IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Provision Of Strom Water Management System In Ichalkaranji City

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Abstract: The provision of a storm water management system in Ichalkaranji addresses critical challenges associated with urban flooding, water quality degradation, and environmental sustainability. This study examines the existing conditions and evaluates the potential benefits of implementing an effective storm water management framework in selected areas of the city. Through data collection, community engagement, and analysis of hydrological patterns, the research identifies key areas vulnerable to flooding and pollution. The proposed system includes a combination of green infrastructure solutions, such as permeable pavements, rain gardens, and retention basins, aimed at enhancing water absorption and reducing runoff. The findings highlight the importance of sustainable practices in urban planning, emphasizing the need for a collaborative approach involving local authorities and residents. Ultimately, the implementation of a storm water management system in Ichalkaranji is projected to improve flood resilience, enhance water quality, and contribute to the overall sustainability of the urban environment.

1. INTRODUCTION

The overall objective of storm water management is the control of rainwater to ensure minimum impacts with regards to flooding, erosion and the dispersal of pollutants within the urban environment and downstream. This management process encompasses the interaction between the amount of rainfall, the urban environment and orography, the existing infrastructure and the water bodies into which the water finally ends up. Storm water is directly linked with other parts of the urban water cycle good and poor management of one element can influence the successful management of another. The linkages between the different elements of the urban water cycle can cause negative impacts. However, these linkages can also be used to provide positive effects.

Integrated management ensures that interventions are designed to maximize multiple benefits in different parts of the cycle while minimizing negative impacts in others. Effective storm water management will produce benefits in the other parts of the urban water cycle and environment. The linkages within the water cycle are numerous, which makes integrated planning a complex business, so water administrations and entities must prepare for integrated urban water management. Examples of the links between stormwater management and other areas of the urban water cycle are

- Water supply: Stormwater can be reused directly for non-potable uses and can also be, after treatment, a potential source for supplementing urban water supply.
- Water treatment: Stormwater entering water supply sources, such as aquifers and reservoirs, influences the water quality of the source.

- Wastewater collection and treatment: Stormwater is mixed with wastewater in combined sewer networks, which increases the volume and cost of wastewater treatment. Heavy rainfall can produce overflows in the network, releasing untreated sewage into the environment.
- Furthermore, stormwater can negatively influence the operation of wastewater treatment plants, since it introduces new pollutants and produces important variations on inflow quantity.
- Water quality: Potential pollutants carried in urban stormwater runoff can cause environmental deterioration.

2. Groundwater recharge: The replacement of natural vegetation with impermeable surfaces reduces stormwater infiltration into aquifers.

