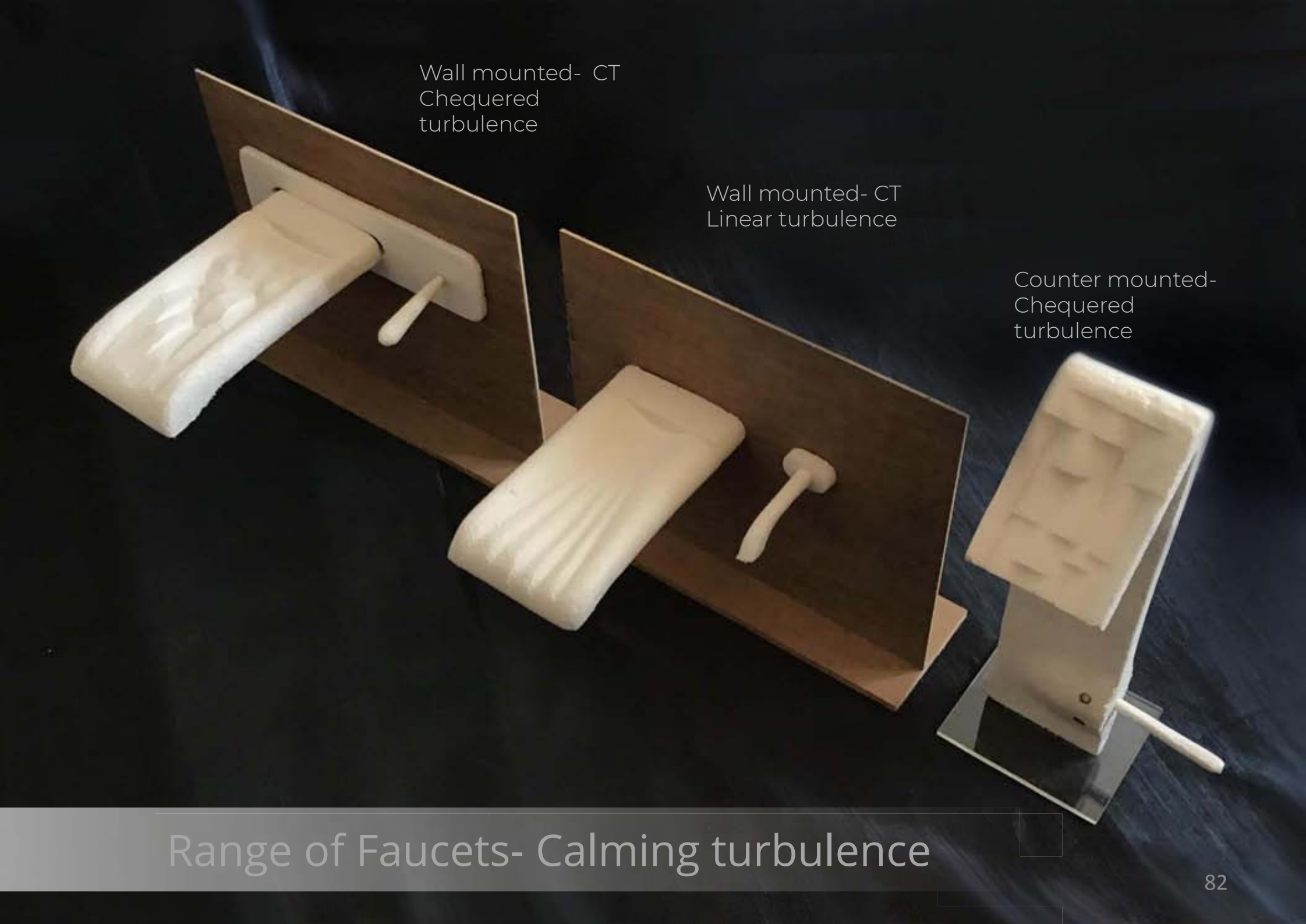


Texture palette

Following is a mood board consisting of a palette to be incorporated on the surface of faucets to give a calming yet turbulent experience. The textures have an earthy and natural feel similar to the earth over which water flows.

