

別添資料-4

討議議事録(M/D)

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Water Supply Systems in Jomi District, Khatlon Region

Based on the several preliminary discussions between the Government of the Republic of Tajikistan (hereinafter referred to as "Tajikistan") and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Improvement of Water Supply Systems in Jomi District, Khatlon Region (hereinafter referred to as "the Project") to Tajikistan. The Team held a series of discussions with the officials of the Government of Tajikistan and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Dushanbe, February 10th, 2023

宇野 純子

Ms. UNO Junko

Leader

Preparatory Survey Team

Japan International Cooperation Agency

Japan

Usmon Gul Davlatzoda

Mr. DAVLATZODA Usmon Gul

Director General

State Unitary Enterprise "Khojagii Manziliu
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Republic of Tajikistan

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve water supply service in Jomi district through rehabilitation and expansion of water supply facilities, thereby contributing to the improvement of living environment and public health of the residents.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Improvement of Water Supply Systems in Jomi District, Khatlon Region”.

3. Project site

Both sides confirmed that the site of the Project is Jomi district, which is shown in **Annex 1**.

4. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

- 4-1. Khojagii Manziliyu-Kommunali (hereinafter referred to as “KMK”) will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). Jomi Tajik Obi Dehod (hereinafter referred to as “JomiTOD”) will be the implementing agency for the Project (hereinafter referred to as “the Implementing Agency”), in which they will execute operation and maintenance of the facility made by the Project after completion. The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization charts are shown in **Annex 2**.

- 4-2. The KMK will also act as the responsible agency for supervising JomiTOD on behalf of the Government of Tajikistan, and allocate necessary budget to JomiTOD for operation and maintenance of the facility made by the Project.

5. Items requested by the Government of Tajikistan

- 5-1. As a result of discussions, both sides confirmed that the items requested by the Government of Tajikistan are as follows:

(1) Facilities

- Rehabilitation of existing wells (85m³/hr × 5 wells)
- Rehabilitation of water transmission pipe (3km)
- Construction of an elevated tank (2,100m³ capacity × 20m height)
- Rehabilitation and expansion of water distribution pipe (174km)
- Construction of service connections up to the customer meters installation of customer meters (11,200 nos.)

(2) Equipment

- Customer meter & relevant equipment
- Maintenance equipment & tools

(3) Soft (Non-physical) components

- Training for the staff of JomiTOD for proper operation and maintenance of the facilities and management of volumetric tariff system

5-2. JICA will assess the feasibility of the above requested items through the survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

5-3. The Government of Tajikistan shall submit an official request to the Government of Japan through a diplomatic channel by the end of July, 2023, before the appraisal of the Project.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Tajikistan side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as “the Grant”) as described in **Annex 3** shall be applied to the Project. As for the monitoring of the implementation of the Project, JICA requires the Tajikistan side to submit the Project Monitoring Report, the form of which is attached as **Annex 4**.

6-2. The Tajikistan side agreed to take the necessary measures, as described in **Annex 5**, for smooth implementation of the Project. The contents of the **Annex 5** will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report. The contents of **Annex 5** will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

- 7-1. The Team will proceed with further survey in Tajikistan until Mid-March, 2023.
- 7-2. JICA will prepare a draft Preparatory Survey Report in Russian and dispatch a mission to Tajikistan in order to explain its contents around end of August, 2023
- 7-3. If the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Tajikistan side, JICA will finalize the Preparatory Survey Report and send it to Tajikistan around December, 2023
- 7-4. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

- 8-1. The Tajikistan side confirmed to give due environmental and social considerations during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (January, 2022).
- 8-2. The Project is categorized as “B” from the following considerations: The project is not located in a sensitive area, nor has sensitive characteristics, nor falls into sensitive sectors under the JICA guidelines for environmental and social considerations (January, 2022), and its potential adverse impacts on the environment are not likely to be significant.
- 8-3. The Executing Agency and the Team confirmed that the EIA report shall be approved by Committee of Environmental Protection (CEP) by August, 2023 before JICA dispatches a mission for the explanation of draft Preparatory Survey Report.
- 8-4. In case there is a need of land acquisition for the construction of new wells as a result of the survey, the Tajikistan side confirmed that such land acquisition shall be implemented in accordance with the necessary laws and regulations of the Government of Tajikistan.

9. Other Relevant Issues

9-1. JICA Global Agenda/ Strategies for Global Development Issues

JICA, with its partners, aims to show global impacts realizing the goals set under JICA’s cooperation strategies for global issues, Global Agenda. JICA Global Agenda and its goals will be shared among partner countries and various actors, enhancing dialogue and collaboration, therefore, maximizing the development impacts. Through these efforts, JICA will comprehensively contribute to the achievement of the SDGs by 2030 as well as realize Japan's Development Cooperation Charter which focus on “human security,”

“quality growth,” and “addressing global challenges”.

Under one of the Global Agenda, “Sustainable Water Resources Management and Water Supply”, JICA proposes an approach of “Supporting the Growth of Water Utilities”. Water supply services in developing countries are suffering from a negative chain of factors, such as low level of service, people's dissatisfaction with the service, lack of trust in the water utilities, inefficient business operations, and insufficient funds, resulting in a vicious cycle. JICA will put the water supply service on a growth trajectory by shifting to a virtuous cycle of improving services, increasing operational efficiency, expanding tariff revenue, and securing investment. The first starting point of growth is "to expand the tariff revenue base and improve services by expanding and upgrading water supply facilities". The second starting point for growth is "to reduce non-revenue water that cannot be billed for, such as leaked or stolen water". Creating a growth spiral in this way, JICA will aim to improve water supply services in more than 40 cities in the next 10 years.

The Tajikistan side and JICA agreed to implement this project based on JICA’s strategies for global development issues and its virtuous cycle scenario as attached in **Annex 6**.

9-2. Introducing volumetric water tariff system

The project aims to introduce volumetric water tariff system by installation of individual customer meters in the target areas. Based on the results of the technical cooperation project "Strengthening the Water Service Management of Pyanj and Khamadoni Vodokanals" (2017-2021), reducing water wasting is possible by introduction of volumetric tariff system and further to realise a safe and stable water supply service through maximizing the water source capacity of existing wells by construction of an elevated tank and efficient water use by reducing water wasting.

Therefore, both sides agreed to implement explanation to residents about improvement of water services, benefits of volumetric tariff system and consideration of ways to promoting household connection through undertakings by the Government of Tajikistan and/or supporting with soft components.

9-3. Planning for water source

The project plans to rehabilitate and utilize five existing wells. During the survey, well cleaning and pumping tests will be conducted to confirm the capacity of the existing wells. Both sides agreed that if the existing wells cannot be utilized, possibility of construction of a new well will be discussed.

9-4. Considering priority of water supply areas and distribution pipe laying

The project envisages the construction of a water distribution pipe (approximately 177 km) for four water supply areas, but depending on the results of the cost estimation and other factors, there is a possibility of making scope cuts in the extension of the water distribution pipe network due to project cost constraints. Both sides agreed to consider priority among water supply areas as well as among laying water distribution pipes within the water supply areas, in order to prepare the case that scoping cuts is necessary.

9-5. Construction of service connections

In order to ensure the reliable and rapid achievement of the project's effect, both sides agreed that it would be considered in the Japanese side to cover construction of service connections up to installation of customer meters under the Japanese Grant, as well as procurement of the equipment necessary for individual service connections, i.e. customer meters and service pipes to households.

The Tajikistan side agreed that all construction works from the meters to each household should be completed within three years after the completion of the works by the Japanese side, and that the necessary costs and works should be borne by the Tajikistan side. The implementation system, realistic construction schedule, necessary costs, fee arrangement paid by the residents for the connection, ownership of service pipes and customer meters, person responsible for management, person responsible for construction work, etc. will be discussed and confirmed by both sides during the survey.

9-6. Climate Change

Both sides confirmed that the Project will contribute as adaptation measures of climate change.

9-7. Gender and Disability Mainstreaming

Both sides confirmed that following gender and disability elements shall be duly reflected in the scope of Preparatory Survey and the Project. Examination of gender-responsive and disability-responsive measures based on the assessment, such as:

- ✓ Collecting data from both men and women, disabled and undisable in case of the survey.
- ✓ Facility design that reflects gender/disability-specific needs.
- ✓ Selection of equipment that reflects gender/disability-specific needs and ensure usability by women.
- ✓ Implementation of soft-component activities that promote women and disabled person's empowerment.

9-8. Tax Exemption

Although general undertakings of both sides are shown in **Annex 5**, the Japanese side emphasized the responsibilities of the Tajikistan side to execute following matters and the Tajikistan side agreed to it.

Both sides confirmed that import tax, customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services will be exempted. The Tajikistan side also confirmed that KMK performs the key administrative role and take necessary measures without delay.

The Tajikistan side agreed to fully cooperate with the survey team to conduct the survey on the latest flow of procedures for tax exemptions.

9-9. Necessary Cooperation for the Survey by the Tajikistan side

The Tajikistan side agreed to facilitate the Survey by following activities:

- (1) To provide the Team with available relevant data, information, and take any measures deemed necessary to secure the safety of the members of the Team,
- (2) To issue identification cards and transit permits for each Team member,
- (3) To assign counterpart (C/P) to the Team and to play the following roles:
 - ✓ to fix the appointments and set up the meetings with the related organizations to which the Team intends to visit,
 - ✓ to attend the site survey and any other visits with the Team and to facilitate any convenience on accommodation, working room, adequate transportation and getting the permissions if required, etc., and
 - ✓ to assist and advise the Team for the collection of data and information.

The counterpart's team (the C/P Team) shall be formulated including the member of KMK and JomiTOD.

- (4) To secure the permission for the Team, to take photographs and enter into private properties and restricted areas for proper execution of the Survey, if necessary,
- (5) To provide the Team with available relevant data, information and materials necessary (including other development partners and government publications) for the execution of the Survey,
- (6) To answer the Questionnaire presented by the Team,
- (7) To make arrangements to allow the Team, to conduct the Survey for Environmental and Social Considerations,
- (8) To make arrangements to allow the Team, to bring back to Japan any necessary data, maps and materials related to the Survey, subject to approval by the Tajikistan side, in order to analyze the Project and prepare the reports,

- (9) To make arrangements of water trucks during the pumping test of the existing wells, regarding the possibility of temporary suspension of water supply service,
- (10) To handle complaints from third parties arising from the Survey of the Team,
- (11) To provide the Team with an office space with necessary utilities such as furniture, electricity, water supply, internet connection, during the survey period,
- (12) To support in obtaining other privileges and benefits, if necessary.

Annex 1: Project Site

Annex 2: Organization Chart

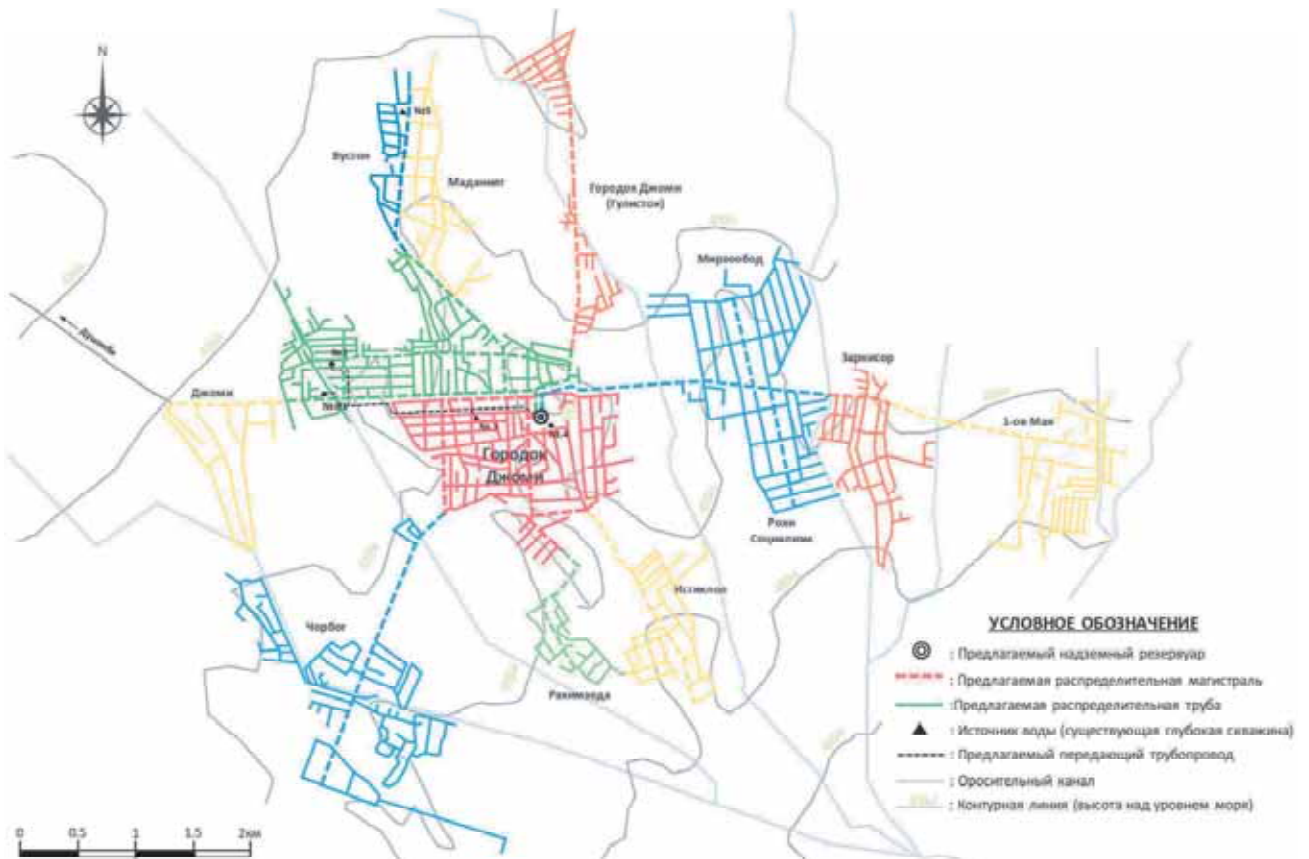
Annex 3: Japanese Grant

Annex 4: Project Monitoring Report (template)

Annex 5: Major Undertakings to be taken by the Government of Tajikistan

Annex 6: JICA's Local Scenario for Water Sector in Tajikistan

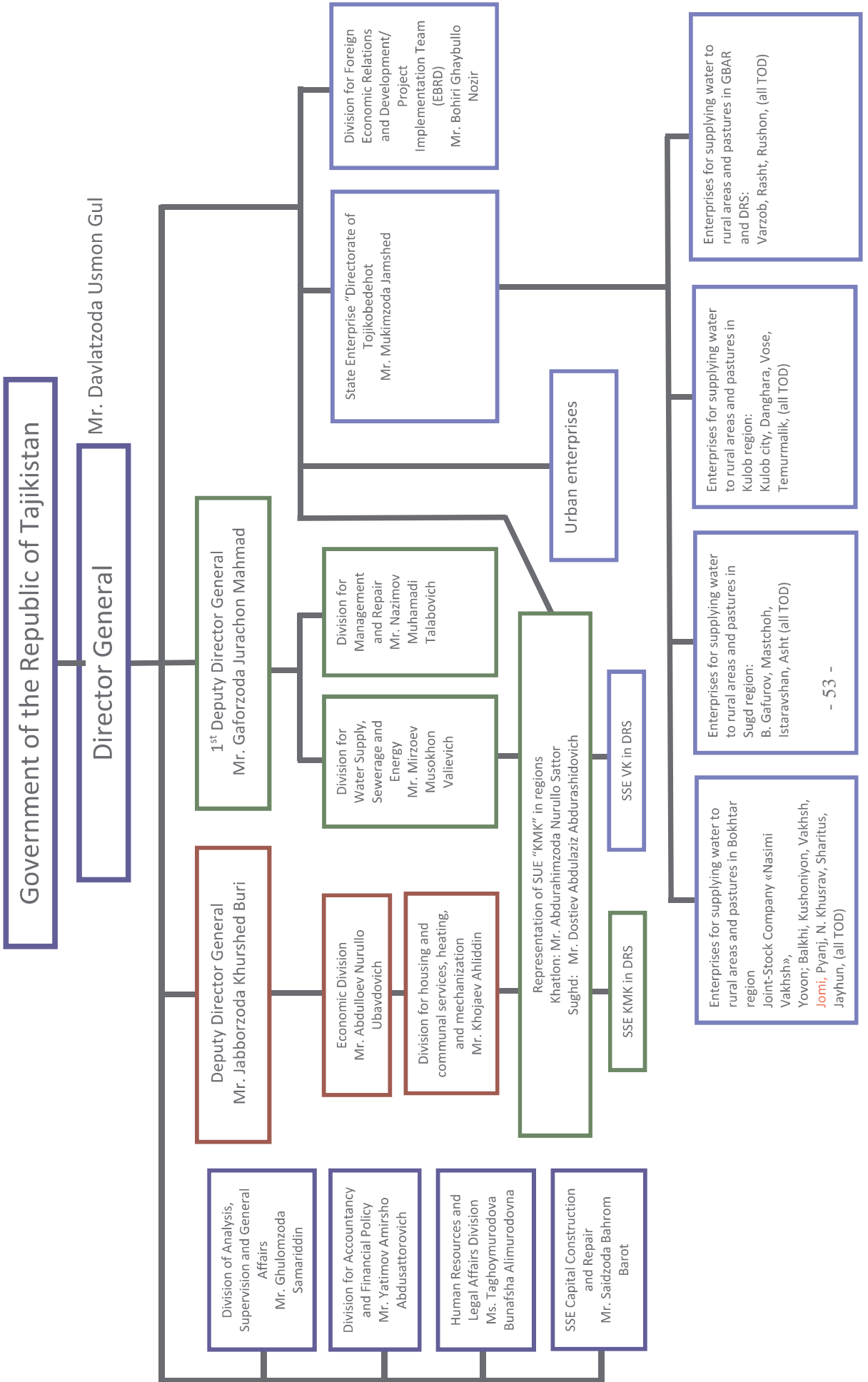
Project Site



General Plan of Proposed Water Supply Facilities

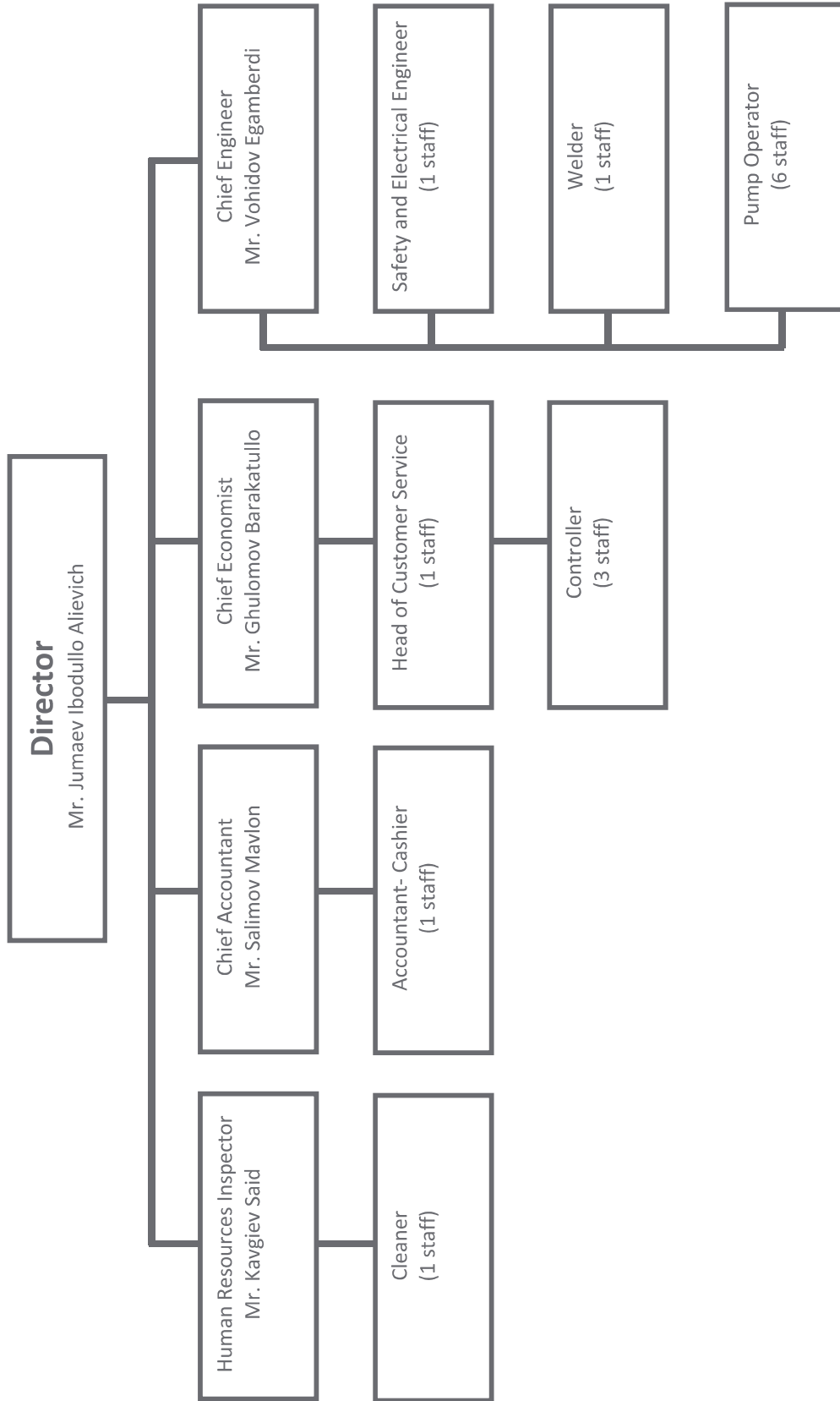
ORGANIZATION CHART

STATE UNITARY ENTERPRISE “KHOJAGII MANZILIYU KOMMUNALI”



ORGANIZATION CHART

JOMI TOD



JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as “the E/N”) will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the “General Terms and Conditions for Japanese Grant (January 2016).”

2) Banking Arrangements (B/A) (See “Financial Flow of Japanese Grant (A/P Type)” for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA’s procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project’s implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the “Meeting”) will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Measures to ensure more efficient implementation of the Grant

- i) In the event that the E/N and the G/A concerning a project cannot be signed by the end of the following Japanese fiscal year of the cabinet decision concerned by the GOJ, the authorities concerned of the two Governments will discuss the cancellation of the project.

ii) In the event that the period, specified in the G/A, during which the grant is available expires before the completion of the disbursement, the authorities concerned of the GO J will thoroughly review the status, situation and perspective of the implementation of the project concerned before extending the said period. The authorities concerned of the two Governments will discuss the termination of the project including a refund, unless there are concrete prospects for its completion.

iii) Regardless of the period mentioned in ii) above, the authorities concerned of the two Governments will, in the event that five years have passed since the cabinet decision concerned by the GOJ before the completion of the disbursement, except as otherwise confirmed between them, discuss the termination of a project including a refund, unless there are concrete prospects for its completion.

4) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

5) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

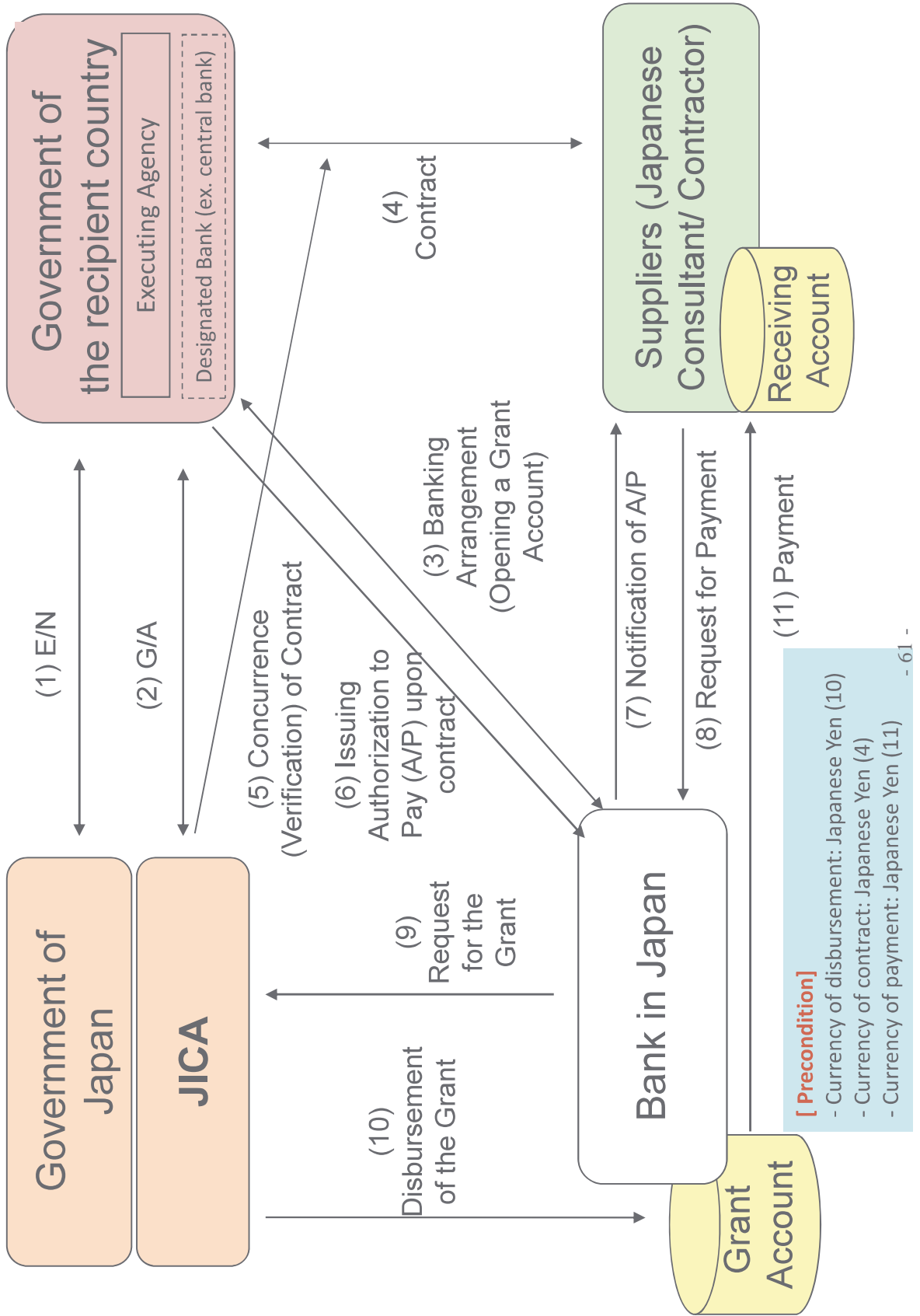
PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
4. Ex-post monitoring & evaluation	(14) Completion certificate		x			x	x	
	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

Financial Flow of Japanese Grant (A/P Type)



<p><u>Project Monitoring Report</u> on <u>Project Name</u> <u>Grant Agreement No. XXXXXXXX</u> 20XX, Month</p>
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Organizational Information

Signer of the G/A (Recipient)	_____ Person in Charge (Designation) _____ Contacts _____ Address: _____ Phone/ FAX: _____ Email: _____
Executing Agency	_____ Person in Charge (Designation) _____ Contacts _____ Address: _____ Phone/ FAX: _____ Email: _____
Line Ministry	_____ Person in Charge (Designation) _____ Contacts _____ Address: _____ Phone/ FAX: _____ Email: _____

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description	
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1-1 Project Objective

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1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/ regional/ sectoral policies and strategies)
- Situation of the target groups to which the project addresses

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1-3 Indicators for measurement of “Effectiveness”

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original <i>(proposed in the outline design)</i>	Actual
1.		

2-2 Scope of the work

Components	Original* <i>(proposed in the outline design)</i>	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	<i>(proposed in the outline design)</i>	<i>(at the time of signing the Grant Agreement)</i>	

Reasons for any changes of the schedule, and their effects on the project (if any)

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2-4 Obligations by the Recipient**2-4-1 Progress of Specific Obligations**

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost**2-5-1 Cost borne by the Grant(Confidential until the Bidding)**

Components			Cost (Million Yen)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original ^(1,2) <i>(proposed in the outline design)</i>	Actual
	1.			
Total				

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original ^(1,2) <i>(proposed in the outline design)</i>	Actual
	1.			

- Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

Actual (PMR)

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original (at the time of outline design)

Actual (PMR)

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)

Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/ Moderate/ Low
	Impact: High/ Moderate/ Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/ Moderate/ Low
	Impact: High/ Moderate/ Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/ Moderate/ Low
	Impact: High/ Moderate/ Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

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5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

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5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/ department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

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Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
 - Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
8. Pictures (by JPEG style by CD-R) (PMR (final) only)
9. Equipment List (PMR (final) only)
10. Drawing (PMR (final) only)
11. Report on RD (After project)
12. Report on the Management of Safety for Construction Works

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
					Price (Decreased) E=C-D	Price (Increased) F=C+D
1 Item 1	●●t	●	●		●	●
2 Item 2	●●t	●	●			
3 Item 3						
4 Item 4						
5 Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials	1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
1 Item 1	●	●	●			
2 Item 2						
3 Item 3						
4 Item 4						
5 Item 5						

(3) Summary of Discussion with Contractor (if necessary)

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-
-

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Report on the Management of Safety for Construction Works

Month/Year 2022 年×月	Cumulative number of labor 労働延人数	Cumulative number of public accident 公衆災害件数	Cumulative hours worked 延べ実労働時間数	Number of deaths and injuries due to industrial accidents 労働災害による死傷者			Frequency rate 度数率	Severity rate 強度率
				Death and injuries 死傷者数	Aggregated number of calendar days absent 延べ休業日数	Aggregated number of work-days lost 延べ労働損失日数		
This Month 当月				Death 死者				
				More than 4 calendar days absent 休業4日以上				
				1 to 3 calendar days absent 休業1～3日				
				Total 計				
Total including this month 当月迄累計				Death 死者				
				More than 4 calendar days absent 休業4日以上				
				1 to 3 calendar days absent 休業1～3日				
				Total 計				
Note 注)				<p>1. Frequency rate is the frequency of occurrence of industrial accidents. 度数率 = (Number of deaths and injuries due to industrial accidents ÷ Cumulative hours worked) × 1,000,000 度数率 = (労働災害による死傷者数 ÷ 延べ実労働時間数) × 100 万時間</p> <p>2. Severity rate is degree of seriousness of the industrial accident. Severity rate = (Aggregated number of work-days lost ÷ Cumulative hours worked) × 1,000 強度率 = (延べ労働損失日数 ÷ 延べ実労働時間数) 1000 時間</p> <p>3. Aggregated number of work-days lost = Aggregated number of calendar days absent × (300 ÷ 365) Death (7,500 days) : death as a result of an industrial accident includes not only instantaneous death but also death as a result of occupational injury or disease. 延べ労働損失日数 = 延べ休業日数 × (300 ÷ 365) ・ ・ ・ 死亡 7500 日 (即死のほか、負傷が原因で死亡したものを含む)</p> <p>4. Frequency rate and severity rate are rounding off the third decimal place. 度数率・強度率は小数点第3位以下四捨五入</p>				

Annex 5

Major Undertakings to be taken by the Government of Tajikistan (draft)

1. Specific obligations of the Government of Tajikistan which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	KMK/NBT		
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	KMK/NBT		
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A		KMK/MOF		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KMK/MOF		
	2) Payment commission for A/P	every payment	KMK/MOF		
4	To approve EIA	August, 2023	KMK/CEP		
5	To secure the necessary budget for implementation of Environmental Management Plan (EMP) and Environmental Monitoring Programme (EMoP) and for fulfilling the conditions.	within 1 month after the signing of the G/A	KMK/MOF/CLMG		
6	To secure the necessary budget and implement land acquisition	before notice of the bidding documents	KMK		
7	To secure and clear the following lands 1) Site for rehabilitation of existing water wells 2) Site for construction of new water wells, if necessary 3) Site for rehabilitation of water transmission pipe 4) Site for construction of an elevated tank 5) Site for rehabilitation and expansion of water distribution pipe 6) temporary construction yard and stock yard near the Project area 7) borrow pit and disposal site near the Project area	before notice of the bidding documents	KMK		
8	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	until land acquisition and resettlement complete	KMK		
9	To obtain the planning, zoning, building permit	before notice of the bidding documents	KMK		
10	To demolish and remove the existing facilities and utilities that situate in the project site. To clear, level and reclaim the project site.	before notice of the bidding documents	KMK		
11	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	KMK		
12	To notify and explain about the implementation of the meter-rate-system to target water supply users.	Before the start of the Project	KMK/Jomi TOD		

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

KMK: Khojagii Manziliyu-Kommunali

NBK: National Bank of Tajikistan

CEP: Committee on Environmental Protection under the Government of Tajikistan

MOF: Ministry of Finance
 SCLMG: State Committee on Land Management and Geodesy
 MOFA: Ministry of Foreign Affairs
 MIA: Ministry of Internal Affairs
 TC: Tax Committee

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	within 1 month after the signing of the contract(s)	KMK/ NBT		
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A		KMK/ MOF		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KMK/ MOF		
	2) Payment commission for A/P	every payment	KMK/ MOF		
3	To ensure prompt customs clearance and to assist the Supplier(s) with internal transportation in the country of the Recipient	during the Project	KMK		
4	To organize necessary personnel for the implementation of the meter-rate-system.	Before start of the Project	KMK		
5	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	KMK/ MOFA/ MIA		
6	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted.	during the Project	KMK/ MOF/ TC		
7	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	KMK		
8	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.	during the construction	KMK		
9	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	KMK		
	2) To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	KMK		
10	To submit a notice concerning completion of the Project	within 6 months after completion of the Project	KMK		
11	To construct access roads				
	1) Outside the site	3 months before completion of the construction	KMK		
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)		KMK		
	1) Electricity The distributing line to the site	before start of the construction	KMK		

	2) Water Supply The city water distribution main to the site	before start of the construction	KMK		
	3) Drainage The city drainage main (for storm, sewer and others) to the site	6 months before completion of the construction	KMK		
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s) General furniture and equipment for the operation room.	before start of the construction	KMK		
14	To ensure the safety of persons engaged in the implementation of the Project	during the Project	KMK		
15	To take necessary measures for security and safety of the Project site (measures for security) 1)Security facilities (security fence, security gate, lighting system, CCTV camera, security guard accommodation etc) 2)Deployment of security guard at the Project site 3)Proper gate control of the Project site 4)Deployment of police/armed guard at the Project site 5)Security escort for the persons related to the Project when commuting to the Project site (measures for safety) 6) maintaining the safety of workers and the general public by thorough implementation of safety measures and immediate action in the case of accident 7) traffic control around the site(s) and on transportation routes of construction materials 8)installation of fences around the site(s)	during the construction	KMK		
16	To implement EMP and EMoP	during the construction	KMK		
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the construction	KMK		
18	To implement RAP (livelihood restoration program)	for a period based on livelihood restoration program	KMK		
19	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between KMK and JICA.	- until the end of livelihood restoration program (In case that livelihood restoration program is provided) - for 2 years after land acquisition and resettlement complete (In case that livelihood restoration program is not provided)	KMK		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	KMK/ CEP		
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between KMK and JICA.	for 3 years after the Project	KMK/ CEP		
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	KMK/ MOF		

2. Other obligations of the Government of Tajikistan funded with the Grant

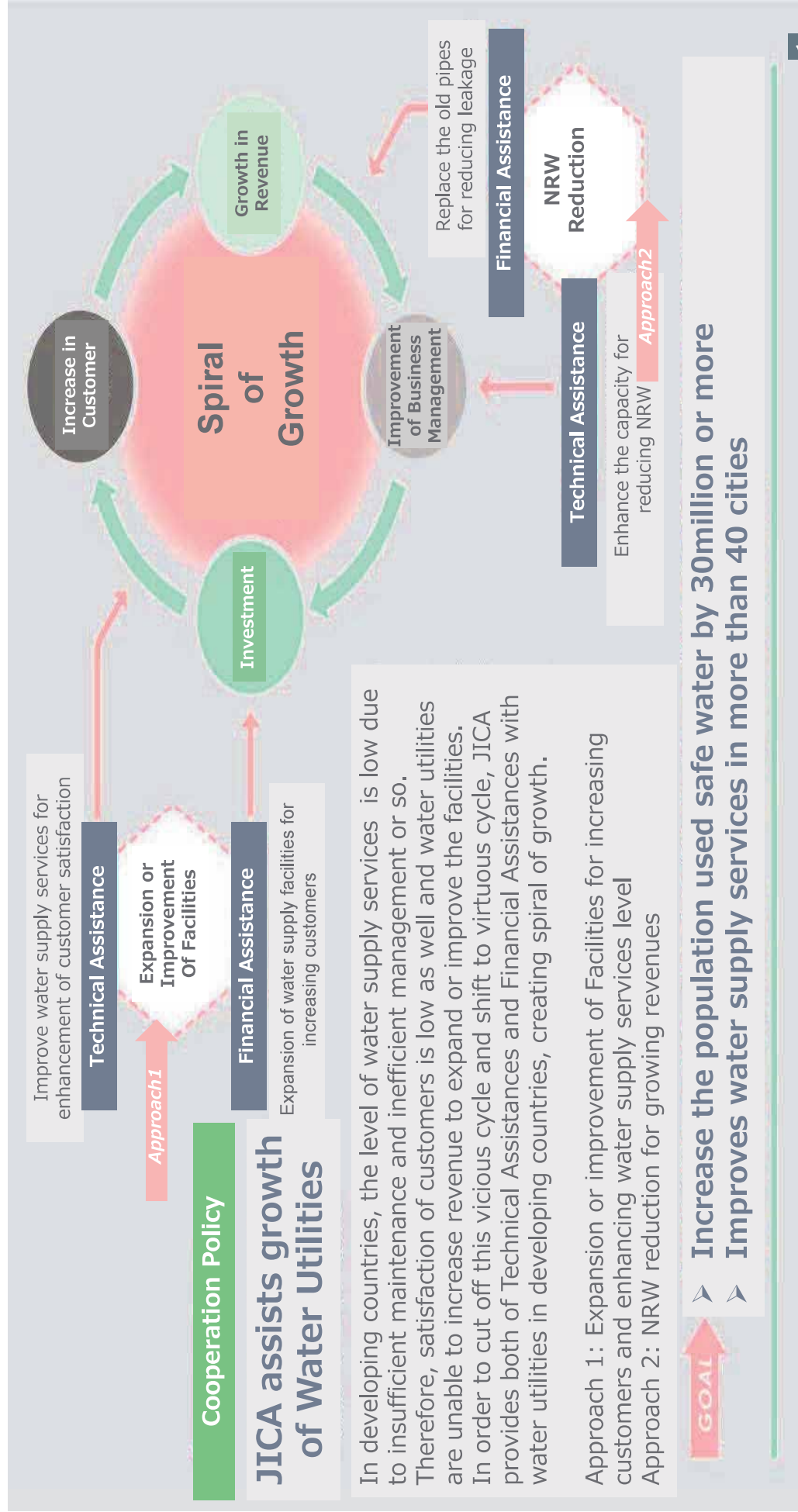
NO	Items	Deadline	Amount (Million Japanese Yen)*
1	(1) To construct facilities; <ul style="list-style-type: none"> - Rehabilitation of existing wells (85m³/hr×5 wells) - Rehabilitation of water transmission pipe (3km) - Construction of an elevated tank (2,100m³ capacity×20m height) - Rehabilitation and expansion of water distribution pipe (174km) - Construction of service connections until installation of customer meters (11,200 nos.) (2) To procure equipment; <ul style="list-style-type: none"> - Customer meter & relevant equipment - Maintenance equipment & tools 	During the Project	/
2	To implement detailed design, bidding support and construction supervision (Consulting Service)		
3	Contingencies		
	Total		XXX

*The Amount is provisional. This is subject to the approval of the Government of Japan.

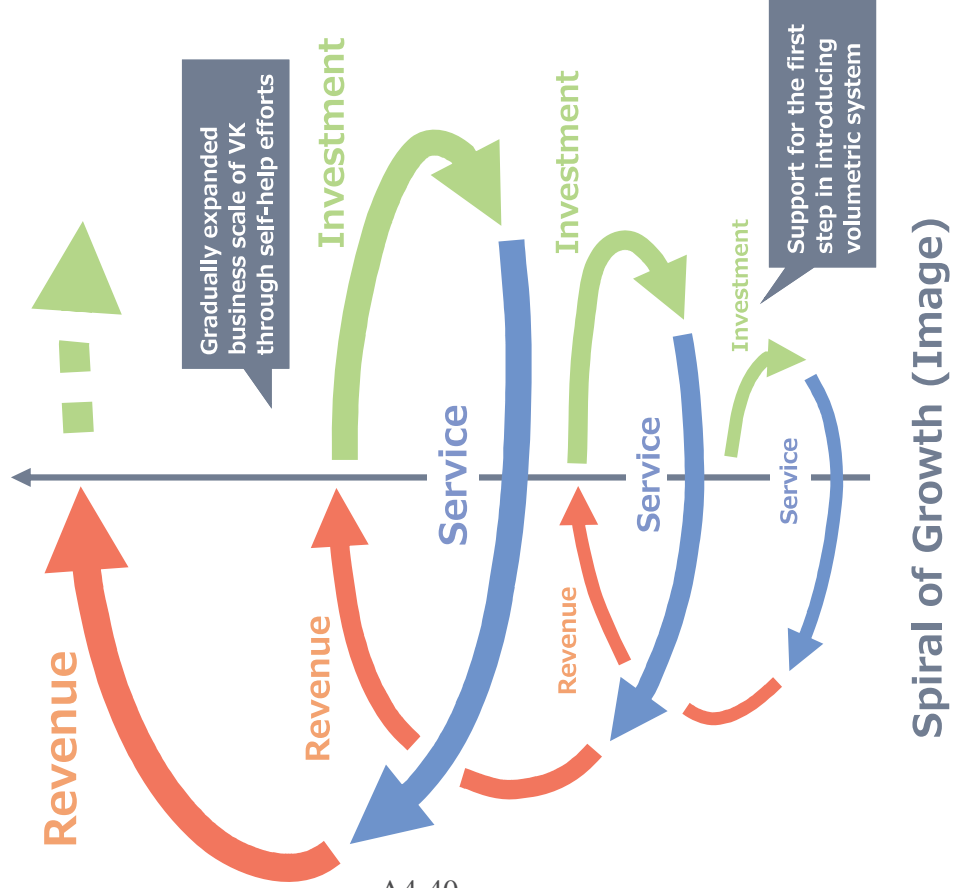
以上

JICA's Cooperation Policy for the Growth of Water Utilities

Annex 6

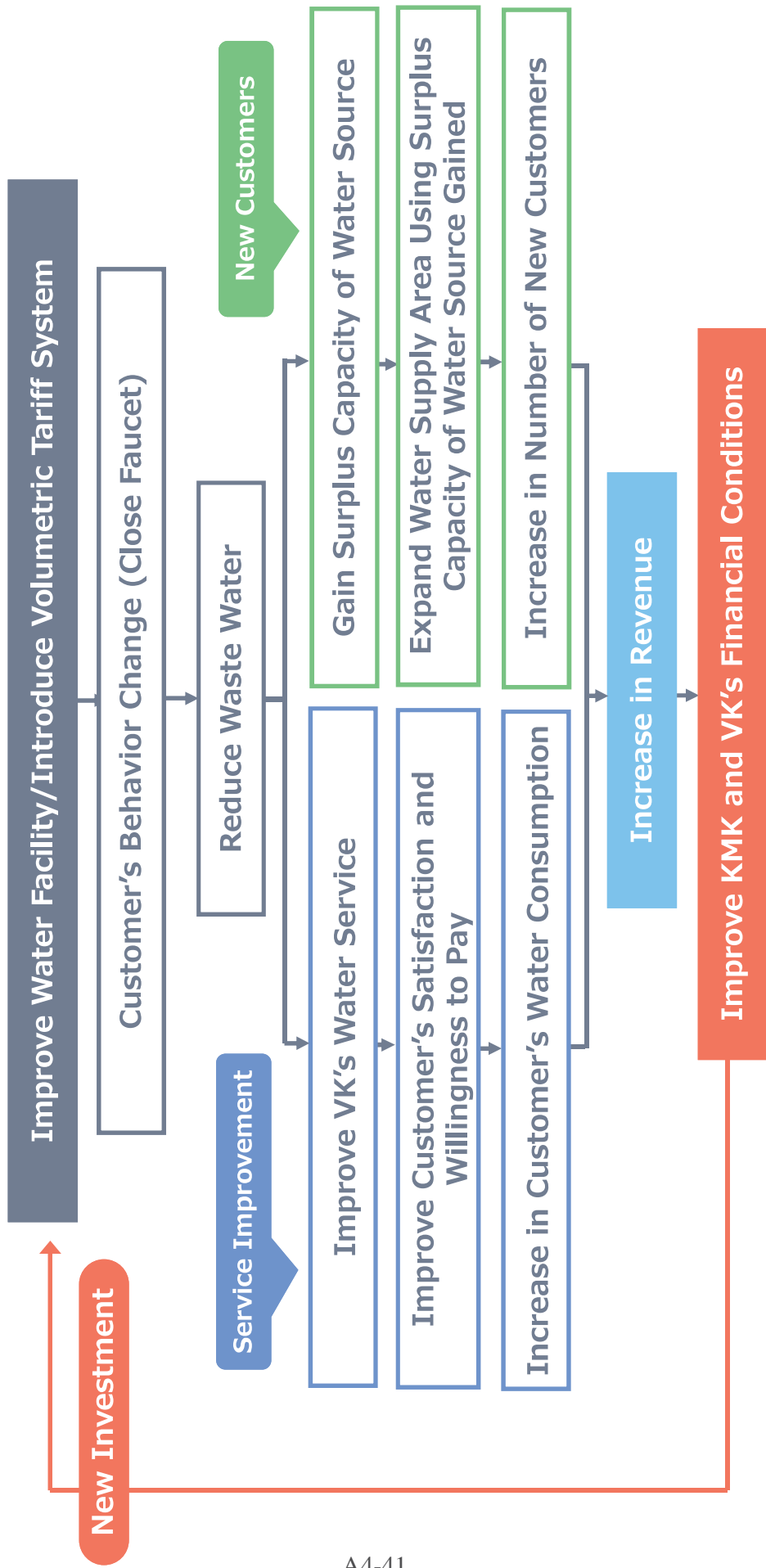


“Volumetric Tariff System” and Growth Spiral for Tajikistan



A4-40

Growth Spiral for Stable Water Supply Services in Tajikistan



Flowchart for Improvement of KMK and VKs

Minutes of Discussions
on the Preparatory Survey for the Project for
the Improvement of Water Supply Systems in Jomi District, Khatlon Region
(Explanation on Draft Preparatory Survey Report)

With reference to the Minutes of Discussions signed between State Unitary Enterprise “Khojagii Manziliyu Kommunalii” of the Republic of Tajikistan (hereinafter referred to as “KMK”) and the Japan International Cooperation Agency (hereinafter referred to as “JICA”) on February 10th, 2023 and in response to the request from the Government of Tajikistan dated March 13th, 2023, JICA dispatched the Preparatory Survey Team (hereinafter referred to as “the Team”) for the explanation of Draft Preparatory Survey Report (hereinafter referred to as “the Draft Report”) for the Project for the Improvement of Water Supply Systems in Jomi District, Khatlon Region (hereinafter referred to as “the Project”).

As a result of the discussions, JICA and Tajikistani sides (hereinafter referred to as “the Both Sides”) agreed on the main items described in the attached sheets.

Dushanbe, August 18, 2023



Dr. OGATA Ryuji

Leader, Preparatory Survey Team

Japan International Cooperation Agency

Japan



Mr. DAVLATZODA Usmon Gul

Director General

State Unitary Enterprise “Khojagii
Manziliyu Kommunalii”
Republic of Tajikistan

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve water supply service in Jomi district through construction and expansion of water supply facilities, thereby contributing to the improvement of living environment and public health of the residents.

2. Title of the Preparatory Survey

Both Sides confirmed the title of the Preparatory Survey (hereinafter referred to as “the Survey”) as “the Preparatory Survey for the Project for the Improvement of Water Supply Systems in Jomi District, Khatlon Region”.

3. Project Site

Both Sides confirmed that the sites of the Project are in Jomi district, which is shown in **Annex 1**.

4. Responsible Authority for the Project

Both Sides confirmed the authorities responsible for the Project are as follows:

4-1. KMK will be the executing agency and Jomi Tajik Obi Dehod (hereinafter referred to as “Jomi TOD”) will be the implementing agency for the Project, in which Jomi TOD will execute operation and maintenance of the facility made by the Project after completion. KMK shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization charts are shown in **Annex 2**.

4-2. KMK will also act as the responsible agency for supervising Jomi TOD on behalf of the Government of Tajikistan. KMK will allocate necessary budget and formulate necessary structure for operation and maintenance of the facility made by the Project.

5. Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Tajikistan side agreed to its contents. JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Tajikistan side at around December 2023.

6. Cost Estimation

Both Sides confirmed that the cost estimation including the contingency explained by the Team is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

7. Confidentiality of the Cost Estimation and Technical Specifications

Both Sides confirmed that the cost estimation and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

8. Procedures and Basic Principles of Japanese Grant

The Tajikistan side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as “the Grant”) as described in **Annex 3** shall be applied to the Project. In addition, the Tajikistan side agreed to take necessary measures according to the procedures.

9. Timeline for the Project Implementation

The Team explained to the Tajikistan side that the expected timeline for the project implementation is as attached in **Annex 4**.

10. Expected Outcomes and Indicators

Both Sides agreed that the key indicators for expected outcomes are as follows. The Tajikistan side will be responsible for the achievement of the agreed key indicators targeted in 2029 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative Indicators]

	Baseline (2022 actual value)	Target (2029) 3 years after the completion of the project
Water Supply Population of the Project Site	7,500 persons	49,801 persons
Daily Water Supply Time	2 hours	24 hours
Water Meter Installation Rate of the Customers in the Project Site	0 %	100 %

[Qualitative Indicators]

- Improvement of the living environment and sanitation for residents
- Reduction of the burden of the women and children caused by fetching water

11. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to six evaluation criteria (Relevance, Coherence, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Tajikistan side is required to provide necessary support for the data collection.

12. Technical Assistance (“Soft Component” of the Project)

In order to ensure effective and sustainable operation and maintenance of the water facilities granted through the Project, technical assistance is planned under the Project. The Tajikistan side confirmed to deploy a necessary number of counterparts (5 personnel from KMK and 25 personnel from Jomi TOD) who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

13. Undertakings of the Project

Both Sides confirmed the major undertakings of the Project as described in **Annex 5**. With regard to exemption of custom duties, internal taxes and other fiscal levies as stipulated in 1. (2) 5 of **Annex 5**, Both Sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by KMK during the implementation stage of the Project.

The Tajikistan side assured to take necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both Sides also confirmed that the **Annex 5** will be used as an attachment of G/A.

14. Monitoring During the Implementation

The Project will be monitored by KMK and reported to JICA by using the form of Project Monitoring Report (PMR) attached as **Annex 6**. The timing of submission of the PMR is described in **Annex 5**.

15. Project Completion

Both Sides confirmed that the project completes when all the facilities constructed and equipment procured by the Grant are in operation. The completion of the Project will be reported to JICA promptly by KMK, but in any event not later than six months after completion of the Project.

16. Signing of E/N and G/A

Both Sides confirmed that the signing process of E/N and G/A will start soon after the approval of the Project by the Government of Japan. KMK will reach out to the related agencies for the smooth implementation of the process when necessary.

17. Environmental and Social Considerations

17-1 General Issues

17-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (January, 2022)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as B because the Project is not located in a sensitive area, nor has sensitive characteristics, nor falls into sensitive sectors under the JICA guidelines for environmental and social considerations (January 2022), and its potential adverse impacts on the environment are not likely to be significant.

17-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as **Annex 7**. KMK assured that they shall take the necessary measures in accordance with the Environmental Checklist and shall report to the JICA Tajikistan Office if any major changes affecting the environment occur during the Project. Both Sides agreed that in case of major modification of the content of the Environmental Checklist, KMK shall submit the modified version to JICA in a timely manner.

17-2 Environmental Issues

17-2-1 Environmental Impact Assessment (EIA)

Both Sides confirmed that the EIA documents will be approved by Committee of Environmental Protection (CEP) in September, 2023.

17-2-2 Environmental Management Plan and Environmental Monitoring Plan

Both Sides confirmed the Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project are attached as **Annex 8**, respectively. Both sides agreed that environmental mitigation measures and monitoring shall be conducted by KMK and Jomi TOD based on the EMP and EMoP, which may be updated during the detailed design stage.

17-2-3 Consultation with Local Stakeholders

The Tajikistan side explained that local stakeholder meetings on the Project with relevant stakeholders and local residents with particular attention to directly affected peoples by the Project were held at the main conference room of Jomi Hukmad Department (Jomi branch of the Government of Tajikistan) on March 9th, 2023. Questions and opinions such as the timeline of the Project, system of the new water supply and specific place of water meter installation, impact on roads due to underground piping, etc. were raised by attendees. The Tajikistan side explained the details of the Project and that there will be no negative impact on the roads because the roads excavated are to be properly restored after the piping and there were no objections to the implementation of the Project from the attendees.

17-3 Environmental and Social Monitoring

17-3-1 Environmental Monitoring

Both Sides confirmed that KMK will submit results of environmental monitoring to JICA as a part of Monthly Progress Report by using the monitoring form attached as **Annex 9**. The timing of submission of the monitoring form is described in **Annex 5**. In case JICA finds that there is a need for improvement in a situation with respect to environmental considerations after the agreed monitoring period, JICA may request to extend the period of monitoring and reporting until JICA confirms the issues have been properly addressed. The extension of the monitoring will be decided in accordance with the agreement between KMK and JICA.

17-3-2 Information Disclosure of Monitoring Results

Both Sides confirmed that KMK will take stipulated procedures for information disclosure in accordance with “Law of the Republic of Tajikistan on Environmental Protection No. 760”. In addition, the Team requested KMK to disclose results of environmental and social monitoring to local stakeholders and the Tajikistan side agreed to disclose monitoring results through their website / in their field offices by date. The Tajikistan side agreed for JICA to disclose results of environmental and social monitoring submitted by KMK as the monitoring forms attached as **Annex 9** on its website. If the third parties request further information, JICA disclose the information, which is subject to approval by the Tajikistan side.

18. Other Relevant Issues

18-1 Introduction of Volumetric Water Tariff System and Construction of Service Connections

The Project aims to introduce volumetric water tariff system by installation of individual customer meters in the Project sites. Based on the results of the technical cooperation project "Strengthening the Water Service Management of Pyanj and Khamadoni Vodokanals" (2017-2021), reducing water wasting is possible by introduction of volumetric tariff system and further to realise a safe and stable water supply service through construction of wells and an elevated tank. Both Sides agreed to continuously implement explanation to residents about improvement of water services, benefits of volumetric tariff system and consideration of ways to promoting household connection.

In order to ensure reliable and rapid achievement of the Project effect, the construction of service connections up to installation of 6,923 customer meters will be covered under the Japanese Grant, as well as procurement of the equipment necessary for individual service connections, i.e. customer meters and service pipes to households. Since application of service connection from residents is necessary for the installation of customer meters, both sides confirmed to work together to promote residents' application after the start of piping construction.

After the Project is completed, the Tajikistan side will need to proceed with the installation of 532 customer meters and construction works from the meters to each household within three years. Both Sides confirmed that the necessary costs and works should be borne by the Tajikistan side.

The process and responsibility of the introduction of volumetric tariff system is as of below.

Timeline	Responsibility	Detail
During the Project		
Before construction works	- Consultant - Contractor	Procurement of 7,455 customer meters and equipment necessary for individual service connections (service pipes, faucet, etc.)
Start of Piping Construction	- KMK - Jomi TOD - Consultant	Promote residents to apply for service connections
During construction works	- Contractor	Installation of 6,923 customer meters
	- KMK - Jomi TOD	Installation of 6,923 service pipes and faucets beyond the customer meters
After the Project		
Within 3 years after the Project	- KMK - Jomi TOD	Installation of 532 customer meters Construction of 7,455 service connection in total

18-2 Acquisition of Construction Approval

Both Sides confirmed that the Tajikistan side is responsible for the preparation of necessary documents and budget for the acquisition of construction approval for the Project and will obtain acquisition by March 2024.

18-3 Land Acquisition

An area of about 2,000m² in a park in Jomi City is planned to be a construction yard and stock yard for the Project. The local government of Jomi has already agreed to convey its land and to issue an official certificate to Jomi TOD. Both Sides

confirmed that the Tajikistan side will complete the land acquisition by December, 2023.

18-4 Securement of Proper Organizational Structure

After the completion of the Project, Jomi TOD will be responsible for the operation and management of the new water facilities and volumetric tariff system with expanded water supply area and population. KMK will reformulate the organizational structure of Jomi TOD as a Vodokanal to secure necessary organizational structure for the operation and maintenance after the Project. Both Sides confirmed that the Tajikistan side will take necessary measures and secure enough budget for proper operation and management by the completion of the Project. The tentative organization chart of Jomi VK is attached as **Annex 10**.

18-5 Disclosure of Information

Both Sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

18-6 Climate Change

Both Sides confirmed that the Project will contribute as adaptation measures of climate change through saving of water.

18-7 Gender and Disability Mainstreaming

Both Sides confirmed that gender and disability mainstreaming should be duly reflected in the Project implementation. In particular, both sides agreed on the following elements to be integrated into the Project.

- (a) Implementation of soft-component activities that consider women and disabled person's empowerment.
- (b) To be mindful of gender/disability-specific needs of workers in the construction works under the Project.

18-8 Safety Measures

Both Sides confirmed that KMK, Jomi TOD and the Japanese side will cooperate in collection and sharing of information and discussion related to security and safety.

END

Annex 1 Project Site

Annex 2 Organization Chart

Annex 3 Japanese Grant

Annex 4 Project Implementation Schedule

Annex 5 Major Undertakings to be taken by the Government of Tajikistan

Annex 6 Project Monitoring Report (template)

Annex 7 Environmental Checklist

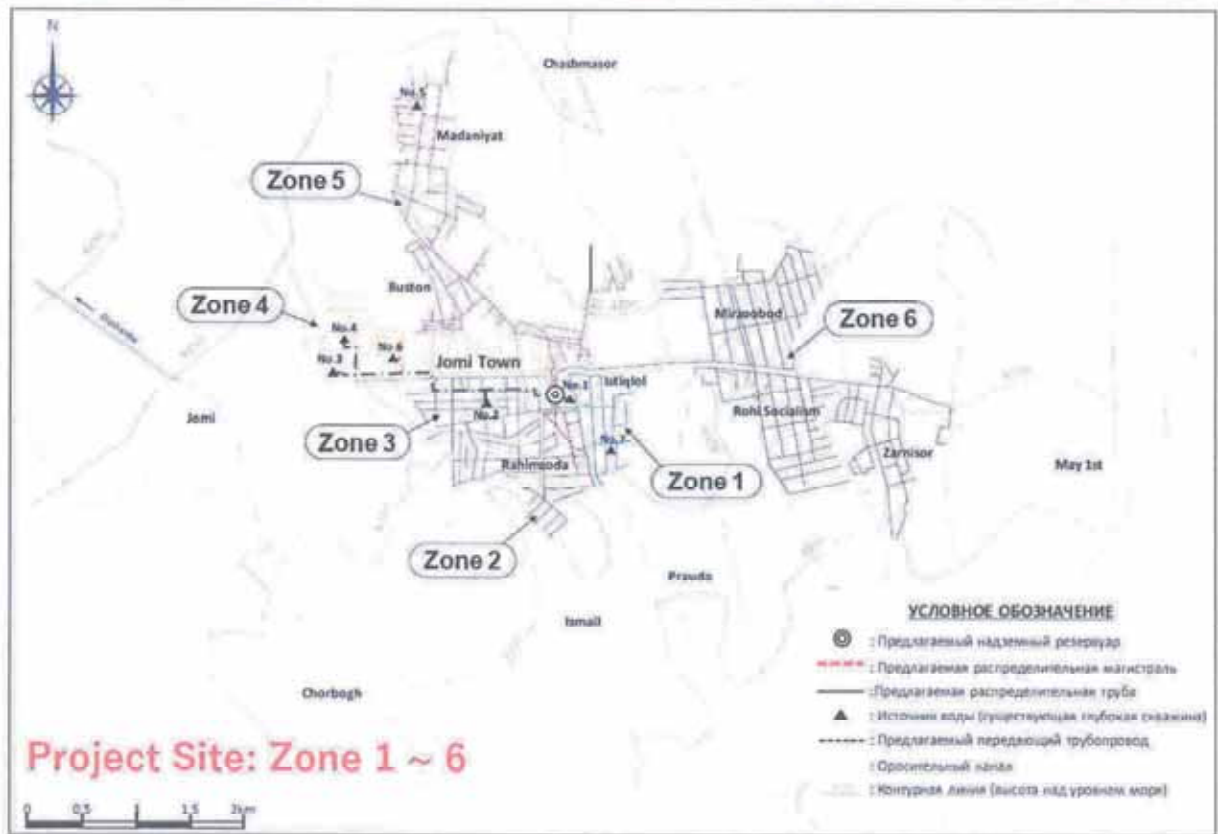
Annex 8 Environmental Management Plan / Environmental Monitoring Plan

Annex 9 Environmental and Social Monitoring Form

Annex 10 Tentative Organization Structure of Jomi VK



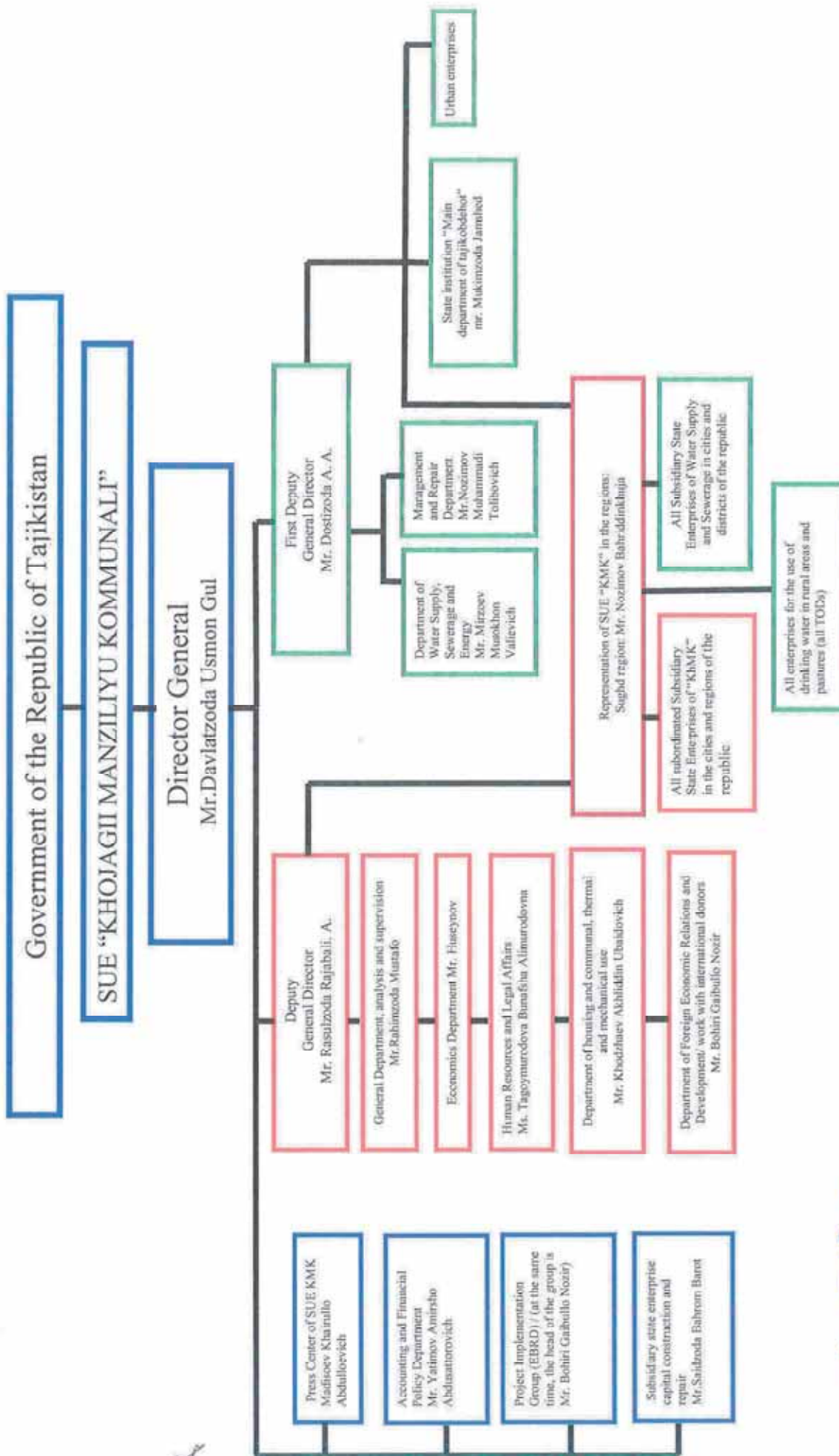
Project Site



General Plan of Proposed Water Supply Facilities

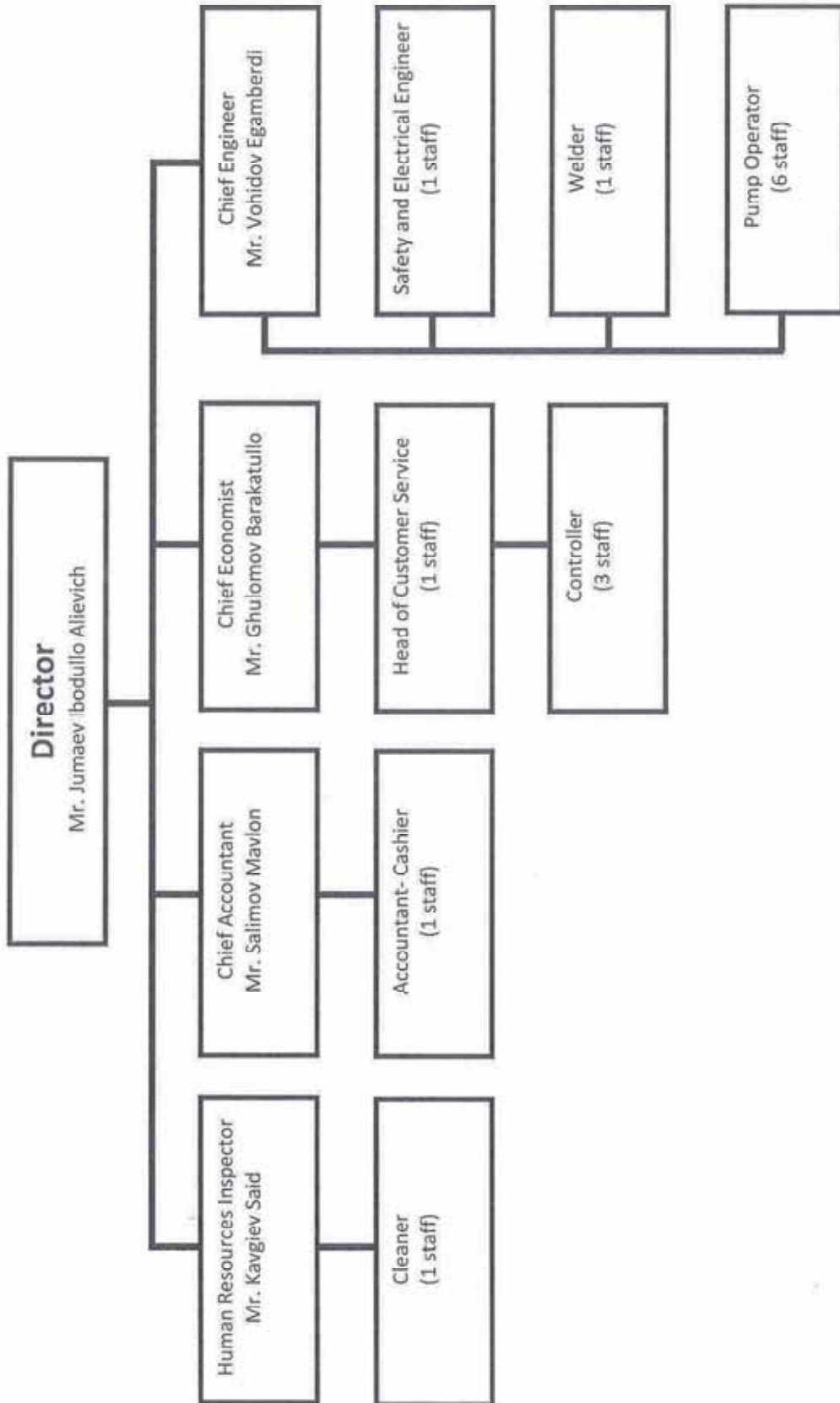
ORGANIZATION CHART

STATE UNITARY ENTERPRISE "KHOJAGII MANZILIYU KOMMUNALI"



ORGANIZATION CHART

JOMI TOD



↑

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See “Financial Flow of Japanese Grant (A/P Type)” for details)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the “Meeting”) will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Measures to ensure more efficient implementation of the Grant

- i) In the event that the E/N and the G/A concerning a project cannot be signed by the end of the following Japanese fiscal year of the cabinet decision concerned by the GOJ, the authorities concerned of the two Governments will discuss the cancellation of the project.

1



ii) In the event that the period, specified in the G/A, during which the grant is available expires before the completion of the disbursement, the authorities concerned of the GO J will thoroughly review the status, situation and perspective of the implementation of the project concerned before extending the said period. The authorities concerned of the two Governments will discuss the termination of the project including a refund, unless there are concrete prospects for its completion.

iii) Regardless of the period mentioned in ii) above, the authorities concerned of the two Governments will, in the event that five years have passed since the cabinet decision concerned by the GOJ before the completion of the disbursement, except as otherwise confirmed between them, discuss the termination of a project including a refund, unless there are concrete prospects for its completion.

4) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

5) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.



PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

A



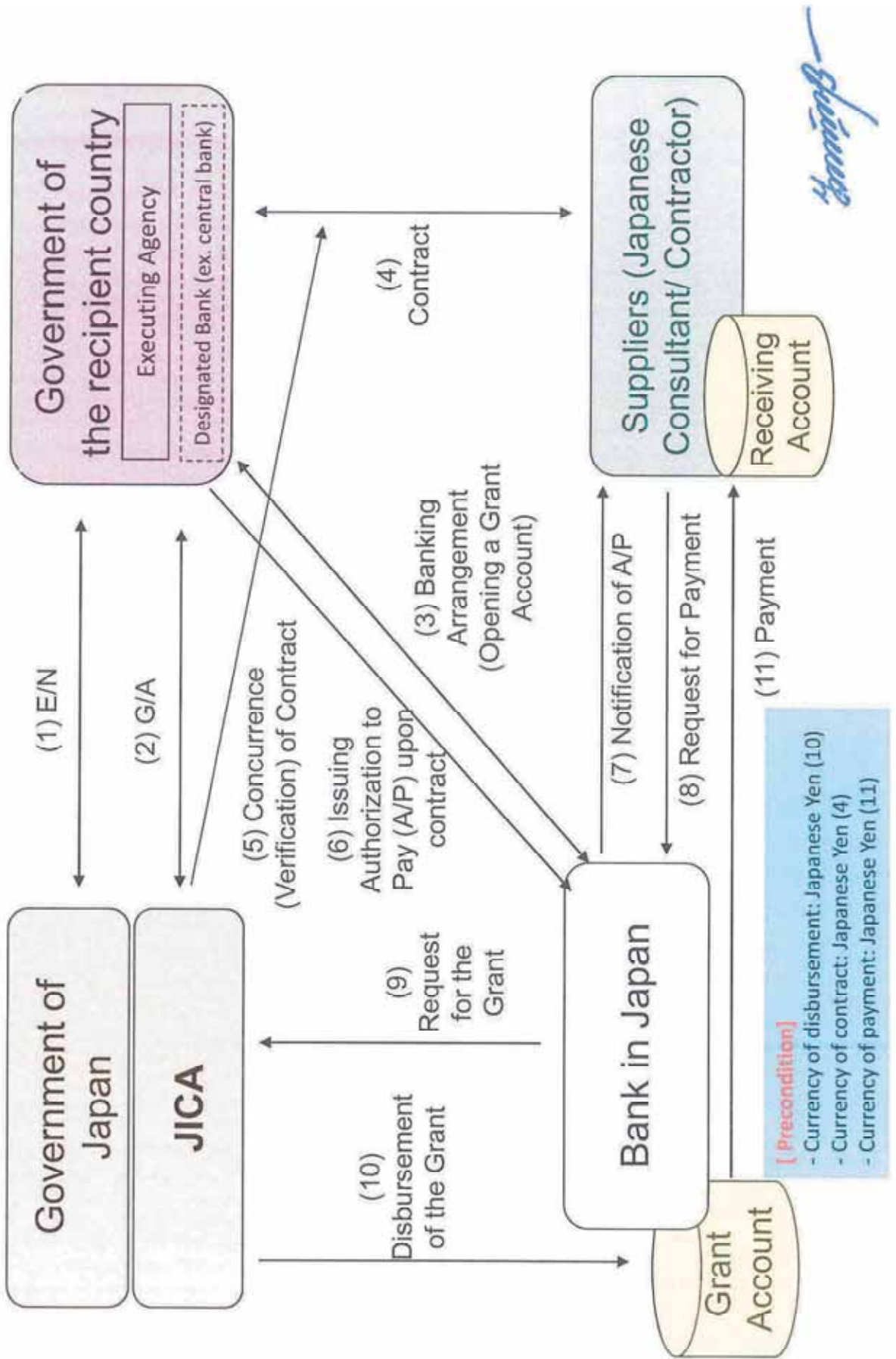
PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

Financial Flow of Japanese Grant (A/P Type)



Annex 4

Project Implementation Timetable

Calendar Year	2024												2025												2026											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Description	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
<Detailed Design>	EN	GA																																		
- Site Survey, Detailed Design																																				
- Preparation of Tender Documents																																				
- Approval of Draft Tender Document																																				
- Tender Announcement and Issuance of Tender Document																																				
- Drawing Handover, Tendering, Contracting																																				
- Assistance in Tender Evaluation																																				
- Preparation of Tender Evaluation Report																																				
<Construction>																																				
- Preparation work in Japan																																				
- Preparatory and Temporary Work																																				
- Foundation Works																																				
- Elevated water tank frame Construction																																				
- Waterproofing																																				
- Water distribution pipe Works																																				
- Water service pipe Works																																				
- Water transmission pipe Works																																				
- Well drilling Works																																				
- Architectural Works																																				
- Equipment and Electrical Works																																				
- Site Maintenance																																				
- Site clean-up																																				
- Inspection and Handover																																				
<Soft Component>																																				

Legend : Work in Japan : Work in Tajikistan



Annex 5

Major Undertakings to be taken by the Government of Tajikistan

1. Specific obligations of the Government of Tajikistan which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost (Ten Thousand Tajikistan Somoni)	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	KMK/NBT		
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	KMK/NBT		
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A		KMK/MOF		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KMK/MOF		
	2) Payment commission for A/P	every payment	KMK/MOF	1.7	
4	To approve EIA	September, 2023	KMK/CEP		
5	To secure the necessary budget for implementation of Environmental Management Plan (EMP) and Environmental Monitoring Programme (EMoP) and for fulfilling the conditions.	within 1 month after the signing of the G/A	KMK/MOF/CLMG		
6	To secure the necessary budget and implement land acquisition	before notice of the bidding documents	KMK		
7	To secure and clear the following lands 1) Site for construction of new wells 2) Site for construction of water transmission pipe 3) Site for construction of an elevated tank 4) Site for construction of water distribution pipe 5) Site for construction of an office building 6) Site for construction of a disinfection room 7) temporary construction yard and stock yard near the Project area 8) borrow pit and disposal site near the Project area	before notice of the bidding documents	KMK		
8	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	until land acquisition and resettlement complete	KMK		
9	To obtain the planning, zoning, building permit	before notice of the bidding documents	KMK		
10	To demolish and remove the existing facilities and utilities that situate in the project site. To clear, level and reclaim the project site.	before notice of the bidding documents	KMK		
11	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	KMK		
12	To notify and explain about the implementation of the meter-rate system to target water supply users.	Before the start of the Project	KMK/Jomi TOD		

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)
 KMK: Khojagii Manziliyu-Kommunali
 NBT: National Bank of Tajikistan
 CEP: Committee on Environmental Protection under the Government of Tajikistan
 MOF: Ministry of Finance
 SCLMG: State Committee on Land Management and Geodesy
 MOFA: Ministry of Foreign Affairs
 MIA: Ministry of Internal Affairs
 TC: Tax Committee

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost (Ten Thousand Tajikistan Somoni)	Ref.
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	within 1 month after the signing of the contract(s)	KMK/ NBT		
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A		KMK/ MOF		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KMK/ MOF		
	2) Payment commission for A/P	every payment	KMK/ MOF	13	
3	To ensure prompt customs clearance and to assist the Supplier(s) with internal transportation in the country of the Recipient	during the Project	KMK		
4	To organize necessary personnel for the implementation of the meter-rate-system.	Before start of the Project	KMK		
5	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	KMK/ MOFA/ MIA		
6	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted.	during the Project	KMK/ MOF/ TC		
7	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	KMK		
8	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.	during the construction	KMK		
9	1) To submit Project Monitoring Report	every month	KMK		
	2) To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	KMK		
10	To submit a notice concerning completion of the Project	within 6 months after completion of the Project	KMK		
11	To construct access roads	3 months before completion of the construction	KMK		
	1) Outside the site				

12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)		KMK		
	1) Electricity The distributing line to the site	before start of the construction	KMK	22	
	2) Water Supply The city water distribution main to the site	before start of the construction	KMK		
	3) Drainage The city drainage main (for storm, sewer and others) to the site	6 months before completion of the construction	KMK		
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	before start of the construction	KMK		
	1) General furniture and equipment for the operation room 2) Installation of electricity meter from the transformer at each well			12 1) included in.	
14	To ensure the safety of persons engaged in the implementation of the Project	during the Project	KMK MIA		
15	To take necessary measures for security and safety of the Project site (measures for security) 1) Security facilities (security fence, security gate, lighting system, CCTV camera, security guard accommodation etc.) 2) Deployment of security guard at the Project site 3) Proper gate control of the Project site (measures for safety) 6) maintaining the safety of workers and the general public by thorough implementation of safety measures and immediate action in the case of accident 7) traffic control around the site(s) and on transportation routes of construction materials 8) Exterior work around the site(s) - Fence (2.0m height, 88.0m length) - Gate (3.0m height, 4.0m length) - Concrete pavement (15cm thickness, 360m ² area size) - Ditch (0.3m height, 0.3m width, 150m length)	during the construction	KMK MIA		60 only for 8)
16	To implement EMP and EMoP	during the construction	KMK		
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the construction	KMK		



18	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between KMK and JICA.	- until the end of livelihood restoration program (In case that livelihood restoration program is provided) - for 2 years after land acquisition and resettlement complete (In case that livelihood restoration program is not provided)	KMK		
19	Construction of 6,923 individual service connection from customer meter to household	During the Project	KMK/ Jomi TOD		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost (Ten Thousand Tajikistan Somoni)	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	KMK/ CEP		
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between KMK and JICA.	for 3 years after the Project	KMK/ CEP		
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	KMK/ MOF		
4	Construction of service connections within 3 years after the Project to ensure reliable and rapid achievement of the Project effect 1) Installation of 532 customer meters 2) Construction of 7,455 individual service connection from customer meters to households	After completion of the construction	KMK/Jomi TOD	392	
5	Procure one pickup truck to transport tools needed to maintain the water supply facilities.	After completion of the construction	KMK/Jomi TOD	67	



2. Other obligations of the Government of Tajikistan funded with the Grant

施工業者契約認証まで非公開

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXXX
 20XX, Month

Organizational Information

Signer of the G/A (Recipient)	_____ Person in Charge (Designation) _____ _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	_____ Person in Charge (Designation) _____ _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Line Ministry	_____ Person in Charge (Designation) _____ _____ Contacts Address: _____ Phone/FAX: _____ Email: _____

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

A handwritten signature in blue ink, possibly reading 'Hannings', with an arrow pointing upwards and to the right.

1: Project Description	
-------------------------------	--

1-1 Project Objective

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1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

--

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original <i>(proposed in the outline design)</i>	Actual
1.		

2-2 Scope of the work

Components	Original* <i>(proposed in the outline design)</i>	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)



2-3 Implementation Schedule

Items	Original		Actual
	<i>(proposed in the outline design)</i>	<i>(at the time of signing the Grant Agreement)</i>	

Reasons for any changes of the schedule, and their effects on the project (if any)

--

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original ^{1),2)} <i>(proposed in the outline design)</i>	Actual
	1.			
	Total			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original ^{1),2)} <i>(proposed in the outline design)</i>	Actual
	1.			

- Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original (at the time of outline design)
name:
role:
financial situation:
institutional and organizational arrangement (organogram):
human resources (number and ability of staff):

Actual (PMR)

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original (at the time of outline design)

Actual (PMR)

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)

Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

G/A NO. XXXXXXXX
PMR prepared on DD/MM/YY

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

--

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

--

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

--

G/A NO. XXXXXXXX
PMR prepared on DD/MM/YY

Attachment

1. Project Location Map
 2. Specific obligations of the Recipient which will not be funded with the Grant
 3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
 5. Environmental Monitoring Form / Social Monitoring Form
 6. Monitoring sheet on price of specified materials (Quarterly)
 7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
 8. Pictures (by JPEG style by CD-R) (PMR (final) only)
 9. Equipment List (PMR (final) only)
 10. Drawing (PMR (final) only)
 11. Report on RD (After project)
 12. Report on the Management of Safety for Construction Works

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment Price (Decreased) E=C-D	Price (Increased) F=C+D
1 Item 1	●●t	●	●	●	●	●
2 Item 2	●●t	●	●	●		
3 Item 3						
4 Item 4						
5 Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials	1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
1 Item 1	●	●	●			
2 Item 2						
3 Item 3						
4 Item 4						
5 Item 5						

(3) Summary of Discussion with Contractor (if necessary)



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Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
 (Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

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Report on the Management of Safety for Construction Works

Month/Year 2022年×月	Cumulative number of labor 労働延入数	Cumulative number of public accident 公衆災害件数	Cumulative hours worked 延べ実労働時間数	Number of deaths and injuries due to industrial accidents 労働災害による死傷者			Aggregated number of work-days lost 延べ労働損失日数	Frequency rate 度数率	Severity rate 強度率
				Death and injuries 死傷者数	Aggregated number of calendar days absent 延べ休業日数	Aggregated number of work-days lost 延べ労働損失日数			
This Month 当月				Death 死者					
				More than 4 calendar days absent 休業4日以上					
				1 to 3 calendar days absent 休業1～3日					
				Total 計					
Total including this month 当月迄累計				Death 死者					
				More than 4 calendar days absent 休業4日以上					
				1 to 3 calendar days absent 休業1～3日					
				Total 計					
<p>Note 注)</p> <p>1. Frequency rate is the frequency of occurrence of industrial accidents. 度数率 = (労働災害による死傷者数 ÷ 延べ実労働時間数) × 100 万時間 Frequency rate = (Number of deaths and injuries due to industrial accidents ÷ Cumulative hours worked) × 1,000,000</p> <p>2. Severity rate is degree of seriousness of the industrial accident. 強度率 = (延べ労働損失日数 ÷ 延べ実労働時間数) × 1000 時間 Severity rate = (Aggregated number of work-days lost ÷ Cumulative hours worked) × 1,000</p> <p>3. Aggregated number of work-days lost = Aggregated number of calendar days absent × (300 ÷ 365) Death (7,500 days) : death as a result of an industrial accident includes not only instantaneous death but also death as a result of occupational injury or disease. 延べ労働損失日数 = 延べ休業日数 × (300 ÷ 365) . . . 死亡 7500 日 (即死のほか負傷が原因で死亡したものを含む)</p> <p>4. Frequency rate and severity rate are rounding off the third decimal place. 度数率・強度率は小数点第3位以下四捨五入</p>									

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Environmental checklist

JICA Environmental Checklist 15: Water Supply

Points to Note

1. Answers should not be limited to Yes/No, but the rationale of the answer and mitigation measures should also be described in the "Specific Environmental and Social Considerations" column.
2. If you have any questions about terminology, etc., please refer to "Japan International Cooperation Agency Guidelines for Environmental and Social Considerations" and "Answers to Frequently Asked Questions about the Japan International Cooperation Agency Guidelines for Environmental and Social Considerations."