METHODOLOGY

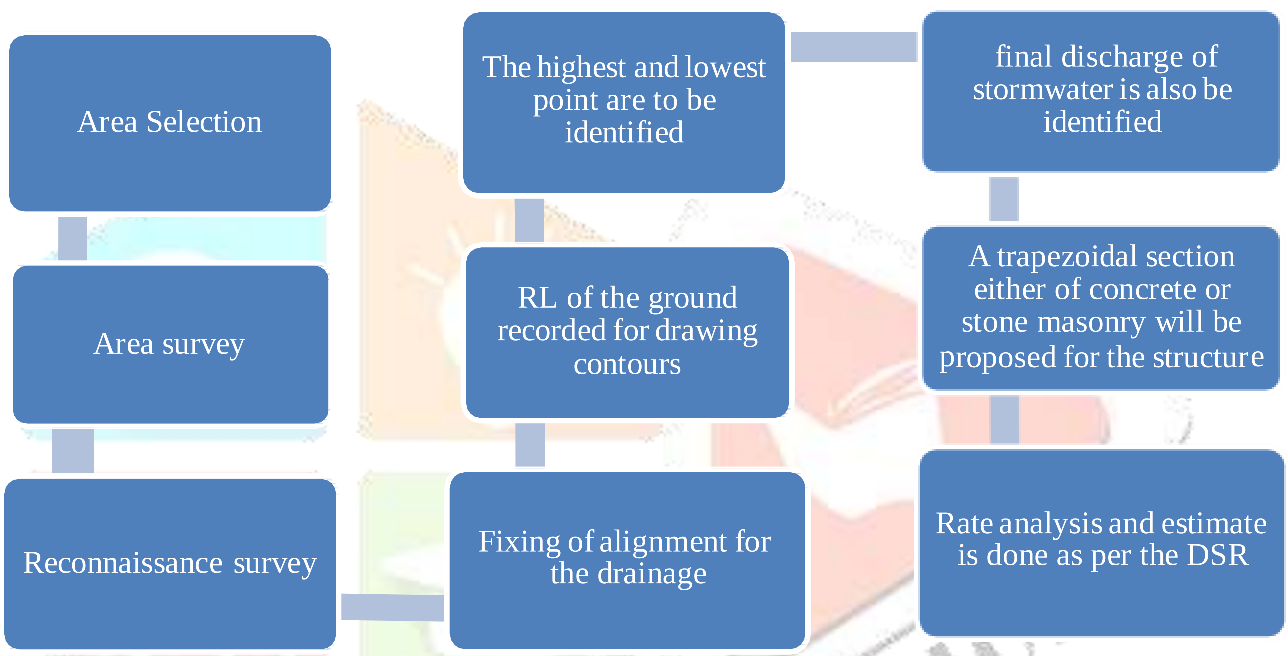


Fig.1Methodology

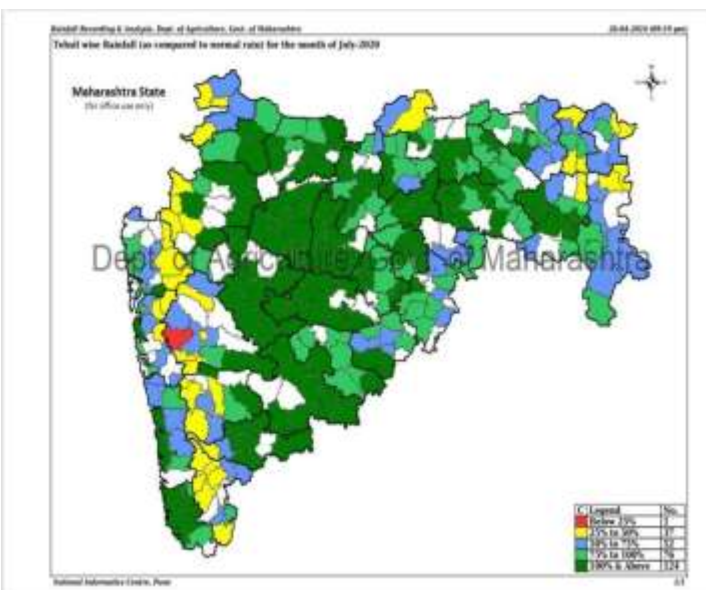
OBJECTIVES

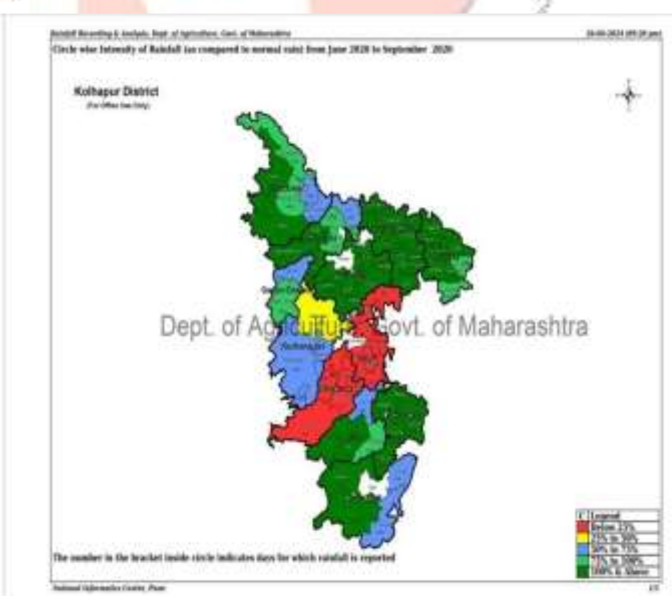
- Identifying the area north served by storm drain.
- Provision of Strom Water Drain Selected Area of Under Ichalkaranji. Municipal limits.
- During the profile and topography of the selected area.
- Location the profile for providing storm water drain.
- Hydraulic design of the proposed section of Strom water
- BOQ and total amount Estimation on per length basis.