CALMING TURBULENCE

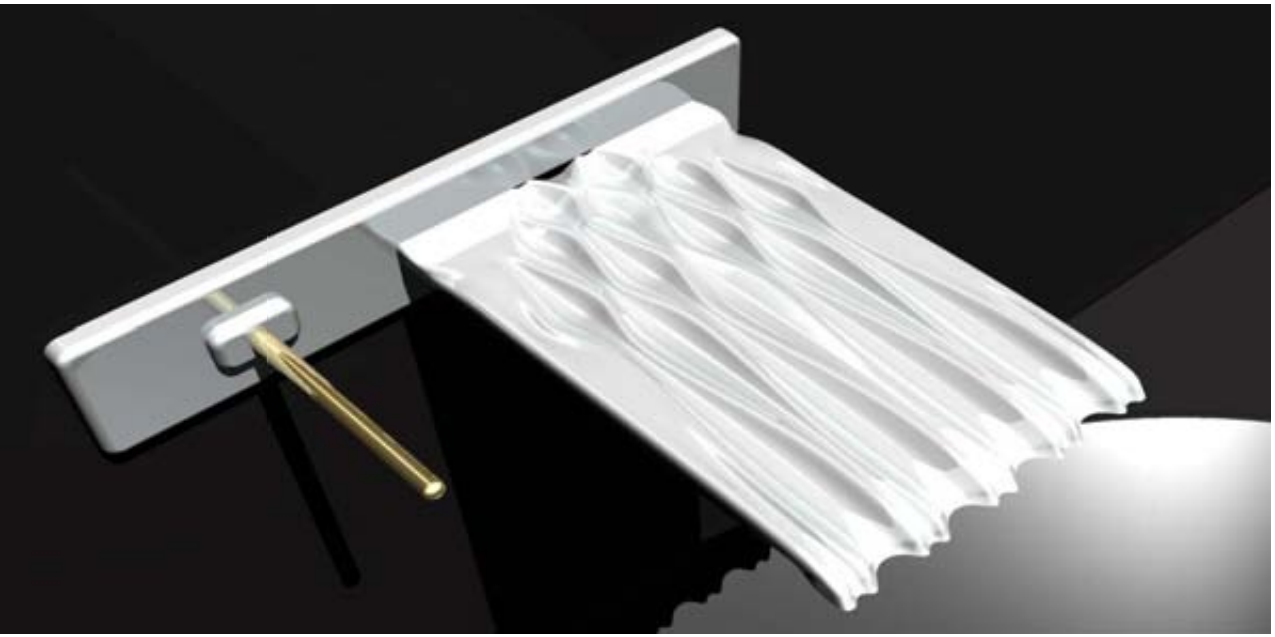
This sounds like an oxymoron, however,
nature is all about contrast and balance.
And so is this faucet design