Item	Main Check Items	Yes: Y No: N	Specific Environmental and Social Considerations (e.g. reasons for Yes/No answers, rationale, mitigation measures)	
(1) Environmental Assessment and Environmental Permits	(a) Have environmental assessment reports (EIA reports) already been prepared?	(a) Y	<p>In principle, the Committee for Environmental Protection determines whether detailed EIA procedures are required based on the content of application materials submitted by the developer.</p> <p>The Project is classified as Category III under the category classification in Decree No. 253; therefore, it is not necessary to submit any EIA report. A report on the environmental protection section imposed on Category III projects has been submitted and is presently being verified by CEP.</p> <p>It has been confirmed that the application will be prepared and submitted in Russian.</p> <p>KMK already submitted a report on the environmental protection section to the CEP. Verification is underway within CEP.</p> <p>If CEP provides any instructions, they will be submitted in due time.</p> <p>Land use permits have been obtained from Jomi District.</p> <p>The Project is a Category B project; therefore, this is not applicable.</p> <p>The confirmation of environmental and social considerations for the Project was implemented after analyzing study data.</p> <p>The Jomi District Office, KMK, CEP, the Jomi branch of the land management committee, hospitals, and schools were interviewed, and the deputy governor of Jomi District cooperated in asking the heads of each village, the mayor of Jomi City, and leaders in each community to brief residence in advance and attend the stakeholder meeting.</p> <p>On March 9, 2023, a stakeholder meeting at which understanding about Project implementation was gained was held in the Project area. Explanations were provided and understanding was gained during discussions with Jomi District, Jomi TOD, the Jomi branch of the CEP, and village and community leaders and residents in the Project area.</p> <p>Roughly half of the participants in the stakeholder meeting were women, a fact that was noted in the record of the discussion.</p> <p>The plan was formulated to reflect the discussions.</p>	
	(b) Are the EIA reports written in the official or widely used language of the host country?	(b) Y		
(c) Have EIA reports been approved by the host country government? (If not yet approved, write the expected date of the approval in the "Specific Environmental and Social Considerations" column.)	(c) N			
(d) Have EIA reports been approved with any conditions? If conditions are imposed, are the conditions satisfied?	(d) N			
(e) In addition to the above approvals, have other required environmental permits been obtained from the local competent government agencies?	(e) Y			
(f) Do the EIA reports cover the items described in Appendix 2 of the JICA Guidelines? (The scope and detail of the impact assessment may be adjusted according to the impact of the project.)	(f) N			
(g) Does the confirmation of environmental and social considerations cover the project's whole scope, cumulative impacts, derivative and secondary impacts, and indivisible projects?	(g) Y			
(2) Briefings and Discussions with Local Residents	(a) Are local stakeholders properly analyzed and identified?	(a) Y		
	(b) Does the project provide appropriate explanations to local stakeholders about the content and impact of the project, and gain their understanding, through the process of ensuring meaningful consultation including information disclosure?	(b) Y		
	(c) For local stakeholder consultations, are records of consultations prepared, including the gender and other attributes of the participants?	(c) Y		
	(d) Have comments from local stakeholders (such as residents) been reflected in the project content, etc.?	(d) Y		
1 Permits and Consultations				



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Annex 7

Item	Main Check Items	Yes: Y No: N	Specific Environmental and Social Considerations (e.g. reasons for Yes/No answers, rationale, mitigation measures)	
(3) Examination of Alternatives	(a) Is the project/plan's scope of multiple alternatives adequately considered?	(a) Y	<p>Alternatives were considered comprehensively in terms of technical perspectives, economic effects, impacts on the natural and social environment, and the schedule and cost of construction.</p> <p>Same as above</p> <p>Comparisons were made assuming that existing wells would continue to be used as sources without drilling new wells, and that existing distribution pipes would continue to be used.</p> <p>A new disinfection equipment building will be built on the property under the Project; therefore, there is little risk of air pollution in the surrounding area.</p> <p>KMK has a safety management manual that includes handling of chlorine agents. Worker safety will be ensured through ongoing use of the manual.</p> <p>No SOx, NOx, soot, dust, or other air pollutants will be emitted under the Project.</p> <p>Exhaust and the like will only be emitted from construction vehicles during construction; air pollutants from the Project are expected to be minimal.</p> <p>Although the negative impacts of construction will be minimal, mitigation measures to be taken to reduce impacts include using well-maintained heavy machinery and trucks (with warranties), regularly checking their condition, regularly spraying water at construction sites and material storage areas, washing vehicles, and covering truck beds.</p> <p>Groundwater will be used as the water source for the Project, and no sedimentation, filtration, or other purification procedures will be performed; therefore, the water supply facilities will generate no wastewater.</p> <p>Same as above</p> <p>Same as above</p> <p>None of the construction work under the Project involves wastewater. Therefore, the construction will cause no water pollution or other negative impacts.</p> <p>The water supply facilities will generate no sludge.</p> <p>The construction will generate no sludge or other waste; therefore, there will be no negative impacts.</p> <p>The Project will generate excavated soil, asphalt, concrete waste, and other types of construction waste. Waste management plans will be formulated, and waste will be disposed of properly under the direction of Jemti District.</p>	
	(b) Are alternatives that are feasible in terms of technical, financial, and environmental and social aspects considered from the view point of environmental and social items and, if necessary, reducing total greenhouse gas emissions?	(b) Y		
	(c) Are comparisons made with the "without project" scenario?	(c) Y		
	(1) Air quality	(a) Does chlorine from chlorine storage facilities and chlorine injection facilities cause air pollution?		(a) N
		(b) Do chlorine concentrations within the working environments comply with the occupational health and safety standards of the host country, etc.?		(b) Y
(c) Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust comply with the emission standards of the host country, etc.?		(c) Y		
(d) Do air pollutants emitted from the project cause areas that do not comply with the ambient air quality standards of the host country, etc.?		(d) N		
(e) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?		(e) N		
(2) Water quality	(a) Do pollutants, such as SS, BOD, COD and pH, contained in effluents discharged by the facility operations comply with the effluent standards of the host country, etc.?	(a) Y		
	(b) Does the quality of sanitary wastewater and stormwater comply with the effluent standards of the host country, etc.?	(b) Y		
	(c) Do effluents from the project cause areas that do not comply with the ambient water quality standards of the host country, etc.?	(c) N		
	(d) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(d) N		
(3) Waste	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed of in accordance with the regulations of the host country?	(a) Y		
	(b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(b) N		

2 Pollution Control

Annex 7

Item	Main Check Items	Yes: Y No: N	Specific Environmental and Social Considerations (e.g. reasons for Yes/No answers, rationale, mitigation measures)
(4) Soil contamination	(a) Has the soil at the project site been contaminated in the past? (b) Are adequate measures taken to prevent contamination of soil? (c) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a) N (b) Y (c) N	(a) Salt accumulation in the surface layer is occurring due to irrigated farming on arid land, but is limited to farmland and has not caused soil contamination at the Project sites. (b) To avoid contaminating the soil, waste generated by the construction will be disposed of in designated areas in town. (c) Therefore, the construction will cause no salt accumulation or other soil contamination. Additionally, areas for storing construction materials and waste will be selected after consulting with key people in the Jomi District Office to prevent waste and the like from temporarily contaminating soil during construction; therefore, no impact will occur.
	(5) Noise and vibrations	(a) Y (b) N	(a) The plan calls for the introduction of submersible pumps for deep wells; therefore, noise and vibrations will be kept to a minimum. (b) There is little risk that the construction will cause noise, vibrations, or other negative impacts. Regarding noise during construction, information about the work will be explained to residents of the vicinity in advance, and work will be limited to daytime hours to reduce the burden on residents.
(6) Subsidence	(a) Will subsidence occur when large amounts of groundwater are pumped? (b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a) N (b) N	(a) The geology of the site comprises alluvial fan and floodplain sediments from the Vakhsh River. Columnar sections for existing source wells revealed no soft ground to a depth of 100 m. Although these wells have been in service since the Soviet era, no subsidence has occurred in the surrounding area. Therefore, there is no risk of subsidence under the Project, which calls for the same type of source. (b) The Project calls for new wells to be drilled on the sites of existing wells; therefore, the construction work involves no risk of new negative impacts.
	(1) Protected areas	(a) N (b) N (c) N	(a) The site includes no protected areas as defined by laws or international treaties. (b) Same as above (c) There is no risk that the construction will cause negative impacts.

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Annex 7

Item	Main Check Items	Yes: Y No: N	Specific Environmental and Social Considerations (e.g. reasons for Yes/No answers, rationale, mitigation measures)
(2) Biodiversity	(a) Does the project site encompass primary forests, natural forests in tropical areas, habitats with important ecological value (coral reefs, mangrove wetlands, tidal flats, etc.)?	(a) N	(a) The site includes no primeval forests, ecologically important habitats, or habitats of rare species that require protection under laws or international treaties.
	(b) Does the project site encompass habitats of rare species that require protection under domestic legislation, international treaties, etc.?	(b) N	(b) Same as above
	(c) Are there any concerns about the significant impact on biodiversity by the project, with significant conversion or significant degradation of critical habitats or critical forests? If yes, are appropriate measures taken to address the impact on biodiversity?	(c) N	(c) There is no concern over ecological impacts.
	(d) Does the amount of water (e.g. surface water, groundwater) used by the project have a negative impact on the surrounding water bodies such as rivers? (Mitigation measures to reduce impacts on aquatic organisms should also be described in the "Specific Environmental and Social Considerations" column.)	(d) N	(d) The water drawn from the deep wells drilled under the Project is not expected to impact rivers or other surface water or groundwater near the ground surface; therefore, there will be no impact on the aquatic environment.
	(e) If there are any other concerns about significant impacts on biodiversity, are measures taken to reduce the impacts on biodiversity?	(e) N	(e) No significant impacts on biodiversity are anticipated.
	(f) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(f) N	(f) There is no risk that the construction will cause negative impacts on biodiversity.
(3) Hydrological phenomena	(a) Does the amount of water used (e.g. surface water, groundwater) by the project adversely affect surface water and groundwater flows?	(a) N	(a) The Project calls for new wells to be drilled on the sites of existing wells; therefore, there is no risk of negative impacts on surface water or groundwater flows.
	(b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(b) N	(b) The new facilities will draw from the same groundwater as existing facilities; therefore, the construction work involves no risk of new negative impacts.

Annex 7

Categ	Item	Main Check Items	Yes: Y No: N	Specific Environmental and Social Considerations (e.g. reasons for Yes/No answers, rationale, mitigation measures)
4 Social Environment	(1) Resettlement and Land Acquisition	<p>(a) Is land acquisition with involuntary resettlement caused by project implementation? If yes, please describe the scale of land acquisition and resettlement.</p> <p>(b) Are efforts made to minimize the impacts caused by the resettlement? Are there any other land acquisition or loss of livelihoods?</p> <p>(c) Is adequate explanation on compensation and livelihood restoration program given to affected people prior to resettlement?</p> <p>(d) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards, developed based on socioeconomic studies on resettlement?</p> <p>(e) Are the compensations paid prior to the resettlement?</p> <p>(f) Are the compensation policies prepared in document?</p> <p>(g) Does the resettlement plan pay particular attention to vulnerable social groups, such as women, children, elderly peoples, people in poverty, persons with disabilities, refugees, internally displaced persons, and minorities?</p> <p>(h) Are the compensation to be agreed are explained to the project affected persons in writing, and are agreements with the affected people obtained prior to resettlement?</p> <p>(i) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(j) Are any plans developed to monitor the impacts of resettlement?</p> <p>(k) Is the grievance redress mechanism established?</p>	<p>(a) N</p> <p>(b) N</p> <p>(c) N</p> <p>(d) N</p> <p>(e) N</p> <p>(f) N</p> <p>(g) N</p> <p>(h) N</p> <p>(i) N</p> <p>(j) N</p> <p>(k) Y</p>	<p>(a) No resettlement will occur as a result of Project implementation. Some of the distribution pipes may pass under farmland; therefore, an onsite confirmation was conducted in the presence of the deputy governor of Jomti District, and a preliminary agreement was reached.</p> <p>(b) Resettlement will not occur as a result of Project implementation; however, when farmland is used temporarily for construction, the growing season will be avoided.</p> <p>(c) When farmland is used, appropriate explanations regarding the duration of use of the land and construction work will be provided in the presence of a district office official.</p> <p>(d) No resettlement will occur as a result of Project implementation.</p> <p>(e) When farmland is used temporarily, the growing season will be avoided, and compensation measures will be considered. If compensation is to be provided, it will be paid prior to construction.</p> <p>(f) When farmland is used temporarily, records of discussions about compensation policy will be kept in the presence of a district office official.</p> <p>(g) No resettlement will occur as a result of Project implementation.</p> <p>(h) No resettlement will occur as a result of Project implementation; however, when farmland is used temporarily, appropriate explanations will be provided in the presence of a district office official.</p> <p>(i) No resettlement will occur as a result of Project implementation.</p> <p>(j) No resettlement will occur as a result of Project implementation.</p> <p>(k) No land acquisition will occur as a result of Project implementation; therefore, no mechanism for complaints or objections has been established.</p>
4 Social Environment	(2) Living and Livelihood	<p>(a) Does the project adversely affect the living conditions of the inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(b) Does the amount of water used (e.g. surface water, groundwater) by the project cause adverse impacts to the existing water uses?</p> <p>(c) Does the project have a negative impact on ecosystem services (provisioning services and regulating services) and affect health and safety of the community (especially indigenous peoples who depend on the services)?</p> <p>(d) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?</p>	<p>(a) N</p> <p>(b) N</p> <p>(c) N</p> <p>(d) N</p>	<p>(a) The implementation of the Project will result in a dependable supply of safe water, thereby improving the lives of residents. Notably, residents in the Project area presently use the existing water system in addition to hand-pump wells in town or from holes they dug themselves. The use of existing shallow wells will not be prohibited even after the water system under the Project is installed; therefore, the Project is unlikely to cause negative impacts to the lives of residents.</p> <p>(b) The pumping plan is formulated based on the results of boring surveys and drawdown tests; therefore, there is little risk of negative impacts to the existing use of groundwater (shallow wells).</p> <p>(c) The sanitary water supplied under the Project will contribute to the health and safety of local residents; therefore, there is no risk of negative impacts.</p> <p>(d) There is no risk that the construction will cause negative impacts. When farmland is used temporarily for construction, the growing season will be avoided, and compensation measures will be explained in the presence of district office officials.</p>

Annex 7

Item	Main Check Items	Yes: Y No: N	Specific Environmental and Social Considerations (e.g. reasons for Yes/No answers, rationale, mitigation measures)
(3) Vulnerable Social Groups	<p>(a) Is appropriate consideration given to vulnerable social groups, such as women, children, elderly peoples, people in poverty, persons with disabilities, refugees, internally displaced persons, and minorities?</p> <p>(b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?</p>	(a) Y (b) N	<p>(a) The reduction of water-pumping labor will provide consideration for vulnerable social groups.</p> <p>(b) There is no risk that the construction will cause negative impacts.</p>
(4) Cultural heritages	<p>(a) Does the project damage any archaeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the laws of the host country?</p> <p>(b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?</p>	(a) N (b) N	<p>(a) The Project sites include no heritages or sites of archaeological, historical, cultural, or religious value. In the southwestern part of Jomi Town, roughly 200 m from a Project site, there are ruins of a castle presently being used as a pasture; however, the construction poses no risk of impact.</p> <p>(b) There is no risk that the construction will cause negative impacts.</p>
(5) Scenery	<p>(a) Does the project adversely affect landscapes that require special considerations?</p> <p>(b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?</p>	(a) N (b) N	<p>(a) There are no scenic resources or viewpoints to be considered in the Project area.</p> <p>(b) There is no risk that the construction will cause negative impacts.</p>
(6) Ethnic Minorities and Indigenous Peoples	<p>(a) Are considerations given to reduce impact on the culture and lifestyle of ethnic minorities and indigenous peoples in the host country?</p> <p>(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?</p> <p>(c) Is an indigenous peoples plan prepared and published, if necessary?</p> <p>(d) Do the project make efforts to obtain the Free, Prior, and Informed Consent (FPIC) of the affected ethnic minorities and indigenous peoples?</p> <p>(e) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?</p>	(a) N (b) N (c) N (d) N (e) N	<p>(a) No ethnic minorities or indigenous people reside in the Project area.</p> <p>(b) Same as above</p> <p>(c) Same as above</p> <p>(d) Same as above</p> <p>(e) There is no risk that the construction will cause negative impacts.</p>
(7) Working Conditions	<p>(a) Does the project comply with laws related to occupational health and safety of the host country?</p> <p>(b) Are tangible safety considerations in place for individuals involved in the project, such as installation of safety equipment which prevents industrial accidents, and management of hazardous materials, etc.?</p> <p>(c) Are intangible measures being planned and implemented for individuals involved in the project, such as development of health and safety plans, and conducting safety trainings (including traffic safety and public health) for workers, etc.?</p>	(a) Y (b) Y (c) Y	<p>(a) Regarding work environments, the labor laws of Tajikistan will be observed.</p> <p>(b) The plan calls for safety equipment for preventing industrial accidents when the facilities are in service, namely installing fences to prevent falls when working high off the ground, and installing ventilation equipment and using gas masks as measures against chlorine gas from sodium hypochlorite injection equipment.</p> <p>(c) KMK has a safety management manual. Intangible measures will be taken for individuals involved in the Project while facilities are in operation through ongoing use of the manual. Additionally, support from experts is preferable for operating and maintaining the new disinfection equipment building, sodium hypochlorite injection equipment, and the like.</p>

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Annex 7

Item	Main Check Items	Yes: Y No: N	Specific Environmental and Social Considerations (e.g. reasons for Yes/No answers, rationale, mitigation measures)
(8) Health, Safety and Security of Local Communities	<p>(a) Are there any negative impacts on health/hygiene of the local community, such as disease outbreaks (including HIV and other infectious diseases) due to the influx of workers, etc. associated with the project? Are there any mitigation measures in place for the impacts?</p> <p>(b) Are there any negative impacts on the safety of the local community, such as deterioration of public safety, due to the influx of workers, etc. associated with the project? Are there any mitigation measures in place for the impacts?</p> <p>(c) When security guards are hired for the project or other personnel are deployed to ensure and maintain the security of the project area as well as the persons related to the implementation of the project during the project preparation and implementation, are any appropriate measures taken for such personnel not to use any force to provide security except for preventive and defensive purposes?</p> <p>(d) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?</p>	<p>(a) N</p> <p>(b) N</p> <p>(c) Y</p> <p>(d) N</p>	<p>The Project proponent will thoroughly instruct workers on matters of health and sanitation in an effort to reduce negative impacts.</p> <p>The Project proponent will train workers in advance in an effort to reduce risks posed to local communities.</p> <p>The Project proponent will thoroughly train security and safety personnel in advance to prevent risks to local communities and others.</p> <p>By taking the aforementioned measures in advance, the negative risks of construction will be prevented.</p>
5 Others	<p>(a) Does the project proponent develop and implement monitoring program for the environmental and social items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the project proponent establish an adequate monitoring framework (organization, personnel, equipment, and budget to sustain the monitoring framework)?</p> <p>(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reporting the monitoring results from the project proponent to the regulatory authorities?</p> <p>(e) Is the grievance redress mechanism regarding environmental and social considerations established?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p> <p>(e) Y</p>	<p>The Project proponent will plan and implement environmental monitoring, mainly for turbid water, dust, noise, vibrations, and traffic blockage during construction.</p> <p>The Project proponent will draft a monitoring plan and work with the CEP to fine-tune the contents.</p> <p>The plan calls for environmental monitoring during construction to be conducted by the Contractor and Construction Manager and reported to the KMK side, which will be reflected in the bidding TOR.</p> <p>The Project proponent will report the results of monitoring according to the method, frequency, and the like required by the CEP.</p> <p>The Project proponent will report complaints related to environmental impacts during construction to KMK.</p>
(1) Reference to Checklist of Other Sectors	<p>(a) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.</p>	<p>(a) N</p>	<p>(a) Not applicable.</p>
(2) Note on Using Environmental Checklist	<p>(a) Where necessary, the impacts to transboundary or global issues should be confirmed (e.g. the project includes factors that may cause problems, such as transboundary waste treatment or global warming).</p> <p>(b) For projects that are expected to generate more than a certain amount of greenhouse gas emissions, is the total amount of the greenhouse gas emissions estimated before the project implementation?</p>	<p>(a) N</p> <p>(b) N</p>	<p>(a) Not applicable.</p> <p>(b) No greenhouse gas emissions are expected.</p>

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Monitoring plan and implementation system

The table below shows the monitoring plan for implementing mitigation measures before and during construction of the water supply facilities.

Table 1.3.11: Environmental Monitoring Plan (before and during construction)

Environmental item	Item	Location	Criteria	Frequency	Responsible organization	Cost
Before construction						
Air quality	•State of construction vehicle maintenance	Construction sites	Vehicle maintenance certificates	1 time before construction	Contractor	No monitoring cost
	•Dust		Visual check for dust			
Noise and vibrations	•Daytime noise and vibration levels	Construction sites	Noise and vibration levels (dB)	1 time before construction	Contractor	Included in BoQ
During construction						
Air quality	•State of road surface watering	Construction sites	Whether dust is generated	Normal conditions (during construction)	Contractor/ KMK	Included in operating cost
	•State of construction vehicle maintenance	Construction sites	Status of scheduled inspections and maintenance	Monthly		No monitoring cost
Water quality	•Water quality (turbidity, odor, quality of surface water)	Construction sites	Turbidity or odors (During monitoring, the turbidity of the closest canals to drilling locations will be measured)	2 times during construction	Contractor	Included in BoQ



Annex 8

Environmental item	Item	Location	Criteria	Frequency	Responsible organization	Cost
			during drilling work)			
Waste	Method of rubble and construction material disposal	Construction sites	Volume of waste (estimated from the volume loaded onto trucks for hauling)	1 time during construction	Contractor/ KMK	Included in BoQ
Noise and vibrations	Daytime noise and vibration levels	Construction sites	Noise and vibration levels (dBA)	Normal conditions (during construction)	Contractor	Included in BoQ
Existing social infrastructure and social services	Formulate a traffic management plan	Construction sites and their surroundings	Existence of a traffic management plan	Monthly	Contractor	Included in BoQ
	Position traffic controllers, install signs, and the like		Use control charts to check personnel, visually confirm signs and the like	Normal conditions (during construction)	Contractor	Included in BoQ
Work environments (including occupational safety)	Conduct occupational safety and health training	Construction sites	Confirm that training is being conducted	Monthly	Contractor/ KMK	Included in operating cost
Accidents	Records of accidents and response	Construction sites	Availability of accident records	Monthly	Contractor/ KMK	Included in operating

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Annex 8

Environmental item	Item	Location	Criteria	Frequency	Responsible organization	Cost
						cost
Global warming	Regular maintenance of heavy machinery and equipment	Construction sites	Check maintenance records	Monthly	Contractor	Included in BoQ
In service						
Hydrological phenomena	Interview residents in the vicinity	Construction sites	Impact caused by pumping groundwater	Monthly	KMK	Included in operating cost
Work environments (including occupational safety)	Status of safety equipment installation	Locations of installed facilities	Check the status of safety equipment installation	Monthly	Contractor/ KMK	Included in BoQ
	Interview workers		Workers' views on improving work environments	Monthly	KMK	Included in operating cost
Accidents	Status of safety equipment installation	Construction sites	Check the status of safety equipment installation	Monthly	Contractor/ KMK	Included in BoQ

The Japanese Contractor and the public housing service provider (KMK) must comply with the environmental monitoring plan set out in this report. Figure 1.3.8 below shows the systems for monitoring implementation and complaint handling during construction and after facilities are in service.

During construction: Monitoring will be conducted regularly and the results will be recorded, mainly by local employees of the Japanese Contractor. On a quarterly basis, an environmental monitoring report will be prepared based on the monitoring form attached to this report and submitted to KMK and the Consultant. The Consultant will report these results to JICA.

In service: The public water supply utility Jomi Tajik Obi Dehod (Jomi TOD) will compile monthly reports on environmental concerns and comments from residents and submit them to



Annex 8

KMK. Upon receiving the report, KMK will peruse the contents and give instructions to Jomi TOD. If it is difficult to take action, KMK will report to the Jomi District branch of CEP and ask for instructions. On a quarterly basis, KMK will prepare an environmental monitoring report based on the monitoring form attached to this report and submit it to the Consultant. The Consultant will report these results to JICA.



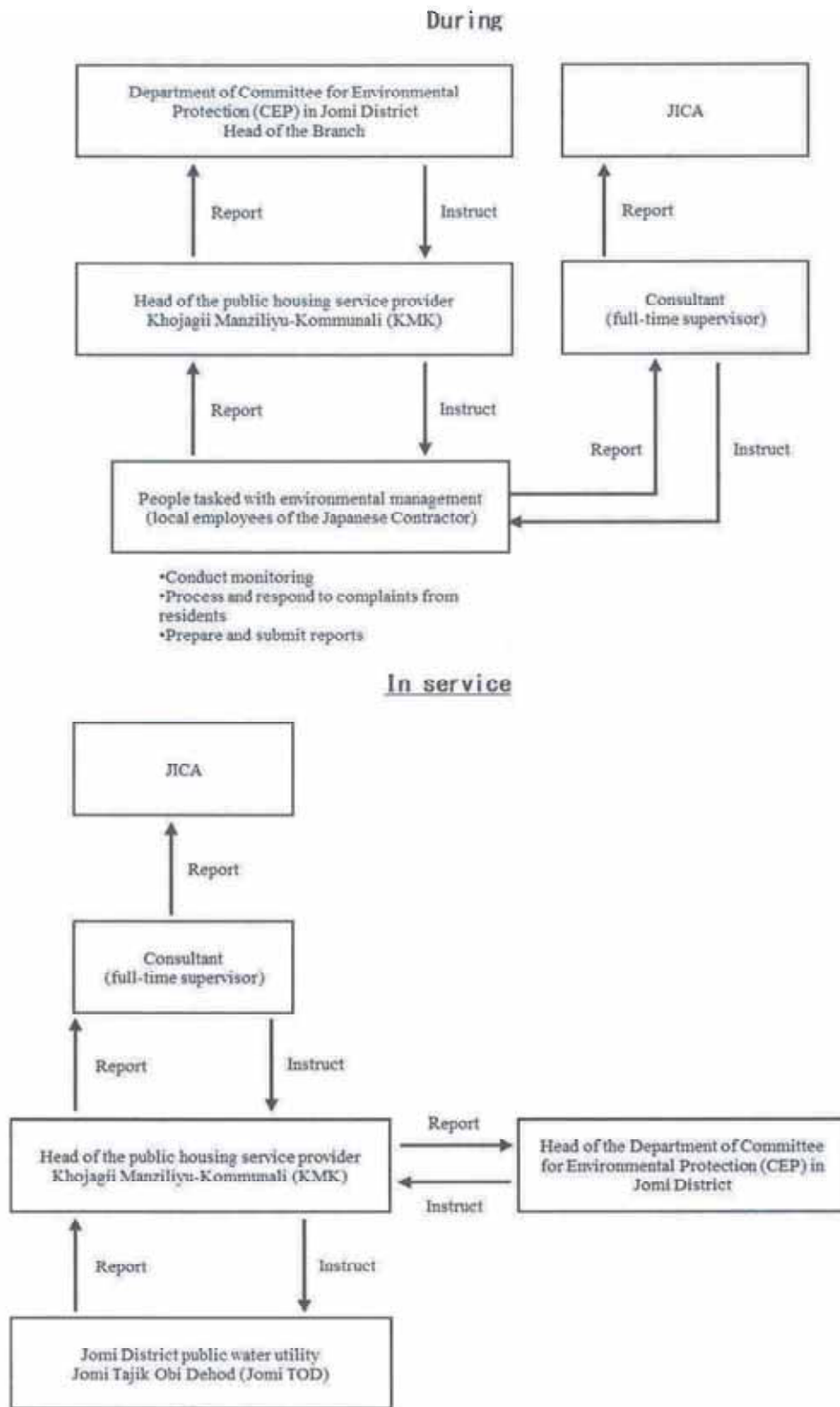


Figure 1.3.8 Implementation System

Draft monitoring form

KMK is required to report the results of monitoring to JICA based on this monitoring form. During construction, the Contractor or construction manager will conduct monitoring and report the results to KMK.

1. Before construction (every other month)

(1) Permits (if environmental approval letters have not been received at the time of the draft report briefing study mission)

Monitoring Item	Responsibility	Methods	Monitoring Period	Results (Progress*)
Status of environmental approval letters issued	KMK	Submit copies of environmental approval letters issued by the Committee for Environmental Protection to JICA	After completion of the preparatory study (in principle, submittal before the E/N is preferable)	

*Describe the progress made through interviews with the Committee for Environmental Protection.

(2) Air pollution (dust)

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
State of construction vehicle maintenance	Check state of vehicle maintenance	Construction sites	Maintenance certificates	1 time before construction	
Dust	Visual check for dust				

(3) Noise and vibrations

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Daytime noise and vibration levels	Measured to obtain mean and maximum values.	Construction sites	Noise level: 85 dB (Japanese standard) Vibrations: 75 dB (Japanese standard)	1 time before construction	

2. During construction

(1) Air pollution (dust)

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results

State of dust	Water road surfaces	Construction sites	Frequency of watering (3 times each month)	Normal conditions (during construction)	
	State of efforts to stop idling of construction vehicles		Visual checks		
	Visually check use of anti-scattering covers		State of coverage with covers		

*Information will be supplemented by interviews with residents as needed.

(2) Noise and vibrations

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Restrictions on construction hours in residential areas (work is performed only during daytime hours)	Records of field measurements of construction hours*	Construction sites in residential areas	8:00-17:00	Normal conditions (during construction)	
Noise level	Records of field measurements	Construction sites	85 db (Japan)	During excavation	
Vibration level	Records of field measurements	Construction sites	75 db (Japan)	During excavation	

*Information will be supplemented by interviews with residents as needed.

(3) Water quality (turbid water)

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Quality of surface water	Measure turbidity	Canals adjacent to pipe installation work	2.0 mg/L or less	2 times during construction	
Treatment of extra slurry at well drilling sites	Lime-based and cement hardening materials will be used to separate slurry into solids and water to prevent residual slurry.	Well drilling locations	Slurry outflow	After well drilling is complete at each location	



(4) Waste

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Amount of rubble and construction material and method of disposal	Volume of waste (estimated from the volume loaded onto trucks for hauling)	Construction sites	Disposal frequency/trucks	Weekly	
	Observe implementation of disposal at designated locations		Daily number of disposal trips	Normal conditions (during construction)	

(5) Existing social infrastructure and social services

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Traffic management plan	Inclusion in the traffic management plan	Construction sites and their surroundings	Inclusion in the traffic management plan	Normal conditions (during construction)	
Position traffic controllers, install signs, and the like	Use control charts to check personnel, visually confirm signs and the like		Inclusion in control charts		

(6) Work environment

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Conduct occupational safety and health training	Conduct training	Construction sites	Training is being conducted	Monthly	

*Information will be supplemented by interviews with residents as needed.

(7) Accidents

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Records of accidents and response	Availability of accident records	Construction sites	With/without traffic blockage	Monthly	

(8) Global warming




Monitoring Item	Methods	Places	Standards	Monitoring Period	Results
Regular maintenance of heavy machinery and equipment	Check maintenance records	Construction sites	Availability of records	Monthly	

3. Facilities in service (three years after the start)

(1) Water quality (semiannually)

Item	Methods	Places	Standard	Monitoring Period	Results
Clarity	Methods based on water quality analysis	Source wells	at least 30 cm	Three years after the start of service	
Turbidity			not more than 2.0 mg/L		
pH			6.0-9.0		
Foul odors			not more than 2.0 points		
Taste			not more than 2.0 points		
Total hardness			not more than 7.0 mc/L		
Sulfide ion concentration			not more than 500 mg/L		
Ammonia			not more than 2.0 mg/L		
Nitrite ion concentration			not more than 3.0 mg/L		
Nitrate ion concentration			not more than 45 mg/L		
Coliform index			not more than 3		
Iron			not more than 0.3 mg/L		
Copper			not more than 1.0 mg/L		
Aluminium	not more than 0.5 mg/L				

*Enter maximum values.

(2) Hydrological phenomena (monthly)

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results*	
					Jomi Town	11 villages
Groundwater conditions	Measure pumpage	Source wells	Below or above planned pumpage	Three years after the start of service		

*Enter daily maximum values.

(3) Work environment

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results*	
					Jomi Town	11 villages
Status of safety equipment installation	Check the status of safety equipment installation	Construction sites	Safety equipment installed or not	One year after the start of service		
Working Conditions	Interview workers	Locations of installed	Workers' views on	Monthly		

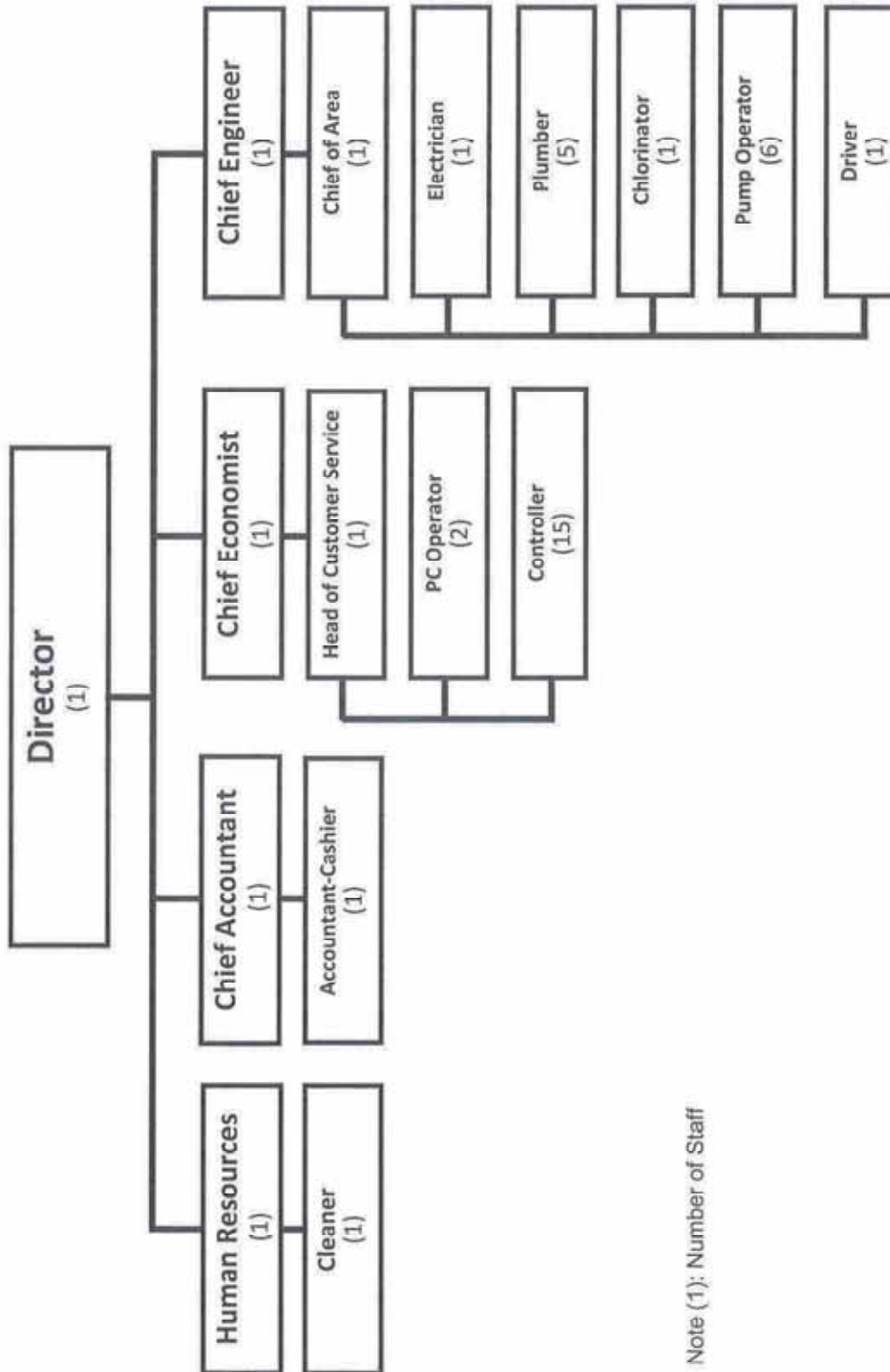
		facilities	improving work environments			
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(4) Accidents

Monitoring Item	Methods	Places	Standards	Monitoring Period	Results*	
					Jomi Town	11 villages
Status of safety equipment installation	Check the status of safety equipment installation	Locations of installed facilities	Safety equipment installed or not	Monthly		



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Note (1): Number of Staff

Tentative Organization Structure of Jomi VK

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別添資料-5

ステークホルダーミーティング議事録

Meeting Minutes of the Stakeholder Meeting

1. Date: 09, March 2023
2. Venue: Main conference hall at HUKMAD (Government of Jomi District)
3. Participants:
 - Governor of HUKMAD of Jomi
 - Mr. Nemonzoda Sharofiddin: Deputy governor of HUKMAD of Jomi
 - Mr. Solehzoda Olimjon: Representative of KMK (Khojagii Manziliyu- Kommunal) of Jomi district
 - Mr. Jumaev Ibodullo: Head of Jomi TOD
 - Mr. AbduaLimov AbduLqudus: Head of department of Environmental Protection of Jomi district
 - Head of Communities (4 persons)
 - Head of Villages (10 villages)
 - Villagers (67 persons)
 - Employee of prefectural government (several people)
 - Japanese Experts (6 persons)
 - Local hired interpreter (4 persons)
 - ❖ Refer to the attached list

About 40 of the 90 total participants were women.
4. Agenda/Issues Discussed:
 - a. Acknowledgments/ Introduction of Participants
 - b. Introduction about the Project by Governor of HUKMAD of Jomi
 - c. Explanation about the Project by Representative of KMK
 - d. Description of the outline and the progress of survey of the Project by Mr. Matsuda (Chief consultant of Project)
 - e. Common understanding of environmental and social considerations by Ms. Kasai (Expert in charge of environmental and social considerations)
 - f. General Discussion (Question and answer session)
 - g. Closing speech
5. Opinions and Suggestions

At the beginning, the expert in charge of environmental and social considerations explained about the points to be improved by implementation of Project.

The contents explained are as follows.

- Supply of hygienic water can be expected to reduce water-caused diseases.
- Realize a safe and stable water supply service through maximizing the water source capacity of existing wells by construction of an elevated tank and efficient water use by reducing water wasting.
- To realize a safe and stable water supply service through maximizing the water source capacity of existing wells by construction of an elevated tank.
- With the spread of introducing the volumetric water tariff system, the wasting water will be reduced, efficient water use will be realized.

Secondly, the expert explained the negative impacts on the environmental impact assessment that would occur during the implementation of the project.

The contents explained are as follows.

- During Construction, the emission gas and dust will be generated.
→however, their impact on ambient air quality is expected to be limited, due to the limited number of heavy vehicles & trucks and limited period of construction work at each site.
- Temporary water contamination may occur during construction.
→No work that causes water pollutants during operation of the water supply facility is assumed.
- During construction, noise and vibration may occur.
→Ensure that construction is done only during daylight hours.
- The use of roads will be temporarily restricted during the burial of water distribution pipes.
→During the construction, the cooperation of the citizens is required.
- Construction waste is generated with the construction.
→Waste will be discarded in a waste dump in Jomi town.

The contents of the question and answer session are shown below.

- When will water be available? (Female villager)
→It will take about three years before the Japanese side makes a decision based on the report of this survey after the investigation.
- In the case of a two- or three-story building, how do the water are raised ? (Head of committee of district of Somoni)
→The water is supplied by piping a water supply pipe from the water supply tank.
- Where should the meter be installed, indoors or outdoors? (Head of committee of Jomi Town)
→They will be Installed outside the building.
- The water supply will generate waste water. Will the project will able to compensate for

this matter? (Head of committee of Jomi Town)

→This project will not implement that matter.

- The existing wells are in poor condition. (Man from a water service company)
→A new well will be dug by the Project. New wells will be usable for 40 to 50 years.
- Are there any negative impacts o by piping system in underground? (Head of village)
→Construction will be done by Japanese contractors. Japanese construction technology restores roads and ground to its original condition.
- This project will improve the water supply in the village, so we would like to cooperate with you. (Participating villagers)



Photo 1 : Meeting with Stakeholders






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Date: /Санаи баргузори
09 / March 2023 - 09
марти соли 2023

No.	Name ному насаб	Profession/Position шӯғл/вазифа	Name of the Village and Community ҷамоат ва маҳалла	Tel or e-mail address ё почтаи электронӣ	Signature Имзо
1	Ҷабрӯров Владислав	Аъзои ҷаҳзеи ИИДТ	Ҷ/м Маҳраб		
2	Ҷамонков Карим	раиси маҷалса	Ҷ/м А. Ҷоӣӣ		
3	Ҷамолова Сулайма	нафарасохур	Ҷ/м А. Ҷоӣӣ		
4	Ҷаматов Насрулло	усто	Ҷ/м Озод		
5	Ҷабрӯров Диван	усто	Ҷ/м Озод		
6	Ҷаблатов Суто	усто	Ҷ/м Озод		
7	Ҷабидова Зӯйра	фармони	Ҷ/м-деҳа-Ҷоӣӣ		
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1	Нозирова Музафар	Раиси ҷамоати деҳа	Ҷамоати деҳаи Ш. Чоӣӣ		
2	Солехова С. Р.	Инженери раҳбар	Ҷамоати деҳаи Ш. Чоӣӣ		
3	НОЗИРОВ МУЗАФАР	Мутах. Бахши Меморӣ.	ҶД КАМЕНИН, ҶТҮТ.		
4	Мерзоев Холмурад	Раиси ҶД	ҶД КАМЕНИН, ҶТҮТ.		
5	Алимов Файз	Сармуҳарраи ҶД	ҶД КАМЕНИН, ҶТҮТ.		
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1	Чушмаев С.А	Раҳбар, Обсерватор	Ҷамоати "А.Чоғи"	—	
2	Қабдиев С.Ш	Нозир касри Обсерватор	Ҷамоати "А.Чоғи"	—	
3	Ҳасанов А	Ҷоғи Раҳбар	Ҷамоати "А.Чоғи"	—	
4	Ҳасанов З	Ҷоғи Раҳбар	Ҷамоати "А.Чоғи"	—	
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1	Зӯрҷӯно Ҷ Мӯр	Б.е.к.с.р	шаҳрӣ		
2	Дӯров Қозимқӯзалиев	Заминсозчи Ш.А.Ҷоғӣ 2/шаҳраки А. Чоғӣ	шаҳраки А. Чоғӣ		
3	Ҷафариҷон Ш	Маъмури	шаҳраки		
4	Ҷӯҷубов Д	Маъмури	шаҳраки		
5	Мӯрӯв	Маъмури	шаҳраки		
6	Доброҷӯҷубов	Маъмури	шаҳраки		
7	Валиев	Б.е.к.с.р	шаҳраки		
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1	Алимақроров Ш	Раиси Маҷласи Советдорӣ	31 шаҳраки А. Чоғӣ		
2	Сафаров Нур	Раиси маҳалли А.Собир.Б.Раҳмонов	— —		
3	Абдураҳимов Ш	Корбари	— —		
4	Собирова Ф.	қарғаси	— —		
5	Давлатмуратов Ш	Корбари	— —		
6	Қурбонов З	Раиси маҷласи Советдорӣ	— —		
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1	Ҷонсӯзода Ш.Ш.	Раиси ҷамоат	Ҷи. А. Ҷоӣӣ		
2	Ҷабборзода Ш.Ш.	Мурбими Раёсати Ҷамоат	Ҷи. А. Ҷоӣӣ		
3	Садрароба Т. Ш.	Котиби ҷамоат	Ҷи. А. Ҷоӣӣ		
4	Нуриддин Н. Ш.	Заминсози ҷамоат	Ҷи. А. Ҷоӣӣ		
5	Василова Ш. Ш.	Дирори ҷамоат	Ҷи. А. Ҷоӣӣ		
6	Сайриддинзода С. Ш.	Коргузори ҷамоат	Ҷи. А. Ҷоӣӣ		
7	Мурсал Ҷуриев	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		
8	Садрароб Қурмаев	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		
9	Ҷузуроб Ҷуриев	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		
10	Давлатова Анон	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		
11	Алиқаримов Гурӯ	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		
12	Шуриқова Раҷаб	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		
13	Ҷаббарова Зӯнайти	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		
14	Ҷасонов Карим	Раиси маҳалла	Ҷи. А. Ҷоӣӣ		

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1	Муҳебов Курбанов	раиси маҳалла	маҳаллаи Ҷ		
2	Муҳебова Хайратова	хотона	маҳаллаи Ҷ		
3	Мажидова С	донаш	маҳаллаи Ҷ		
4	Маҷидова А	фарош	маҳаллаи Ҷ		
5	Саидова	донаш	маҳаллаи Ҷ		
6	Зодиева Т	донаш	маҳаллаи Ҷ		
7	Муҳебова Т	хонаш	маҳаллаи Ҷ		
8	Муҳебова Т	хонаш	маҳаллаи Ҷ		
9	Заров Ашқар	хонаш	маҳаллаи Ҷ		
10	Ашқарова Т	хонаш	маҳаллаи Ҷ		
11	Ашқарова Сафар	фарош	маҳаллаи Ҷ		
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1	Довлатова Анор	раиси маҷмаа	кӯ. Саодат 7 шаҳр		
2	Ҷабборов Басти	хонашени	кӯ. Крӯнски 1/19		
3	Саврулова Ситора	Белорхонач марказ	кӯ. Саодат 15/9		
4	Абдуллоева Мадина	Хонашени	кӯ. Атамшева		
5	Равадатова Санабар	сорибкор	кӯ. Саодат		
6	Равадатова Мавзӯна	хонашени	кӯ. Саодат		
7	Сафоришова Турмуҳ	хонашени	кӯ. Саодат 70м/2		
8	Абдулазизова Филбор	хонашени	кӯ. Ҷомил 2		
9	Ҷураевиҷева Мухом	ҷамаатсардор	кӯ. Саодат 7/6		
10	Қозиева Мисилона	хонашени	к. Солиевӣ 25-6		
11	Қудратова Замини	хонашени	Солиевӣ 25-7		
12	Шоҷиҷаев Сабир	Раиси маҷмаа	Зи. А. Чоӣи		
13					
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1	Ҷаҳонгаров Р	Сарғари ҳозира	3/9 - Ҷаҳонгаров		
2	Ҷаҳонгаров С.	Сарғари ҳозира	3/9 - Ҷаҳонгаров		
3	Ҷаҳонгаров Х	ЭЛЕКТРИК	3/9 Ҷаҳонгаров		
4	Ҷаҳонгаров А.	Сарғари ҳозира	3/9 - Ҷаҳонгаров 3/9		
5	Ҷаҳонгаров А	Ҷонашин	Ҷаҳонгаров Соҳиб		
6	Ҷаҳонгаров А	Ҷонашин	Соҳибгар		
7	Ҷаҳонгаров А	Сарғари	К. Озод		
8	Ҷаҳонгаров Р	Ҷонашин	К. Озод		
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別添資料-6

ソフトコンポーネント計画書

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タジキスタン国
ハトロン州 ジョミ県 給水改善計画

ソフトコンポーネント計画書

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ハトロン州ジョミ県給水改善計画
ソフトコンポーネント計画書（案）

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1. ソフトコンポーネントを計画する背景

「ジョミ県給水改善計画」（以下、「本事業」という）は、タジキスタン国ハトロン州ジョミ県の県庁所在地であるジョミ町と近隣の7村に、取水井5本（計画揚水量 8,700m³/日）、高架水槽1基（容量 1,800m³）及び配水管網（延長約 120km）を整備し、約5万人に給水する計画である。

本事業の実施により、給水施設が新設されるとともに給水区域が拡張され、給水人口は現在の約6.6倍になる計画である。このように、事業規模が大きく拡大されることになるため、本事業の先方実施機関であるジョミ県上水道公社（以下、「Jomi TOD」という）は、新設される給水施設の運転・維持管理及び水道事業の運営管理が行える組織体制を整備することが求められる。

特に、給水施設の運転・維持管理に関しては、現状の時間給水から24時間給水に移行することが計画されている。また、本事業の実施後は、適切な消毒設備の導入により、給水中に24時間所定の濃度の残留塩素を保持することで、安全な給水を行う必要がある。一方、運営面では、現行の定額制の料金制度に代えて従量料金制を導入する計画である。このため、Jomi TODには、同制度の適切な運用を行うための体制を整備することが求められる。

現在、Jomi TODの職員数は12人であり、本事業実施後の新組織の体制整備に当たっては、現在の職員に加え新たな職員を採用する必要があるが、現在の職員及び新規に採用される職員を含めて、これら職員の技術面及び運営面での能力強化を通じて、信頼性の高い給水サービスの提供と水道事業の持続的な運営の実現に取り組んでいかなければならない。しかしながら、本事業の実施に伴って、上記のようにJomi TODには、同TODがこれまで経験をしたことのない技術面及び運営面での手法が導入されることになることから、本事業のソフトコンポーネントの実施を通じて、Jomi TODの体制整備を支援することが必要となっている。

1-1 ジョミ県上水道公社の現状

現在、Jomi TODは、ジョミ町の住民の約半数（7,500人）に給水している。既存の給水施設は、旧ソ連時代に建設されたもので、老朽化している。水源として6本の深井戸がある。各井戸から同町の配水管網（約35km）に直接接続して配水している。給水時間は、朝夕3時間ずつ井戸を運転しているが、給水時間内に配水管網内のバルブを操作して、複数の給水区を順番に給水しているため、実質的に朝夕1時間、1日約2時間の給水が行われているに過ぎない。

住民への給水は、町内の約200ヶ所の公共水栓で行われている。水道料金の徴収は、定額制の料金制度が採用されている。この定額制の料金制度の下では、住民に適切な蛇口の管理（使用後に蛇口を閉める）を求めることは難しく、多くの住民は蛇口を開けたままにしているため、多量の無駄水が発生している。Jomi TODは、料金収入につながらない多量の無駄水を含む給水を行っていることもあり、給水施設の修理や更新、水道事業の運営に

必要な十分な予算が確保できない状況にある。

Jomi TOD の運営は、所長の他、事務職員 9 人（経理主任、会計、総務人事、営業、顧客管理、集金人、庶務）と、技術職員 9 人（技術主任、電気工、溶接工、オペレーター）の 19 人の職員で構成されることになっているが、現状では欠員があり、12 人の体制となっている。この欠員の中には、同 TOD の幹部職員である経理主任や技術主任も含まれており、本事業の実施に当たっては、欠員となっている職員の雇用のみならず、事業規模の拡大や従量料金制の導入に向けた組織体制の整備はもとより、職員の技術面及び運営面での能力強化が不可欠となっている。

1-2 技術水準

Jomi TOD のオペレーターの日常業務は、朝夕の井戸ポンプの運転であり、適切に作業を行っている。今般の準備調査では、既存井戸の状況を把握するため、井戸カメラによる調査や揚水試験を実施したが、オペレーターが水中ポンプの引き揚げや再設置の作業に参加し、これらの作業手順を熟知していることから、現在のオペレーターは、本事業で建設される井戸ポンプの故障に対しても適切に対応できる技術があるものと判断する。また、溶接工は、通常は既存配管（鋼管）の漏水修理や加工を行う配管工として勤務しており、配管に係る技術については、一定の水準に達しているものと判断する。一方、本事業で建設される配水管や各世帯に引き込む給水管は、水道用ポリエチレン管（HDPE 管）を使用する予定である。現在、Jomi TOD にはこの HDPE 管の配管に経験のある配管工がいないため、新たに雇用する必要がある。

水処理に関しては、水源の地下水の水質が良いため、消毒処理のみを行っている。現在、さらし粉の溶液を深井戸に直接注入する方法が採用されているが、注入量の管理や給水中の残留塩素濃度のモニタリング等は実施されておらず、同作業のマニュアルもない。本事業では、さらし粉を消毒剤として使用するさらし粉溶解注入設備（溶解槽、定量注入ポンプ）を導入する計画である。このため、消毒処理のための新たな職員の雇用とマニュアルに従った溶解・注入作業、給水中の残留塩素濃度のモニタリング方法等を指導する必要がある。

配水管理に関しては、現在は井戸ポンプを朝夕の定時に運転しているのみで、運転記録やマニュアルなどはない。本事業では、水源の地下水を一旦高架水槽に揚水・貯留した後、自然流下で配水（24 時間給水）する計画である。このため、本事業では、配水管理に必要なマニュアル等を整備するとともに、流量計の読みや高架水槽の水位の記録（運転・維持管理台帳の作成）や、施設の運転データを日々の配水管理にフィードバックする運転管理手法を指導する必要がある。

本事業では、給水施設の建設に加えて、各世帯に水道メーターを設置して現行の定額制の料金システムから従量料金制に移行する計画である。Jomi TOD にとって、従量料金制による料金徴収は初めての経験となるため、水道メーターの検針や集金業務を行う検針員を

雇用するとともに、会計担当者や検針員への座学、実務研修などが必要になる。

1-3 運転・維持管理上の課題

本事業では、新しい給水施設を建設した後、既存の施設の使用を中止し、給水はすべて新しい施設で行う計画である。建設される給水施設は、既存の施設に比べて、その規模は大きくなるものの、地下水を利用した給水システムそのものには変更はなく、井戸ポンプの運転管理などは、現在の作業内容と大きく変わることはない。

一方で、本事業では、Jomi TOD の職員がこれまで経験したことのない 24 時間給水、給水の安全管理、個別給水、従量料金制の導入などが計画されており、新設される給水施設を Jomi TOD の職員が適切に運転・維持管理できるようになるためには、以下のような課題がある。

(1) 新しい給水施設の運転・維持管理

現在、Jomi TOD では、朝夕の決まった時刻に井戸ポンプを運転して給水する時間給水が行われている。一方、本事業で建設される給水施設は、深井戸の地下水を貯留する高架水槽が建設され、同高架水槽から自然流下で 24 時間給水する給水システムとなる。この場合の運転方法は、高架水槽の水位と高架水槽から各給水区域に配水する配水本管に設置される流量計の読み（配水量）のデータを基に、毎日の運転管理計画を策定し、同計画に基づいて当日に運転する井戸ポンプの台数や運転時間を決定する運転手法を採用する。

また、本事業では消毒設備として、さらし粉を消毒剤として使用するさらし粉溶解注入設備を導入する計画である。同設備の運転方法については、まず、マニュアルに従って、所定の濃度のさらし粉の溶液を準備した後、井戸から高架水槽に送水される送水量に応じて（上記の井戸の運転計画に連動して）、適切な注入率に調整した注入ポンプにより、さらし粉の溶液を注入する必要がある。また、高架水槽直下及び配水管網の末端で給水中の残留塩素濃度を測定し、その測定結果を上記のさらし粉の注入率にフィードバックする運転管理が必要になる。

給水施設の竣工に先立って、本邦請負業者が実施する初期操作指導は、各機器のマニュアルに沿って、単体の基本的な操作、取扱説明、点検方法などの説明が主体となるが、これらの説明だけでは、建設される給水施設を「システム」として運転することはできない。また、Jomi TOD の職員の現在の技術水準では、上記のような施設の運転データに基づく運転計画の策定、計画の実行、結果の把握、結果と基準となる指標の値との比較、新たな運転計画の策定といった、「PDCA サイクル」による施設の運転管理を、経験ある技術者の支援なしに、Jomi TOD の技術職員のみで行うことは困難である。

(2) 従量料金制による料金徴収体制

本事業では、給水施設の建設に加えて、各世帯に水道メーターを設置して、現行の定額制の料金システムから従量料金制に移行することになる。このため、同料金制度に対応し

た運営管理体制の整備が必要である。従量料金制に移行するに当たっての具体的な作業としては、現在欠員となっている経理主任や会計担当者の雇用、水道メーターの検針や集金業務を行う検針員（1人当たり600世帯の検針・集金を行うものとする、15人の検針員が必要）を雇用する必要がある。

また、上記の職員の雇用の他に、①従量料金制の導入に係る住民への啓発活動及び合意形成（住民説明会の開催）、②料金徴収のための利用者登録と接続契約の締結、③顧客データベースの構築、④料金徴収システム（検針、料金計算、請求書発行、料金徴収、会計管理システム）の整備、⑤会計担当、検針員等に対する集金業務の座学、実務研修などが必要となる。

Jomi TODの職員は、従量料金制に係る経験がまったくなく、従量料金制の導入に先立って必要となる上記の①～⑤の作業を、同制度に経験ある人材による支援なしに、Jomi TODの事務職員のみで行うことは困難である。なお、同作業が完了して従量料金制が導入できないと、本事業で給水施設が建設されて供用を開始しても、水道事業の運営のための料金収入が得られない。このため、給水施設の施工に並行して上記の作業を実施し、従量料金制による料金徴収体制を整備する必要がある。

1-4 ソフトコンポーネント導入の必要性

本事業が円滑に立ち上がり、協力の成果が発現し、その成果が持続するためには、下記の要件を満たす必要がある。

- (1) 給水施設の供用開始までに最低限度の運転・維持管理方法を理解すること。
- (2) 給水施設の供用開始までに従量料金制による料金徴収体制が整備されること。

本事業の建設工事が竣工した後、Jomi TODは自らの力で新しい給水施設の運転・維持管理を実施し、事業運営のための料金徴収も開始しなければならない。しかし、前述したとおり、現在のJomi TODの技術水準や運営能力では、これらの要件を満たすことは難しく、経験豊富で専門的技術を有する技術者の支援が必要である。このため、本事業のソフトコンポーネントとして、Jomi TODに対し、新しい給水施設の運転・維持管理に係る技術移転と、従量料金制による料金徴収体制の整備に係る技術移転を実施するものとする。

なお、本事業の実施に伴うJomi TODの新しい組織は、下図に示すとおり、所長(Director)、技術主任(Chief Engineer)及び経理主任(Chief Accountant)の幹部職員の下に、技術職員16人、事務職員23人の計40人の体制を構築する。

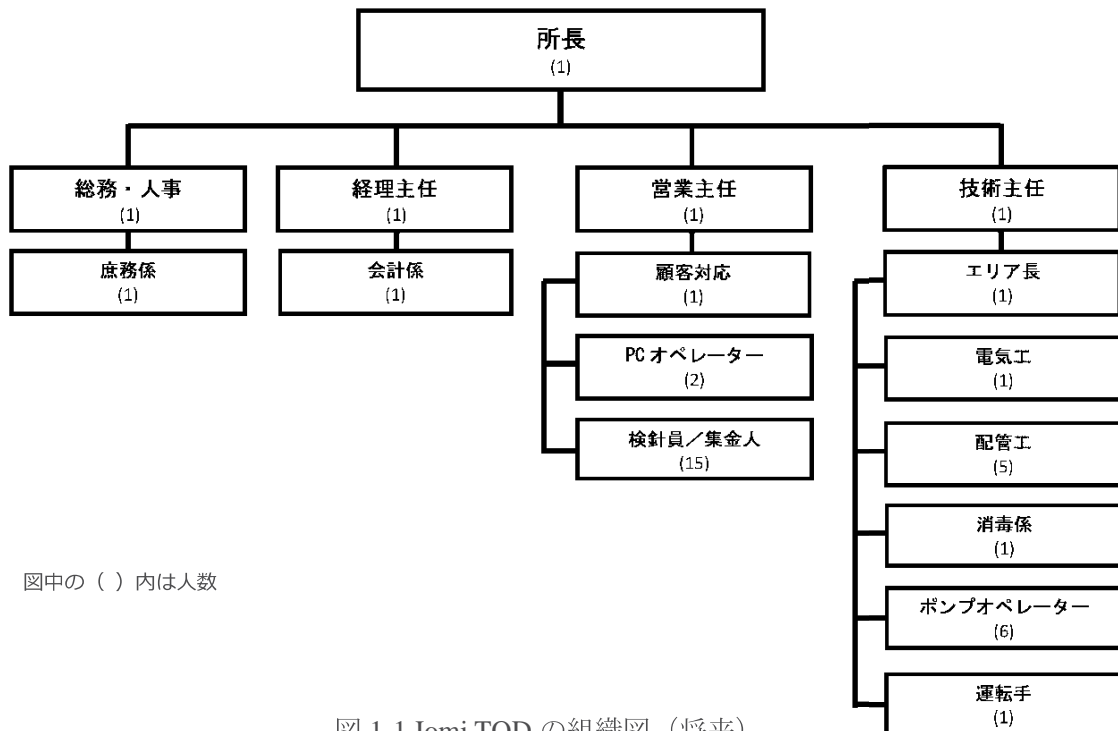


図 1-1 Jomi TOD の組織図（将来）

2. ソフトコンポーネントの目標

本ソフトコンポーネントは、「Jomi TOD が、新しい給水施設の運転・維持管理を適切に行うこと、従量料金制による料金徴収体制を整備し、料金徴収を行うこと」を目標とする。

3. ソフトコンポーネントの成果

前項 1-3 運転・維持管理上の課題を踏まえ、本ソフトコンポーネントの各分野の成果を以下のとおり設定する。

(1) 運転・維持管理方法の習得

成果 1：給水施設の運転管理データの記録方法が習得される

専門家の支援の下に、建設される給水施設を運転管理する上での基本データの取得及び記録方法を習得する。具体的には、高架水槽の水位、配水本管に設置される流量計の読み方の習得、作成する運転・維持管理台帳への記録方法を習得する。

成果 2：消毒設備の運転・維持管理手順が習得される

専門家の支援の下に、消毒設備を運転・維持管理する上での手順を習得する。具体的には、作成するマニュアルに従って、消毒剤として使用するさらし粉の有効塩素量に応じて、所定の濃度（有効塩素濃度 1～2%）のさらし粉の溶液を作る方法を習得する。また、井戸からの送水量に応じて、所定の注入率でさらし粉の溶液を注入ポンプで注入する方法を習得する。さらに、高架水槽直下や配水管網の末端等の定点で給水中の残留塩素濃度を測定し、その結果を基に注入ポンプの注入率を適切に調整するスキル

を習得する。

成果3：PDCA サイクルによる施設の運転管理手法が習得される

専門家の支援の下に、日々の運転管理計画を作成する方法を習得する。具体的には、作成するマニュアルに従って、毎日定時に測定される前日と当日の高架水槽の水位変動（貯水量の変動）及び前日の配水量、高架水槽の基準水位を基に、当日の配水量を決定し、井戸の運転計画（運転台数、運転時間）を策定する方法を習得する。また、策定された井戸の運転計画に従って、さらし粉の注入ポンプの注入率を決定する方法を習得する。

成果4：安全な水の供給に係る JMP 評価の調査手法が習得される

安全な水の供給については、国際的な評価手法（Joint Monitoring Program: JMP、SDGs の Goal 6.1「安全な水の供給」に係る WHO/UNICEF の統一された評価ツール）が存在する。タジキスタン政府として、今後、JMP の評価手法によって同国の安全な水の供給に係る評価を行っていく方針である。このため、本事業でも、我が国の無償資金協力で建設された施設の給水の安全性を国際的な評価手法で評価した上で、先方政府に引き渡すこととする。JMP による評価は、本事業の瑕疵検査の前に現地再委託業務で実施するが、Jomi TOD の職員も同評価のための調査（大腸菌調査と世帯調査）に同行して、JMP の調査手法を習得する。

(2) 従量料金制による料金徴収体制の整備

成果5：料金徴収のための利用者登録と接続契約が締結される

専門家の支援の下に、水道メーターの設置及び従量料金制の導入に係る住民説明会を開催する。水道の接続を希望する利用者に接続申請書を配布し、所定の事項（申請者名、住所、連絡先、家族数等）の記入後に回収する。回収された申請書を基に Jomi TOD と利用者との接続契約書を作成し、接続契約を締結する。

成果6：顧客のデータベースが構築される

専門家の支援の下に、接続契約書の内容を顧客管理ソフト（当国での先行別事業「ピアンジ県・ハマドニ県上下水道公社給水事業運営能力強化プロジェクト」で作成済み）に入力して顧客のデータベースを構築する。

成果7：料金徴収システムが構築される

専門家の支援の下に、作成されるマニュアルに従って、検針、料金計算、請求書発行、料金徴収、会計管理の方法を座学にて習得する。

成果8：料金徴収の実務が習得される

専門家の支援の下に、作成されるマニュアルに従って、検針員に対する検針、料金徴収に係る OJT を実施し、料金徴収の方法を習得する。

4. 成果達成度の確認方法

本ソフトコンポーネントの成果毎の達成度の確認方法を下表に示す。

表 4-1 各分野の成果に対する成果達成度の確認項目と方法

分野	成果	達成度の確認項目	確認方法
運転・維持管理方法の習得	成果 1： 給水施設の運転管理データの記録方法が習得される	①専門家とオペレーターの高架水槽の水位やメーター類の読み的一致度、あるいは差の有無。 ②運転管理データの運転・維持管理台帳への記載の有無。	①専門家によるオペレーターの読みの正確性に係る試験で確認。 ②運転管理データが記録された運転・維持管理台帳で確認。
	成果 2： 消毒設備の運転・維持管理手順が習得される	①マニュアルに従ったさらし粉の溶解作業の可否。 ②マニュアルに従った注入ポンプの操作の可否。 ③給水中の残留塩素濃度と基準値との比較。	①専門家によるオペレーターの作業手順に係る試験で確認。 ②専門家によるオペレーターの作業手順に係る試験で確認。 ③運転・維持管理台帳に記載された残留塩素濃度の測定データで確認。
	成果 3： PDCA サイクルによる施設の運転管理手法が習得される	①マニュアルに従った運転管理計画の策定の有無。 ②策定された運転管理計画の実際の運転管理へのフィードバック。	①作成された運転管理計画書により確認。 ②運転管理データが記録された運転・維持管理台帳で確認。
安全な水の供給に係る JMP 評価の調査手法が習得される	成果 4： 安全な水の供給に係る JMP 評価の調査手法が習得される	①世帯調査用の調査票を用いたアンケート調査の実施の可否。 ②マニュアルに従った大腸菌調査のための適切な採水の可否。	①JMP 調査の参加者リストで確認。 ②記入済みの調査票で確認。 ③大腸菌の水質分析結果で確認。
料金徴収体制の整備	成果 5： 料金徴収のための利用者登録と接続契約が締結される	①住民説明会の開催状況。 ②接続申請書の配布及び回収の状況。 ③接続契約の進捗状況。	①説明会の開催記録で確認。 ②回収された接続申請書で確認。 ③署名済み接続契約書で確認。
	成果 6： 顧客のデータベースが構築される	①顧客データの顧客管理ソフトへの入力状況。	①顧客管理ソフトへの入力データで確認。
	成果 7： 料金徴収システムが構築される	①料金徴収及び会計担当者のマニュアルに従った作業手順の正確性。	①作成された帳票類及び会計書類で確認。
	成果 8： 料金徴収の実務が習得される	①検針及び料金徴収に係る検針員の理解度。	①検針員が携行する顧客管理台帳の記述内容で確認。

5. ソフトコンポーネントの活動（投入計画）

5-1 投入方針

本ソフトコンポーネントの投入は、給水施設の竣工・引渡しまでに実施すべき準備段階の投入と、給水施設の供用開始後の運転・維持管理及び料金徴収業務の支援に必要な最低限度の投入を計画する。また、現地では言葉（露語あるいはタジク語）の問題があり、本邦コンサルタントによる英語での直接の指導ができないため、通訳を兼ねた現地スタッフと本邦コンサルタントとの組合せで業務を実施する。

本ソフトコンポーネントでは、以下の本邦コンサルタント2名と現地スタッフ2名を投入する。

- ・本邦コンサルタント1：給水施設の運転・維持管理支援
- ・本邦コンサルタント2：従量料金制の料金徴収体制整備支援
- ・現地スタッフ：本邦コンサルタント1の業務補助
- ・現地スタッフ：本邦コンサルタント2の業務補助

Jomi TODの技術職員に対する給水施設の運転・維持管理に係る支援に関しては、本邦建設業者が実施する竣工時の初期操作指導に加え、供用開始後、本ソフトコンポーネントにより、暫くの期間、実際に給水施設を運転しながら、給水システム全体の運転管理、水質管理等に関する指導と習熟訓練が必要である。一方、従量料金制の料金徴収体制の整備に係る支援についても、供用開始前の座学に加え、供用開始後、本ソフトコンポーネントで集金業務の実務に係るOJTや顧客管理ソフトを使った会計実務に係る指導が必要である。

5-2 投入計画

新設される給水施設の運転・維持管理手法の立案や研修、運転・維持管理台帳、運転管理マニュアル作成、料金徴収システムの構築、研修支援など、確かな専門知識と豊富な経験に基づく水道技術や理論的な考察力を必要とする業務は、日本人専門家による直接支援型とし、作成された手順書やマニュアル等の実際の運用に係る支援の一部は、現地スタッフが日本人専門家を補助して行うものとする。

投入要素は、日本人専門家、現地スタッフとし、業務区分は概ね下記のとおりとする。

(1) 日本人専門家

各分野の総括、給水施設の運転・維持管理及び従量料金制の料金徴収体制整備に必要な業務内容及び業務量の分析、研修コース管理、運転管理手順の立案、従量料金制導入手順の立案、マニュアル等の作成、研修資料作成、成果達成度の評価。

(2) 現地スタッフ

資料整理、ロシア語資料作成、カウンターパートとの連絡調整、日本人専門家活動時の通訳、資料翻訳

本ソフトコンポーネントの活動（投入計画）を表 5-1 に、日本人専門家の業務計画案を表 5-2 に示す。なお、料金徴収体制整備を支援する専門家は、配水管及び給水管の布設工事に並行して、住民説明会の開催、接続申請書の配布・回収、接続契約の締結等の活動を支援する必要があること、また、施設の竣工後の料金徴収に係る OJT 等を実施する必要があるため、2 回の渡航に分けて活動を行うものとする。

表 5-1 ソフトコンポーネントの活動（投入計画）

分野	成果	活動内容	対象者	必要な投入量
運転・維持管理方法の習得	成果 1： 給水施設の運転管理データの記録方法が習得される	<ul style="list-style-type: none"> ・指導計画の作成 ・運転・維持管理台帳作成 ・水位、流量計、計器類の読み指導 ・運転・維持管理台帳へのデータ記入・記録作成に係る指導 ・記録の正確性に係る確認、試験の実施 	技術職員 (16 人)	<u>日本人専門家</u> 1 名×1.60 P/M (48 日) 渡航 1 回 <P/M 内訳> ・成果 1：0.33 P/M (10 日) ・成果 2：0.54 P/M (16 日) ・成果 3：0.60 P/M (18 日) ・成果 4：0.13 P/M (4 日)
	成果 2： 消毒設備の運転・維持管理手順が習得される	<ul style="list-style-type: none"> ・運転マニュアルの作成 ・さらし粉溶解作業指導 ・注入ポンプの操作指導 ・給水中の残留塩素濃度測定に係る指導 ・塩素濃度測定結果に基づく注入ポンプの調整に係る指導 ・運転管理記録の作成指導 	技術主任 エリア長 消毒係 (3 人)	現地スタッフ 1 名×1.33P/M (40 日)
	成果 3： PDCA サイクルによる施設の運転管理手法が習得される	<ul style="list-style-type: none"> ・運転管理計画の策定マニュアルの作成 ・運転管理計画の策定に係る指導 ・策定した運転管理計画の運転管理へのフィードバック指導。 	技術主任 エリア長 消毒係 オペレーター (9 人)	
	成果 4： 安全な水の供給に係る JMP 評価の調査手法が習得される	<ul style="list-style-type: none"> ・世帯調査用の調査票の作成 ・アンケート調査の実施方法に係る指導 ・採水マニュアルの作成 ・マニュアルに従った採水方法の指導 	所長 技術主任 経理主任 営業主任 顧客対応 (5 人)	

分野	成果	活動内容	対象者	必要な投入量
料金徴収体制の整備	成果5： 料金徴収のための利用者登録と接続契約が締結される	<ul style="list-style-type: none"> ・住民説明会の開催に係る支援 ・接続申請書の作成、配布、回収に係る支援 ・接続契約書の作成、締結に係る支援 	経理主任 営業主任 顧客対応 PCオペレーター (5人)	日本人専門家 1名×2.60P/M (78日) 渡航2回 <P/M内訳> ・成果5：P/M (19日) ・成果6：P/M (20日)
	成果6： 顧客のデータベースが構築される	<ul style="list-style-type: none"> ・顧客管理ソフトの操作マニュアルの作成 ・顧客管理ソフトの使用方法に係る指導 ・顧客管理ソフトへの顧客データの入力に係る支援 	営業主任 顧客対応 PCオペレーター (4人)	・成果7：P/M (25日) ・成果8：P/M (14日) 現地スタッフ 1名×2.07P/M (62日)
	成果7： 料金徴収システムが構築される	<ul style="list-style-type: none"> ・料金徴収マニュアルの作成 ・料金徴収作業及び会計業務に必要な帳票類の作成 ・マニュアルに従った料金徴収作業、会計業務に係る指導(座学) 	経理主任 会計 営業主任 顧客対応 PCオペレーター (6人)	
	成果8： 料金徴収の実務が習得される	<ul style="list-style-type: none"> ・料金徴収実務に係る検針員へのOJTの実施 ・検針員が携行する顧客管理台帳の記述内容の正確性に係る確認。 	営業主任 顧客対応 検針員 (17人)	

表 5-2 (1) 日本人専門家の業務計画案

【第1回渡航】			活動項目	活動内容	備考	
料金徴収体制整備専門家	1	土	渡航	移動：東京→	現地業務：50日/30=1.67MM	
	2	日		移動：→イスタンブール→		
	3	月		移動：→ドゥシャンベ		
	4	火	5-1	住民説明会の開催に係る支援	・住民説明会用資料の作成 ・住民説明会の開催支援	Jomi TODと協議、内容確認・調整 Zone 1～Zone 3
	5	水				
	6	木				
	7	金				
	8	土				
	9	日				
	10	月	5-1	住民説明会の開催に係る支援	・住民説明会の開催支援	Zone 10～Zone 12
	11	火				
	12	水	5-2	接続申請書の作成、配布、回収に係る支援	・接続申請書の様式作成 ・接続申請書の配布・回収支援	Jomi TODと協議、内容確認・調整 Zone 1～Zone 8
	13	木				
	14	金				
	15	土				
	16	日				
	17	月	5-3	接続契約書の作成、締結に係る支援	・接続契約書の様式作成 ・接続契約書の作成・契約支援	Jomi TODと協議、内容確認・調整 Zone 1～Zone 8
	18	火				
	19	水				
	20	木	6-1	顧客管理ソフトの操作マニュアルの作成	・マニュアルの作成	Jomi TODと協議、内容確認・調整
	21	金	6-2	顧客管理ソフトの使用方法に係る指導	・ソフトウェアのインストール、準備作業	
	22	土				
	23	日				
	24	月	6-2	顧客管理ソフトの使用方法に係る指導	・座学(ソフトの操作説明)	顧客管理ソフトの全体概要
	25	火			・座学(ソフトの操作説明)	顧客管理ソフトの各種機能
	26	水	6-3	顧客管理ソフトへの顧客データの入力に係る支援	・マニュアルに基づくOJT	契約書に基づいて、顧客情報(氏名、住所、連絡先、家族構成、水道メーター初期値等)を顧客管理ソフト
	27	木			・マニュアルに基づくOJT	に入力し、約7,000世帯の顧客データ
	28	金			・マニュアルに基づくOJT	ベースを構築する。データ入力に
	29	土				5日間、入力データの確認に2日
	30	日				間、データの修正に1日間が必要。
	31	月	6-3	顧客管理ソフトへの顧客データの入力に係る支援	・マニュアルに基づくOJT	上記のデータベースの構築に加え
	32	火			・マニュアルに基づくOJT	て、衛星画像ソフトに各顧客の位置
	33	水			・マニュアルに基づくOJT	情報(GPSデータ)を整理する。
	34	木			・マニュアルに基づくOJT	
	35	金			・マニュアルに基づくOJT	
	36	土				
	37	日				
	38	月	6-3	顧客管理ソフトへの顧客データの入力に係る支援	・マニュアルに基づくOJT	月次データ集計方法の指導
	39	火			・マニュアルに基づくOJT	地区別データ集計方法の指導
	40	水	7-1	料金徴収マニュアルの作成	・マニュアルの作成	Jomi TODと協議、内容確認・調整
	41	木			・座学(マニュアルの説明)	従量料金制
	42	金			・座学(マニュアルの説明)	料金徴収プロセス
	43	土				
	44	日				
	45	月	7-1	料金徴収マニュアルの作成	・座学(マニュアルの説明)	顧客対応、現金管理方法
	46	火	7-2	料金徴収作業及び会計業務に必要な帳票類の作成	・帳票類の作成、会計管理ソフトのインストール	料金徴収の各プロセスで使用
	47	水			・座学(料金徴収、帳票類の使用)	方法)帳票類の説明に1日間、会計ソフト
	48	木			・座学(料金徴収、帳票類の使用)	を使った演習に2日間が必要。
	49	金	渡航		移動：ドゥシャンベ→イスタンブール	
	50	土			移動：イスタンブール→東京	

【第2回渡航】			活動項目	活動内容	備考	
料金徴収体制整備専門家	1	土	渡航	移動：東京→	現地業務：28日/30=0.93MM	
	2	日		移動：→イスタンブール→		
	3	月		移動：→ドゥシャンベ		
	4	火	7-3	マニュアルに従った料金徴収作業、会計業務に係る指導	・座学(マニュアルの説明)	検針結果に基づく料金計算方法
	5	水			・座学(マニュアルの説明)	顧客管理台帳の作成方法
	6	木			・マニュアルに基づくOJT	約3,500世帯の検針データの入力に
	7	金			・マニュアルに基づくOJT	2日間、入力データの確認に1日
	8	土				間、PC上での料金計算に1日が必要。
	9	日				顧客の属性、検針結果、水道料
	10	月	7-3	マニュアルに従った料金徴収作業、会計業務に係る指導	・マニュアルに基づくOJT	金等が記載され、検針員が現場に
	11	火			・マニュアルに基づくOJT	携行するための顧客管理台帳(検
	12	水			・マニュアルに基づくOJT	針員15人分)の作成に1日間が必要。
	13	木	8-1	料金徴収実務に係る検針員へのOJTの実施	・座学(マニュアルの説明)	検針～料金徴収プロセス
	14	金			・座学(マニュアルの説明)	顧客管理台帳記載実習
	15	土				検針員15人に対して、①水道メ
	16	日				ーターの検針方法、②検針値の記録
	17	月	8-1	料金徴収実務に係る検針員へのOJTの実施	・マニュアルに基づくOJT	方法、③顧客管理台帳に基づく紙
	18	火			・マニュアルに基づくOJT	ベースの請求書の発行、④料金徴
	19	水			・マニュアルに基づくOJT	収・記録方法、⑤領収書の発行を個
	20	木			・マニュアルに基づくOJT	別に指導する。検針員のOJTは1日
	21	金			・マニュアルに基づくOJT	3人として、15人の検針員を指導
	22	土				するのに5日間が必要。
	23	日				
	24	月	8-2	検針員が携行する顧客管理台帳の記述内容の正確性に係る確認	・座学(顧客台帳記入の正確性確認)	顧客管理台帳の記述と、請求書、領
	25	火			・座学(顧客台帳記入の正確性確認)	収書、集金額の一致を確認する。1
	26	水			・座学(顧客台帳記入の正確性確認)	日5人の指導で3日間が必要。
	27	木	渡航		移動：ドゥシャンベ→イスタンブール	
	28	金			移動：イスタンブール→東京	

表 5-2 (2) 日本人専門家の業務計画案

		活動項目	活動内容	備考		
運 転・ 維 持 管 理 専 門 家	1	土	渡航	移動：東京→	現地業務：48日/30=1.60MM	
	2	日		移動：→イスタンブール		
	3	月		移動：→ドゥシャンベ		
	4	火	1-1	指導計画の作成	・研修資料作成	Jomi TODと協議、内容確認・調整
	5	水	1-2	運転・維持管理台帳作成	・研修資料作成	Jomi TODと協議、内容確認・調整
	6	木	1-3	水位、流量計、計器類の読み指導	・座学(給水システム全般、管理項目等)	
	7	金			・研修資料に基づくOJT	
	8	土				
	9	日				
	10	月	1-4	運転・維持管理台帳へのデータ記入・記録作成に係る指導	・座学(データ記録方法等)	
	11	火			・研修資料に基づくOJT	手書き台帳への記録指導
	12	水			・研修資料に基づくOJT	PCへのデータ入力指導
	13	木			・研修資料に基づくOJT	PCへのデータ入力指導
	14	金	1-5	記録の正確性に係る確認、試験の実施	・実地試験	
	15	土				
	16	日				
	17	月	2-1	運転マニュアルの作成	・研修資料作成	Jomi TODと協議、内容確認・調整
	18	火			・座学(給水システムの運転管理方法全般)	
	19	水	2-2	さらし粉溶解作業指導	・座学(溶解、注入作業)	
	20	木			・マニュアルに基づくOJT	25%さらし粉溶解作業
	21	金			・マニュアルに基づくOJT	60%さらし粉溶解作業
	22	土				
	23	日				
	24	月	2-3	注入ポンプの操作指導	・座学(注入方法、注入率の調整)	
	25	火			・マニュアルに基づくOJT	注入率の設定指導
	26	水	2-4	給水中の残留塩素濃度測定に係る指導	・座学(残留塩素測定方法、測定地点)	
	27	木			・マニュアルに基づくOJT	残留塩素濃度測定実務指導
	28	金	2-5	塩素濃度測定結果に基づく注入ポンプの調整に係る指導	・座学(測定データのフィードバック方法)	
	29	土				
	30	日				
	31	月	2-5	塩素濃度測定結果に基づく注入ポンプの調整に係る指導	・マニュアルに基づくOJT	残留塩素濃度調整方法指導
	32	火			・マニュアルに基づくOJT	残留塩素濃度調整方法指導
	33	水	2-6	運転管理記録の作成指導	・座学(運転管理台帳の記入方法)	PCへのデータ入力支援
	34	木			・運転管理台帳の記録に係るOJT	PCへのデータ入力支援
	35	金	3-1	運転管理計画の策定マニュアルの作成	・研修資料作成	Jomi TODと協議、内容確認・調整
	36	土				
	37	日				
	38	月	3-2	運転管理計画の策定に係る指導	・座学(PDCA手法による運転管理)	
	39	火			・マニュアルに基づくOJT	PCを用いた運転管理計画の作成
	40	水	3-3	策定した運転管理計画の運転管理へのフィードバック指導	・座学(運転管理計画の作成)	
	41	木	4-1	世帯調査用の調査票の作成	・研修資料作成	Jomi TODと協議、内容確認・調整
	42	金	4-2	アンケート調査の実施方法に係る指導	・座学(JMP手法)	
	43	土				
	44	日				
	45	月	4-3	採水マニュアルの作成	・研修資料作成	Jomi TODと協議、内容確認・調整
	46	火	4-4	マニュアルに従った採水方法の指導	・マニュアルに基づくOJT	
	47	水	渡航		移動：ドゥシャンベ→イスタンブール	
	48	木			移動：イスタンブール→東京	

6. ソフトコンポーネントの実施リソースの調達方法

本ソフトコンポーネント実施にあたり、配置が予想される実施リソースを以下に示す。

(1) 日本人専門家

給水施設(深井戸施設、消毒設備、配水施設/高架水槽、配水管等)の運転・維持管理、生産管理、水質管理に精通し、水道事業の運営にも経験のある専門家を投入するものとする。

(2) 現地スタッフ

タジキスタンで過去に実施された無償資金協力事業(ピアンジ給水計画、ハマドニ給水計画)やJICA技術協力プロジェクトで給水分野のプロジェクトの現地スタッフや通訳として当該分野の業務経験のある現地技術者を雇用し、研修資料やマニュアルのロシア語翻訳、カウンターパートとの連絡調整、日本人専門家活動時の通訳等を行う現地のスタッフを投入するものとする。

表 9-1 ソフトコンポーネント概略事業費

項目	日本円 (千円)	現地貨		米ドル		円換算計 (千円)	合計 (千円)
		現地貨 (TJS)	円換算 (千円)	米ドル	円換算 (千円)		
直接人件費	3,993	0	0	0	0	0	3,993
直接経費	3,332	41,328	536	18,463	2,471	3,007	6,339
間接費	8,306	0	0	0	0	0	8,306
合計	15,631	41,328	536	18,463	2,471	3,007	18,638

表 9-2 ソフトコンポーネント積算内訳書

項目	仕様	単価 (円)	単位	数量	金額 (円)	備考
直接人件費	従量料金制導入支援	1,024,000	人月	2.6	2,662,400	3号
	給水施設初期運転管理支援	832,000	人月	1.6	1,331,200	4号
直接人件費計					3,993,600	
直接経費	現地アシスタント1	34,843	月	2.07	72,125	現地備人
	現地アシスタント2	44,625	月	1.33	59,351	現地備人
	運転手	44,625	月	4.20	187,425	現地備人
	航空運賃		渡航	2.0	1,027,894	3号：往復(エコノミークラス)
	航空運賃		渡航	1.0	513,947	4号：往復(エコノミークラス)
	国内旅費	2,740	回	6.0	16,440	片道
	日当 (3号)	(3,800~3,040)	日	78	278,160	宿泊日数：通減率0~20%
	日当 (4号)	(3,800~3,420)	日	48	175,560	宿泊日数：通減率0~10%
	宿泊費 (3号)	(11,600~9,280)	日	72	815,480	日当の通減率0~20%
	宿泊費 (4号)	(11,600~10,400)	日	45	504,600	日当の通減率0~10%
	車両費	8,841	日	116	1,025,611	
	ガソリン	1,948.8	L	111.4	217,120	5.6/h*3h*116日
	JMP基準による調査		式	1	1,445,472	見積による
直接経費計					6,339,000	千円止め
間接費						
	その他原価		式	1.0	4,792,320	直人×120%
	一般管理費等		式	1.0	3,514,368	(直人+その他原価)×40%
合計					18,638,000	千円止め

※合計金額は換算等端数処理のため一致しない。

10. 相手国側実地機関の責務

本ソフトコンポーネントは、Jomi TOD が新しい給水施設を速やかに、適切に運用していくために技術的な指導を行うものであり、実際の運用に必要な人員の確保と適切な職員配置はタジキスタン国側で実施されるべき事項である。図 1-1 Jomi TOD の組織図（将来）を基に、必要な人員が本ソフトコンポーネントの実施に先立って配置される必要がある。

別添資料-7

配水管網の設計計算書

配水管網の設計計算

1. 配水管網の水理計算

配水管網の計算は、以下の条件により実施した。

項目	内容
使用する水理計算ソフト	EPANET 2.2
管路の流量公式	ヘーゼン・ウィリアムス式
最小残存水圧	1.0bar 以上
最大流速	1.5m/s 以下
時間係数	1.71
管路流速係数	130
消火時の条件	人口 1 万人未満とし、1 m ³ /min を 60 分消火時間に充てると仮定して、各ゾーンに 60 m ³ /h を加算。この時負圧にならないか確認。
その他	<ul style="list-style-type: none"> ・ DMA 配水システムを採用 (ゾーンと呼ぶ)。 ・ 隣り合うゾーンが大規模断水になった際の応援が可能な設計とした。この時、負圧にならないか確認。 ・ 西側エリアへの拡張を念頭に置き (1500 m³/日程度)、水理計算及び設計を実施。

2. 配水管網の水理計算

時間最大時の水理計算結果を以下に示す。



火災時時間最大の水利計算結果を以下に示す。



交点の管網計算データ及び計算結果を以下に示す。なお、需要が0の交点は、交差点部や曲部など、便宜的に設置した交点である。

Node ID	Peak Demand			Extinction Demand		
	Demand	Head	Pressure	Demand	Head	Pressure
	CMD	m	m	CMD	m	m
Junc 1	5.76	445.25	15.25	7.07	443.07	13.07
Junc 2	5.76	445.26	15.26	7.07	443.07	13.07
Junc 3	5.76	445.28	15.28	7.07	443.11	13.11
Junc 4	5.76	445.31	15.31	7.07	443.16	13.16
Junc 5	5.76	445.32	15.32	7.07	443.16	13.16
Junc 6	5.76	445.32	15.32	7.07	443.16	13.16
Junc 7	5.76	445.32	15.32	7.07	443.17	13.17
Junc 8	5.76	445.32	17.32	7.07	443.17	15.17
Junc 9	5.76	445.33	17.33	7.07	443.19	15.19
Junc 10	5.76	445.34	17.34	7.07	443.2	15.2
Junc 11	5.76	445.47	18.47	7.07	443.38	16.38
Junc 12	5.76	445.35	18.35	7.07	443.22	16.22
Junc 13	5.76	445.37	18.37	7.07	443.24	16.24
Junc 14	5.76	445.32	18.32	7.07	443.17	16.17