Area selection

Data Collection

Area Selection – Ring Road Masatta Chowk Ichalkaranji. (416115)





Rainfall data

Sr	Distri	Taluka	Circle	Taluka Normal RainFall	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
May 20	Kolhapur	Hatkanangle	Ichalkaranji	52.1	2.3	0	0.3	0	0	0	0	0	0	0	5.8	0	7	0	-	0
June				117.5	4.8	5.5	6.3	13	12.5	5.5	0	0	0	0	0	0	17	0.5	1	5.5
July				173.9	47.8	6.8	0	0.3	1.8	1	6	9.8	1.5	17.8	0.3	0	0	0.8	0.5	9.3
Aug				129.1	27	0.5	4	6	46.3	78.8	14	3.5	4	2.5	11.5	2.5	1	6.8	7.3	32.3
Sept				16.6	0	0	8.8	2.3	0	0	33.8	0	0.3	0	0	5	4.3	0	0	0
Oct				8.1	0	0	3.3	1	0.3	8.3	0	0	0	0	15.8	5.3	11	3.3	87.5	5.8
Nov				27.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec				6.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May-21				52.1	0	0	0	11	0	0	0	0.8	0	0	0.8	0	0	0	0	11.3
June				117.5	1	6	10.3	20	0.5	1.8	0	0	0	0	4.3	1.3	0	0.3	2.3	17.5
July				173.9	0	0	0	0.8	0	0	0.3	0	12	7	0.3	2.3	4.3	2.5	3.5	1.5
Aug				129.1	2.8	0.5	2.3	8.3	4	5.3	1.5	2.3	0.3	0.5	0	1.8	3.5	2.5	4.5	0.8
Sept				116.6	0	2.8	0.3	0	3.5	1.5	7.3	8.3	3.3	2.3	2.5	2.8	3.5	9.3	0	0.3
Oct				8.1	10	5.3	4.8	1	8.3	0.5	6.8	28.8	0	4.8	34.5	0	0.3	0	0	0
Nov				98.1	10	5.3	4.8	1	8.3	0.5	6.8	28.8	0	4.8	34.5	0	0.3	0	0	0
Dec				27.1	0	0	0	0	0	0	0	0	0	0	0	0	0	7.3	1.3	0
May-22				52.1	0	0	0	0	0	0	0	0	0	0	0	2.8	3.8	6.3	0	0
June				17.5	2	0	10.3	0	0	1.8	0	0	2	0	0	1.5	11.5	0.8	0	0
July				173.9	4.8	6.8	2.3	0.5	17.3	25.8	5.8	3.3	8	12.3	2	12.5	6.5	19	6.3	4.5
Aug				129.1	0	3.8	0	25.3	1.8	3.3	10.8	26.3	39.5	10.3	2.8	12	2.3	1.3	3.3	6
Sept				116.6	47.8	0.8	0	0	0	1	8.3	1	22	6	8.5	13.8	6.3	2.3	1	0.3
Oct				98.1	10.8	0.3	0	0	0	0	54.5	0	0	0	52.8	16.8	33	3.5	7.3	12.5
Nov				27.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec				6.3	0	0	0	0	0	0	0	0	0	0	0	0.3	3.5	0	0	0
May-23				52.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June				17.5	0	0	0	0	12.5	0	0	0	0	0	0	0.3	0	0	0	0
July				173.9	9.8	7	6	3.3	0	4.8	10.8	4	2.8	2.3	0	0	0.3	6.3	7.3	0.8
Aug				129.1	2.5	0.3	0	1.5	1	1	3.3	0.3	0.8	0	0	0	0.5	0.8	0	0
Sept				116.6	0.5	4.5	0	10.8	0.8	0	0	0.8	7.8	1.5	0	0	0	1	0.5	0.3
Oct				98.1	10.8	10.5	0	0	2	0	0.3	0.3	0	0	0	0	0	0	0	0
Nov				27.1	0	0	0	0	0	0	0	1.5	17	0	0	0	0	0	0	0
Dec				6.3	1	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0