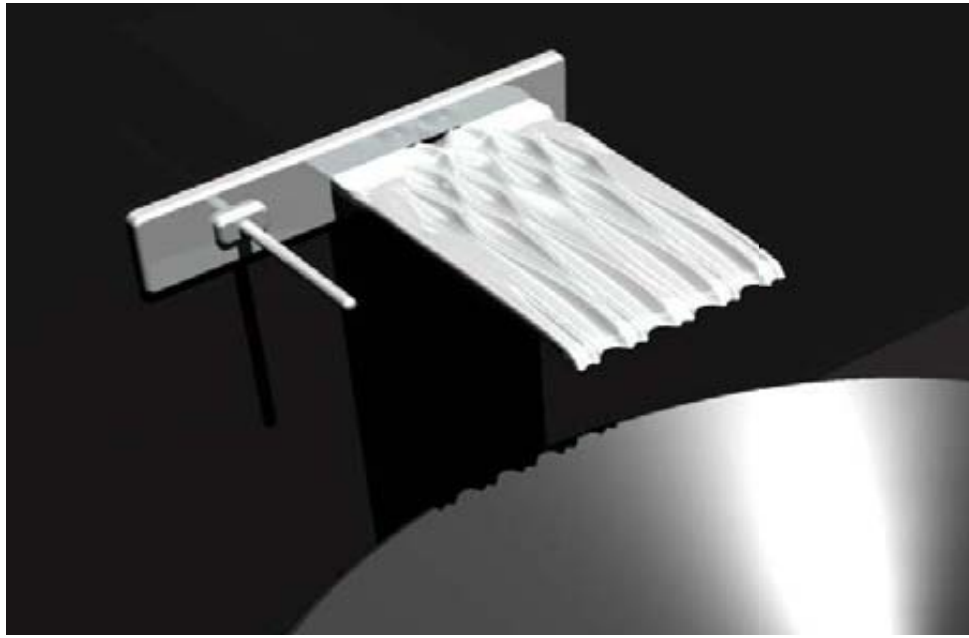


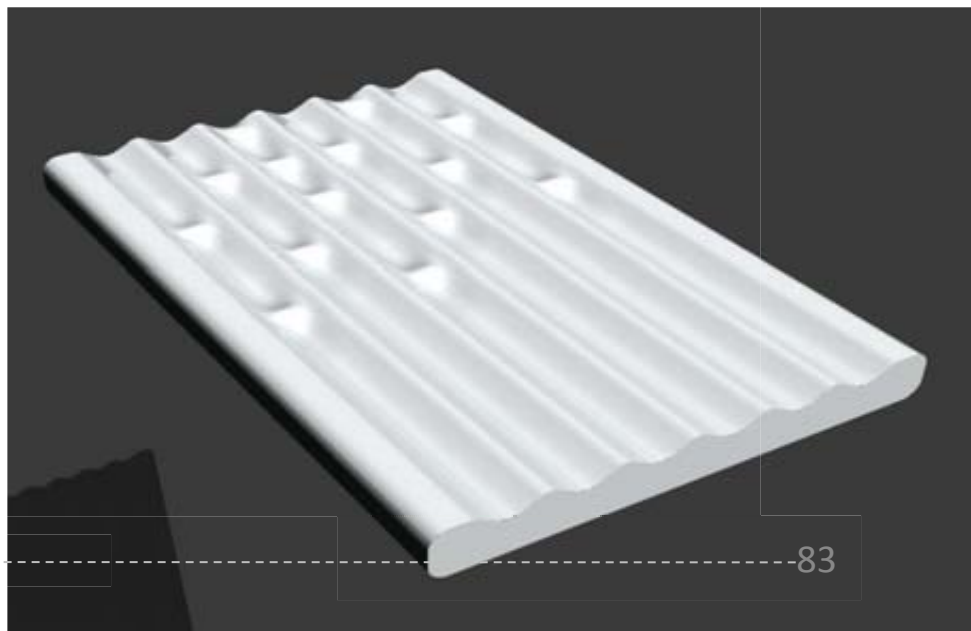
Range of Faucets- Calming turbulence

Calming turbulence- faucet renders

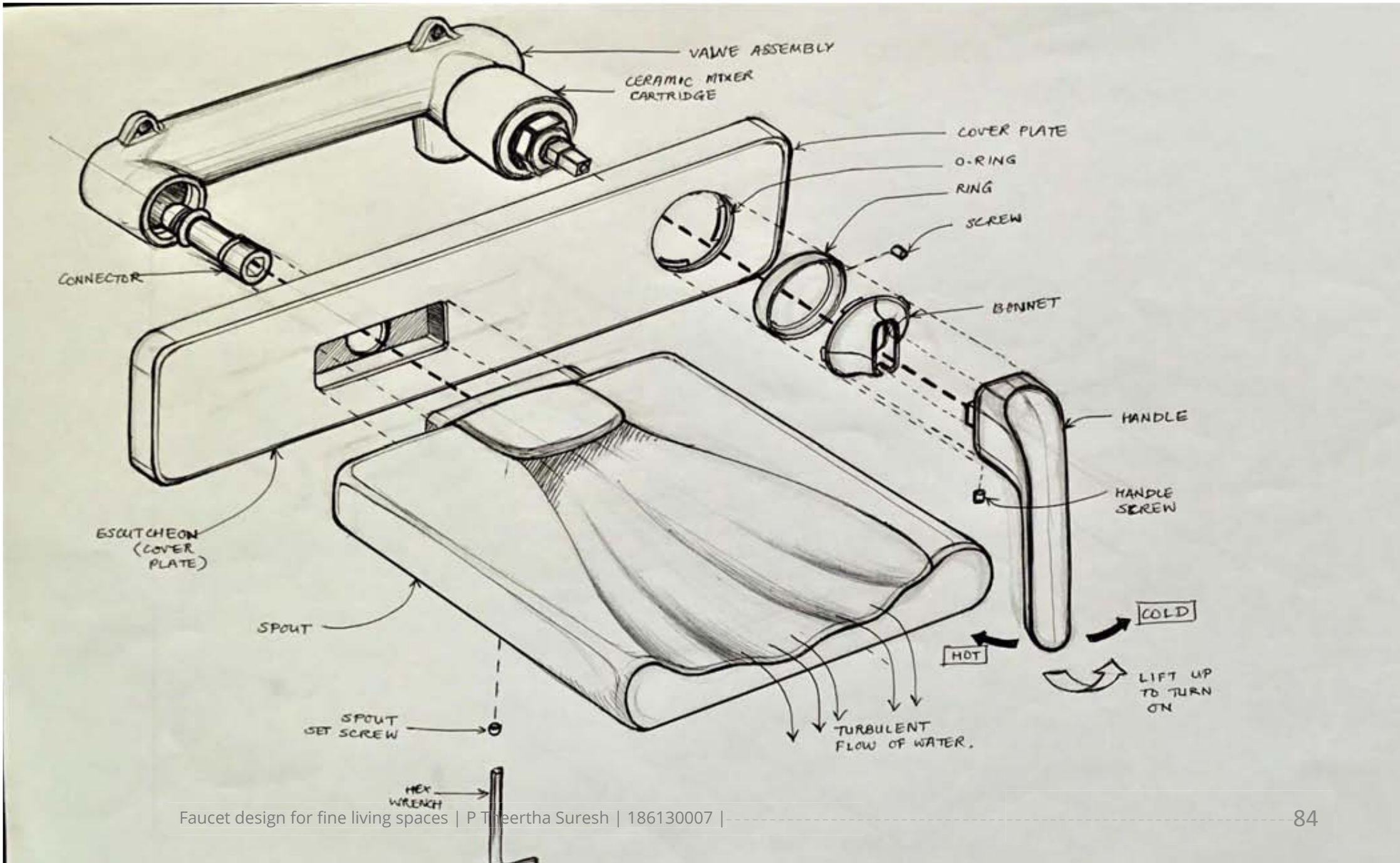
Renders of faucet designs in the range of Calming turbulence. The renders depict the various texture and form options in order to give a turbulent yet calm flow of water







Exploded view- Calming turbulence



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