Junc 15	5.76	445.39	18.39	7.07	443.26	16.26
Junc 16	5.76	445.4	18.4	7.07	443.28	16.28
Junc 17	5.76	445.41	18.41	7.07	443.3	16.3
Junc 18	5.76	445.47	18.47	7.07	443.39	16.39
Junc 19	5.76	445.54	18.54	7.07	443.48	16.48
Junc 20	5.76	445.61	18.61	7.07	443.59	16.59
Junc 21	5.76	445.43	18.43	7.07	443.33	16.33
Junc 22	5.76	445.45	18.45	7.07	443.36	16.36
Junc 23	5.76	445.35	18.35	7.07	443.21	16.21
Junc 24	5.76	445.31	18.31	7.07	443.15	16.15
Junc 25	5.76	445.3	18.3	7.07	443.13	16.13
Junc 26	5.76	445.29	18.29	7.07	443.12	16.12
Junc 27	5.76	445.28	18.28	7.07	443.1	16.1
Junc 28	5.76	445.27	18.27	7.07	443.09	16.09
Junc 29	5.76	445.26	18.26	7.07	443.08	16.08
Junc 30	5.76	445.26	17.26	7.07	443.07	15.07
Junc 31	5.76	445.26	17.26	7.07	443.07	15.07
Junc 32	5.76	445.25	15.25	7.07	443.07	13.07
Junc 33	5.76	445.23	15.23	7.07	443.03	13.03
Junc 34	5.76	445.22	15.22	7.07	443.01	13.01
Junc 35	5.76	445.29	15.29	7.07	443.13	13.13
Junc 36	5.76	445.21	15.21	7.07	443	13
Junc 37	5.76	445.2	15.2	7.07	442.99	12.99
Junc 38	5.76	445.19	15.19	7.07	442.97	12.97
Junc 39	5.76	445.18	15.18	7.07	442.96	12.96
Junc 40	5.76	445.17	15.17	7.07	442.95	12.95
Junc 41	5.76	445.17	15.17	7.07	442.95	12.95
Junc 42	5.76	445.17	15.17	7.07	442.95	12.95
Junc 43	5.76	445.17	15.17	7.07	442.95	12.95
Junc 44	5.76	445.17	15.17	7.07	442.95	12.95
Junc 45	5.76	445.17	15.17	7.07	442.95	12.95
Junc 47	5.76	445.17	15.17	7.07	442.94	12.94
Junc 48	5.76	445.17	17.17	7.07	442.95	14.95
Junc 49	5.76	445.17	15.17	7.07	442.94	12.94
Junc 50	5.76	445.17	17.17	7.07	442.94	14.94
Junc 51	5.76	445.17	15.17	7.07	442.94	12.94
Junc 52	5.76	445.17	17.17	7.07	442.94	14.94
Junc 53	5.76	445.16	15.16	7.07	442.93	12.93
Junc 54	5.76	445.16	17.16	7.07	442.93	14.93
Junc 55	5.76	445.16	15.16	7.07	442.93	12.93
Junc 56	5.76	445.15	17.15	7.07	442.92	14.92
Junc 57	5.76	445.15	17.15	7.07	442.91	14.91
Junc 58	5.76	445.17	17.17	7.07	442.95	14.95

Junc 59	5.76	445.17	15.17	7.07	442.95	12.95
Junc 60	5.76	445.14	18.14	7.07	442.91	15.91
Junc 61	5.76	445.16	18.16	7.07	442.93	15.93
Junc 62	5.76	445.16	18.16	7.07	442.93	15.93
Junc 65	5.76	445.32	18.32	7.07	443.17	16.17
Junc 66	5.76	445.32	18.32	7.07	443.16	16.16
Junc 67	5.76	445.16	18.16	7.07	442.94	15.94
Junc 68	5.76	445.19	18.19	7.07	442.98	15.98
Junc 69	5.76	445.21	18.21	7.07	443.01	16.01
Junc 70	5.76	445.18	18.18	7.07	442.96	15.96
Junc 71	5.76	445.19	18.19	7.07	442.97	15.97
Junc 72	5.76	445.22	18.22	7.07	443.01	16.01
Junc 73	5.76	445.22	18.22	7.07	443.02	16.02
Junc 74	5.76	445.22	18.22	7.07	443.01	16.01
Junc 75	5.76	445.21	18.21	7.07	443.01	16.01
Junc 76	5.76	445.21	18.21	7.07	443.01	16.01
Junc 77	5.76	445.22	18.22	7.07	443.03	16.03
Junc 78	5.76	445.23	18.23	7.07	443.03	16.03
Junc 79	5.76	445.22	18.22	7.07	443.01	16.01
Junc 80	5.76	445.3	18.3	7.07	443.14	16.14
Junc 81	5.76	445.41	18.41	7.07	443.3	16.3
Junc 82	5.76	445.32	18.32	7.07	443.17	16.17
Junc 83	5.76	445.32	18.32	7.07	443.16	16.16
Junc 84	5.76	445.31	18.31	7.07	443.16	16.16
Junc 85	5.76	445.29	18.29	7.07	443.12	16.12
Junc 86	5.76	445.25	18.25	7.07	443.06	16.06
Junc 87	5.76	445.24	18.24	7.07	443.04	16.04
Junc 88	5.76	445.25	18.25	7.07	443.06	16.06
Junc 89	5.76	445.27	18.27	7.07	443.09	16.09
Junc 90	5.76	445.24	18.24	7.07	443.05	16.05
Junc 91	5.76	445.24	18.24	7.07	443.04	16.04
Junc 92	5.76	445.24	18.24	7.07	443.04	16.04
Junc 93	5.76	445.23	18.23	7.07	443.03	16.03
Junc 94	5.76	445.23	18.23	7.07	443.03	16.03
Junc 95	5.76	445.23	18.23	7.07	443.03	16.03
Junc 96	5.76	445.23	18.23	7.07	443.04	16.04
Junc 97	5.76	445.22	18.22	7.07	443.02	16.02
Junc 98	5.76	445.22	18.22	7.07	443.02	16.02
Junc 99	5.76	445.22	18.22	7.07	443.01	16.01
Junc 100	5.76	445.23	18.23	7.07	443.03	16.03
Junc 101	5.76	445.23	17.23	7.07	443.03	15.03
Junc 102	5.76	445.2	17.2	7.07	443	15
Junc 103	5.76	445.2	17.2	7.07	442.98	14.98

Junc 104	5.76	445.19	17.19	7.07	442.98	14.98
Junc 105	5.76	445.19	17.19	7.07	442.97	14.97
Junc 106	5.76	445.2	17.2	7.07	442.98	14.98
Junc 107	5.76	445.2	17.2	7.07	442.98	14.98
Junc 108	5.76	445.19	17.19	7.07	442.97	14.97
Junc 109	5.76	445.18	17.18	7.07	442.96	14.96
Junc 110	5.76	445.17	17.17	7.07	442.95	14.95
Junc 111	5.76	445.14	17.14	7.07	442.91	14.91
Junc 112	5.76	445.15	18.15	7.07	442.91	15.91
Junc 113	5.76	445.14	18.14	7.07	442.91	15.91
Junc 114	5.76	445.23	18.23	7.07	443.03	16.03
Junc 115	5.76	445.23	18.23	7.07	443.03	16.03
Junc 116	7.9	446.09	21.09	9.85	443.71	18.71
Junc 117	7.9	445.81	20.81	9.85	443.29	18.29
Junc 118	7.9	445.74	20.74	9.85	443.19	18.19
Junc 119	7.9	445.68	20.68	9.85	443.11	18.11
Junc 120	7.9	445.67	20.67	9.85	443.09	18.09
Junc 121	7.9	446.12	21.12	9.85	443.77	18.77
Junc 122	7.9	446.09	21.09	9.85	443.72	18.72
Junc 123	7.9	446.08	19.08	9.85	443.7	16.7
Junc 124	7.9	446.07	19.07	9.85	443.69	16.69
Junc 125	7.9	446.06	19.06	9.85	443.67	16.67
Junc 126	7.9	446.06	19.06	9.85	443.67	16.67
Junc 127	7.9	446.06	19.06	9.85	443.67	16.67
Junc 128	7.9	446.06	19.06	9.85	443.67	16.67
Junc 129	7.9	446.06	16.06	9.85	443.67	13.67
Junc 130	7.9	446.06	16.06	9.85	443.67	13.67
Junc 131	7.9	446.13	21.13	9.85	443.77	18.77
Junc 132	7.9	446.14	21.14	9.85	443.79	18.79
Junc 133	7.9	446.14	21.14	9.85	443.8	18.8
Junc 134	7.9	446.24	21.24	9.85	443.94	18.94
Junc 135	7.9	446.3	21.3	9.85	444.03	19.03
Junc 136	7.9	446.11	21.11	9.85	443.75	18.75
Junc 137	7.9	446.11	21.11	9.85	443.74	18.74
Junc 138	7.9	446.12	21.12	9.85	443.77	18.77
Junc 139	7.9	446.1	21.1	9.85	443.73	18.73
Junc 140	7.9	446.09	19.09	9.85	443.71	16.71
Junc 141	7.9	446.08	19.08	9.85	443.7	16.7
Junc 142	7.9	446.07	19.07	9.85	443.69	16.69
Junc 143	7.9	446.07	19.07	9.85	443.69	16.69
Junc 144	7.9	446.07	16.07	9.85	443.68	13.68
Junc 145	7.9	446.07	16.07	9.85	443.68	13.68
Junc 146	7.9	446.18	21.18	9.85	443.86	18.86

Junc 147	7.9	446.15	21.15	9.85	443.81	18.81
Junc 148	7.9	446.12	21.12	9.85	443.76	18.76
Junc 149	7.9	446.12	21.12	9.85	443.76	18.76
Junc 150	7.9	446.14	21.14	9.85	443.78	18.78
Junc 151	7.9	446.14	21.14	9.85	443.79	18.79
Junc 152	7.9	446.16	21.16	9.85	443.82	18.82
Junc 153	7.9	446.14	21.14	9.85	443.8	18.8
Junc 154	7.9	446.14	21.14	9.85	443.79	18.79
Junc 155	7.9	446.15	21.15	9.85	443.8	18.8
Junc 156	7.9	446.17	21.17	9.85	443.83	18.83
Junc 157	7.9	446.2	21.2	9.85	443.88	18.88
Junc 158	7.9	445.79	18.79	9.85	443.26	16.26
Junc 159	7.9	445.78	18.78	9.85	443.25	16.25
Junc 160	7.9	446.08	19.08	9.85	443.7	16.7
Junc 162	7.9	445.81	18.81	9.85	443.3	16.3
Junc 163	7.9	445.78	18.78	9.85	443.25	16.25
Junc 164	7.9	446.13	21.13	9.85	443.78	18.78
Junc 165	7.9	446.12	21.12	9.85	443.76	18.76
Junc 166	7.9	446.09	21.09	9.85	443.72	18.72
Junc 167	7.9	446.08	21.08	9.85	443.71	18.71
Junc 168	7.9	446.12	21.12	9.85	443.77	18.77
Junc 169	7.9	446.12	21.12	9.85	443.76	18.76
Junc 170	7.9	446.12	21.12	9.85	443.76	18.76
Junc 171	7.9	446.14	21.14	9.85	443.78	18.78
Junc 172	7.9	446.1	21.1	9.85	443.74	18.74
Junc 173	7.9	446.09	21.09	9.85	443.72	18.72
Junc 174	7.9	445.85	18.85	9.85	443.35	16.35
Junc 175	7.9	445.81	18.81	9.85	443.29	16.29
Junc 176	7.9	446.13	21.13	9.85	443.77	18.77
Junc 177	7.9	446.05	19.05	9.85	443.66	16.66
Junc 178	7.9	446.06	19.06	9.85	443.68	16.68
Junc 179	7.9	446.06	19.06	9.85	443.68	16.68
Junc 180	7.9	446.06	19.06	9.85	443.68	16.68
Junc 181	7.9	446.07	19.07	9.85	443.68	16.68
Junc 182	7.9	446.07	19.07	9.85	443.69	16.69
Junc 183	7.9	446.06	19.06	9.85	443.69	16.69
Junc 184	7.9	446.08	21.08	9.85	443.71	18.71
Junc 185	7.9	446.11	21.11	9.85	443.74	18.74
Junc 186	7.9	446.08	19.08	9.85	443.71	16.71
Junc 187	7.9	445.84	18.84	9.85	443.34	16.34
Junc 188	7.9	445.79	18.79	9.85	443.27	16.27
Junc 189	7.9	445.78	18.78	9.85	443.25	16.25
Junc 190	13.8	446.7	26.7	16.35	444.57	24.57

Junc 191	13.8	446.71	23.71	16.35	444.59	21.59
Junc 192	13.8	446.72	23.72	16.35	444.7	21.7
Junc 193	13.8	446.72	23.72	16.35	444.71	21.71
Junc 194	13.8	446.71	26.71	16.35	444.69	24.69
Junc 195	13.8	446.76	23.76	16.35	444.77	21.77
Junc 196	13.8	446.74	26.74	16.35	444.75	24.75
Junc 197	13.8	446.72	23.72	16.35	444.7	21.7
Junc 198	13.8	446.72	23.72	16.35	444.69	21.69
Junc 199	13.8	446.72	21.72	16.35	444.69	19.69
Junc 200	13.8	446.69	21.69	16.35	444.63	19.63
Junc 201	13.8	446.63	21.63	16.35	444.53	19.53
Junc 202	13.8	446.62	21.62	16.35	444.52	19.52
Junc 203	13.8	446.58	21.58	16.35	444.45	19.45
Junc 204	13.8	446.38	23.38	16.35	444.18	21.18
Junc 205	13.8	446.42	21.42	16.35	444.25	19.25
Junc 206	13.8	446.46	21.46	16.35	444.3	19.3
Junc 207	13.8	446.49	21.49	16.35	444.34	19.34
Junc 208	13.8	446.5	21.5	16.35	444.35	19.35
Junc 209	13.8	446.48	21.48	16.35	444.32	19.32
Junc 210	13.8	446.33	23.33	16.35	444.12	21.12
Junc 211	13.8	446.08	26.08	16.35	443.77	23.77
Junc 212	13.8	445.83	25.83	16.35	443.43	23.43
Junc 213	13.8	445.61	25.61	16.35	443.12	23.12
Junc 214	13.8	445.48	25.48	16.35	442.94	22.94
Junc 215	13.8	445.47	25.47	16.35	442.94	22.94
Junc 216	13.8	446.48	21.48	16.35	444.32	19.32
Junc 217	13.8	446.48	23.48	16.35	444.32	21.32
Junc 218	13.8	446.34	23.34	16.35	444.12	21.12
Junc 219	13.8	445.61	22.61	16.35	443.12	20.12
Junc 220	13.8	445.4	20.4	16.35	442.83	17.83
Junc 221	13.8	445.36	25.36	16.35	442.79	22.79
Junc 222	13.8	445.36	20.36	16.35	442.78	17.78
Junc 223	13.8	445.44	22.44	16.35	442.9	19.9
Junc 224	13.8	446.45	23.45	16.35	444.28	21.28
Junc 225	13.8	446.38	23.38	16.35	444.18	21.18
Junc 226	13.8	446.49	23.49	16.35	444.33	21.33
Junc 227	13.8	446.49	21.49	16.35	444.34	19.34
Junc 228	13.8	446.5	21.5	16.35	444.34	19.34
Junc 229	13.8	446.52	21.52	16.35	444.37	19.37
Junc 230	13.8	446.45	21.45	16.35	444.27	19.27
Junc 231	13.8	446.57	21.57	16.35	444.45	19.45
Junc 232	13.8	446.63	21.63	16.35	444.52	19.52
Junc 233	13.8	446.57	21.57	16.35	444.44	19.44

Junc 234	13.8	446.64	21.64	16.35	444.54	19.54
Junc 235	13.8	446.57	21.57	16.35	444.44	19.44
Junc 236	13.8	446.64	19.64	16.35	444.53	17.53
Junc 237	13.8	446.7	21.7	16.35	444.64	19.64
Junc 238	13.8	446.72	21.72	16.35	444.66	19.66
Junc 239	13.8	446.71	19.71	16.35	444.64	17.64
Junc 240	13.8	446.69	21.69	16.35	444.64	19.64
Junc 241	13.8	446.71	21.71	16.35	444.66	19.66
Junc 242	13.8	446.73	21.73	16.35	444.68	19.68
Junc 243	13.8	446.74	19.74	16.35	444.68	17.68
Junc 244	13.8	446.78	21.78	16.35	444.79	19.79
Junc 245	13.8	446.87	21.87	16.35	444.91	19.91
Junc 246	13.8	447.04	22.04	16.35	445.09	20.09
Junc 247	13.8	446.83	23.83	16.35	444.9	21.9
Junc 248	13.8	446.98	21.98	16.35	445.14	20.14
Junc 249	13.8	447.2	22.2	16.35	445.26	20.26
Junc 250	16.78	446.53	21.53	19.73	444.4	19.4
Junc 251	13.8	446.76	19.76	16.35	444.69	17.69
Junc 252	13.8	446.71	19.71	16.35	444.63	17.63
Junc 253	13.8	446.64	19.64	16.35	444.53	17.53
Junc 254	13.8	446.58	21.58	16.35	444.44	19.44
Junc 255	13.8	446.5	21.5	16.35	444.34	19.34
Junc 256	13.8	446.46	21.46	16.35	444.28	19.28
Junc 257	16.78	446.49	21.49	19.73	444.31	19.31
Junc 258	16.78	446.43	21.43	19.73	444.23	19.23
Junc 259	16.78	446.35	21.35	19.73	444.12	19.12
Junc 260	16.78	446.32	21.32	19.73	444.08	19.08
Junc 261	16.78	446.32	21.32	19.73	444.09	19.09
Junc 262	16.78	446.33	21.33	19.73	444.09	19.09
Junc 263	16.78	446.3	21.3	19.73	444.05	19.05
Junc 264	16.78	446.29	21.29	19.73	444.05	19.05
Junc 265	16.78	446.32	21.32	19.73	444.09	19.09
Junc 266	16.78	446.28	21.28	19.73	444.03	19.03
Junc 267	16.78	446.32	21.32	19.73	444.09	19.09
Junc 268	16.78	446.27	21.27	19.73	444.02	19.02
Junc 269	16.78	446.43	21.43	19.73	444.24	19.24
Junc 270	16.78	446.37	21.37	19.73	444.15	19.15
Junc 271	16.78	446.32	21.32	19.73	444.09	19.09
Junc 272	16.78	446.29	21.29	19.73	444.05	19.05
Junc 273	16.78	446.27	21.27	19.73	444.01	19.01
Junc 274	16.78	446.29	21.29	19.73	444.05	19.05
Junc 275	16.78	446.2	21.2	19.73	443.92	18.92
Junc 276	16.78	446.29	19.29	19.73	444.04	17.04

Junc 277	16.78	446.2	19.2	19.73	443.92	16.92
Junc 278	16.78	446.49	21.49	19.73	444.32	19.32
Junc 279	16.78	446.44	21.44	19.73	444.25	19.25
Junc 280	16.78	446.39	19.39	19.73	444.18	17.18
Junc 281	16.78	446.35	19.35	19.73	444.13	17.13
Junc 282	16.78	446.32	19.32	19.73	444.09	17.09
Junc 283	16.78	446.29	19.29	19.73	444.04	17.04
Junc 284	16.78	446.26	19.26	19.73	444.01	17.01
Junc 285	16.78	445.99	18.99	19.73	443.63	16.63
Junc 286	16.78	445.9	18.9	19.73	443.52	16.52
Junc 287	16.78	446.26	19.26	19.73	444.01	17.01
Junc 288	16.78	445.97	18.97	19.73	443.62	16.62
Junc 289	16.78	445.9	18.9	19.73	443.52	16.52
Junc 290	16.78	446.48	19.48	19.73	444.3	17.3
Junc 291	16.78	446.4	19.4	19.73	444.19	17.19
Junc 292	16.78	446.36	19.36	19.73	444.14	17.14
Junc 293	16.78	446.33	19.33	19.73	444.09	17.09
Junc 294	16.78	446.32	19.32	19.73	444.08	17.08
Junc 295	16.78	446.27	19.27	19.73	444.01	17.01
Junc 296	16.78	446.27	19.27	19.73	444.02	17.02
Junc 297	16.78	446.29	19.29	19.73	444.04	17.04
Junc 298	16.78	446.31	19.31	19.73	444.08	17.08
Junc 299	16.78	446.37	19.37	19.73	444.15	17.15
Junc 300	16.78	446.41	19.41	19.73	444.2	17.2
Junc 301	16.78	446.48	19.48	19.73	444.29	17.29
Junc 302	16.78	446.42	21.42	19.73	444.26	19.26
Junc 303	16.78	446.41	21.41	19.73	444.25	19.25
Junc 304	16.78	446.39	21.39	19.73	444.13	19.13
Junc 305	16.78	446.36	21.36	19.73	444.09	19.09
Junc 306	16.78	446.36	21.36	19.73	444.09	19.09
Junc 307	13.8	447.18	22.18	16.35	445.52	20.52
Junc 308	13.8	447.37	22.37	16.35	445.88	20.88
Junc 309	16.78	446.42	21.42	19.73	444.32	19.32
Junc 310	16.78	446.42	21.42	19.73	444.36	19.36
Junc 311	16.78	446.42	21.42	19.73	444.35	19.35
Junc 312	0	447.71	22.71	0	446.36	21.36
Junc 313	16.78	446.34	21.34	19.73	444.2	19.2
Junc 314	0	448.09	23.09	0	446.88	21.88
Junc 315	0	448.53	23.53	0	447.5	22.5
Junc 316	23.1	446.25	29.25	25.66	445.2	28.2
Junc 317	9.1	446.22	29.22	11.63	445.16	28.16
Junc 318	9.1	446.18	29.18	11.63	445.1	28.1
Junc 319	9.1	446.14	29.14	11.63	445.03	28.03

Junc 320	9.1	446.1	29.1	11.63	444.97	27.97
Junc 321	9.1	445.97	28.97	11.63	444.77	27.77
Junc 322	9.1	445.95	28.95	11.63	444.73	27.73
Junc 323	9.1	445.96	28.96	11.63	444.74	27.74
Junc 324	9.1	446.16	29.16	11.63	445.07	28.07
Junc 325	9.1	446.14	31.14	11.63	445.02	30.02
Junc 326	9.1	446.12	31.12	11.63	445	30
Junc 327	9.1	446.12	31.12	11.63	444.99	29.99
Junc 328	9.1	446.16	29.16	11.63	445.05	28.05
Junc 329	9.1	446.15	29.15	11.63	445.05	28.05
Junc 330	9.1	446.1	31.1	11.63	444.96	29.96
Junc 331	9.1	446.03	31.03	11.63	444.86	29.86
Junc 332	9.1	446	31	11.63	444.81	29.81
Junc 333	9.1	445.96	28.96	11.63	444.74	27.74
Junc 334	9.1	445.95	28.95	11.63	444.73	27.73
Junc 335	9.1	445.95	28.95	11.63	444.74	27.74
Junc 336	9.1	445.95	28.95	11.63	444.73	27.73
Junc 337	9.1	446.12	31.12	11.63	445	30
Junc 338	9.1	446.07	31.07	11.63	444.91	29.91
Junc 339	9.1	446.03	31.03	11.63	444.85	29.85
Junc 340	9.1	446	31	11.63	444.81	29.81
Junc 341	9.1	445.98	30.98	11.63	444.78	29.78
Junc 342	9.1	445.96	28.96	11.63	444.75	27.75
Junc 343	9.1	445.92	28.92	11.63	444.69	27.69
Junc 344	9.1	445.9	28.9	11.63	444.66	27.66
Junc 345	9.1	445.88	28.88	11.63	444.62	27.62
Junc 346	9.1	445.86	28.86	11.63	444.59	27.59
Junc 347	9.1	445.85	28.85	11.63	444.57	27.57
Junc 348	9.1	445.85	28.85	11.63	444.56	27.56
Junc 349	9.1	445.84	28.84	11.63	444.56	27.56
Junc 350	9.1	445.81	28.81	11.63	444.5	27.5
Junc 351	9.1	445.81	28.81	11.63	444.5	27.5
Junc 352	9.1	445.82	28.82	11.63	444.52	27.52
Junc 353	9.1	445.9	28.9	11.63	444.65	27.65
Junc 354	9.1	445.93	28.93	11.63	444.7	27.7
Junc 355	9.1	445.94	28.94	11.63	444.71	27.71
Junc 356	9.1	445.97	30.97	11.63	444.76	29.76
Junc 357	9.1	446.01	31.01	11.63	444.83	29.83
Junc 358	9.1	446.12	31.12	11.63	445	30
Junc 359	9.1	446.08	31.08	11.63	444.94	29.94
Junc 360	9.1	446.05	31.05	11.63	444.88	29.88
Junc 361	9.1	446.03	31.03	11.63	444.85	29.85
Junc 362	9.1	446.02	31.02	11.63	444.83	29.83

Junc 364	10.68	445.02	20.02	13.69	442.15	17.15
Junc 366	10.68	445.08	30.08	13.69	442.25	27.25
Junc 367	10.68	445.11	30.11	13.69	442.29	27.29
Junc 368	10.68	445.17	28.17	13.69	442.39	25.39
Junc 369	10.68	445.16	28.16	13.69	442.38	25.38
Junc 370	10.68	445.11	30.11	13.69	442.3	27.3
Junc 371	10.68	445.11	30.11	13.69	442.3	27.3
Junc 372	10.68	445.12	28.12	13.69	442.31	25.31
Junc 373	10.68	445.17	28.17	13.69	442.39	25.39
Junc 374	10.68	445.09	30.09	13.69	442.27	27.27
Junc 375	10.68	445.09	30.09	13.69	442.26	27.26
Junc 376	10.68	445.11	28.11	13.69	442.29	25.29
Junc 377	10.68	445.1	28.1	13.69	442.28	25.28
Junc 378	10.68	445.08	28.08	13.69	442.26	25.26
Junc 379	10.68	445.06	28.06	13.69	442.22	25.22
Junc 380	10.68	445.09	28.09	13.69	442.27	25.27
Junc 381	10.68	445.06	28.06	13.69	442.22	25.22
Junc 382	10.68	445.21	28.21	13.69	442.46	25.46
Junc 383	10.68	445.22	28.22	13.69	442.47	25.47
Junc 384	10.68	445.22	28.22	13.69	442.47	25.47
Junc 385	10.68	445.2	28.2	13.69	442.44	25.44
Junc 386	10.68	445.31	28.31	13.69	442.62	25.62
Junc 387	10.68	445.32	28.32	13.69	442.63	25.63
Junc 388	10.68	445.3	28.3	13.69	442.6	25.6
Junc 389	10.68	445.34	28.34	13.69	442.66	25.66
Junc 390	10.68	445.38	28.38	13.69	442.73	25.73
Junc 391	10.68	445.38	28.38	13.69	442.72	25.72
Junc 392	10.68	445.37	28.37	13.69	442.71	25.71
Junc 393	10.68	445.63	28.63	13.69	443.12	26.12
Junc 394	10.68	445.59	28.59	13.69	443.05	26.05
Junc 395	10.68	445.73	28.73	13.69	443.28	26.28
Junc 396	10.68	445.73	28.73	13.69	443.28	26.28
Junc 397	10.68	445.71	28.71	13.69	443.25	26.25
Junc 398	10.68	445.72	28.72	13.69	443.27	26.27
Junc 399	10.68	445.73	28.73	13.69	443.28	26.28
Junc 400	10.68	446.08	29.08	13.69	443.83	26.83
Junc 401	10.68	446.41	26.41	13.69	444.36	24.36
Junc 402	10.68	445.7	25.7	13.69	443.23	23.23
Junc 403	10.68	445.69	25.69	13.69	443.22	23.22
Junc 405	10.68	445.83	25.83	13.69	443.44	23.44
Junc 406	9.5	446.76	29.76	12.2	444.91	27.91
Junc 407	9.5	446.67	26.67	12.2	444.77	24.77
Junc 408	9.5	446.22	26.22	12.2	444.05	24.05

Junc 409	9.5	446.15	26.15	12.2	444.03	24.03
Junc 410	10.68	446.11	26.11	13.69	444.01	24.01
Junc 411	10.68	446.06	26.06	13.69	443.93	23.93
Junc 412	10.68	446.03	26.03	13.69	443.89	23.89
Junc 413	10.68	446.04	26.04	13.69	443.89	23.89
Junc 414	9.5	446.15	26.15	12.2	444.02	24.02
Junc 415	9.5	446.86	26.86	12.2	445.08	25.08
Junc 416	9.5	446.7	26.7	12.2	444.81	24.81
Junc 417	9.5	446.68	26.68	12.2	444.79	24.79
Junc 418	9.5	446.43	26.43	12.2	444.39	24.39
Junc 419	9.5	446.42	26.42	12.2	444.37	24.37
Junc 420	9.5	446.78	26.78	12.2	444.95	24.95
Junc 421	9.5	446.85	26.85	12.2	445.06	25.06
Junc 422	9.5	446.85	26.85	12.2	445.05	25.05
Junc 423	9.5	446.81	26.81	12.2	445	25
Junc 424	9.5	446.8	26.8	12.2	444.98	24.98
Junc 425	9.5	446.8	26.8	12.2	444.98	24.98
Junc 426	9.5	446.81	26.81	12.2	444.99	24.99
Junc 427	9.5	446.81	26.81	12.2	444.99	24.99
Junc 428	9.5	446.83	26.83	12.2	445.03	25.03
Junc 429	9.5	446.85	26.85	12.2	445.05	25.05
Junc 430	9.5	446.85	26.85	12.2	445.05	25.05
Junc 431	9.5	446.84	26.84	12.2	445.05	25.05
Junc 432	9.5	446.84	26.84	12.2	445.04	25.04
Junc 433	9.5	446.84	26.84	12.2	445.05	25.05
Junc 434	9.5	446.84	26.84	12.2	445.05	25.05
Junc 435	9.5	446.85	26.85	12.2	445.06	25.06
Junc 436	9.5	446.86	26.86	12.2	445.07	25.07
Junc 437	9.5	446.93	26.93	12.2	445.18	25.18
Junc 438	9.5	446.93	26.93	12.2	445.18	25.18
Junc 439	9.5	446.93	26.93	12.2	445.18	25.18
Junc 440	9.5	447.02	27.02	12.2	445.32	25.32
Junc 441	9.5	447.01	27.01	12.2	445.31	25.31
Junc 442	18.6	447.02	22.02	22.72	445.33	20.33
Junc 443	9.5	447.2	24.2	12.2	445.61	22.61
Junc 444	9.5	447.04	27.04	12.2	445.36	25.36
Junc 446	9.5	447.03	24.03	12.2	445.33	22.33
Junc 447	9.5	447.03	27.03	12.2	445.34	25.34
Junc 448	9.5	447.03	27.03	12.2	445.34	25.34
Junc 449	9.5	447.03	27.03	12.2	445.34	25.34
Junc 450	9.5	447.02	22.02	12.2	445.32	20.32
Junc 451	9.5	447.03	22.03	12.2	445.34	20.34
Junc 452	9.5	447.03	24.03	12.2	445.33	22.33

Junc 453	9.5	446.89	26.89	12.2	445.12	25.12
Junc 454	9.5	446.88	26.88	12.2	445.11	25.11
Junc 455	9.5	446.86	26.86	12.2	445.08	25.08
Junc 456	9.5	446.86	26.86	12.2	445.07	25.07
Junc 457	9.5	446.82	26.81	12.2	445.01	25.01
Junc 458	9.5	446.8	26.8	12.2	444.98	24.98
Junc 459	18.6	446.26	26.26	22.72	444.24	24.24
Junc 460	18.6	446.07	26.07	22.72	443.98	23.98
Junc 461	18.6	446.04	26.04	22.72	443.94	23.94
Junc 462	18.6	446.01	26.01	22.72	443.89	23.89
Junc 463	18.6	446.04	26.04	22.72	443.95	23.95
Junc 464	18.6	445.99	25.99	22.72	443.88	23.88
Junc 465	18.6	445.98	25.98	22.72	443.86	23.86
Junc 466	18.6	445.98	25.98	22.72	443.86	23.86
Junc 467	18.6	446	26	22.72	443.88	23.88
Junc 468	18.6	446.12	26.12	22.72	444.07	24.07
Junc 469	18.6	446.27	26.27	22.72	444.29	24.29
Junc 470	18.6	446.1	26.1	22.72	444.04	24.04
Junc 471	23.1	448.33	28.33	25.66	447.9	27.9
Junc 472	18.6	446.71	26.71	22.72	444.94	24.94
Junc 473	23.1	448.43	25.43	25.66	448.02	25.02
Junc 474	23.1	448.64	25.64	25.66	448.29	25.29
Junc 475	23.1	448.76	23.76	25.66	448.44	23.44
Junc 476	18.6	447.65	24.65	22.72	446.3	23.3
Junc 477	18.6	447.6	24.6	22.72	446.23	23.23
Junc 478	18.6	447.57	24.57	22.72	446.19	23.19
Junc 479	18.6	447.49	24.49	22.72	446.06	23.06
Junc 480	18.6	447.46	24.46	22.72	446.01	23.01
Junc 481	18.6	447.33	24.33	22.72	445.82	22.82
Junc 482	18.6	447.3	24.3	22.72	445.77	22.77
Junc 483	18.6	447.3	24.3	22.72	445.76	22.76
Junc 484	18.6	447.74	22.74	22.72	446.45	21.45
Junc 485	18.6	447.8	22.8	22.72	446.55	21.55
Junc 486	18.6	447.82	22.82	22.72	446.58	21.58
Junc 487	18.6	448.05	23.05	22.72	446.92	21.92
Junc 488	18.6	448.05	23.05	22.72	446.92	21.92
Junc 489	4.61	448.6	23.6	7.7	447.74	22.74
Junc 490	4.61	448.78	23.78	7.7	448.04	23.04
Junc 491	18.6	448.12	23.12	22.72	447.03	22.03
Junc 492	18.6	448.19	23.19	22.72	447.14	22.14
Junc 493	4.61	448.79	23.79	7.7	448.05	23.05
Junc 494	4.61	448.91	23.91	7.7	448.25	23.25
Junc 495	4.61	449.02	24.02	7.7	448.43	23.43

Junc 496	4.61	449.04	24.04	7.7	448.45	23.45
Junc 497	4.61	449.11	24.11	7.7	448.56	23.56
Junc 498	4.61	449.25	24.25	7.7	448.8	23.8
Junc 499	4.61	448.38	23.38	7.7	447.43	22.43
Junc 500	4.61	449.47	22.47	7.7	449.15	22.15
Junc 501	18.6	448.04	23.04	22.72	446.9	21.9
Junc 502	23.1	449	24	25.66	448.75	23.75
Junc JDMAM4-5	23.1	449.56	22.56	25.66	449.45	22.45
Junc 504	4.61	449.7	24.7	7.7	449.51	24.51
Junc JDMAM4-6	4.61	449.7	22.7	7.7	449.52	22.52
Junc JDMAM4-7	23.1	449.38	24.38	25.66	449.22	24.22
Junc 507	23.1	448.95	23.95	25.66	448.68	23.68
Junc 508	23.1	449.1	24.1	25.66	448.86	23.86
Junc 509	23.1	448.71	25.71	25.66	448.38	25.38
Junc 510	23.1	448.7	25.7	25.66	448.36	25.36
Junc 511	23.1	448.76	25.76	25.66	448.44	25.44
Junc 512	23.1	448.79	25.79	25.66	448.48	25.48
Junc 513	23.1	448.92	23.92	25.66	448.64	23.64
Junc 514	23.1	448.71	25.71	25.66	448.38	25.38
Junc 515	23.1	448.71	25.71	25.66	448.38	25.38
Junc 516	23.1	448.92	25.92	25.66	448.64	25.64
Junc 517	23.1	448.86	25.86	25.66	448.56	25.56
Junc 518	23.1	448.8	25.8	25.66	448.49	25.49
Junc 519	23.1	448.75	25.75	25.66	448.43	25.43
Junc 520	23.1	448.5	25.5	25.66	448.11	25.11
Junc 521	23.1	448.45	25.45	25.66	448.05	25.05
Junc 522	23.1	448.44	25.44	25.66	448.03	25.03
Junc 523	23.1	448.44	25.44	25.66	448.04	25.04
Junc 524	23.1	448.47	25.47	25.66	448.07	25.07
Junc 525	23.1	448.41	25.41	25.66	447.99	24.99
Junc 526	23.1	448.45	25.45	25.66	448.04	25.04
Junc 527	23.1	448.35	28.35	25.66	447.92	27.92
Junc 528	23.1	448.21	28.21	25.66	447.75	27.75
Junc 529	23.1	448.13	28.13	25.66	447.65	27.65
Junc 530	23.1	448.13	28.13	25.66	447.65	27.65
Junc 531	23.1	448.07	28.07	25.66	447.57	27.57
Junc 532	23.1	448.06	28.06	25.66	447.56	27.56
Junc 533	23.1	447.91	27.91	25.66	447.36	27.36
Junc 534	23.1	447.91	27.91	25.66	447.36	27.36
Junc 535	18.6	446.72	26.72	22.72	444.95	24.95
Junc 536	23.1	447.75	27.75	25.66	447.16	27.16
Junc 537	23.1	447.74	27.74	25.66	447.15	27.15
Junc 538	23.1	447.55	27.55	25.66	446.9	26.9

Junc 539	23.1	447.58	27.58	25.66	446.94	26.94
Junc 540	23.1	447.4	27.4	25.66	446.72	26.72
Junc 541	23.1	447.36	27.36	25.66	446.67	26.67
Junc 542	23.1	447.37	27.37	25.66	446.68	26.68
Junc 543	23.1	447.31	27.31	25.66	446.61	26.61
Junc 544	23.1	447.27	27.27	25.66	446.55	26.55
Junc 545	23.1	447.24	27.24	25.66	446.51	26.51
Junc 546	23.1	447.23	27.23	25.66	446.5	26.5
Junc 547	23.1	447.23	27.23	25.66	446.5	26.5
Junc 548	23.1	446.82	26.82	25.66	445.99	25.99
Junc 549	23.1	446.93	26.93	25.66	446.12	26.12
Junc 550	23.1	446.94	26.94	25.66	446.12	26.12
Junc 551	23.1	446.47	29.47	25.66	445.54	28.54
Junc 552	23.1	446.65	29.65	25.66	445.76	28.76
Junc 553	23.1	446.69	29.69	25.66	445.8	28.8
Junc 554	23.1	446.68	26.68	25.66	445.79	25.79
Junc 555	23.1	446.91	26.91	25.66	446.09	26.09
Junc 556	23.1	446.93	26.93	25.66	446.1	26.1
Junc 557	23.1	446.65	26.65	25.66	445.75	25.75
Junc 558	23.1	447.08	27.08	25.66	446.31	26.31
Junc 559	23.1	447.08	27.08	25.66	446.3	26.3
Junc 560	23.1	446.86	26.86	25.66	446.01	26.01
Junc 561	23.1	446.82	26.82	25.66	445.97	25.97
Junc 562	23.1	446.69	26.69	25.66	445.8	25.8
Junc 563	23.1	446.69	26.69	25.66	445.8	25.8
Junc 564	23.1	446.7	26.7	25.66	445.81	25.81
Junc 565	23.1	446.56	26.56	25.66	445.64	25.64
Junc 566	23.1	446.48	26.48	25.66	445.55	25.55
Junc 567	23.1	446.76	26.76	25.66	445.91	25.91
Junc 568	23.1	446.73	26.73	25.66	445.88	25.88
Junc 569	23.1	446.74	26.74	25.66	445.88	25.88
Junc 570	23.1	446.73	26.73	25.66	445.87	25.87
Junc 571	23.1	446.71	26.71	25.66	445.86	25.86
Junc 572	23.1	446.7	26.7	25.66	445.85	25.85
Junc 573	23.1	445.21	30.21	25.66	444	29
Junc 574	23.1	445.21	30.21	25.66	444	29
Junc 575	23.1	445.23	30.23	25.66	444.02	29.02
Junc 576	23.1	445.24	30.24	25.66	444.03	29.03
Junc 577	23.1	445.26	30.26	25.66	444.06	29.06
Junc 578	23.1	445.77	28.77	25.66	444.68	27.68
Junc 579	23.1	445.86	28.86	25.66	444.8	27.8
Junc 580	23.1	444.77	27.77	25.66	443.48	26.48
Junc 581	23.1	444.66	27.66	25.66	443.34	26.34

Junc 582	23.1	444.59	27.59	25.66	443.25	26.25
Junc 583	23.1	445.05	28.05	25.66	443.81	26.81
Junc 584	23.1	444.95	27.95	25.66	443.69	26.69
Junc 585	23.1	445.8	28.8	25.66	444.72	27.72
Junc 586	23.1	445.73	28.73	25.66	444.64	27.64
Junc 587	23.1	445.88	28.88	25.66	444.83	27.83
Junc 588	23.1	445.87	28.87	25.66	444.82	27.82
Junc 589	23.1	445.83	28.83	25.66	444.77	27.77
Junc 590	23.1	445.9	28.9	25.66	444.84	27.84
Junc 591	23.1	445.94	28.94	25.66	444.9	27.9
Junc 592	23.1	445.94	28.94	25.66	444.9	27.9
Junc 593	23.1	446	29	25.66	444.97	27.97
Junc 594	23.1	446.09	29.09	25.66	445.08	28.08
Junc 595	23.1	446.09	29.09	25.66	445.08	28.08
Junc 596	23.1	445.92	28.91	25.66	444.86	27.86
Junc 597	23.1	446.04	29.04	25.66	445.02	28.02
Junc 598	23.1	446.06	29.06	25.66	445.04	28.04
Junc 599	23.1	446.37	29.37	25.66	445.42	28.42
Junc 600	23.1	446.06	29.06	25.66	445.04	28.04
Junc 601	23.1	446.01	29.01	25.66	444.97	27.97
Junc 602	23.1	445.76	28.76	25.66	444.65	27.65
Junc 603	23.1	445.34	28.34	25.66	444.15	27.15
Junc 604	23.1	445.32	28.32	25.66	444.12	27.12
Junc 605	23.1	445.25	28.25	25.66	444.04	27.04
Junc 606	23.1	445.19	28.19	25.66	443.96	26.96
Junc 607	23.1	445.13	28.13	25.66	443.89	26.89
Junc 608	23.1	445.25	28.25	25.66	444.04	27.04
Junc 609	23.1	445.3	28.3	25.66	444.1	27.1
Junc 610	23.1	445.38	28.38	25.66	444.2	27.2
Junc 611	23.1	445.36	28.36	25.66	444.16	27.16
Junc 612	23.1	445.32	28.32	25.66	444.12	27.12
Junc 613	23.1	445.21	30.21	25.66	444	29
Junc 614	23.1	445.07	30.07	25.66	443.83	28.83
Junc 615	23.1	445.87	28.87	25.66	444.79	27.79
Junc 616	23.1	445.86	28.86	25.66	444.78	27.78
Junc 617	23.1	445.76	28.76	25.66	444.65	27.65
Junc 618	23.1	445.71	28.71	25.66	444.59	27.59
Junc 619	23.1	445.78	28.78	25.66	444.68	27.68
Junc 620	23.1	445.76	28.76	25.66	444.65	27.65
Junc 621	23.1	445.83	28.83	25.66	444.72	27.72
Junc 622	23.1	445.9	28.9	25.66	444.8	27.8
Junc 623	23.1	446.31	29.31	25.66	445.28	28.28
Junc 624	23.1	446.26	29.26	25.66	445.22	28.22

Junc 625	23.1	446.27	29.27	25.66	445.24	28.24
Junc 626	23.1	446.22	29.22	25.66	445.18	28.18
Junc 627	23.1	446.35	29.35	25.66	445.34	28.34
Junc 628	23.1	446.23	29.23	25.66	445.19	28.19
Junc 629	23.1	446.27	29.27	25.66	445.25	28.25
Junc 630	23.1	446.27	29.27	25.66	445.24	28.24
Junc 631	23.1	446.23	29.23	25.66	445.2	28.2
Junc 632	23.1	446.22	29.22	25.66	445.18	28.18
Junc 633	23.1	446.21	29.21	25.66	445.17	28.17
Junc 634	23.1	446.21	29.21	25.66	445.17	28.17
Junc 635	23.1	446.21	29.21	25.66	445.17	28.17
Junc 636	23.1	446.21	29.21	25.66	445.17	28.17
Junc 637	23.1	446.55	26.55	25.66	445.62	25.62
Junc 638	9.1	446.54	26.54	11.63	445.6	25.6
Junc 639	9.1	446.54	26.54	11.63	445.6	25.6
Junc 640	9.1	446.54	26.54	11.63	445.6	25.6
Junc 641	9.1	446.54	26.54	11.63	445.6	25.6
Junc 642	9.1	446.52	29.52	11.63	445.56	28.56
Junc 643	9.1	446.22	29.22	11.63	445.15	28.15
Junc JDMAM1-3	6.07	449.88	22.88	8.95	449.79	22.79
Junc JDMAM1-4	6.07	449.83	22.83	8.95	449.7	22.7
Junc JDMAM1-5	6.07	449.77	24.77	8.95	449.6	24.6
Junc 647	6.07	449.81	19.81	8.95	449.66	19.66
Junc 648	6.07	449.79	19.79	8.95	449.64	19.64
Junc 649	6.07	449.76	19.76	8.95	449.56	19.56
Junc 650	6.07	449.75	19.75	8.95	449.56	19.56
Junc 651	6.07	449.75	22.75	8.95	449.55	22.55
Junc 652	6.07	449.74	24.74	8.95	449.54	24.54
Junc 653	6.07	449.74	24.74	8.95	449.54	24.54
Junc 654	6.07	449.75	22.75	8.95	449.55	22.55
Junc 655	6.07	449.75	24.75	8.95	449.55	24.55
Junc 656	6.07	449.72	24.72	8.95	449.51	24.51
Junc 657	6.07	449.72	24.72	8.95	449.51	24.51
Junc 658	6.07	449.76	24.76	8.95	449.57	24.57
Junc 659	6.07	449.72	24.72	8.95	449.51	24.51
Junc 660	6.07	449.72	24.72	8.95	449.5	24.5
Junc 661	6.07	449.72	24.72	8.95	449.5	24.5
Junc 662	6.07	449.71	24.71	8.95	449.5	24.5
Junc 663	6.07	449.66	24.66	8.95	449.39	24.39
Junc 664	6.07	449.66	24.66	8.95	449.38	24.38
Junc 665	6.07	449.71	24.71	8.95	449.5	24.5
Junc 666	6.07	449.71	24.71	8.95	449.49	24.49
Junc 667	6.07	449.71	24.71	8.95	449.49	24.49

Junc 668	6.07	449.67	24.67	8.95	449.43	24.43
Junc 669	6.07	449.63	24.63	8.95	449.36	24.36
Junc 670	6.07	449.62	24.62	8.95	449.34	24.34
Junc 671	6.07	449.61	24.61	8.95	449.32	24.32
Junc 672	6.07	449.62	24.62	8.95	449.33	24.33
Junc 673	6.07	449.62	24.62	8.95	449.33	24.33
Junc 674	6.07	449.62	24.62	8.95	449.33	24.33
Junc 675	6.07	449.62	24.62	8.95	449.33	24.33
Junc 676	6.07	449.59	24.59	8.95	449.3	24.3
Junc 677	6.07	449.57	24.57	8.95	449.26	24.26
Junc 678	6.07	449.68	24.68	8.95	449.44	24.44
Junc 679	6.07	449.62	24.62	8.95	449.35	24.35
Junc 680	6.07	449.58	24.58	8.95	449.27	24.27
Junc 681	6.07	449.55	24.55	8.95	449.22	24.22
Junc 682	6.07	449.54	24.54	8.95	449.21	24.21
Junc 683	6.07	449.51	24.51	8.95	449.17	24.17
Junc 684	6.07	449.32	24.32	8.95	448.86	23.86
Junc 685	10.65	448.85	21.85	13.75	448.11	21.11
Junc 686	10.65	448.82	21.82	13.75	448.06	21.06
Junc 687	10.65	448.8	21.8	13.75	448.02	21.02
Junc 688	10.65	448.83	21.83	13.75	448.07	21.07
Junc 689	10.65	448.8	21.8	13.75	448.02	21.02
Junc 690	10.65	448.74	21.74	13.75	447.92	20.92
Junc 691	10.65	448.68	21.68	13.75	447.83	20.83
Junc 692	10.65	448.67	21.67	13.75	447.82	20.82
Junc 693	10.65	448.67	21.67	13.75	447.81	20.81
Junc 694	10.65	448.7	21.7	13.75	447.86	20.86
Junc 695	10.65	448.58	23.58	13.75	447.67	22.67
Junc 696	10.65	448.58	23.58	13.75	447.67	22.67
Junc 697	10.65	448.65	21.65	13.75	447.77	20.77
Junc 698	10.65	448.65	21.65	13.75	447.78	20.78
Junc 699	10.65	448.64	21.64	13.75	447.76	20.76
Junc 700	10.65	448.63	21.63	13.75	447.76	20.76
Junc 701	10.65	448.65	21.65	13.75	447.78	20.78
Junc 702	10.65	448.59	18.59	13.75	447.69	17.69
Junc 703	10.65	448.59	18.59	13.75	447.69	17.69
Junc 704	10.65	448.59	18.59	13.75	447.69	17.69
Junc 705	10.65	448.59	18.59	13.75	447.69	17.69
Junc 706	10.65	448.58	18.58	13.75	447.67	17.67
Junc 707	10.65	448.57	18.57	13.75	447.65	17.65
Junc 708	10.65	448.56	18.56	13.75	447.65	17.65
Junc 709	10.65	448.54	18.54	13.75	447.61	17.61
Junc 710	10.65	448.53	18.53	13.75	447.59	17.59

Junc 711	10.65	448.53	18.53	13.75	447.6	17.6
Junc 712	10.65	448.57	18.57	13.75	447.66	17.66
Junc 713	10.65	448.59	18.59	13.75	447.68	17.68
Junc 714	10.65	448.56	18.56	13.75	447.64	17.64
Junc 715	10.65	448.55	18.55	13.75	447.63	17.63
Junc 716	10.65	448.53	21.53	13.75	447.6	20.6
Junc 717	10.65	448.54	18.54	13.75	447.62	17.62
Junc 718	10.65	448.53	18.53	13.75	447.6	17.6
Junc 719	10.65	448.53	18.53	13.75	447.59	17.59
Junc 720	10.65	448.53	21.53	13.75	447.59	20.59
Junc 721	10.65	448.5	18.5	13.75	447.54	17.54
Junc 722	10.65	448.52	21.52	13.75	447.58	20.58
Junc 723	10.65	448.53	18.53	13.75	447.6	17.6
Junc 724	10.65	448.53	18.53	13.75	447.59	17.59
Junc 725	10.65	448.52	18.52	13.75	447.58	17.58
Junc 726	10.65	448.4	18.4	13.75	447.38	17.38
Junc 727	10.65	448.17	18.17	13.75	447.02	17.02
Junc 728	10.65	448.16	18.16	13.75	447	17
Junc 729	9.1	448.29	21.29	13.11	446.65	19.65
Junc 730	9.1	448.29	21.29	13.11	446.65	19.65
Junc 731	9.1	448.26	21.26	13.11	446.6	19.6
Junc 732	9.1	448.26	21.26	13.11	446.6	19.6
Junc 733	9.1	448.26	21.26	13.11	446.61	19.61
Junc 734	9.1	448.29	21.29	13.11	446.66	19.66
Junc 735	9.1	448.3	21.3	13.11	446.68	19.68
Junc 736	9.1	448.26	21.26	13.11	446.6	19.6
Junc 737	9.1	448.25	21.25	13.11	446.58	19.58
Junc 738	9.1	448.26	21.26	13.11	446.61	19.61
Junc 739	9.1	448.26	21.26	13.11	446.61	19.61
Junc 740	9.1	448.24	21.24	13.11	446.56	19.56
Junc 741	9.1	448.22	21.22	13.11	446.52	19.52
Junc 742	9.1	448.34	21.34	13.11	446.75	19.75
Junc 743	9.1	448.33	21.33	13.11	446.74	19.74
Junc 744	9.1	448.33	21.33	13.11	446.73	19.73
Junc 745	9.1	448.32	23.32	13.11	446.72	21.72
Junc 746	9.1	448.32	23.32	13.11	446.72	21.72
Junc 747	9.1	448.3	23.3	13.11	446.67	21.67
Junc 748	9.1	448.33	21.33	13.11	446.73	19.73
Junc 749	9.1	448.36	21.36	13.11	446.8	19.8
Junc 750	9.1	448.4	23.4	13.11	446.87	21.87
Junc 751	9.1	448.39	23.39	13.11	446.86	21.86
Junc 752	9.1	448.38	23.38	13.11	446.84	21.84
Junc 753	9.1	448.37	23.37	13.11	446.82	21.82

Junc 754	9.1	448.41	23.41	13.11	446.9	21.9
Junc 755	9.1	448.68	23.68	13.11	447.42	22.42
Junc 756	9.1	449.05	24.05	13.11	448.16	23.16
Junc 757	9.1	449.08	24.08	13.11	448.22	23.22
Junc 758	0	449.2	24.2	0	448.45	23.45
Junc 759	8.79	449.29	24.29	12.66	448.62	23.62
Junc 760	8.79	449.32	24.32	12.66	448.69	23.69
Junc 761	8.79	449.36	24.36	12.66	448.77	23.77
Junc 762	8.79	449.38	24.38	12.66	448.8	23.8
Junc 763	8.79	449.4	24.4	12.66	448.85	23.85
Junc 764	8.79	449.28	24.28	12.66	448.62	23.62
Junc 765	8.79	449.32	24.32	12.66	448.68	23.68
Junc 766	8.79	449.36	24.36	12.66	448.76	23.76
Junc 767	8.79	449.4	24.4	12.66	448.84	23.84
Junc 768	8.79	449.42	24.42	12.66	448.88	23.88
Junc 769	8.79	449.4	24.4	12.66	448.84	23.84
Junc 770	8.79	449.38	24.38	12.66	448.81	23.81
Junc 771	8.79	449.43	24.43	12.66	448.9	23.9
Junc 772	8.79	449.45	24.45	12.66	448.93	23.93
Junc 773	8.79	449.46	24.46	12.66	448.96	23.96
Junc 774	8.79	449.62	24.62	12.66	449.28	24.28
Junc 775	8.79	449.6	24.6	12.66	449.24	24.24
Junc 776	8.79	449.56	24.56	12.66	449.15	24.15
Junc 777	8.79	449.45	24.45	12.66	448.94	23.94
Junc 778	8.79	449.46	24.46	12.66	448.96	23.96
Junc JDMAM2-3	25.25	449.83	22.83	34.32	449.67	22.67
Junc JDMAM2-4	25.25	449.73	22.73	34.32	449.5	22.5
Junc 781	25.25	449.74	24.74	34.32	449.5	24.5
Junc 782	25.25	449.77	24.77	34.32	449.56	24.56
Junc 783	25.25	449.7	24.7	34.32	449.43	24.43
Junc 784	25.25	449.69	24.69	34.32	449.41	24.41
Junc 785	25.25	449.7	24.7	34.32	449.43	24.43
Junc 786	25.25	449.67	24.67	34.32	449.37	24.37
Junc 787	8.79	449.66	24.66	12.66	449.35	24.35
Junc 788	8.79	449.63	24.63	12.66	449.3	24.3
Junc 789	8.79	449.56	24.56	12.66	449.17	24.17
Junc 790	8.79	449.58	24.58	12.66	449.19	24.19
Junc 791	8.79	449.57	24.57	12.66	449.17	24.17
Junc 792	8.79	449.57	24.57	12.66	449.19	24.19
Junc 793	8.79	449.55	24.55	12.66	449.15	24.15
Junc 794	8.79	449.55	24.55	12.66	449.14	24.14
Junc 795	7.57	449.44	24.44	8.2	449.3	24.3
Junc 796	25.25	449.62	24.62	34.32	449.29	24.29

Junc 797	25.25	449.62	24.62	34.32	449.3	24.3
Junc 798	25.25	449.64	24.64	34.32	449.32	24.32
Junc 799	25.25	449.7	22.7	34.32	449.44	22.44
Junc 800	25.25	449.81	22.81	34.32	449.64	22.64
Junc 801	8.79	449.6	24.6	12.66	449.23	24.23
Junc 802	25.25	449.63	24.63	34.32	449.3	24.3
Junc JDMAM3-3	28.97	449.74	22.74	32.98	449.67	22.67
Junc JDMAM3-4	28.97	449.5	24.5	32.98	449.37	24.37
Junc 805	28.97	449.37	24.37	32.98	449.21	24.21
Junc 806	28.97	449.48	24.48	32.98	449.35	24.35
Junc 807	7.57	449.47	24.47	8.2	449.34	24.34
Junc 808	7.57	449.46	24.46	8.2	449.32	24.32
Junc 809	7.57	449.44	24.44	8.2	449.3	24.3
Junc 810	7.57	449.43	24.43	8.2	449.29	24.29
Junc 811	7.57	449.42	24.42	8.2	449.27	24.27
Junc 812	28.97	449.2	24.2	32.98	448.99	23.99
Junc 813	28.97	449.12	24.12	32.98	448.89	23.89
Junc 814	28.97	449.11	24.11	32.98	448.89	23.89
Junc 815	28.97	449.12	24.12	32.98	448.9	23.9
Junc 816	28.97	449.1	24.1	32.98	448.86	23.86
Junc 817	28.97	449.15	24.15	32.98	448.93	23.93
Junc 818	28.97	449.27	24.27	32.98	449.08	24.08
Junc 819	28.97	449.44	24.44	32.98	449.3	24.3
Junc 820	28.97	449.04	19.04	32.98	448.79	18.79
Junc 821	28.97	449.04	26.04	32.98	448.79	25.79
Junc 822	28.97	449.07	26.07	32.98	448.83	25.83
Junc 823	28.97	449.03	26.03	32.98	448.78	25.78
Junc 824	28.97	449.06	26.06	32.98	448.82	25.82
Junc 825	28.97	448.98	25.98	32.98	448.71	25.71
Junc 826	28.97	449.01	26.01	32.98	448.74	25.74
Junc 827	28.97	448.9	25.9	32.98	448.6	25.6
Junc 828	28.97	448.87	25.87	32.98	448.56	25.56
Junc 829	28.97	448.88	25.88	32.98	448.56	25.56
Junc 830	28.97	449.01	26.01	32.98	448.75	25.75
Junc 831	28.97	449.01	26.01	32.98	448.74	25.74
Junc 832	28.97	448.91	25.91	32.98	448.62	25.62
Junc 833	28.97	449.02	26.02	32.98	448.76	25.76
Junc 834	28.97	448.97	25.97	32.98	448.7	25.7
Junc 835	28.97	448.89	25.89	32.98	448.58	25.58
Junc 836	28.97	449.16	24.16	32.98	448.95	23.95
Junc 837	28.97	449.32	24.32	32.98	449.15	24.15
Junc 838	7.57	449.46	24.46	8.2	449.32	24.32
Junc 839	7.57	449.15	24.15	8.2	448.95	23.95

Junc 840	28.97	449.03	26.03	32.98	448.88	25.88
Junc 841	7.57	448.99	25.99	8.2	448.58	25.58
Junc 842	28.97	448.84	25.84	32.98	448.38	25.38
Junc 843	28.97	448.85	25.85	32.98	448.53	25.53
Junc 844	28.97	448.85	25.85	32.98	448.53	25.53
Junc 845	7.57	449.15	24.15	8.2	448.95	23.95
Junc 846	7.57	449.05	26.05	8.2	448.76	25.76
Junc 847	7.57	449.18	24.18	8.2	448.97	23.97
Junc 848	7.57	449	26	8.2	448.73	25.73
Junc 849	7.57	449.01	26.01	8.2	448.74	25.74
Junc 850	7.57	448.89	25.89	8.2	448.59	25.59
Junc 851	7.57	448.92	25.92	8.2	448.64	25.64
Junc 852	7.57	449.09	24.09	8.2	448.86	23.86
Junc 853	7.57	449.08	24.08	8.2	448.85	23.85
Junc 854	7.57	449.11	24.11	8.2	448.88	23.88
Junc 855	7.57	449.1	24.1	8.2	448.87	23.87
Junc 856	7.57	449.09	24.09	8.2	448.86	23.86
Junc 857	7.57	449.19	24.19	8.2	448.98	23.98
Junc 858	7.57	449.02	26.02	8.2	448.76	25.76
Junc 859	7.57	448.98	25.98	8.2	448.72	25.72
Junc 860	7.57	448.96	25.96	8.2	448.69	25.69
Junc 861	7.57	448.9	25.9	8.2	448.61	25.61
Junc 862	7.57	448.85	28.85	8.2	448.54	28.54
Junc 863	7.57	448.96	25.96	8.2	448.68	25.68
Junc 864	7.57	448.9	25.9	8.2	448.61	25.61
Junc 865	7.57	448.85	28.85	8.2	448.54	28.54
Junc 866	7.57	448.82	28.82	8.2	448.51	28.51
Junc 867	28.97	448.84	28.84	32.98	448.52	28.52
Junc 868	28.97	448.83	28.83	32.98	448.51	28.51
Junc 869	28.97	448.84	28.84	32.98	448.52	28.52
Junc 870	28.97	448.83	28.83	32.98	448.52	28.52
Junc 871	28.97	448.85	28.85	32.98	448.54	28.54
Junc 872	28.97	448.84	28.84	32.98	448.53	28.53
Junc 873	28.97	448.95	25.95	32.98	448.67	25.67
Junc 874	28.97	448.98	25.98	32.98	448.71	25.71
Junc 875	28.97	448.95	28.95	32.98	448.68	28.68
Junc 876	28.97	448.94	28.94	32.98	448.65	28.65
Junc 877	28.97	448.93	28.93	32.98	448.65	28.65
Junc 878	28.97	448.94	28.94	32.98	448.65	28.65
Junc 879	28.97	448.85	28.85	32.98	448.54	28.54
Junc 880	28.97	448.8	28.8	32.98	448.47	28.47
Junc 881	28.97	448.76	28.76	32.98	448.42	28.42
Junc 882	28.97	448.79	28.79	32.98	448.47	28.47

Junc 883	28.97	448.7	28.7	32.98	448.35	28.35
Junc 884	28.97	448.93	28.93	32.98	448.65	28.65
Junc 885	28.97	448.92	28.92	32.98	448.63	28.63
Junc 886	28.97	448.58	28.58	32.98	448.2	28.2
Junc JDMAM5-9	0	449.17	24.17	0	448.39	23.39
Junc JDMAM5-8	0	449.36	24.36	0	448.65	23.65
Junc JDMAM5-7	0	449.58	24.58	0	448.95	23.95
Junc JDMAM5-6	0	449.64	24.64	0	449.04	24.04
Junc JDMAM5-5	0	449.8	19.8	0	449.57	19.57
Junc JDMAM5-4	0	449.87	19.87	0	449.83	19.83
Junc JDMAM5-3	0	449.9	19.9	0	449.86	19.86
Junc JDMAM5-2	0	449.98	19.98	0	449.97	19.97
Junc JDMAM5-1	0	449.99	19.99	0	449.98	19.98
Junc JDMAM4-4	0	449.71	19.71	0	449.64	19.64
Junc JDMAM4-3	0	449.76	19.76	0	449.69	19.69
Junc JDMAM4-2	0	449.93	19.93	0	449.92	19.92
Junc JDMAM4-1	0	449.96	19.96	0	449.95	19.95
Junc JDMAM1-1	0	449.98	19.98	0	449.97	19.97
Junc JDMAM2-1	0	449.98	19.98	0	449.96	19.96
Junc JDMAM3-1	0	449.96	19.96	0	449.96	19.96
Junc JDMAM1-2	0	449.95	19.95	0	449.91	19.91
Junc JDMAM2-2	0	449.93	19.93	0	449.87	19.87
Junc JDMAM3-2	0	449.9	19.9	0	449.87	19.87
Junc 908	8.79	449.42	24.42	12.66	448.88	23.88
Junc 909	8.79	449.4	24.4	12.66	448.85	23.85
Junc 911	9.1	448.33	21.33	13.11	446.74	19.74
Junc 912	28.97	449.17	24.17	32.98	448.96	23.96
Junc 913	7.57	448.85	25.85	8.2	448.54	25.54
Junc 914	7.57	448.9	25.9	8.2	448.61	25.61
Junc 915	7.57	448.89	25.89	8.2	448.6	25.6
Junc 916	7.57	448.89	25.89	8.2	448.59	25.59
Junc 917	7.57	448.89	25.89	8.2	448.6	25.6
Junc 918	4.61	448.41	23.41	7.7	447.48	22.48
Junc 919	18.6	446.15	26.15	22.72	444.11	24.11
Junc 920	23.1	447.74	27.74	25.66	447.15	27.15
Junc 921	23.1	446.62	29.62	25.66	445.71	28.71
Junc 922	23.1	446.34	29.34	25.66	445.39	28.39
Junc 923	23.1	446.68	29.68	25.66	445.8	28.8
Junc 924	23.1	446.64	29.64	25.66	445.75	28.75
Junc 925	23.1	446.23	29.23	25.66	445.23	28.23
Junc 926	23.1	446.2	29.2	25.66	445.22	28.22
Junc 928	23.1	445.27	28.27	25.66	444.07	27.07
Junc 929	23.1	445.7	28.7	25.66	444.58	27.58

Junc 930	23.1	445.83	28.83	25.66	444.71	27.71
Junc 931	9.1	446.55	26.55	11.63	445.61	25.61
Junc 932	9.1	446.55	29.55	11.63	445.61	28.61
Junc 933	9.1	446.55	29.55	11.63	445.61	28.61
Junc 942	10.68	445.25	28.25	13.69	442.53	25.53
Junc 943	10.68	445.13	28.13	13.69	442.33	25.33
Junc 944	9.5	446.42	26.42	12.2	444.38	24.38
Junc 945	9.5	446.84	26.84	12.2	445.05	25.05
Junc 947	9.5	447.02	24.02	12.2	445.32	22.32
Junc 948	16.78	446.44	21.44	19.73	444.34	19.34
Junc 949	16.78	446.36	21.36	19.73	444.23	19.23
Junc 950	16.78	446.3	21.3	19.73	444.15	19.15
Junc 951	13.8	446.46	21.46	16.35	444.28	19.28
Junc 952	13.8	445.48	22.48	16.35	442.94	19.94
Junc 957	16.78	446.3	21.3	19.73	444.06	19.06
Junc 958	16.78	446.26	21.26	19.73	444	19
Junc 959	7.9	446.11	21.11	9.85	443.75	18.75
Junc 961	7.9	446.07	19.07	9.85	443.68	16.68
Junc 962	7.9	446.06	19.06	9.85	443.68	16.68
Junc 963	5.76	445.29	15.29	7.07	443.11	13.11
Junc 964	5.76	445.21	18.21	7.07	443.01	16.01
Junc 965	5.76	445.17	18.17	7.07	442.95	15.95
Junc 966	5.76	445.17	15.17	7.07	442.95	12.95
Junc 967	5.76	445.14	20.14	7.07	442.9	17.9
Junc 968	5.76	445.14	20.14	7.07	442.9	17.9
Junc 46	9.5	447.02	27.02	12.2	445.32	25.32
Junc 63	4.61	448.79	23.79	7.7	448.05	23.05
Junc 64	4.61	448.78	23.78	7.7	448.05	23.05
Junc 161	4.61	448.78	23.78	7.7	448.05	23.05
Junc 363	4.61	448.78	23.78	7.7	448.05	23.05
Junc 365	4.61	448.78	23.78	7.7	448.04	23.04
Junc 404	4.61	448.78	23.78	7.7	448.04	23.04
Junc 503	4.61	448.77	23.77	7.7	448	23
Junc 505	4.61	448.76	23.76	7.7	447.99	22.99
Junc 506	4.61	448.76	23.76	7.7	447.99	22.99
Junc 644	4.61	448.76	23.76	7.7	447.99	22.99
Junc 645	4.61	448.76	23.76	7.7	447.98	22.98
Junc 646	4.61	448.76	23.76	7.7	447.98	22.98
Junc 779	4.61	448.76	23.76	7.7	447.98	22.98
Junc 780	4.61	448.76	23.76	7.7	447.98	22.98
Junc 803	4.61	448.78	23.78	7.7	448.05	23.05
Junc 804	4.61	448.78	23.78	7.7	448.04	23.04
Junc 887	4.61	448.78	23.78	7.7	448.04	23.04

Junc 888	4.61	448.77	23.77	7.7	448.02	23.02
Junc 445	28.97	449.03	24.03	32.98	448.78	23.78
Junc 889	28.97	448.97	28.97	32.98	448.7	28.7
Junc 890	28.97	448.94	28.94	32.98	448.66	28.66
Junc 891	28.97	448.62	28.62	32.98	448.25	28.25
Junc 892	28.97	449.06	19.06	32.98	448.81	18.81
Junc 893	16.78	446.57	21.57	19.73	444.43	19.43
Junc 894	16.78	446.69	21.69	19.73	444.6	19.6
Junc 895	16.78	446.62	21.62	19.73	444.51	19.51
Junc JDMAM-M1-1	0	449.42	24.42	0	449.16	24.16
Junc JDMAM-M1-2	0	448.7	23.7	0	448.11	23.11
Junc 896	18.6	446.76	21.76	22.72	445.01	20.01
Junc 897	18.6	446.91	21.91	22.72	445.23	20.23
Junc 898	18.6	447.17	22.17	22.72	445.61	20.61
Junc 899	18.6	447.45	22.45	22.72	446.03	21.03
Junc 900	18.6	447.7	22.7	22.72	446.39	21.39
Junc 901	23.1	449	24	25.66	448.74	23.74
Junc 902	23.1	449.53	22.53	25.66	449.41	22.41
Junc 903	0	449.98	19.98	0	449.97	19.97
Junc 904	0	449.95	19.95	0	449.92	19.92
Junc 905	0	449.94	19.94	0	449.9	19.9
Junc 906	0	449.85	19.85	0	449.76	19.76
Junc 907	23.1	448.85	23.85	25.66	448.55	23.55
Junc 910	23.1	448.8	23.8	25.66	448.49	23.49
Junc 927	18.6	447.87	22.87	22.72	446.64	21.64
Junc 934	23.1	448.91	23.91	25.66	448.63	23.63
Junc 935	4.61	449.11	24.11	7.7	448.55	23.55
Junc 936	4.61	449.11	24.11	7.7	448.55	23.55
Junc 937	4.61	449.11	24.11	7.7	448.54	23.54
Junc 938	4.61	448.28	23.28	7.7	447.26	22.26
Junc 939	4.61	448.4	23.4	7.7	447.45	22.45
Junc DMAM3-18	28.97	448.78	28.78	32.98	448.47	28.47

管路の管網計算データ及び計算結果を以下に示す。

Link ID	Diameter	Length	Roughness	Peak Demand			Extinction Demand		
				Flow	Velocity	Unit Headloss	Flow	Velocity	Unit Headloss
				CMD	m/s	m/km	CMD	m/s	m/km
Pipe DMAM1-1	200	36.11	130	717.17	0.26	0.46	972	0.36	0.81
Pipe DMAM1-2	200	75.44	130	717.17	0.26	0.46	972	0.36	0.81
Pipe DMAM1-3	200	149.3	130	717.17	0.26	0.46	972	0.36	0.81
Pipe DMAM1-4	200	116.73	130	711.1	0.26	0.45	963.05	0.35	0.8
Pipe DMAM1-5	200	135.22	130	663.49	0.24	0.4	895.17	0.33	0.7

Pipe DMAM1-6	200	44.25	130	632.38	0.23	0.36	849.82	0.31	0.63
Pipe DMAM1-7	200	115.25	130	575.76	0.21	0.31	773.19	0.28	0.53
Pipe DMAM1-8	200	188.68	130	520.99	0.19	0.26	689.47	0.25	0.43
Pipe DMAM1-9	200	182.7	130	514.93	0.19	0.25	680.52	0.25	0.42
Pipe DMAM1-10	200	157.31	130	468.12	0.17	0.21	611.63	0.23	0.34
Pipe DMAM1-11	200	124.27	130	462.05	0.17	0.2	602.68	0.22	0.33
Pipe DMAM1-12	200	111.86	130	455.99	0.17	0.2	593.73	0.22	0.32
Pipe DMAM1-13	200	32.05	130	486.6	0.18	0.23	631.82	0.23	0.36
Pipe DMAM1-14	200	115.72	130	480.54	0.18	0.22	622.87	0.23	0.36
Pipe DMAM1-15	150	219.07	130	474.47	0.31	0.87	613.91	0.4	1.4
Pipe DMAM1-16	150	552.37	130	468.4	0.31	0.85	604.96	0.4	1.37
Pipe DMAM1-17	150	25.7	130	457.76	0.3	0.82	591.21	0.39	1.31
Pipe 18	100	279.35	130	28.39	0.04	0.03	36.66	0.05	0.05
Pipe 19	50	53.28	130	17.74	0.1	0.42	22.91	0.14	0.67
Pipe 20	100	275.91	130	7.1	0.01	0	9.16	0.01	0
Pipe DMAM1-18	150	47.03	130	418.72	0.27	0.69	540.8	0.35	1.11
Pipe 22	100	285.87	130	72.1	0.11	0.19	93.11	0.14	0.31
Pipe 23	100	71.53	130	-61.45	0.09	0.14	-79.36	0.12	0.23
Pipe DMAM1-19	150	93.18	130	415.17	0.27	0.68	536.22	0.35	1.09
Pipe DMAM1-20	150	76.84	130	332.43	0.22	0.45	429.35	0.28	0.72
Pipe DMAM1-21	150	175.78	130	269.29	0.18	0.31	347.81	0.23	0.49
Pipe DMAM1-22	150	289.6	130	211.16	0.14	0.19	272.77	0.18	0.31
Pipe DMAM1-23	200	11.5	130	212.65	0.14	0.2	275.1	0.1	0.08
Pipe DMAM1-24	150	291.13	130	42.32	0.03	0.01	55.12	0.04	0.02
Pipe 30	100	282.35	130	31.67	0.05	0.04	41.37	0.06	0.07
Pipe 31	50	143.48	130	14.38	0.08	0.28	18.66	0.11	0.46
Pipe DMAM2-1	200	31.92	130	898.95	0.33	0.7	1266.4	0.47	1.32
Pipe DMAM2-2	200	68.94	130	898.95	0.33	0.7	1266.4	0.47	1.32
Pipe DMAM2-3	200	147.87	130	898.95	0.33	0.7	1266.4	0.47	1.32
Pipe DMAM2-4	200	22.22	130	849.32	0.31	0.63	1197.61	0.44	1.19
Pipe DMAM2-5	200	120.86	130	641.87	0.24	0.38	907.75	0.33	0.71
Pipe DMAM2-6	200	125.47	130	513.12	0.19	0.25	728.62	0.27	0.47
Pipe DMAM2-7	200	157.63	130	487.01	0.18	0.23	694.47	0.26	0.43
Pipe DMAM2-8	200	161	130	461.77	0.17	0.2	660.15	0.24	0.4
Pipe DMAM2-9	200	51.17	130	447.09	0.16	0.19	641.85	0.24	0.38
Pipe DMAM2-10	200	199.54	130	425.94	0.16	0.18	611.65	0.23	0.34
Pipe DMAM2-11	200	123.05	130	383.84	0.14	0.14	551.03	0.2	0.28
Pipe DMAM2-12	200	332.91	130	384.37	0.14	0.15	551.92	0.2	0.28
Pipe DMAM2-13	150	150.6	130	406.76	0.27	0.66	586.07	0.38	1.29
Pipe DMAM2-14	150	64.17	130	382.7	0.25	0.59	551.35	0.36	1.15
Pipe DMAM2-15	150	35.39	130	347.56	0.23	0.49	500.69	0.33	0.96
Pipe DMAM2-16	150	58.92	130	329.99	0.22	0.45	475.36	0.31	0.87
Pipe DMAM2-17	150	31.72	130	325.86	0.21	0.43	469.39	0.31	0.85

Pipe DMAM2-18	150	100.98	130	308.29	0.2	0.39	444.07	0.29	0.77
Pipe DMAM2-19	150	98.62	130	290.72	0.19	0.35	418.74	0.27	0.69
Pipe DMAM2-20	150	285.42	130	273.15	0.18	0.31	393.41	0.26	0.62
Pipe DMAM2-21	150	365.85	130	273.15	0.18	0.31	393.41	0.26	0.62
Pipe DMAM2-22	150	104.7	130	264.04	0.17	0.29	380.3	0.25	0.58
Pipe DMAM2-23	100	188.92	130	254.94	0.38	1.99	367.18	0.54	3.91
Pipe DMAM2-24	100	143.65	130	245.83	0.36	1.86	354.07	0.52	3.65
Pipe DMAM2-25	100	181.5	130	109.55	0.16	0.42	157.79	0.23	0.82
Pipe DMAM2-26	75	212.23	130	45.82	0.12	0.34	65.99	0.17	0.66
Pipe DMAM2-27	75	32.61	130	18.5	0.05	0.06	26.65	0.07	0.12
Pipe DMAM3-1	250	32.69	130	2039.7	0.48	1.08	2307.11	0.54	1.35
Pipe DMAM3-2	250	60.83	130	2039.7	0.48	1.08	2307.11	0.54	1.35
Pipe DMAM3-3	250	148.46	130	2039.7	0.48	1.08	2307.11	0.54	1.35
Pipe DMAM3-4	250	225.92	130	2010.73	0.47	1.05	2274.13	0.54	1.32
Pipe DMAM3-5	200	57.36	130	1137.47	0.42	1.08	1293.26	0.48	1.37
Pipe DMAM3-6	200	174.24	130	1079.53	0.4	0.98	1227.29	0.45	1.25
Pipe 45	100	164.49	130	144.17	0.21	0.69	164.11	0.24	0.88
Pipe 46	100	212.12	130	86.22	0.13	0.27	98.14	0.14	0.34
Pipe 47	100	110.59	130	124.32	0.18	0.53	141.96	0.21	0.67
Pipe 48	100	16.61	130	107.1	0.16	0.4	122.38	0.18	0.51
Pipe 49	100	200.23	130	89.52	0.13	0.29	102.39	0.15	0.37
Pipe 50	100	138.25	130	72.33	0.11	0.19	82.84	0.12	0.25
Pipe 52	100	165.78	130	16.47	0.02	0.01	19.31	0.03	0.02
Pipe 53	200	157.08	130	-99.42	0.04	0.01	-112.62	0.04	0.02
Pipe DMAM3-16	100	94.54	130	168.2	0.25	0.92	194.17	0.29	1.2
Pipe DMAM3-17	75	90.59	130	62.08	0.16	0.59	71.15	0.19	0.76
Pipe DMAM3-19	100	166.33	130	-28.97	0.04	0.04	-32.98	0.05	0.04
Pipe DMAM3-20	100	144.71	130	-40.26	0.06	0.07	-41.32	0.06	0.07
Pipe DMAM3-21	100	17.09	130	-51.53	0.08	0.1	-49.87	0.07	0.1
Pipe DMAM3-22	100	124.76	130	-80.51	0.12	0.24	-82.86	0.12	0.25
Pipe DMAM3-23	100	25.27	130	-115.85	0.17	0.46	-119.04	0.18	0.48
Pipe DMAM3-24	100	170.28	130	-121.07	0.18	0.5	-149.48	0.22	0.74
Pipe DMAM3-25	100	73.71	130	-135.82	0.2	0.62	-156.32	0.23	0.8
Pipe DMAM3-26	100	59.54	130	-228.34	0.34	1.62	-263.58	0.39	2.11
Pipe DMAM3-27	100	71.53	130	-186.73	0.28	1.12	-210.61	0.31	1.4
Pipe DMAM3-28	100	145.04	130	-263.69	0.39	2.12	-299.3	0.44	2.67
Pipe DMAM3-29	200	63.23	130	580.59	0.21	0.31	648.59	0.24	0.38
Pipe DMAM3-30	200	68.98	130	339.44	0.13	0.12	378.64	0.14	0.14
Pipe DMAM3-31	200	181.88	130	324.31	0.12	0.11	362.24	0.13	0.13
Pipe DMAM3-32	200	155.39	130	309.18	0.11	0.1	345.85	0.13	0.12
Pipe DMAM3-33	200	130.97	130	208	0.08	0.05	232.82	0.09	0.06
Pipe DMAM3-34	100	208.64	130	192.87	0.28	1.19	216.43	0.32	1.47
Pipe DMAM4-1	300	27.52	130	4035.06	0.66	1.57	4566.28	0.75	1.97

Pipe DMAM4-2	300	13.91	130	4035.06	0.66	1.57	4566.28	0.75	1.97
Pipe DMAM4-3	300	114.6	130	4035.06	0.66	1.57	4566.28	0.75	1.97
Pipe DMAM4-4	300	26.78	130	4035.06	0.66	1.57	4566.28	0.75	1.97
Pipe DMAM4-6	300	118.39	130	3988.85	0.65	1.54	4514.95	0.74	1.93
Pipe DMAM4-7	300	217.17	130	3670.18	0.6	1.32	4155.29	0.68	1.66
Pipe DMAM4-8	250	107.68	130	2540.3	0.6	1.62	2878.99	0.68	2.04
Pipe DMAM4-9	250	80.4	130	2494.09	0.59	1.56	2827.66	0.67	1.97
Pipe DMAM4-10	250	195.62	130	2447.89	0.58	1.51	2776.33	0.65	1.91
Pipe DMAM4-11	250	76.32	130	2195.66	0.52	1.24	2492.14	0.59	1.56
Pipe DMAM4-12	200	83.35	130	1721.76	0.63	2.34	1955.6	0.72	2.96
Pipe DMAM4-13	200	64.66	130	1652.45	0.61	2.16	1878.61	0.69	2.74
Pipe DMAM4-14	200	80.49	130	1606.25	0.59	2.05	1827.28	0.67	2.61
Pipe DMAM4-15	200	83.27	130	1582.77	0.58	2	1802.43	0.66	2.54
Pipe DMAM4-16	200	97.76	130	1566.15	0.58	1.96	1785.53	0.66	2.5
Pipe DMAM4-17	200	217.17	130	1333.08	0.49	1.45	1521.19	0.56	1.86
Pipe DMAM4-18	200	215.99	130	1317.78	0.49	1.42	1513.33	0.56	1.84
Pipe DMAM4-19	200	184.85	130	1239.04	0.46	1.27	1426.09	0.53	1.65
Pipe DMAM4-20	200	30.69	130	1219.13	0.45	1.23	1417.82	0.52	1.63
Pipe DMAM4-21	200	74.38	130	1275.23	0.47	1.34	1489.03	0.55	1.78
Pipe DMAM4-22	200	244.91	130	983.16	0.36	0.83	1154.9	0.43	1.11
Pipe DMAM4-23	200	89.41	130	752.15	0.28	0.5	898.27	0.33	0.7
Pipe DMAM4-24	200	146.61	130	659.74	0.24	0.4	795.61	0.29	0.56
Pipe DMAM4-25	200	149.36	130	418.62	0.15	0.17	535.06	0.2	0.27
Pipe DMAM4-26	200	257.73	130	390.52	0.14	0.15	499.15	0.18	0.24
Pipe DMAM4-27	200	186.08	130	327.24	0.12	0.11	418.26	0.15	0.17
Pipe DMAM4-28	200	317.9	130	299.94	0.11	0.09	383.37	0.14	0.14
Pipe DMAM4-29	200	244.96	130	226.6	0.08	0.05	289.62	0.11	0.09
Pipe DMAM4-30	200	24.34	130	217.5	0.08	0.05	277.99	0.1	0.08
Pipe DMAM4-31	200	52.97	130	107.34	0.04	0.01	137.2	0.05	0.02
Pipe DMAM4-32	200	144.06	130	1106.78	0.41	1.03	1250.64	0.46	1.29
Pipe DMAM4-33	200	34.71	130	987.9	0.36	0.83	1117.92	0.41	1.05
Pipe DMAM4-34	200	212.21	130	935.46	0.34	0.75	1059.14	0.39	0.95
Pipe DMAM4-36	200	40.08	130	1194.55	0.44	1.19	1517.24	0.56	1.85
Pipe DMAM4-37	200	94.7	130	1157.35	0.43	1.12	1471.8	0.54	1.75
Pipe DMAM4-38	200	150.57	130	1120.14	0.41	1.05	1426.36	0.53	1.65
Pipe DMAM4-39	200	139.22	130	1064.33	0.39	0.96	1358.21	0.5	1.5
Pipe DMAM4-40	200	245.03	130	855.85	0.32	0.64	1092.52	0.4	1.01
Pipe DMAM4-41	200	47.37	130	770.36	0.28	0.53	982.71	0.36	0.83
Pipe DMAM4-42	200	401.55	130	653.18	0.24	0.39	834.45	0.31	0.61
Pipe DMAM4-43	200	48.7	130	512.36	0.19	0.25	653.8	0.24	0.39
Pipe DMAM4-44	200	327.88	130	464.45	0.17	0.21	595.55	0.22	0.33
Pipe DMAM4-45	150	246.4	130	336.78	0.22	0.46	431.81	0.28	0.73
Pipe DMAM4-46	100	75.65	130	339.6	0.5	3.38	435.36	0.64	5.35

Pipe DMAM4-47	100	280.33	130	284.38	0.42	2.43	364.56	0.54	3.85
Pipe DMAM4-48	100	202.59	130	235.75	0.35	1.72	302.22	0.45	2.72
Pipe DMAM4-49	100	31.34	130	218.75	0.32	1.5	280.41	0.41	2.37
Pipe DMAM4-50	100	162.96	130	147.37	0.22	0.72	188.92	0.28	1.14
Pipe DMAM4-51	100	140.64	130	103.05	0.15	0.37	132.1	0.19	0.59
Pipe DMAM4-52	100	428.54	130	0.38	0	0	-0.81	0	0
Pipe DMAM4-53	200	83.95	130	1528.23	0.56	1.87	1737.31	0.64	2.37
Pipe DMAM4-54	200	99.02	130	1475.54	0.54	1.75	1677.21	0.62	2.22
Pipe DMAM4-55	200	222.32	130	1191.19	0.44	1.18	1353.86	0.5	1.5
Pipe DMAM4-56	150	212.23	130	807.7	0.53	2.33	911.61	0.6	2.92
Pipe DMAM4-57	150	26.64	130	784.6	0.51	2.21	885.94	0.58	2.77
Pipe DMAM4-58	150	190.12	130	645.99	0.42	1.54	731.96	0.48	1.94
Pipe DMAM4-59	100	264.03	130	221.39	0.33	1.53	249.82	0.37	1.91
Pipe DMAM5-1	300	16.13	130	2624.27	0.43	0.71	3135.44	0.51	0.98
Pipe DMAM5-2	300	18.17	130	2624.27	0.43	0.71	3135.44	0.51	0.98
Pipe DMAM5-3	300	109.77	130	2624.27	0.43	0.71	3135.44	0.51	0.98
Pipe DMAM5-4	300	33.66	130	2624.27	0.43	0.71	3135.44	0.51	0.98
Pipe DMAM5-5	250	105.93	130	2624.27	0.43	0.71	3135.44	0.74	2.39
Pipe DMAM5-6	250	221.82	130	2624.27	0.43	0.71	3135.44	0.74	2.39
Pipe DMAM5-7	250	38.73	130	2624.27	0.62	1.72	3135.44	0.74	2.39
Pipe DMAM5-8	250	123.57	130	2624.27	0.62	1.72	3135.44	0.74	2.39
Pipe DMAM5-9	250	112.52	130	2624.27	0.62	1.72	3135.44	0.74	2.39
Pipe DMAM5-10	250	369.65	130	2624.27	0.62	1.72	3135.44	0.74	2.39
Pipe DMAM5-11	250	258.63	130	2624.27	0.62	1.72	3135.44	0.74	2.39
Pipe DMAM5-12	250	220.01	130	2624.27	0.62	1.72	3135.44	0.74	2.39
Pipe DMAM5-13	250	198.2	130	2624.27	0.62	1.72	3135.44	0.74	2.39
Pipe DMAM5-14	150	142.58	130	599.09	0.39	1.34	844.15	0.55	2.53
Pipe DMAM5-15	150	156.67	130	585.28	0.38	1.29	827.8	0.54	2.44
Pipe DMAM5-16	150	154.9	130	431.8	0.28	0.73	627.12	0.41	1.46
Pipe DMAM5-17	150	145.72	130	485.55	0.32	0.91	653.69	0.43	1.58
Pipe DMAM5-18	150	19.13	130	452.48	0.3	0.8	585.14	0.38	1.29
Pipe DMAM5-19	150	144.38	130	368.32	0.24	0.55	466.23	0.31	0.84
Pipe DMAM5-20	150	155.84	130	319.19	0.21	0.42	388.74	0.25	0.6
Pipe DMAM5-21	150	137.98	130	315.06	0.21	0.41	372.66	0.24	0.56
Pipe DMAM5-22	150	99.23	130	230.61	0.15	0.23	272.77	0.18	0.31
Pipe DMAM5-23	150	163.58	130	86.52	0.06	0.04	102.15	0.07	0.05
Pipe DMAM5-24	150	185.82	130	72.72	0.05	0.03	85.8	0.06	0.04
Pipe DMAM5-25	200	160.5	130	2011.37	0.47	1.05	2274.95	0.84	3.91
Pipe DMAM5-28	200	19.51	130	1752.88	0.65	2.41	2034.57	0.75	3.18
Pipe DMAM5-29	200	157.77	130	702.48	0.26	0.44	820.83	0.3	0.59
Pipe DMAM5-30	200	156.62	130	672.01	0.25	0.41	809.97	0.3	0.58
Pipe DMAM5-32	100	177.22	130	103.97	0.15	0.38	119.91	0.18	0.49
Pipe DMAM5-33	100	154.09	130	87.19	0.13	0.27	100.19	0.15	0.35