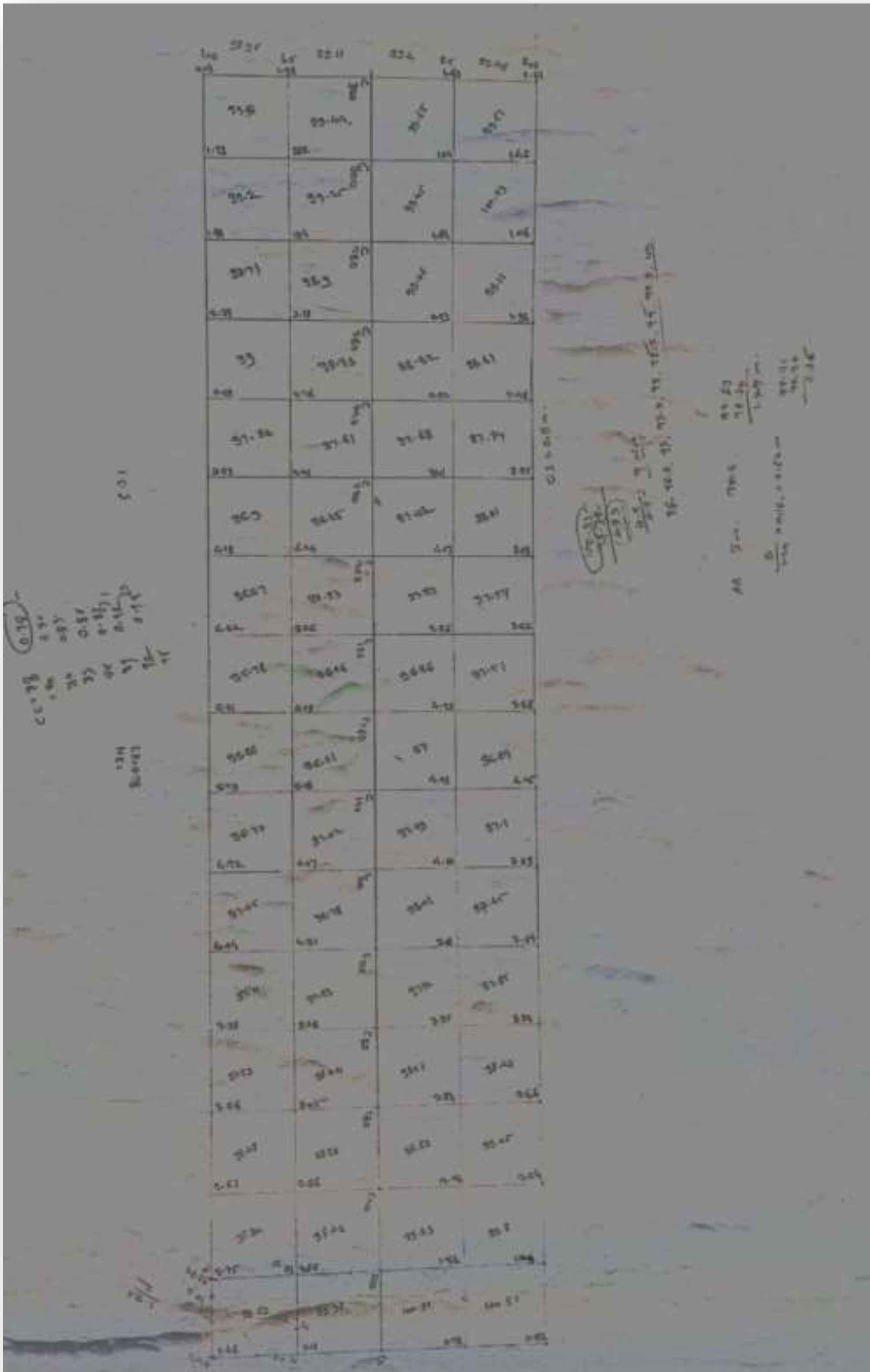
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total RainFa	%RainFal	Raing Day
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.4	33.7	2
23.5	18.8	5.5	0	0	0	0	0	0	13.3	2	0	0	18.3	-	153	148.4	13
10	2	3.8	0	5.3	0	0	0	0.3	0	0	0	0	0	14.3	139.4	118.7	10
24.5	11.5	2.3	1.8	3.5	1.5	2.8	8	1	0.3	0	0.3	1.8	3.8	0.5	311.6	321.6	18
0	0	3.5	6.5	23.5	1.5	8.3	1.5	2.5	2.3	1.3	0.3	0	0		105.7	84.4	8
0	1	0	2.8	33	0	0	0	9.5	0	5.5	0.3	7.3	0	0	201	202.2	13
0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0.3	1.8	0	0	5.5	0	38.5	0	0	0	0	0.5	3.8	0	96.3	210.7	6
76	11.5	24	9.5	0.5	0	0	0	1.8	0.3	0.3	0.5	3.8	0		193	187.2	10
2.5	4	15.8	3.5	12.8	47	58.5	107.3	0.5	4.5	0	3.5	0	2.8	3.5	300.3	255.7	15
1.3	1.3	1	0	0.3	0	0	0	0	0	0.8	3.8	0	0	0.5	49.3	50.8	7
0.5	0	0	0	0	7.3	3	1	0	0	2	4.5	2.8	3.8		72	57.5	13
0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	105	105.6	8
0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	105	105.6	8