Pipe DMAM5-34	100	323.86	130	66.47	0.1	0.16	76.81	0.11	0.22
Pipe DMAM5-35	100	136.03	130	74.18	0.11	0.2	87	0.13	0.27
Pipe DMAM5-36	100	107.24	130	59.07	0.09	0.13	69.35	0.1	0.18
Pipe DMAM5-39	200	106.53	130	752.87	0.28	0.5	924.9	0.34	0.74
Pipe DMAM5-40	200	390.46	130	600.78	0.22	0.33	748.29	0.28	0.5
Pipe DMAM5-41	150	80.1	130	458.71	0.3	0.82	571.33	0.37	1.23
Pipe DMAM5-42	150	176.88	130	357.12	0.23	0.51	444.8	0.29	0.77
Pipe DMAM5-43	150	22.18	130	301.78	0.2	0.38	375.88	0.25	0.57
Pipe DMAM5-44	150	80.11	130	156.12	0.1	0.11	194.45	0.13	0.17
Pipe DMAM5-45	150	66.38	130	100.79	0.07	0.05	125.53	0.08	0.07
Pipe DMAM5-48	150	151.86	130	527.17	0.35	1.06	646.8	0.42	1.55
Pipe DMAM5-49	150	109.33	130	298.49	0.2	0.37	366.23	0.24	0.54
Pipe DMAM5-50	150	242.22	130	292.73	0.19	0.36	359.17	0.24	0.52
Pipe DMAM5-51	150	116.42	130	275.45	0.18	0.32	337.96	0.22	0.47
Pipe DMAM5-52	150	136.22	130	269.69	0.18	0.31	330.9	0.22	0.45
Pipe 199	75	72.31	130	41.55	0.11	0.28	58.93	0.15	0.54
Pipe 200	75	55.56	130	35.48	0.09	0.21	49.98	0.13	0.4
Pipe 201	75	257.25	130	29.41	0.08	0.15	41.02	0.11	0.27
Pipe 202	75	30.11	130	23.35	0.06	0.1	32.07	0.08	0.17
Pipe 203	75	100.02	130	17.28	0.05	0.06	23.12	0.06	0.09
Pipe 204	50	70.91	130	7.47	0.04	0.08	9.39	0.06	0.13
Pipe 205	50	130.61	130	1.4	0.01	0	0.44	0	0
Pipe 206	75	100.61	130	-16.64	0.04	0.05	-23.27	0.06	0.1
Pipe 207	50	185.02	130	2.33	0.01	0.01	4.18	0.02	0.03
Pipe 208	50	131.6	130	3.74	0.02	0.02	4.78	0.03	0.04
Pipe 209	75	233.85	130	-25.04	0.07	0.11	-36.4	0.1	0.22
Pipe 210	50	111.21	130	11.98	0.07	0.2	14.76	0.09	0.3
Pipe 211	100	182.73	130	-6.23	0.01	0	-12.1	0.02	0.01
Pipe 212	100	186.38	130	-12.29	0.02	0.01	-21.05	0.03	0.02
Pipe 213	50	270.15	130	12.14	0.07	0.21	17.9	0.11	0.43
Pipe 214	50	125.71	130	6.07	0.04	0.06	8.95	0.05	0.12
Pipe 215	100	89.72	130	36.4	0.05	0.05	53.71	0.08	0.11
Pipe 216	100	110.86	130	12.14	0.02	0.01	17.9	0.03	0.01
Pipe 217	75	224.92	130	6.07	0.02	0.01	8.95	0.02	0.02
Pipe 218	100	195.19	130	18.2	0.03	0.02	26.86	0.04	0.03
Pipe 219	75	190.53	130	50.55	0.13	0.4	67.68	0.18	0.69
Pipe 220	75	174.78	130	44.49	0.12	0.32	58.72	0.15	0.53
Pipe 221	50	106.73	130	-4.33	0.03	0.03	-6.22	0.04	0.06
Pipe 222	100	99.5	130	36.4	0.05	0.05	53.71	0.08	0.11
Pipe 223	50	217.43	130	6.07	0.04	0.06	8.95	0.05	0.12
Pipe 224	100	187.16	130	24.27	0.04	0.03	35.81	0.05	0.05
Pipe 225	100	75.47	130	12.14	0.02	0.01	17.9	0.03	0.01
Pipe 226	75	140.96	130	6.07	0.02	0.01	8.95	0.02	0.02

Pipe 227	75	126.85	130	6.07	0.02	0.01	8.95	0.02	0.02
Pipe 228	100	13.39	130	39.12	0.06	0.06	50.52	0.07	0.1
Pipe 229	100	292.64	130	-52.49	0.08	0.11	-67.79	0.1	0.17
Pipe 230	100	98.83	130	80.97	0.12	0.24	104.57	0.15	0.38
Pipe 231	100	36.55	130	30.47	0.04	0.04	39.35	0.06	0.06
Pipe 232	50	351.23	130	10.22	0.06	0.15	13.19	0.08	0.24
Pipe 233	50	109.16	130	-0.43	0	0	-0.55	0	0
Pipe 234	50	468.78	130	11.68	0.07	0.19	15.09	0.09	0.31
Pipe 235	50	137.86	130	1.04	0.01	0	1.34	0.01	0
Pipe 236	50	484.2	130	-9.61	0.06	0.13	-12.41	0.07	0.22
Pipe 237	100	129.74	130	39.85	0.06	0.06	51.47	0.08	0.1
Pipe 238	100	122.83	130	29.21	0.04	0.04	37.72	0.06	0.06
Pipe 239	100	154.8	130	-47.49	0.07	0.09	-61.3	0.09	0.14
Pipe 240	100	254.79	130	66.05	0.1	0.16	85.27	0.13	0.26
Pipe 241	100	162.51	130	12.13	0.02	0.01	16.09	0.02	0.01
Pipe 242	100	197.96	130	32.2	0.05	0.04	41.13	0.06	0.07
Pipe 243	100	198.38	130	21.55	0.03	0.02	27.38	0.04	0.03
Pipe 244	50	147	130	6.65	0.04	0.07	8.96	0.05	0.12
Pipe 245	50	62.38	130	17.55	0.1	0.41	22.59	0.13	0.65
Pipe 246	50	141.55	130	6.91	0.04	0.07	8.84	0.05	0.12
Pipe 247	50	222.17	130	-3.74	0.02	0.02	-4.91	0.03	0.04
Pipe 248	100	211.71	130	42.84	0.06	0.07	54.88	0.08	0.12
Pipe 249	100	34.49	130	159.68	0.24	0.84	206.24	0.3	1.34
Pipe 250	100	49.16	130	96	0.14	0.33	123.99	0.18	0.52
Pipe 251	100	123.44	130	50.9	0.08	0.1	65.74	0.1	0.16
Pipe 252	100	120.54	130	25.22	0.04	0.03	32.57	0.05	0.04
Pipe 253	100	19.72	130	46.31	0.07	0.08	59.81	0.09	0.14
Pipe 254	100	88.31	130	25.02	0.04	0.03	32.32	0.05	0.04
Pipe 255	100	204.5	130	14.38	0.02	0.01	18.57	0.03	0.02
Pipe 256	100	206.52	130	-28.21	0.04	0.03	-36.43	0.05	0.05
Pipe 257	100	125.36	130	-23.81	0.04	0.02	-30.76	0.05	0.04
Pipe 258	50	102.86	130	31.94	0.19	1.24	41.25	0.24	1.99
Pipe 259	50	382.61	130	21.29	0.13	0.59	27.5	0.16	0.94
Pipe 260	50	77.98	130	10.65	0.06	0.16	13.75	0.08	0.26
Pipe 261	100	86.75	130	-31.74	0.05	0.04	-41	0.06	0.07
Pipe 262	100	266.65	130	-42.39	0.06	0.07	-54.75	0.08	0.12
Pipe 263	100	82.76	130	-53.03	0.08	0.11	-68.49	0.1	0.17
Pipe 264	100	225.2	130	15.04	0.02	0.01	19.42	0.03	0.02
Pipe 265	100	239.5	130	34.46	0.05	0.05	44.5	0.07	0.08
Pipe 266	50	181.15	130	10.65	0.06	0.16	13.75	0.08	0.26
Pipe 267	100	101.93	130	182.2	0.27	1.07	255.54	0.38	2
Pipe 268	100	106.84	130	134.25	0.2	0.61	189.79	0.28	1.15
Pipe 269	100	18.93	130	101.08	0.15	0.36	145.59	0.21	0.7

Pipe 270	100	165.43	130	75.84	0.11	0.21	111.27	0.16	0.43
Pipe 271	100	131.15	130	67.05	0.1	0.17	98.61	0.15	0.34
Pipe 272	100	95.79	130	48.1	0.07	0.09	71.21	0.1	0.19
Pipe 273	100	69.76	130	31.91	0.05	0.04	47.96	0.07	0.09
Pipe 274	100	179.46	130	31.17	0.05	0.04	46.81	0.07	0.09
Pipe 275	50	120.48	130	24.39	0.14	0.75	34.48	0.2	1.43
Pipe 276	50	135.22	130	-0.86	0.01	0	0.16	0	0
Pipe 277	100	186.49	130	103.5	0.15	0.37	144.81	0.21	0.7
Pipe 278	100	75.49	130	58.39	0.09	0.13	83.19	0.12	0.25
Pipe 279	50	124.09	130	10.57	0.06	0.16	16.01	0.09	0.35
Pipe 280	50	161.64	130	7.92	0.05	0.09	9.89	0.06	0.14
Pipe 281	50	81.42	130	5.38	0.03	0.05	7.01	0.04	0.07
Pipe 282	50	149.8	130	-19.87	0.12	0.52	-27.31	0.16	0.93
Pipe 283	50	146.79	130	10.16	0.06	0.15	14.73	0.09	0.3
Pipe 285	50	113.83	130	1.38	0.01	0	2.07	0.01	0.01
Pipe 286	50	158.48	130	-8.05	0.05	0.1	-11.52	0.07	0.19
Pipe 287	50	137.69	130	-16.83	0.1	0.38	-24.18	0.14	0.74
Pipe 288	50	123.56	130	-12.37	0.07	0.21	-17.54	0.1	0.41
Pipe 289	75	224.77	130	15.27	0.04	0.04	22.06	0.06	0.09
Pipe 290	75	163.23	130	6.48	0.02	0.01	9.4	0.02	0.02
Pipe 291	75	124.78	130	-24.53	0.06	0.11	-35.29	0.09	0.21
Pipe 292	50	121.45	130	-33.32	0.2	1.34	-47.95	0.28	2.63
Pipe 293	100	40.43	130	26.36	0.04	0.03	37.99	0.06	0.06
Pipe 294	50	189.45	130	8.79	0.05	0.11	12.66	0.07	0.22
Pipe 295	50	144.45	130	8.79	0.05	0.11	12.66	0.07	0.22
Pipe 296	75	252.01	130	8.79	0.02	0.02	12.66	0.03	0.03
Pipe 297	75	250.01	130	8.79	0.02	0.02	12.66	0.03	0.03
Pipe 298	75	233.05	130	8.79	0.02	0.02	12.66	0.03	0.03
Pipe 299	75	204.06	130	8.79	0.02	0.02	12.66	0.03	0.03
Pipe 300	50	178.91	130	-4.66	0.03	0.04	-6.69	0.04	0.07
Pipe 301	50	181.84	130	-13.44	0.08	0.25	-19.36	0.11	0.49
Pipe 302	50	28.38	130	-22.23	0.13	0.63	-32.02	0.19	1.25
Pipe 303	100	27.37	130	127.18	0.19	0.55	183.17	0.27	1.08
Pipe 306	100	130.05	130	72.55	0.11	0.19	104.49	0.15	0.38
Pipe 307	100	133.05	130	48.88	0.07	0.09	70.41	0.1	0.18
Pipe 308	100	95.09	130	27.12	0.04	0.03	39.07	0.06	0.06
Pipe 309	100	146.73	130	9.1	0.01	0	13.11	0.02	0.01
Pipe 311	100	88.67	130	45.52	0.07	0.08	65.57	0.1	0.16
Pipe 312	100	95.39	130	21.84	0.03	0.02	31.46	0.05	0.04
Pipe 313	75	195.97	130	12.74	0.03	0.03	18.35	0.05	0.06
Pipe 314	75	145.49	130	3.63	0.01	0	5.23	0.01	0.01
Pipe 315	75	213.47	130	14.58	0.04	0.04	20.99	0.06	0.08
Pipe 316	50	187.21	130	9.1	0.05	0.12	13.11	0.08	0.24

Pipe 317	50	44.5	130	9.1	0.05	0.12	13.11	0.08	0.24
Pipe 318	50	64.01	130	18.21	0.11	0.44	26.23	0.15	0.86
Pipe 319	50	140.15	130	9.1	0.05	0.12	13.11	0.08	0.24
Pipe 320	50	111.28	130	3.65	0.02	0.02	5.26	0.03	0.04
Pipe 321	50	144.31	130	-14.56	0.09	0.29	-20.97	0.12	0.57
Pipe 322	50	98.06	130	9.1	0.05	0.12	13.11	0.08	0.24
Pipe 323	75	116.54	130	5.75	0.02	0.01	8.28	0.02	0.01
Pipe 324	50	140.04	130	-3.55	0.02	0.02	-5.11	0.03	0.04
Pipe 325	50	110.81	130	-12.66	0.07	0.22	-18.23	0.11	0.44
Pipe 326	75	123.84	130	0.19	0	0	0.28	0	0
Pipe 327	50	212.04	130	-8.91	0.05	0.12	-12.84	0.08	0.23
Pipe 328	100	98.03	130	38.01	0.06	0.06	54.75	0.08	0.12
Pipe 329	50	73.19	130	9.1	0.05	0.12	13.11	0.08	0.24
Pipe 330	50	160.26	130	9.1	0.05	0.12	13.11	0.08	0.24
Pipe 331	50	181.99	130	7.57	0.04	0.09	8.2	0.05	0.1
Pipe DMAM3-7	200	143.08	130	877.41	0.32	0.67	997.22	0.37	0.85
Pipe DMAM3-8	200	68.63	130	896.43	0.33	0.7	1019.94	0.38	0.89
Pipe DMAM3-9	200	109.11	130	748.82	0.28	0.5	856.59	0.32	0.64
Pipe DMAM3-10	200	19.26	130	708.1	0.26	0.45	810.2	0.3	0.58
Pipe DMAM3-11	200	198.1	130	544.97	0.2	0.28	623.69	0.23	0.36
Pipe DMAM3-12	200	136.62	130	474.81	0.17	0.21	543.3	0.2	0.28
Pipe DMAM3-15	200	165	130	325.56	0.12	0.11	372.76	0.14	0.14
Pipe 340	100	159.02	130	-67.07	0.1	0.17	-76.81	0.11	0.22
Pipe 341	50	155.49	130	-11.75	0.07	0.19	-13.4	0.08	0.25
Pipe 342	50	153.48	130	-11.39	0.07	0.18	-12.99	0.08	0.23
Pipe 343	50	155.93	130	-11.79	0.07	0.2	-13.44	0.08	0.25
Pipe 344	50	155.41	130	-11.24	0.07	0.18	-12.81	0.08	0.23
Pipe 345	50	156.94	130	-8.67	0.05	0.11	-9.89	0.06	0.14
Pipe 346	50	66.95	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe 347	100	249.94	130	-47.99	0.07	0.09	-55.71	0.08	0.12
Pipe 348	100	95.46	130	51.57	0.08	0.1	53.56	0.08	0.11
Pipe 349	100	164.78	130	-6.38	0.01	0	-12.41	0.02	0.01
Pipe 350	100	100.42	130	122.76	0.18	0.51	140.53	0.21	0.66
Pipe 351	100	88.39	130	37.55	0.06	0.06	42.59	0.06	0.07
Pipe 352	100	91.25	130	-63.55	0.09	0.15	-74.27	0.11	0.2
Pipe 353	75	233.56	130	-56.24	0.15	0.49	-64.96	0.17	0.64
Pipe 354	75	134.11	130	-43.15	0.11	0.3	-50.89	0.13	0.41
Pipe 355	75	122.48	130	-72.12	0.19	0.78	-83.88	0.22	1.03
Pipe 356	50	104.55	130	29.4	0.17	1.06	33.98	0.2	1.39
Pipe 357	50	82.69	130	15.23	0.09	0.32	18.52	0.11	0.45
Pipe 358	50	111.96	130	-6.37	0.04	0.06	-3.2	0.02	0.02
Pipe 359	75	178.52	130	41.43	0.11	0.28	47.43	0.12	0.36
Pipe 360	75	98.2	130	12.46	0.03	0.03	14.44	0.04	0.04

Pipe 361	75	157.62	130	35.78	0.09	0.21	39.63	0.1	0.26
Pipe 362	75	119.05	130	6.81	0.02	0.01	6.65	0.02	0.01
Pipe 363	50	93.56	130	31.27	0.18	1.19	36.16	0.21	1.56
Pipe 364	100	91.71	130	47.08	0.07	0.09	56.52	0.08	0.12
Pipe DMAM3-19-1	100	147.5	130	-13.04	0.02	0.01	-12.45	0.02	0.01
Pipe 366	100	163.51	130	-32.32	0.05	0.04	-38.91	0.06	0.06
Pipe 367	75	161.76	130	37.95	0.1	0.24	42.64	0.11	0.29
Pipe 368	100	113.39	130	212.18	0.31	1.41	236.97	0.35	1.74
Pipe 369	100	153.45	130	183.2	0.27	1.08	203.98	0.3	1.32
Pipe 370	100	190.65	130	76.95	0.11	0.22	98.37	0.14	0.34
Pipe 371	50	169.67	130	7.57	0.04	0.09	8.2	0.05	0.1
Pipe 372	100	21.14	130	77.28	0.11	0.22	72.63	0.11	0.19
Pipe 373	100	103.02	130	-10.94	0.02	0.01	5.21	0.01	0
Pipe 374	100	135.4	130	-67.2	0.1	0.17	-69.83	0.1	0.18
Pipe 375	100	127.9	130	-47.36	0.07	0.09	-50.64	0.07	0.1
Pipe 376	75	209.73	130	93.61	0.25	1.26	104.84	0.27	1.56
Pipe 377	75	131.42	130	66.21	0.17	0.66	77.45	0.2	0.89
Pipe 378	75	175.02	130	58.64	0.15	0.53	69.26	0.18	0.72
Pipe 379	75	96.29	130	71.3	0.19	0.76	80.32	0.21	0.95
Pipe 380	75	88.53	130	38.07	0.1	0.24	42.25	0.11	0.29
Pipe 381	75	63.55	130	15.37	0.04	0.04	17.66	0.05	0.06
Pipe 382	75	58.06	130	0.56	0	0	0.97	0	0
Pipe 383	75	67.86	130	-30.73	0.08	0.16	-37.1	0.1	0.23
Pipe 384	75	299.59	130	-31.75	0.08	0.17	-38.09	0.1	0.24
Pipe 385	75	233.9	130	-38.76	0.1	0.25	-45.32	0.12	0.33
Pipe 386	100	122.9	130	137.94	0.2	0.64	157.59	0.23	0.82
Pipe 387	100	62.92	130	115.24	0.17	0.46	133	0.2	0.6
Pipe 388	100	155.63	130	107.68	0.16	0.4	124.8	0.18	0.53
Pipe 389	100	115.22	130	90.61	0.13	0.29	104.17	0.15	0.38
Pipe 392	100	47.42	130	46.32	0.07	0.08	53.51	0.08	0.11
Pipe 393	50	36.68	130	15.13	0.09	0.31	16.39	0.1	0.36
Pipe 394	50	101.27	130	7.57	0.04	0.09	8.2	0.05	0.1
Pipe 395	75	126.62	130	80.65	0.21	0.96	59.22	0.16	0.54
Pipe 396	5	160.53	130	37.45	0.1	0.23	0.09	0.06	1.88
Pipe 397	50	151.45	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe 398	50	207.16	130	-14.22	0.08	0.28	-26.14	0.15	0.86
Pipe 399	50	147.18	130	-23.75	0.14	0.72	-2.54	0.01	0.01
Pipe 400	75	89.96	130	-17.69	0.05	0.06	-24.43	0.06	0.11
Pipe 401	75	275.1	130	48.69	0.13	0.38	66.84	0.18	0.68
Pipe 402	50	81.13	130	18.29	0.11	0.44	15.01	0.09	0.31
Pipe 403	50	110.2	130	10.72	0.06	0.16	6.81	0.04	0.07
Pipe 404	50	165.39	130	-9.5	0.06	0.13	-12.44	0.07	0.22
Pipe 405	75	132.3	130	-40.87	0.11	0.27	-47.84	0.13	0.36

Pipe 406	50	195.67	130	-15.2	0.09	0.31	-17.97	0.11	0.43
Pipe 407	50	105.74	130	7.57	0.04	0.09	8.2	0.05	0.1
Pipe 408	50	230.36	130	-13.95	0.08	0.27	-16.3	0.1	0.36
Pipe 409	50	139.74	130	-13.63	0.08	0.26	-16.59	0.1	0.37
Pipe 410	75	158.24	130	-21.19	0.06	0.08	-24.78	0.06	0.11
Pipe 411	75	65.69	130	-14.1	0.04	0.04	-15.4	0.04	0.04
Pipe 412	75	92.91	130	-8.04	0.02	0.01	-7.01	0.02	0.01
Pipe 413	50	142.16	130	7.57	0.04	0.09	8.2	0.05	0.1
Pipe 414	75	189.64	130	33.3	0.09	0.19	39.64	0.1	0.26
Pipe 415	200	304.51	130	86.92	0.03	0.01	98.95	0.04	0.01
Pipe 416	100	97.84	130	57.94	0.09	0.13	65.97	0.1	0.16
Pipe 417	50	324.9	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe 419	50	229.31	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe 420	75	182.68	130	44.83	0.12	0.32	51.13	0.13	0.41
Pipe 422	75	134.98	130	42.09	0.11	0.29	47.82	0.13	0.36
Pipe 423	50	97.83	130	-15.86	0.09	0.34	-18.15	0.11	0.44
Pipe DMAM4-61	200	87.38	130	1839.29	0.68	2.64	2377.18	0.88	4.24
Pipe DMAM4-62	200	91.79	130	1749.17	0.64	2.4	2260.13	0.83	3.87
Pipe DMAM4-63	200	104.61	130	1666.89	0.61	2.2	2148.71	0.79	3.52
Pipe DMAM4-64	200	48.94	130	1690.79	0.62	2.26	2173.08	0.8	3.59
Pipe DMAM4-65	200	54.32	130	1712.32	0.63	2.31	2198.54	0.81	3.67
Pipe 430	200	215.76	130	1535.18	0.57	1.89	1934.53	0.71	2.9
Pipe 431	200	92.24	130	1611.48	0.59	2.07	2028.47	0.75	3.16
Pipe 432	200	96.7	130	1396.35	0.51	1.58	1758.17	0.65	2.43
Pipe 435	100	145.44	130	-295.57	0.44	2.61	-334	0.49	3.28
Pipe 436	100	217.46	130	-83.02	0.12	0.25	-94.75	0.14	0.32
Pipe 437	100	39.86	130	89.61	0.13	0.29	117.73	0.17	0.48
Pipe 438	50	88.08	130	41.57	0.25	2.02	54.5	0.32	3.34
Pipe 440	100	59.27	130	13.76	0.02	0.01	16.38	0.02	0.01
Pipe 441	100	50.74	130	-216.76	0.32	1.47	-272.7	0.4	2.25
Pipe 443	100	54.79	130	-196.54	0.29	1.23	-247.58	0.36	1.88
Pipe 444	100	158.14	130	211.91	0.31	1.41	266.36	0.39	2.16
Pipe 445	100	17.96	130	193.31	0.28	1.19	243.64	0.36	1.83
Pipe 446	100	64.85	130	174.7	0.26	0.99	220.92	0.33	1.52
Pipe 447	100	115.1	130	156.1	0.23	0.8	198.2	0.29	1.25
Pipe 448	75	96.15	130	-28.5	0.07	0.14	-32.07	0.08	0.17
Pipe 449	75	144.53	130	-59.24	0.16	0.54	-72.93	0.19	0.79
Pipe 450	50	144.74	130	26.13	0.15	0.86	33.16	0.2	1.33
Pipe 451	100	146.07	130	-80.91	0.12	0.24	-101.65	0.15	0.36
Pipe 452	50	137.75	130	-85.51	0.5	7.69	-109.34	0.64	12.13
Pipe 454	50	138.95	130	-4.61	0.03	0.03	-7.7	0.05	0.09
Pipe 455	200	52.29	130	1009.4	0.37	0.87	1144.41	0.42	1.1
Pipe 456	200	94.35	130	963.2	0.35	0.8	1093.08	0.4	1.01

Pipe 457	200	182.94	130	1055.83	0.39	0.94	1199.68	0.44	1.2
Pipe 458	200	43.58	130	1001.08	0.37	0.86	1138.33	0.42	1.09
Pipe 459	200	92.9	130	1119.72	0.41	1.05	1273.93	0.47	1.34
Pipe 461	100	156.43	130	178.8	0.26	1.03	201.81	0.3	1.29
Pipe 462	100	35.84	130	155.7	0.23	0.8	176.14	0.26	1
Pipe 463	100	56.08	130	161.94	0.24	0.86	183.59	0.27	1.08
Pipe 464	100	155.91	130	115.73	0.17	0.46	132.27	0.19	0.59
Pipe 465	75	130.59	130	23.1	0.06	0.09	25.66	0.07	0.12
Pipe 466	100	133.11	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 467	50	151.55	130	-29.34	0.17	1.06	-33.12	0.2	1.33
Pipe 468	50	96.23	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 469	50	66.29	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 470	150	220.96	130	229.13	0.15	0.23	258.53	0.17	0.28
Pipe 471	150	24.5	130	206.03	0.13	0.19	232.86	0.15	0.23
Pipe 472	150	92.49	130	156.3	0.1	0.11	176.9	0.12	0.14
Pipe 473	50	53.39	130	-8.55	0.05	0.11	-10.03	0.06	0.15
Pipe 474	50	19.67	130	-31.65	0.19	1.22	-35.7	0.21	1.52
Pipe 475	150	80.67	130	141.74	0.09	0.09	161.27	0.11	0.12
Pipe 476	200	297.78	130	450.8	0.17	0.2	510.88	0.19	0.25
Pipe 477	200	89.6	130	454.33	0.17	0.2	515.51	0.19	0.25
Pipe 478	50	110.35	130	-26.63	0.16	0.89	-30.3	0.18	1.13
Pipe 479	50	55.35	130	18.6	0.11	0.46	22.72	0.13	0.66
Pipe 480	50	77.96	130	18.6	0.11	0.46	22.72	0.13	0.66
Pipe 481	75	142.87	130	37.21	0.1	0.23	45.44	0.12	0.33
Pipe 482	75	61.53	130	-18.6	0.05	0.06	-22.72	0.06	0.09
Pipe 483	75	233.91	130	46.2	0.12	0.34	51.33	0.13	0.41
Pipe 484	75	38.74	130	23.1	0.06	0.1	25.66	0.07	0.12
Pipe 485	100	357.41	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 486	50	148.9	130	58.47	0.34	3.8	72.19	0.43	5.62
Pipe 488	100	198.47	130	-6.48	0.01	0	-8.77	0.01	0
Pipe 489	100	237.57	130	-29.58	0.04	0.04	-34.43	0.05	0.05
Pipe 490	100	83.17	130	261.25	0.38	2.08	297.69	0.44	2.65
Pipe 491	100	104.82	130	103.39	0.15	0.37	118.51	0.17	0.48
Pipe 492	100	106.44	130	-48.5	0.07	0.09	-54.45	0.08	0.11
Pipe 493	100	126.37	130	-209.97	0.31	1.39	-238.68	0.35	1.76
Pipe 494	100	66.2	130	-166.46	0.25	0.9	-185.39	0.27	1.1
Pipe 495	100	80.49	130	-244.45	0.36	1.84	-273.05	0.4	2.26
Pipe 496	100	69.06	130	-371.79	0.55	4	-416.46	0.61	4.93
Pipe 497	150	60.35	130	-667.21	0.44	1.64	-748.68	0.49	2.03
Pipe 498	100	84.42	130	-265.71	0.39	2.15	-292.2	0.43	2.56
Pipe 499	100	99.09	130	-108.92	0.16	0.41	-112.37	0.17	0.44
Pipe 500	100	110.81	130	34.29	0.05	0.05	53.19	0.08	0.11
Pipe 501	100	127.71	130	79.2	0.12	0.23	96.87	0.14	0.33

Pipe 502	100	218.96	130	138.37	0.2	0.64	158.56	0.23	0.82
Pipe 503	100	81.68	130	246.58	0.36	1.87	281.8	0.42	2.39
Pipe 504	100	133.71	130	200.38	0.3	1.27	230.47	0.34	1.65
Pipe 505	100	33.16	130	232.92	0.34	1.68	266.39	0.39	2.16
Pipe 506	100	141.47	130	186.71	0.28	1.12	215.06	0.32	1.45
Pipe 507	100	11.82	130	117.41	0.17	0.47	138.07	0.2	0.64
Pipe 508	100	29.64	130	91.11	0.13	0.29	95.01	0.14	0.32
Pipe 509	100	129.32	130	-55.64	0.08	0.12	-61.58	0.09	0.14
Pipe 510	100	127.13	130	3.19	0	0	17.4	0.03	0.01
Pipe 511	50	56.07	130	46.2	0.27	2.46	51.33	0.3	2.99
Pipe 512	50	111.72	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 513	50	47.99	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 514	100	40.25	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 515	50	95.74	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 516	100	215.86	130	128.79	0.19	0.56	147.3	0.22	0.72
Pipe 517	100	216.96	130	212.52	0.31	1.42	242.56	0.36	1.81
Pipe 518	100	215.44	130	189.42	0.28	1.15	216.89	0.32	1.47
Pipe 519	100	218.85	130	134.76	0.2	0.61	153.52	0.23	0.78
Pipe 520	100	215.36	130	226.1	0.33	1.59	256.81	0.38	2.01
Pipe 521	100	214.56	130	202.99	0.3	1.3	231.15	0.34	1.66
Pipe 522	150	84.27	130	360.39	0.24	0.52	416.59	0.27	0.68
Pipe 523	150	103.58	130	245.95	0.16	0.26	287.63	0.19	0.34
Pipe 524	150	104.71	130	139.12	0.09	0.09	166.71	0.11	0.13
Pipe 525	150	126.57	130	7.8	0.01	0	17.8	0.01	0
Pipe 526	100	53.55	130	115.51	0.17	0.46	128.32	0.19	0.56
Pipe 527	75	78.97	130	23.1	0.06	0.09	25.66	0.07	0.11
Pipe 528	100	44.54	130	69.3	0.1	0.18	76.99	0.11	0.22
Pipe 529	75	153.83	130	23.1	0.06	0.09	25.66	0.07	0.11
Pipe 530	50	33.1	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 531	100	115.25	130	80.3	0.12	0.23	89.74	0.13	0.29
Pipe 532	50	68.26	130	57.19	0.34	3.65	64.08	0.38	4.51
Pipe 533	50	80.61	130	39.23	0.23	1.82	43.81	0.26	2.23
Pipe 534	100	117.64	130	16.13	0.02	0.01	18.15	0.03	0.01
Pipe 535	100	119.08	130	-5.13	0.01	0	-5.4	0.01	0
Pipe 536	100	106.57	130	46.2	0.07	0.08	51.33	0.08	0.1
Pipe 537	50	60.3	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 538	100	41.66	130	193.74	0.29	1.2	225.55	0.33	1.58
Pipe 539	100	40.84	130	343.7	0.51	3.46	389.63	0.57	4.36
Pipe 540	100	42.69	130	297.49	0.44	2.65	338.31	0.5	3.36
Pipe 541	100	95.18	130	-24.1	0.04	0.03	-17.95	0.03	0.01
Pipe 542	100	73.5	130	-93.41	0.14	0.31	-94.94	0.14	0.32
Pipe 543	100	68.04	130	-139.61	0.21	0.65	-146.27	0.22	0.71
Pipe 544	100	79.88	130	-162.71	0.24	0.87	-171.93	0.25	0.96

Pipe 545	100	255.81	130	-208.92	0.31	1.37	-223.26	0.33	1.55
Pipe 546	100	208.64	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 547	100	167.17	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 548	100	262.14	130	196.16	0.29	1.22	215.41	0.32	1.45
Pipe 549	100	227.91	130	173.06	0.26	0.97	189.75	0.28	1.15
Pipe 550	100	59.27	130	207.91	0.31	1.36	230.97	0.34	1.66
Pipe 551	100	47.29	130	161.71	0.24	0.86	179.65	0.26	1.04
Pipe 552	100	86.11	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 553	100	24.36	130	115.51	0.17	0.46	128.32	0.19	0.56
Pipe 554	100	25.9	130	92.41	0.14	0.3	102.65	0.15	0.37
Pipe 555	100	18.09	130	69.3	0.1	0.18	76.99	0.11	0.22
Pipe 556	100	65.85	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 557	100	31.76	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 558	100	78.78	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 559	100	195.32	130	69.3	0.1	0.18	76.99	0.11	0.22
Pipe 560	75	136.74	130	23.1	0.06	0.09	25.66	0.07	0.11
Pipe 561	50	70.91	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 562	100	139.87	130	192.02	0.28	1.18	216.82	0.32	1.47
Pipe 563	100	151.85	130	168.92	0.25	0.93	191.15	0.28	1.17
Pipe 564	100	143.49	130	99.11	0.15	0.35	112.35	0.17	0.44
Pipe 565	100	178.48	130	76	0.11	0.21	86.68	0.13	0.27
Pipe 566	100	152.52	130	71.01	0.1	0.19	80.15	0.12	0.23
Pipe 567	100	201.34	130	47.91	0.07	0.09	54.48	0.08	0.11
Pipe 568	100	264.56	130	97.16	0.14	0.33	108.4	0.16	0.41
Pipe 569	75	107.45	130	-64.55	0.17	0.63	-71.25	0.19	0.76
Pipe 570	100	66.3	130	4.55	0.01	0	-1.4	0	0
Pipe 571	100	77.64	130	150.37	0.22	0.75	164.09	0.24	0.88
Pipe 572	100	82.07	130	203.28	0.3	1.31	225.11	0.33	1.58
Pipe 573	100	20.53	130	228.08	0.34	1.62	253.93	0.37	1.97
Pipe 574	50	55.84	130	115.51	0.68	13.42	128.32	0.76	16.31
Pipe 575	50	52.5	130	69.3	0.41	5.21	76.99	0.45	6.33
Pipe 576	50	45.79	130	46.2	0.27	2.46	51.33	0.3	2.99
Pipe 577	50	103.34	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 578	50	141.19	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 579	50	99.43	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 580	100	149.44	130	140.43	0.21	0.66	157.02	0.23	0.81
Pipe 581	75	262.96	130	117.33	0.31	1.92	131.35	0.34	2.36
Pipe 582	75	58.06	130	56.28	0.15	0.49	63.2	0.17	0.61
Pipe 583	75	107.84	130	33.18	0.09	0.18	37.54	0.1	0.23
Pipe 584	75	39.86	130	10.08	0.03	0.02	11.88	0.03	0.03
Pipe 585	50	94.9	130	-14.85	0.09	0.3	-16.82	0.1	0.38
Pipe 586	50	12.17	130	-37.95	0.22	1.71	-42.49	0.25	2.11
Pipe 587	75	26.44	130	1.82	0	0	3.04	0.01	0

Pipe 588	50	205.76	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 589	75	340	130	-44.38	0.12	0.32	-48.29	0.13	0.37
Pipe 590	100	141.31	130	298.5	0.44	2.66	330.59	0.49	3.22
Pipe 591	100	34.89	130	184.81	0.27	1.1	205.31	0.3	1.33
Pipe 592	100	63.2	130	115.51	0.17	0.46	128.32	0.19	0.56
Pipe 593	50	60.52	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 594	50	52.13	130	46.2	0.27	2.46	51.33	0.3	2.99
Pipe 595	50	81.47	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 596	50	96.23	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 597	50	60.38	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 598	50	132.5	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 599	75	92.66	130	23.1	0.06	0.09	25.66	0.07	0.11
Pipe 600	100	92.53	130	90.58	0.13	0.29	99.62	0.15	0.35
Pipe 601	100	210.95	130	67.48	0.1	0.17	73.96	0.11	0.2
Pipe 602	50	80.74	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 603	50	36.87	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 604	50	104.43	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 605	50	89.05	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 606	100	20.91	130	72.8	0.11	0.2	93.05	0.14	0.31
Pipe 607	100	152.39	130	18.2	0.03	0.01	23.26	0.03	0.02
Pipe 608	100	188.45	130	9.1	0.01	0	11.63	0.02	0.01
Pipe 609	100	63.27	130	45.5	0.07	0.08	58.16	0.09	0.13
Pipe 610	100	62.1	130	21.41	0.03	0.02	27.36	0.04	0.03
Pipe 611	50	208.01	130	9.1	0.05	0.12	11.63	0.07	0.19
Pipe 612	100	115.06	130	15	0.02	0.01	19.17	0.03	0.02
Pipe 613	100	63.87	130	5.89	0.01	0	7.53	0.01	0
Pipe 614	100	110.28	130	-3.21	0	0	-4.1	0.01	0
Pipe 615	50	233.35	130	9.1	0.05	0.12	11.63	0.07	0.19
Pipe 616	50	171.05	130	19	0.11	0.47	24.28	0.14	0.75
Pipe 617	75	176.11	130	54.18	0.14	0.46	69.25	0.18	0.72
Pipe 618	50	269.08	130	-9.9	0.06	0.14	-12.65	0.07	0.22
Pipe 619	75	152.94	130	18.2	0.05	0.06	23.26	0.06	0.1
Pipe 620	75	119.16	130	9.1	0.02	0.02	11.63	0.03	0.03
Pipe 621	75	62.16	130	64.24	0.17	0.63	82.11	0.22	0.99
Pipe 622	75	138.41	130	55.14	0.14	0.47	70.48	0.18	0.75
Pipe 623	75	81.22	130	46.04	0.12	0.34	58.85	0.15	0.53
Pipe 624	75	201.13	130	36.94	0.1	0.23	47.22	0.12	0.36
Pipe 625	75	60.68	130	27.84	0.07	0.13	35.58	0.09	0.21
Pipe 626	75	74.41	130	-18.58	0.05	0.06	-23.75	0.06	0.1
Pipe 627	75	152.13	130	-27.68	0.07	0.13	-35.38	0.09	0.21
Pipe 628	75	274.57	130	-54.98	0.14	0.47	-70.27	0.18	0.74
Pipe 629	100	153.66	130	101.05	0.15	0.36	129.16	0.19	0.56
Pipe 630	100	133.69	130	91.95	0.14	0.3	117.53	0.17	0.47

Pipe 631	100	103.04	130	82.85	0.12	0.25	105.9	0.16	0.39
Pipe 632	100	82.3	130	73.75	0.11	0.2	94.26	0.14	0.31
Pipe 633	100	140.47	130	64.65	0.1	0.16	82.63	0.12	0.25
Pipe 634	100	115.12	130	55.55	0.08	0.12	71	0.1	0.19
Pipe 635	100	112.93	130	75.7	0.11	0.21	96.76	0.14	0.33
Pipe 636	100	117.65	130	66.6	0.1	0.17	85.12	0.13	0.26
Pipe 637	100	182.98	130	57.5	0.08	0.13	73.49	0.11	0.2
Pipe 638	100	216.39	130	48.4	0.07	0.09	61.86	0.09	0.14
Pipe 639	100	185.11	130	39.3	0.06	0.06	50.23	0.07	0.1
Pipe 640	100	120.53	130	30.2	0.04	0.04	38.6	0.06	0.06
Pipe 641	100	63.62	130	21.1	0.03	0.02	26.97	0.04	0.03
Pipe 642	50	193.21	130	12	0.07	0.2	15.33	0.09	0.32
Pipe 643	50	21.05	130	2.9	0.02	0.01	3.7	0.02	0.02
Pipe 644	50	227.65	130	-6.2	0.04	0.06	-7.93	0.05	0.09
Pipe 645	50	257.53	130	-15.3	0.09	0.32	-19.56	0.12	0.5
Pipe 646	75	298.67	130	-24.4	0.06	0.1	-31.19	0.08	0.16
Pipe 647	100	32	130	37.32	0.05	0.06	47.7	0.07	0.09
Pipe 648	50	166.5	130	8.07	0.05	0.1	10.31	0.06	0.15
Pipe 649	75	45.57	130	-25.44	0.07	0.11	-32.51	0.09	0.18
Pipe 650	75	160.56	130	-34.54	0.09	0.2	-44.15	0.12	0.31
Pipe 651	75	140.14	130	-43.64	0.11	0.31	-55.78	0.15	0.48
Pipe 652	75	365.24	130	-42.01	0.11	0.29	-53.7	0.14	0.45
Pipe 653	100	35.35	130	51.11	0.08	0.1	65.33	0.1	0.16
Pipe 654	75	103.2	130	47.13	0.12	0.35	60.24	0.16	0.56
Pipe 655	75	153.78	130	38.03	0.1	0.24	48.61	0.13	0.37
Pipe 656	75	138.4	130	28.93	0.08	0.14	36.98	0.1	0.23
Pipe 657	50	95.37	130	9.1	0.05	0.12	11.63	0.07	0.19
Pipe 658	50	91.76	130	10.73	0.06	0.16	13.71	0.08	0.26
Pipe 659	75	272.91	130	18.2	0.05	0.06	23.26	0.06	0.1
Pipe 660	75	233.81	130	9.1	0.02	0.02	11.63	0.03	0.03
Pipe 662	50	34.51	130	113.39	0.67	12.97	139.75	0.82	19.1
Pipe 663	50	33.05	130	63.9	0.38	4.48	78.66	0.46	6.59
Pipe 664	50	54.31	130	45.3	0.27	2.37	55.94	0.33	3.51
Pipe 665	50	43.3	130	7.14	0.04	0.08	9.19	0.05	0.12
Pipe 666	50	47.22	130	-29.12	0.17	1.05	-34.93	0.21	1.47
Pipe 667	50	35.22	130	-37.91	0.22	1.71	-46.88	0.28	2.53
Pipe 668	50	27.8	130	-39.87	0.24	1.87	-49.47	0.29	2.79
Pipe 669	50	146.43	130	30.89	0.18	1.17	38.37	0.23	1.74
Pipe 670	50	28.23	130	17.65	0.1	0.41	21.41	0.13	0.59
Pipe 671	50	43.21	130	-0.95	0.01	0	-1.31	0.01	0
Pipe 672	50	29.89	130	-19.55	0.12	0.5	-24.03	0.14	0.73
Pipe 673	50	209.86	130	14.25	0.08	0.28	18.24	0.11	0.44
Pipe 674	50	79.45	130	18.6	0.11	0.46	22.72	0.13	0.66

Pipe 675	50	42.52	130	-22.95	0.14	0.67	-27.2	0.16	0.92
Pipe 676	50	63.19	130	-51.37	0.3	2.99	-60.69	0.36	4.08
Pipe 677	50	104.37	130	-69.97	0.41	5.31	-83.41	0.49	7.34
Pipe 678	50	216.49	130	-9.81	0.06	0.14	-10.77	0.06	0.17
Pipe 679	100	140.86	130	198.98	0.29	1.26	253.48	0.37	1.97
Pipe 680	100	141.17	130	142.74	0.21	0.68	181.88	0.27	1.06
Pipe 681	100	64.08	130	135.89	0.2	0.62	172.14	0.25	0.96
Pipe 682	100	53.61	130	116.89	0.17	0.47	147.74	0.22	0.72
Pipe 683	100	63.83	130	97.89	0.14	0.34	123.33	0.18	0.52
Pipe 684	100	95.03	130	88.97	0.13	0.28	107.81	0.16	0.4
Pipe 685	50	130.21	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 686	100	193.47	130	-0.58	0	0	3.32	0	0
Pipe 687	100	179.21	130	-10.08	0.01	0	-8.88	0.01	0
Pipe 690	100	51.23	130	37.58	0.06	0.06	51.57	0.08	0.1
Pipe 691	100	201.41	130	-4.45	0.01	0	-2.46	0	0
Pipe 692	100	57.79	130	-38.41	0.06	0.06	-46.05	0.07	0.08
Pipe 694	75	95.15	130	32.53	0.09	0.18	41.82	0.11	0.28
Pipe 695	75	247.7	130	23.03	0.06	0.09	29.62	0.08	0.15
Pipe 696	75	29.88	130	19.28	0.05	0.07	24.79	0.06	0.11
Pipe 697	50	45.88	130	24.47	0.14	0.76	31.39	0.19	1.2
Pipe 698	50	109.75	130	5.75	0.03	0.05	7.37	0.04	0.08
Pipe 699	75	70.97	130	9.79	0.03	0.02	12.58	0.03	0.03
Pipe 700	50	146.5	130	0.29	0	0	0.38	0	0
Pipe 701	50	73.41	130	-9.21	0.05	0.12	-11.82	0.07	0.2
Pipe 702	50	98.43	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 703	50	78.78	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 705	75	169.13	130	93.32	0.24	1.25	119.64	0.31	1.99
Pipe 706	75	229.88	130	108.96	0.29	1.67	139.65	0.37	2.65
Pipe 707	50	261.6	130	24.79	0.15	0.78	31.78	0.19	1.23
Pipe 708	50	153.95	130	14.11	0.08	0.27	18.09	0.11	0.43
Pipe 709	75	201.06	130	84.65	0.22	1.05	108.5	0.28	1.66
Pipe 710	75	167.36	130	69.61	0.18	0.73	89.23	0.23	1.15
Pipe 711	75	160.14	130	58.93	0.15	0.54	75.54	0.2	0.85
Pipe 712	50	146.64	130	-0.36	0	0	-0.47	0	0
Pipe 713	100	167.57	130	92.01	0.14	0.3	117.94	0.17	0.48
Pipe 714	100	141.66	130	26.14	0.04	0.03	33.51	0.05	0.05
Pipe 716	100	85.8	130	39.34	0.06	0.06	50.43	0.07	0.1
Pipe 717	50	93.99	130	28.66	0.17	1.02	36.73	0.22	1.61
Pipe 718	50	113.1	130	7.3	0.04	0.08	9.35	0.06	0.13
Pipe 719	100	218.83	130	-33.64	0.05	0.05	-43.12	0.06	0.07
Pipe 720	50	105.18	130	30.26	0.18	1.12	38.79	0.23	1.78
Pipe 721	50	93.13	130	7.79	0.05	0.09	9.99	0.06	0.14
Pipe 722	50	81.63	130	-12.46	0.07	0.22	-15.97	0.09	0.34

Pipe 723	100	200.24	130	-23.14	0.03	0.02	-29.67	0.04	0.04
Pipe 724	100	100.71	130	-55.18	0.08	0.12	-70.74	0.1	0.19
Pipe 725	50	150.4	130	4.78	0.03	0.04	6.13	0.04	0.06
Pipe 726	75	156.04	130	37.94	0.1	0.24	48.63	0.13	0.38
Pipe 727	75	180.05	130	27.26	0.07	0.13	34.94	0.09	0.2
Pipe 728	50	44.32	130	21.36	0.13	0.59	27.38	0.16	0.93
Pipe 729	50	388.54	130	10.68	0.06	0.16	13.69	0.08	0.26
Pipe 730	75	196.07	130	10.68	0.03	0.02	13.69	0.04	0.04
Pipe 731	75	192.71	130	21.36	0.06	0.08	27.38	0.07	0.13
Pipe 732	75	143.6	130	10.68	0.03	0.02	13.69	0.04	0.04
Pipe 733	50	159.04	130	9.58	0.06	0.13	12.28	0.07	0.21
Pipe 734	50	93.52	130	-1.1	0.01	0	-1.41	0.01	0
Pipe 735	50	150.46	130	-11.78	0.07	0.2	-15.11	0.09	0.31
Pipe 736	50	123.53	130	10.68	0.06	0.16	13.69	0.08	0.26
Pipe 737	50	127.26	130	10.68	0.06	0.16	13.69	0.08	0.26
Pipe 738	100	126.86	130	-60.7	0.09	0.14	-77.81	0.11	0.22
Pipe 739	50	141.22	130	6.32	0.04	0.06	8.12	0.05	0.1
Pipe 740	75	144.7	130	10.68	0.03	0.02	13.69	0.04	0.04
Pipe 741	75	160.22	130	10.68	0.03	0.02	13.69	0.04	0.04
Pipe 742	75	165.43	130	73.48	0.19	0.81	94.18	0.25	1.28
Pipe 743	75	262.41	130	52.12	0.14	0.43	66.8	0.18	0.68
Pipe 744	50	140.27	130	-29.09	0.17	1.04	-37.3	0.22	1.65
Pipe 745	50	48.75	130	10.68	0.06	0.16	13.69	0.08	0.26
Pipe 746	100	86.84	130	8.86	0.01	0	11.35	0.02	0.01
Pipe 747	100	64.21	130	-12.5	0.02	0.01	-16.03	0.02	0.01
Pipe 748	50	248.03	130	-33.86	0.2	1.38	-43.41	0.26	2.19
Pipe 749	50	147.42	130	-44.54	0.26	2.3	-57.1	0.34	3.64
Pipe 750	150	363.59	130	118.17	0.08	0.07	151.53	0.1	0.11
Pipe 751	100	218.84	130	108.67	0.16	0.41	139.33	0.21	0.65
Pipe 752	75	186.02	130	96.35	0.25	1.33	123.58	0.32	2.11
Pipe 753	75	188.5	130	86.85	0.23	1.1	111.38	0.29	1.74
Pipe 754	100	104.4	130	61.72	0.16	0.58	79.17	0.12	0.23
Pipe 755	100	151.58	130	42.72	0.11	0.3	54.76	0.08	0.12
Pipe 756	50	111.93	130	18.06	0.11	0.43	23.15	0.14	0.68
Pipe 757	50	324.07	130	7.38	0.04	0.08	9.46	0.06	0.13
Pipe 758	50	94.54	130	-3.3	0.02	0.02	-4.23	0.02	0.03
Pipe 759	50	272.3	130	-13.98	0.08	0.27	-17.93	0.11	0.43
Pipe 760	75	267.19	130	9.5	0.02	0.02	12.2	0.03	0.03
Pipe 761	100	95.26	130	-19.58	0.03	0.02	-21.09	0.03	0.02
Pipe 762	100	53.22	130	-38.58	0.06	0.06	-45.49	0.07	0.08
Pipe 763	100	34.96	130	-48.08	0.07	0.09	-57.69	0.09	0.13
Pipe 764	50	35.61	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 765	100	27.37	130	-95.16	0.14	0.32	-121.46	0.18	0.5

Pipe 766	100	183.7	130	-104.66	0.15	0.38	-133.66	0.2	0.6
Pipe 767	100	199.2	130	12.15	0.02	0.01	14.67	0.02	0.01
Pipe 768	100	133.31	130	2.65	0	0	2.47	0	0
Pipe 769	100	149.26	130	-126.31	0.19	0.54	-160.54	0.24	0.84
Pipe 770	100	21.79	130	-107.67	0.16	0.4	-136.06	0.2	0.62
Pipe 772	50	60.97	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 773	50	59.53	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 774	100	52.63	130	76	0.11	0.21	97.62	0.14	0.34
Pipe 775	100	19.49	130	57	0.08	0.12	73.21	0.11	0.2
Pipe 776	100	29.18	130	19	0.03	0.02	24.4	0.04	0.03
Pipe 777	50	72.16	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 778	100	63.7	130	28.5	0.04	0.03	36.61	0.05	0.05
Pipe 779	75	154.23	130	9.5	0.02	0.02	12.2	0.03	0.03
Pipe 780	50	88.29	130	9.5	0.06	0.13	12.2	0.07	0.21
Pipe 781	75	377.67	130	9.5	0.02	0.02	12.2	0.03	0.03
Pipe 783	50	43.75	130	50.23	0.13	0.4	19.38	0.11	0.49
Pipe 784	50	108.74	130	42.46	0.11	0.29	37.85	0.22	1.7
Pipe 785	50	205.76	130	-7.88	0.05	0.09	-21.34	0.13	0.59
Pipe 786	100	146.34	130	-24.66	0.06	0.11	-41.06	0.06	0.07
Pipe 787	100	182.51	130	-41.44	0.11	0.28	-60.79	0.09	0.14
Pipe 788	75	173.8	130	-9.01	0.02	0.02	-38.19	0.1	0.24
Pipe 789	75	48.74	130	42.57	0.25	2.11	77.65	0.2	0.89
Pipe 790	75	121.71	130	16.78	0.04	0.05	19.73	0.05	0.07
Pipe 791	75	149.59	130	33.56	0.09	0.19	39.46	0.1	0.25
Pipe 792	75	94.35	130	16.78	0.04	0.05	19.73	0.05	0.07
Pipe 793	75	194.77	130	50.34	0.13	0.4	59.18	0.16	0.54
Pipe 794	50	159.57	130	16.78	0.1	0.38	19.73	0.12	0.51
Pipe 795	50	57.32	130	16.78	0.1	0.38	19.73	0.12	0.51
Pipe 796	100	222.08	130	139.68	0.21	0.65	184.34	0.27	1.09
Pipe 797	100	142.96	130	125.88	0.19	0.54	167.99	0.25	0.92
Pipe 798	100	100.33	130	98.27	0.14	0.34	135.29	0.2	0.61
Pipe 799	100	11.84	130	70.66	0.1	0.18	102.6	0.15	0.37
Pipe 800	100	37.43	130	29.24	0.04	0.04	53.56	0.08	0.11
Pipe 801	100	39.92	130	15.44	0.02	0.01	37.21	0.05	0.06
Pipe 802	100	71.03	130	1.63	0	0	20.86	0.03	0.02
Pipe 803	100	237.51	130	-87.73	0.13	0.28	-109.97	0.16	0.42
Pipe 804	100	224.23	130	-101.54	0.15	0.36	-126.32	0.19	0.54
Pipe 805	100	116.19	130	75.56	0.11	0.21	114.49	0.17	0.45
Pipe 806	100	222.91	130	-39.65	0.06	0.06	-41.6	0.06	0.07
Pipe 807	100	219.27	130	-53.45	0.08	0.11	-57.95	0.09	0.13
Pipe 808	100	19.1	130	101.41	0.15	0.36	139.74	0.21	0.65
Pipe 809	100	213.94	130	-33.93	0.05	0.05	-33.55	0.05	0.05
Pipe 810	100	220.89	130	-47.73	0.07	0.09	-49.9	0.07	0.1

Pipe 811	75	388.31	130	13.8	0.04	0.04	16.35	0.04	0.05
Pipe 812	75	357.41	130	13.8	0.04	0.04	16.35	0.04	0.05
Pipe 813	50	86.58	130	27.61	0.07	0.13	32.69	0.19	1.3
Pipe 814	75	355.07	130	13.8	0.04	0.04	16.35	0.04	0.05
Pipe 815	100	189.42	130	-169.1	0.25	0.93	-169.24	0.25	0.93
Pipe 816	100	150.3	130	-182.9	0.27	1.07	-185.58	0.27	1.1
Pipe 817	100	221.85	130	-34.18	0.05	0.05	-5.75	0.01	0
Pipe 818	100	171.81	130	-47.98	0.07	0.09	-22.1	0.03	0.02
Pipe 819	100	221.68	130	22.62	0.03	0.02	52.67	0.08	0.11
Pipe 820	100	179.35	130	8.82	0.01	0	36.32	0.05	0.05
Pipe 821	100	118.8	130	121.53	0.18	0.5	156.94	0.23	0.81
Pipe 822	100	34.64	130	76.63	0.11	0.21	103.37	0.15	0.37
Pipe 823	100	157.89	130	87.2	0.13	0.27	109.98	0.16	0.42
Pipe 824	50	139.21	130	31.09	0.18	1.18	37.23	0.22	1.65
Pipe 825	50	179.1	130	-10.32	0.06	0.15	-11.81	0.07	0.2
Pipe 826	50	117.17	130	-24.13	0.14	0.74	-28.16	0.17	0.98
Pipe 827	50	44.11	130	27.61	0.16	0.95	32.69	0.19	1.3
Pipe 828	50	173.8	130	13.8	0.08	0.26	16.35	0.1	0.36
Pipe 829	100	204.87	130	-24.38	0.04	0.03	-22.96	0.03	0.02
Pipe 830	100	223.6	130	-38.18	0.06	0.06	-39.31	0.06	0.06
Pipe 831	100	223.01	130	-2.86	0	0	21.84	0.03	0.02
Pipe 832	100	228.16	130	-16.67	0.02	0.01	5.49	0.01	0
Pipe 833	100	200.53	130	19.22	0.03	0.02	29.45	0.04	0.04
Pipe 834	100	217.58	130	5.41	0.01	0	13.1	0.02	0.01
Pipe 835	100	236.28	130	-4.26	0.01	0	12.83	0.02	0.01
Pipe 836	100	264.44	130	-18.06	0.03	0.01	-3.52	0.01	0
Pipe 837	50	67.75	130	30.05	0.18	1.11	36.03	0.21	1.55
Pipe 838	50	62.22	130	16.25	0.1	0.35	19.68	0.12	0.51
Pipe 839	50	129.54	130	30.26	0.18	1.12	35.84	0.21	1.54
Pipe 840	50	128.51	130	41.13	0.24	1.98	48.71	0.29	2.71
Pipe 841	100	104.05	130	-27.81	0.04	0.03	-32.51	0.05	0.04
Pipe 842	100	186.26	130	-43.04	0.06	0.07	-50.85	0.07	0.1
Pipe 843	100	162.91	130	-56.84	0.08	0.12	-67.2	0.1	0.17
Pipe 844	50	261.01	130	13.8	0.08	0.26	16.35	0.1	0.36
Pipe 845	100	93.57	130	-1.42	0	0	-2	0	0
Pipe 846	50	193.43	130	24.67	0.15	0.77	29.22	0.17	1.05
Pipe 847	50	97.02	130	35.66	0.21	1.52	42.23	0.25	2.08
Pipe 848	50	95.33	130	85.13	0.5	7.63	100.81	0.59	10.43
Pipe 849	50	105.8	130	41.41	0.24	2.01	49.04	0.29	2.75
Pipe 850	100	165.39	130	-88.87	0.13	0.28	-105.23	0.16	0.39
Pipe 851	100	184.27	130	-102.67	0.15	0.37	-121.58	0.18	0.5
Pipe 852	100	94.81	130	-116.48	0.17	0.47	-137.92	0.2	0.64
Pipe 853	50	146.68	130	13.8	0.08	0.26	16.35	0.1	0.36

Pipe 854	50	139.16	130	27.61	0.16	0.95	32.69	0.19	1.3
Pipe 855	50	127.58	130	13.8	0.08	0.26	16.35	0.1	0.36
Pipe 856	50	138.49	130	13.8	0.08	0.26	16.35	0.1	0.36
Pipe 857	50	134.95	130	13.8	0.08	0.26	16.35	0.1	0.36
Pipe 858	50	297.47	130	2.31	0.01	0.01	2.73	0.02	0.01
Pipe 859	50	135.82	130	27.61	0.16	0.95	32.69	0.19	1.3
Pipe 860	50	24.8	130	13.8	0.08	0.26	16.35	0.1	0.36
Pipe 861	50	124.99	130	-39.11	0.23	1.81	-46.31	0.27	2.47
Pipe 862	50	78.53	130	-52.91	0.31	3.16	-62.66	0.37	4.32
Pipe 863	50	310.92	130	-25.59	0.15	0.82	-30.3	0.18	1.13
Pipe 864	50	154.53	130	13.8	0.08	0.26	16.35	0.1	0.36
Pipe 867	150	154.9	130	287.85	0.19	0.35	342.16	0.22	0.48
Pipe 868	150	170.56	130	271.07	0.18	0.31	322.43	0.21	0.43
Pipe 869	150	174.9	130	224.67	0.15	0.22	266.81	0.17	0.3
Pipe 870	150	150.87	130	207.89	0.14	0.19	247.09	0.16	0.26
Pipe 871	100	108.2	130	93.21	0.14	0.31	110.18	0.16	0.42
Pipe 872	100	106.8	130	75.17	0.11	0.21	88.47	0.13	0.28
Pipe 873	50	213.87	130	-4.35	0.03	0.03	-5.1	0.03	0.04
Pipe 874	50	135.75	130	19.03	0.11	0.48	22.87	0.13	0.67
Pipe 875	100	93.44	130	15.71	0.02	0.01	20.66	0.03	0.02
Pipe 876	100	109.55	130	-1.07	0	0	0.93	0	0
Pipe 877	100	99.31	130	-34.63	0.05	0.05	-38.52	0.06	0.06
Pipe 878	100	90.14	130	-84.97	0.13	0.26	-97.7	0.14	0.34
Pipe 879	100	132.97	130	-135.31	0.2	0.61	-156.89	0.23	0.81
Pipe 880	50	158.93	130	-3.79	0.02	0.02	-7.52	0.04	0.09
Pipe 881	50	150.95	130	-7.86	0.05	0.09	-10.48	0.06	0.16
Pipe 882	50	128.78	130	18.64	0.11	0.46	22.69	0.13	0.66
Pipe 884	75	168.47	130	54.49	0.14	0.46	64.24	0.17	0.63
Pipe 885	75	165.24	130	37.71	0.1	0.23	44.52	0.12	0.32
Pipe 886	75	171.72	130	35.45	0.09	0.21	41.46	0.11	0.28
Pipe 887	75	151.73	130	18.67	0.05	0.06	21.73	0.06	0.08
Pipe 888	50	158.28	130	3.93	0.02	0.03	3.65	0.02	0.02
Pipe 889	50	152.58	130	-10.59	0.06	0.16	-13.02	0.08	0.24
Pipe 890	100	133.63	130	104.53	0.15	0.38	122.66	0.18	0.51
Pipe 891	100	157.59	130	106.39	0.16	0.39	125.62	0.19	0.54
Pipe 892	100	173.56	130	89.61	0.13	0.29	105.9	0.16	0.39
Pipe 894	100	102.27	130	-7.76	0.01	0	-10.26	0.02	0.01
Pipe 895	100	107.42	130	33.24	0.05	0.05	38.68	0.06	0.06
Pipe 896	100	146.34	130	-24.48	0.04	0.03	-29.91	0.04	0.04
Pipe 897	100	150.65	130	-22.6	0.03	0.02	-27.91	0.04	0.03
Pipe 898	100	136.96	130	75.31	0.11	0.21	89.27	0.13	0.28
Pipe 899	100	137.4	130	-0.42	0	0	-0.09	0	0
Pipe 900	50	241.84	130	-1.67	0.01	0.01	-2.08	0.01	0.01

Pipe 901	100	107.99	130	37.93	0.06	0.06	44.52	0.07	0.08
Pipe 902	100	199.05	130	21.15	0.03	0.02	24.8	0.04	0.03
Pipe 903	100	104.94	130	28.51	0.04	0.03	33.59	0.05	0.05
Pipe 904	50	220.82	130	32.89	0.19	1.31	38.66	0.23	1.77
Pipe 905	50	211.75	130	16.1	0.09	0.35	18.93	0.11	0.47
Pipe 906	50	106.65	130	-0.68	0	0	-0.79	0	0
Pipe 907	50	216.95	130	-17.46	0.1	0.41	-20.52	0.12	0.55
Pipe 908	50	197.5	130	-34.24	0.2	1.41	-40.25	0.24	1.91
Pipe 909	50	255.73	130	16.04	0.09	0.35	18.86	0.11	0.47
Pipe 910	50	137.45	130	-0.74	0	0	-0.87	0.01	0
Pipe 911	50	228.73	130	-17.52	0.1	0.41	-20.59	0.12	0.55
Pipe 912	75	111.82	130	33.56	0.09	0.19	39.46	0.1	0.25
Pipe 913	75	75.94	130	16.78	0.04	0.05	19.73	0.05	0.07
Pipe 914	100	105.33	130	-42.58	0.06	0.07	-48.92	0.07	0.09
Pipe 915	100	109.73	130	-76.14	0.11	0.21	-88.37	0.13	0.28
Pipe 916	50	102.2	130	16.78	0.1	0.38	19.73	0.12	0.51
Pipe 917	50	109.03	130	16.78	0.1	0.38	19.73	0.12	0.51
Pipe 918	75	144.91	130	33.56	0.09	0.19	39.46	0.1	0.25
Pipe 919	75	113.46	130	16.78	0.04	0.05	19.73	0.05	0.07
Pipe 920	75	141.01	130	33.56	0.09	0.19	39.46	0.1	0.25
Pipe 921	75	115.85	130	16.78	0.04	0.05	19.73	0.05	0.07
Pipe 922	100	110.3	130	47.43	0.07	0.09	59.08	0.09	0.13
Pipe 923	100	69.03	130	31.62	0.05	0.04	39.38	0.06	0.06
Pipe 924	50	120.76	130	15.81	0.09	0.34	19.69	0.12	0.51
Pipe 925	50	96.05	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 926	50	127.25	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 927	50	79.7	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 928	100	59.46	130	47.43	0.07	0.09	59.08	0.09	0.13
Pipe 929	100	31.48	130	39.52	0.06	0.06	49.23	0.07	0.09
Pipe 930	100	65.07	130	31.62	0.05	0.04	39.38	0.06	0.06
Pipe 931	50	39.62	130	15.81	0.09	0.34	19.69	0.12	0.51
Pipe 932	50	155.34	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 933	50	50.81	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 934	150	144.72	130	137.76	0.09	0.09	171.58	0.11	0.13
Pipe 935	150	162.31	130	129.85	0.09	0.08	161.73	0.11	0.12
Pipe 936	150	162.9	130	131.63	0.09	0.08	163.95	0.11	0.12
Pipe 937	150	160.23	130	123.73	0.08	0.07	154.11	0.1	0.11
Pipe 938	150	237.08	130	90.8	0.06	0.04	113.09	0.07	0.06
Pipe 939	150	191.21	130	58.54	0.04	0.02	72.92	0.05	0.03
Pipe 940	150	189.76	130	50.64	0.03	0.01	63.07	0.04	0.02
Pipe 941	150	168.31	130	42.73	0.03	0.01	53.22	0.03	0.02
Pipe 942	150	220.45	130	34.83	0.02	0.01	43.38	0.03	0.01
Pipe 943	100	168.16	130	134.17	0.2	0.61	167.11	0.25	0.91

Pipe 944	75	255.16	130	31.73	0.08	0.17	39.52	0.1	0.26
Pipe 945	50	80.13	130	12.74	0.08	0.23	15.87	0.09	0.34
Pipe 946	100	256.05	130	-69.3	0.1	0.18	-86.32	0.13	0.27
Pipe 947	100	167.64	130	-93.69	0.14	0.31	-116.69	0.17	0.47
Pipe 948	100	79.33	130	-73.99	0.11	0.2	-92.16	0.14	0.3
Pipe 949	50	57.76	130	20.54	0.12	0.55	25.59	0.15	0.82
Pipe 950	50	88.75	130	12.64	0.07	0.22	15.74	0.09	0.33
Pipe 951	50	164.93	130	4.73	0.03	0.04	5.89	0.03	0.05
Pipe 952	50	80.18	130	-11.08	0.07	0.17	-13.8	0.08	0.26
Pipe 953	50	65.45	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 954	100	15.69	130	74.14	0.11	0.2	92.35	0.14	0.3
Pipe 955	100	88.02	130	66.24	0.1	0.16	82.5	0.12	0.25
Pipe 956	100	128.51	130	-11.5	0.02	0.01	-14.32	0.02	0.01
Pipe 957	100	69.84	130	63.16	0.09	0.15	78.67	0.12	0.23
Pipe 958	100	154.86	130	53.47	0.08	0.11	66.6	0.1	0.17
Pipe 959	100	134	130	-82.56	0.12	0.25	-102.84	0.15	0.37
Pipe 960	100	100.62	130	-90.47	0.13	0.29	-112.68	0.17	0.44
Pipe 961	100	68.07	130	69.83	0.1	0.18	86.98	0.13	0.27
Pipe 962	100	167.47	130	61.93	0.09	0.14	77.13	0.11	0.22
Pipe 963	100	76.51	130	25.03	0.04	0.03	31.17	0.05	0.04
Pipe 964	100	19.48	130	79.05	0.12	0.23	98.46	0.15	0.34
Pipe 965	50	127.57	130	40.28	0.24	1.91	50.17	0.3	2.86
Pipe 966	50	20.16	130	32.37	0.19	1.27	40.32	0.24	1.91
Pipe 967	50	94.43	130	14.9	0.09	0.3	18.56	0.11	0.45
Pipe 968	50	57.58	130	6.99	0.04	0.07	8.71	0.05	0.11
Pipe 969	50	54.04	130	-0.91	0.01	0	-1.14	0.01	0
Pipe 970	50	88.77	130	-8.82	0.05	0.11	-10.98	0.06	0.17
Pipe 971	50	39.74	130	-7.15	0.04	0.08	-8.91	0.05	0.12
Pipe 972	50	47.52	130	-15.06	0.09	0.31	-18.76	0.11	0.46
Pipe 973	50	63.19	130	-22.96	0.14	0.67	-28.6	0.17	1.01
Pipe 974	50	198.44	130	-30.87	0.18	1.17	-38.45	0.23	1.75
Pipe 975	100	147.46	130	24.35	0.04	0.03	30.33	0.04	0.04
Pipe 976	100	159.35	130	53.36	0.08	0.11	66.46	0.1	0.16
Pipe 977	100	159.22	130	45.45	0.07	0.08	56.61	0.08	0.12
Pipe 978	100	90.34	130	54.41	0.08	0.11	67.77	0.1	0.17
Pipe 979	100	135.04	130	46.51	0.07	0.09	57.93	0.09	0.13
Pipe 980	100	100.22	130	7.9	0.05	0.09	9.85	0.01	0
Pipe 981	100	82.37	130	30.7	0.05	0.04	38.23	0.06	0.06
Pipe 982	100	165.26	130	22.79	0.03	0.02	28.39	0.04	0.03
Pipe 983	100	79.46	130	14.89	0.02	0.01	18.54	0.03	0.02
Pipe 984	100	47.3	130	6.98	0.01	0	8.7	0.01	0
Pipe 985	100	59.73	130	-0.92	0	0	-1.15	0	0
Pipe 986	100	56.37	130	-8.83	0.01	0	-11	0.02	0.01

Pipe 987	100	228.93	130	36.61	0.05	0.05	45.59	0.07	0.08
Pipe 988	100	249.28	130	28.7	0.04	0.03	35.75	0.05	0.05
Pipe 989	100	103.16	130	45.15	0.07	0.08	56.23	0.08	0.12
Pipe 990	100	94.38	130	28.41	0.04	0.03	35.39	0.05	0.05
Pipe 991	100	207.02	130	12.6	0.02	0.01	15.7	0.02	0.01
Pipe 992	100	28.36	130	4.7	0.01	0	5.85	0.01	0
Pipe 993	100	101.35	130	-3.21	0	0	-4	0.01	0
Pipe 994	100	67.03	130	-11.11	0.02	0.01	-13.84	0.02	0.01
Pipe 995	100	85.17	130	-19.02	0.03	0.02	-23.69	0.03	0.02
Pipe 996	100	186.66	130	26.92	0.04	0.03	33.53	0.05	0.05
Pipe 997	50	230.57	130	31.62	0.19	1.22	39.38	0.23	1.83
Pipe 998	50	91.65	130	23.72	0.14	0.72	29.54	0.17	1.07
Pipe 999	50	169.03	130	15.81	0.09	0.34	19.69	0.12	0.51
Pipe 1000	50	106.52	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 1001	150	97.25	130	222.92	0.15	0.22	273.5	0.18	0.31
Pipe 1002	150	88.15	130	217.16	0.14	0.21	266.44	0.17	0.3
Pipe 1003	150	75.09	130	199.25	0.13	0.17	244.47	0.16	0.26
Pipe 1004	150	75.63	130	193.49	0.13	0.17	237.4	0.16	0.24
Pipe 1005	150	103.48	130	187.73	0.12	0.16	230.33	0.15	0.23
Pipe 1006	150	106.57	130	181.97	0.12	0.15	223.26	0.15	0.22
Pipe 1007	150	119.33	130	158.93	0.1	0.11	195	0.13	0.17
Pipe 1008	150	60.75	130	153.17	0.1	0.11	187.93	0.12	0.16
Pipe 1009	150	95.41	130	147.41	0.1	0.1	180.86	0.12	0.15
Pipe 1010	100	83.79	130	101.33	0.15	0.36	124.32	0.18	0.53
Pipe 1011	100	29	130	95.57	0.14	0.32	117.26	0.17	0.47
Pipe 1012	100	109.79	130	89.81	0.13	0.29	110.19	0.16	0.42
Pipe 1013	100	94.51	130	141.62	0.21	0.67	173.75	0.26	0.98
Pipe 1015	100	84.52	130	55.31	0.08	0.12	67.86	0.1	0.17
Pipe 1016	100	102.13	130	49.55	0.07	0.1	60.79	0.09	0.14
Pipe 1017	100	125.53	130	43.79	0.06	0.08	53.72	0.08	0.11
Pipe 1018	100	95.61	130	38.03	0.06	0.06	46.65	0.07	0.09
Pipe 1019	100	88.73	130	32.27	0.05	0.04	39.59	0.06	0.06
Pipe 1020	100	70.44	130	26.51	0.04	0.03	32.52	0.05	0.04
Pipe 1021	100	88.37	130	20.75	0.03	0.02	25.45	0.04	0.03
Pipe 1022	100	174.95	130	63.27	0.09	0.15	77.63	0.11	0.22
Pipe 1023	100	170.97	130	57.51	0.08	0.13	70.56	0.1	0.18
Pipe 1024	100	120.56	130	51.75	0.08	0.1	63.49	0.09	0.15
Pipe 1025	150	194.2	130	102.65	0.07	0.05	125.95	0.08	0.07
Pipe 1026	150	90.08	130	148.65	0.1	0.1	182.38	0.12	0.15
Pipe 1027	150	22.7	130	142.89	0.09	0.09	175.31	0.11	0.14
Pipe 1028	150	61.94	130	131.37	0.09	0.08	161.18	0.11	0.12
Pipe 1029	150	65.19	130	102.57	0.07	0.05	125.84	0.08	0.07
Pipe 1030	150	62.18	130	85.29	0.06	0.04	104.64	0.07	0.05

Pipe 1031	100	101.11	130	79.53	0.12	0.23	97.57	0.14	0.34
Pipe 1032	100	139.86	130	57.95	0.09	0.13	71.1	0.1	0.19
Pipe 1033	100	91.74	130	15.5	0.02	0.01	19.02	0.03	0.02
Pipe 1034	100	93.87	130	9.74	0.01	0	11.95	0.02	0.01
Pipe 1035	50	180.32	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1036	100	156.08	130	23.04	0.03	0.02	28.27	0.04	0.03
Pipe 1037	100	151.39	130	17.28	0.03	0.01	21.2	0.03	0.02
Pipe 1038	50	53.62	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1039	50	36.88	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1040	50	161.82	130	11.52	0.07	0.19	14.13	0.08	0.27
Pipe 1041	50	128.4	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1042	50	61.25	130	15.81	0.09	0.34	19.4	0.11	0.49
Pipe 1043	50	53.62	130	8.65	0.05	0.11	10.61	0.06	0.16
Pipe 1044	50	62.27	130	6.47	0.04	0.06	7.94	0.05	0.09
Pipe 1045	50	58.33	130	5.95	0.04	0.06	7.31	0.04	0.08
Pipe 1046	100	60.83	130	36.69	0.05	0.06	45.02	0.07	0.08
Pipe 1047	100	60.33	130	30.46	0.04	0.04	37.38	0.06	0.06
Pipe 1048	100	57.85	130	20.73	0.03	0.02	25.44	0.04	0.03
Pipe 1049	50	59.3	130	10.39	0.06	0.15	12.74	0.08	0.23
Pipe 1050	50	58.86	130	9.39	0.06	0.13	11.52	0.07	0.19
Pipe 1051	50	113.67	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1052	100	62.3	130	3.98	0.01	0	4.88	0.01	0
Pipe 1053	100	58.32	130	-5.66	0.01	0	-6.95	0.01	0
Pipe 1054	100	58.84	130	-16.8	0.02	0.01	-20.61	0.03	0.02
Pipe 1055	100	50.78	130	-28.98	0.04	0.04	-35.55	0.05	0.05
Pipe 1056	100	9.1	130	-40.5	0.06	0.07	-49.68	0.07	0.09
Pipe 1057	100	59.44	130	-56.59	0.08	0.12	-69.43	0.1	0.18
Pipe 1058	100	33.68	130	-75.99	0.11	0.21	-93.24	0.14	0.31
Pipe 1059	100	55.51	130	-81.75	0.12	0.24	-100.31	0.15	0.35
Pipe 1060	50	63.43	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1061	50	140.56	130	1.41	0.01	0	1.73	0.01	0.01
Pipe 1062	50	90.63	130	1.88	0.01	0.01	2.3	0.01	0.01
Pipe 1063	50	96.16	130	-3.88	0.02	0.03	-4.76	0.03	0.04
Pipe 1064	50	140.77	130	-3.58	0.02	0.02	-4.39	0.03	0.03
Pipe 1065	50	92.64	130	0.39	0	0	0.48	0	0
Pipe 1066	50	94.02	130	-5.37	0.03	0.05	-6.59	0.04	0.07
Pipe 1067	50	135.96	130	-5.25	0.03	0.04	-6.44	0.04	0.06
Pipe 1068	50	92.32	130	-0.66	0	0	-0.81	0	0
Pipe 1069	50	94.95	130	-6.42	0.04	0.06	-7.88	0.05	0.09
Pipe 1070	50	137.97	130	0.19	0	0	0.24	0	0
Pipe 1071	50	89.07	130	-4.57	0.03	0.03	-5.61	0.03	0.05
Pipe 1072	50	95.7	130	-10.33	0.06	0.15	-12.68	0.07	0.22
Pipe 1073	50	88.77	130	-7.89	0.05	0.09	-9.68	0.06	0.14

Pipe 1074	50	94.52	130	-13.65	0.08	0.26	-16.74	0.1	0.38
Pipe 1075	50	40.86	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1076	100	51.32	130	-87.51	0.13	0.27	-107.37	0.16	0.4
Pipe 1077	50	122.46	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1078	100	37.84	130	-99.03	0.15	0.35	-121.51	0.18	0.5
Pipe 1079	100	63.22	130	-104.79	0.15	0.38	-128.58	0.19	0.56
Pipe 1080	100	51.78	130	40.32	0.06	0.07	49.47	0.07	0.1
Pipe 1081	100	71.43	130	34.56	0.05	0.05	42.4	0.06	0.07
Pipe 1082	100	74.36	130	28.8	0.04	0.04	35.34	0.05	0.05
Pipe 1083	100	57.27	130	23.04	0.03	0.02	28.27	0.04	0.03
Pipe 1084	50	78.43	130	17.28	0.1	0.4	21.2	0.12	0.58
Pipe 1085	50	137.18	130	11.52	0.07	0.19	14.13	0.08	0.27
Pipe 1086	50	87.29	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1087	50	76.3	130	17.28	0.1	0.4	21.2	0.12	0.58
Pipe 1088	50	124.79	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1089	50	45.7	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1090	100	103.18	130	146.75	0.22	0.71	180.05	0.27	1.04
Pipe 1091	100	99.76	130	140.99	0.21	0.66	172.98	0.25	0.97
Pipe 1092	100	105.66	130	129.47	0.19	0.57	158.85	0.23	0.83
Pipe 1093	50	90.93	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1094	50	114.91	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1095	50	42.27	130	11.52	0.07	0.19	14.13	0.08	0.27
Pipe 1096	50	33.03	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1097	100	82.39	130	74.88	0.11	0.21	91.87	0.14	0.3
Pipe 1098	100	216.02	130	63.36	0.09	0.15	77.74	0.11	0.22
Pipe 1099	100	95.31	130	46.08	0.07	0.08	56.54	0.08	0.12
Pipe 1100	100	128.37	130	40.32	0.06	0.07	49.47	0.07	0.1
Pipe 1101	100	164.24	130	34.56	0.05	0.05	42.4	0.06	0.07
Pipe 1102	50	123.55	130	11.52	0.07	0.19	14.13	0.08	0.27
Pipe 1103	50	84.43	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1104	50	71.77	130	17.28	0.1	0.4	21.2	0.12	0.58
Pipe 1105	50	78.79	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1106	50	48.85	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1107	100	174.18	130	11.52	0.02	0.01	14.13	0.02	0.01
Pipe 1108	50	189.08	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1109	100	221.62	130	28.8	0.04	0.04	35.34	0.05	0.05
Pipe 1110	100	192.72	130	23.04	0.03	0.02	28.27	0.04	0.03
Pipe 1111	50	55.1	130	17.28	0.1	0.4	21.2	0.12	0.58
Pipe 1112	50	37.84	130	11.52	0.07	0.19	14.13	0.08	0.27
Pipe 1113	50	120.29	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 1114	100	29.37	130	86.4	0.13	0.27	106.01	0.16	0.39
Pipe 1115	100	80.11	130	24.26	0.04	0.03	29.77	0.04	0.04
Pipe 1116	100	141.1	130	27.58	0.04	0.03	33.84	0.05	0.05

Pipe 1117	100	139.74	130	21.82	0.03	0.02	26.77	0.04	0.03
Pipe 1118	100	78.71	130	16.06	0.02	0.01	19.7	0.03	0.02
Pipe 1119	50	105.23	130	8.09	0.05	0.1	9.93	0.06	0.14
Pipe 1120	50	62.56	130	-3.43	0.02	0.02	-4.21	0.02	0.03
Pipe 1121	50	124.61	130	-9.19	0.05	0.12	-11.28	0.07	0.18
Pipe 1122	100	164.81	130	9.31	0.01	0	11.42	0.02	0.01
Pipe 1123	50	95.12	130	2.21	0.01	0.01	2.71	0.02	0.01
Pipe 1124	50	306.29	130	3.55	0.02	0.02	4.36	0.03	0.03
Pipe 1	75	157.33	130	42.75	0.11	0.3	55.99	0.15	0.49
Pipe 2	75	138.46	130	36.69	0.1	0.22	47.04	0.12	0.35
Pipe 3	75	118.97	130	12.14	0.03	0.03	17.9	0.05	0.06
Pipe 4	75	251.13	130	6.07	0.02	0.01	8.95	0.02	0.02
Pipe 5	50	262.91	130	7.57	0.04	0.09	8.2	0.05	0.1
Pipe 6	50	55.65	130	10.68	0.06	0.16	13.69	0.08	0.26
Pipe 7	50	127.68	130	10.68	0.06	0.16	13.69	0.08	0.26
Pipe 8	50	109.46	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe 9	100	140.62	130	37.64	0.06	0.06	48.88	0.07	0.09
Pipe 10	100	163.85	130	28.14	0.04	0.03	36.68	0.05	0.05
Pipe 11	50	60.25	130	5.76	0.03	0.05	7.07	0.04	0.08
Pipe 12	100	152.33	130	5.76	0.01	0	7.07	0.01	0
Pipe 13	50	169.59	130	9.57	0.06	0.13	11.92	0.07	0.2
Pipe 14	50	124.02	130	7.9	0.05	0.09	9.85	0.06	0.14
Pipe 15	100	61.75	130	135.86	0.2	0.62	166.69	0.25	0.91
Pipe 16	100	27.6	130	124.34	0.18	0.53	152.55	0.22	0.77
Pipe 17	75	70.4	130	131.32	0.34	2.36	168.45	0.44	3.75
Pipe 21	75	152.46	130	112.32	0.29	1.77	144.04	0.38	2.8
Pipe 25	200	22.1	130	82.92	0.03	0.01	138.59	0.05	0.02
Pipe 26	200	338.11	130	78.31	0.03	0.01	130.89	0.05	0.02
Pipe 27	200	73.95	130	69.1	0.03	0.01	115.49	0.04	0.02
Pipe 28	200	73.51	130	59.88	0.02	0	100.09	0.04	0.01
Pipe 29	200	65.07	130	50.67	0.02	0	84.69	0.03	0.01
Pipe 32	200	105.85	130	4.61	0	0	7.7	0	0
Pipe 33	75	128.97	130	4.61	0.01	0	7.7	0.02	0.01
Pipe 34	75	139.7	130	4.61	0.01	0	7.7	0.02	0.01
Pipe 35	100	153.21	130	-41.46	0.06	0.07	-69.29	0.1	0.18
Pipe 36	100	110.15	130	36.85	0.05	0.06	61.59	0.09	0.14
Pipe 37	100	64.9	130	32.25	0.05	0.04	53.89	0.08	0.11
Pipe 38	100	128.51	130	23.03	0.03	0.02	38.5	0.06	0.06
Pipe 39	100	175.27	130	4.61	0.01	0	7.7	0.01	0
Pipe 40	100	189.75	130	18.43	0.03	0.02	30.8	0.05	0.04
Pipe 41	100	233.59	130	4.61	0.01	0	7.7	0.01	0
Pipe 42	100	68.31	130	9.21	0.01	0	15.4	0.02	0.01
Pipe 43	100	66.68	130	4.61	0.01	0	7.7	0.01	0

Pipe 44	75	114.19	130	4.61	0.01	0	7.7	0.02	0.01
Pipe 54	50	79.25	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe 55	50	86.1	130	22.57	0.13	0.65	32.86	0.19	1.31
Pipe 56	50	208.09	130	9.32	0.05	0.13	13.55	0.08	0.25
Pipe 57	50	164.21	130	-7.41	0.04	0.08	-10.6	0.06	0.16
Pipe 58	50	132.64	130	7.57	0.04	0.09	8.2	0.05	0.1
Pipe DMAM3-13	200	48.92	130	434.61	0.16	0.18	497.5	0.18	0.23
Pipe DMAM3-14	200	92.42	130	394.48	0.15	0.15	451.79	0.17	0.2
Pipe 60	100	79.99	130	54.6	0.08	0.11	62.67	0.09	0.15
Pipe 61	100	62.03	130	36.77	0.05	0.06	42.41	0.06	0.07
Pipe 62	50	158.99	130	-11.15	0.07	0.18	-12.72	0.07	0.23
Pipe 63	50	131.33	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe 64	100	138.49	130	-67.84	0.1	0.17	-78	0.11	0.22
Pipe 65	50	83.19	130	22.84	0.13	0.67	43.63	0.26	2.21
Pipe 51	50	200.26	130	28.97	0.17	1.04	32.98	0.19	1.32
Pipe DMAM5-26	200	172.46	130	1814.67	0.67	2.57	2073.02	0.76	3.29
Pipe DMAM5-27	200	17.4	130	612.54	0.23	0.34	757.41	0.28	0.51
Pipe DMAM5-37	200	130.65	130	874.18	0.32	0.67	1067.29	0.39	0.96
Pipe 68	50	79.12	130	27.61	0.16	0.95	32.69	0.19	1.3
Pipe 69	100	187.2	130	-117.36	0.17	0.47	-98.29	0.14	0.34
Pipe 70	100	165.42	130	-176.7	0.26	1.01	-195.67	0.29	1.22
Pipe 71	200	159.9	130	693.53	0.26	0.43	825.4	0.3	0.6
Pipe 72	200	154.32	130	609.55	0.22	0.34	724.66	0.27	0.47
Pipe 73	150	176.38	130	331.13	0.22	0.45	395.05	0.26	0.62
Pipe 74	75	213.14	130	67.2	0.18	0.68	81.01	0.21	0.97
Pipe 75	100	265.62	130	158.4	0.23	0.82	192.92	0.28	1.19
Pipe 76	200	19.51	130	1045.41	0.39	0.93	1233.71	0.45	1.26
Pipe DMAM-M1-1	200	1382.41	130	679.68	0.25	0.42	833.92	0.31	0.61
Pipe DMAM-M1-2	200	1722.35	130	679.68	0.25	0.42	833.92	0.31	0.61
Pipe DMAM-M1-3	150	1823.51	130	679.68	0.45	1.7	833.92	0.55	2.48
Pipe DMAM5-46	100	580.3	130	39.52	0.06	0.06	49.23	0.07	0.09
Pipe DMAM4-5	300	94.75	130	4035.06	0.66	1.57	4566.28	0.75	1.97
Pipe 77	100	108.3	130	23.1	0.03	0.02	25.66	0.04	0.03
Pipe 78	50	45.93	130	23.1	0.14	0.68	25.66	0.15	0.83
Pipe 79	300	46.86	130	1848.5	0.3	0.37	2392.58	0.39	0.6
Pipe 80	300	81.83	130	1848.5	0.3	0.37	2392.58	0.39	0.6
Pipe 81	300	45.74	130	1848.5	0.3	0.37	2392.58	0.39	0.6
Pipe 82	250	92.16	130	1848.5	0.44	0.9	2392.58	0.56	1.45
Pipe 83	200	55.66	130	1848.5	0.68	2.66	2392.58	0.88	4.29
Pipe 84	100	99.59	130	166.35	0.25	0.9	187.92	0.28	1.13
Pipe 85	100	96.88	130	143.25	0.21	0.68	162.26	0.24	0.86
Pipe 86	100	93.15	130	120.14	0.18	0.49	136.59	0.2	0.63
Pipe 87	100	124.13	130	97.04	0.14	0.33	110.93	0.16	0.43

Pipe 88	200	110.09	130	1377.74	0.51	1.55	1735.45	0.64	2.37
Pipe 89	200	108.9	130	1359.14	0.5	1.51	1712.73	0.63	2.31
Pipe 90	100	102.97	130	283.48	0.42	2.42	348.25	0.51	3.54
Pipe 91	100	131.9	130	264.88	0.39	2.13	325.54	0.48	3.13
Pipe 92	100	141.32	130	246.28	0.36	1.86	302.82	0.45	2.73
Pipe 93	100	90.76	130	227.67	0.34	1.61	280.1	0.41	2.37
Pipe 94	100	35.51	130	190.47	0.28	1.16	234.66	0.35	1.7
Pipe 95	50	108.36	130	18.6	0.11	0.46	22.72	0.13	0.66
Pipe 96	200	58.48	130	1057.05	0.39	0.95	1341.76	0.49	1.47
Pipe 97	75	155.03	130	77.67	0.2	0.89	103.73	0.27	1.53
Pipe 98	75	93.56	130	13.82	0.04	0.04	23.1	0.06	0.09
Pipe 99	75	115.48	130	9.21	0.02	0.02	15.4	0.04	0.04
Pipe 100	50	88.19	130	4.61	0.03	0.03	7.7	0.05	0.09
Pipe 101	50	185.96	130	-32.36	0.19	1.27	-39.1	0.23	1.81
Pipe 102	50	192.47	130	-36.97	0.22	1.63	-46.8	0.28	2.52
Pipe 103	50	169.51	130	-43.43	0.26	2.19	-55.53	0.33	3.46
Pipe 104	50	158.22	130	38.82	0.23	1.78	47.83	0.28	2.62
Pipe 67	50	121.01	130	22.71	0.13	0.66	31.43	0.19	1.2
Pipe 109	200	220.32	130	1550.95	0.57	1.92	1763.78	0.65	2.44
Pipe 110	100	159.44	130	80.06	0.12	0.23	115.31	0.17	0.46
Pipe 111	100	133.54	130	81.65	0.12	0.24	117.6	0.17	0.47
Pipe 112	50	191.43	130	10.7	0.06	0.16	15.41	0.09	0.32
Pipe 113	100	107.15	110	28.97	0.08	0.2	32.98	0.05	0.06

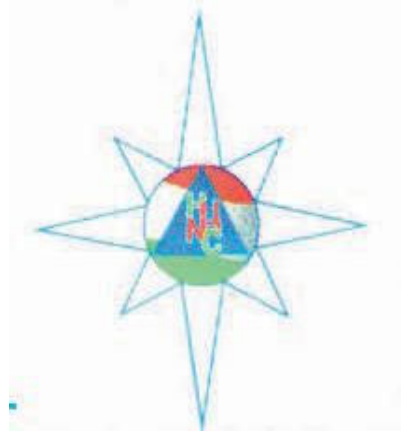
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National Center for Disaster Risk Reduction

Project Improvement of the water supply system in Abdurahmoni Jomi district, Khatlon region of the Republic of Tajikistan



Conceptual report on the results of the survey of the population of A Jomi District, Khatlon Region

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Conceptual report

on the results of a survey on the social conditions of the population

of A. Jomi district of the Khatlon Region within the framework of the Project Improvement of the water supply system

1. Introduction

Abdurahmoni Jomi district is an administrative district in the Khatlon Region of the Republic of Tajikistan. The district center is the city-type settlement of Abdurahmoni Jomi.

The population on January 1, 2022 is 183,900 people, including - in the township of A. Jomi - 8.3% or 12,700 people. There are seven rural communities (jamoats) and one city-type settlement (township) in A. Jomi district. The implementing Water Supply Improvement Project envisages water supply to A. Jomi town and nearby villages of A. Jomi district, which is located about 50 kilometers south of Dushanbe city. The planned water supply area of the project is located on the right bank of the Vakhsh River and has a flat terrain and declivity from southeast to northwest.

Currently, the state subsidiary enterprise Tojikobdehot (TOD), the structural unit of KMK responsible for the water supply system in rural areas, provides water to about half the population of the town of A. Jomi (about 7,500 people) for 3 hours in the morning and evening. However, the water supply area is divided into several blocks, and water is supplied to each block one at a time, residents actually receive water for about 2 hours a day. For this reason, residents compensate for the lack of water with unsafe water, which is used to irrigate household plots. Such negative water conditions are one of the factors hindering the development of A. Jomi town, despite the fact that it is the center of the A. Jomi district.

The source of drinking water for the existing water supply system is five deep wells, the capacity (total capacity of the installed submersible pumps) which is 400m³ / hour. The depth of all existing wells is 100 m and more, the water quality is quite good. The existing wells were built during the Soviet era. Although they are quite old, some of them are artesian wells, and there is a possibility of taking more water by replacing submersible pumps with more efficient ones. There are no private water pipes in the town to supply water to the residents of the town, but there are 220 public water taps. The total length of the running water pipes is estimated at about 30 kilometers.

Households are mostly single-story structures with a living area in the range of 70-120m² located on plots of land ranging from 400 to 800 square meters. There are also multi-apartment houses with no more than 2 stories. Households are inhabited by 2-3 generations of families with an average of at least 6 residents, including 2-3 minor children. According to observations, the average age of respondents interviewed is between 35-45 years old. No more than 1 person among the household members has a permanent job, and 20% of households are retired people with an average income of 300 somoni per month. The average cash income of households is 1200-1300 somoni per month; the number of families whose cash income exceeds these figures is at most 20%. The main source of money income of the population is labor migration to the Russian Federation, work in retail trade and catering, and working in budgetary institutions of the district.

The existing water supply system of the settlement of Shahrak Jomi was built in the 60-80s of the last century and is a dead-end network with separate water supply zones powered by 7 wells with a depth of 100 to 150 m, there are currently 5 operational wells. There are no alternative sources of water supply such as closed reservoirs, open ponds as well as mobile reservoirs in the town. The water supply network itself is made of cast-iron and asbestos-cement pipes, and shut-off valves of consumers are practically absent. Storage tanks, chemical and biological water treatment, and laboratory control are not available, water from the wells is fed directly into the network. The power supply of pumping stations is made from transformer substations supplying residential buildings. Water supply to households is currently carried out within 3 hours in the morning and 3 hours in the evening. The end sections of the water supply system practically remain without water. There is no metering system for water consumption. Payment for water services to households is made on a monthly basis according to established tariffs without taking into account the actual water consumption.

There is no sewage system, wastewater is discharged into ditches, and collecting drains. Washing of table and kitchen dishes is carried out in unsuitable conditions. Specially arranged washing places in households are practically absent. The number of local individual places for storage and disposal of wastewater in households does not exceed 3-5% of the total number of households. Toilets are structurally small structures with cesspools located in the territory of households. The sanitary condition of toilets in apartment buildings does not meet the requirements of sanitary norms. Daily cleaning of toilets of apartment buildings is practically not carried out. The cesspools of apartment buildings are cleaned by communal services and taken to a waste dump located 12 km away from the settlement. There are no treatment facilities. The sanitary requirements in Jomi town prohibit keeping pets and poultry. There is no sewage system; sewage is discharged into ditches and collecting drains. The sanitary condition in settlements is controlled by the state sanitary and epidemiological service. Functionally, it monitors only the unauthorized disposal of household waste by the population. There is no awareness-raising work.

The existing water supply system of rural settlements of Jomi district, including the settlements where the population survey was conducted, are wells with a depth of 100 to 150 m. Alternative sources of water supply such as closed reservoirs, open ponds, or mobile collective tanks in the settlements are not available. Due to the lack of a water supply network and temporary restrictions on the operation of wells not more than 6 hours per day, the population of nearby areas within a radius of 2-3 km is forced to deliver water to their households by handcarts, bicycles, vehicles with almost all family members, including children. This situation leads to the accumulation of a large number of residents at the wells. There are no storage tanks, chemical and biological water treatment, or laboratory control, water supply from wells is carried out directly into the nearby ditches, and the power supply of pumping stations is made from transformer substations feeding residential buildings. There is no metering system for water consumption. Payment for water services to households is made on a monthly basis according to established tariffs without regard to actual water consumption.

2. Survey methodology.

The survey of residents of A. Jomi district of Khatlon region was conducted in accordance with the terms of reference prepared by Eight-Japan Engineering Consultants Inc, in order to obtain

information on the need to design water supply facilities in the area of residence, as well as to take into account the views of local residents on water consumption.

The survey was conducted within the methodological framework presented by the Client. The preparatory stage consisted of the formation of a sample of fieldwork finalization of the tools and preparation of clarification of questions for the survey team, preparation of the fieldwork plan, and selection of the target group for the survey.

The survey tools for each target group were provided by the Client. On the Contractor's side, their adaptation for data collection was carried out, which included: data collection, selection and training of moderators and interviewers, organization of fieldwork, meetings with local authorities to help organize the survey, coordination, and ongoing quality control of work.

Data processing consisted of reception and selection of questionnaires, the input of obtained data into the database in MS Excel format

Data analysis, preparation of the technical report of the survey, preparation of summary tables and charts, preparation of the report in Word format, and translation of the report into English.

The survey was conducted from March 2 to March 11, 2023 by a group of specialists from the National Center for Disaster Risk Reduction, consisting of 7 people.

The survey of residents of settlements was conducted in close cooperation with representatives of jamoats and public heads of streets and quarters.

The work was carried out on the territory of the town of A. Jomi and 3 adjacent jamoats, the survey was accompanied by a photo fixation of the work process.

2.1. Survey methods

The survey was conducted using a quantitative method - a survey of A. Jomi district residents by face-to-face individual interview method.

2.2. Survey sample

The sample design for the survey, including the scope of the sample, the coverage areas, and the criteria for the selection of respondents for the survey was presented in the Terms of Reference.

The final research sample (Sampling Points Selection) for quantitative data collection was prepared by the Contractor on the basis of the data provided by the local self-government authorities.

In addition to these parameters, the selection was based on the existing proportion of common types of housing in the A. Jomi district: multi-story houses and houses of private development.

The sample frame was 218 households from 14 water supply areas in the A. Jomi district.

2.3. Организация команды исследования

To conduct the survey a team was formed with the required number of interviewers, who worked under the direction of the manager and supervisors. The survey involved interviewers with higher education, familiar with the topic of the survey, communicative, and with the ability to communicate informally.

2.4. Ensuring the quality of fieldwork and monitoring the work of interviewers

To ensure the quality of data collection during fieldwork, interviewers filled out 1-2 questionnaires after the training and submitted them to the supervisor for review. The supervisor, after reviewing all the questionnaires, made the necessary comments and adjustments and communicated them to all his interviewers. Thus, only those applicants who demonstrated competence were allowed to work. After that, the interviewers started the data collection process and handed in the completed questionnaires to the supervisor on a daily basis. In addition, the work of interviewers and supervisors was supervised by questionnaire receivers in the Contractor's office. In this way, it was possible to make timely adjustments to the interviewers' work.

Supervisors were involved in checking the interviewers' work on a daily basis. The procedure for checking the interviewers' work included the following steps:

- 1) Visual inspection of the correctness of filling out the questionnaires. Subject of inspection: correctness of filling out the questionnaires, presence of mistakes, omissions, comprehensibility of filling out open questions, compliance with transitions. Visual inspection of 100% of questionnaires.
- 2) Monitoring the work of interviewers with the completion of the checklist. Subject of verification: the fact of conducting an interview with the respondent, conducting interviews on the entire questionnaire. 30% of the work of each interviewer was monitored.

2.5. Data processing and analysis

After data collection, all questionnaires were entered into a database in MS Excel format, which completely eliminates data entry errors in the computer database.

The analysis of data from a survey of residents and organizations was carried out using the MS Excel program, which, upon completion of the work on the formation of the database, the database will be converted into MS Excel format and transferred to the Customer.

2.5. Survey results and reporting

Upon completion of the survey, the contractor prepared an analytical report describing the results of the survey, describing the survey methodology, including the goals and objectives of the survey, the target group, and the results in the form of graphs and tables with comments, conclusions, and recommendations.

3. SURVEY RESULTS

3.1. GENERAL INFORMATION ABOUT THE RESPONDENTS

218 households of the A. Jomi district took part in the survey of the social conditions of the respondents:

Table 1. Distribution of respondents by water supply areas of the A. Jomi district

Name of settlements	Total population (Person)	Number of surveyed residents (Person)	% of the residents	% to the number of respondents
Jomi town (north)	7560	40	0,53	18,35
Jomi town (south)	6920	40	0,58	18,35
Jomi town (Guliston north)	180	11	6,11	5,05
Jomi town (Guliston south)	140	11	7,86	5,05
Buston village	980	13	1,33	5,96
Madaniyat village	2560	12	0,47	5,50
Mirzoobod village (north)	2620	11	0,42	5,05
Mirzoobod village (south)	3020	10	0,33	4,59
Rohi socialism village	5600	10	0,18	4,59
Zarnisor village	3420	12	0,35	5,50
Istiqlol village	2230	12	0,54	5,50
Rahimzoda village	4850	14	0,29	6,42
1st May village	4160	11	0,26	5,05
Jomi village	3030	11	0,36	5,05
TOTAL	47270	218	0,46	100,00

Diagram 1: Distribution of respondents by water supply zones

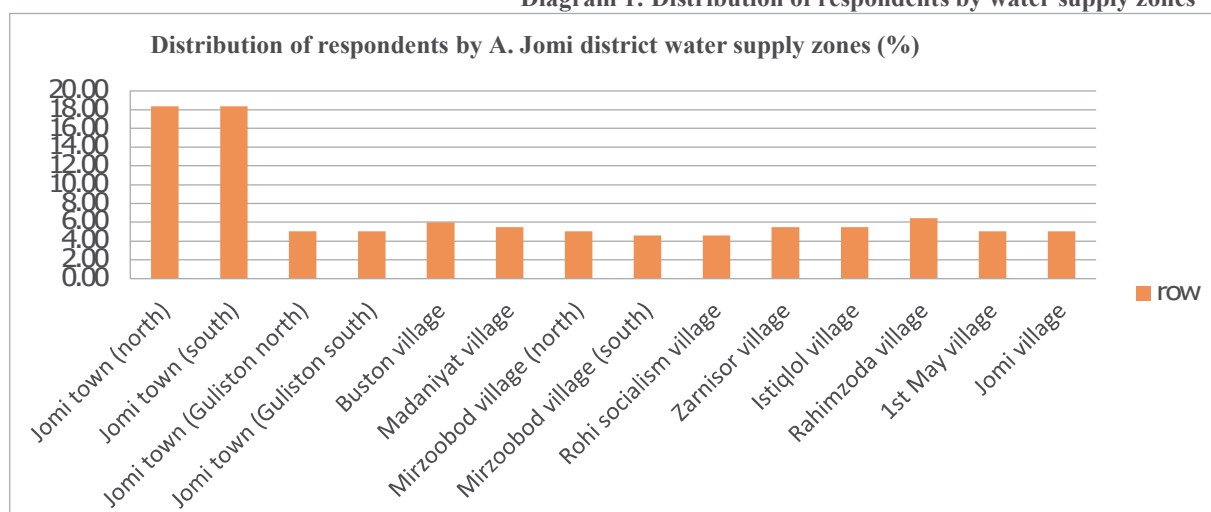


Table 2. Distribution of respondents by gender

Name of settlements	The number of residents surveyed in total	Number of male residents surveyed	% of men from the total number surveyed	Number of female residents surveyed	% of women from the total number surveyed
Jomi town (north)	40	10	25	30	75
Jomi town (south)	40	14	35	26	65
Jomi town (Guliston north)	11	4	36	7	64
Jomi town (Guliston south)	11	4	36	7	64
Buston village	13	5	38	8	62

Madaniyat village	12	4	33	8	67
Mirzoobod village (north)	11	4	36	7	64
Mirzoobod village (south)	10	4	40	6	60
Rohi socialism village	10	4	40	6	60
Zarnisor village	12	4	33	8	67
Istiqlol village	12	4	33	8	67
Rahimzoda village	14	5	36	9	64
1st May village	11	4	36	7	64
Jomi village	11	4	36	7	64
TOTAL	218	74	34	144	66

Diagram 2: Distribution of respondents by gender

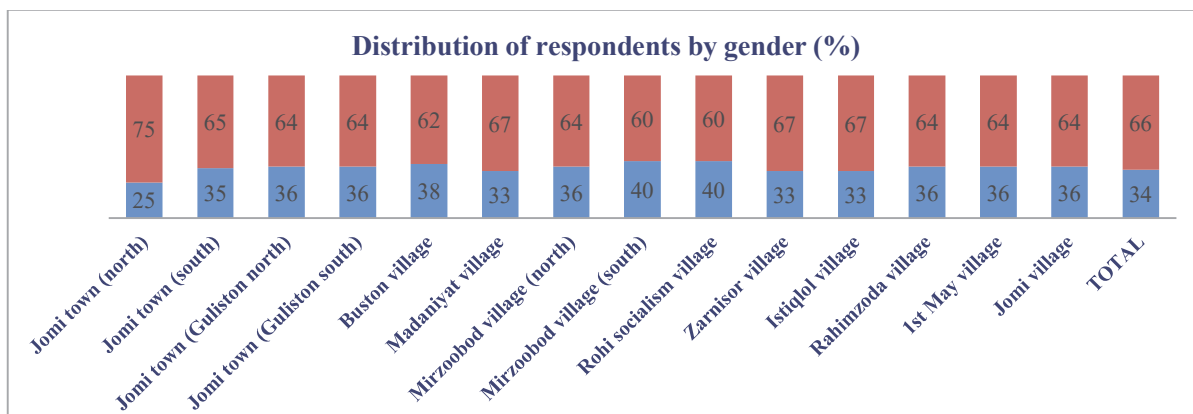


Таблица 3. Распределение по составу семьи

Name of settlements	Surveyed	Total generations	Total household members	Adults	%	Children	%
Jomi town (north)	40	3	425	233	54,82	192	45,18
Jomi town (south)	40	2	358	193	53,91	165	46,09
Jomi town (Guliston north)	11	3	67	32	47,76	35	52,24
Jomi town (Guliston south)	11	2	75	51	68,00	24	32,00
Buston village	13	3	165	74	44,85	91	55,15
Madaniyat village	12	3	114	67	58,77	47	41,23
Mirzoobod village (north)	11	3	133	72	54,14	61	45,86
Mirzoobod village (south)	10	3	124	82	66,13	42	33,87
Rohi socialism village	10	2	84	47	55,95	38	45,24
Zarnisor village	12	3	122	72	59,02	50	40,98
Istiqlol village	12	3	95	54	56,84	41	43,16
Rahimzoda village	14	2	124	66	53,23	58	46,77
1st May village	11	3	67	42	62,69	25	37,31
Jomi village	11	3	111	53	47,75	58	52,25
Beero	218	2,71	2064	1138	55,14	927	44,91

Diagram 3. The respondents' classification by family composition

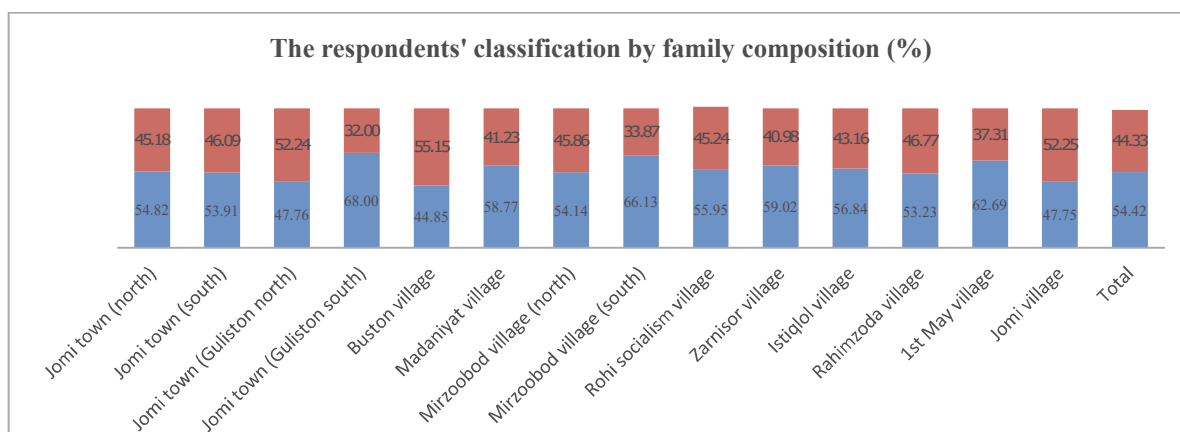


Table 4: Breakdown of respondents by nationality

Name of settlements	Surv eyed	Tajik	%	Uzbek	%	Kyr gyz	%	Other nationality	%
Jomi town (north)	40	38	95	2	5	0	0	0	0
Jomi town (south)	40	40	100	0	0	0	0	0	0
Jomi town (Guliston north)	11	11	100	0	0	0	0	0	0
Jomi town (Guliston south)	11	11	100	0	0	0	0	0	0
Buston village	13	13	100	0	0	0	0	0	0
Madaniyat village	12	12	100	0	0	0	0	0	0
Mirzoobod village (north)	11	10	90.9	1	9.1	0	0	0	0
Mirzoobod village (south)	10	10	100	0	0	0	0	0	0
Rohi socialism village	10	10	100	0	0	0	0	0	0
Zarnisor village	12	12	100	0	0	0	0	0	0
Istiqloq village	12	12	100	0	0	0	0	0	0
Rahimzoda village	14	14	100	0	0	0	0	0	0
1st May village	11	11	100	0	0	0	0	0	0
Jomi village	11	11	100	0	0	0	0	0	0
Bcero	218	216	99.1	2	0.9	0	0	0	0

Diagram 4. Breakdown of respondents by nationality

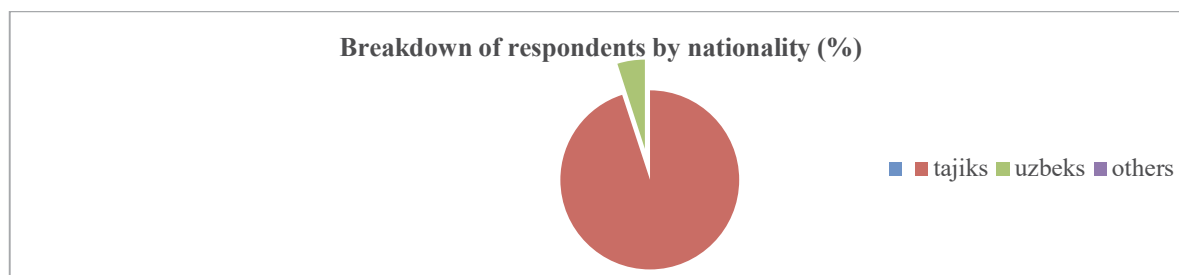


Table 5. Breakdown of respondents by religion

Name of settlements	Surveyed	Muslim Sunni	%	Muslim Shia	%	Christian	%	Other religion	%
Jomi town (north)	40	40	100	0	0	0	0	0	0
Jomi town (south)	40	40	100	0	0	0	0	0	0
Jomi town (Guliston north)	11	11	100	0	0	0	0	0	0
Jomi town (Guliston south)	11	11	100	0	0	0	0	0	0
Buston village	13	13	100	0	0	0	0	0	0
Madaniyat village	12	12	100	0	0	0	0	0	0
Mirzoobod village (north)	11	11	100	0	0	0	0	0	0
Mirzoobod village (south)	10	10	100	0	0	0	0	0	0
Rohi socialism village	10	10	100	0	0	0	0	0	0
Zarnisor village	12	12	100	0	0	0	0	0	0

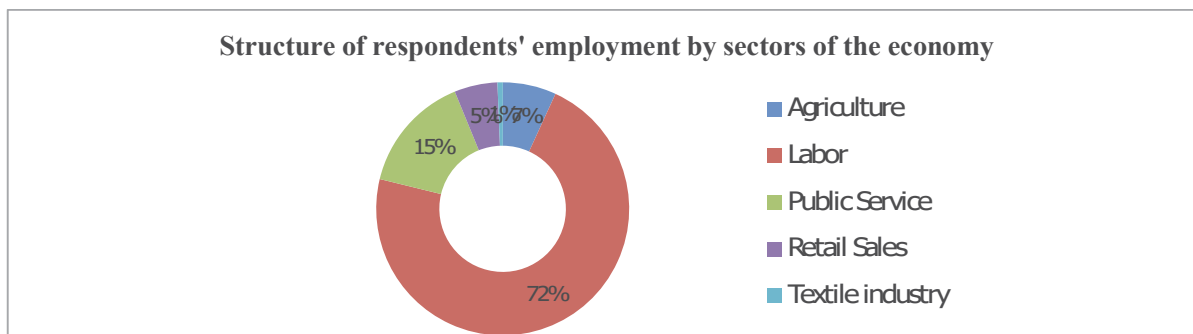
Istiqlol village	12	12	100	0	0	0	0	0	0
Rahimzoda village	14	14	100	0	0	0	0	0	0
1st May village	11	11	100	0	0	0	0	0	0
Jomi village	11	11	100	0	0	0	0	0	0
TOTAL	218	218	100	0	0	0	0	0	0

3.2. Socio-economic situation of the respondents. Characteristics and structure of the surveyed households:

Table 6: Breakdown of respondents by profession and occupation

Name of settlements	Surveyed	Agriculture	Hired workers %	Livestock	Other	Textile industry	%	Public Service	Retail Sales
Jomi town (north)	40		19	-	14			5	2
Jomi town (south)	40	1	15	-	15			6	3
Jomi town (Guliston north)	11	1	5	-	2			2	1
Jomi town (Guliston south)	11	1	8	-	1			1	
Buston village	13		6	-	5	1		1	
Madaniyat village	12	2	5	-	5				
Mirzoobod village (north)	11		5	-	4			2	
Mirzoobod village (south)	10	2	4	-	4				
Rohi socialism village	10	1	2	-	6				1
Zarnisor village	12		7	-	4			1	
Istiqlol village	12		8	-	3			1	
Rahimzoda village	14	1	12	-	1				
1st May village	11		4	--	3			3	1
Jomi village	11	1	5	--	5				
TOTAL	218	10	105		72	1		22	8

Diagram 5: Employment structure by sectors of the economy



3.3. Agricultural production

Table 7. In agricultural production

Name of settlements	Surveyed	Average size of cultivated land area (ha)	Main crops grown			
			Cotton	%	Other crops	%
Jomi town (north)	40	-	-		-	-
Jomi town (south)	40	-	-		-	-
Jomi town (Guliston north)	11	-	-		-	-
Jomi town (Guliston south)	11	-	-		-	-
Buston village	13	15	13	86,67	2	13,33
Madaniyat village	12	18	13	72,22	5	27,78
Mirzoobod village (north)	11	14	9	64,29	5	35,71
Mirzoobod village (south)	10	16	10	62,50	6	37,50
Rohi socialism village	10	16	8	50,00	8	50,00
Zarnisor village	12	8	5	62,50	3	37,50
Istiqlol village	12	10	8	80,00	2	20,00

Rahimzoda village	14	18	13	72,22	5	27,78
1st May village	11	-				
Jomi village	11	15	12	80,00	3	20,00
TOTAL	218	130	96	73,85	39	30,00

Diagram 6. The size of the cultivated area of agricultural land

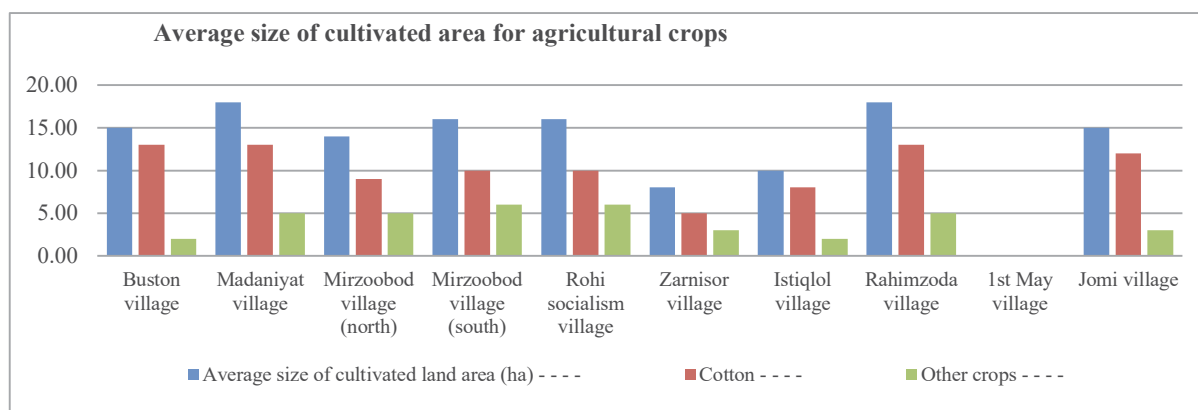


Table 8: Situation with the use of pesticides

Name of settlements	Surveyed	Using pesticides				Using fertilizers			
		Using	%	Not using	%	Not using	%	Using	%
Jomi town (north)	40	-	-	-	-	-	-	-	-
Jomi town (south)	40	-	-	-	-	-	-	-	-
Jomi town (Guliston north)	11	-	-	-	-	-	-	-	-
Jomi town (Guliston south)	11	-	-	-	-	-	-	-	-
Buston village	13	4	30,77	9	69,23	4	30,77	9	69,23
Madaniyat village	12	1	8,33	11	91,67	1	8,33	11	91,67
Mirzoobod village (north)	11	4	36,36	5	45,45	4	36,36	5	45,45
Mirzoobod village (south)	10	4	40,00	6	60,00	4	40,00	6	60,00
Rohi socialism village	10	4	40,00	6	60,00	4	40,00	6	60,00
Zarnisor village	12	1	8,33	11	91,67	1	8,33	11	91,67
Istiqlol village	12	6	50,00	6	50,00	6	50,00	6	50,00
Rahimzoda village	14	4	28,57	10	71,43	4	28,57	10	71,43
1st May village	11	-		-			0,00		0,00
Jomi village	11	6	54,55	4	36,36	6	54,55	4	36,36
TOTAL	218	34		68	31,19	34	15,60	68	31,19

Diagram 7: Situation with the use of pesticides and fertilizers in agricultural production

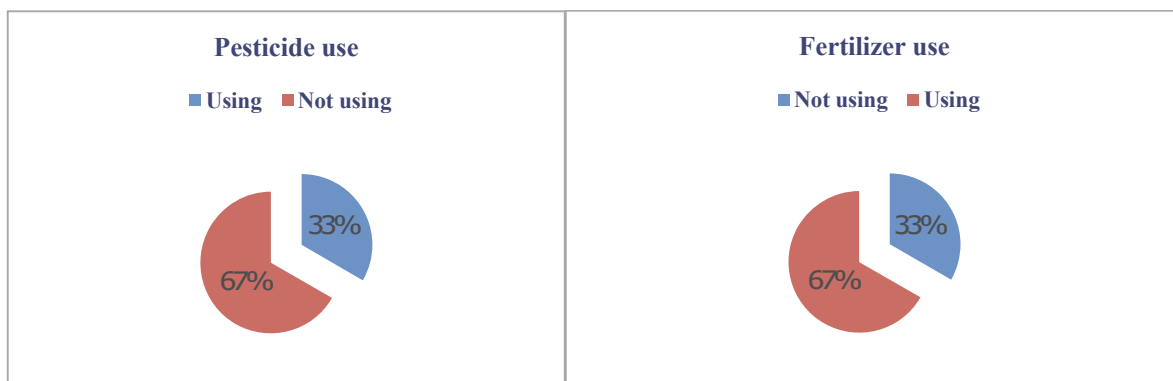
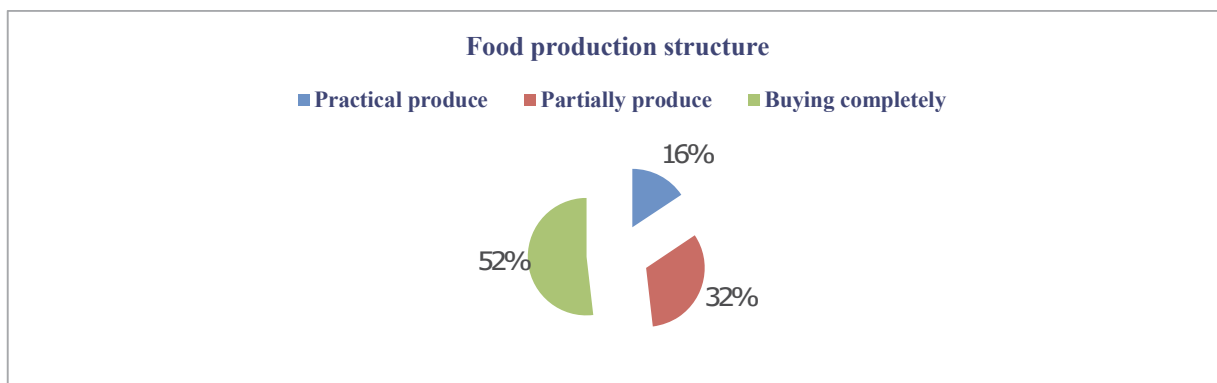


Table 9: Respondents' production of basic foodstuffs

Name of settlements	Surveyed	Practical produce	%	Partially produce	%	Buying completely	%
Jomi town (north)	40	-	-	-	-	40	100
Jomi town (south)	40					40	100
Jomi town (Guliston north)	11					11	100
Jomi town (Guliston south)	11					11	100
Buston village	13	4	30,77	9	69,23		
Madaniyat village	12	1	8,33	11	91,67		
Mirzoobod village (north)	11	4	36,36	7	63,64		
Mirzoobod village (south)	10	4	40,00	6	60,00		
Rohi socialism village	10	4	40,00	6	60,00		
Zarnisor village	12	1	8,33	11	91,67		
Istiqlol village	12	6	50,00	6	50,00		
Rahimzoda village	14	4	28,57	10	71,43		
1st May village	11	-		-		11	100
Jomi village	11	6	54,55	5	45,45		
TOTAL	218	34	15,60	71	32,57	113	51,83

Diagram 8: Food Production

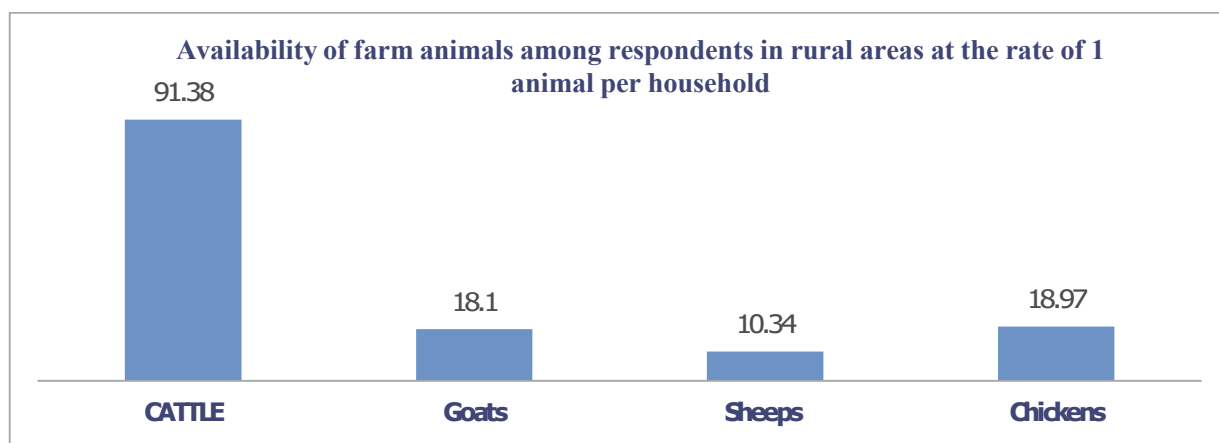


3.4. Livestock farming

Table 10. Livestock availability

Name of settlements	Surveyed	CATTLE		Goats		Sheep		Chickens	
			%		%		%		%
Jomi town (north)	40	-	-	-	-	-	-	-	-
Jomi town (south)	40	-	-	-	-	-	-	-	-
Jomi town (Guliston north)	11	-	-	-	-	-	-	-	-
Jomi town (Guliston south)	11	-	-	-	-	-	-	-	-
Buston village	13	4	30,77	1	7,69				
Madaniyat village	12	14	116,67			2	16,67		
Mirzoobod village (north)	11	15	136,36			3	27,27	5	45,45
Mirzoobod village (south)	10	7	70,00				0,00		
Rohi socialism village	10	8	80,00				0,00		
Zarnisor village	12	15	125,00				0,00	7	58,33
Istiqlol village	12	10	83,33			2	16,67		
Rahimzoda village	14	15	107,14	15	107,14	5	35,71		
1st May village	11	12	109,09	5	45,45		0,00		
Jomi village	11	6	54,55		0,00		0,00	10	90,91
TOTAL	116	106	91,38	21	18,10	12	10,34	22	18,97

Diagram 9. Availability of farm animals in households



It is prohibited to keep livestock in urban-type settlements. The calculation of farm animals was made on the basis of 1 animal per household. At the same time, some households have 2 or 3 animals, and other households have no livestock at all.

Table 11. Source of drinking water for household animals:

Name of settlements	Surveyed	Source of drinking water for household animals			
		Channel		Other source	
Jomi town (north)	40				
Jomi town (south)	40				
Jomi town (Guliston north)	11				
Jomi town (Guliston south)	11				
Buston village	13	13	100	13	100
Madaniyat village	12	12	100	12	100
Mirzoobod village (north)	11	11	100	11	100
Mirzoobod village (south)	10	10	100	10	100
Rohi socialism village	10	10	100	10	100
Zarnisor village	12	12	100	12	100

Istiqlol village	12	12	100	12	100
Rahimzoda village	14	14	100	14	100
1st May village	11	11	100	11	100
Jomi village	11	11	100	11	100
TOTAL	116	116	100	116	100

3.5. Income of the population

Average cash income (only the cash portion of income, not including grains and livestock used for personal household consumption):

Table 12. Income of the population

Name of settlements	Surveyed	Income per month (Somoni)
Jomi town (north)	40	1500,0
Jomi town (south)	40	1400,0
Jomi town (Guliston north)	11	1400,0
Jomi town (Guliston south)	11	1500,0
Buston village	13	1400,0
Madaniyat village	12	1300,0
Mirzoobod village (north)	11	1300,0
Mirzoobod village (south)	10	1200,0
Rohi socialism village	10	1200,0
Zarnisor village	12	1200,0
Istiqlol village	12	1300,0
Rahimzoda village	14	1300,0
1st May village	11	1300,0
Jomi village	11	1400,0
TOTAL	218	1335,7

Diagram 10. The average amount of cash income per 1 month

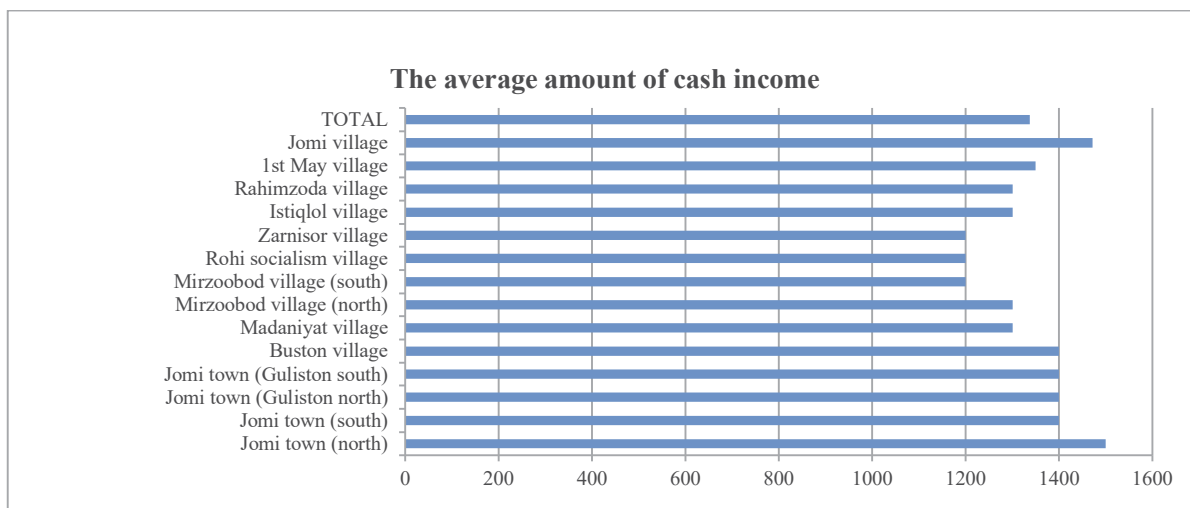


Table 13. The average amount of a family's expenses (per month)

		Average family expenses (per month)													
		Total expenses			Foodstuffs		Water charges		Electricity charges		Medical expenses		Fuel		Educ ation
Jomi town (north)	40	1500,0	100	1000	66,67	10	0,67	120	8,00	150	10,00	150	10,00	70	4,67
Jomi town (south)	40	1400,0	100	1000	71,43	10	0,71	100	7,14	100	7,14	90	6,43	100	7,14
Jomi town (Guliston north)	11	1400,0	100	1000	71,43	10	0,71	100	7,14	100	7,14	90	6,43	100	7,14

Jomi town (Guliston south)	11	1500,0	100	1000	66,67	10	0,67	120	8,00	150	10,00	150	10,00	70	4,67
Buston village	13	1400,0	100	800	57,14	10	0,71	140	10,00	150	10,71	150	10,71	150	10,71
Madaniyat village	12	1300,0	100	800	61,54	10	0,77	140	10,77	100	7,69	100	7,69	150	11,54
Mirzoobod village (north)	11	1300,0	100	800	61,54	10	0,77	140	10,77	100	7,69	100	7,69	150	11,54
Mirzoobod village (south)	10	1200,0	100	700	58,33	10	0,83	140	11,67	100	8,33	100	8,33	150	12,50
Rohi socialism village	10	1200,0	100	700	58,33	10	0,83	140	11,67	100	8,33	100	8,33	150	12,50
Zamisor village	12	1200,0	100	700	58,33	10	0,83	140	11,67	100	8,33	100	8,33	150	12,50
Istiqlol village	12	1300,0	100	800	61,54	10	0,77	140	10,77	100	7,69	100	7,69	150	11,54
Rahimzoda village	14	1300,0	100	800	61,54	10	0,77	140	10,77	100	7,69	100	7,69	150	11,54
1st May village	11	1300,0	100	800	61,54	10	0,77	140	10,77	100	7,69	100	7,69	150	11,54
Jomi village	11	1400,0	100	800	57,14	10	0,71	140	10,00	150	10,71	150	10,71	150	10,71
TOTAL	218	1335,7	100	835,71	62,57	10	0,75	131,43	9,84	114,29	8,56	112,86	8,45	131,43	9,84

Diagram 11. The average amount of expenditures of a household per 1 month

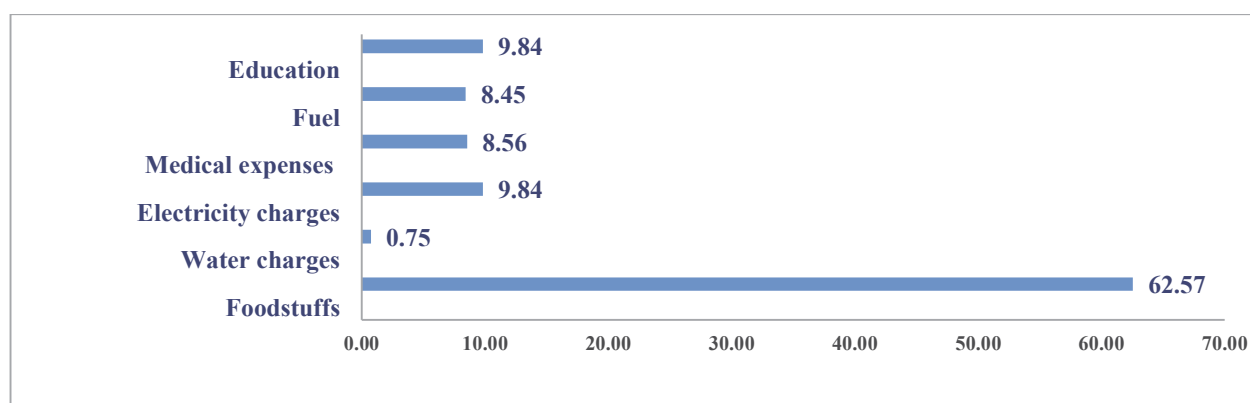


Table 14. Respondents' assets

Name of settlements	Surveyed	Housing		Land area (ha)		Common consumption goods			
		Own	Rental	Owned	Leased land	vehicle	motorcycle	TV, cell phone	
Jomi town (north)	40	40		0,05		8		40	
Jomi town (south)	40	40		0,05		8		40	
Jomi town (Guliston north)	11	11		0,05		5		11	
Jomi town (Guliston south)	11	11		0,05		5		11	
Buston village	13	13		0,1	2,0	4		13	
Madaniyat village	12	12		0,1	2,0	6		12	
Mirzoobod village (north)	11	11		0,1	2,0	5		11	
Mirzoobod village (south)	10	10		0,1	2,0	4		10	
Rohi socialism village	10	10		0,1	2,0	5		10	
Zamisor village	12	12		0,1	2,0	6		12	
Istiqlol village	12	12		0,1	2,0	4		12	
Rahimzoda village	14	14		0,1	2,0	6		14	
1st May village	11	11		0,1	2,0	5		11	

Jomi village	11	11		0.1	2.0	4		11	
TOTAL	218	218						218	

Table 15. Ownership of land plots

Name of settlements	Surveyed	Ownership of land plots							
		man		woman		other owner		other	
			%		%		%		%
Jomi town (north)	40	38	95,00	2	5,00				
Jomi town (south)	40	37	92,50	3	7,50				
Jomi town (Guliston north)	11	10	90,91	1	9,09				
Jomi town (Guliston south)	11	10	90,91	1	9,09				
Buston village	13	13	100,00		0,00				
Madaniyat village	12	12	100,00		0,00				
Mirzoobod village (north)	11	11	100,00		0,00				
Mirzoobod village (south)	10	10	100,00		0,00				
Rohi socialism village	10	10	100,00		0,00				
Zarnisor village	12	12	100,00		0,00				
Istiqlol village	12	12	100,00		0,00				
Rahimzoda village	14	14	100,00		0,00				
1st May village	11	11	100,00		0,00				
Jomi village	11	11	100,00		0,00				
TOTAL	218	211	96,79	7	3,21				

Diagram 12. Owners of land plots

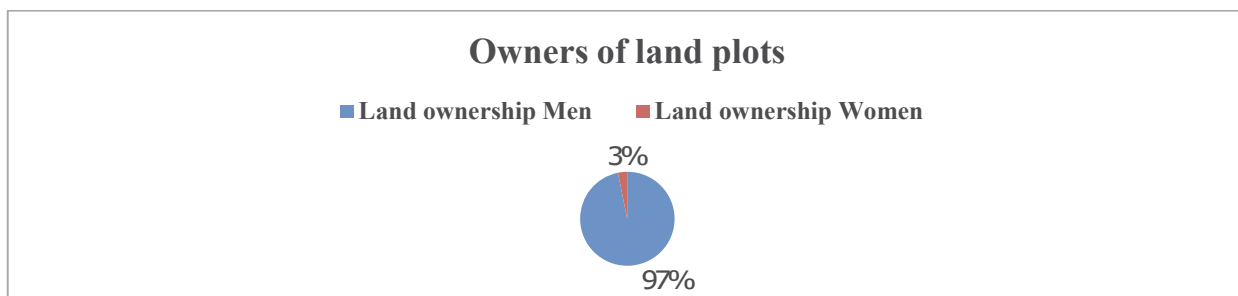
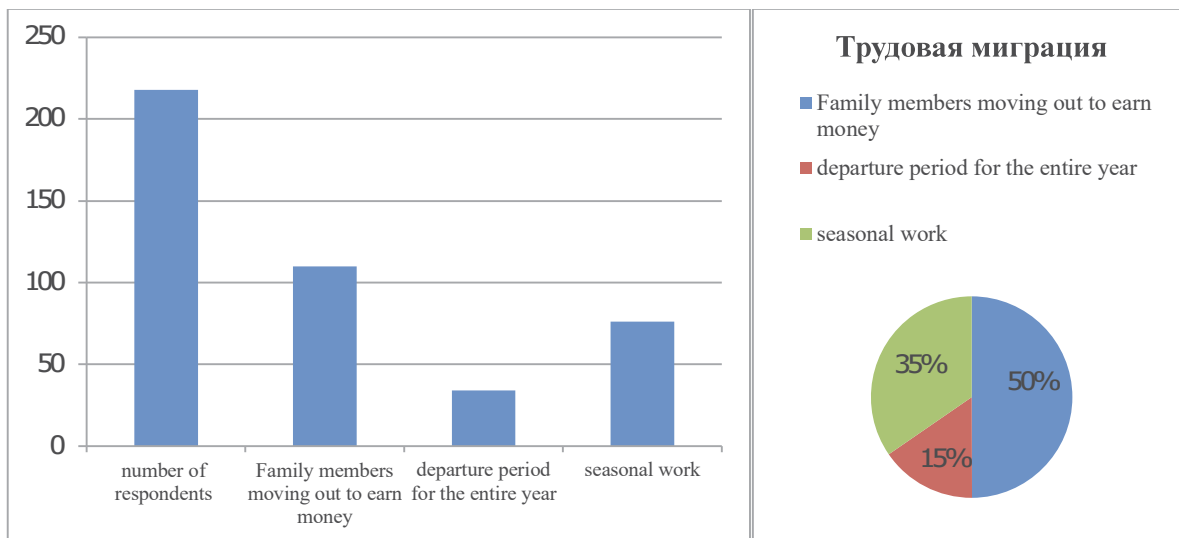


Table 16. Moving out to work in other places

Name of settlements	Surveyed	Family members moving out to earn money		Move-out period				Place of departure	
			%	All year long	%	Seasonal work	%		%
Jomi town (north)	40	21	52,50	7	17,50	14	35,00	RF	
Jomi town (south)	40	23	57,50	3	7,50	20	50,00	RF	
Jomi town (Guliston north)	11	4	36,36		0,00	4	36,36	Kazakhstan	
Jomi town (Guliston south)	11	3	27,27		0,00	3	27,27	RF	
Buston village	13	5	38,46	3	23,08	2	15,38	RF	
Madaniyat village	12	10	83,33	5	41,67	5	41,67	RF	
Mirzoobod village (north)	11	2	18,18		0,00	2	18,18	RF	
Mirzoobod village (south)	10	2	20,00		0,00	2	20,00	RF	

Rohi socialism village	10	6	60,00	3	30,00	3	30,00	RF	
Zarnisor village	12	8	66,67	4	33,33	4	33,33	RF	
Istiqloq village	12	4	33,33		0,00	4	33,33	RF	
Rahimzoda village	14	11	78,57	6	42,86	5	35,71	RF	
1st May village	11	5	45,45		0,00	5	45,45	RF	
Jomi village	11	6	54,55	3	27,27	3	27,27	RF	
TOTAL	218	110	50,46	34	15,60	76	34,86		

Diagram 13. Labor migration



3.4. Existing water supply facilities.

Table 17. Existing water supply facilities. Type, condition and number

Name of settlements		Private faucet		Public tap		Well with a hand pump		Other		Without any amenities	
		Working	Not working	Working	Not working	Working	Not working	Working	Not working	Working	Not working
Jomi town (north)	40	10	5	20	10	5	3	5	4		
Jomi town (south)	40	10	5	15	8	10	6	5	4		
Jomi town (Guliston north)	11	2	1	6	4	3	2				
Jomi town (Guliston south)	11	3	2	6	3	2	1				
Buston village	13	3	2	7	4	3	2				
Madaniyat village	12	3	2	6	4	3	2				
Mirzoobod village (north)	11	3	2	6	3	2	1				
Mirzoobod village (south)	10	3	2	4	3	3	2				
Rohi socialism village	10	3	2	4	2	3	2				
Zarnisor village	12	2	1	7	4	3	2				
Istiqloq village	12	2	1	7	5	3	2				
Rahimzoda village	14	3	2	7	4	4	2				
1st May village	11	3	2	6	3	2	1				
Jomi village	11	2	1	7	4	2	1				

TOTAL	218	52	30	108	61	48	29	10	8		
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Diagram 14. Condition of water supply facilities

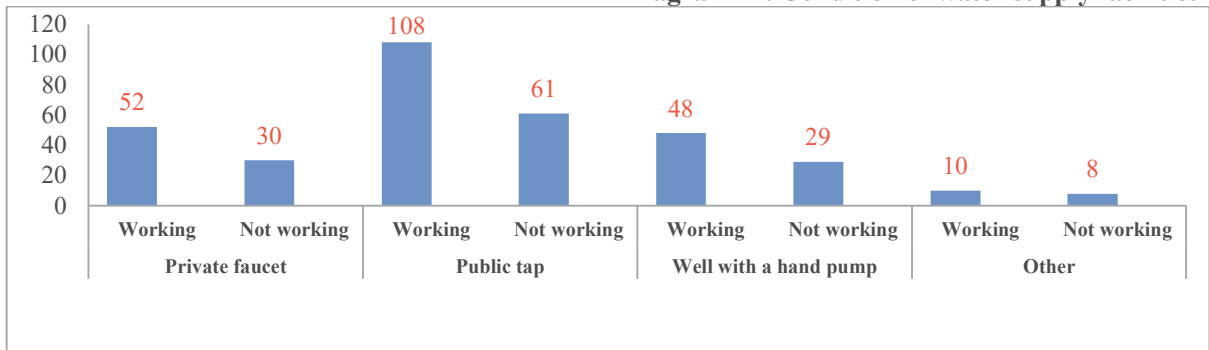


Table 18. If a resident (dweller) receives water supply service

Name of settlements		Rate type		You have been paying every month		You have been paying, but you stopped paying after the breakdown		You haven't been paying since the beginning	
		Metered (counter)	Flat rate		%		%		%
Jomi town (north)	40	-	40	30	75,00	10	25,00	-	-
Jomi town (south)	40	-	40	35	87,50	5	12,50	-	-
Jomi town (Guliston north)	11	-	11	8	72,73	3	27,27	-	-
Jomi town (Guliston south)	11	-	11	10	90,91	1	9,09	-	-
Buston village	13	-	13	9	69,23	4	30,77	-	-
Madaniyat village	12	-	12	9	75,00	3	25,00	-	-
Mirzoobod village (north)	11	-	11	8	72,73	3	27,27	-	-
Mirzoobod village (south)	10	-	10	8	80,00	2	20,00	-	-
Rohi socialism village	10	-	10	8	80,00	2	20,00	-	-
Zarnisor village	12	-	12	10	83,33	2	16,67	-	-
Istiqlol village	12	-	12	9	75,00	3	25,00	-	-
Rahimzoda village	14	-	14	10	71,43	4	28,57	-	-
1st May village	11	-	11	10	90,91	1	9,09	-	-
Jomi village	11	-	11	8	72,73	3	27,27	-	-
TOTAL	218	-	218	172	78,90	46	21,10	-	-

Diagram 15. Payment for water consumption services

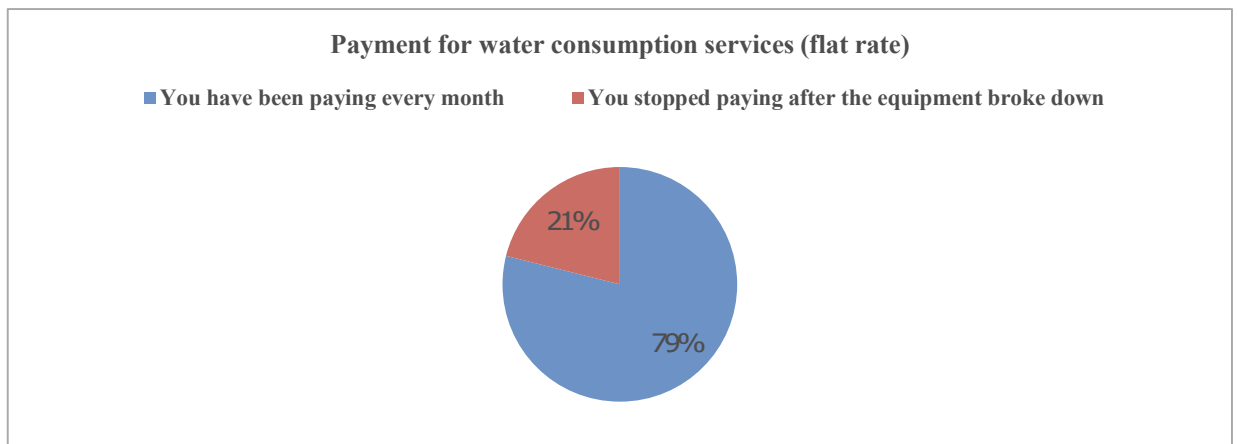


Table 19. Objectives of water use

Name of settlements	Respondents	Potable water	For cooking food	For the family's needs	For the bathroom, baths	For household animals
Jomi town (north)	40	15	10	10	5	
Jomi town (south)	40	10	10	15	5	
Jomi town (Guliston north)	11	3	3	3	2	
Jomi town (Guliston south)	11	3	3	3	2	
Buston village	13	3	3	2	3	2
Madaniyat village	12	3	3	3		2
Mirzoobod village (north)	11	2	2	2	2	2
Mirzoobod village (south)	10	2	2	2	2	2
Rohi socialism village	10	3	3	2	2	2
Zarnisor village	12	4	4		2	2
Istiqlol village	12	2	3	3	2	2
Rahimzoda village	14	2	2	3	4	3
1st May village	11	3	3	1	2	2
Jomi village	11	3	3	3	2	
TOTAL	218	58	54	52	35	19

Diagram 15. Objectives of water use

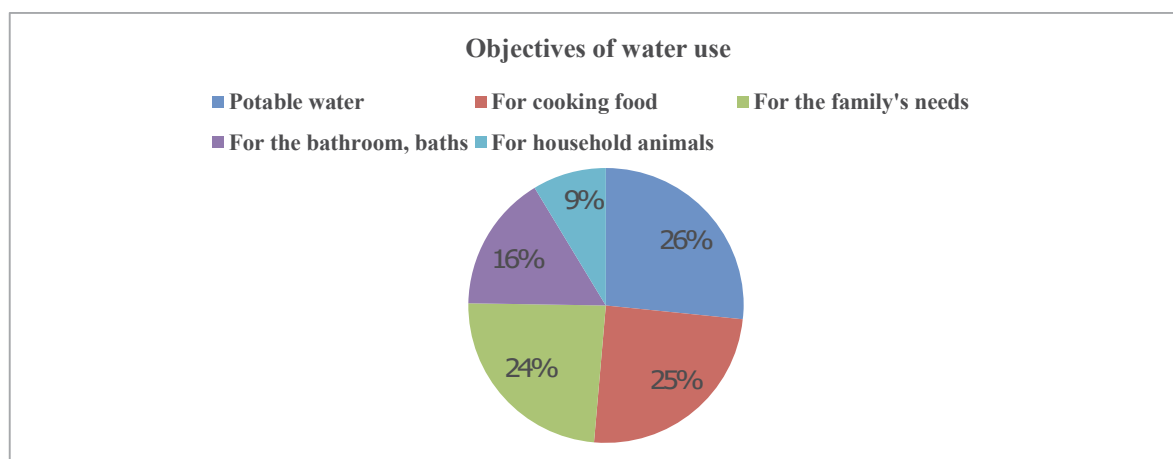


Table 20. Water sources currently in use

Types of water sources	Channel, water for irrigation	Deep well with a hand-operated pump	Water supply network
Number of respondents	98	40	80
Purposes of water use	For all purposes of water use	For all purposes of water use	For all purposes of water use
Use in the dry season (Yes/No)	no	no	no
Use during the rainy season (Yes/No)	yes	yes	yes
Distance to water source, km	50	70	100

Average water consumption per day (l/day)	160	140	120
Is there any drying-out of the water source? (Yes/No)	yes	yes	yes
Water quality (good, bad, water color)	satisfactorily	satisfactorily	satisfactorily
Water delivery method	manually	manually	manually

Table 21. Do you have to use other sources of water, despite the existence of a network of water pipes, wells and other water supply facilities?

Types of water sources		Yes, I have to	No, I don't	Specify the reason					
				The water supply facility is located too far away	It's hard to pay the water bill	Quantitative water shortages	There is no benefit to using the water supply facility	Water supply facility is broken	Other reason
Jomi town (north)	40		-			20	10	10	
Jomi town (south)	40					20	10	10	
Jomi town (Guliston north)	11			5		6			
Jomi town (Guliston south)	11			5		6			
Buston village	13			5		8			
Madaniyat village	12					6		6	
Mirzoobod village (north)	11					6		5	
Mirzoobod village (south)	10			3	2	3		2	
Rohi socialism village	10			3	2	3		2	
Zarnisor village	12			6		3		6	
Istiqlol village	12			3		6		3	
Rahimzoda village	14			4	3	3		5	
1st May village	11			2	2	2	2	2	1
Jomi village	11			2	2	2	2	2	1
TOTAL	218			38	11	94	24	53	2

Diagram 16. Use of alternative sources of water supply

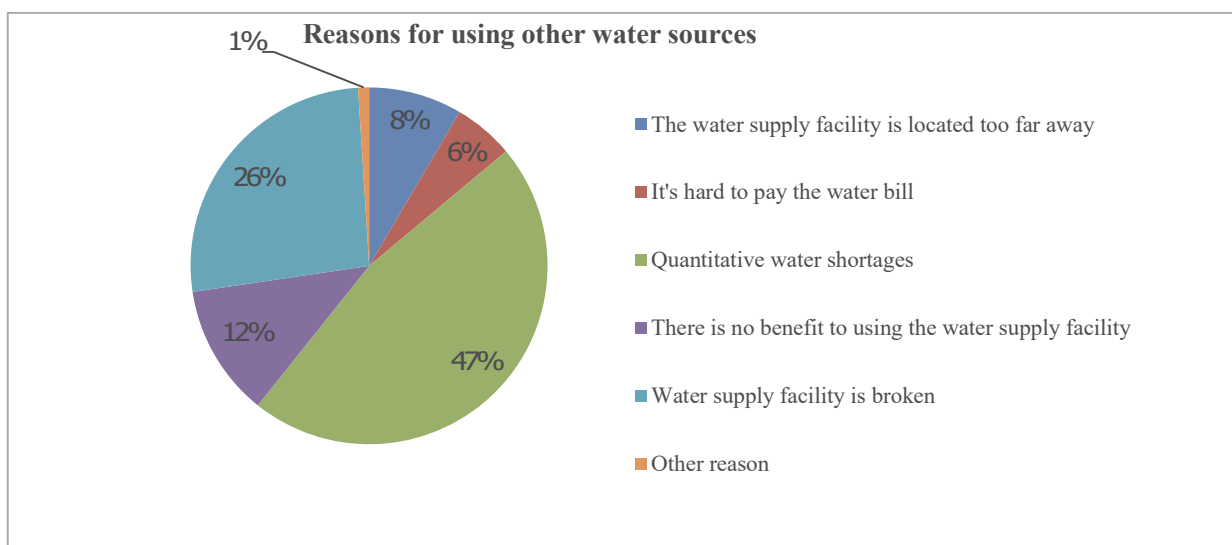


Table 22. Labor for water delivery

Name of settlements	Surveyed	Not required	Required	Who should deliver the water?						How many times do you transport (back and forth)
				Husband	Wife	Male children under 18 years old	Female children under 18 years old	Housekeeper	Others	
Jomi town (north)	40			5	20	5	10			2
Jomi town (south)	40			5	20	10	5			2
Jomi town (Guliston north)	11			2	4	2	3			2
Jomi town (Guliston south)	11			2	4	3	2			2
Buston village	13			2	4	3	4			3
Madaniyat village	12			2	4	2	4			3
Mirzoobod village (north)	11			2	4	2	3			2
Mirzoobod village (south)	10			2	4	2	2			3
Rohi socialism village	10			2	4	2	2			2
Zarnisor village	12			2	4	2	4			3
Istiqlol village	12			2	4	2	4			3
Rahimzoda village	14			2	4	4	4			2
1st May village	11			1	4	2	4			3
Jomi village	11			1	4	2	4			3
TOTAL	218			32	88	43	55			2.5

Diagram 17. Water delivery to the household

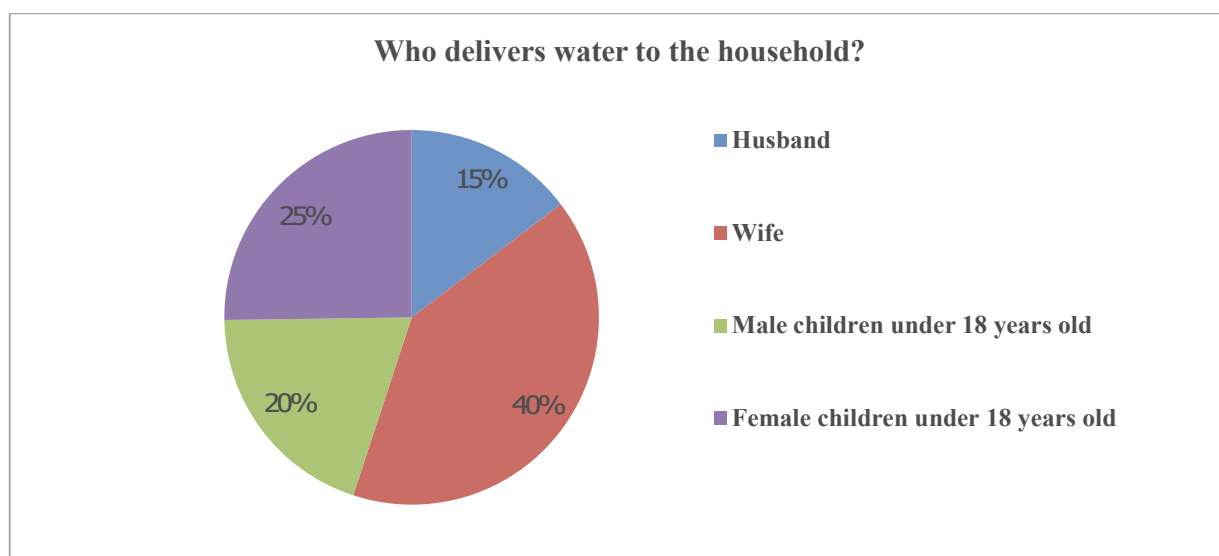


Table 23. Total time spent by the family per day on water delivery

Name of settlements	Surveyed	Within 30 minutes	30 minutes	1 hour	2 hours	2 hours and more
Jomi town (north)	40	40	-	-	-	-
Jomi town (south)	40	40	-	-	-	-
Jomi town (Guliston north)	11	11	-	-	-	-

Jomi town (Guliston south)	11	11	-	-	-	-
Buston village	13	-	-	13	-	-
Madaniyat village	12	-	-	12	-	-
Mirzoobod village (north)	11	-	-	11	-	-
Mirzoobod village (south)	10	-	-	10	-	-
Rohi socialism village	10	-	-	10	-	-
Zarnisor village	12	-	-	12	-	-
Istiqlol village	12	-	-	12	-	-
Rahimzoda village	14	-	-	14	-	-
1st May village	11	-	-	11	-	-
Jomi village	11	-	-	11	-	-
TOTAL	218	102	-	116	-	-

Diagram 16. Time spent by the family on water delivery

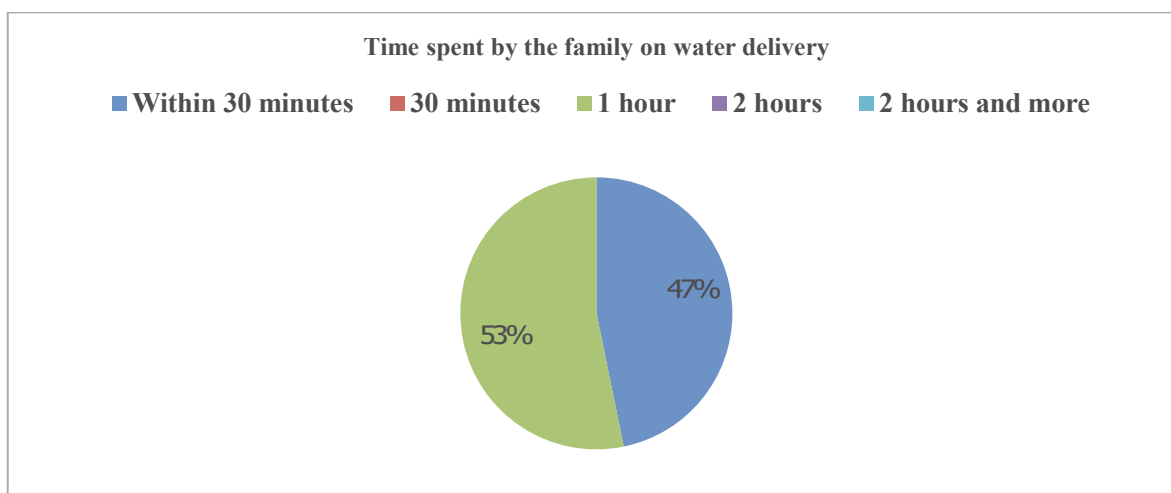


Table 24. Main methods of water delivery

Name of settlements	Surveyed	On foot	By bike	On a trolley	By scooter	Using draught animals	Another way
Jomi town (north)	40	40					
Jomi town (south)	40	40					
Jomi town (Guliston north)	11	10				1	
Jomi town (Guliston south)	11	10				1	
Buston village	13	6	3	4		2	
Madaniyat village	12	3	3	5	1		
Mirzoobod village (north)	11	3	4	3	1		
Mirzoobod village (south)	10	3	3	3	1		
Rohi socialism village	10	3	3	3	1		
Zarnisor village	12	4	6	1	1		
Istiqlol village	12	6	4	1	1		
Rahimzoda village	14	5	5	2	2		

1st May village	11	3	3	3	1		
Jomi village	11	3	3	3	1		
TOTAL	218	139	37	28	10	4	

Diagram 17. The main ways of water delivery

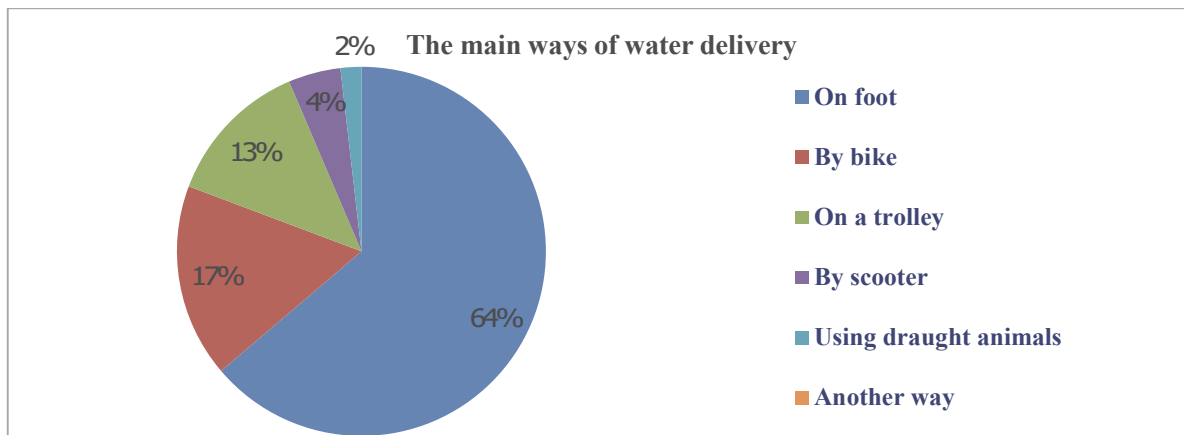


Table 25. Water use volume and sufficient amount of water

Name of settlements	Surveyed	in the rainy season (liters) per person				in the dry season (liters) per person			
		For drinking and cooking	for household needs	for bathing	for household animals	For drinking and cooking	for household needs	for bathing	for household animals
Jomi town (north)	40	30	30	20		30	30	20	
Jomi town (south)	40	30	30	20		30	30	20	
Jomi town (Guliston north)	11	30	30	20		30	30	20	
Jomi town (Guliston south)	11	30	30	20		30	30	20	
Buston village	13	30	30	20	50	30	30	20	50
Madaniyat village	12	30	30	20	50	30	30	20	50
Mirzoobod village (north)	11	30	30	20	50	30	30	20	50
Mirzoobod village (south)	10	30	30	20	50	30	30	20	50
Rohi socialism village	10	30	30	20	50	30	30	20	50
Zarnisor village	12	30	30	20	50	30	30	20	50
Istiqlol village	12	30	30	20	50	30	30	20	50
Rahimzoda village	14	30	30	20	50	30	30	20	50
1st May village	11	30	30	20	50	30	30	20	50
Jomi village	11	30	30	20	50	30	30	20	50
TOTAL	218	30	30	20	50	30	30	20	50

Diagram 18. The volume of water use by seasons

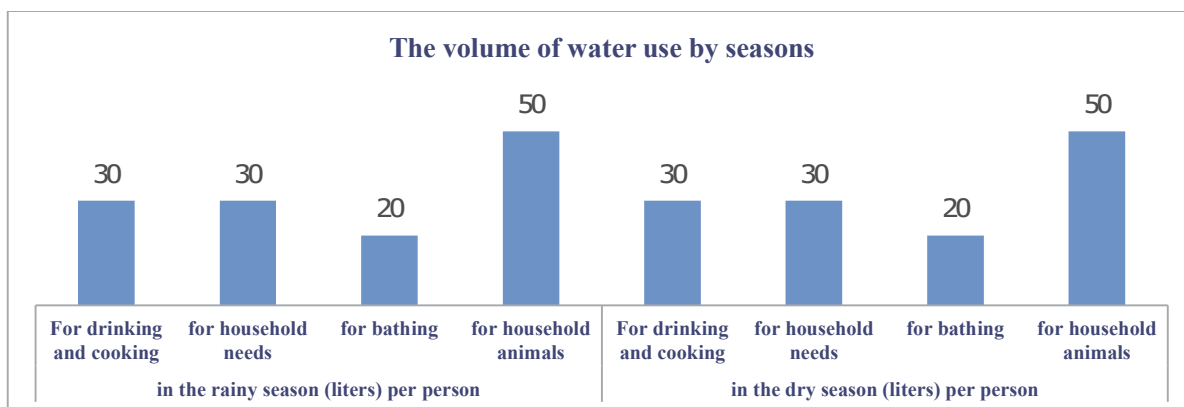


Table 26. Quantity of water

Name of settlements	Insufficient in both the dry and the rainy seasons	Insufficient only in the dry season	Sufficient both in the dry and in the rainy seasons
Jomi town (north)	30	10	-
Jomi town (south)	30	10	-
Jomi town (Guliston north)	7	4	-
Jomi town (Guliston south)	6	5	-
Buston village	10	3	-
Madaniyat village	7	5	-
Mirzoobod village (north)	7	4	-
Mirzoobod village (south)	6	4	-
Rohi socialism village	5	5	-
Zarnisor village	9	3	-
Istiqlol village	8	4	-
Rahimzoda village	9	5	-
1st May village	7	4	-
Jomi village	7	4	-
TOTAL	148	70	-

Diagram 19. Water sufficiency depending on the season

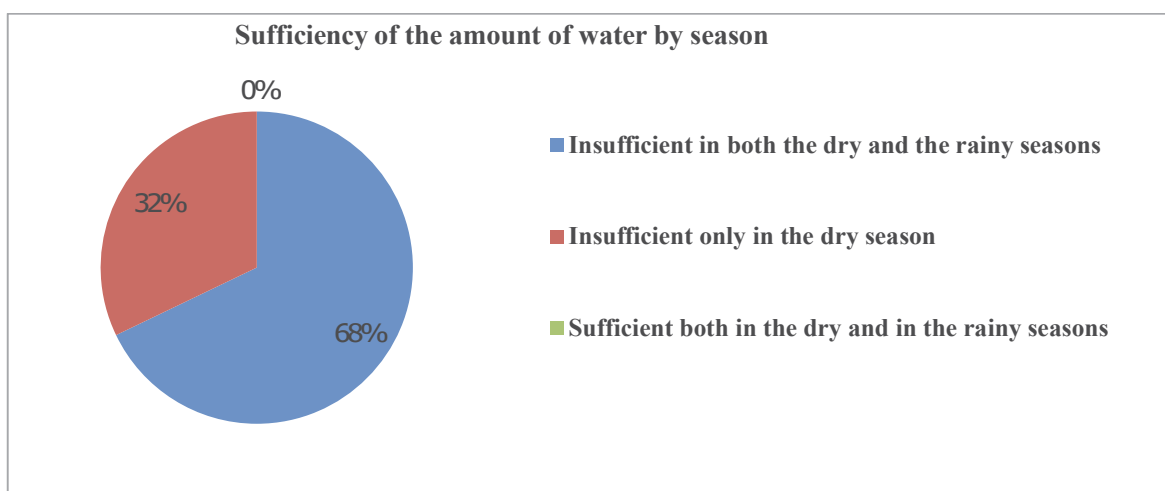


Table 27. Suggestions and opinions regarding new water supply facilities

Name of settlements	Respondents	Explanation of the Japanese plan; Improvement of water facilities by building new ones. The project will install a water meter in every home, Jomi TOD supervisors take meter readings and issue a water bill, and you pay your water bill by the amount you use. You can get safe water within 24 hours. So if you don't conserve your water consumption, you have to pay such an expensive rate. Does that make sense?	
		yes	no
Jomi town (north)	40	40	
Jomi town (south)	40	40	
Jomi town (Guliston north)	11	11	
Jomi town (Guliston south)	11	11	
Buston village	13	13	
Madaniyat village	12	12	
Mirzoobod village (north)	11	11	
Mirzoobod village (south)	10	10	
Rohi socialism village	10	10	
Zarnisor village	12	12	

Istiqloq village	12	12	
Rahimzoda village	14	14	
1st May village	11	11	
Jomi village	11	11	
TOTAL	218	218	

Table 28. Do citizens wish to equip the water supply facilities described above?

	Do citizens wish to equip the water supply facilities described above?			Reasons why citizens wish to equip facilities:					
	Yes	No	Total	1	2	3	4	5	6
Jomi town (north)	40	40		10	10	10			10
Jomi town (south)	40	40		10		10	10		10
Jomi town (Guliston north)	11	11		2		3	3		3
Jomi town (Guliston south)	11	11		2		3	3		3
Buston village	13	13		2	2	3	3		3
Madaniyat village	12	12		2	2	3	3		2
Mirzoobod village (north)	11	11		2		3	3		3
Mirzoobod village (south)	10	10		2	2	2			4
Rohi socialism village	10	10		2	2	2	2		2
Zamisor village	12	12		2	2	3	3		2
Istiqloq village	12	12		2	2	3	3		2
Rahimzoda village	14	14		2	3	3	3		3
1st May village	11	11		2		3	3		3
Jomi village	11	11		2		3	3		3
TOTAL	218	218		44	25	54	42		53

Diagram 20. Reasons why Respondents wish to equip facilities

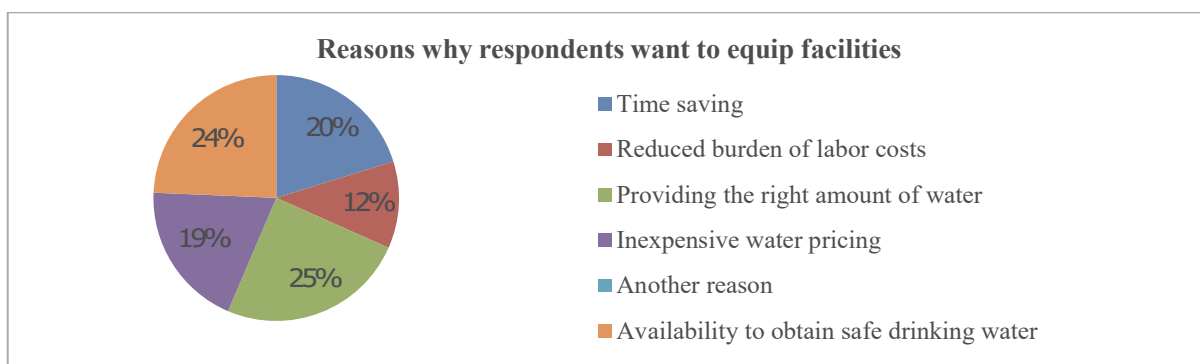
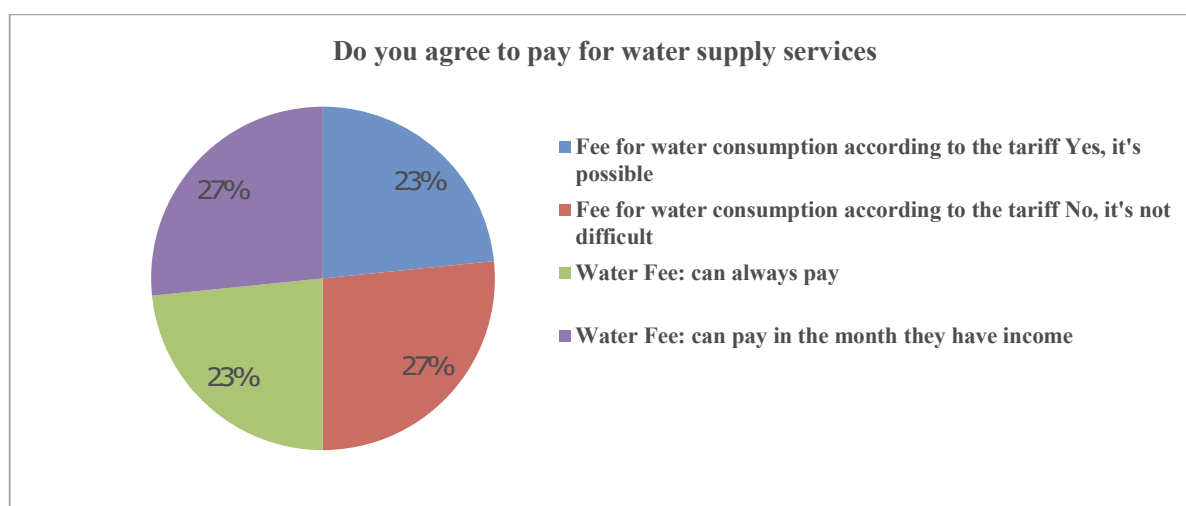


Table 29. Obligations for users

		Fee for water consumption according to the tariff	Water Fee:	Fee for water consumption by tariff (somoni)
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Name of settlements	Respondents	Yes, it's possible	No, it's not difficult	can always pay	can pay in the month they have income	minimum	maximum	average
Jomi town (north)	40	40		40		10	20	15
Jomi town (south)	40	40		40		10	20	15
Jomi town (Guliston north)	11	11		11		10	20	15
Jomi town (Guliston south)	11	11		11		10	20	15
Buston village	13		13		13	10	20	15
Madaniyat village	12		12		12	10	20	15
Mirzoobod village (north)	11		11		11	10	20	15
Mirzoobod village (south)	10		10		10	10	20	15
Rohi socialism village	10		10		10	10	20	15
Zarnisor village	12		12		12	10	20	15
Istiqlol village	12		12		12	10	20	15
Rahimzoda village	14		14		14	10	20	15
1st May village	11		11		11	10	20	15
Jomi village	11		11		11	10	20	15
TOTAL	218	102	116	102	116	10	20	15

Diagram 21. Do you agree to pay for water supply services?