13.5	6	4.8	1.3	4.8	0	0	11.3	0	0	0	0	0	0		50	211.9	6
0	0	0	48.8	21.8	0	0	0	0	0	0	0	0	0	0	83.5	182.7	5
0	0	0	0	0	0.3	0.5	28.5	0	3.5	0.3	3.3	0	0.8		67.1	65.1	5
5.5	0	0	0.3	0	0	0.5	1	2.3	2.3	6.5	12.8	0	3.3	2	174.2	148.4	17
2.5	2.5	0.5	1	2.5	1.8	2.3	1.3	0.3	0	0	9.5	0	3.8	0.3	177.1	182.8	13
0.5	0	0.3	0	0	0	0.3	0	0	0	0	0	0	3.5		123.7	98.7	8
5	5.5	23.8	17.8	4	30.8	0	0	0	0	0	0	0	0	0	278.4	280.1	14
0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.8	70.4	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0
0	0	0	0	0	0	0	1	1.3	0	2.5	5	0.3	5.5		28.4	27.5	3
3.8	5.3	19.8	13.3	16.5	16	25	16.3	8.3	15	19.5	16.8	1	0.5	1	243.6	207.5	22
0.8	1.5	1	1	0	0	0	0	3.8	9.8	0	1.8	0.3	0	0	32	33	3
0	1	9.8	0.8	1.5	0	1.8	1.3	0.5	0.3	8.3	0	2.3	6.5		62.6	50	6
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23.9	24	2
0	0	0	0	0	0	0	0	0	0	0	0	34.8	1.5		54.8	232.2	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	27.8	0