3.4. Public Health and Sanitation

Table 30. Public Health and Sanitation

Name of settlements	Respondents	Water storage methods				
		We use clean water for drinking	We use any kind of water	In a water jug or bucket, without a lid	In a water jug or bucket, with a lid	Another way
Jomi town (north)	40		40		40	
Jomi town (south)	40		40		40	
Jomi town (Guliston north)	11		11		11	
Jomi town (Guliston south)	11		11		11	
Buston village	13		13		13	
Madaniyat village	12		12		12	
Mirzoobod village (north)	11		11		11	
Mirzoobod village (south)	10		10		10	
Rohi socialism village	10		10		10	
Zarnisor village	12		12		12	
Istiqlol village	12		12		12	
Rahimzoda village	14		14		14	
1st May village	11		11		11	
Jomi village	11		11		11	
TOTAL	218		218		218	

Table 31: Availability of a restroom

Name of settlements	Respon dents	There is an indoor toilet	The toilet is located outside the house on the premises of the household	No toilet (space used instead of a toilet): Toilet structure		
				Connected to the sewer	Filtration through the ground layer	
Jomi town (north)	40	-	40		40	
Jomi town (south)	40	-	40		40	
Jomi town (Guliston north)	11	-	11		11	
Jomi town (Guliston south)	11	-	11		11	
Buston village	13	-	13		13	
Madaniyat village	12	-	12		12	
Mirzoobod village (north)	11	-	11		11	
Mirzoobod village (south)	10	-	10		10	
Rohi socialism village	10	-	10		10	
Zarnisor village	12	-	12		12	
Istiqloq village	12	-	12		12	
Rahimzoda village	14	-	14		14	
1st May village	11	-	11		11	
Jomi village	11	--	11		11	
TOTAL	218		218		218	

Table 32. Washing hands before eating

Name of settlements	Washing hands before eating:					
	Responde nts	Always washing hands with soap and water	Always washing hands with water	Hands sometimes are not washed	Hands are rarely washed	Hands are not washed
Jomi town (north)	40		40			
Jomi town (south)	40		40			
Jomi town (Guliston north)	11		11			
Jomi town (Guliston south)	11		11			
Buston village	13		13			
Madaniyat village	12		12			
Mirzoobod village (north)	11		11			
Mirzoobod village (south)	10		10			
Rohi socialism village	10		10			
Zarnisor village	12		12			
Istiqloq village	12		12			
Rahimzoda village	14		14			
1st May village	11		11			
Jomi village	11		11			
TOTAL	218		218			

Table 33. Washing hands after using the toilet

Name of settlements	Respondents	Сходил в туалет по-большому:				
		Always washing hands with soap and water	Always washing hands with water	Sometimes washing hands	Hands are rarely washed	Hands are not washed
Jomi town (north)	40		40			
Jomi town (south)	40		40			
Jomi town (Guliston north)	11		11			
Jomi town (Guliston south)	11		11			
Buston village	13		13			
Madaniyat village	12		12			
Mirzoobod village (north)	11		11			
Mirzoobod village (south)	10		10			
Rohi socialism village	10		10			
Zarnisor village	12		12			
Istiqloq village	12		12			
Rahimzoda village	14		14			
1st May village	11		11			
Jomi village	11		11			

TOTAL	218	218			
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Table 34. Place of laundry washing

	Place of laundry washing:			How often do you use the laundry room:			
	Respondents	Available	Not available (place used for laundry):	Daily	2-3 times a week	Not more than once a week	Other answers
Jomi town (north)	40	10	30		10		
Jomi town (south)	40	10	30		10		
Jomi town (Guliston north)	11	3	8		3		
Jomi town (Guliston south)	11	3	8		3		
Buston village	13	4	9		4		
Madaniyat village	12	6	6		6		
Mirzoobod village (north)	11	5	6		5		
Mirzoobod village (south)	10	4	6		4		
Rohi socialism village	10	4	6		4		
Zarnisor village	12	4	8		4		
Istiqlol village	12	4	8		4		
Rahimzoda village	14	4	10		4		
1st May village	11	5	6		5		
Jomi village	11	5	6		5		
TOTAL	218	71	147		71		

Table 35. Garbage disposal method:

	Garbage disposal methods						
	Respondents	Throw it in a designated area	Burning	Other way	2-3 times a week	Not more than once a week	Other answers
Jomi town (north)	40	40			40		
Jomi town (south)	40	40			40		
Jomi town (Guliston north)	11	11			11		
Jomi town (Guliston south)	11	11			11		
Buston village	13			13	13		
Madaniyat village	12			12	12		
Mirzoobod village (north)	11			11	11		
Mirzoobod village (south)	10			10	10		
Rohi socialism village	10			10	10		
Zarnisor village	12		12		12		
Istiqlol village	12		12		12		
Rahimzoda village	14		14		14		
1st May village	11		11		11		
Jomi village	11		11		11		
TOTAL	218	102	60	56	218		

Water-borne infectious diseases

Table 36. Main diseases in the last 2 years

	Respondents	Hepatitis	Acute intestinal diseases	TOTAL
Jomi town (north)	40	3	5	8
Jomi town (south)	40	3	5	8
Jomi town (Guliston north)	11		1	1
Jomi town (Guliston south)	11			
Buston village	13		1	1
Madaniyat village	12	2		2
Mirzoobod village (north)	11	2	2	4
Mirzoobod village (south)	10			0
Rohi socialism village	10	1	2	3
Zarnisor village	12		2	2
Istiqlol village	12			
Rahimzoda village	14	3	3	6
1st May village	11	2	3	5
Jomi village	11			
TOTAL	218	16	24	40

Table 37. Knowledge of diseases

	Respondents	We know very well	To a certain extent, we know	Almost don't know
Jomi town (north)	40	40		
Jomi town (south)	40	40		
Jomi town (Guliston north)	11	11		
Jomi town (Guliston south)	11	11		
Buston village	13		13	
Madaniyat village	12		12	
Mirzoobod village (north)	11		11	
Mirzoobod village (south)	10		10	
Rohi socialism village	10		10	
Zarnisor village	12		12	
Istiqlol village	12		12	
Rahimzoda village	14		14	
1st May village	11		11	
Jomi village	11		11	
TOTAL	218	102	116	

Table 38. Observations of surveyed citizens about the causes and ways of treating and preventing infectious diseases

	Respondents	Know very well	To a certain extent know	Almost don't know
Jomi town (north)	40	40		
Jomi town (south)	40	40		
Jomi town (Guliston north)	11	11		
Jomi town (Guliston south)	11	11		
Buston village	13		13	
Madaniyat village	12		12	
Mirzoobod village (north)	11		11	
Mirzoobod village (south)	10		10	
Rohi socialism village	10		10	
Zarnisor village	12		12	
Istiqlol village	12		12	
Rahimzoda village	14		14	
1st May village	11		11	
Jomi village	11		11	
TOTAL	218	102	116	

Table 39. Health education class participation

	Respondents	Attended	Did not attend	Frequency of conducting within the framework of COVID prevention
Jomi town (north)	40	20	20	once a year
Jomi town (south)	40	10	30	once a year
Jomi town (Guliston north)	11	4	7	once a year
Jomi town (Guliston south)	11	4	7	once a year
Buston village	13	7	6	once a year
Madaniyat village	12	6	6	once a year
Mirzoobod village (north)	11	4	7	once a year
Mirzoobod village (south)	10	4	6	once a year
Rohi socialism village	10	4	6	once a year
Zarnisor village	12	6	6	once a year
Istiqlol village	12	6	6	once a year
Rahimzoda village	14	7	7	once a year
1st May village	11	3	8	once a year
Jomi village	11	3	8	once a year
TOTAL	218	88	130	once a year

別添資料-8-2

Joint Monitoring Programme 調査

REPORT ON CONDUCTING THE SOCIAL CONDITION SURVEY

with a baseline for the joint monitoring program for the preparatory survey for the Project for improvement of the water supply system in A. Jomi district of the Khatlon region of the Republic of Tajikistan

Prepared by:

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2023

Project for Improvement of the water supply system in Abdurahmoni Jomi District, Khatlon region of the Republic of Tajikistan



Report on conducting the social condition survey (research)

with a baseline for the joint monitoring program for the preparatory survey for the Project for improvement of the water supply system in A. Jomi district of the Khatlon region of the Republic of Tajikistan

CHAPTER 1. INTRODUCTION

1. The purpose of the survey is to conduct a social condition survey with a baseline for the Joint Monitoring Program of the customers of A. Jomi district of Khatlon region in the Project Area in order to obtain information necessary for planning water supply facilities in this district.

2. Scope of work

The territory of the survey is the town of Jomi and 10 villages of the Jomi district of Khatlon region. Customers for the present survey (research) are 218 households who participated in the previous survey.

Field surveyors should visit the same households, referring to the data sheets of the previous survey.

The number of respondents participating in the survey (research) and laboratory sampling are shown in the table below.

Name of settlements	Number of the population by (2022)	Target number of respondents	Testing water quality for the presence of E. coli
		Target households-users of public taps	Water sources
Jomi town	14,480	North: 40 South: 40	North: 7 South: 7
Guliston north	180	11	3
Guliston south	140	11	3
Buston village	980	13	3
Madaniyat village	2,560	12	3
Mirzoobod village (north)	2,620	11	3
Mirzoobod village (south)	3,020	10	3
Rohi socialism village	5,600	10	3
Zarnisor village	3,420	12	3
Istiqloq village	2,230	12	3
Rahimzoda village	4,850	14	3
1st May village	4,160	11	3
Jomi village	3,030	11	3
Total	47,270	218	50

3) Survey methodology

The survey was conducted from June 5 to June 30, 2023 by a 7-person team from the National Center for Disaster Risk Reduction. The survey of respondents of target settlements was conducted in close cooperation with representatives of jamoats and public heads of streets and neighborhoods.

The survey was conducted by means of face-to-face interviews with respondents

4) Field survey and organization of the survey team

The field study (survey) was conducted on the basis of a questionnaire provided by the Project Consultant (attached hereto).

To conduct the survey a team was formed with the necessary number of interviewers, who worked under the direction of the project manager. Interviewers with higher education, familiar with the topic of the survey, communicative skills, and informal communication abilities were involved in the survey.

To ensure the quality of data collection during fieldwork, interviewers filled out 1-2 questionnaires after the training and submitted them to the project manager for review. Thus, as a result of the selection process, only those applicants who demonstrated their competence were allowed to work.

Interviewers were in the project area for one month and interviewed customers selected in the previous survey in order to obtain answers from respondents to the questions given in the framework of the survey to prepare the information needed for planning water supply facilities in this district.

The location of each household is marked with GPS (global positioning system) coordinates and the telephone number of the interviewees is presented.

5) Data processing and analysis

After data collection, all questionnaires were entered into a database in MS Excel format, which completely eliminates errors in entering data into a computer database.

Data processing consisted of receiving and rejecting questionnaires, entering the results of the survey into a database in MS Excel format

Analysis of data on the survey of respondents was carried out using MS Excel program in the future will be converted to MS Excel format and transferred to the Client. Completed questionnaires are presented as part of the project result.

6) Survey results and reporting

Upon completion of the survey, the contractor submits an analytical report describing the results of the survey, describing the survey methodology, including the goals and objectives of the survey, the target group, and the results in the form of graphs and tables with comments, conclusions as well as recommendations.

7) Water quality check

As part of the survey (research), samples are taken to test for the presence of E. coli. Samples are taken from interviewed households, and also samples of water are taken from as many different sources as possible. Samples were delivered to the Central Laboratory of Drinking Water Quality Control of SUE "Water Supply and Sewerage of Dushanbe City" for laboratory testing within 1 hour according to the established norms. The results of the samples are presented in the appendix to this report.

The total number of samples for E. coli analysis is 50 samples from the target streets of Jomi Town and villages in the Project Area (see table above). Sterilized bottles are used for sampling and are provided by the laboratory. The laboratory provides the test results of the submitted samples and technical data sheets in accordance with the requirements of GOST 18963-73.



Condition of the water supply system in the project area

A. Jomi Town

For the target group of interviewees in the A. Jomi town, the main source of drinking water is the water supply system consisting of 3 deep wells and pipelines supplying drinking water to the population by means of street water pipes, built during the Soviet times. The capacity (total capacity of the installed submersible pumps) is 400m³/hour. This system built during the Soviet era is still in operation. However, due to considerable wear and tear of the system and frequent equipment failures, water is supplied to the population for 6 hours a day (3 hours in the morning and 3 hours in the evening).

In project zone A. Jomi town, the well located in "UShOS" (State Land Reclamation and Irrigation Administration of A. Jomi district) supplies Lohuti Street and adjacent territories, the well on the territory of MPMK supplies Guliston Street, the well located on the territory of the water utility supplies Somonien, Krupskaya and other Streets. Water from the wells is supplied through the main pipes to the system of street public water pipelines, which were built 40 years ago. The total length of the running water pipes is estimated at about 30 kilometers. The town uses a system of public street water taps consisting of 220 public water taps, most of which are not working. Thus, in the town of A. Jomi about 65% of the public street water taps do not work, and residents are forced to go for water to the working water taps, which are quite far from where they live.

Subsidiary state enterprise Tojikobdehot (TOD), a structural unit of SUE "KMK" responsible for the water supply system in rural areas, provides water to about half of the population of the A. Jomi town (about 7500 people). However, the water supply area is divided into several blocks, and the water is supplied to each block on an orderly basis, the residents actually receive water for about 4 hours a day. For this reason, residents compensate for the lack of water with unsafe water, from canals that are used to irrigate household plots. Such negative water supply conditions are one of the factors preventing the development of the A. Jomi town, despite the fact that it is the administrative center of A. Jomi district.

The situation in the Project area of target villages is even worse. In Soviet times, water supply to villages in the Project area was carried out with the help of pumping stations, which even had chlorination plants and were on the balance sheet of former collective farms, then transferred to the balance sheet of local self-government bodies (Jamoats). After that, part of the land was transferred to other owners and farms, including the property and ownership of water supply organizations of collective farms. The new owners were not interested in the proper maintenance of the water supply system and the system began to gradually deteriorate, and subsequently the technical documents and documents of the rights of the owners were lost. At present, the local community maintains and operates the water supply systems in the villages of the project area. The local community periodically collects

funds to repair equipment, but the water supply system, built 40 years ago, is significantly deteriorated and in need of serious reconstruction.

Thus, in the project area, pumping stations were built in the villages of Madaniyat, Mirzobod, Rahimzoda, Jomi, and May 1 (see Appendix), which are in operation up to the present day. The depth of all existing wells was 100 m and more, water quality is good enough.

Due to the deterioration of pumping systems, equipment, main pipelines as well as street taps and the inability of local authorities and the local community to find significant funds for a major renovation of the water supply system, it does not meet the basic needs of the population in clean drinking water.

A number of welfare organizations provide assistance to the villages of Jomi, Zarnisor, Rohi Socialism (see appendix) in partial repair of pumping stations equipment and have built a system of pumping stations that take water from the hollow up to 5 meters. However, due to poor water quality and difficulties with water extraction, the population prefers to use the traditional system of water supply through public street water pipes or go directly to wells for drinking water.

Depending on the season, use water for drinking, cooking, or hand washing from irrigation canals by leaving it for some time beforehand to allow suspended particles to settle or by boiling the water.

In winter, water pumping is used as an alternative source of water supply, and water is supplied by pumps or pumping devices to tanks up to 3 m³ and used as needed.



Chapter 1. W1-1: MAIN SOURCE OF DRINKING WATER

W1-1: Main source of drinking water

Table 1.1. Main source of drinking water for customers of A. Jomi Town

Name of settlements	Number of customers	Private (time of delivery in hours)	Public (time of delivery in hours)	Own well (shallow)	Irrigation	Bottled water	Other (specify)
1. Navobod Street. (Jomi north)	12,00	2,00 (4 hours)	9,00 (4 hours)				1,00 (all the time)
2. Communism Street (Jomi north)	3,00	0,00	3,00 (4 hours)				
3. Krupskaya Street (Jomi north)	19,00	4,00 (4 hours)	15,00 (4 hours)				
4. Somoni Street (Jomi north)	6,00	1,00 (4 hours)	5,00 (4 hours)				
5. Somoni Street (Jomi south)	21,00	2,00 (4 hours)	19,00 (4 hours)				
6. Lohuti Street (Jomi south)	19,00	2,00 (4 hours)	17,00 (4 hours)				
7. Guliston Street north	11,00	0,00	11,00 (4 hours)				
8. Guliston Street south	11,00	0,00	11(4 hours)				
Total	102,00	11,00	90,00				1,00
%	100	10,78	88,23				0,98

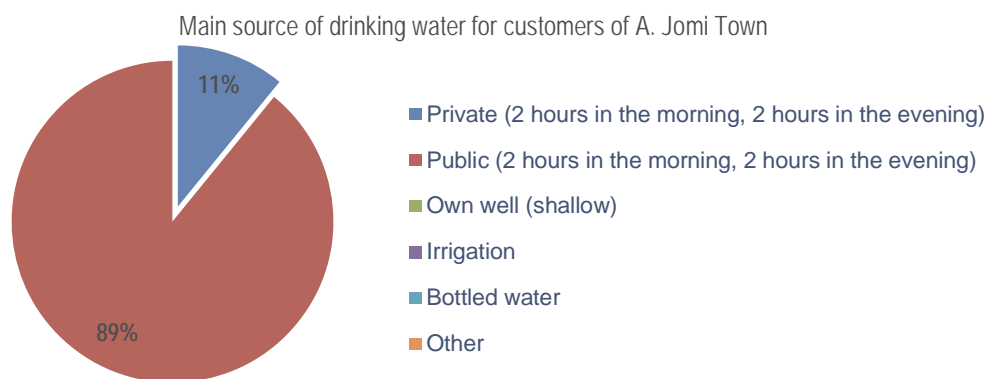
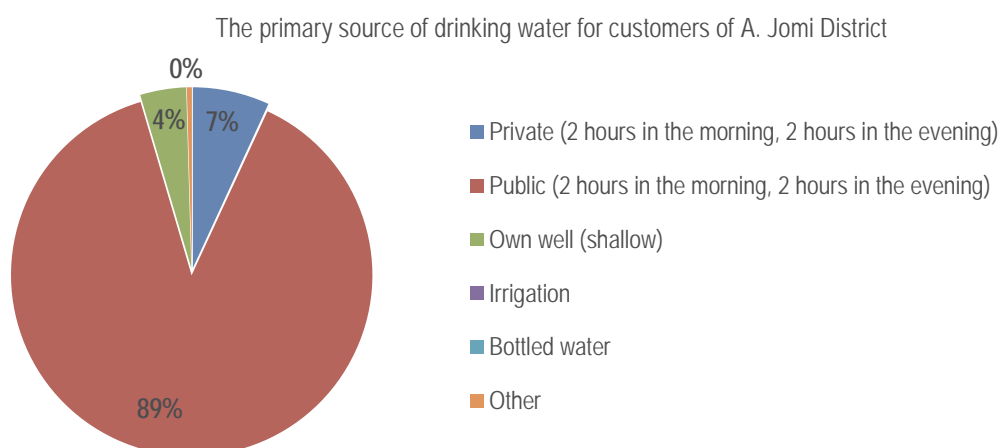


Table 1.2. W1-1: The primary source of drinking water for customers of A. Jomi District

Name of settlements	Number of customers	Private (time of delivery in hours)	Public (time of delivery in hours)	Own well (shallow)	Irrigation	Bottled water	Other (specify)
1. Jomi town	102	11,00	90,00				1,00
2. Buston village	13		12,00	1,00			
3. Madaniyat village	12		9,00	3,00			
4. Mirzoobod north	11	2,00	9,00				
5. Mirzoobod south	10		10,00				
6. Rohi Sotsialism	10		10,00				
7. Zarnisor	12		11,00	1,00			
8. Istiqlol	12		12,00				
9. Rahimzoda	14		13,00	1,00			
10. 1st May village	11	1,00	9,00	1,00			
11. Jomi village	11	1,00	8,00	2,00			
TOTAL	218	15,00	193,00	9,00			1,00
%	100%	6,88	88,53	4,12			0,46



W1-1-2: How is water treated?

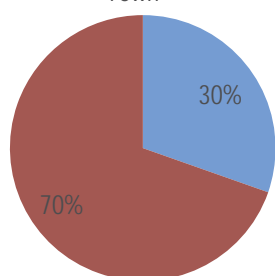
Table 1.3. W1-1-2: Potable water treatment methods in A. Jomi Town

Name of settlements		Not treated	With a filter	By boiling
1.Navobod Street (Jomi north)	12	4,00		8,00
2.Communism Street (Jomi north)	3	1,00		2,00
3. Krupskaya Street (Jomi north)	19	5,00		14,00
4. Somoni Street (Jomi north)	6	2,00		4,00
5. Somoni Street (Jomi south)	21	7,00		14,00
6. Lohuti Street (Jomi south)	19	6,00		13,00
7. Guliston Street north	11	3,00		8,00
8. Guliston Street south	11	3,00		8,00
Total	102	31,00		71,00
%	100	30,39		69,60

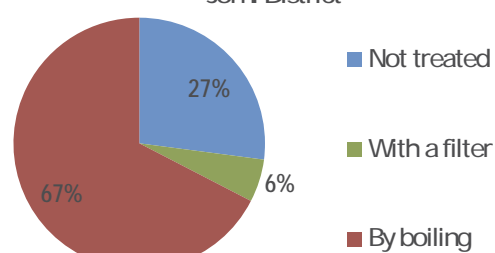
Table 1.4. W1-1-2: Potable water treatment methods in A. Jomi District

Name of settlements	Number of customers	Not treated	With a filter	By boiling
1. Jomi town	102	31,00		71,00
2. Buston village	13	4,00	1,00	8,00
3. Madaniyat village	12	3,00		9,00
4. Mirzoobod north	11	3,00	2,00	6,00
5. Mirzoobod south	10	3,00	2,00	5,00
6.Rohi Sotsialism	10	1,00	2,00	7,00
7. Zarnisor	12	3,00	1,00	8,00
8. Istiqlol	12	3,00		9,00
9. Rahimzoda	14	3,00	2,00	9,00
10.1st May village	11	2,00	1,00	8,00
11. Jomi village	11	3,00	1,00	7,00
TOTAL	218	59,00	12,00	147,00
	100	27,06	5,50	67,43

Potable water treatment methods in A. Jomi Town



Potable water treatment methods in A. Jomi District



W1-1-3: Satisfaction

A) Complete satisfaction

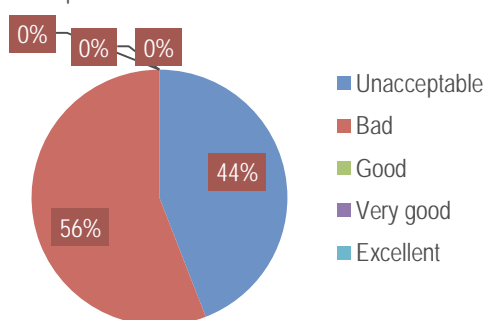
Table 1.5. W1-1-3: Complete customer satisfaction of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1.Navobod Street (Jomi north)	12	5,00	7,00			
2.Communism Street (Jomi north)	3	1,00	2,00			
3. Krupskaya Street (Jomi north)	19	6,00	13,00			
4. Somoni Street (Jomi north)	6	2,00	4,00			
5. Somoni Street (Jomi south)	21	9,00	12,00			
6. Lohuti Street (Jomi south)	19	10,00	9,00			
7. Guliston Street north	11	6,00	5,00			
8. Guliston Street south	11	6,00	5,00			
Total	102	45,00	57,00			
%	100	44,11	55,88			

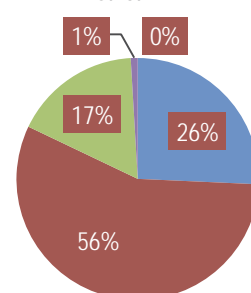
Table 1.6. W1-1-3: Complete customer satisfaction of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1. Jomi town	102	45,00	57,00			
2. Buston village	13	3,00	8,00	2,00		
3. Madaniyat village	12		3,00	9,00		
4. Mirzoobod north	11		8,00	3,00		
5. Mirzoobod south	10		7,00	3,00		
6.Rohi Sotsialism	10	3,00	6,00	1,00		
7. Zarnisor	12	2,00	7,00	3,00		
8. Istiqlol	12		10,00	2,00		
9. Rahimzoda	14	1,00	8,00	5,00		
10.1st May village	11		4,00	5,00	2,00	
11. Jomi village	11	2,00	5,00	4,00		
TOTAL	218	56,00	123,00	37,00	2,00	
%	100	25,69	56,42	16,97	0,92	

Complete customer satisfaction of A. Jomi Town



Complete customer satisfaction of A. Jomi District



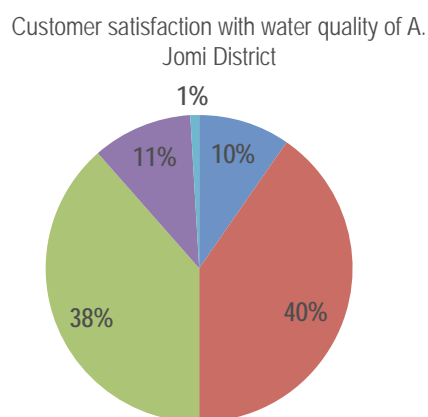
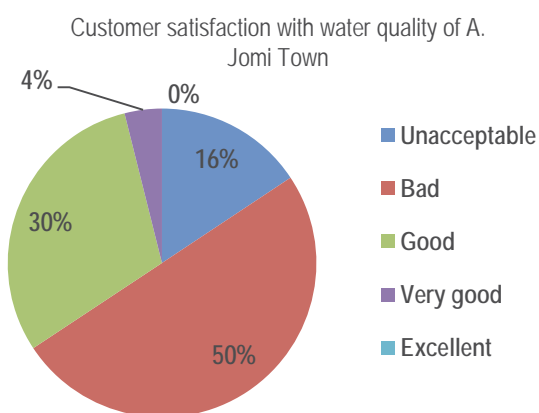
B) Water quality

Table 1.7. Customer satisfaction with water quality of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1.Navobod Street (Jomi north)	12,00		2,00	7,00	3,00	
2.Communism Street (Jomi north)	3,00			2,00	1,00	
3. Krupskaya Street (Jomi north)	19,00		9,00	10,00		
4. Somoni Street (Jomi north)	6,00		4,00	2,00		
5. Somoni Street (Jomi south)	21		11,00	10,00		
6. Lohuti Street (Jomi south)	19,00	9,00	10,00			
7. Guliston Street north	11,00	5,00	6,00			
8. Guliston Street south	11,00	2,00	9,00			
Total	102,00	16,00	51,00	31,00	4,00	
%	100	15,68	50,00	30,39	3,92	

Table 1.8. Customer satisfaction with water quality of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1.Jomi town	102	16,00	51,00	31,00	4,00	
2. Buston village	13	3,00	6,00	4,00		
3. Madaniyat village	12		2,00	6,00	4,00	
4. Mirzoobod north	11			5,00	4,00	
5. Mirzoobod south	10		2,00	5,00	3,00	
6.Rohi Sotsialism	10	1,00	5,00	4,00		
7. Zarnisor	12	1,00	5,00	5,00	1,00	
8. Istiqlol	12		6,00	5,00	1,00	
9. Rahimzoda	14		5,00	6,00	3,00	
10.1st May village	11		3,00	7,00	1,00	
11. Jomi village	11		3,00	6,00	2,00	
TOTAL	218	21,00	88,00	84,00	23,00	2,00
	100	9,63	40,37	38,53	10,55	0,92



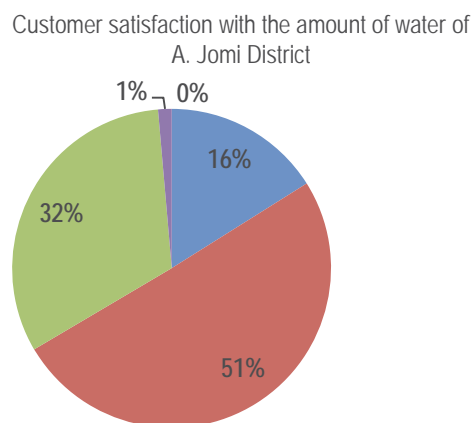
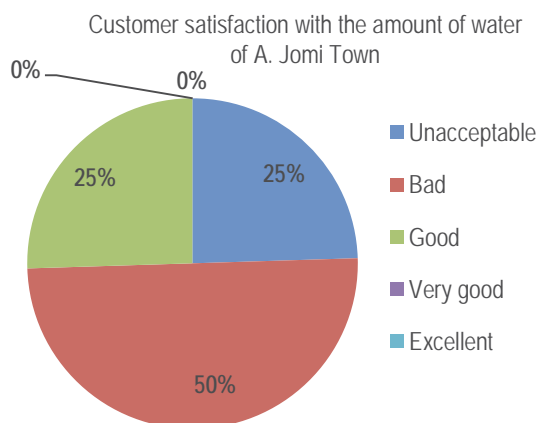
C) Amount (water supply time)

Table 1.9. Customer satisfaction with the amount of water of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1.Navobod Street (Jomi north)	12,00	4,00	6,00	2,00		
2.Communism Street (Jomi north)	3,00	1,00	2,00			
3. Krupskaya Street (Jomi north)	19,00	2,00	8,00	9,00		
4. Somoni Street (Jomi north)	6,00	1,00	2,00	3,00		
5. Somoni Street (Jomi south)	21	6,00	12,00	3,00		
6. Lohuti Street (Jomi south)	19,00	6,00	9,00	4,00		
7. Guliston Street north	11,00	3,00	6,00	2,00		
8. Guliston Street south	11,00	2,00	6,00	3,00		
Total	102,00	25,00	51,00	26,00		
%	100	24,50	50,00	25,49		

Table 1.10. Customer satisfaction with the amount of water of A. Jomi District (time of water supply)

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	25,00	51,00	26,00		
Buston village	13	2,00	8,00	3,00		
Madaniyat village	12		3,00	9,00		
Mirzoobod village (north)	11		8,00	3,00		
Mirzoobod village (south)	10	2,00	6,00	2,00		
Rohi socialism village	10	1,00	4,00	5,00		
Zarnisor village	12		6,00	5,00	1,00	
Istiqlol village	12	4,00	7,00	1,00		
Rahimzoda village	14		5,00	8,00	1,00	
1st May village	11	1,00	5,00	4,00	1,00	
Jomi village	11		7,00	4,00		
Total	218	35,00	110,00	70,00	3,00	
	100	16,06	50,46	32,11	1,38	



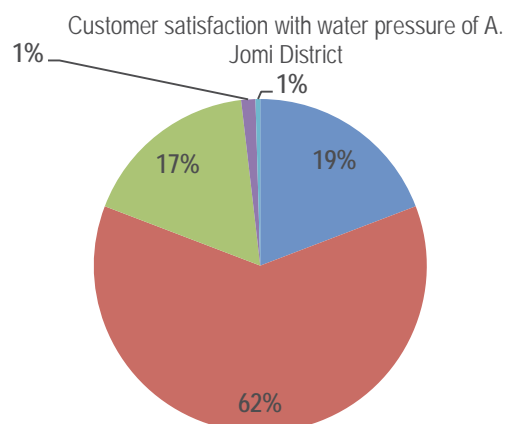
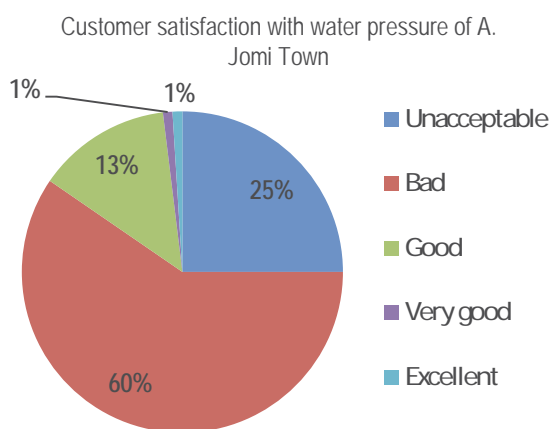
D) Pressure (in case of water source is ① or ②)

Table 1.11. Customer satisfaction with water pressure of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1.Navobod Street (Jomi north)	12,00	2,00	6,00	4,00		
2.Communism Street (Jomi north)	3,00	1,00	1,00	1,00		
3. Krupskaya Street (Jomi north)	19,00	4,00	8,00	7,00		
4. Somoni Street (Jomi north)	6,00	1,00	3,00	2,00		
5. Somoni Street (Jomi south)	21	7,00	14,00	0,00		
6. Lohuti Street (Jomi south)	19,00	5,00	14,00	0,00		
7. Guliston Street north	11,00	3,00	8,00	0,00		
8. Guliston Street south	11,00	3,00	8,00	0,00		
Total	102,00	26,00	62,00	14,00		
%	100	25,49	60,78	13,72		

Table 1.12. Customer satisfaction with water pressure of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	26,00	62,00	14,00		
Buston village	13	3,00	7,00	3,00		
Madaniyat village	12	3,00	9,00			
Mirzoobod village (north)	11		6,00	5,00		
Mirzoobod village (south)	10	2,00	7,00	1,00		
Rohi socialism village	10	4,00	4,00	2,00		
Zarnisor village	12		7,00	4,00	1,00	
Istiqlol village	12	2,00	9,00	1,00		
Rahimzoda village	14		6,00	6,00	2,00	
1st May village	11		10,00	1,00		
Jomi village	11	2,00	8,00	1,00		
Total	218	42,00	135,00	38,00	3,00	
	100	19,26	61,92	17,43	1,37	



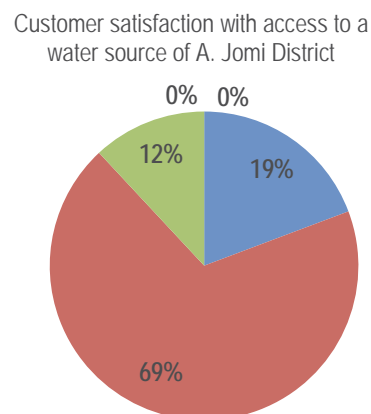
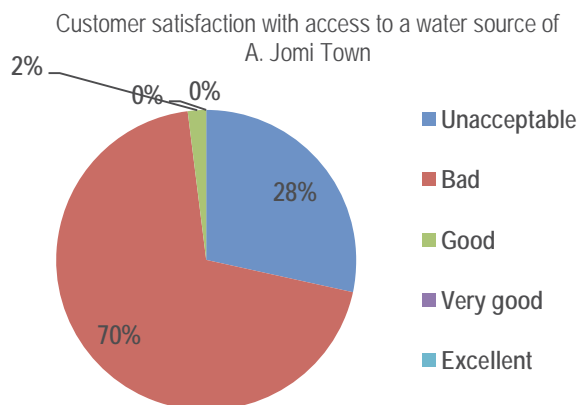
E) Access to the source

Table 1.13. Customer satisfaction with access to a water source of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1.Navobod Street (Jomi north)	12,00	2,00	10,00			
2.Communism Street (Jomi north)	3,00	1,00	2,00			
3. Krupskaya Street (Jomi north)	19,00	5,00	13,00	1,00		
4. Somoni Street (Jomi north)	6,00	2,00	4,00			
5. Somoni Street (Jomi south)	21	6,00	15,00			
6. Lohuti Street (Jomi south)	19,00	6,00	13,00			
7. Guliston Street north	11,00	3,00	8,00			
8. Guliston Street south	11,00	4,00	6,00	1,00		
Total	102,00	29,00	71,00	2,00		
%	100	28,43	69,60	1,96		

Table 1.14. Customer satisfaction with access to a water source of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	29,00	71,00	2,00		
Buston village	13	2,00	8,00	3,00		
Madaniyat village	12		9,00	3,00		
Mirzoobod village (north)	11		7,00	4,00		
Mirzoobod village (south)	10	2,00	7,00	1,00		
Rohi socialism village	10	2,00	2,00	6,00		
Zarnisor village	12	1,00	11,00			
Istiqlol village	12	2,00	9,00	1,00		
Rahimzoda village	14	1,00	10,00	3,00		
1st May village	11	2,00	8,00	1,00		
Jomi village	11	1,00	8,00	2,00		
Total	218	42,00	150,00	26,00		
	100	19,26	68,80	11,92		



- Unacceptable
- Bad
- Good
- Very good
- Excellent

F) Drinking water charges (if the water source is ① or ②)

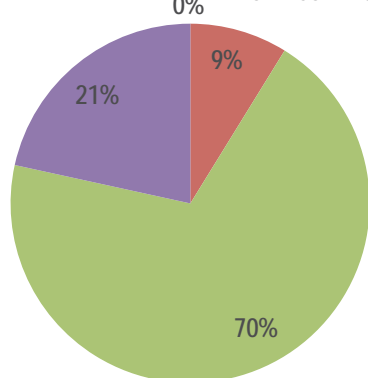
Table 1.15. Customer satisfaction with payment for drinking water of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1.Navobod Street (Jomi north)	12,00		2,00	8,00	2,00	
2.Communism Street (Jomi north)	3,00		1,00	1,00	1,00	
3. Krupskaya Street (Jomi north)	19,00		2,00	14,00	3,00	
4. Somoni Street (Jomi north)	6,00		1,00	3,00	2,00	
5. Somoni Street (Jomi south)	21		3,00	14,00	4,00	
6. Lohuti Street (Jomi south)	19,00			16,00	3,00	
7. Guliston Street north	11,00			8,00	3,00	
8. Guliston Street south	11,00			7,00	4,00	
Total	102,00		9,00	71,00	22,00	
%			8,82	69,60	21,56	

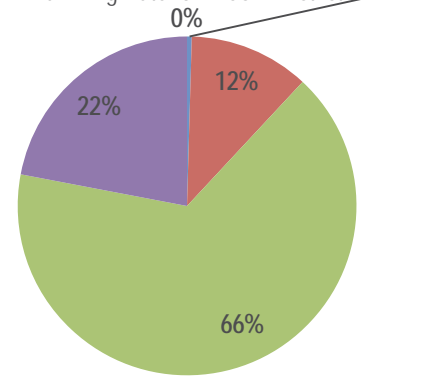
Table 1.16. Customer satisfaction with payment for drinking water of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102		9,00	71,00	22,00	
Buston village	13	1,00	4,00	5,00	3,00	
Madaniyat village	12			6,00	6,00	
Mirzoobod village (north)	11			9,00	2,00	
Mirzoobod village (south)	10			7,00	3,00	
Rohi socialism village	10		2,00	3,00	5,00	
Zarnisor village	12		4,00	7,00	1,00	
Istiqloq village	12		1,00	10,00	1,00	
Rahimzoda village	14		2,00	9,00	3,00	
1st May village	11			11,00		
Jomi village	11		3,00	6,00	2,00	
Total	218	1,00	25,00	144,00	48,00	
%	100	0,45	11,46	66,05	22,01	

Customer satisfaction with payment for drinking water of A. Jomi Town



Customer satisfaction with payment for drinking water of A. Jomi District



- Unacceptable
- Bad
- Good
- Very good
- Excellent

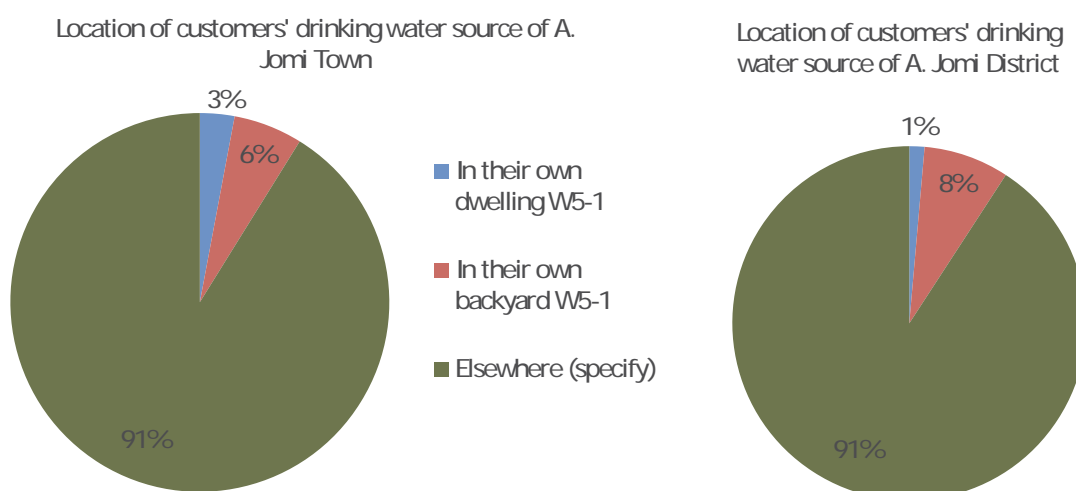
W3-1: LOCATION OF DRINKING WATER SOURCE / WHERE DOES THE WATER FOR DRINKING COME FROM?

Table 1.17. W3-1: Location of drinking water source of A. Jomi Town

Name of settlements	Number of customers	In their own dwelling W5-1	In their own backyard W5-1	Elsewhere (specify) If ②, ④ or ⑥ is selected in W1-1-1, go to W4-1
1.Navobod Street (Jomi north)	12,00	1 Private tap in the house	1 Water supply in the yard	10 Public street tap
2.Communism Street (Jomi north)	3,00			3 Public street tap
3. Krupskaya Street (Jomi north)	19,00	2 Private tap in the house	2 Water supply in the yard	15 Public street tap
4. Somoni Street (Jomi north)	6,00		1 Water supply in the yard	5 Public street tap
5. Somoni Street (Jomi south)	21		2 Water supply in the yard	19 Public street tap
6. Lohuti Street (Jomi south)	19,00			19 Public street tap
7. Guliston Street north	11,00			11 Public street tap
8. Guliston Street south	11,00			11 Public street tap
Total	102,00	3	6	93
%	100	2,94	5,88	91,17

Table 1.18. W3-1: Location of drinking water source of A. Jomi District

Name of settlements	Number of customers	In their own dwelling W5-1	In their own backyard W5-1	Elsewhere (specify) If ②, ④ or ⑥ is selected in W1-1-1, go to W4-1
1. Jomi town	102	3 Private tap in the house	6,00 Water supply in the yard	93,00 Public street tap
2. Buston village	13		1,00 Water supply in the yard	12,00 Public street tap
3. Madaniyat village	12		3,00 Water supply in the yard	9,00 Public street tap
4. Mirzoobod north	11		2,0 Water supply in the yard	9,00 Public street tap
5. Mirzoobod south	10			10,00 Public street tap
6.Rohi Sotsialism	10			10,00 Public street tap
7. Zarnisor	12		1,00 Water supply in the yard	11,00 Public street tap
8. Istiqlol	12			12,00 Public street tap
9. Rahimzoda	14		1,00 Water supply in the yard	13,00 Public street tap
10.1st May village	11		2,00 Water supply in the yard	9,00 Public street tap
11. Jomi village	11		1,00 Water supply in the yard	10,00
TOTAL	218	3,00	17,00	198,00
%	100	1.37	7,79	90,82



W4-1: TIME FOR DRINKING WATER COLLECTION

How long does it take to go there, get water for drinking, and return? (NOTE: If you select ②,④,⑥ in W1-1-1)

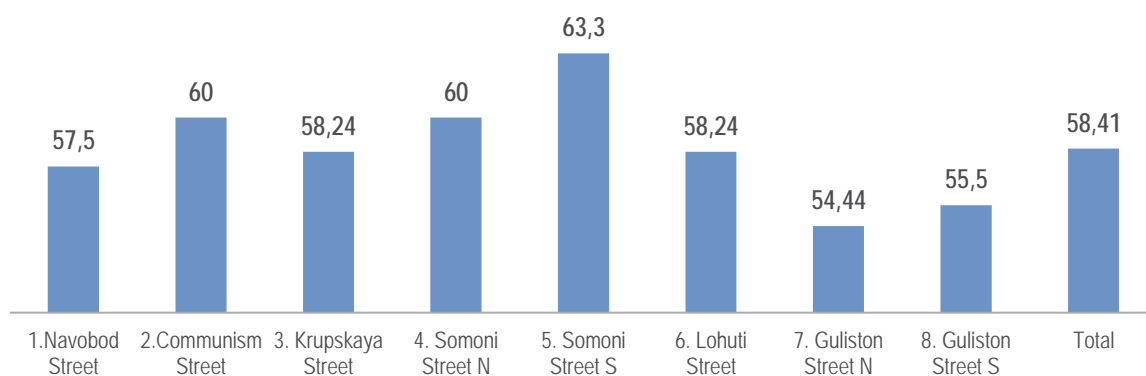
Table 1.19. W4-1: Time for drinking water collection for customers of A. Jomi Town

Name of settlements	Number of customers	Minutes : minutes (round trip)	Not going to	Don't know
1. Navobod Street (Jomi north)	12,00	57,5		
2. Communism Street (Jomi north)	3,00	60		1
3. Krupskaya Street (Jomi north)	19,00	58,24		2
4. Somoni Street (Jomi north)	6,00	60,00		1
5. Somoni Street (Jomi south)	21	63,33		3
6. Lohuti Street (Jomi south)	19,00	58,24		2
7. Guliston Street north	11,00	54,44		2
8. Guliston Street south	11,00	55,5		1
Total	102,00	58,41		12,00
%				

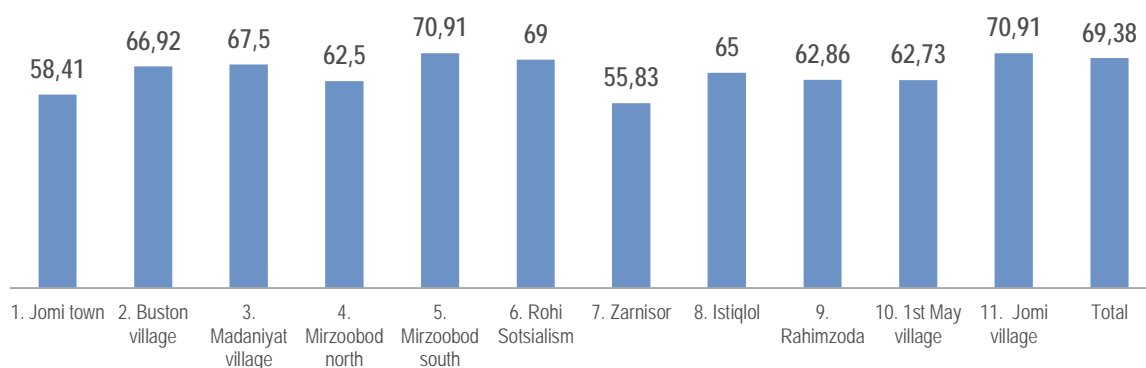
Table 1.20. W3-1: Time for drinking water collection for customers of A. Jomi District

Name of settlements	Number of customers	Minutes : minutes (round trip)	Not going to	Don't know
1. Jomi town	102	58,41		12
2. Buston village	13	66,92		
3. Madaniyat village	12	67,50		
4. Mirzoobod north	11	62,50		
5. Mirzoobod south	10	70,91		
6. Rohi Sotsialism	10	69,00		
7. Zarnisor	12	55,83		
8. Istiqlol	12	65,00		
9. Rahimzoda	14	62,86		
10.1st May village	11	62,73		
11. Jomi village	11	70,91		
TOTAL	218	64,78		

Time for drinking water collection for customers of A. Jomi Town



Time for drinking water collection for customers of A. Jomi District



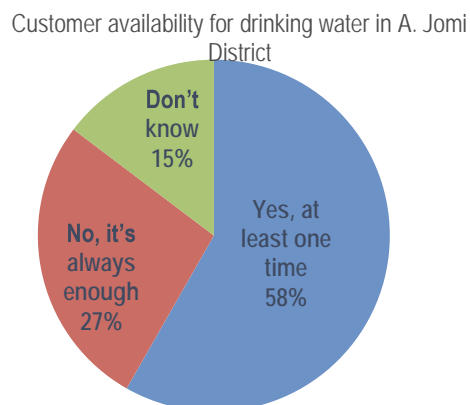
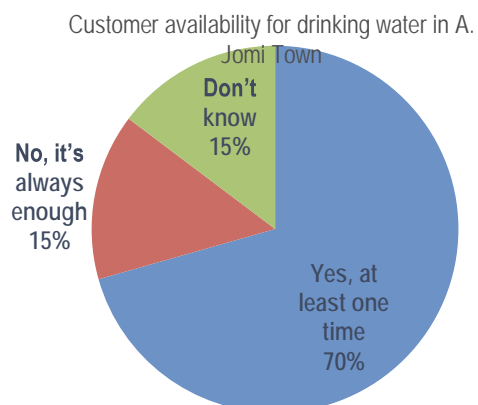
W5-1: AVAILABILITY OF DRINKING WATER. (Have there been any occasions in the last month when your household did not have enough drinking water when you needed it?)

Table 1.21: W5-1: Customer availability for drinking water in A. Jomi Town

Name of settlements	Number of customers	Yes, at least one time	No, it's always enough	Don't know
1.Navobod Street (Jomi north)	12,00	8,00	4,00	
2.Communist Street (Jomi north)	3,00	2,00		1,00
3. Krupskaya Street (Jomi north)	19,00	14,00	2,00	3,00
4. Somoni Street (Jomi north)	6,00	4,00	1,00	1,00
5. Somoni Street (Jomi south)	21	14,00	4,00	3,00
6. Lohuti Street (Jomi south)	19,00	16,00	1,00	2,00
7. Guliston Street north	11,00	7,00	2,00	2,00
8. Guliston Street south	11,00	7,00	1,00	3,00
Total	102,00	72,00	15,00	15,00
%	100	70,58	14,70	14,70

Table 1.22: W5-1: Customer availability for drinking water in A. Jomi District

Name of settlements	Number of customers	Yes, at least one time	No, it's always enough	Don't know
1. Jomi town	102	72,00	15,00	15,00
2. Buston village	13	7,00	4,00	2,00
3. Madaniyat village	12	4,00	6,00	2,00
4. Mirzoobod north	11	4,00	7,00	
5. Mirzoobod south	10	5,00	4,00	1,00
6. Rohi Sotsialism	10	6,00	4,00	
7. Zarnisor	12	3,00	6,00	3,00
8. Istiqlol	12	7,00	3,00	2,00
9. Rahimzoda	14	7,00	4,00	3,00
10. 1st May village	11	6,00	2,00	3,00
11. Jomi village	11	6,00	4,00	1,00
TOTAL	218	127,00	59,00	32,00
	100	58,25	27,06	14,67



Water sampling to test water quality for E. coli

Table 1.23. The collection of water samples to test water quality for the presence of E. coli from customers of A. Jomi Town

Name of settlements	Number of customers	Number of samples	Not	Date of sampling: sample name
Navobod Street (Jomi north)	12,00	3		06.06.23. Navobod st. Water supply management 06.06. Navobod 23 North 06.06.23. Navobod North
Communism Street	3,00	1		07.06.23. Communism 1. Own well
Krupskaya Street (Jomi north)	19,00	3		07.06.23. N. Rasulova 35 / Krupskaya intersection 07.06.23. Pushkin 8/Krupskaya intersection 07.06.23. Krupskaya 26. street water pipeline
Somoni Street (Jomi north)	6,00	2		06.06.23 Somoni. Lemon Shop 06.06.23 Agricultural Machinery Bread Plant
Somoni Street (Jomi south)	21	3		06.06.23 Somonien str. 59 06.06.23 Somonien str. 49 06.06.23 Somonien str. 175 (9)
Lohuti Street (Jomi south)	19,00	3		07.06.23. Lohuti -28 Well 07.06.22. Lohuti 22 Aini water pipeline UShKh 07.06.22. Lohuti 22 water pipeline UShKh
Guliston Street north	11,00	3		07.06.23.Guliston north д 1, street tap 0.7.06.23. Guliston-North 17 street water pipeline 07.06.23. Guliston north 6
Guliston Street south	11,00	3		07.06.23. Guliston south new houses 07.06.22. Guliston south new houses 2 07.06.23. Guliston south new houses 1
Total	102,00	21		30

Table 1.24. The collection of water samples to test water quality for the presence of E. coli from customers of A. Jomi District

Name of settlements	Number of customers	Number of samples	Not	Date of sampling: sample name
1. Jomi town	102	22		
2. Buston village	13	3		08.06.23. Buston 2/2 08.06.23. Buston -1 08.06. Buston -1. river
3. Madaniyat village	12	3		08.06.23. Madaniyat: Polit - Dept. 08.06.23. Madaniyat: Polit - Dept. 08.06.23. Madaniyat: Polit - Dept.
4. Mirzoobod north	11	3		12.06.22. Mirzoobod north 236 well 12.06.22. Mirzoobod north 240. Reservoir 12.06.23. Mirzoobod north 479, street water pipeline
5. Mirzoobod south	10	3		12.06.23. Mirzoobod south. well 12.06.23. Mirzoobod south 135 well 12.06.2023 Mirzoobod south 49
6. Rohi Sotsialism	10	3		12.06.23.Rohi Sotsialism, Kalinin, river 12.06.23. Rohi Sotsialism. Kalinin new houses 12.06.23. Rohi Sotsialism, Kalinin.
7. Zarnisor	12	3		12.06.23. Zarnisor №3 12.06.23. Zarnisor №258 12.06.23. Zarnisor. Street well
8. Istiqlol	12	3		08.06.23 Istiqlol street water pipeline 08.06.23.Istiqlol 1 near the bazaar 08.06.23.Istiqlol 3 bazaar
9. Rahimzoda	14	3		13.06.22. Rahimzoda 2/2 street tap 13.06.22. Rahimzoda Kurultai. Tower depth pump 13.06.23. Rahimzoda- Kurultai 232/2
10. 1st May village	11	3		13.06.223. 1st May village, 23. 13.06.23. 1st May village, depth pump 13.06.22. 1st May village -32 Canal water for irrigation
11. Jomi village	11	3		13.06.23. Jomi, Yakkatut. street water pipeline 13.06.23. Jomi, Yakkatut. School №29 well 13.06.23. Jomi, Yakkatut, Canal water for irrigation
TOTAL	218	52		



Chapter 2. W2-1: MAIN SOURCE OF WATER FOR COOKING FOOD

What is the main source of cooking water used by members of your household?

W2-1: Main source of water for cooking

Due to the fact that customers take drinking water and cooking water from the same source, practically all parameters for drinking water and cooking water are practically the same

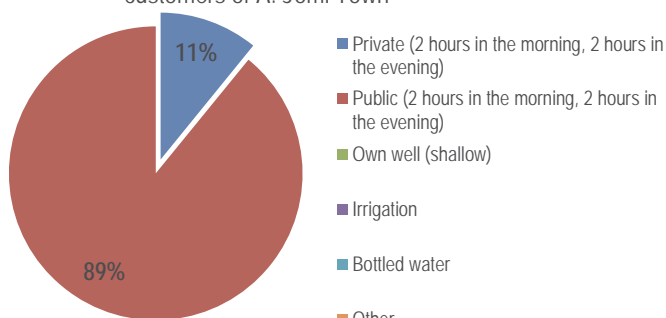
Table 2.1. W2-1-1: Primary source of water for cooking purposes of customers of A. Jomi Town

Name of settlements	Number of customers	Private (time of delivery in hours)	Public (time of delivery in hours)	Own well (shallow)	Irrigation	Bottled water	Other (specify)
Navobod Street (Jomi north)	12	2 (4 hours)	9 (4 hours)				1 (all the time)
Communism Street (Jomi north)	3	0	3 (4 hours)				
Krupskaya Street (Jomi north)	19	4 (4 hours)	15 (4 hours)				
Somoni Street (Jomi north)	6	1 (4 hours)	5 (4 hours)				
Somoni Street (Jomi south)	21	2 (4 hours)	19 (4 hours)				
Lohuti Street (Jomi south)	19	2 (4 hours)	17 (4 hours)				
Gulliston Street north	11	0	11 (4 hours)				
Gulliston Street south	11	0	11(4 hours)				
Total	102	11	90				1
	100	1078	88,23				0.98

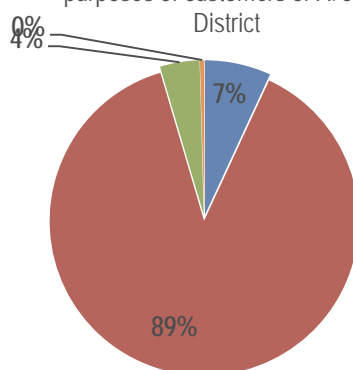
Table 2.2. W2-1-1: Primary source of water for cooking purposes of customers of A. Jomi District

Name of settlements	Number of customers	Private (time of delivery in hours)	Public (time of delivery in hours)	Own well (shallow)	Irrigation	Bottled water	Other (specify)
1. Jomi town	102	11,00	90,00				1,00
2. Buston village	13		12,00	1,00			
3. Madaniyat village	12		9,00	3,00			
4. Mirzoobod north	11	2,00	9,00				
5. Mirzoobod south	10		10,00				
6. Rohi Sotsialism	10		10,00				
7. Zarnisor	12		11,00	1,00			
8. Istiqlol	12		12,00				
9. Rahimzoda	14		13,00	1,00			
10. 1st May village	11	1,00	9,00	1,00			
11. Jomi village	11	1,00	8,00	2,00			
TOTAL	218	15,00	193,00	9,00			1,00
%	100%	6,88	88,53	4,12			0,46

Primary source of water for cooking purposes of customers of A. Jomi Town



Primary source of water for cooking purposes of customers of A. Jomi District



W2-1-2: How cooking water is treated

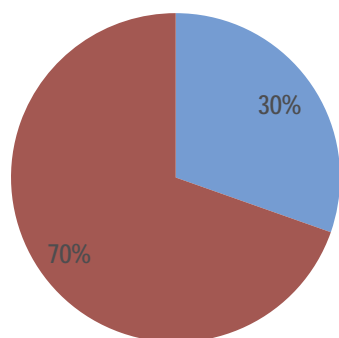
Table 2.3. How water is treated in A. Jomi Town

Name of settlements	Number of customers	Not treated	With a filter	By boiling
Navobod Street (Jomi north)	12	4,00		8,00
Communism Street (Jomi north)	3	1,00		2,00
Krupskaya Street (Jomi north)	19	5,00		14,00
Somoni Street (Jomi north)	6	2,00		4,00
Somoni Street (Jomi south)	21	7,00		14,00
Lohuti Street (Jomi south)	19	6,00		13,00
Guliston Street north	11	3,00		8,00
Guliston Street south	11	3,00		8,00
Total	102	31,00		71,00
	100	30.39		69.60

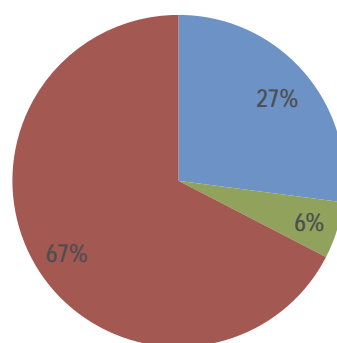
Table 2.4. How water is treated in A. Jomi District

Name of settlements	Number of customers	Not treated	With a filter	By boiling
1. Jomi town	102	31,00		71,00
2. Buston village	13	4,00	1,00	8,00
3. Madaniyat village	12	3,00		9,00
4. Mirzoobod north	11	3,00	2,00	6,00
5. Mirzoobod south	10	3,00	2,00	5,00
6. Rohi Sotsialism	10	1,00	2,00	7,00
7. Zarnisor	12	3,00	1,00	8,00
8. Istiqlol	12	3,00		9,00
9. Rahimzoda	14	3,00	2,00	9,00
10. 1st May village	11	2,00	1,00	8,00
11. Jomi village	11	3,00	1,00	7,00
TOTAL	218	59,00	12,00	147,00
	100	27.06	5.50	67.43

Methods of treating water for cooking in A. Jomi Town



Methods of treating water for cooking in A. Jomi District



- Not treated
- With a filter
- By boiling

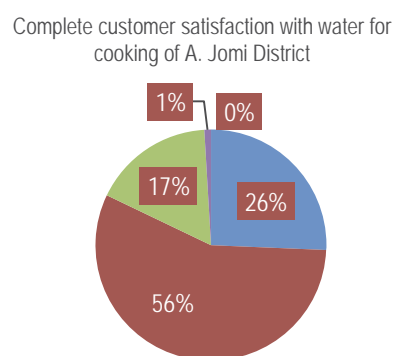
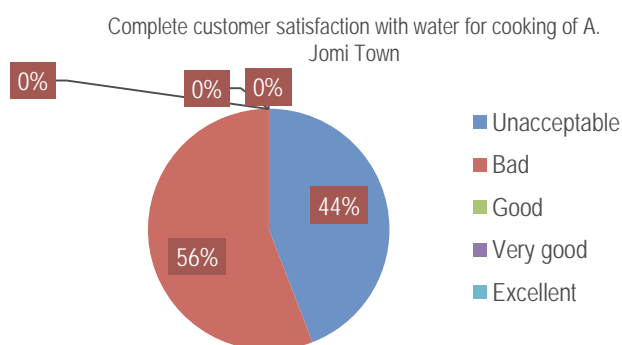
W2-1-3: Satisfaction
A) Complete satisfaction

Table 2.5. W2-1-3: Complete customer satisfaction with water for cooking of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12	5,00	7,00			
Communism Street (Jomi north)	3	1,00	2,00			
Krupskaya Street (Jomi north)	19	6,00	13,00			
Somoni Street (Jomi north)	6	2,00	4,00			
Somoni Street (Jomi south)	21	9,00	12,00			
Lohuti Street (Jomi south)	19	10,00	9,00			
Guliston Street north	11	6,00	5,00			
Guliston Street south	11	6,00	5,00			
Total	102	45,00	57,00			
%	100	44,11	55,88			

Table 2.6. W2-1-3: Complete customer satisfaction with water for cooking of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1. Jomi town	102	45,00	57,00			
2. Buston village	13	3,00	8,00	2,00		
3. Madaniyat village	12		3,00	9,00		
4. Mirzoobod north	11		8,00	3,00		
5. Mirzoobod south	10		7,00	3,00		
6. Rohi Sotsialism	10	3,00	6,00	1,00		
7. Zarnisor	12	2,00	7,00	3,00		
8. Istiqlol	12		10,00	2,00		
9. Rahimzoda	14	1,00	8,00	5,00		
10. 1st May village	11		4,00	5,00	2,00	
11. Jomi village	11	2,00	5,00	4,00		
TOTAL	218	56,00	123,00	37,00	2,00	
%	100	25,69	56,42	16,97	0,92	



B) Water quality

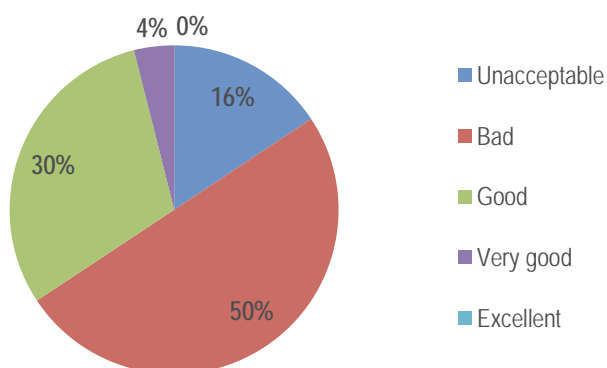
Table 2.7. W2-1-3 Customer satisfaction with the quality of water for cooking of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00		2,00	7,00	3,00	
Communism Street (Jomi north)	3,00			2,00	1,00	
Krupskaya Street (Jomi north)	19,00		9,00	10,00		
Somoni Street (Jomi north)	6,00		4,00	2,00		
Somoni Street (Jomi south)	21		11,00	10,00		
Lohuti Street (Jomi south)	19,00	9,00	10,00			
Gulliston Street north	11,00	5,00	6,00			
Gulliston Street south	11,00	2,00	9,00			
Total	102,00	16,00	51,00	31,00	4,00	
%	100	15,68	50,00	30,39	3,92	

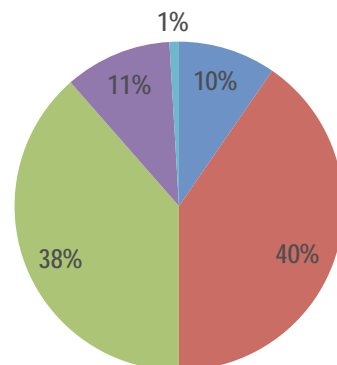
Table 2.7. W2-1-3 Customer satisfaction with the quality of water for cooking of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1. Jomi town	102	16,00	51,00	31,00	4,00	
2. Buston village	13	3,00	6,00	4,00		
3. Madaniyat village	12		2,00	6,00	4,00	
4. Mirzoobod north	11			5,00	4,00	
5. Mirzoobod south	10		2,00	5,00	3,00	
6. Rohi Sotsialism	10	1,00	5,00	4,00		
7. Zarnisor	12	1,00	5,00	5,00	1,00	
8. Istiqlol	12		6,00	5,00	1,00	
9. Rahimzoda	14		5,00	6,00	3,00	
10. 1st May village	11		3,00	7,00	1,00	
11. Jomi village	11		3,00	6,00	2,00	
TOTAL	218	21,00	88,00	84,00	23,00	2,00
	100	9,63	40,36	38,53	10,55	0,91

Customer satisfaction with the quality of water for cooking of A. Jomi Town



Customer satisfaction with the quality of water for cooking of A. Jomi District



C) Amount (water supply time)

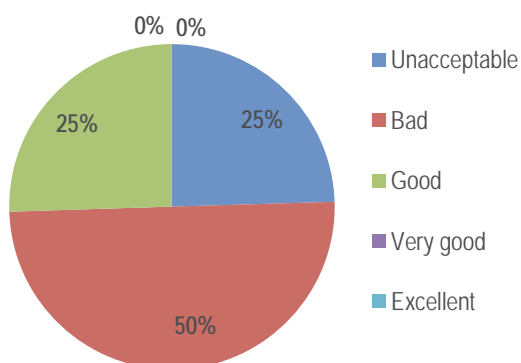
Table 2.9. W2-1-3. Customer satisfaction with the amount of cooking water of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00	4,00	6,00	2,00		
Communism Street (Jomi north)	3,00	1,00	2,00			
Krupskaya Street (Jomi north)	19,00	2,00	8,00	9,00		
Somoni Street (Jomi north)	6,00	1,00	2,00	3,00		
Somoni Street (Jomi south)	21	6,00	12,00	3,00		
Lohuti Street (Jomi south)	19,00	6,00	9,00	4,00		
Guliston Street north	11,00	3,00	6,00	2,00		
Guliston Street south	11,00	2,00	6,00	3,00		
Total	102,00	25,00	51,00	26,00		
%	100	24,50	50,00	25,49		

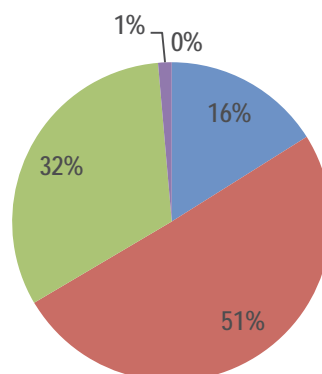
Table 2.10. W2-1-3. Customer satisfaction with the amount of cooking water of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	25,00	51,00	26,00		
Buston village	13	2,00	8,00	3,00		
Madaniyat village	12		3,00	9,00		
Mirzobod village (north)	11		8,00	3,00		
Mirzobod village (south)	10	2,00	6,00	2,00		
Rohi socialism village	10	1,00	4,00	5,00		
Zarnisor village	12		6,00	5,00	1,00	
Istiqlol village	12	4,00	7,00	1,00		
Rahimzoda village	14		5,00	8,00	1,00	
1st May village	11	1,00	5,00	4,00	1,00	
Jomi village	11		7,00	4,00		
Total	218	35,00	110,00	70,00	3,00	0,00
	100	16,06	50,46	32,11	1,38	0,00

Customer satisfaction with the amount of cooking water of A. Jomi Town



Customer satisfaction with the amount of cooking water of A. Jomi District



D) Pressure (in case of water source is ① or ②)

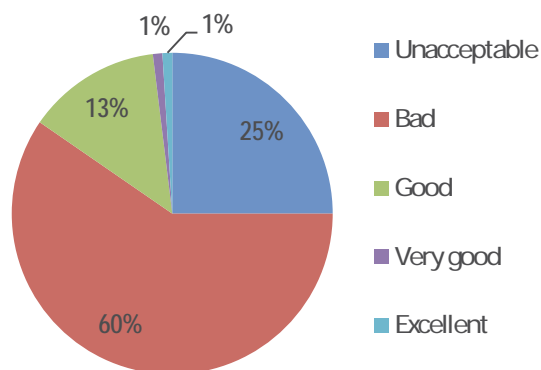
Table 2.11. W2-1-3: Customer satisfaction with cooking water pressure of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00	2,00	6,00	4,00		
Communism Street (Jomi north)	3,00	1,00	1,00	1,00		
Krupskaya Street (Jomi north)	19,00	4,00	8,00	7,00		
Somoni Street (Jomi north)	6,00	1,00	3,00	2,00		
Somoni Street (Jomi south)	21	7,00	14,00	0,00		
Lohuti Street (Jomi south)	19,00	5,00	14,00	0,00		
Guliston Street north	11,00	3,00	8,00	0,00		
Guliston Street south	11,00	3,00	8,00	0,00		
Total	102,00	26,00	62,00	14,00		
%	100	25,49	60,78	13,72		

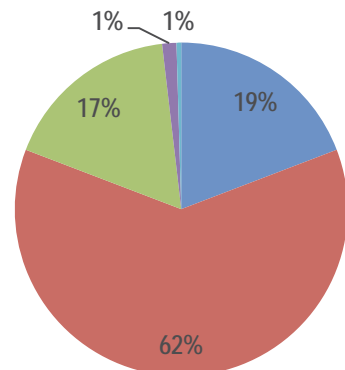
Table 2.12. W2-1-3: Customer satisfaction with cooking water pressure of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	26,00	62,00	14,00		
Buston village	13	3,00	7,00	3,00		
Madaniyat village	12	3,00	9,00			
Mirzoobod village (north)	11		6,00	5,00		
Mirzoobod village (south)	10	2,00	7,00	1,00		
Rohi socialism village	10	4,00	4,00	2,00		
Zarnisor village	12		7,00	4,00	1,00	
Istiqlol village	12	2,00	9,00	1,00		
Rahimzoda village	14		6,00	6,00	2,00	
1st May village	11		10,00	1,00		
Jomi village	11	2,00	8,00	1,00		
Total	218	42,00	135,00	38,00	3,00	
%	100	19,26	61,92	17,43	1,38	

Customer satisfaction with cooking water pressure of A. Jomi Town



Customer satisfaction with cooking water pressure of A. Jomi District



E) Access to the source

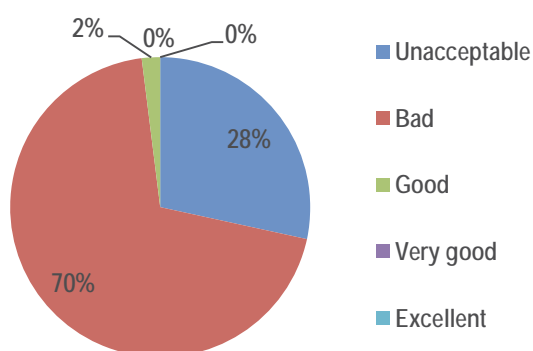
Table 2.13. W2-1-3 Customer satisfaction with access to a water source of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00	2,00	10,00			
Communism Street (Jomi north)	3,00	1,00	2,00			
Krupskaya Street (Jomi north)	19,00	5,00	13,00	1,00		
Somoni Street (Jomi north)	6,00	2,00	4,00			
Somoni Street (Jomi south)	21	6,00	15,00			
Lohuti Street (Jomi south)	19,00	6,00	13,00			
Guliston Street north	11,00	3,00	8,00			
Guliston Street south	11,00	4,00	6,00	1,00		
Total	102,00	29,00	71,00	2,00		
%						

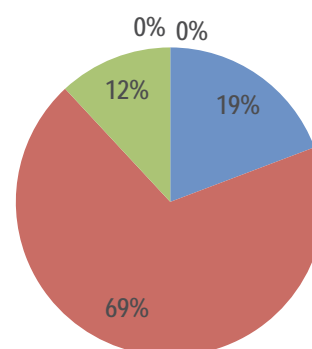
Table 2.14. W2-1-3 Customer satisfaction with access to a water source of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	29,00	71,00	2,00		
Buston village	13	2,00	8,00	3,00		
Madaniyat village	12		9,00	3,00		
Mirzoobod village (north)	11		7,00	4,00		
Mirzoobod village (south)	10	2,00	7,00	1,00		
Rohi socialism village	10	2,00	2,00	6,00		
Zarnisor village	12	1,00	11,00			
Istiqlol village	12	2,00	9,00	1,00		
Rahimzoda village	14	1,00	10,00	3,00		
1st May village	11	2,00	8,00	1,00		
Jomi village	11	1,00	8,00	2,00		
Total	218	42,00	150,00	26,00		
%	100	19,26	68,80	11,92		

Customer satisfaction with access to a water source of A. Jomi Town



Customer satisfaction with access to a water source of A. Jomi District



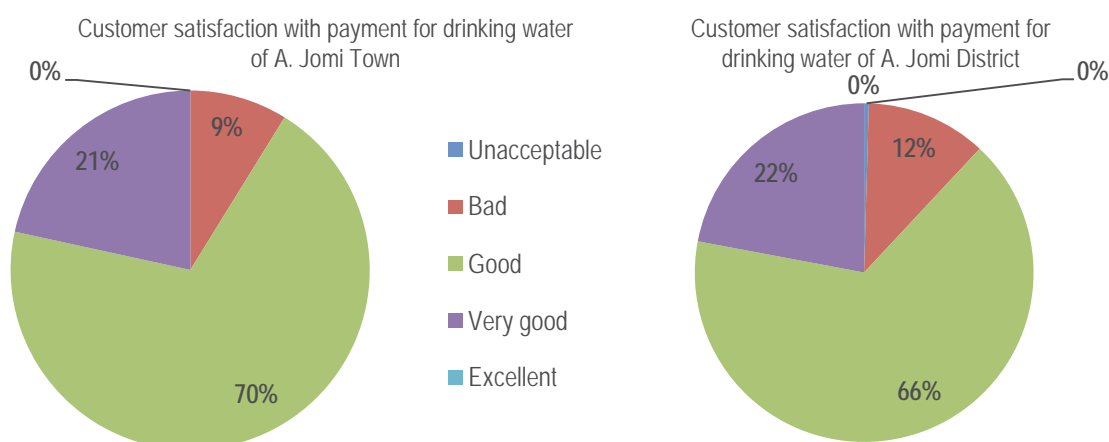
F) Drinking water charges (if the water source is ① or ②)

Table 2.15. W2-1-3. Customer satisfaction with payment for drinking water of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00		2,00	8,00	2,00	
Communism Street (Jomi north)	3,00		1,00	1,00	1,00	
Krupskaya Street (Jomi north)	19,00		2,00	14,00	3,00	
Somoni Street (Jomi north)	6,00		1,00	3,00	2,00	
Somoni Street (Jomi south)	21		3,00	14,00	4,00	
Lohuti Street (Jomi south)	19,00			16,00	3,00	
Guliston Street north	11,00			8,00	3,00	
Guliston Street south	11,00			7,00	4,00	
Total	102,00		9	71,00	22,00	
%	100		8,82	69,60	25,16	

Table 2.16. W2-1-3. Customer satisfaction with payment for drinking water of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102		9,00	71,00	22,00	
Buston village	13	1,00	4,00	5,00	3,00	
Madaniyat village	12			6,00	6,00	
Mirzoobod village (north)	11			9,00	2,00	
Mirzoobod village (south)	10			7,00	3,00	
Rohi socialism village	10		2,00	3,00	5,00	
Zarnisor village	12		4,00	7,00	1,00	
Istiqlol village	12		1,00	10,00	1,00	
Rahimzoda village	14		2,00	9,00	3,00	
1st May village	11			11,00		
Jomi village	11		3,00	6,00	2,00	
Total	218	1,00	25,00	144,00	48,00	
	100	0,45	11,46	66,05	22,01	



W3-2: LOCATION OF THE COOKING WATER SOURCE

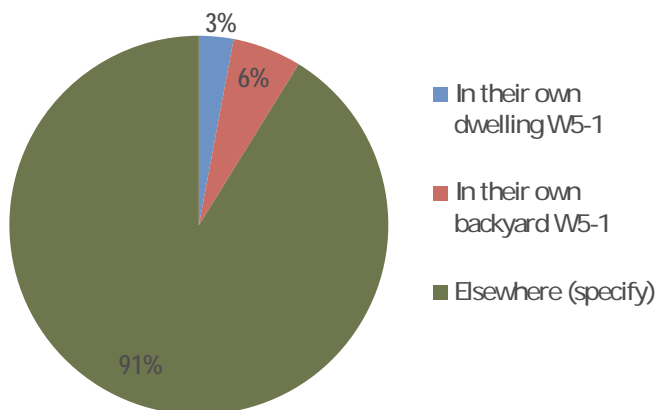
Table 2.17. W3-2: Location of drinking water source for cooking in A. Jomi Town

Name of settlements	Number of customers	In their own dwelling W5-1	In their own backyard W5-1	Elsewhere (specify) If ②, ④ or ⑥ is selected in W1-1-1, go to W4-1
Navobod Street (Jomi north)	12,00	1 Private tap in the house	1 Water supply in the yard	10 Public street tap
Communism Street (Jomi north)	3,00			3 Public street tap
Krupskaya Street (Jomi north)	19,00	2 Private tap in the house	2 Water supply in the yard	15 Public street tap
Somoni Street (Jomi north)	6,00		1 Water supply in the yard	5 Public street tap
Somoni Street (Jomi south)	21		2 Water supply in the yard	19 Public street tap
Lohuti Street (Jomi south)	19,00			19 Public street tap
Guliston Street north	11,00			11 Public street tap
Guliston Street south	11,00			11 Public street tap
Total	102,00	3	6	93
	100	2,94	5,88	91,18

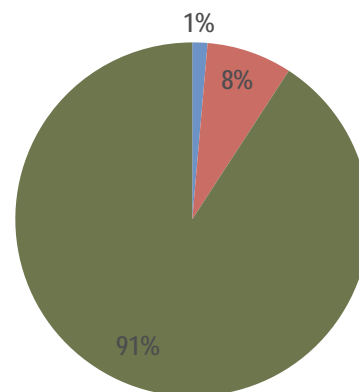
Table 2.18. W3-2: Location of drinking water source for cooking in A. Jomi District

Name of settlements	Number of customers	In their own dwelling W5-1	In their own backyard W5-1	Elsewhere (specify) If ②, ④ or ⑥ is selected in W1-1-1, go to W4-1
1. Jomi town	102	3 Private tap in the house	6,00 Water supply in the yard	93,00 Public street tap
2. Buston village	13		1,00 Water supply in the yard	12,00 Public street tap
3. Madaniyat village	12		3,00 Water supply in the yard	9,00 Public street tap
4. Mirzoobod north	11		2,0 Water supply in the yard	9,00 Public street tap
5. Mirzoobod south	10			10,00 Public street tap
6. Rohi Sotsialism	10			10,00 Public street tap
7. Zarnisor	12		1,00 Water supply in the yard	11,00 Public street tap
8. Istiqlol	12			12,00 Public street tap
9. Rahimzoda	14		1,00 Water supply in the yard	13,00 Public street tap
10. 1st May village	11		2,00 Water supply in the yard	9,00 Public street tap
11. Jomi village	11		1,00 Water supply in the yard	10,00
TOTAL	218	3,00	17,00	98,00

Location of drinking water source for cooking in A. Jomi Town



Location of drinking water source for cooking in A. Jomi District



W4-2: TIME FOR DRINKING WATER COLLECTION

How long does it take to go there, get water for drinking, and return? (NOTE: If you select ②,④,⑥ in W1-1-1

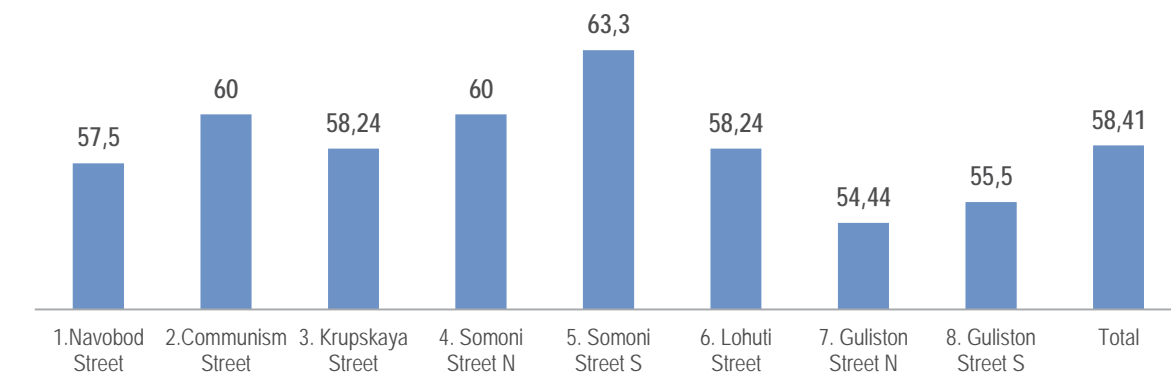
Table 2.19. W4-2: Time to collect water for cooking in A. Jomi Town

Name of settlements	Number of customers	Minutes : minutes (round trip)	Not going to	Don't know
Navobod Street (Jomi north)	12,00	57,5		
Communism Street (Jomi north)	3,00	60		1
Krupskaya Street (Jomi north)	19,00	58,24		2
Somoni Street (Jomi north)	6,00	60,00		1
Somoni Street (Jomi south)	21	63,33		3
Lohuti Street (Jomi south)	19,00	58,24		2
Guliston Street north	11,00	54,44		2
Guliston Street south	11,00	55,5		1
Total	102,00	58,41		12,00

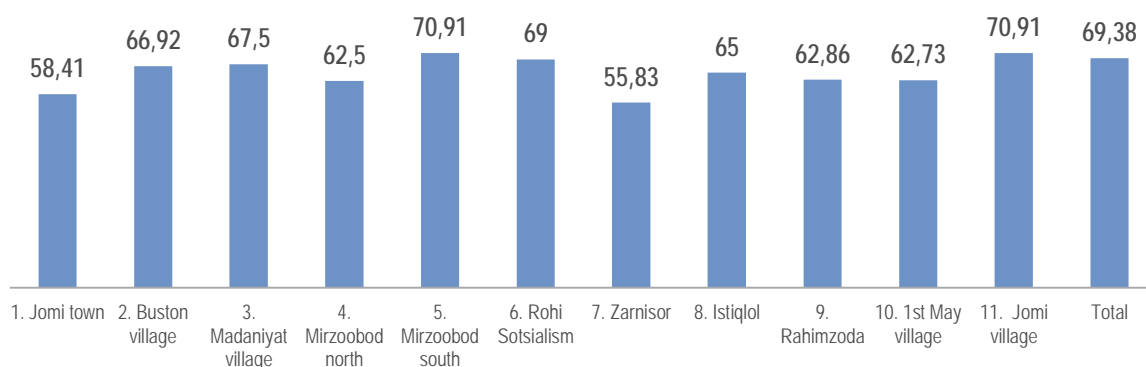
Table 2.19. W4-2: Time to collect water for cooking in A. Jomi District

Name of settlements	Number of customers	Minutes : minutes (round trip)	Not going to	Don't know
1. Jomi town	102	58,41		12
2. Buston village	13	66,92		
3. Madaniyat village	12	67,50		
4. Mirzoobod north	11	62,50		
5. Mirzoobod south	10	70,91		
6. Rohi Sotsialism	10	69,00		
7. Zarnisor	12	55,83		
8. Istiqlol	12	65,00		
9. Rahimzoda	14	62,86		
10.1st May village	11	62,73		
11. Jomi village	11	70,91		
TOTAL	218	64,78		12

Time to collect water for cooking for customers of A. Jomi Town



Time to collect water for cooking for customers of A. Jomi District



W5-2: AVAILABILITY OF DRINKING WATER. (Have there been any occasions in the last month when your household did not have enough drinking water when you needed it?)

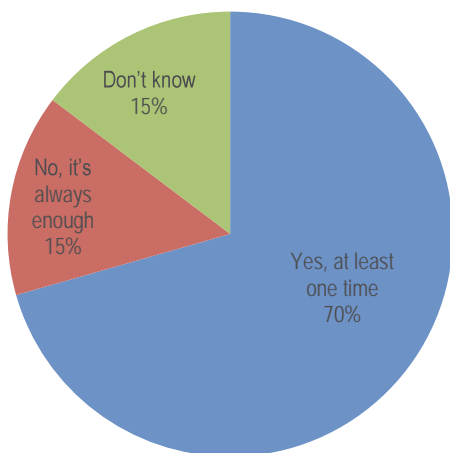
Table 2.21: W5-2: Customer water availability for cooking in A. Jomi Town

Name of settlements	Number of customers	Yes, at least one time	No, it's always enough	Don't know
Navobod Street (Jomi north)	12,00	8,00	4,00	
Communism Street (Jomi north)	3,00	2,00		1,00
Krupskaya Street (Jomi north)	19,00	14,00	2,00	3,00
Somoni Street (Jomi north)	6,00	4,00	1,00	1,00
Somoni Street (Jomi south)	21	14,00	4,00	3,00
Lohuti Street (Jomi south)	19,00	16,00	1,00	2,00
Guliston Street north	11,00	7,00	2,00	2,00
Guliston Street south	11,00	7,00	1,00	3,00
Total	102,00	72,00	15,00	15,00
	100	70,58	14,70	14,70

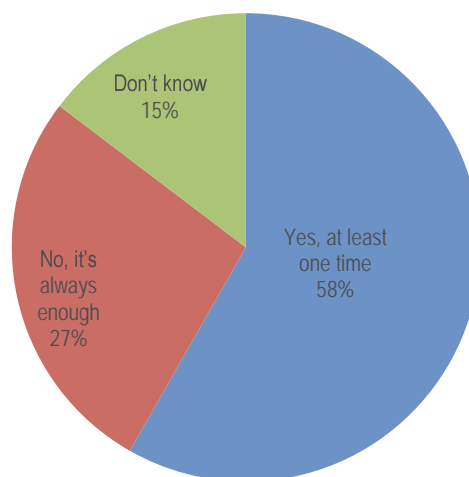
Table 2.22: W5-2: Customer water availability for cooking in A. Jomi District

Name of settlements	Number of customers	Yes, at least one time	No, it's always enough	Don't know
1. Jomi town	102	72,00	15,00	15,00
2. Buston village	13	7,00	4,00	2,00
3. Madaniyat village	12	4,00	6,00	2,00
4. Mirzoobod north	11	4,00	7,00	
5. Mirzoobod south	10	5,00	4,00	1,00
6. Rohi Sotsialism	10	6,00	4,00	
7. Zarnisor	12	3,00	6,00	3,00
8. Istiqlol	12	7,00	3,00	2,00
9. Rahimzoda	14	7,00	4,00	3,00
10. 1st May village	11	6,00	2,00	3,00
11. Jomi village	11	6,00	4,00	1,00
TOTAL	218	127,00	59,00	32,00
	100	58,25	25,68	14,67

Customer water availability for cooking in A. Jomi Town



Customer water availability for cooking in A. Jomi District





Chapter 3: W2-2: Main source of water for handwashing

W2-2-1: What is the source of water?