Area survey Block Contouring

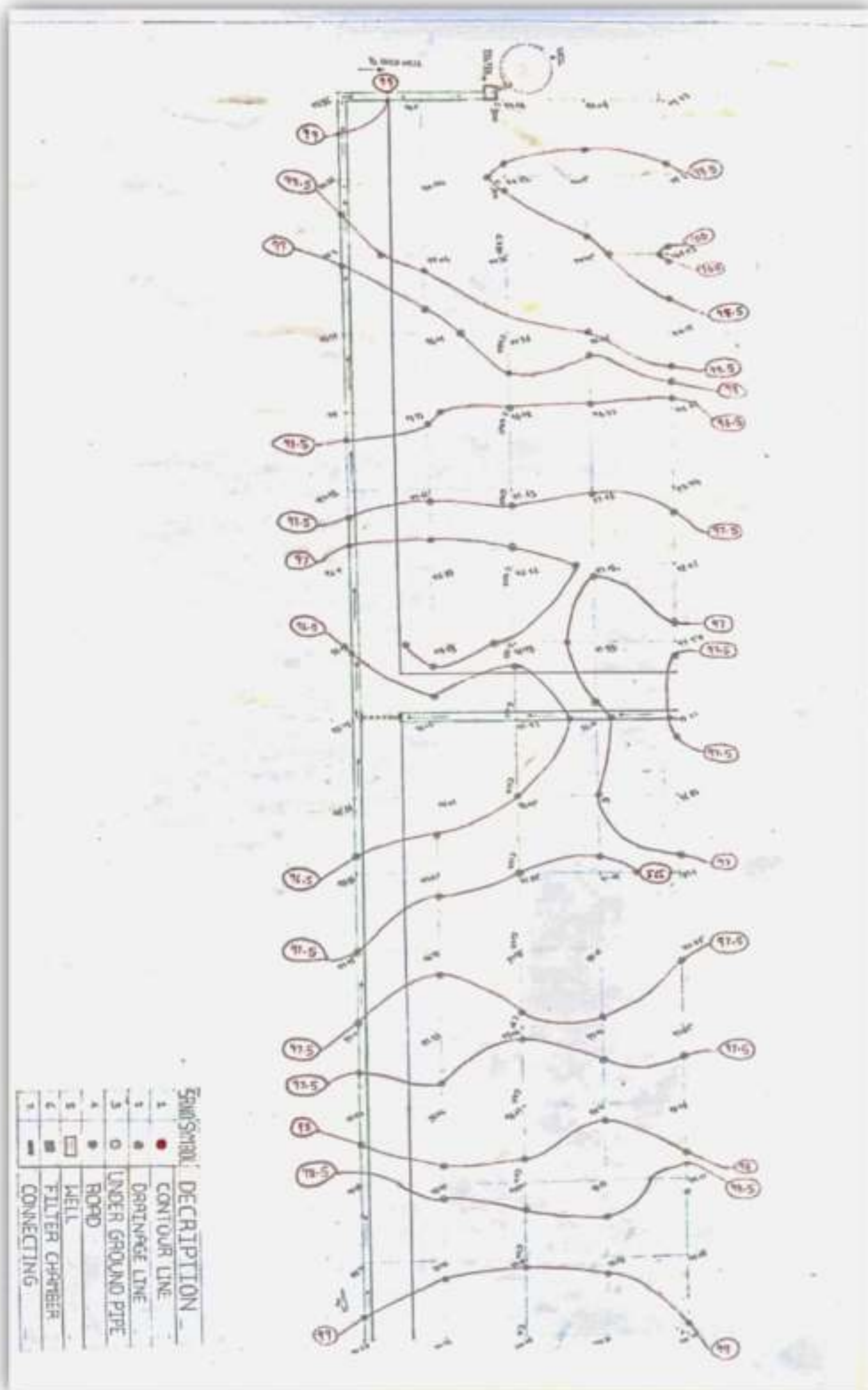
Distance			Bearing		Staff reading					
Left	Center	Right	Fore	Back	Back	Inter	Fore	H.I	Reduced Level	Remark
	C0		6.5	1.03				101.09	100	BM
L5						1.11			99.84	
L10						1.46			99.57	
		R5				0.78			100.25	
		R10				0.52			100.07	
	C20					2.21			98.82	
L5						2.66			98.37	
L10						2.75			98.28	
		R5				1.86			99.17	
		R10				1.29			99.74	
	C40					2.52			98.81	
L5						2.56			98.47	
L10						2.61			98.42	
		R5				2.26			98.77	
		R10					2.04		98.99	
Arithmetical										
Check EBS-EFS= Last RL - First RL = -1.01 = -1.01										
1	C60					3.02		101.02	98.01	
L5						3.05			97.98	
L10						3.56			56.47	
		R5				2.88			98.15	
		R10				2.66			98.37	
	C80					3.05			97.53	
L5						3.26			97.77	
L10						3.98			97.05	
		R5				3.35			97.68	
		R10				3.24			97.99	
	C100					3.66			97.37	
L5						4.31			96.72	
L10						4.04			96.63	
		R5					3.8		97.23	
Arithmetical										
Check EBS-EFS= Last RL - First RL = 2.04 - 3.08 = 97.23 - 98.99 = -1.76 = -1.76										
		R5			3.8			101.09	97.23	
		R10				3.64			97.39	
	C120					4.04			96.99	
L5						4.07			96.33	
L10						4.72			96.31	
		R5				4			97.03	
		R10				3.99			97.04	
	C140					5.04			95.99	
L5						5.08			95.96	
L10						5.23			95.08	
		R5				4.09			96.94	
		R10				4.25			96.78	
	C160					5.12			96.91	
L5						5.03			96	
L10							5.31		98.72	
Arithmetical										