Table 3.1. W2-2-1: Primary source of handwashing water for customers of A. Jomi Town

Name of settlements	Number of customers	Private (time of delivery in hours)	Public (time of delivery in hours)	Own well (shallow)	Irrigation	Bottled water	Other (specify)
Navobod Street (Jomi north)	12,00	2,00	9,00				1,00
Communism Street (Jomi north)	3,00		3,00				
Krupskaya Street (Jomi north)	19,00	4,00	15,00				
Somoni Street (Jomi north)	6,00	1,00	5,00				
Somoni Street (Jomi south)	21	2,00	19,00				
Lohuti Street (Jomi south)	19,00	2,00	17,00				
Guliston Street north	11,00		11,00				
Guliston Street south	11,00	11,00					
Total	102,00	11,00	90,00				1,00
	100	10,78	88,23				0,98

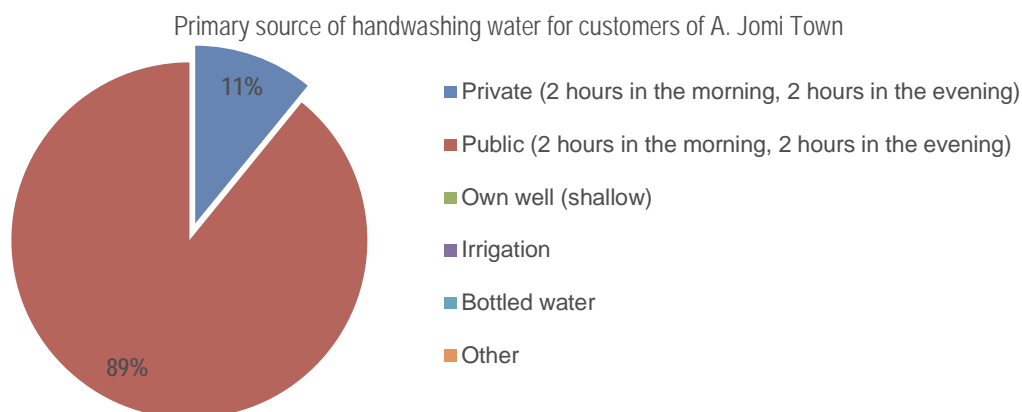
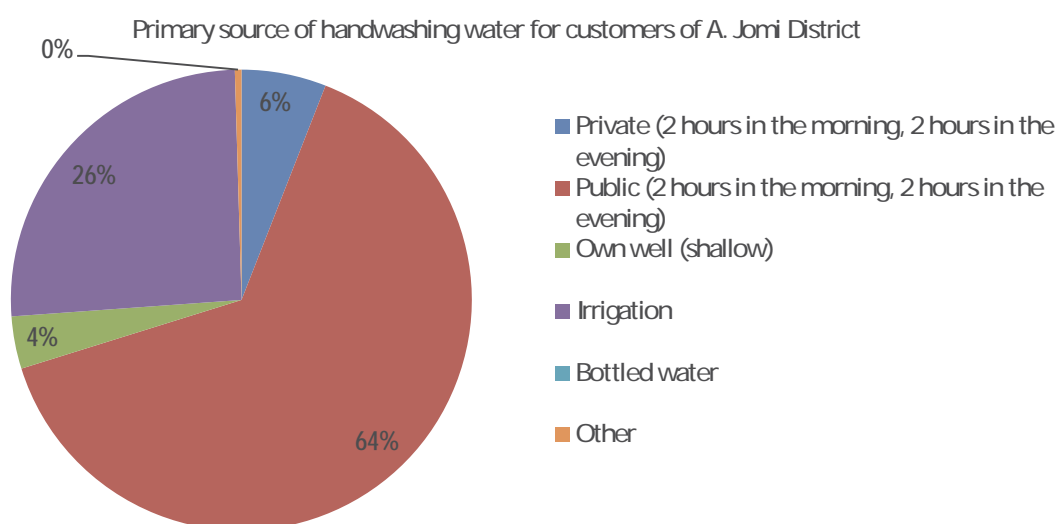


Table 3.2. W2-2-1: Primary source of handwashing water for customers of A. Jomi District

Name of settlements	Number of customers	Private (time of delivery in hours)	Public (time of delivery in hours)	Own well (shallow)	Irrigation	Bottled water	Other (specify)
1. Jomi town	102	11,00	90,00				1,00
2. Buston village	13		4,00	1,00	8,00		
3. Madaniyat village	12			3,00	9,00		
4. Mirzobod	11		1,00	2,00	8,00		
5. Mirzobod south	10				10,00		
6. Rohi Sotsialism	10				10,00		
7. Zarnisor	12		12,00				
8. Istiqlol	12		12,00				
9. Rahimzoda	14		13,00	1,00			
10. 1st May village	11	1,00	2,00	1,00	7,00		
11. Jomi village	11	1,00	6,00		4,00		
TOTAL	218	13	140	8	56		1,00
%	100%	5,96	64,22	3,67	11,92		0,46



W2-2-2: How is the water treated?

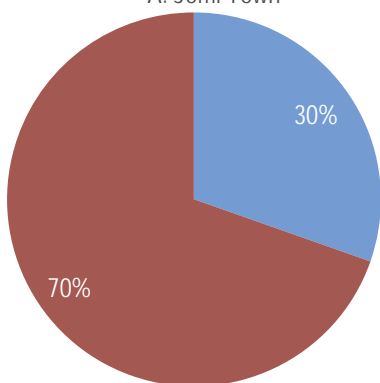
Table 3.3. W2-2-2: How handwashing water is treated in A. Jomi Town

Name of settlements	Number of customers	Not treated	With a filter	By boiling
Navobod Street (Jomi north)	12	4,00		8,00
Communism Street (Jomi north)	3	1,00		2,00
Krupskaya Street (Jomi north)	19	5,00		14,00
Somoni Street (Jomi north)	6	2,00		4,00
Somoni Street (Jomi south)	21	7,00		14,00
Lohuti Street (Jomi south)	19	6,00		13,00
Guliston Street north	11	3,00		8,00
Guliston Street south	11	3,00		8,00
Total	102	31,00		71,00
	100	30,39		69,60

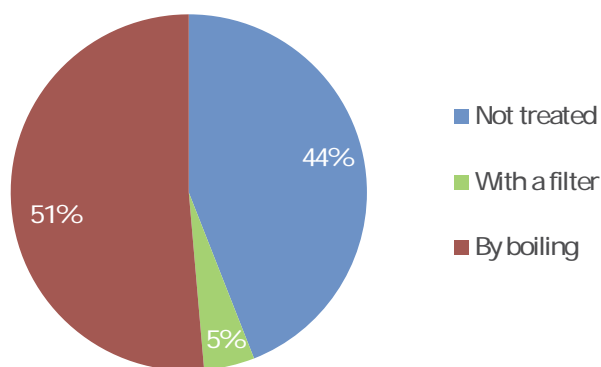
Table 3.4. W2-2-2: How handwashing water is treated in A. Jomi District

Name of settlements	Number of customers	Not treated	With a filter	By boiling
1. Jomi town	102	31,00		71,00
2. Buston village	13	13,00		
3. Madaniyat village	12	3,00		9,00
4. Mirzoobod north	11	8,00	2,00	1,00
5. Mirzoobod south	10	7,00	2,00	1,00
6. Rohi Sotsialism	10	7,00	2,00	1,00
7. Zarnisor	12	3,00	1,00	8,00
8. Istiqlol	12	3,00		9,00
9. Rahimzoda	14	3,00	2,00	9,00
10. 1st May village	11	11,00	0,00	0,00
11. Jomi village	11	7,00	1,00	3,00
TOTAL	218	96,00	10,00	112,00
	100	44,04	4,59	51,38

Ways of treating handwashing water in A. Jomi Town



Ways of treating handwashing water in A. Jomi District



W2-2-3: Satisfaction

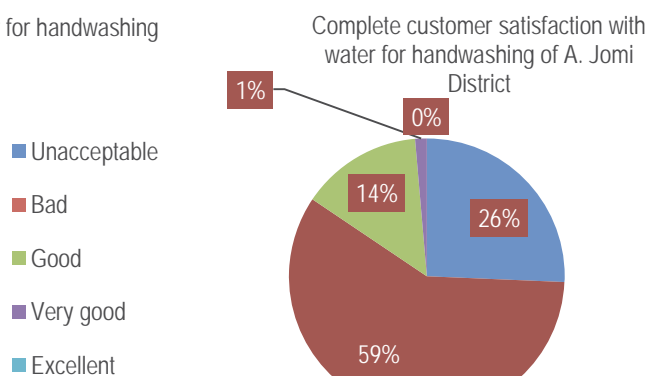
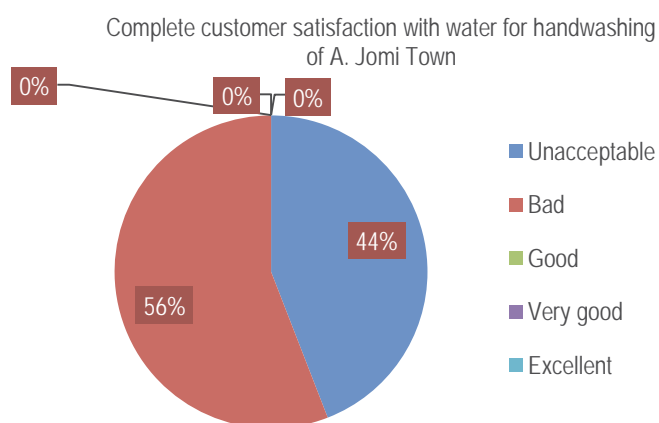
A) Complete satisfaction

Table 3.5. W2-2-3: Complete customer satisfaction with water for handwashing of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12	5,00	7,00			
Communism Street (Jomi north)	3	1,00	2,00			
Krupskaya Street (Jomi north)	19	6,00	13,00			
Somoni Street (Jomi north)	6	2,00	4,00			
Somoni Street (Jomi south)	21	9,00	12,00			
Lohuti Street (Jomi south)	19	10,00	9,00			
Guliston Street north	11	6,00	5,00			
Guliston Street south	11	6,00	5,00			
Total	102	45,00	57,00			
%	100,00	44,11	55,88			

Table 3.6. W2-2-3: Complete customer satisfaction with water for handwashing of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1. Jomi town	102	45,00	57,00			
2. Buston village	13	1,00	8,00	2,00	2,00	
3. Madaniyat village	12		3,00	9,00		
4. Mirzoobod north	11		8,00	3,00		
5. Mirzoobod south	10		7,00	3,00		
6. Rohi Sotsialism	10	3,00	6,00	1,00		
7. Zarnisor	12	2,00	7,00	3,00		
8. Istiqlol	12		10,00	2,00		
9. Rahimzoda	14	1,00	8,00	5,00		
10. 1st May village	11	2,00	7,00	1,00	1,00	
11. Jomi village	11	2,00	7,00	2,00		
TOTAL	218	56,00	128,00	31,00	3,00	
%	100	25,69	55,71	16,22	1,37	



B) Water quality

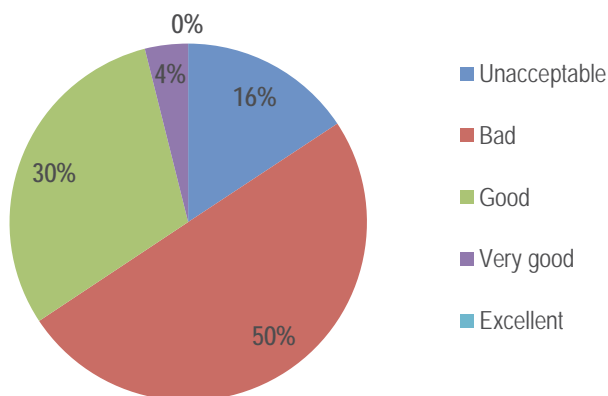
Table 3.7. W2-2-3. Customer satisfaction with the quality of water for handwashing of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00		2,00	7,00	3,00	
Communism Street (Jomi north)	3,00			2,00	1,00	
Krupskaya Street (Jomi north)	19,00		9,00	10,00		
Somoni Street (Jomi north)	6,00		4,00	2,00		
Somoni Street (Jomi south)	21		11,00	10,00		
Lohuti Street (Jomi south)	19,00	9,00	10,00			
Gulliston Street north	11,00	5,00	6,00			
Gulliston Street south	11,00	2,00	9,00			
Total	102,00	16,00	51,00	31,00	4,00	
%	100	15,68	50,00	30,39	3,92	

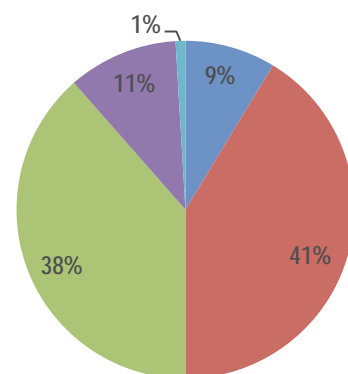
Table 3.8. W2-2-3. Customer satisfaction with the quality of water for handwashing of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
1. Jomi town	102	16,00	51,00	31,00	4,00	
2. Buston village	13		4,00	6,00	3,00	
3. Madaniyat village	12		2,00	6,00	4,00	
4. Mirzoobod north	11			5,00	4,00	2,00
5. Mirzoobod south	10		2,00	5,00	3,00	
6. Rohi Sotsialism	10	1,00	5,00	4,00		
7. Zarnisor	12	1,00	5,00	5,00	1,00	
8. Istiqlol	12		6,00	5,00	1,00	
9. Rahimzoda	14		5,00	6,00	3,00	
10. 1st May village	11	1,00	4,00	6,00		
11. Jomi village	11		6,00	5,00	0,00	
TOTAL	218	19,00	90,00	84,00	23,00	2,00
	100	8,71	41,28	38,53	10,55	0,91

Customer satisfaction with the quality of water for handwashing of A. Jomi Town



Customer satisfaction with the quality of water for handwashing of A. Jomi District



C) Amount (water supply time)

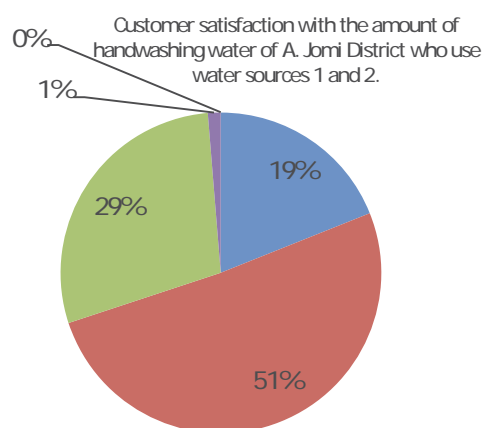
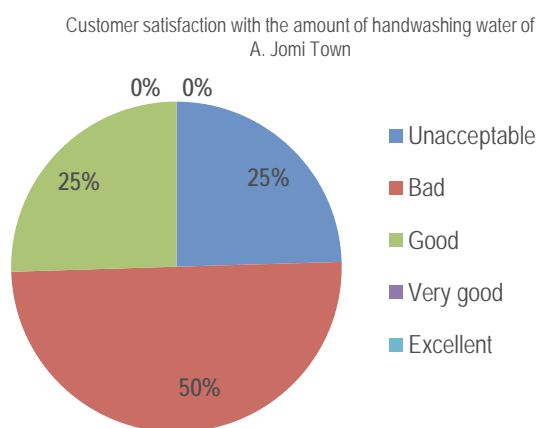
Table 3.9. W2-2-3. Customer satisfaction with the amount of handwashing water of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00	4,00	6,00	2,00		
Communism Street (Jomi north)	3,00	1,00	2,00			
Krupskaya Street (Jomi north)	19,00	2,00	8,00	9,00		
Somoni Street (Jomi north)	6,00	1,00	2,00	3,00		
Somoni Street (Jomi south)	21	6,00	12,00	3,00		
Lohuti Street (Jomi south)	19,00	6,00	9,00	4,00		
Guliston Street north	11,00	3,00	6,00	2,00		
Guliston Street south	11,00	2,00	6,00	3,00		
Total	102,00	25,00	51,00	26,00		
%	100	24,50	50,00	25,49		

Table 3.10. W2-2-3. Customer satisfaction with the amount of handwashing water of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	25,00	51,00	26,00		
Buston village	13		4,00			
Madaniyat village	12		3,00	3,00		
Mirzoobod village (north)	11		0,00	1,00		
Mirzoobod village (south)	10					
Rohi socialism village	10					
Zarnisor village	12		4,00	2,00	1,00	
Istiqloq village	12	3,00	4,00	1,00		
Rahimzoda village	14		5,00	7,00	1,00	
1st May village	11	1,00	3,00			
Jomi village	11		4,00	4,00		
Total	218	29,00	78,00	44,00	2,00	
	100	13,30	35,78	20,18	0,92	

P.S. Of 218 subscribers, 153 use water sources ① or ②, while the remaining 65 respondents use other sources of water supply.



D) Pressure (in case of water source is ① or ②)

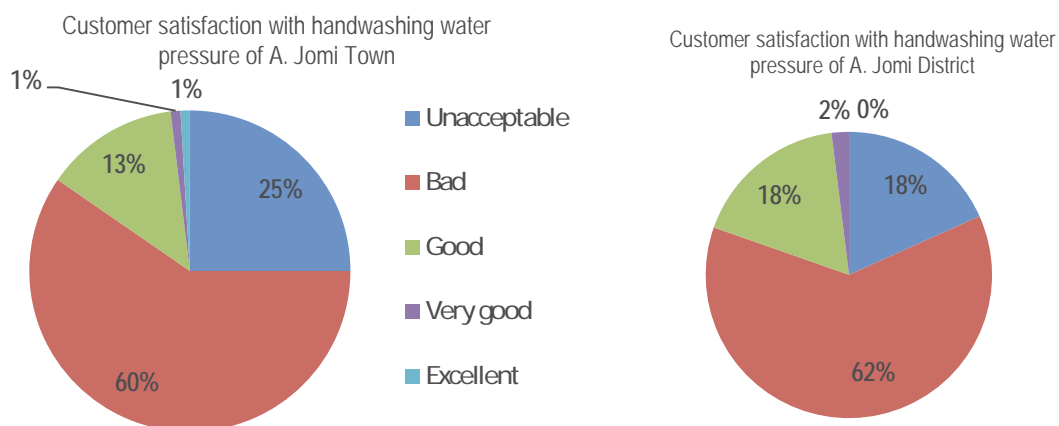
Table 3.11. W2-2-3: Customer satisfaction with handwashing water pressure of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00	2,00	6,00	4,00		
Communism Street (Jomi north)	3,00	1,00	1,00	1,00		
Krupskaya Street (Jomi north)	19,00	4,00	8,00	7,00		
Somoni Street (Jomi north)	6,00	1,00	3,00	2,00		
Somoni Street (Jomi south)	21	7,00	14,00	0,00		
Lohuti Street (Jomi south)	19,00	5,00	14,00	0,00		
Guliston Street north	11,00	3,00	8,00	0,00		
Guliston Street south	11,00	3,00	8,00	0,00		
Total	102,00	26,00	62,00	14,00		
%	100	25,49	60,78	13,72		

Table 3.12. W2-2-3: Customer satisfaction with handwashing water pressure of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	26,00	62,00	14,00		
Buston village	13		4,00			
Madaniyat village	12					
Mirzoobod village (north)	11		1,00	0,00		
Mirzoobod village (south)	10					
Rohi socialism village	10					
Zarnisor village	12		7,00	5,00	1,00	
Istiqlol village	12	2,00	5,00	1,00		
Rahimzoda village	14		6,00	6,00	2,00	
1st May village	11	0,00	6,00	1,00		
Jomi village	11	2,00	8,00	1,00		
Total	218	28,00	95,00	27,00	3,00	
	100	12,84	43,57	12,38	1,37	

P.S. Of 218 subscribers, 153 use water sources ① or ②, while the remaining 65 respondents use other sources of water supply.



E) Access to the source

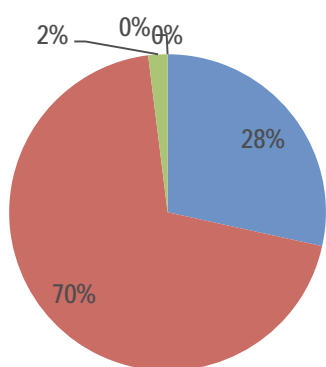
Table 3.13. W2-2-3 Customer satisfaction with access to a water source for handwashing of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00	2,00	10,00			
Communism Street (Jomi north)	3,00	1,00	2,00			
Krupskaya Street (Jomi north)	19,00	5,00	13,00	1,00		
Somoni Street (Jomi north)	6,00	2,00	4,00			
Somoni Street (Jomi south)	21	6,00	15,00			
Lohuti Street (Jomi south)	19,00	6,00	13,00			
Guliston Street north	11,00	3,00	8,00			
Guliston Street south	11,00	4,00	6,00	1,00		
Total	102,00	29,00	71,00	2,00		
%	100	28,43	69,60	1,96		

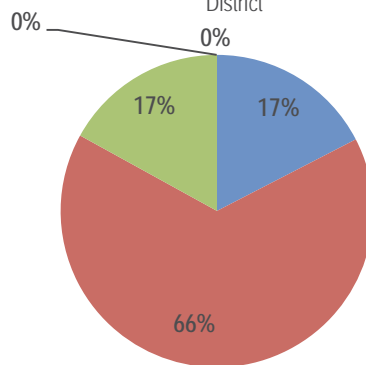
Table 3.14. W2-2-3 Customer satisfaction with access to a water source for handwashing of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102	29,00	71,00	2,00		
Buston village	13		4,00	9,00		
Madaniyat village	12		9,00	3,00		
Mirzoobod village (north)	11		7,00	4,00		
Mirzoobod village (south)	10	2,00	6,00	2,00		
Rohi socialism village	10	1,00	1,00	8,00		
Zarnisor village	12	1,00	11,00			
Istiqlol village	12	2,00	9,00	1,00		
Rahimzoda village	14	1,00	10,00	3,00		
1st May village	11	2,00	8,00	1,00		
Jomi village	11	0,00	7,00	4,00		
Total	218	38,00	143,00	37,00		
%	100	17,43	65,59	16,97		

Customer satisfaction with access to a water source for handwashing of A. Jomi Town



Customer satisfaction with access to a water source for handwashing of A. Jomi District



F) Drinking water charges (if the water source is ① or ②)

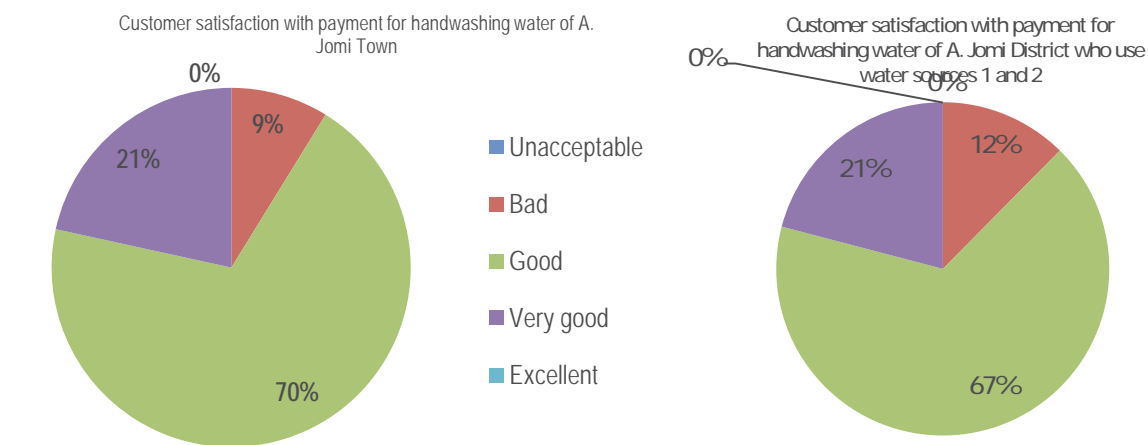
Table 3.15. W2-2-3. Customer satisfaction with payment for handwashing water of A. Jomi Town

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Navobod Street (Jomi north)	12,00		2,00	8,00	2,00	
Communism Street (Jomi north)	3,00		1,00	1,00	1,00	
Krupskaya Street (Jomi north)	19,00		2,00	14,00	3,00	
Somoni Street (Jomi north)	6,00		1,00	3,00	2,00	
Somoni Street (Jomi south)	21		3,00	14,00	4,00	
Lohuti Street (Jomi south)	19,00			16,00	3,00	
Guliston Street north	11,00			8,00	3,00	
Guliston Street south	11,00			7,00	4,00	
Total	102,00		9,00	71,00	22,00	
%	100		8,82	69,60	21,56	

Table 3.16. W2-2-3. Customer satisfaction with payment for handwashing water of A. Jomi District

Name of settlements	Number of customers	Unacceptable	Bad	Good	Very good	Excellent
Jomi town	102		9,00	71,00	22,00	
Buston village	13			4,00		
Madaniyat village	12					
Mirzoobod village (north)	11			1,00		
Mirzoobod village (south)	10					
Rohi socialism village	10		2,00	3,00	3,00	
Zarnisor village	12		3,00	5,00	1,00	
Istiqlol village	12		1,00	5,00	1,00	
Rahimzoda village	14		2,00	5,00	3,00	
1st May village	11			4,00		
Jomi village	11		2,00	4,00	2,00	
Total	218		19,00	102,00	32,00	
%	100		8,71	46,79	14,67	

P.S. 153 out of 218 subscribers use water sources ① or ②, the remaining 65 respondents use other sources of water supply for which they do not pay money.



W3-3: LOCATION OF WATER SOURCE/WHERE DOES WATER FOR HANDWASHING COME FROM?

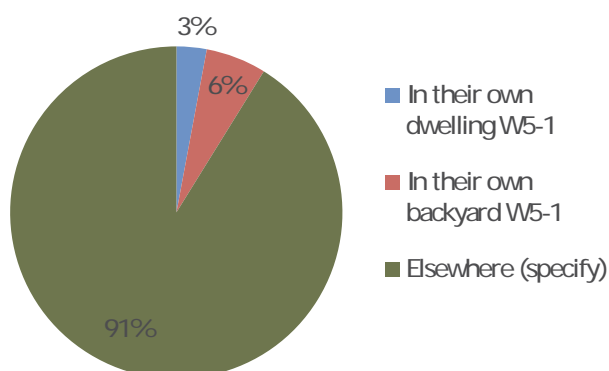
Table 3.17. W3-3: Location of handwashing water source of A. Jomi Town

Name of settlements	Number of customers	In their own dwelling W5-1	In their own backyard W5-1	Elsewhere (specify) If ②,④ or ⑥ is selected in W1-1-1, go to W4-1
Navobod Street (Jomi north)	12,00	1,00		11,00
Communism Street (Jomi north)	3,00			3,00
Krupskaya Street (Jomi north)	19,00	2,00	2,00	15,00
Somoni Street (Jomi north)	6,00			6,00
Somoni Street (Jomi south)	21			21,00
Lohuti Street (Jomi south)	19,00			19,00
Guliston Street north	11,00			11,00
Guliston Street	11,00			11,00
Total	102,00	3,00	2,00	97,00
	100	2,94	1,96	95,10

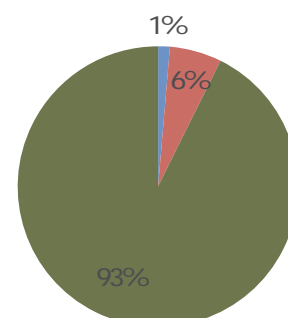
Table 3.17. W3-3: Location of handwashing water source

Name of settlements	Number of customers	In their own dwelling W5-1	In their own backyard W5-1	Elsewhere (specify) If ②,④ or ⑥ is selected in W1-1-1, go to W4-1
1. Jomi town	102	3,00	2,00	97,00
2. Buston village	13		1,00	12,00
3. Madaniyat village	12		3,00	9,00
4. Mirzoobod north	11		2,00	9,00
5. Mirzoobod south	10			10,00
6. Rohi Sotsialism	10			10,00
7. Zarnisor	12		1,00	11,00
8. Istiqlol	12			12,00
9. Rahimzoda	14		1,00	13,00
10. 1st May village	11		2,00	9,00
11. Jomi village	11		1,00	10,00
TOTAL	218	3	13	202
	100	1,38	5,96	92,66

Location of handwashing water source of A. Jomi Town



Location of handwashing water source of A. Jomi District



W4-3: TIME FOR HANDWASHING WATER COLLECTION

How long does it take to go there, get water for the handwashing, and return? (NOTE: If you select ②,④,⑥ in W1-1-1

Table 3.19. W4-3: Time for handwashing water collection for customers of A. Jomi Town

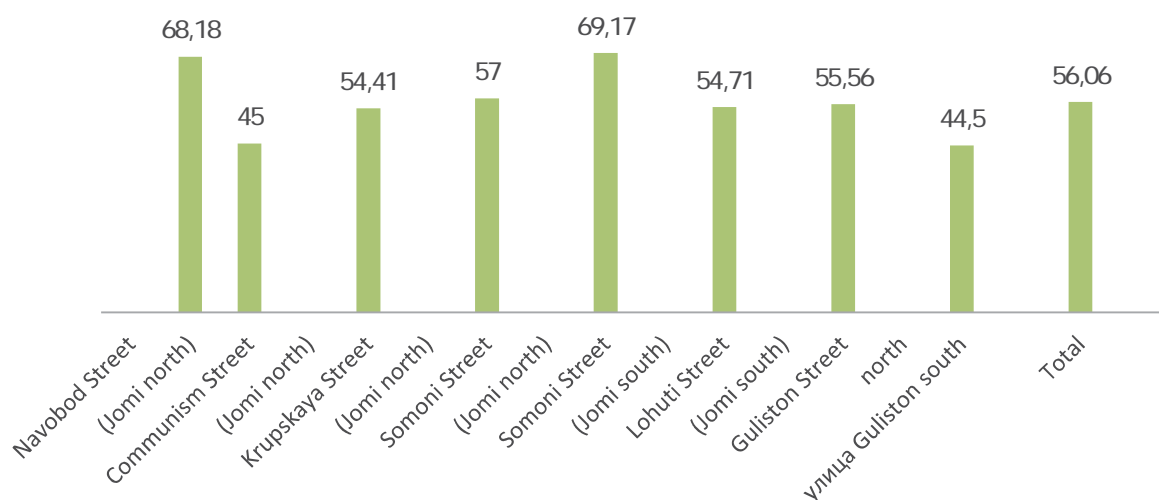
Name of settlements	Number of customers	Minutes : minutes (round trip)	Not going to	Don't know
Navobod Street (Jomi north)	12,00	68,18		1
Communism Street (Jomi north)	3,00	45,00		1
Krupskaya Street (Jomi north)	19,00	54,41		2
Somoni Street (Jomi north)	6,00	57,00		1
Somoni Street (Jomi south)	21	69,17		3
Lohuti Street (Jomi south)	19,00	54,71		2
Guliston Street north	11,00	55,56		2
улица Guliston south	11,00	44,50		1
Total	102	56,06		13

Table 3.20. W4-3: Time for handwashing water collection for customers of A. Jomi District

Name of settlements	Number of customers	Minutes : minutes (round trip)	Not going to	Don't know
1. Jomi town	102	56,06		12
2. Buston village	13	41,15		
3. Madaniyat village	12	36,67		
4. Mirzoobod north	11	24,55		
5. Mirzoobod south	10	26,00		
6.Rohi Sotsialism	10	38,00		
7. Zarnisor	12	51,67		
8. Istiqlol	12	40,83		
9. Rahimzoda	14	37,86		
10.1st May village	11	35,45		
11. Jomi village	11	35,45		
TOTAL	218	38,52		12

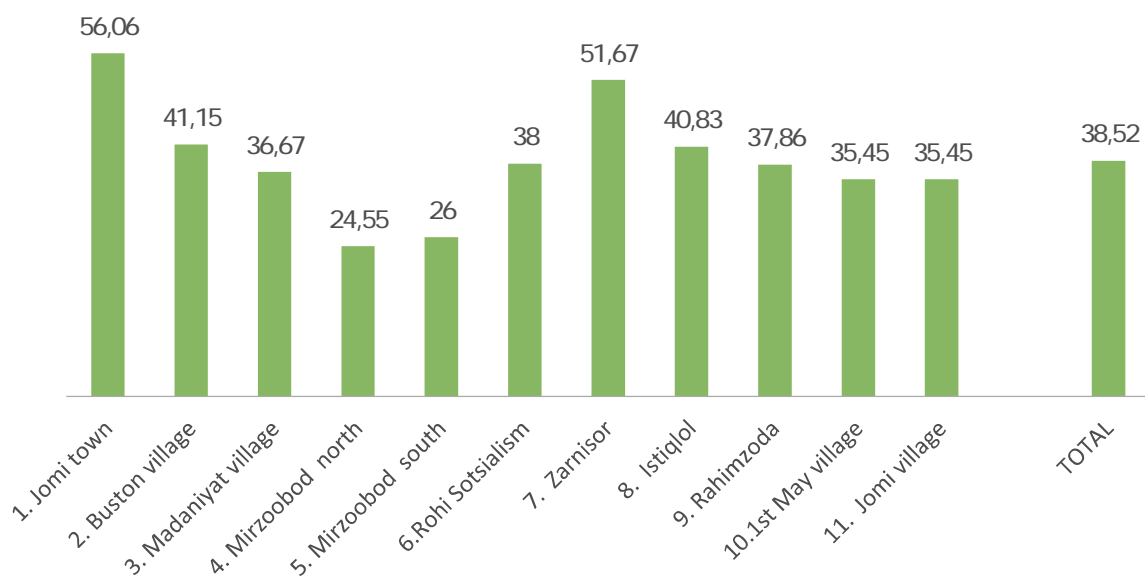
W4-3: Time for handwashing water collection for customers of A. Jomi Town

Minutes: minutes (round trip)



. W4-3: Time for handwashing water collection for customers of A. Jomi District

■ Minutes : minutes (round trip)



W5-3: AVAILABILITY OF HANDWASHING WATER. (Were there any occasions in the last month when your household did not have enough water for handwashing when it was needed?)

W5-3: Availability of handwashing water

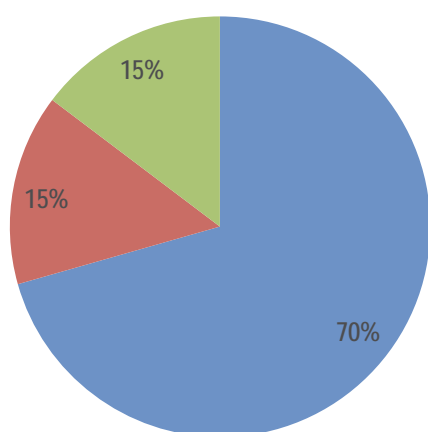
Table 3.21: W5-3: Customer availability for handwashing water in A. Jomi Town

Name of settlements	Number of customers	Yes, at least one time	No, it's always enough	Don't know
Navobod Street	12,00	8,00	4,00	
Communism Street	3,00	2,00		1,00
Krupskaya Street	19,00	14,00	2,00	3,00
Somoni Street	6,00	4,00	1,00	1,00
Somoni Street	21	14,00	4,00	3,00
Lohuti Street	19,00	16,00	1,00	2,00
Guliston Street	11,00	7,00	2,00	2,00
Guliston Street	11,00	7,00	1,00	3,00
Total				
	100	70,58	14,70	14,70

Table 3.22: W5-3: Customer availability for handwashing water in A. Jomi District

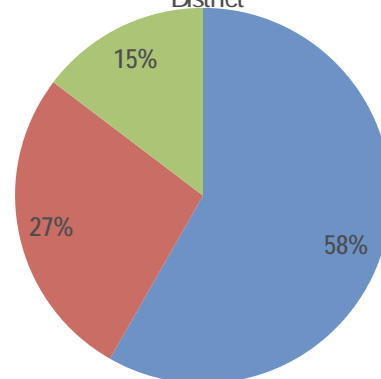
Name of settlements	Number of customers	Yes, at least one time	No, it's always enough	Don't know
1. Jomi town	102	72,00	15,00	15,00
2. Buston village	13	7,00	4,00	2,00
3. Madaniyat village	12	4,00	6,00	2,00
4. Mirzoobod north	11	4,00	7,00	
5. Mirzoobod south	10	5,00	4,00	1,00
6. Rohi Sotsialism	10	6,00	4,00	
7. Zarnisor	12	3,00	6,00	3,00
8. Istiqlol	12	7,00	3,00	2,00
9. Rahimzoda	14	7,00	4,00	3,00
10. 1st May village	11	6,00	2,00	3,00
11. Jomi village	11	6,00	4,00	1,00
TOTAL	218	127,00	59,00	32,00
	100	58,25	27,06	14,67

Customer availability for handwashing water in A. Jomi Town



Customer availability for handwashing water in A. Jomi District

■ Yes, at least one time
 ■ No, it's always enough
 ■ Don't know





Public toilet in A. Jomi Town

CHAPTER 4 S1: SANITARY FACILITIES

What type of toilet (restroom) does your family usually use? NOTE: If this cannot be determined, ask for permission to observe the facility.

The Master Plan of the town of A. Jomi, developed in Soviet times, provided for the construction of two-story residential buildings which do not have internal water supply and sewerage systems. The water supply was initially provided by the street water supply system. Since there were no toilets in residential buildings and no sewage system, there was a system of outdoor cesspool toilets for several residential buildings, which was periodically cleaned.

Sanitary facilities in the project area of the villages are dry cesspools with concrete slabs or wooden decking.

In the town of A. Jomi, out of 102 respondents surveyed, 56 use a private toilet and 46 respondents use a public toilet.

46 respondents who use a public toilet said that the public toilet is operated by the Housing and Public Utility Company (HPUC), which is responsible for periodically cleaning public toilets, and 16 respondents said they did not know who is responsible for cleaning public toilets.

From the project target area, in villages of the district, practically all households have private toilets, which are used exclusively by family members and are located in their own yards/ plots. Respondents stated that they did not empty their toilets, but buried them in a covered pit there in their own yard/plot, and built another toilet nearby.

Drain / Bulk Drain

Table 4.1: S1: Availability of Drain/ Bulk Drain of sanitary facilities of customers of A. Jomi Town

Name of settlements	Number of customers	Drain into the sewage system	Drain into the septic tank	Drain into the cesspool	Drain into an open sump	Drain into the unknown direction
Navobod Street (Jomi north)	12,00	0	0	0	0	0
Communism Street (Jomi north)	3,00	0	0	0	0	0
Krupskaya Street (Jomi north)	19,00	0	0	0	0	0
Somoni Street (Jomi north)	6,00	0	0	0	0	0
Somoni Street (Jomi south)	21	0	0	0	0	0
Lohuti Street (Jomi south)	19,00	0	0	0	0	0
Guliston Street north	11,00	0	0	0	0	0
Guliston Street south	11,00	0	0	0	0	0
Total	102,00	0	0	0	0	0

Table 4.2: S1: Availability of Drain/ Bulk Drain of sanitary facilities of customers of A. Jomi District

Name of settlements	Number of customers	Drain into the sewage system	Drain into the septic tank	Drain into the cesspool	Drain into an open sump	Drain into the unknown direction
1. Jomi town	102	0	0	0	0	0
2. Buston village	13	0	0	0	0	0
3. Madaniyat village	12	0	0	0	0	0
4. Mirzoobod north	11	0	0	0	0	0
5. Mirzoobod south	10	0	0	0	0	0
6. Rohi Sotsialism	10	0	0	0	0	0
7. Zarnisor	12	0	0	0	0	0
8. Istiqlol	12	0	0	0	0	0
9. Rahimzoda	14	0	0	0	0	0
10. 1st May village	11	0	0	0	0	0
11. Jomi village	11	0	0	0	0	0
TOTAL	218	0	0	0	0	0

Dry cesspools

Table 4.3: S1: Availability of sanitary facilities in the form of dry cesspools among customers of A. Jomi Town

Name of settlements	Number of customers	Cesspool with slab	Cesspool without overlap / Open pit
Navobod Street (Jomi north)	12,00	12,00	0
Communism Street (Jomi north)	3,00	3,00	0
Krupskaya Street (Jomi north)	19,00	19,00	0
Somoni Street (Jomi north)	6,00	6,00	0
Somoni Street (Jomi south)	21	21	0
Lohuti Street (Jomi south)	19,00	19,00	0
Gulliston Street north	11,00	11,00	0
Gulliston Street south	11,00	11,00	0
Total	102,00	102,00	0

Table 4.4: S1: Availability of sanitary facilities in the form of dry cesspools among customers of A. Jomi District

Name of settlements	Number of customers	Cesspool with slab	Cesspool without overlap / Open pit
1. Jomi town	102	102	0
2. Buston village	13	13	0
3. Madaniyat village	12	12	0
4. Mirzoobod north	11	11	0
5. Mirzoobod south	10	10	0
6. Rohi Sotsialism	10	10	0
7. Zarnisor	12	12	0
8. Istiqlol	12	12	0
9. Rahimzoda	14	14	0
10. 1st May village	11	11	0
11. Jomi village	11	11	0
TOTAL	218	218	0

Bio-toilets for composting

Table 4.5: S1: Availability of bio-toilets for composting among customers of A. Jomi Town

Name of settlements	Number of customers	Double pit with slab	Double pit without slab	Another, bio-toilet
Navobod Street	12,00	0	0	0
Communism Street	3,00	0	0	0
Krupskaya Street	19,00	0	0	0
Somoni Street	6,00	0	0	0
Somoni Street	21	0	0	0
Lohuti Street	19,00	0	0	0
Guliston Street	11,00	0	0	0
Guliston Street	11,00	0	0	0
Total	102,00	0	0	0

Table 4.6: S1: Availability of bio-toilets for composting among customers of A. Jomi District

Name of settlements	Number of customers	Double pit with slab	Double pit without slab	Another, bio-toilet
1. Jomi town	102	0	0	0
2. Buston village	13	0	0	0
3. Madaniyat village	12	0	0	0
4. Mirzoobod north	11	0	0	0
5. Mirzoobod south	10	0	0	0
6. Rohi Sotsialism	10	0	0	0
7. Zarnisor	12	0	0	0
8. Istiqlol	12	0	0	0
9. Rahimzoda	14	0	0	0
10. 1st May village	11	0	0	0
11. Jomi village	11	0	0	0
TOTAL	218	0	0	0

Other facilities or amenities

Table 4.6: S1: Availability of other sanitation facilities / amenities among customers of A. Jomi Town

Name of settlements	Number of customers	Bucket	Container-based sanitation	Overhead toilet / latrine	Other	No facility / bush / field
Navobod Street (Jomi north)	12,00	0	0	0	0	0
Communism Street (Jomi north)	3,00	0	0	0	0	0
Krupskaya Street (Jomi north)	19,00	0	0	0	0	0
Somoni Street (Jomi north)	6,00	0	0	0	0	0
Somoni Street (Jomi south)	21	0	0	0	0	0
Lohuti Street (Jomi south)	19,00	0	0	0	0	0
Guliston Street north	11,00	0	0	0	0	0
Guliston Street south	11,00	0	0	0	0	0
Total	102,00	0	0	0	0	0

Table 4.7: S1: Availability of other sanitation facilities / amenities among customers of A. Jomi District

Name of settlements	Number of customers	Bucket	Container-based sanitation	Overhead toilet / latrine	Other	No facility / bush / field
1. Jomi town	102	0	0	0	0	0
2. Buston village	13	0	0	0	0	0
3. Madaniyat village	12	0	0	0	0	0
4. Mirzoobod north	11	0	0	0	0	0
5. Mirzoobod south	10	0	0	0	0	0
6. Rohi Sotsialism	10	0	0	0	0	0
7. Zarnisor	12	0	0	0	0	0
8. Istiqlol	12	0	0	0	0	0
9. Rahimzoda	14	0	0	0	0	0
10. 1st May village	11	0	0	0	0	0
11. Jomi village	11	0	0	0	0	0
TOTAL	218	0	0	0	0	

S2-0: Do you have a separate toilet in your home?

Table 4.8. Do you have a separate toilet in your home

Name of settlements	Number of customers	Yes, we use our own private toilet.	No. We use a public toilet
Navobod Street (Jomi north)	12,00	12	
Communism Street (Jomi north)	3,00	3	
Krupskaya Street (Jomi north)	19,00		19
Somoni Street (Jomi north)	6,00		6
Somoni Street	21		21
Lohuti Street	19,00	19	
Guliston Street	11,00	11	
Guliston Street	11,00	11	
Total	102,00	56	46

Table 4.9. Do you have a separate toilet in your home

Name of settlements	Number of customers	Yes, we use our own private toilet.	No. We use a public toilet
Jomi town	102	56	46
Buston village	13	13	-
Madaniyat village	12	12	-
Mirzoobod village (north)	11	11	-
Mirzoobod village (south)	10	10	-
Rohi socialism village	10	10	-
Zarnisor village	12	12	-
Istiqlol village	12	12	-
Rahimzoda village	14	14	-
1st May village	11	11	-
Jomi village	11	11	-
Total			

In the case of the answer: We use our private toilet.

S2: Do you share this room with other people who are not members of your family?

Table 4.10: Do you share this room with other people who are not members of your family

Name of settlements	S2: Do you share this room with other people who are not members of your family?		S3: Where is this toilet located?			S4: Has your (cesspool or septic tank) ever been emptied?		
	Yes	No	In own dwelling	In own yard/site	In another place, specify:	Yes, emptied	Never been emptied	Don't know
Navobod Street (Jomi north)		12		12			12	
Communism Street (Jomi north)		3		3			3	
Krupskaya Street (Jomi north)	19,00				19			
Somoni Street (Jomi north)	6,00				6			
Somoni Street (Jomi south)	21				21			
Lohuti Street (Jomi south)		19,00		19			19	
Guliston Street north		11,00		11			11	
Guliston Street south		11,00		11			11	
Total	46	56		56	46		46	

Table 4.11: Do you share this room with other people who are not members of your family

Name of settlements	S2: Do you share this room with other people who are not members of your family?		S3: Where is this toilet located?			S4: Has your (cesspool or septic tank) ever been emptied?		
	Yes	No	In own dwelling	In own yard/site	In another place, specify:	Yes, emptied	Never been emptied	Don't know
Jomi town	46	56	-	56	46		56	
Buston village	-	13	-	13	-		13	
Madaniyat village	-	12	-	12	-		12	
Mirzoobod village (north)	-	11	-	11	-		11	
Mirzoobod village (south)	-	10	-	10	-		10	
Rohi socialism village	-	10	-	10	-		10	
Zarnisor village	-	12	-	12	-		12	
Istiqlol village	-	12	-	12	-		12	
Rahimzoda village	-	14	-	14	-		14	
1st May village	-	11	-	11	-		11	
Jomi village	-	11	-	11	-		11	
Total	46	172		172	46		172	

S5: When was the last time it was emptied, and where were the contents poured?

Table 4.12. When it was last emptied, where the contents were poured

Name of settlements	Removed by the service provider			Emptied by the household					Other, specify:	Don't know
	to the wastewater treatment plant	buried in a covered pit	unknown location	buried in a covered pit	into an uncovered pit	into the open ground	into the reservoir	to another location, specify		
Jomi town				56						
Buston village				13						
Madaniyat village				12						
Mirzoobod village (north)				11						
Mirzoobod village (south)				10						
Rohi socialism village				10						
Zarnisor village				12						
Istiqlol village				12						
Rahimzoda village				14						
1st May village				11						
Jomi village				11						
Total				172						

Name of settlements	Number of customers	No. We use a public toilet	
		S4-2: Who operates the public toilet you use?	Don't know
Navobod Street (Jomi north)	12,00	-	-
Communism Street (Jomi north)	3,00	-	-
Krupskaya Street (Jomi north)	19,00	12 (PUHE)	7
Somoni Street (Jomi north)	6,00	3 (PUHE)	3
Somoni Street (Jomi south)	21	14 (PUHE)	7
Lohuti Street (Jomi south)	19,00	-	-
Guliston Street north	11,00	-	-
Guliston Street south	11,00	-	-
Total	102,00	29	17



CHAPTER 5. MONITORING HANDWASHING FACILITIES, WATER AVAILABILITY, AND AVAILABILITY OF SOAP OR DETERGENT

H1: Monitoring of handwashing equipment

Could you please show me where your family members most often wash their hands?

Name of settlements	Observed stationary object (sink/tap)		Observed moving object (bucket/bowl/teapot, etc.) indicate:	No place to wash hands in the house/yard/site	No permission to observe	The other reason, specify:
	In the dwelling	In the yard/site				
Navobod Street	3,00	9,00	Refer to Excel Format			
Communism Street	1,00	2,00	Refer to Excel Format			
Krupskaya Street	10,00	9,00	Refer to Excel Format			
Somoni Street (Jomi north)	2,00	4,00	Refer to Excel Format			
Somoni Street (Jomi south)	9,00	12,00	Refer to Excel Format			
Lohuti Street (Jomi south)	5,00	14,00	Refer to Excel Format			
Guliston Street north	2,00	9,00	Refer to Excel Format			
Guliston Street south	3,00	8,00	Refer to Excel Format			
Total	35,00	67,00				

Table 5.1. H1: Supervision of handwashing equipment

Name of settlements	Observed stationary object (sink/tap)		Observed moving object (bucket/pot/kettle, etc.) indicate:	No place to wash hands in the house/yard/site	No permission to observe	The other reason, specify:
	In the dwelling	In the yard/site				
Jomi town	35,00	67,00	Refer to Excel Format			
Buston village	3,00	10,00	Refer to Excel Format			
Madaniyat village		12,00	Refer to Excel Format			
Mirzoobod village (north)		11,00	Refer to Excel Format			
Mirzoobod village (south)	2,00	8,00	Refer to Excel Format			
Rohi socialism village	3,00	7,00	Refer to Excel Format			
Zarnisor village		12,00	Refer to Excel Format			
Istiqlol village		12,00	Refer to Excel Format			
Rahimzoda village		14,00	Refer to Excel Format			
1st May village	2,00	9,00	Refer to Excel Format			
Jomi village	2,00	9,00	Refer to Excel Format			
Total	47,00	171,00				

H2: Water monitoring. Make sure there is water in the handwashing area. Check for water in the faucet/pump, sink, bucket, water tank, or similar items.

Name of settlements	Availability of water in the handwashing area	
	Water is available	Water is not available
Navobod Street (Jomi north)	8,00	4,00
Communism Street (Jomi north)	2,00	1,00
Krupskaya Street (Jomi north)	11,00	8,00
Somoni Street (Jomi north)	4,00	2,00
Somoni Street (Jomi south)	11,00	10,00
Lohuti Street (Jomi south)	13,00	6,00
Guliston Street north	10,00	1,00
Guliston Street south	9,00	2,00
Total	68,00	34,00

Table 5.2. H2: Water monitoring

Name of settlements	Availability of water in the handwashing area	
	Water is available	Water is not available
Jomi town	68,00	34,00
Buston village	8,00	5,00
Madaniyat village	9,00	3,00
Mirzoobod village (north)	10,00	1,00
Mirzoobod village (south)	10,00	
Rohi socialism village	3,00	7,00
Zarnisor village	10,00	2,00
Istiqlol village	6,00	6,00
Rahimzoda village	6,00	8,00
1st May village	8,00	3,00
Jomi village	8,00	3,00
Total	146,00	72,00

H3: Monitoring the availability of soap.

Make sure there is soap or detergent in the handwashing area

Table 5.3. H3: Monitoring the presence of soap

Name of settlements	Availability of soap and detergents	
	Soap or detergent is available	Soap or detergent is not available
Navobod Street (Jomi north)	8,00	4,00
Communism Street (Jomi north)	2,00	1,00
Krupskaya Street (Jomi north)	14,00	5,00
Somoni Street (Jomi north)	3,00	3,00
Somoni Street (Jomi south)	14,00	7,00
Lohuti Street (Jomi south)	13,00	6,00
Guliston Street north	9,00	2,00
Guliston Street south	8,00	3,00
Total	71,00	31,00

Table 5.4. H3: Monitoring the presence of soap

Name of settlements	Availability of soap and detergents	
	Soap or detergent is available	Soap or detergent is not available
Jomi town	71,00	31,00
Buston village	11,00	2,00
Madaniyat village	10,00	2,00
Mirzoobod village (north)	9,00	2,00
Mirzoobod village (south)	6,00	4,00
Rohi socialism village	10,00	
Zarnisor village	12,00	
Istiqlol village	11,00	1,00
Rahimzoda village	13,00	1,00
1st May village	11,00	
Jomi village	11,00	
Total	175,00	43,00

別添資料-8-3

ボーリング調査

**COMMITTEE OF ARCHITECTURE AND CONSTRUCTION
UNDER THE GOVERNMENT OF THE REPUBLIC OF TAJIKISTAN**

JSC GIINTIZ

**ДСП.
Экз. _____
Arch. № 12862**

TECHNICAL REPORT

**ON ENGINEERING-GEOLOGICAL SURVEYS ON THE OBJECT:
"Construction of a water tower in the village of. A.Jomi
in Khatlon region of RT"**

(stage - detailed design)

Director

R.S. Saidov.

**Head of department
Engineering Geology Department**

Muinov R.R.

Chief geologist

Tsarinenko Y.V.

c. Dushanbe - 2023 г.

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EXPLANATORY NOTE

1. Introduction

Engineering-geological surveys on the object: "Construction of a water pressure tower in the settlement of A.Jomi in Khatlon region of Tajikistan" were carried out by the department of engineering geology of the Survey Institute "GIINTIZ" on the basis of the technical assignment of the customer.

The purpose of the surveys was to study the engineering-geological conditions of the proposed construction site with the study of geological-lithological structure, hydrogeological conditions, determination of physical-mechanical and chemical properties of soils to develop design and estimate documentation at the stage of detailed design.

All the information concerning the surveys are given in the following worksheet.

PASSPORT OF WORK.

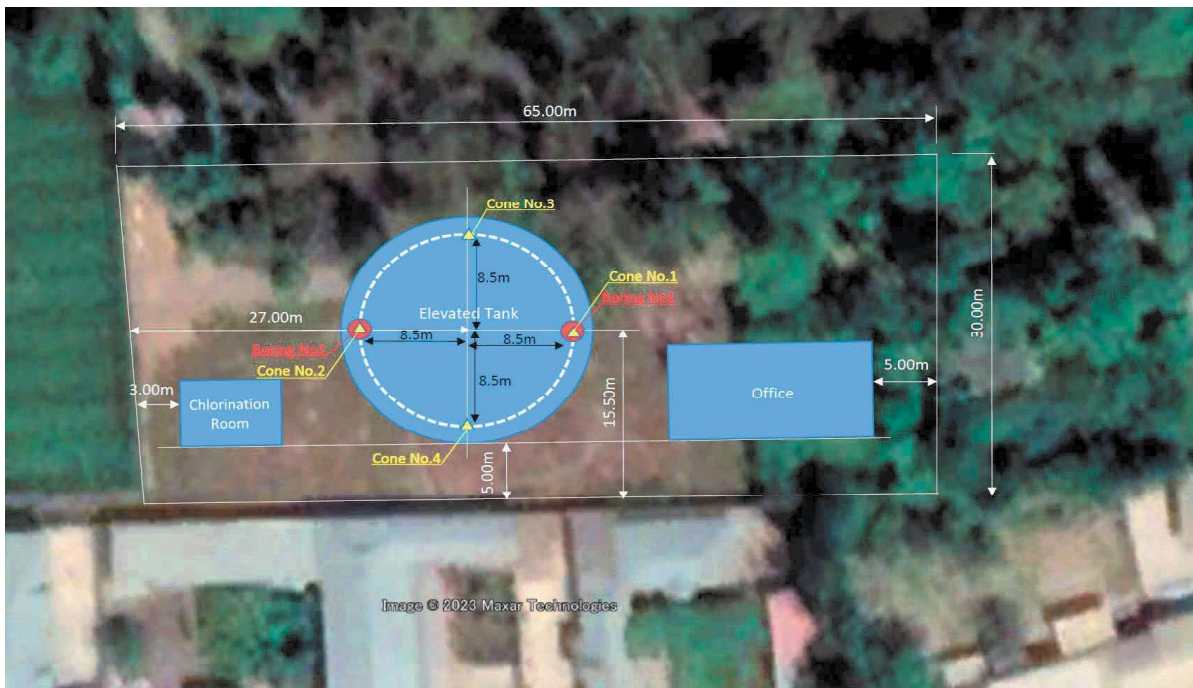
<u>Name of facility:</u>	"Construction of a water tower in the village of A. Jomi in Khatlon province of RT".
The basis for the work:	Customer's terms of reference
Location of the facility and its administrative subordination:	The work site is located on the territory of the Park of Culture and Recreation in the settlement of A. Jomi.
Composition of performers:	
on fieldwork	geologist - Nekdili Rizopur.
on laboratory work	laboratory assistant- geotechnician -Ziyadullaeva G.
office work	laboratory assistant - chemist - Dadabaeva G. Chief geologist - Tsarinenko Yu. cameral team supervisor - Morkel N.V.
Period of performance:	
field and field experimental	23.03. - 27.03.2023y.
laboratory	25.03. - 31.03.2023y.
cameral	01.03.- 06.04.2023y.
Tools and equipment, used in carrying out surveys:	field - drilling rig UGB-50M, dynamic sounding unit UES-M416. laboratory - compression and shear gauges, chemical reagents.
Regulatory literature used in the performance of work:	Construction norms and standards in force on the territory of the Republic of Tajikistan.
Completeness of the assignment:	sufficient for the preparation of the report, meets the requirements of regulatory documents.

1.1 Methodology of works.

Engineering-geological surveys at the construction site of the designed water tower were conducted in accordance with the types and scope of works, declared by the customer, and reflected in the terms of reference.

In accordance with the stated types and scope of works on the survey site the geodetic, drilling, field experimental works (SAT) were performed, the methodology of which is given below.

Geodetic researches consisted in the drawing of the topographic map of the area, the drawing of all project exploration and experimental excavations with the help of "Leika" device on the basis of the initial geodetic points, laid by the state organizations near the borders of the research site.



Drilling works were carried out by self-propelled drilling rigs UGB-50M by percussion-trenching method, with sampling of undisturbed deposits at intervals of 1.0-2.0 m for laboratory research. The selected samples were packed in waterproof bags and placed in special boxes for transportation to the laboratory. All selected samples were provided with labels. Drilling wells were accompanied by their documentation. The samples were taken so that it would be possible to estimate physical, mechanical, strength, deformation and chemical characteristics of soils uncovered during drilling. A total of 2 boreholes were drilled to a depth of 15.0 meters each.



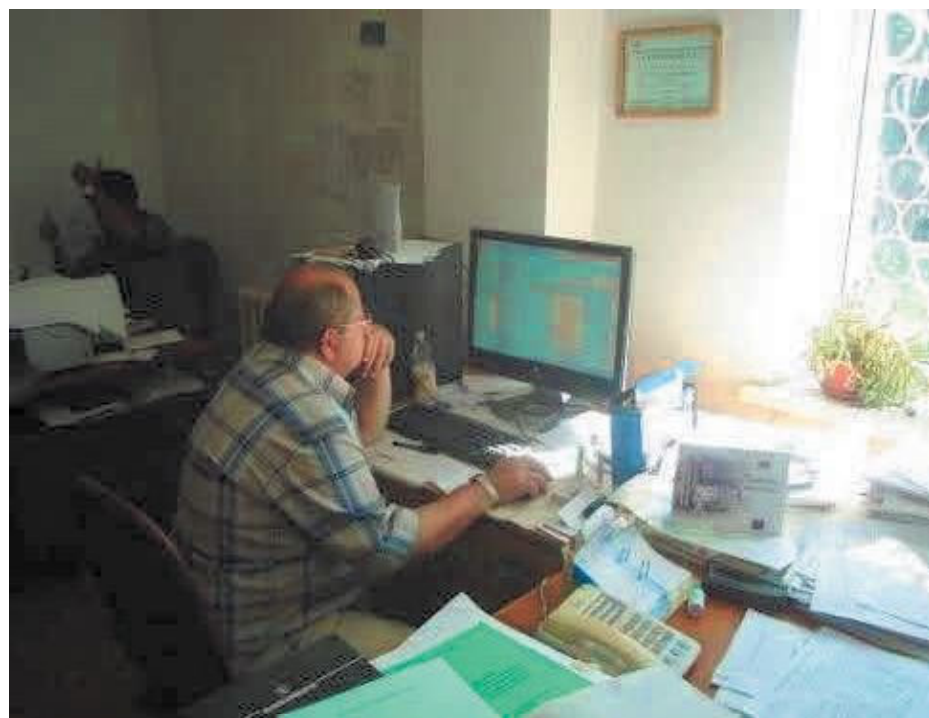
The field-experimental work consisted of field tests of soils by dynamic probing (DPT). The tests were conducted by with an average impact device with the weight of a hammer 63.5 kg, hammer drop height 0.80 m, the bail value was 10 cm (bail-depth of immersion of the cone, by which the number of hammer blows was counted). A total of 4 tests with a depth of 7.0 to 7.3 m were performed.



Laboratory work was carried out in the geotechnical laboratory of JSC "GIINTIZ" and consisted in determining the physical-mechanical, deformation, strength properties of soils and their chemical composition in order to determine the degree of aggressiveness to concrete and reinforced concrete structures.



The desk work consisted of processing the drilling, field-experimental, and laboratory work and compiling this technical report with recommendations for the projected water tower.



2. Engineering and geological conditions of the site

2.1 Location.

The site is located in the south-western part of A.Jomi settlement 78 km to the south of Dushanbe in the territory of the Park of Culture and Recreation of A.Jomi settlement of Khatlon Region of the Republic of Tajikistan.

The boundaries of the site are: from the north - the territory of the Park of Culture and Recreation, then street Somoniyon, from the east - the territory of the existing water intake, from the south - private houses and buildings, from the west - a sports field, then private housing.



2.2. Geomorphological conditions and tectonics.

In geomorphological terms, the site of the projected construction is confined to the surface of the II-nd right-bank terrace of the Vakhsh River.

The relief of the site is flat, with a slight slope to the northwest with absolute elevations of 423.37 - 423.52 m above sea level.

The site is currently vacant and free of any structures except for an old concrete basin, which is adjacent to the southern side of the projected structure.

Tectonically, the territory of A.Jomi is located in the central part of the Tajik Depression, bounded by the Rangon Ridge to the north and the Karatau Ridge to the east and the Aktau Ridge to the west. According to the map of neotectonic zoning of Tajikistan territory (based on total vertical deformations up to Neogene surface during Neogene-Quaternary time) the territory is included in the area of predominant deflections with partial subsequent uplifts and borders with South-Tianshan (Vakhsh) in the north and North-Pamir (Darvaz-Karakul) marginal faults in the east.

According to the seismic zoning map of the territory of the Republic of Tajikistan, the seismicity of the study area is 7 points on the MSK-64 scale.

2.3 Hydrometeorological conditions.

The climate of Tajikistan is due to its geographical location within the Eurasian continent, on the border of the subtropical and temperate belts. Its characteristic features are high intensity of solar radiation, aridity, low cloudiness, long duration of sunshine, sharp fluctuations of daily and seasonal temperatures and air dustiness.

According to the map of climatic conditions of Tajikistan, the study area and the adjacent territory are part of the Trans-Asian region and belong to the belt of dry climate with very warm summers and moderately mild winters.

According to zoning GNiP RT 23-01-2007, the climate of the construction site belongs to the climatic type of AIV-5e - sub-area with very warm summers and moderately mild winters. Zone I- low mountains (LH) covers territories located at an altitude of up to 800 m above sea level and affected by overheating conditions and dust storms of southern regions of the country (covers mainly cities and towns of Khatlon Region IVA and IVG climatic sub-region). Climatic conditions are not conducive to the creation of an optimal indoor and outdoor micro-climate.

Characteristics of hydrometeorological conditions are given on the basis of data obtained from the Agency for Hydrometeorology of the RT. As there is no meteorological observation station in Jomi settlement and it is located under the same meteorological conditions as Bokhtar, located 12 km to the south of Jomi settlement, climatic data are given for Bokhtar.

The average annual air temperature for a multi-year period (according to the weather station in Bokhtar, located at a distance of 15 km to the south of A.Jami settlement) is 15.7 °C. Average monthly temperature of the coldest month - January is + 0.9 °C, the warmest month - July. 28.3 °C.

The absolute minimum temperature in winter reaches minus 26°C, the absolute maximum temperature in summer reaches +46°C. The average duration of the frost-free period is 246 days. The average date of the first frost in fall is November 03 and the last frost in spring is February 05.

The coldest month is January and partially February. The hottest months of the year are July and August. Stable transition of average daily air temperature below 0 °C occurs in the second half of December, above 0 °C - in the second half of February.

The average multi-year monthly, annual, minimum and maximum air temperatures are given in Table 1.

Months	Average air temperature, °C	Absolute maximum temperature, °C	Absolute minimum temperature, °C
I	-1,1	22	-26
II	5,4	28	-22
III	10,8	35	-15
IV	17,3	38	-2
V	22,5	42	5
VI	27,2	46	8
VII	28,7	46	12
VIII	26,5	43	9
IX	21,3	41	1
X	15,5	36	-5
XI	9,3	34	-16
XII	4,3	26	-20
year	15,7	46	-26

Average annual surface temperature +17.9°C, average monthly and average annual soil temperature at different depths are given in Table No. 2.

Average monthly and annual soil temperatures as a function of depth are shown in Table 2.

Table 2

Bokhtar	Soil depth	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
Soil temperature, C°	0,20	5,1	7,0	11,5	17,3	24,2	29,7	31,6	29,7	24,8	18,3	11,2	6,3	18,1
	0,40	6,3	7,5	11,4	16,6	23,0	28,1	30,2	29,1	25,2	19,6	13,2	8,1	18,1
	0,80	9,3	9,1	11,7	15,1	20,1	24,5	26,8	26,9	24,7	21,1	16,3	11,6	18,1
	1,60	13,0	11,7	12,8	14,3	17,3	20,3	22,6	23,5	23,0	21,6	19,0	15,4	17,9
	3,20	17,0	15,4	15,1	15,0	15,6	16,7	17,8	18,8	19,5	20,3	20,1	18,3	17,5

Monthly and annual precipitation (%) Table 3

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	annual
solids (S)	25	13	5	1							6	17	10
liquid (L)	49	55	69	95	100	100	100	100	100	100	74	51	69
mixed (M)	26	32	26	4							20	32	21

Average ten-day snow cover height in cm.

Table4

Bokhtar	november			December			January			February			March			Maximum height, cm		
decade	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	Medium	Maximal	Minimal
medium height, cm						2	2	3	2							5	17	0

As can be seen from Table 3 by year, solid precipitation accounts for 10%, precipitation in liquid form - 69%, mixed precipitation - 21%. At the same time, the sum of annual precipitation is 270 mm.

One of the important climatic factors is wind. Seasonal change of wind directions over this territory is determined by both the nature of atmospheric circulation and the terrain.

Average wind speed in Bokhtar is 1.2 m/s. The highest wind speed is observed from February to March.



Average wind speed by month and year (m/s)

Table 5

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
Bokhtar	1,2	1,5	1,9	1,7	1,5	1,2	1,0	1,0	0,8	0,9	1,0	1,0	1,2

Frequency of wind directions and doldrums (% per year)

Table 6

Station	N	NE	E	SE	S	SW	W	NS
Bokhtar	28	13	5	10	25	8	5	6

The highest wind speed of different probability, m/s.

Table 7

Wind speed, not including gusts, possible once per				
year	5	10	15	20
14 m/s	19 m/s	21 m/s	23 m/s	24 m/s

Average monthly and annual values of relative humidity air (%)

Table 8

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
Bokhtar	81	76	70	66	57	46	45	47	51	59	68	79	62

Average number of cases with thunderstorms

Table 9

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
Bokhtar	-	0,2	1	3	6	2	0,5	0,1		0,1	0,2		13

Average number of days with fog

Table 10

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
Bokhtar	4	1	0,4	0,2	0,03					0,03	1	4	11
season												X-III	IV-IX
day												10	1

Dangerous hydrometeorological phenomena affecting the operation of the facility are not observed. The exception may be flooding of the basement part of the structure as a result of poor operation of the drainage system, which provides a constant level of groundwater in this area and the surrounding area.

In summer, due to the strong solar radiation, the walls of buildings (mostly western) are heated to 55 °C. The greatest amount of solar radiation enters the interior in the western and eastern orientation of facades, the least in the northern and southern. Relative orientation of facades should be considered south.

- design snow load -70 kgf/m²
- normative wind load -38 kgf/m²
- the duration of the heating period -110 days.
- depth of soil freezing - 0.40 m (at absolute minimum)

2.4.Geological structure, hydrogeological conditions, physical and geological processes and phenomena

Geologically, the site consists of alluvial-proluvial deposits of Upper Quaternary and modern age represented by coarse-clastic soils over 15.0 m thick, overlain by clay soils to the depth of 5.2-5.3 m and bulk soils to the depth of 0.70-0.80 m and soil-vegetative layer to the depth of 0.30 m. The total thickness of the deposits is 15.0 m.

Conditions of occurrence of lithological and genetic varieties of soils are presented in Attachment No. 6.2, Drawing No. 7034, sheet 1-2.

Ground waters in explorations for the period of surveys (March) are opened on the depth of 2.30 m, which is close to its maximum position, the minimum position is timed for the autumn-winter period and is supposed to be 3.10-3.20 m. Amplitude of fluctuation of Groundwater level (GWL) is 0.80-1.0 m.

The source of groundwater feeding is mainly irrigation systems water and, to a lesser extent, atmospheric precipitation and anthropogenic water.

In terms of chemical composition groundwater is chloride-hydrocarbonate-sodium-calcium, pH = 7.8, dry residue 1536 mg/l, hardness 29 mg-eq. and is characterized by the following Kurlov formula.

$$M_{2.1} = \frac{Cl_{40} HCO^3_{36} SO^4_{24}}{Ca_{68} Mg_{22} Na_{10}} \quad (\text{appendix No 5.9})$$

In terms of chloride content, groundwater is slightly aggressive to reinforcement of reinforced concrete structures during periodic wetting and non-aggressive when they are permanently immersed.

As for sulfate content (SO_4) at (HCO_3 over 6.0 mg/eq) ground waters are slightly aggressive to concrete W_4 , W_6 and not aggressive to concrete W_8 on Portland cement according to GOST 10178-86 and not aggressive to concrete on Portland slag cement and sulfate resistant cement according to GOST 10178-86.

Corrosion aggressiveness of underground waters in relation to non-ferrous metals: to aluminum and lead cable sheathing is medium (Appendix № 5.10).

Current physical and geological processes at the time of survey at the site of works and adjacent territory, excluding human activities (existing structures and engineering communications).

2.5. Physical and mechanical properties of soils.

Identification of the engineering-geological elements within the active zone of the foundation grounds and all its explored thickness is made on the basis of the analysis of the spatial variability of the particular properties of soils determined by laboratory methods, taking into account the data on the geological-lithological structure and hydrogeological conditions, in accordance with GOST 20522-96 and internal documents specifying and explaining the mentioned GOST.

As a result of the performed calculations, 6 engineering-geological elements (EGE) were identified in the geological-lithological section, which are described below:

Engineering-geological element No. 1 - is represented by a soil-vegetation layer of loamy composition with roots of grassy plants, layer thickness is 0.30 m.

Normative value of density is 1.20 t/m³.

Engineering-geological element No. 2 - is represented by the bulk soil, consisting of loam with a small content of construction and household debris. The soil is dense, compacted, low-moisture, layer thickness is 0.40-0.50 m.

The normative value of the density of the soil to take 1.80 t/m³.

Engineering-geological element № 3 -lying above GVL (groundwater level), according to the normative value of plasticity number 7.2 is represented by brownish loam, of medium density, pelitic structure, massive texture, from semi-solid to tight plastic consistency, with signs of ironing and roots of plants.

The main characteristics of the physical and mechanical properties of IGE No. 3 are as follows:

- moisture content varies from 21.7 to 23.3% with the normative value of 22.5%;
- Ground density in a natural condition is 1.60-1.86 t/m³, while the normative value of 1.78 t/m³.
- density of soil in water-saturated state is 1.80-1.95 t/m³, with the normative value of 1.91 t/m³.

The deformation properties of clayey soil were determined in the laboratory by means of compression devices in the range of loads $P_{byt}+0.2$ MPa in its natural state and in water-saturated state.

The deformation modulus in the natural state is 5.17 MPa, in the water saturated state is 2.76 MPa.

The conventional dynamic resistance of soil determined by dynamic probing varies from 0.58 to 2.18 MPa with the averaged value of 1.09 MPa. (Appendix № 5.12).

Clayey soils of the site (IGE №3) have minimal subsidence properties only under additional loads. The type of soil conditions according to the manifestation of subsidence properties is I (first).

Engineering-geological element № 4 -lying below GVL (groundwater level), according to the normative value of the number of plasticity 7.4 is a brown loam, dense, pelitic structure, massive texture, viscous, sticky from soft plastic to flowing consistency, with rare inclusions of small gravel.

The main characteristics of physical and mechanical properties of IGE № 4 are as follows:

- moisture content varies from 22.7 to 27.1% with the normative value of 25.6 %;
- soil density in natural (water-saturated state) is 1.98-2.11 t/m³, while the normative value is 2.02 t/m³.

Deformation modulus in natural (water-saturated) state is 2.76 MPa.

The deformation properties of IGE № 3 and № 4 were determined in the laboratory by the method of unconsolidated cut at its water saturation in the range of loadings 0.1-0.3 MPa and make up:

- cohesion is 0.0325-0.0350 MPa, with a normative value of 0.0337 MPa;
- angle of internal friction is 23°00' - 24°00', with the normative value of 23°30'.

The conventional dynamic resistance of the soil determined by dynamic probing varies from 0.58 to 2.18 MPa, with the averaged value of 3.0 MPa. (Annex No. 5.12). Clayey soils (IGE No.4) located below the SPE do not have subsidence properties.

Engineering-geological element № 5 -is represented by coarse-clastic (pebble) soil deposited at the base of the lithological section in the interval of 5.20-6.80 m.

According to the data of archival materials and visual identification, the average particle size distribution of deposits is as follows:

- boulders - 10.0%
- pebbles - 55.1%
- gravel - 15.4%
- sandy loam (aggregate) - 19.5% (Appendix № 5.4, sheet 1).

According to the nomenclature of GOST 25100-2011, Table 2, these sediments In accordance with the nomenclature of GOST 25100-2011, Table 2, these sediments belong to pebble soil with inclusion of boulders up to 10%. The debris is well rounded, rounded and oval in shape. In petrographic terms, the soil is represented by metamorphic and, less frequently, igneous and sedimentary rocks. The fill is sandy loam with small (4-6 cm) interlayers of clayey soils, the soil is water-saturated.

According to archive materials made in the adjacent territory of the density of soil is 1.98-2.02t/m³, with a standard value of 2.00 t/m³, the calculated value at the confidence level of 0.95 is 1.98 t/m³, and at 0.85 - 2.00 t/m³.

- The angle of internal friction is 39°41' to 41°18', with a standard value of 40°18', the calculated values at a confidence level of 0.95 are 39°29', and at 0.85 are 39°43' (Appendix No. 5.5, sheet 1).

The conventional dynamic resistance of the soil determined by dynamic probing varies from 4.87 to 9.74 MPa, with the averaged value of 6.72MPa. (Annex No. 5.12).

According to MKS TS 50-01-2007, appendix 5, table 5.1, the calculated resistance of pebble soils is 400 kPa, the same, appendix 4, volume 4.1, cohesion - 0.006 MPa, deformation module - 28 MPa.

Engineering geological element № 6 -is represented by coarse-clastic (pebble) soil deposited at the base of the lithological section in the interval of 6.80 - 15.0 m.

According to the data of archival materials and visual identification, the average particle size distribution of deposits is as follows:

- boulders - 10.0%
- pebbles - 53.2%
- gravel - 21.8%
- sand - 15.0% (Attachment № 5.4, sheet 2).

According to the nomenclature of GOST 25100-2011, Table 2, these sediments belong to pebble soil with inclusion of boulders up to 15%. The fragments are well rounded, rounded and oval in shape. In petrographic terms, the soil is represented by metamorphic and, less frequently, igneous and sedimentary rocks. The aggregate is sand (15-20%), gray, water-saturated.

According to archive materials field measurements of soil density are 2.08-2.12 t/m³ , with a normative value of 2.10 t/m³ , calculated values are 2.08 t/m³ at a confidence probability of 0.95 and 2.10 t/m³ at 0.85.

- The angle of internal friction is 38°56' to 43°42', with a standard value of 40°24', the calculated values at a confidence level of 0.95 are 38°45', and at 0.85 it is 39°34' (Appendix No. 5.4, sheet 2).

In accordance with MKS TS 50-01-2007, appendix 5, table 5.1 the calculated resistance of pebble soils is 600 kPa, the same, appendix 4, vol.4.1, cohesion - 0.001 MPa, the modulus of deformation - 40 MPa.

The conventional dynamic resistance of the soil determined by dynamic probing varies from 11.69 to 17.54MPa, with the averaged value of 14.2 MPa. (Annex No. 5.12).

Corrosion aggressiveness of clay soils to carbon and low-alloy steel is medium (Appendix № 5.7)

Corrosion aggressiveness of clay soils to non-ferrous metals: to aluminum cladding of the cable - high, to lead - medium, in connection with which it is necessary to provide for measures for corrosion protection of utilities (Attachment № 5.8).

In terms of chemical composition, by the content of SO_4 (moist zone), the site soils are moderately aggressive with respect to concrete grades W_4 , W_6 , slightly aggressive to concrete grades W_8 on Portland cement for water resistance according to GOST 10178-86 and not aggressive to concrete of all grades of water resistance on Portland slag cement and sulfate resistant cements

- in terms of CI content, taking into account SO_4 , the site soils are moderately aggressive to the reinforcement of reinforced concrete structures using any grades of cement (Appendix № 5.10).

Clay soils of the site are not saline, the content of plant residues does not exceed permissible standards (Appendix № 5.8, 5.10).

3. Forecast of changes in engineering and geological conditions of the site in connection with engineering development its territory.

According to the data of surveys, the site of the projected construction is formed by coarse-clastic soils over 15.0 m thick, covered with clay soils from the surface to a depth of 5.2-5.3 m, bulk soils to a depth of 0.70-0.80 m and the topsoil to a depth of 0.30 m. The total exposed thickness of sediments is 15.0 m.

Underground water is revealed at the depth of 2.30 m by exploratory excavations for the period of surveys (March), which is close to its maximum

The minimum position is timed to the autumn-winter period and is expected to be 3.10-3.20 m. Amplitude of underground water fluctuation is 0.80-1.0 m. The source of groundwater recharge is mainly irrigation systems water and, to a lesser extent, atmospheric precipitation and technogenic water.

As the construction experience shows in the similar engineering and geological conditions the change of physical and mechanical properties of soils comprising the site of works, practically will not occur.

Modern physico-geological processes at the time of investigations at the work site and adjacent territory, with the exception of human activities (existing buildings and engineering communications) are not observed.

Seismic activity of the site, according to the map of seismic zoning of the territory of the Republic of Tajikistan, is 7 points. Category of soils on seismic properties III-third, the index of consistency > 0.5 , the calculated seismicity to take 8 points on a scale of MSK-64.

4. Conclusions and recommendations.

4.1 According to the results of the performed engineering-geological surveys, the thickness of soils of the base of the designed tower to the explored depth of 15.0 m is heterogeneous, within its limits six engineering-geological elements are identified. Lithological composition of soils, which are the base of the designed structure, with division of layers is given in Appendix No. 6.2, drawing No. 7034, pages 1-2

4.2 Standard and design values of the soil characteristics of the selected engineering and geological elements, which are recommended for use in calculations of the foundation deformation and bearing capacity, are given in Chapter 2.5 and in Appendix 5.6, Sheets 1-3.

4.3. Underground waters in explorations for the period of survey (March) are revealed at a depth of 2.30 m, which is close to its maximum position, the minimum position is timed for the autumn-winter period and is expected to be 3.10-3.20 m. Amplitude of underground water fluctuation is 0.80-1.0 m.

The source of groundwater recharge is mainly irrigation systems water and, to a lesser extent, atmospheric precipitation and anthropogenic water.

In terms of chemical composition groundwater is chloride-hydrocarbonate-sodium-calcium, pH = 7.8, dry residue 1536 mg/l, hardness 29 mg-eq.

Groundwater is slightly aggressive to reinforcement of reinforced concrete structures as to chloride content when periodically wetted and is not aggressive when permanently immersed.

As for sulfate content (SO_4) at (HCO_3 over 6.0 mg/eq) ground waters are nonaggressive to concrete W_4 , W_6 and not aggressive to concrete W_8 on Portland cement according to GOST 10178-86 and not aggressive to concrete on Portland slag cement and sulfate resistant cements according to GOST 10178-86.

Corrosion aggressiveness of ground water in relation to non-ferrous metals: to aluminum and lead cable sheath - medium.

4.4 The clayey soils of the site (IGE No. 3) have minimal subsidence properties only under additional loads. Type of soil conditions according to the manifestation of subsidence properties is I (first). Clayey soils (SGE №4) located below the level of groundwater do not have subsidence properties.

4.5 Corrosion aggressiveness of clay soils in relation to the carbon and low-alloy steel is medium.

4.6 Corrosion aggressiveness of clay soils in relation to non-ferrous metals: to aluminum cable sheathing - high, to lead - medium, in connection with which in the design it is necessary to provide measures for corrosion protection of engineering communications.

4.7 In respect of chemical composition, by the content of SO_4 (moist zone), the site soils are moderately aggressive with respect to concrete grades W_4 , W_6 , slightly aggressive to concrete grades W_8 on Portland cement for water resistance according to GOST 10178-86 and not aggressive to concrete of all grades of water resistance on Portland slag cement and on sulfate-resistant cements

- in terms of CI content, taking into account SO_4 , soils of the site are moderately aggressive to the reinforcement of reinforced concrete structures using any grades of cement.

4.8. Clayey soils of the site are not saline, the content of plant residues does not exceed permissible norms.

4.9 Construction category of soils on their development to take according to GNiP RT 81-01-2007 tabl. 1 items. 9 b), 26 a), 35 c), 6 a) depending on the type of excavation and the type of used mechanisms.

4.10 Slope inclination of pits and trenches is taken in accordance with MKC ЧТ 50-01-2007, Tab. 13.1, p. 116 depending on the depth of their excavation and the nomenclature of soils, will have the following values

Name soil	at a depth of excavation in m, up to		
	1.5	3.0	5.0
bulk soil	1:0.67	-	-
clay loam	1:0.	1:0.50	1:0.75
pebble soil	1: 0.5	1:1	1:1

Note: When designing a temporary drainage system in order to lower the underground water, the filtration coefficient of clay soils to take - 0.12-0.18 m / day.

4.11. The recommended type of foundation - solid reinforced concrete slab, as a method of engineering preparation of the base of the projected water tower is recommended the device of soil cushion of coarse clastic soil.

In the case of laying the foundation below the groundwater level (2.30 m), it is necessary to dig an excavation pit to the design depth, bring coarse clastic material (river gravel of 10-15 cm in size) and compress it into the water-saturated clay soil to failure, and then proceed to the construction of the foundation.

Also it is not excluded to consider the option of driven piles in similar conditions, which was practiced in the 80-ies of the last century in the city of Bokhtar (before the failure on the pebble soil).

4.12. In order to lower the level of groundwater it is recommended to arrange a ring drainage, and it is advisable to carry out excavation work in the autumn and winter time, in the period of the maximum standing of groundwater.

4.13. The type of foundations and engineering preparation of the territory shall be selected by the designer based on the structural features of the designed facility and the given engineering and geological conditions taking into account the requirements of MKS RT 50-01-2007, appendix. 3.68-3.71 "Foundations and fundamentals of buildings and Structures".

4.14. Physical and geological processes at the time of survey on the site and adjacent territory, excluding human activities (existing buildings and engineering communications).

4.15. Seismic activity of the site, according to the seismic zoning map of the territory of the Republic of Tajikistan, is 7 points. Soil category according to seismic properties III-third, design seismicity to accept 8 points on the MSK-64 scale.

Compiled by

Morkel N.V.

Terms of Reference

for

Boring Survey for Elevated Tank

on

The Preparatory Survey for the Project
for Improvement of Water Supply Systems
in Jomi District, Khatlon Region

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Appendix No. 5.1

1. GENERAL

These terms of reference shall be applied to the boring surveys for basement of planned elevated tank in Jomi Town. The work includes on site tests and soil laboratory tests.

2. LOCATION

The adjacent land of well No.1 in Jomi Town. The detail drilling points shall be confirmed by the Consultant after the topographic survey.

3. SUPERVISOR

The Contractor shall assign an engineer to the site as a representative/supervisor. The assigned engineer shall supervise at the site till the completion of the field work, be in full control of all works, and maintain timely communication with the Consultants.

4. Scope of Works

The Work comprises the following items.

4.1 Mobilization to site

The Contractor shall arrange and prepare all necessary personnel, material, equipment, and tools for the Works. He shall bear the all-relevant costs including accommodations for his personnel and labors, transportation of personnel, material and equipment, and any other costs to execute the tests on site.

Boring machine must be selected that are capable of withstanding drilling and must be securely installed. The work area shall be enclosed by a safety fence to keep out the public access.

4.2 Boring survey and soil laboratory test.

The Work include following contents.

1) Machine Boring

Two (2) in total, for planned elevated tank. Each estimated depth is 15m. It shall be confirmed at least 5m of continuous dense cobblestone layer. The final depth should be discussed with the Consultants based on the geological condition. If the groundwater is detected, the depth shall be reported.

2) Cone Sounding

The test should be operated under GOST standard. The number of survey points should be four (4).

3) Soil Sampling

Number of samples is planned two in each borehole. The sampling depth should be discussed with the Consultants based on the geological condition.

4) Soil Test

The test should be done using above-mentioned samples. The items are expected to consist of Moisture Content, Specific Gravity, Sieve Analysis, Liquid plasticity limit test, Compression test, and Consolidation test. The type of test to be performed shall be determined by the properties of the sample taken. It shall be approved by the Consultant.

4.3 Demobilization

On the completion of all the works in the field, the Contractor shall remove all the equipment and materials concerned and clean up the sites as almost same as in original status before the commencement of the Work.

5. Records and Report

- 1) Daily working record
- 2) Photographs for boring survey, cone sounding, soil sampling, and soil laboratory tests
- 3) Final Report (boring columnar section, soil laboratory test data sheets)

The report should be written in English or Russian. (2 hardcopies and softcopy)

6. Duration of the Work

Preparation and Field work	by March 10, 2023
Reporting	by March 25, 2023

7. MEASUREMENT AND PAYMENT

Payment will be made based on the following pay items. Unit costs of payment item shall also include necessary tax in Tajikistan.

The payment shall include full compensation for all costs including equipment, tools, labor, materials, transportation, and other incidentals to complete the Works, including recording, and presenting the results.