Check EBS-EFS= Last RL - First RL = 3.08 - 5.31 = 95.72 - 97.23 = -1.51 = -1.58										
L10					5.31			101.03	98.72	
		R5				4.23			96.08	
		R10			3.58			100.22	96.64	
	C180					4.32			95.09	
L5						3.26			96.96	
L10						4.52			95.6	
		R5				3.56			96.66	
		R10				3.52			96.64	
	C200					4.17			96.05	
L5						4.24			95.98	
L10						4.19			96.03	
		R5				4.07			95.02	
		R10				3.08			96.42	
	C220					3.46			96.76	
L5							3.48		96.74	
Arithmetical										
Check EBS-EFS= Last RL - First RL = 8.89 - 7.87 = 96.74 - 98.72 = 1.02 = - 1.02										
L5					3.48			100.22	96.74	
L10						3.53			96.69	
		R5				3.41			96.81	
		R10				3.35			96.87	
	C240					2.61			97.61	
L5						2.76			97.46	
L10						2.09			97.32	
		R5				2.52			97.04	
		R10				2.48			97.74	
	C260					2.12			98.01	
L5						2.19			98.03	
L10.						2.38			97.84	
		R5				2.03			98.19	
		R10				1.98			98.24	
	C280						1.73		98.49	
Arithmetical										
Check EBS-EFS= Last RL - First RL = 3.48 - 1.73 = 98.49 - 96.47 = 1.75 = 1.75										
	C280				1.73			100.22	98.49	
L5						1.84			98.38	
L10						1.89			98.33	
		R5				1.64			98.48	
		R10				1.06			98.62	
	C300					1.37			98.65	
L5						1.65			98.57	
L10						1.73			98.49	
		R5				1.44			98.78	
		R10				1.42			98.08	
	C320					1.83			98.39	
L5						1.98			98.24	
L10						2.13			98.09	
		R5				1.69			98.53	
		R10					1.61		98.61	
Arithmetical										
Check EBS-EFS= Last RL - First RL = 1.73 - 1.61 = 98.61 - 98.29 = 0.12 = -0.12										

Preparing a block for passing a contour line We select 9 contour points
96, 96.5, 97, 97.5, 98, 98.5, 99, 99.5, 100
Create a square block 5x5 m. on site We select a scale 4:50
Create a square block on sheet 4x4 cm.

Drawing sheet 1



Drawing sheet 2




GPS Map Camera
Ichalkaranji, Maharashtra, India
MFPF+49M, Aasara Nagar, Rajwade, Ichalkaranji, Maharashtra 416121, India
Lat 16.685544°
Long 74.473368°
07/08/24 01:09 PM GMT +05:30
Google


Ichalkaranji, Maharashtra, India


GPS Map Camera
Ichalkaranji, Maharashtra, India
MFPC+494, Kagwade Mala, Ichalkaranji, Maharashtra 416115, India
Lat 16.685735°
Long 74.471229°
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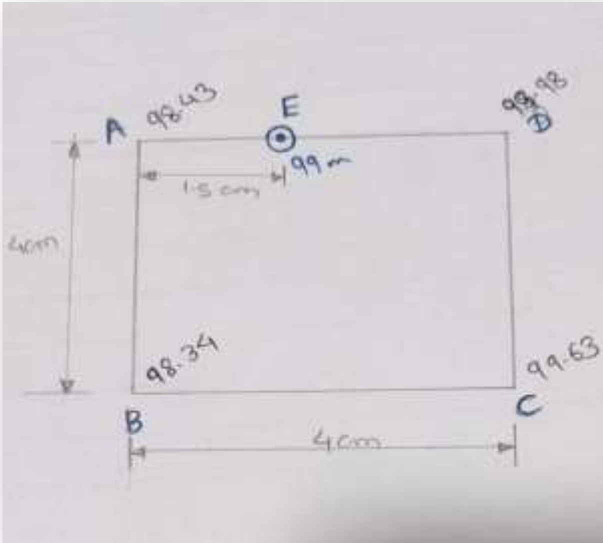
Google


Ichalkaranji, Maharashtra, India


Ichalkaranji, Maharashtra, India


GPS Map Camera
Ichalkaranji, Maharashtra, India
MFPC+494, Kagwade Mala, Ichalkaranji, Maharashtra 416115, India
Lat 16.685737°
Long 74.47126°
20/08/24 01:25 PM GMT +05:30
Google

Calculation of C.I



1) 99.98 – 98.43	**2) 96.63 – 98.34**
= 1.55 m.	**= 1.29 m.**
99 - 98.43	**99 - 98.34**
= 0.57 m.	**= 0.66 m.**
99 contour line	**99 contour line**
= 0.55/1.55 x 4	**= 0.66/1.29 x 4**
= 1.47 cm.	**= 2.05 cm.**
= 1.5 cm.	

Hydraulic Design Calculation

I = 0.6

Area = 1600 sqm

R = 25.14 (rain fall intensity)

1) □ = $\frac{AIR}{360}$

□ = $\frac{1600x0.6x25.14}{360}$

□ = 67.04 m^3

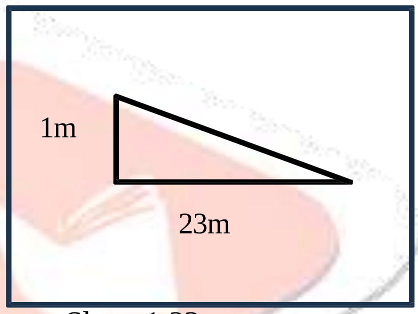
2) □ = □ □ □

67.04 x 1600 = V

□ = $\frac{67.04}{1600}$

V = 0.0419 say = 1:23m

Slope 1m vertical to 23m horizontal



Slope 1:23

3) □ = $\frac{Q}{V}$ so, V provide 1.7 m/s

= $\frac{67.04}{1.7}$

A = 37.67 m^3/sec so, assuming 50% = 33.52 m^3/sec

Assuming A = 13.40 sqm

So, provide 36m X 36m Square section.

Square Section Image

Ground Level & Cutting Filling

4. CONCLUSIONS

The implementation of an effective storm water management system in Ichalkaranji is crucial for mitigating flooding, enhancing water quality, and protecting local ecosystems. Based on the assessment of the selected area, several key points emerge:

1. **Reduction of Flood Risks**: A well-designed storm water management system can significantly reduce the risk of flooding during heavy rainfall, protecting infrastructure and minimizing economic losses.
2. **Improved Water Quality**: Implementing strategies such as green infrastructure and sediment control will help filter pollutants, leading to improved water quality in local water bodies.
3. **Community Resilience**: Engaging the local community in the planning and maintenance of the storm water system fosters a sense of ownership and responsibility, enhancing overall resilience to climate impacts.
4. **Sustainable Development**: Integrating storm water management into urban planning promotes sustainable development, balancing economic growth with environmental preservation.
5. **Cost-Effectiveness**: Investing in preventive storm water management measures can be more cost-effective than dealing with the aftermath of flooding and water quality issues.

5. ACKNOWLEDGEMENT

We would like to express our gratefulness and sincere gratitude to my guide Dr.V.K. Naik guiding us to accomplish this project work. It was our privilege and pleasure to work under his able guidance, we are indeed grateful to him for providing helpful suggestion, from time to time. Due to his constant encouragement and inspiration, we are able to present this project. We are thankful to our parents for their moral as well as financial support.

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