**CATALOG OF EXPLORATION EXCAVATIONS
AND LITHOLOGICAL DESCRIPTION OF SOILS**
*Object: "Construction of water tower in A.Jomi settlement
in Khatlon Region of the Republic of Tajikistan"*

№. № п/п	Soil Description.	Type and number output.	СКВ-ВН -1	СКВ-ВН -2	
		Coordinates	X-86952.17 Y-26064.16	X-86351.88 Y-26046.53	
		Mark mouth, m.	423.52	423.37	
		Sec. m ² . dia. mm	219	219	
		Depth, m	15.0	15.0	
		Geomorphology	Surface of the II-nd right bank terrace of the Vakhsh River.		
		GWL, m .opened	2.30	2.30	
		Date tunneling, drilling.	25 - 26.03. 2023г.	26 - 27.03. 2023г.	
1.	Soil layer of loamy composition, with roots of herbaceous plants.	Soil category according to the difficulty of its excavation according to GNIP RT 81-01-2007, Table 1.	9 б)	0.0 - 0.30	0.0 - 0.30
2.	Bulk soil consisting of clay soil with a small amount of construction and household debris. The soil is of medium density, compacted, low-moisture.		26 a)	0.30 - 0.80	0.30 - 0.70
3.	Brownish loam, of medium density, pelitic structure, massive texture, from semi-solid to tightly plastic consistency with signs of ferruginization and plant roots, the soil is above the GWL.		35 Б)	0.80 - 2.30	0.70 - 2.30
4.	Brown loam, dense, massive texture, viscous, sticky, softly plastic to flowing consistency, with rare inclusions of small gravel, the soil lies below the UP.		35 Б)	2.30 - 5.20	2.30 - 5.30
5.	Pebble soil, predominant debris size 4-8 cm, well rounded and oval in shape, petrographic composition - metamorphic, and less often magmatic and sedimentary rocks. The filler is sandy loam (20-25%) with small (up to 4-6 cm) interlayers of clayey soils, water-saturated. Soil with inclusion of boulders up to 10%.		6 a)	5.20 - 6.80	5.30 - 6.70
6.	Pebble soil, predominant debris size 5-10 cm, well rounded and oval in shape, petrographic composition - metamorphic, and less often magmatic and sedimentary rocks. The filler is sand (15-20%), gray, water-saturated. Soil with inclusions of boulders 10-15%.		6 a)	7.20 - 15.0	6.70 - 15.0

Compiled by Morkel N.V.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES OF SOILS

Object: "Construction of water tower in A.Jomi settlement in Khatlon Region of the Republic of Tajikistan"

№	No. of the EGE engineering and geological element	No. of production	depth, m	Specific weight	Density t/m ³				Soil porosity		Soil porosity coefficient	Soil moisture in fractional units.					Number of plasticity	Soil name
					In its natural state	at full saturation	In a suspended state	skeleton	n	e		Natural	Degree of humidity in the natural state	Total moisture capacity	At the yield point	At the rolling edge		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
				ρ_s	ρ	ρ_B	ρ_B	ρ_B	ρ_d	n	e	W	I_w	W_n	W_L	W_p	J_p	
1	2	СКВ -BH-1	1.5	2.68	1.70	1.80	0.80	1.41	0.474	0.901	20.3	57.09	33.6	26.0	18.9	7.1	clay loam	
2	2	-//-	2.0	2.68	1.85	1.95	0.95	1.52	0.433	0.763	21.7	76.20	28.5	25.3	18.2	7.1	clay loam	
3	3	-//-	3.0	2.68	1.96	2.00	1.00	1.60	0.403	0.675	22.7	90.13	25.2	25.8	18.0	7.8	clay loam	
4	3	-//-	4.0	2.68	2.02	2.02	1.02	1.62	0.396	0.654	24.5	100.35	24.4	25.0	17.6	7.4	clay loam	
5	3	-//-	5.0	2.68	2.01	2.01	1.01	1.59	0.407	0.686	26.6	103.99	25.6	25.4	18.3	7.1	clay loam	
6	2	СКВ -BH-2	1.5	2.68	1.72	1.90	0.90	1.43	0.466	0.874	20.7	63.52	32.5	26.9	19.4	7.5	clay loam	
7	2	-//-	2.0	2.68	1.86	1.95	0.95	1.48	0.437	0.775	20.9	78.51	28.9	25.0	18.0	7.0	clay loam	
8	3	-//-	3.0	2.68	1.98	1.98	0.98	1.51	0.422	0.729	23.5	99.62	27.2	27.0	19.3	7.7	clay loam	
9	3	-//-	4.0	2.68	2.11	2.11	1.11	1.66	0.381	0.614	27.0	117.76	22.9	25.5	18.0	7.5	clay loam	
10	3	-//-	5.0	2.68	2.00	2.00	1.00	1.58	0.410	0.696	26.8	103.28	25.9	25.4	18.3	7.1	clay loam	

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES OF SOILS

No n.n.	coefficient					Strain modulus.		Value of natural pressure, MPa	Relative subsidence					Initial drawdown pressure, MPa	Angle of interna. of friction, ϕ	cohesion, MPa	consistency	
	a	a_w	β	m	m_w	E	E_w		P_u	At natural pressure, MPa	At a load Pbyt. + 0.05 MPa	At load. Pbyt. + 0.1 MPa	At a load Pbyt. + 0.15 MPa				At a load Pbyt. + 0.2 MPa	P_{ps}
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
1	0.33	0.42	0.658	1.47	1.0	5.17	2.76	0.039	0.003	0.004	0.005	0.007	0.009	>0.2	24° 00'	0.0350	0.49	1.44
2																	0.60	1.80
3																	0.93	1.74
4																	1.17	1.03
5																	0.17	1.59
6																	0.41	1.18
7																	0.55	1.20
8																	1.20	0.65
9																	1.17	1.03
10																		

Compiled by

Morkel N.V.

RESULTS
OF MECHANICAL ANALYSIS BY SIEVE METHOD IN % OF SOILS

Object: "Construction of a water tower in the settlement of A. Jomi in Khatlon Region of Tajikistan".

EGE No. 5 - pebble soil

№ п п	№ production	Depth	Average value of particle size distribution											Name soil	
			200 ^	200-100	100- 40	40-20	20-10	10- 5.0	5.0- 2.0	2.0- 1.0	1.0- 0.5	0.5- 0.25	0.25- 0.10		0.10
1.	Pit-3*.	5.0	10	14.0	14.5	14.5	14.1	7.3	8.0	4.7	4.1	4.4	3.1	1.3	pebble soil
2.	-//-	6.0	10	13.7	13.4	12.9	14.6	8.4	9.0	5.2	4.8	4.1	3.7	0.2	-//-
3.	-//-	7.0	10	14.9	13.5	14.0	14.0	8.0	7.0	7.0	6.0	3.3	1.2	1.1	-//-
4.	Pit-3*.	5.5	10	13.9	14.8	13.3	13.8	8.4	7.2	5.1	5.7	4.5	2.1	1.2	pebble soil
5.	-//-	6.5	10	14.3	13.2	14.8	14.2	6.1	8.0	7.0	4.2	4.2	2.0	2.0	-//-
6.	-//-	7.0	10	13.8	13.1	13.0	13.2	8.0	7.5	6.02	6.0	4.0	3.0	2.3	-//-
			Average value of particle size distribution												
			10	14.1	13.8	13.8	14.0	7.7	7.8	5.8	5.1	4.1	2.5	1.3	pebble soil
			boulders - 10.0%												
			pebbles - 55.7%												
			gravel - 15.5%												
			loam - 18.8%												

Note: pit-3,4* -data on granulometric composition are given according to the archival materials made on adjacent territories.

Geologist

B.B. Shonazarov.

RESULTS
MECHANICAL ANALYSIS BY SIEVE METHOD IN % OF SOILS

Object: "Construction of a water tower in the settlement of A. Jomi in Khatlon Region of Tajikistan".

EGE No. 6-pebble soil

№ mm	№ production	Depth	> 200	200- 100	100- 40	40- 20	20-10	10- 5.0	5.0- 2.0	2.0- 1.0	1.0-0.5	0.5- 0.25	0.25- 0.10	0.10	Name soil
1.	Pit-3*	7.0	10.0	17.9	15.5	10.5	11.1	11.0	9.0	5.7	4.5	3.4	1.1	0.3	pebble soil
2.	-//-	8.0	10.0	17.6	15.4	10.0	12.6	10.1	9.9	4.8	5.6	3.1	0.7	0.2	-//-
3.	-//-	9.0	10.0	17.7	13.9	12.9	10.2	10.5	9.5	5.7	5.2	3.1	1.0	0.3	pebble soil
4.	pit-4*	7.0	10.0	18.8	14.4	12.0	10.7	10.2	9.8	4.9	4.6	3.3	1.2	0.1	-//-
5.	-//-	8.0	10.0	17.8	13.8	11.3	11.8	10.9	8.2	5.1	5.3	4.5	1.1	0.2	pebble soil
6.	-//-	9.0	10.0	18.2	13.2	12.8	10.2	10.8	9.8	5.0	4.8	4.2	0.9	0.1	-//-
Average value of particle size distribution															
			10.0	18.0	14.4	11.6	11.1	10.6	9.3	5.2	5.0	3.6	1.0	0.2	pebble soil

Note: pit-3,4* -data on granulometric composition are given according to the archival materials made on adjacent territories.

Geologist

B.B. Shonazarov.

ОАО «ГПИИТИЗ»

Appendix No. 5.5
Sheet 1.
Arch. no. 12862

**RESULTS
OF FIELD DETERMINATION OF DENSITY AND ANGLE
OF THE NATURAL SLOPE.**

Object: "Construction of a water tower in the settlement of A. Jomi in Khatlon
Region of Tajikistan".

*EGE № 5 - pebble soil
sandy loam aggregate*

№ № III	Develop- working out and its number	Depth in m.	Weight soil ton.	Volum e water, m ³ .	Density density soil t/ m ³	Height cone, m.	Diagram meter base- of the base cone, m	Angle of natural- natural slope, deg.	tgφ
1	2	3	4	5	6	7	8	9	10
1.	pit -3*	5.0	0.0464	0.0231	2.01	0.32	0.80	39° 41'	0.800
2.	- / -	6.0	0.0514	0.0260	1.98	0.45	1.07	40° 11'	0.844
3.	- / -	7.0	0.0486	0.0243	2.00	0.36	0.82	41° 18'	0.878
4.	pit -4*	5.5	0.0526	0.0260	2.02	0.32	0.75	40° 29'	0.853
5.	- / -	6.5	0.0472	0.0237	1.99	0.35	0.82	40° 43'	0.834
6.	- / -	7.0	0.0501	0.0249	2.01	0.40	0.91	41° 18'	0.879
					$P_n = 2.00 \text{ t/ m}^3$ $v = 0.01$ $P_I = 1.98 \text{ t/ m}^3$ $p_{II} = 2.00 \text{ t/ m}^3$			$\Phi_n = 40^\circ 18'$ $v = 0.04$ $\varphi_I = 39^\circ 29'$ $\varphi_{II} = 39^\circ 43'$	

Geologist

B.B. Shonazarov.

JSC GIINTIZ

Appendix No. 5.5

Sheet 2.

Arch. no. 12862

**RESULTS
OF FIELD DETERMINATION OF DENSITY AND ANGLE
OF THE NATURAL SLOPE.**

*Object: "Construction of a water tower in the settlement of A. Jomi in Khatlon
Region of Tajikistan".*

*EGE № 6 - pebble soil
sandy aggregate*

№ № III	Develop- working out and its number	Depth in m.	Weight soil ton.	Volum e water, m ³ .	Density density soil t/ m ³	Height cone, m.	Diagram meter base- of the base cone, m	Angle of natural- natural slope, deg.	tgφ
1	2	3	4	5	6	7	8	9	10
1.	pit -3*	5.0	0.0480	0.0231	2.08	0.43	1.01	40° 24'	0.851
2.	- / -	6.0	0.0580	0.0275	2.11	0.39	0.90	43° 42'	0.956
3.	- / -	7.0	0.0530	0.0252	2.10	0.34	0.80	40° 22'	0.850
4.	pit -4*	5.5	0.0540	0.0255	2.12	0.30	0.70	40° 36'	0.857
5.	- / -	6.5	0.0360	0.0172	2.09	0.40	0.99	38° 56'	0.808
6.	- / -	7.0	0.0470	0.0224	2.10	0.45	1.05	40° 36'	0.857
					$P_{II} = 2.10 \text{ t/ m}^3$ $v = 0.01$ $P_I = 2.08 \text{ t/ m}^3$ $p_{II} = 2.10 \text{ t/ m}^3$				
					$tg\varphi_{II} = 40^\circ 24'$ $v = 0.05$ $tg\varphi_I = 38^\circ 45'$ $tg\varphi_{II} = 39^\circ 34'$				

Note: pit-3,4* -data on granulometric composition are given according to the archival materials made on adjacent territories.

Geologist

B.B. Shonazarov.

RESULTS OF STATISTICAL PROCESSING OF SOIL CHARACTERISTICS
(normative and calculated)

Engineering-geological element No. 1 - soil-vegetation layer

$$P^H = 1.20 \text{ t/m}^3$$

Engineering-geological element No. 2 - bulk soil

(low-moist soil)

$$P^H = 1.80 \text{ t/m}^3$$

Engineering-geological element No.3 - J n=7.1 loam above GWL

(semi-solid to tight plastic consistency)

$$w^n = 22.5\% \quad P^{n_{\text{nat}}} = 1.78 \text{ t/m}^3 \quad P^{n_{\text{wat.}}} = 1.91 \text{ t/m}^3 \quad E^{n_{\text{nat}}} = 5.17 \text{ MPa} \quad E^{n_{\text{wat.}}} = 2.76 \text{ MPa}$$

$$C^n = 0.0337 \text{ MPa}$$

$$\varphi^H = 23^\circ 24'$$

Engineering-geological element No 4 - J n=7.4 loam under GWL

(soft plastic to fluid consistency)

$$w^H = 25.6\% \quad P^{n_{\text{wat.}}} = 2.02 \text{ t/m}^3 \quad E^{n_{\text{wat.}}} = 2.76 \text{ MPa}$$

$$C^n = 0.0337 \text{ MPa}$$

$$\varphi^n = 23^\circ 24'$$

RESULTS OF STATISTICAL PROCESSING OF SOIL CHARACTERISTICS
(standard and design)

Engineering-geological element No. 6-pebble soil
(sand filler - low-moisture)

$$P_{nat.} = 2.10 \text{ T/M}^3$$

$$u = 0.01$$

$$p_I = 2.08 \text{ t/m}^3$$

$$p_{II} = 2.10 \text{ t/m}^3$$

$$\varphi_{nat} = 40^\circ 24'$$

$$u = 0.04$$

$$\varphi_I = 38^\circ 45'$$

$$\varphi_{II} = 39^\circ 34'$$

$$C = 0.006 \text{ MPa} \quad \left. \begin{array}{l} \text{MKS} \\ \text{RT 50-01-2007, Appendix 4, table 4.1} \end{array} \right\}$$

$$E_{nat} = 28 \text{ MPa} \quad \left. \begin{array}{l} \text{MKS} \\ \text{RT 50-01-2007, Appendix 5, table 5.1} \end{array} \right\}$$

$$R_0 = 400 \text{ kPa} \quad \left. \begin{array}{l} \text{MKS} \\ \text{RT 50-01-2007, Appendix 5, table 5.1} \end{array} \right\}$$

RESULTS OF STATISTICAL PROCESSING OF SOIL CHARACTERISTICS
 (standard and design)

Engineering-geological element № 5 - pebble soil with sandy loam aggregate

(sand filler - low-moisture)

$\Gamma_{nat.} = 2.00 \text{ t/m}^3$	$\varphi_{nat} = 40^\circ 18'$
$u = 0.01$	$u = 0.04$
$p_I = 1.98 \text{ t/m}^3$	$\varphi_I = 39^\circ 29'$
$p_{II} = 2.00 \text{ t/m}^3$	$\varphi_{II} = 39^\circ 43'$

$C = 0.006 \text{ MPa}$ MKS RT 50-01-2007, Appendix 4, Table 4.1

$E_{nat} = 28 \text{ MPa}$

$R_0 = 400 \text{ kPa}$ MKS RT 50-01-2007, Appendix 5, Table 5.1

Compiled by Morkel N.V.

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Appendix No. 5.7

Sheet 1.

Arch. no. 12862

**RESULTS OF ANALYSIS
CORROSION OF SOILS
BY USE OF METHOD OF SER**
(Method of Specific electric resistance)

Object: "Construction of water tower in A.Jomi settlement in Khatlon region of RT".

No/ № п/ П	No production	Depth selection, in m.	SER B OM. M	Corrosion aggressiveness soils
1	2	3	4	5
1.	borehole -1	1.5	28.20	average
2.	borehole -2	2.0	26.40	average

Geotechnician laboratory

assistant Ziyadullaeva G.

GIINTIZ

Appendix No. 5.8

Sheet 1.

Arch. no. 12862

**RESULTS OF ANALYSIS
CORROSION ACTIVITY OF SOILS
TO NONFERROUS METALS**

*Object: "Construction of water tower in A.Jomi settlement in Khatlon
region of RT".*

No/ № п/ п	No production	Depth selection, in m.	PH	Chlorine- ions,% CL	Nitrate- ions,% NO ₃	Iron ions,% Fe	Organic substances%
1	2	3	4	5	6	7	8
1.	borehole -1	1.5	8.80	0.0274	0.0006	no	0.0028
2.	Borehole-2	2.0	8.94	0.0686	0.0004	no	0.0030

Laboratory geotechnician

Dadabaeva G.

GIINTIZ

Appendix No. 5.9
Sheet 1.
Arch. no. 12862**CHEMICAL WATER ANALYSIS***Object: "Construction of water tower in A.Jomi settlement in Khatlon region of
RT".*No. of excavation - Well No. 1
sampling depth - 2.30 m.

Chemical composition of water

KATHYONS	Content per liter				Other definitions
	Ions	Mg/l	Mg-equivalent	% Mg-equivalent	
	Ca	440.9	22.0	68.15	CO mg/L.
	Mg	85.1	7.0	21.69	CO2 atres expert/exercise mg/l -3.52
	Na	75.4	3.28	10.16	Oxidation O2 mg/l -3.52
	K				Hardness (mg/l) 29.0 and deg.
	NH4	no			Dry Residue 2138.2 mg/l
	Fe ⁺⁺	- / / -			PH 7.78
	Fe ⁺⁺⁺	- / / -			Physical properties
					Transparency
ANIONS	Total:	601.4	32.28	100.0	Taste - b/w
	CO3	no	-	-	Color - b/c
	HCO3	700.3	11.48	35.56	Odor - none
	Cl	459.6	12.96	40.15	Sediment - is
	SO4	376.9	7.84	24.29	Change on standing
	NO3				
	NO2				
	Total:	1536.8	32.28	100	

Kurlov's formula:

$$M_{2.1} = \frac{Cl_{40} HCO^3_{36} SO^4_{24}}{Ca_{68} Mg_{22} Na_{10}}$$

Laboratory chemist

Dadabaeva G.

ОАО «ГИИНТИЗ»

Appendix #5.10

Sheet 1.

Arch. no. 12862

TABLE
chemical composition of soils
 Type of analysis: aqueous extraction

Object: "Construction of water tower in A.Jomi settlement in Khatlon region of RT".

№ шт	№ production	Depth selecti on, in m.	Мг/ кг грунта								PH
			Dry residue	alkalinity		Cl'	SO ₄ "	Ca"	Mg"	Na'+K'	
				CO ₃ "	HCO ₃ '						
1	2	3	4	5	6	7	8	9	10	11	12
1.	borehole -1	1.5	1981.0	no	317	274	831	401	85	73	8.80
2.	borehole -2	2.0	2231.0	no	268	686	634	421	109	113	8.94

Laboratory chemist

Dadabaeva G.

"GINTZ"

Appendix #5.11.

Sheet 1.

Journal
Soil testing by dynamic sounding method
DPT №1

probe insertion depth	number of strokes in the collateral	the depth of the probe for the bail	correction factors		evaporated number of beats in the pledge	specific energy of probing	conditional dynamic resistance of the ground
m	раз	cm	K1	K2	nK1K2	A, kg/sm	Pd, mPa
0,1	3	10	0,65	1,00	1,95	1120	2,18
0,2	5	10	0,65	1,00	3,25	1120	3,64
0,3	5	10	0,65	1,00	3,25	1120	3,64
0,4	4	10	0,65	1,00	2,60	1120	2,91
0,5	5	10	0,65	1,00	3,25	1120	3,64
0,6	3	10	0,65	1,00	1,95	1120	2,18
0,7	3	10	0,65	1,00	1,95	1120	2,18
0,8	2	10	0,65	1,00	1,30	1120	1,46
0,9	2	10	0,65	1,00	1,30	1120	1,46
1	2	10	0,65	1,00	1,30	1120	1,46
1,1	1	10	0,65	1,00	0,65	1120	0,73
1,2	2	10	0,65	1,00	1,30	1120	1,46
1,3	2	10	0,65	1,00	1,30	1120	1,46
1,4	1	10	0,65	1,00	0,65	1120	0,73
1,5	1	10	0,65	1,00	0,65	1120	0,73
1,6	1	10	0,62	0,83	0,51	1120	0,58
1,7	2	10	0,62	0,83	1,03	1120	1,15
1,8	2	10	0,62	0,83	1,03	1120	1,15
1,9	2	10	0,62	0,83	1,03	1120	1,15
2	1	10	0,62	0,83	0,51	1120	0,58
2,1	2	10	0,62	0,83	1,03	1120	1,15
2,2	1	10	0,62	0,83	0,51	1120	0,58
2,3	1	10	0,62	0,83	0,51	1120	0,58
2,4	2	10	0,62	0,83	1,03	1120	1,15
2,5	1	10	0,62	0,83	0,51	1120	0,58
2,6	1	10	0,62	0,83	0,51	1120	0,58
2,7	2	10	0,62	0,83	1,03	1120	1,15
2,8	2	10	0,62	0,83	1,03	1120	1,15
2,9	3	10	0,62	0,83	1,54	1120	1,73
3	3	10	0,62	0,83	1,54	1120	1,73
3,1	4	10	0,62	0,83	2,06	1120	2,31
3,2	6	10	0,62	0,83	3,09	1120	3,46
3,3	5	10	0,62	0,83	2,57	1120	2,88
3,4	3	10	0,62	0,83	1,54	1120	1,73
3,5	3	10	0,62	0,83	1,54	1120	1,73

Appendix #5.11.

Sheet 2

3,6	5	10	0,62	0,83	2,57	1120	2,88
3,7	3	10	0,62	0,83	1,54	1120	1,73
3,8	4	10	0,62	0,83	2,06	1120	2,31
3,9	5	10	0,62	0,83	2,57	1120	2,88
4	5	10	0,58	0,83	2,41	1120	2,70
4,1	7	10	0,58	0,75	3,05	1120	3,41
4,2	6	10	0,58	0,75	2,61	1120	2,92
4,3	7	10	0,58	0,75	3,05	1120	3,41
4,4	9	10	0,58	0,75	3,92	1120	4,38
4,5	10	10	0,58	0,75	4,35	1120	4,87
4,6	10	10	0,58	0,75	4,35	1120	4,87
4,7	10	10	0,58	0,75	4,35	1120	4,87
4,8	8	10	0,58	0,75	3,48	1120	3,90
4,9	9	10	0,58	0,75	3,92	1120	4,38
5	10	10	0,58	0,75	4,35	1120	4,87
5,1	19	10	0,58	0,75	8,27	1120	9,26
5,2	20	10	0,58	0,75	8,70	1120	9,74
5,3	18	10	0,58	0,75	7,83	1120	8,77
5,4	20	10	0,58	0,75	8,70	1120	9,74
5,5	17	10	0,58	0,75	7,40	1120	8,28
5,6	21	10	0,58	0,75	9,14	1120	10,23
5,7	19	10	0,58	0,75	8,27	1120	9,26
5,8	13	10	0,58	0,75	5,66	1120	6,33
5,9	11	10	0,58	0,75	4,79	1120	5,36
6	10	10	0,58	0,75	4,35	1120	4,87
6,1	14	10	0,58	0,75	6,09	1120	6,82
6,2	12	10	0,58	0,75	5,22	1120	5,85
6,3	12	10	0,58	0,75	5,22	1120	5,85
6,4	13	10	0,58	0,75	5,66	1120	6,33
6,5	12	10	0,58	0,75	5,22	1120	5,85
6,6	12	10	0,58	0,75	5,22	1120	5,85
6,7	11	10	0,58	0,75	4,79	1120	5,36
6,8	10	10	0,58	0,75	4,35	1120	4,87
6,9	30	10	0,58	0,75	13,05	1120	14,62
7	32	10	0,58	0,75	13,92	1120	15,59
7,1	36	10	0,58	0,75	15,66	1120	17,54

Compiled by Morkel N.V.

Journal
Soil testing by dynamic sounding method

DPT №2

borehole 18

probe insertion depth	number of strokes in the collateral	the depth of the probe for the bail	correction factors		evaporated number of beats in the pledge	specific energy of probing	conditional dynamic resistance of the ground
m	раз	cm	K1	K2	nK1K2	A, kg/sm	Pd, mPa
0,1	4	10	0,65	1,00	2,60	1120	2,91
0,2	3	10	0,65	1,00	1,95	1120	2,18
0,3	4	10	0,65	1,00	2,60	1120	2,91
0,4	5	10	0,65	1,00	3,25	1120	3,64
0,5	3	10	0,65	1,00	1,95	1120	2,18
0,6	5	10	0,65	1,00	3,25	1120	3,64
0,7	4	10	0,65	1,00	2,60	1120	2,91
0,8	2	10	0,65	1,00	1,30	1120	1,46
0,9	3	10	0,65	1,00	1,95	1120	2,18
1	3	10	0,65	1,00	1,95	1120	2,18
1,1	2	10	0,65	1,00	1,30	1120	1,46
1,2	1	10	0,65	1,00	0,65	1120	0,73
1,3	2	10	0,65	1,00	1,30	1120	1,46
1,4	1	10	0,65	1,00	0,65	1120	0,73
1,5	1	10	0,65	1,00	0,65	1120	0,73
1,6	2	10	0,62	0,83	1,03	1120	1,15
1,7	3	10	0,62	0,83	1,54	1120	1,73
1,8	2	10	0,62	0,83	1,03	1120	1,15
1,9	1	10	0,62	0,83	0,51	1120	0,58
2	2	10	0,62	0,83	1,03	1120	1,15
2,1	2	10	0,62	0,83	1,03	1120	1,15
2,2	2	10	0,62	0,83	1,03	1120	1,15
2,3	1	10	0,62	0,83	0,51	1120	0,58
2,4	2	10	0,62	0,83	1,03	1120	1,15
2,5	3	10	0,62	0,83	1,54	1120	1,73
2,6	2	10	0,62	0,83	1,03	1120	1,15
2,7	3	10	0,62	0,83	1,54	1120	1,73
2,8	3	10	0,62	0,83	1,54	1120	1,73
2,9	2	10	0,62	0,83	1,03	1120	1,15
3	3	10	0,62	0,83	1,54	1120	1,73
3,1	4	10	0,62	0,83	2,06	1120	2,31
3,2	5	10	0,62	0,83	2,57	1120	2,88
3,3	5	10	0,62	0,83	2,57	1120	2,88
3,4	6	10	0,62	0,83	3,09	1120	3,46

3,5	4	10	0,62	0,83	2,06	1120	2,31
3,6	4	10	0,62	0,83	2,06	1120	2,31
3,7	5	10	0,62	0,83	2,57	1120	2,88
3,8	4	10	0,62	0,83	2,06	1120	2,31
3,9	4	10	0,62	0,83	2,06	1120	2,31
4	6	10	0,62	0,83	3,09	1120	3,46
4,1	5	10	0,58	0,75	2,18	1120	2,44
4,2	6	10	0,58	0,75	2,61	1120	2,92
4,3	8	10	0,58	0,75	3,48	1120	3,90
4,4	9	10	0,58	0,75	3,92	1120	4,38
4,5	9	10	0,58	0,75	3,92	1120	4,38
4,6	8	10	0,58	0,75	3,48	1120	3,90
4,7	8	10	0,58	0,75	3,48	1120	3,90
4,8	10	10	0,58	0,75	4,35	1120	4,87
4,9	10	10	0,58	0,75	4,35	1120	4,87
5	12	10	0,58	0,75	5,22	1120	5,85
5,1	14	10	0,58	0,75	6,09	1120	6,82
5,2	15	10	0,58	0,75	6,53	1120	7,31
5,3	14	10	0,58	0,75	6,09	1120	6,82
5,4	16	10	0,58	0,75	6,96	1120	7,80
5,5	16	10	0,58	0,75	6,96	1120	7,80
5,6	14	10	0,58	0,75	6,09	1120	6,82
5,7	12	10	0,58	0,75	5,22	1120	5,85
5,8	12	10	0,58	0,75	5,22	1120	5,85
5,9	11	10	0,58	0,75	4,79	1120	5,36
6	12	10	0,58	0,75	5,22	1120	5,85
6,1	13	10	0,58	0,75	5,66	1120	6,33
6,2	12	10	0,58	0,75	5,22	1120	5,85
6,3	11	10	0,58	0,75	4,79	1120	5,36
6,4	12	10	0,58	0,75	5,22	1120	5,85
6,5	13	10	0,58	0,75	5,66	1120	6,33
6,6	13	10	0,58	0,75	5,66	1120	6,33
6,7	11	10	0,58	0,75	4,79	1120	5,36
6,8	18	10	0,58	0,75	7,83	1120	8,77
6,9	24	10	0,58	0,75	10,44	1120	11,69
7	33	10	0,58	0,75	14,36	1120	16,08

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GUNTZ

Appendix #5.11

Sheet 5.

Journal
Soil testing by dynamic sounding method

DPT №3

probe insertion depth	number of strokes in the collateral	the depth of the probe for the bail	correction factors		evaporated number of beats in the pledge	specific energy of probing	conditional dynamic resistance of the ground
m	раз	cm	K1	K2	nK1K2	A, N/sm	Pd, mPa
0,1	4	10	0,65	1,00	2,60	1120	2,91
0,2	4	10	0,65	1,00	2,60	1120	2,91
0,3	5	10	0,65	1,00	3,25	1120	3,64
0,4	3	10	0,65	1,00	1,95	1120	2,18
0,5	4	10	0,65	1,00	2,60	1120	2,91
0,6	3	10	0,65	1,00	1,95	1120	2,18
0,7	3	10	0,65	1,00	1,95	1120	2,18
0,8	2	10	0,65	1,00	1,30	1120	1,46
0,9	3	10	0,65	1,00	1,95	1120	2,18
1	2	10	0,65	1,00	1,30	1120	1,46
1,1	2	10	0,65	1,00	1,30	1120	1,46
1,2	2	10	0,65	1,00	1,30	1120	1,46
1,3	1	10	0,65	1,00	0,65	1120	0,73
1,4	2	10	0,65	1,00	1,30	1120	1,46
1,5	1	10	0,65	1,00	0,65	1120	0,73
1,6	1	10	0,62	0,83	0,51	1120	0,58
1,7	2	10	0,62	0,83	1,03	1120	1,15
1,8	2	10	0,62	0,83	1,03	1120	1,15
1,9	2	10	0,62	0,83	1,03	1120	1,15
2	1	10	0,62	0,83	0,51	1120	0,58
2,1	2	10	0,62	0,83	1,03	1120	1,15
2,2	1	10	0,62	0,83	0,51	1120	0,58
2,3	2	10	0,62	0,83	1,03	1120	1,15
2,4	3	10	0,62	0,83	1,54	1120	1,73
2,5	1	10	0,62	0,83	0,51	1120	0,58
2,6	2	10	0,62	0,83	1,03	1120	1,15
2,7	2	10	0,62	0,83	1,03	1120	1,15
2,8	3	10	0,62	0,83	1,54	1120	1,73
2,9	2	10	0,62	0,83	1,03	1120	1,15
3	3	10	0,62	0,83	1,54	1120	1,73
3,1	3	10	0,62	0,83	1,54	1120	1,73
3,2	5	10	0,62	0,83	2,57	1120	2,88

3,3	6	10	0,62	0,83	3,09	1120	3,46
3,4	4	10	0,62	0,83	2,06	1120	2,31
3,5	3	10	0,62	0,83	1,54	1120	1,73
3,6	4	10	0,62	0,83	2,06	1120	2,31
3,7	4	10	0,62	0,83	2,06	1120	2,31
3,8	4	10	0,62	0,83	2,06	1120	2,31
3,9	5	10	0,62	0,83	2,57	1120	2,88
4	5	10	0,62	0,83	2,57	1120	2,88
4,1	6	10	0,58	0,75	2,61	1120	2,92
4,2	7	10	0,58	0,75	3,05	1120	3,41
4,3	10	10	0,58	0,75	4,35	1120	4,87
4,4	9	10	0,58	0,75	3,92	1120	4,38
4,5	10	10	0,58	0,75	4,35	1120	4,87
4,6	9	10	0,58	0,75	3,92	1120	4,38
4,7	9	10	0,58	0,75	3,92	1120	4,38
4,8	10	10	0,58	0,75	4,35	1120	4,87
4,9	12	10	0,58	0,75	5,22	1120	5,85
5	18	10	0,58	0,75	7,83	1120	8,77
5,1	18	10	0,58	0,75	7,83	1120	8,77
5,2	16	10	0,58	0,75	6,96	1120	7,80
5,3	17	10	0,58	0,75	7,40	1120	8,28
5,4	17	10	0,58	0,75	7,40	1120	8,28
5,5	20	10	0,58	0,75	8,70	1120	9,74
5,6	18	10	0,58	0,75	7,83	1120	8,77
5,7	14	10	0,58	0,75	6,09	1120	6,82
5,8	10	10	0,58	0,75	4,35	1120	4,87
5,9	10	10	0,58	0,75	4,35	1120	4,87
6	13	10	0,58	0,75	5,66	1120	6,33
6,1	12	10	0,58	0,75	5,22	1120	5,85
6,2	11	10	0,58	0,75	4,79	1120	5,36
6,3	12	10	0,58	0,75	5,22	1120	5,85
6,4	13	10	0,58	0,75	5,66	1120	6,33
6,5	11	10	0,58	0,75	4,79	1120	5,36
6,6	12	10	0,58	0,75	5,22	1120	5,85
6,7	13	10	0,58	0,75	5,66	1120	6,33
6,8	16	10	0,58	0,75	6,96	1120	7,80
6,9	27	10	0,58	0,75	11,75	1120	13,15
7	30	10	0,58	0,75	13,05	1120	14,62
7,1	29	10	0,58	0,75	12,62	1120	14,13
7,2	28	10	0,58	0,75	12,18	1120	13,64
7,3	34	10	0,58	0,75	14,79	1120	16,56

Compiled by Morkel N.V.

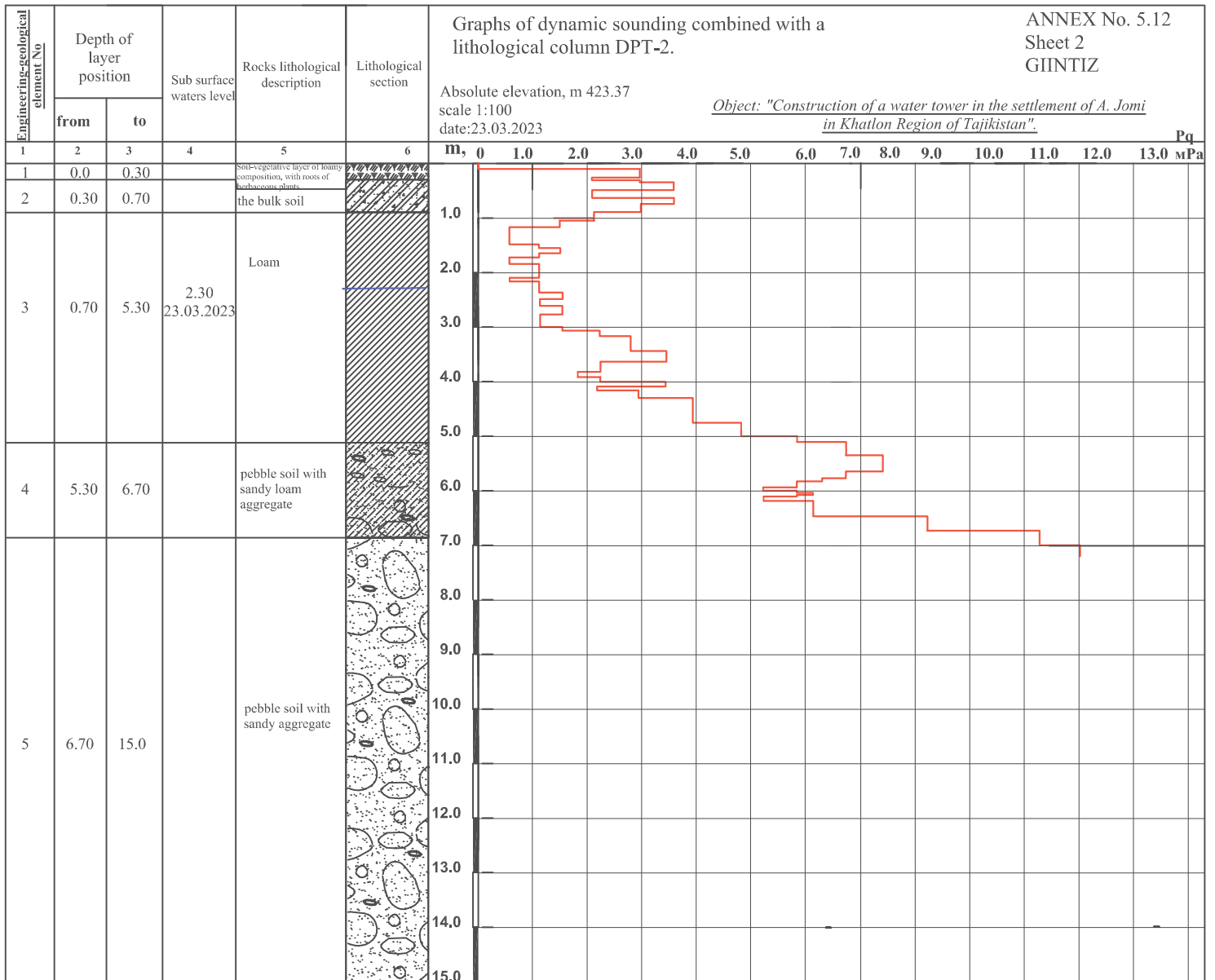
Journal
Soil testing by dynamic sounding method

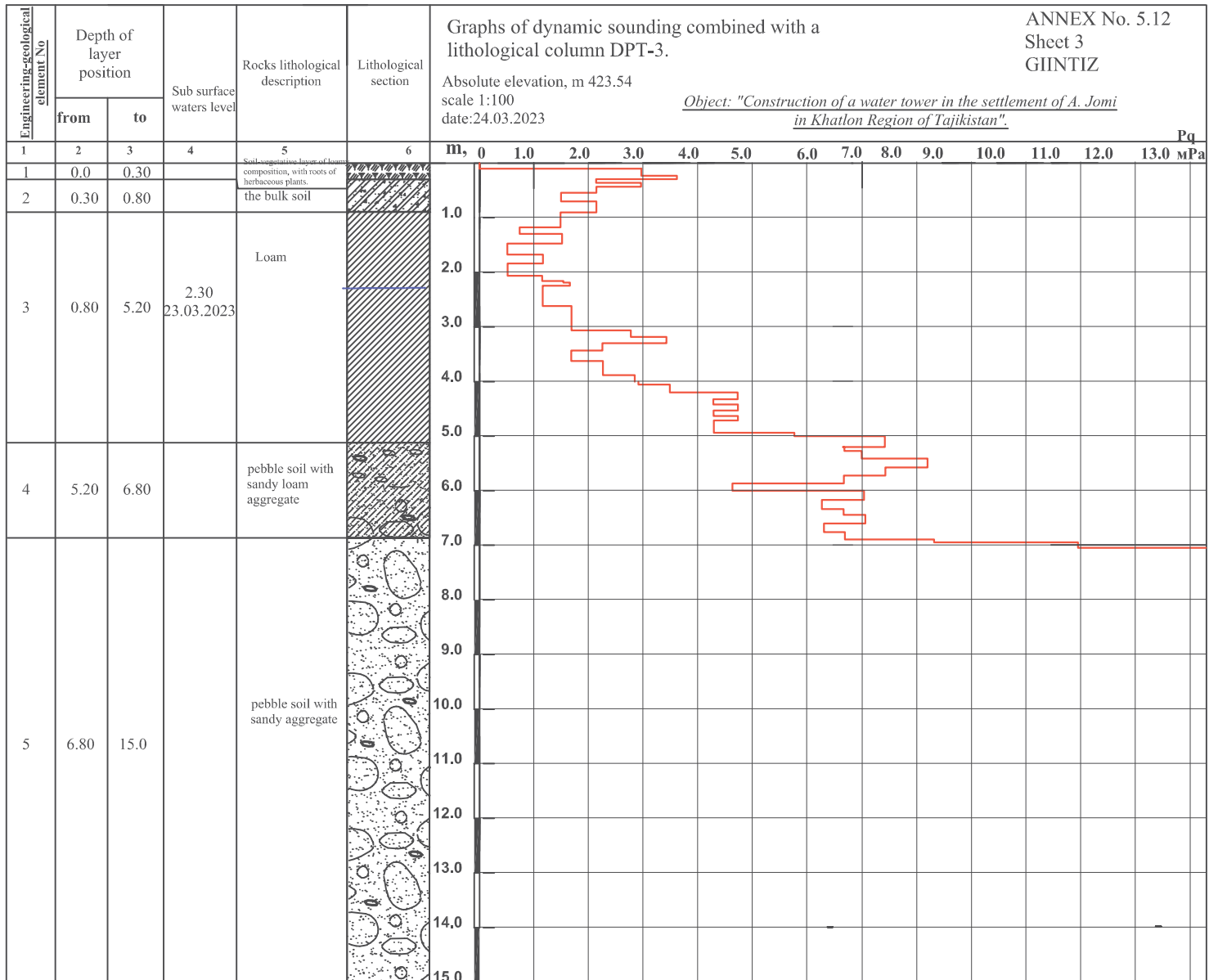
DPT № 4

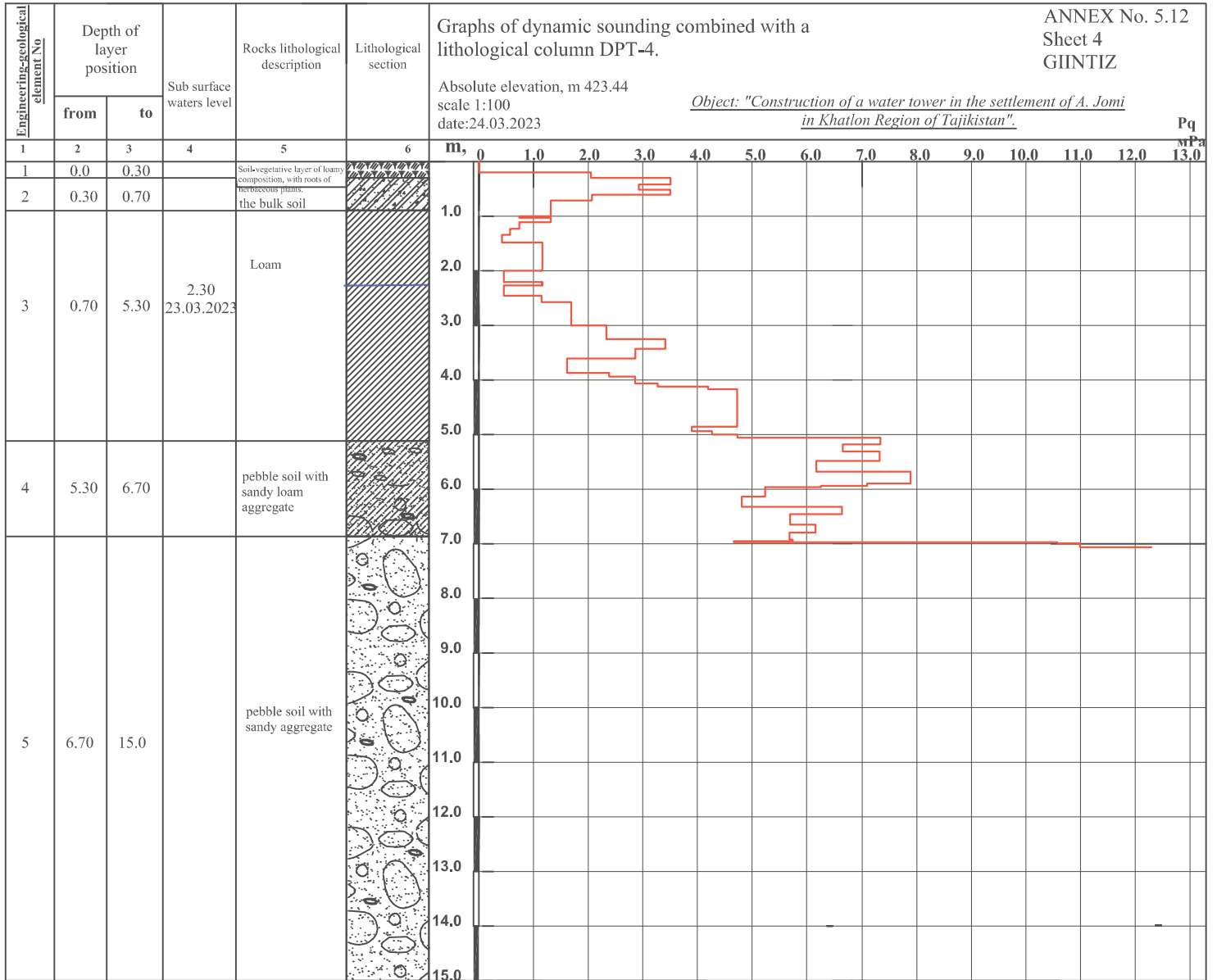
probe insertion depth	number of strokes in the collateral	the depth of the probe for the bail	correction factors		evaporated number of beats in the pledge	specific energy of probing	conditional dynamic resistance of the ground
m	раз	cm	K1	K2	nK1K2	A, N/sm	Pd, mPa
0,1	3	10	0,65	1,00	1,95	1120	2,18
0,2	4	10	0,65	1,00	2,60	1120	2,91
0,3	4	10	0,65	1,00	2,60	1120	2,91
0,4	5	10	0,65	1,00	3,25	1120	3,64
0,5	5	10	0,65	1,00	3,25	1120	3,64
0,6	3	10	0,65	1,00	1,95	1120	2,18
0,7	2	10	0,65	1,00	1,30	1120	1,46
0,8	2	10	0,65	1,00	1,30	1120	1,46
0,9	3	10	0,65	1,00	1,95	1120	2,18
1	1	10	0,65	1,00	0,65	1120	0,73
1,1	2	10	0,65	1,00	1,30	1120	1,46
1,2	2	10	0,65	1,00	1,30	1120	1,46
1,3	1	10	0,65	1,00	0,65	1120	0,73
1,4	2	10	0,65	1,00	1,30	1120	1,46
1,5	1	10	0,65	1,00	0,65	1120	0,73
1,6	2	10	0,62	0,83	1,03	1120	1,15
1,7	1	10	0,62	0,83	0,51	1120	0,58
1,8	1	10	0,62	0,83	0,51	1120	0,58
1,9	2	10	0,62	0,83	1,03	1120	1,15
2	2	10	0,62	0,83	1,03	1120	1,15
2,1	1	10	0,62	0,83	0,51	1120	0,58
2,2	2	10	0,62	0,83	1,03	1120	1,15
2,3	1	10	0,62	0,83	0,51	1120	0,58
2,4	2	10	0,62	0,83	1,03	1120	1,15
2,5	2	10	0,62	0,83	1,03	1120	1,15
2,6	1	10	0,62	0,83	0,51	1120	0,58
2,7	1	10	0,62	0,83	0,51	1120	0,58
2,8	3	10	0,62	0,83	1,54	1120	1,73
2,9	2	10	0,62	0,83	1,03	1120	1,15
3	4	10	0,62	0,83	2,06	1120	2,31
3,1	5	10	0,62	0,83	2,57	1120	2,88
3,2	5	10	0,62	0,83	2,57	1120	2,88
3,3	6	10	0,62	0,83	3,09	1120	3,46
3,4	4	10	0,62	0,83	2,06	1120	2,31
3,5	4	10	0,62	0,83	2,06	1120	2,31

3,6	4	10	0,62	0,83	2,06	1120	2,31
3,7	3	10	0,62	0,83	1,54	1120	1,73
3,8	5	10	0,62	0,83	2,57	1120	2,88
3,9	4	10	0,62	0,83	2,06	1120	2,31
4	4	10	0,62	0,83	2,06	1120	2,31
4,1	6	10	0,58	0,75	2,61	1120	2,92
4,2	6	10	0,58	0,75	2,61	1120	2,92
4,3	7	10	0,58	0,75	3,05	1120	3,41
4,4	7	10	0,58	0,75	3,05	1120	3,41
4,5	9	10	0,58	0,75	3,92	1120	4,38
4,6	9	10	0,58	0,75	3,92	1120	4,38
4,7	10	10	0,58	0,75	4,35	1120	4,87
4,8	10	10	0,58	0,75	4,35	1120	4,87
4,9	9	10	0,58	0,75	3,92	1120	4,38
5	11	10	0,58	0,75	4,79	1120	5,36
5,1	16	10	0,58	0,75	6,96	1120	7,80
5,2	18	10	0,58	0,75	7,83	1120	8,77
5,3	20	10	0,58	0,75	8,70	1120	9,74
5,4	16	10	0,58	0,75	6,96	1120	7,80
5,5	15	10	0,58	0,75	6,53	1120	7,31
5,6	19	10	0,58	0,75	8,27	1120	9,26
5,7	20	10	0,58	0,75	8,70	1120	9,74
5,8	15	10	0,58	0,75	6,53	1120	7,31
5,9	12	10	0,58	0,75	5,22	1120	5,85
6	11	10	0,58	0,75	4,79	1120	5,36
6,1	13	10	0,58	0,75	5,66	1120	6,33
6,2	12	10	0,58	0,75	5,22	1120	5,85
6,3	13	10	0,58	0,75	5,66	1120	6,33
6,4	11	10	0,58	0,75	4,79	1120	5,36
6,5	11	10	0,58	0,75	4,79	1120	5,36
6,6	13	10	0,58	0,75	5,66	1120	6,33
6,7	12	10	0,58	0,75	5,22	1120	5,85
6,8	5	10	0,58	0,75	2,18	1120	2,44
6,9	11	10	0,58	0,75	4,79	1120	5,36
7	24	10	0,58	0,75	10,44	1120	11,69
7,1	29	10	0,58	0,75	12,62	1120	14,13
7,2	35	10	0,58	0,75	15,23	1120	17,05

Compiled by Morkel N.V.



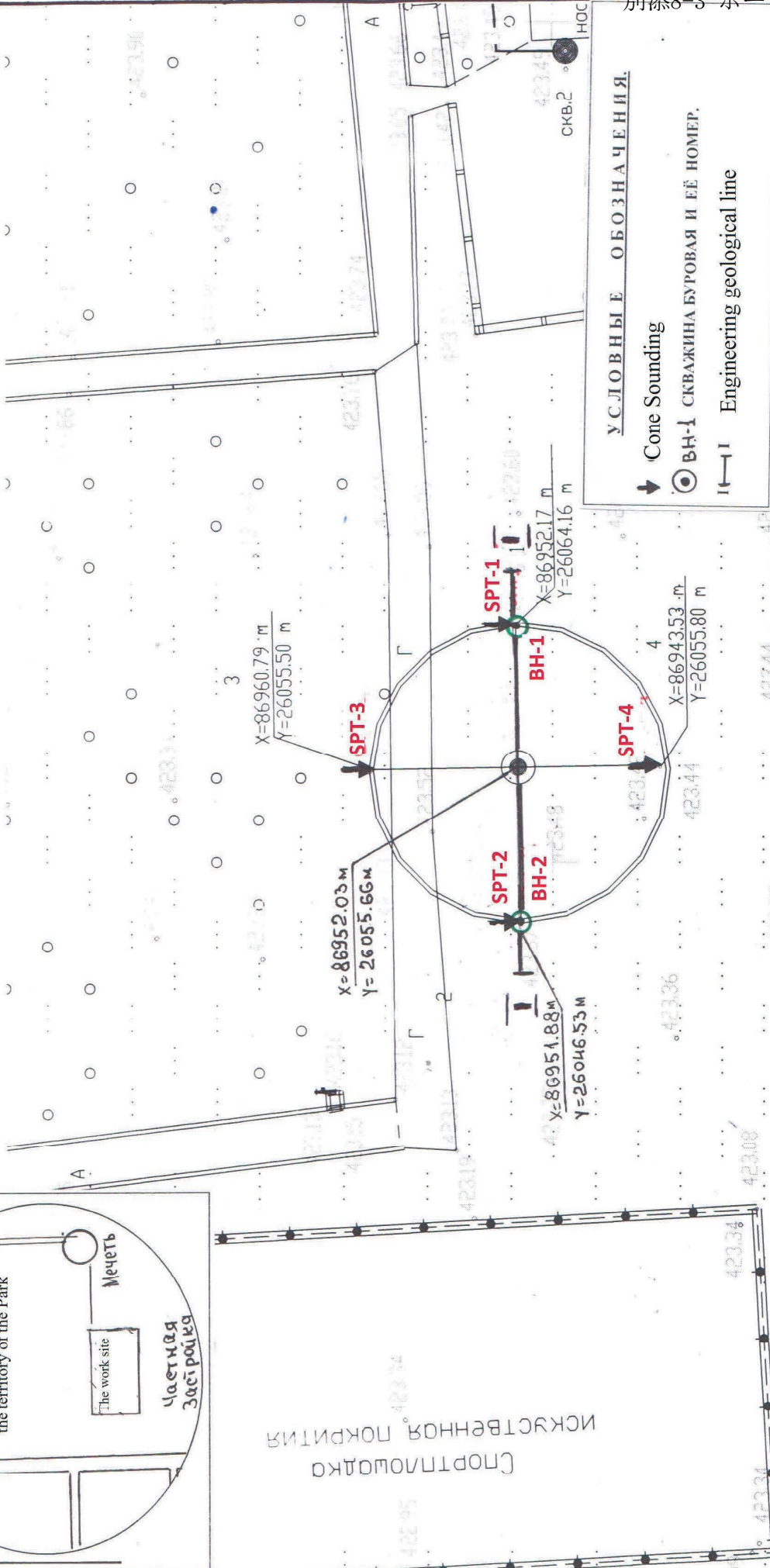
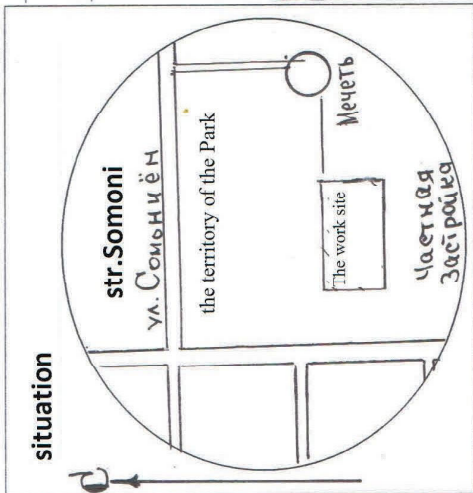




Appendix #5.11.
No. 6.1 Sheet 8

КАРТА ФАКТИЧЕСКОГО МАТЕРИАЛА

Map of the actual material



УСЛОВНЫЕ ОБОЗНАЧЕНИЯ.

↓ Cone Sounding

⊙ BH-1 СКВАЖИНА БУРОВАЯ И ЕЁ НОМЕР.

┆┆┆ Engineering geological line

«Строительство водонапорной башни в пгт. А. Чоми в Хатлонской области РТ»

ОАО «ГИИ НТИЗ» комплексный отдел

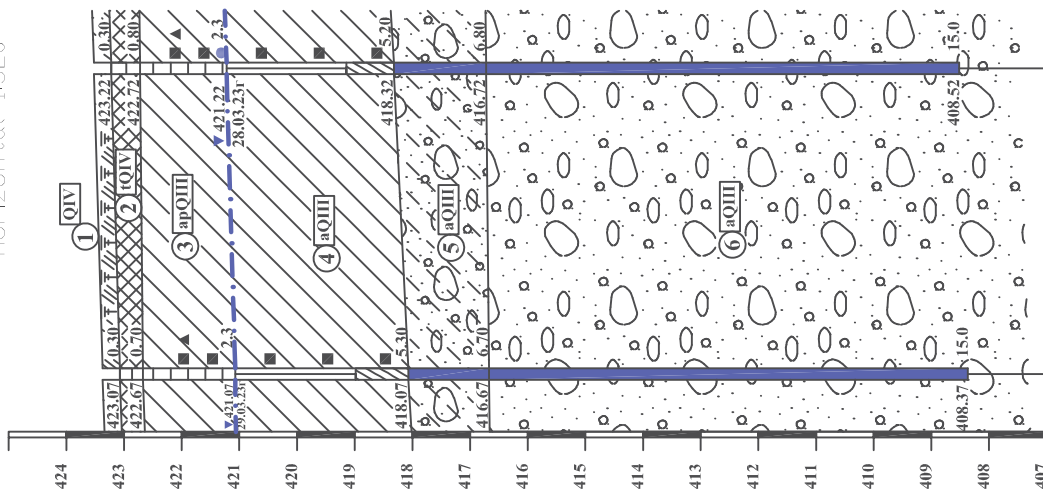
КН

КХ

Карта фактического материала	7033
Шоназаров Б.Ф.	стадия: РП М-б 1:320
Моркель Н.В.	чертёж № 7042, лист 1.

Engineering and geological section on line I-I

scale: vertical 1:100
horizontal 1:320



Вис. и номер выработки глубина отсчета, м	С.Кв.БН-2	С.Кв.БН-1
Расстояние, м	423.37	423.52
Distance, m	16.96	

Legend sheet 2

ANNEX No. 6.2
Sheet 2
Archive No.12862

LEGENDS

MODERN SEDIMENTS

- QIV** Soil layer of loamy composition, with roots of herbaceous plants.
- tQIV** Bulk soil consisting of clay soil with a small amount of construction and household debris. The soil is of medium density, compacted, low-moisture.
- apQIII** Brown loam, of medium density, pelitic structure, massive texture, from semi-solid to tightly plastic consistency with signs of ferruginization and plant roots, the soil is above the GWL.
- apQIII** Brown loam, dense, massive texture, viscous, sticky, softly plastic to flowing consistency, with rare inclusions of small gravel, the soil lies below the underground water.
- aQIII** Pebble soil, predominant debris size 4-8 cm, well rounded and oval in shape, petrographic composition - metamorphic, and less often magmatic and sedimentary rocks. The filler is sandy loam (20-25%) with small (up to 4-6 cm) interlayers of clayey soils, water-saturated. Soil with inclusion of boulders up to 10%.
- aQIII** Pebble soil, predominant debris size 5-10 cm, well rounded and oval in shape, petrographic composition - metamorphic, and less often magmatic and sedimentary rocks. The filler is sand (15-20%), gray, water-saturated. Soil with inclusions of boulders 10-15%.

① number of engineering and geological element

- the places of soil sampling.
 - ▲ the places of water sampling.
- Soils conditions**
- Hard loam
 - Tight-plastic loam
 - Soft-plastic loam
 - sand fluid

"OPEN COMPANY GIINTIZ"		"Construction of a water tower in the village of A. Jomi in Khatlon regione of RT"	
Head of the Department of Engineering Geology		B. Shomazarov	Drawing № 7034, sheet 2
Made by		Morkel N.V	scale vert. 1:100 goriz. 1:320

別添資料-8-4

適正揚水量調査

REPORT ABOUT THE WORK PERFORMED ON WELLS IN THE ABDURAKHMAN JAMI DISTRICT OF KHATLON

The hydrogeological work sites are located in the right-bank part of the valley of the Vakhsh River. Administratively, the site belongs to the Abdurakhman Jami district of Khatlon region.

Geographical coordinates of wells: No. 6 N37.9492°, E68.7957°. The absolute mark of the earth is 419 m. No. 7 N37.9424°, E68.8187°. The absolute mark of the earth is 424 m. Well No. 6 is located in the central part of the Jami district center, well No. 7 is located in the southeastern part.



Fig.1 Location of tested wells

To restore the operability of wells No. 6 and 7, their cleaning and testing was provided. Cleaning and testing of wells were carried out by an air water lifter (airlift) and with the help of an electric submersible pump ECV 8-40-60. After scanning the internal condition of the casing string and the depth to siltation with the help of a television camera, air supply pipes with a diameter of 50 mm are mounted in the well for pumping. As the bottom of the wells is cleaned of silt and growths, the air supply pipes are buried down. After the air supply pipes reach the actual bottom of the well, the maximum air supply is carried out for the final cleaning of the inner cavity of the casing pipes and the filter from silt and growths. The duration of pumping is 7-8 hours. After pumping, the position of the static level was determined.

Upon receipt of clean water, they begin to install an airlift for experimental pumping. The airlift is mounted according to the "inside" system with water-lifting pipes

with a diameter of 100 mm, and air supply pipes with a diameter of 50 mm. The depth of loading of pipes: water-lifting - up to 95 m, air supply – 92 m. Pumping water from the well is carried out by one AIRMAN PDSJ750S compressor for one maximum reduction. Pumping duration is 24 hours with periodic stops for 5-10 minutes. This ensures the fastest cleaning of the borehole filter holes from silt.

In the process of experimental pumping, observations of the water level and flow rate were carried out. The water level was measured using an electric level gauge from the upper edge of the casing pipe at the following time intervals.

- Every 1 minute from 0 to 10 minutes
- Every 2 minutes from 10 to 20 minutes
- Every 5 minutes from 20 to 60 minutes
- Every 10 minutes from 60 to 120 minutes
- Every 30 minutes from 120 to 240 minutes
- Every 60 minutes from 240 to 1440 minutes

The water flow rate during pumping was measured by volumetric method using a measuring vessel with a capacity of 240 liters every 4 hours.

The time was counted using the STOPWATCH XL-016 stopwatch.

At the end of the experimental pumping, measurements of the recovering level were made.

The restoration of the water level was measured at the following intervals.

- Every 1 minute from 0 to 10 minutes
- Every 2 minutes from 10 to 20 minutes
- Every 5 minutes from 20 to 60 minutes
- Every 10 minutes from 60 to 120 minutes
- Every 60 minutes from 120 to 300 minutes

Step drawdown test of the well performance was carried out at four (4) depressions, each stage was measured for 120 minutes. The tests were carried out using an electric submersible pump ECV 8-40-60. Measurements of the dynamic level for wells were carried out using an electric level gauge, graduated with an accuracy of 0.01 m. The starting point for dynamic level measurements is recorded from the upper edge of the casing pipe. The productivity of the well was regulated by means of a Ludlo valve.

The dynamic water level was measured at the following time intervals.

- Every 1 minute from 0 to 10 minutes
- Every 2 minutes from 10 to 20 minutes
- Every 5 minutes from 20 to 60 minutes
- Every 10 minutes from 60 to 120 minutes

At the end of the experimental pumping, water samples were taken for complete chemical analysis (including: odor, taste and aftertaste, color, turbidity), NO₃, SO₄, Cl, HCO₃, Ca, Mg, Na+K).

RESULTS OF THE WORK PERFORMED (WELL NO.7)

A video card made by Japanese experts showed that the walls of the casing of well No. 7 to a depth of 62 m have growths and rust. The well was cleaned by an airlift unit using an AIRMAN PDSJ750S compressor with a capacity of up to 21.0 atm. Cleaning was carried out to a depth of 96.0 m.

Pumping water by airlift from well No. 7 showed the following results:

Table 1 Summary of airlift (well No.7)

Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	The magnitude of the decrease (m)	Water flow rate (l/s)	Specific flow rate l/(sec*m)
+3.90	6.83	10.73	18.20	1.69

The installation of the ECV 8-40-60 pump is carried out to a depth of 24.0 m. The diameter of the water lifting pipes is 100 mm.

Pumping water using an electric submersible pump ECV 8-40-60 from well No. 7 showed the following results:

Table 2 Summary of step drawdown test (well No.7)

Step	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	The magnitude of the decrease (m)	Water flow rate (l/s)	Specific flow rate l/(sec*m)
I	+3.90	0.83	4.73	2.69	0.57
II	+3.90	5.56	9.46	6.01	0.64
III	+3.90	10.29	14.19	8.70	0.61
IV	+3.90	15.02	18.92	12.71	0.67

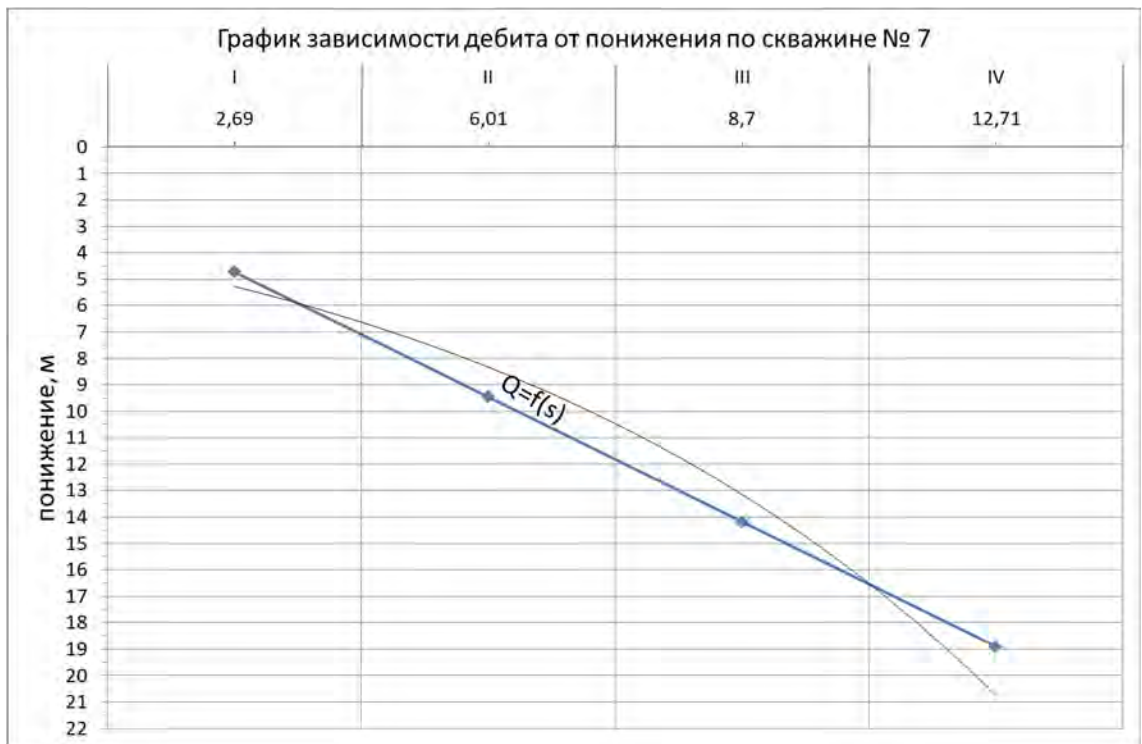


Figure 2 Water flow rate and drawdown during step drawdown test (well No.7)

RESULTS OF THE WORK PERFORMED (WELL NO.6)

A video report made by Japanese experts showed that the inner part of the casing of well No. 6 is silted up to a depth of 24 m with sand and silt. The well was cleaned by an airlift unit using an AIRMAN PDSJ750S compressor with a capacity of up to 21.0 atm. Cleaning was carried out to a depth of 96.0 m.

Pumping water by airlift from well No. 6 showed the following results:

Table 3 Summary of airlift (well No.6)

Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	The magnitude of the decrease (m)	Water flow rate (l/s)	Specific flow rate l/(sec*m)
1.23	22.23	21.00	12.30	0.58

The installation of the ECV 8-40-60 pump is carried out to a depth of 24.0 m. The diameter of the water lifting pipes is 100 mm.

Pumping water using an electric submersible pump ECV 8-40-60 from well No. 6 showed the following results:

Table 4 Summary of step drawdown test (well No.6)

Step	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	The magnitude of the decrease (m)	Water flow rate (l/s)	Specific flow rate l/(sec*m)
I	1.23	5.92	4.69	2.48	0.53
II	1.23	10.60	9.37	5.43	0.58
III	1.23	15.93	14.70	8.23	0.56
IV	1.23	21.64	20.41	11.62	0.57

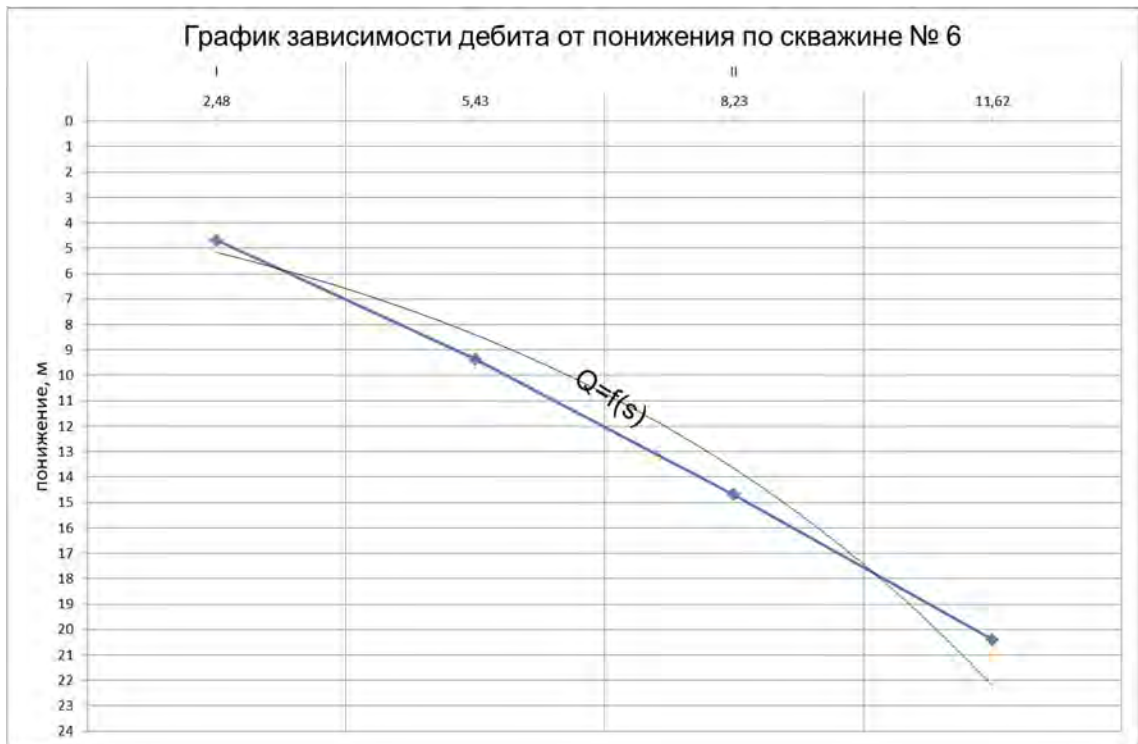


Figure 3 Water flow rate and drawdown during step drawdown test (well No.6)

CONCLUSION

The works provided for in the terms of reference have been completed in full.

Cleaning and hydrogeological testing were carried out at wells No. 6 and 7.

Well No. 6 was cleaned to a depth of 96 m. The maximum flow rate of the well was 12.3 l/s with a decrease of 21.0 m, the specific flow rate is 0.58 l/(sec*m).

Well No. 7 has been cleaned to a depth of 96 m. The maximum flow rate of the well was 18.2 l/s with a decrease of 10.73 m, the specific flow rate is 1.69 l/(sec*m).

Journal of experimental pumping of water by airlift from well No. 7

hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
	0								
	1	+3.90	0.00	3.90					
	2	+3.90	0.61	4.51					
	3	+3.90	0.73	4.63					
	4	+3.90	1.26	5.16					
	5	+3.90	1.59	5.49					
	6	+3.90	1.99	5.89					
	7	+3.90	2.56	6.46					
	8	+3.90	2.77	6.67					
	9	+3.90	3.10	7.00					
	10	+3.90	3.82	7.72					
	12	+3.90	4.34	8.24					
	14	+3.90	4.99	8.89					
	16	+3.90	5.68	9.58					
	18	+3.90	6.25	10.15					
	20	+3.90	7.84	11.74					
	25	+3.90	8.12	12.02					
	30	+3.90	8.60	12.5					
	35	+3.90	8.49	12.39					
	40	+3.90	8.13	12.03					
	45	+3.90	8.00	11.90					
	50	+3.90	7.81	11.71					
	55	+3.90	7.43	11.33					
	60	+3.90	7.15	11.05	240	13.29	18.1	1.63	
	70	+3.90	7.10	11.00					
	80	+3.90	6.88	10.78					
	pumping progress								
1									
2									

	hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		90	+3.90	6.73	10.63				
		100	+3.90	6.71	10.61				
		110	+3.90	6.65	10.55				
		120	+3.90	6.63	10.53				
		150	+3.90	6.62	10.52				
	3	180	+3.90	6.63	10.53				
		210	+3.90	6.61	10.51				
	4	240	+3.90	6.62	10.52	240	13.22	18.2	1.73
		300	+3.90	6.65	10.55				
		360	+3.90	6.76	10.66				
		420	+3.90	6.79	10.69				
		480	+3.90	6.80	10.70	240	13.26	18.1	1.69
		540	+3.90	6.82	10.72				
		600	+3.90	6.83	10.73				
		660	+3.90	6.81	10.71				
		720	+3.90	6.81	10.71	240	13.32	18.0	1.68
		780	+3.90	6.80	10.70				
		840	+3.90	6.80	10.70				
		900	+3.90	6.83	10.73				
		960	+3.90	6.84	10.74	240	13.20	18.2	1.69
		1020	+3.90	6.85	10.75				
		1080	+3.90	6.85	10.75				
		1140	+3.90	6.84	10.74				
		1200	+3.90	6.83	10.73	240	13.20	18.2	1.69
		1260	+3.90	6.83	10.73				
		1320	+3.90	6.81	10.71				
		1380	+3.90	6.83	10.73				

hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
24	1440	+3.90	6.83	10.73	240	13.20	18.2	1.69
	0							
	1		6.00					
	2		5.10					
	3		4.30					
	4		3.80					
	5		3.20					
	6		2.60					
	7		2.10					
	8		1.50					
	9		1.12					
	10		+0.34					
	12		+0.80					
	14		+1.16					
	16		+1.98					
	18		+2.22					
	20		+2.67					
	25		+3.20					
	30		+3.40					
	35		+3.60					
	40		+3.86					
	45		+3.90					
	50		+3.90					
	55		+3.90					
1	60		+3.90					
	70		+3.90					
2	80		+3.90					

recovering water level

	hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		90		+3.90					
		100		+3.90					
		110		+3.90					
		120		+3.90					
	3	180		+3.90					
	4	240		+3.90					
	5	300		+3.90					

График изменения динамического уровня воды
во время опытной откачки эрлифтом из скважины № 7

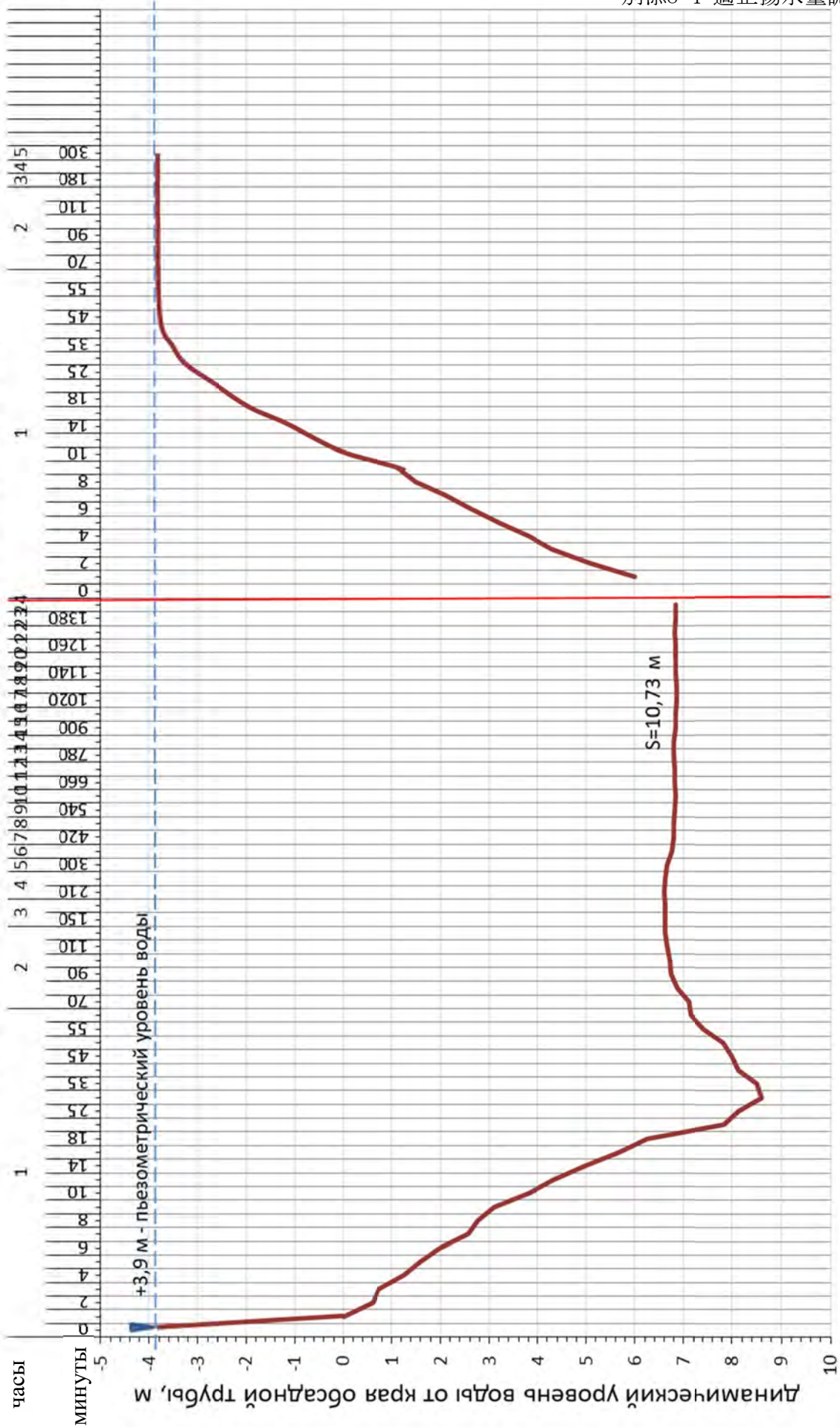
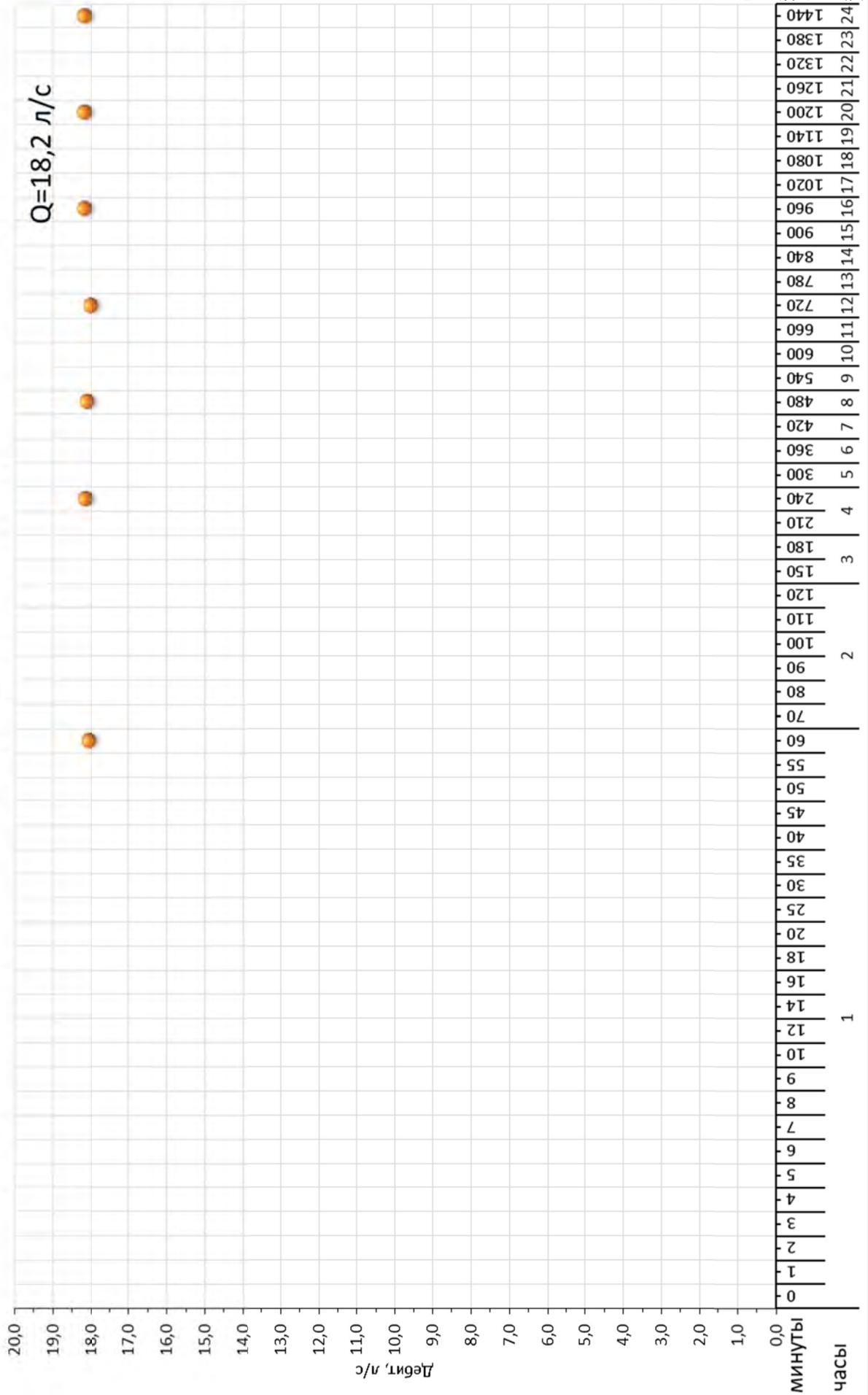


График изменения дебита воды во время откачки эрлифтом из скважины № 7



Journal of experimental pumping by ECV 8-40-60 pump from well No. 7

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
I	1	0		-3.90	0.00					
		1	+3.90	0.00	3.90					
		2	+3.90	0.61	4.51					
		3	+3.90	0.59	4.49					
		4	+3.90	0.67	4.57					
		5	+3.90	0.77	4.67	240	89.20	2.69	0.58	
		6	+3.90	0.80	4.70					
		7	+3.90	0.69	4.59					
		8	+3.90	0.56	4.46					
		9	+3.90	0.64	4.54					
		10	+3.90	0.80	4.70	240	89.20	2.69	0.57	
		12	+3.90	0.72	4.62					
		14	+3.90	0.64	4.54					
		16	+3.90	0.58	4.48	240	89.00	2.70	0.60	
		18	+3.90	0.77	4.67					
		20	+3.90	0.71	4.61	240	90.36	2.66	0.58	
		25	+3.90	0.69	4.59					
		30	+3.90	0.73	4.63	240	89.88	2.67	0.58	
		35	+3.90	0.75	4.65					
		40	+3.90	0.81	4.71	240	89.12	2.69	0.57	
45	+3.90	0.81	4.71							
50	+3.90	0.86	4.76	240	89.20	2.69	0.57			
55	+3.90	0.83	4.73							
60	+3.90	0.83	4.73	240	89.27	2.69	0.57			
70	+3.90	0.83	4.73	240	89.38	2.69	0.57			
80	+3.90	0.83	4.73	240	89.46	2.68	0.57			
2										

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
II	1	90	+3.90	0.83	4.73	240	89.33	2.69	0.57	
		100	+3.90	0.83	4.73	240	89.29	2.69	0.57	
		110	+3.90	0.83	4.73	240	89.31	2.69	0.57	
		120	+3.90	0.83	4.73	240	89.14	2.69	0.57	
		1	+3.90	3.91	7.81					
		2	+3.90	4.19	8.09					
		3	+3.90	4.38	8.28					
		4	+3.90	4.82	8.72					
		5	+3.90	5.10	9.00	240	40.36	5.95	0.66	
		6	+3.90	5.49	9.39					
		7	+3.90	5.56	9.46					
		8	+3.90	5.56	9.46	240	40.16	5.98	0.63	
9	+3.90	5.56	9.46							
10	+3.90	5.56	9.46	240	40.61	5.91	0.62			
12	+3.90	5.56	9.46							
14	+3.90	5.56	9.46	240	40.54	5.92	0.63			
16	+3.90	5.46	9.36							
18	+3.90	5.55	9.45	240	40.73	5.89	0.62			
20	+3.90	5.55	9.45							
25	+3.90	5.56	9.46	240	40.43	5.94	0.63			
30	+3.90	5.56	9.46							
35	+3.90	5.57	9.47	240	40.29	5.96	0.63			
40	+3.90	5.56	9.46	240	40.12	5.98	0.63			
45	+3.90	5.58	9.48	240	40.06	5.99	0.63			
50	+3.90	5.58	9.48	240	39.88	6.02	0.63			
55	+3.90	5.55	9.45	240	39.92	6.01	0.64			
60	+3.90	5.54	9.44	240	39.83	6.03	0.64			
70	+3.90	5.56	9.46	240	40.11	5.98	0.63			
80	+3.90	5.55	9.45	240	39.81	6.03	0.64			
	2									

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
III	1	90	+3.90	5.56	9.46	240	40.05	5.99	0.63	
		100	+3.90	5.56	9.46	240	39.96	6.01	0.63	
		110	+3.90	5.56	9.46	240	39.90	6.02	0.64	
		120	+3.90	5.56	9.46	240	39.94	6.01	0.64	
		1	+3.90	7.29	11.19					
		2	+3.90	8.45	12.35					
		3	+3.90	8.12	12.02					
		4	+3.90	8.88	12.78					
		5	+3.90	8.79	12.69	240	27.50	8.73	0.69	
		6	+3.90	8.93	12.83					
		7	+3.90	9.15	13.05					
		8	+3.90	9.86	13.76	240	28.00	8.57	0.62	
9	+3.90	10.09	13.99							
10	+3.90	10.29	14.19	240	27.81	8.63	0.61			
12	+3.90	10.30	14.20							
14	+3.90	10.25	14.15	240	27.93	8.59	0.61			
16	+3.90	10.25	14.15							
18	+3.90	10.28	14.18	240	27.79	8.64	0.61			
20	+3.90	10.29	14.19							
25	+3.90	10.29	14.19	240	27.65	8.68	0.61			
30	+3.90	10.27	14.17							
35	+3.90	10.27	14.17	240	27.6	8.70	0.61			
40	+3.90	10.26	14.16	240	27.65	8.68	0.61			
45	+3.90	10.27	14.17	240	27.46	8.74	0.62			
50	+3.90	10.28	14.18	240	27.51	8.72	0.62			
55	+3.90	10.28	14.18	240	27.40	8.76	0.62			
60	+3.90	10.29	14.19	240	27.50	8.73	0.62			
70	+3.90	10.27	14.17	240	27.69	8.67	0.61			
80	+3.90	10.29	14.19	240	27.55	8.71	0.61			
2										

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
IV	1	90	+3.90	10.28	14.18	240	27.53	8.72	0.61	
		100	+3.90	10.29	14.19	240	27.59	8.70	0.61	
		110	+3.90	10.29	14.19	240	27.62	8.69	0.61	
		120	+3.90	10.29	14.19	240	27.60	8.70	0.61	
		1	+3.90	11.02	14.92					
		2	+3.90	11.85	15.75					
		3	+3.90	13.09	16.99					
		4	+3.90	13.71	17.61					
		5	+3.90	14.93	18.83	240	18.26	13.14	0.70	
		6	+3.90	14.83	18.73					
		7	+3.90	14.79	18.69					
		8	+3.90	14.66	18.56	240	18.73	12.81	0.69	
9	+3.90	14.98	18.88							
10	+3.90	14.87	18.77	240	18.92	12.68	0.68			
12	+3.90	14.92	18.82							
14	+3.90	14.99	18.89	240	18.77	12.79	0.68			
16	+3.90	15.00	18.90							
18	+3.90	15.00	18.90	240	18.49	12.98	0.69			
20	+3.90	15.00	18.90							
25	+3.90	15.01	18.91	240	18.66	12.86	0.68			
30	+3.90	15.03	18.93							
35	+3.90	15.03	18.93	240	18.78	12.78	0.68			
40	+3.90	15.02	18.92	240	18.91	12.69	0.67			
45	+3.90	15.05	18.95	240	18.79	12.77	0.67			
50	+3.90	15.05	18.95	240	18.93	12.68	0.67			
55	+3.90	15.05	18.95	240	18.88	12.71	0.67			
60	+3.90	15.04	18.94	240	18.79	12.77	0.67			
70	+3.90	15.02	18.92	240	18.71	12.83	0.68			
80	+3.90	15.02	18.92	240	19.01	12.62	0.67			
2										

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
recovering water level		90	+3.90	15.02	18.92	240	19.03	12.61	0.67	
		100	+3.90	15.02	18.92	240	19	12.63	0.67	
		110	+3.90	15.02	18.92	240	18.95	12.66	0.67	
		120	+3.90	15.02	18.92	240	18.89	12.71	0.67	
	1		1		14.83					
			2		11.33					
			3		7.93					
			4		7.10					
			5		3.15					
			6		2.10					
			7		0.00					
			8		0.00					
9				+0.80						
10				+1.30						
12				+2.10						
14				+2.60						
16				+3.20						
18				+3.50						
20				+3.90						
25				+3.90						
30		+3.90								
35		+3.90								
40		+3.90								
45		+3.90								
50		+3.90								
55		+3.90								
60		+3.90								
70		+3.90								
80		+3.90								
	2									

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		90		+3.90					
		100		+3.90					
		110		+3.90					
		120		+3.90					

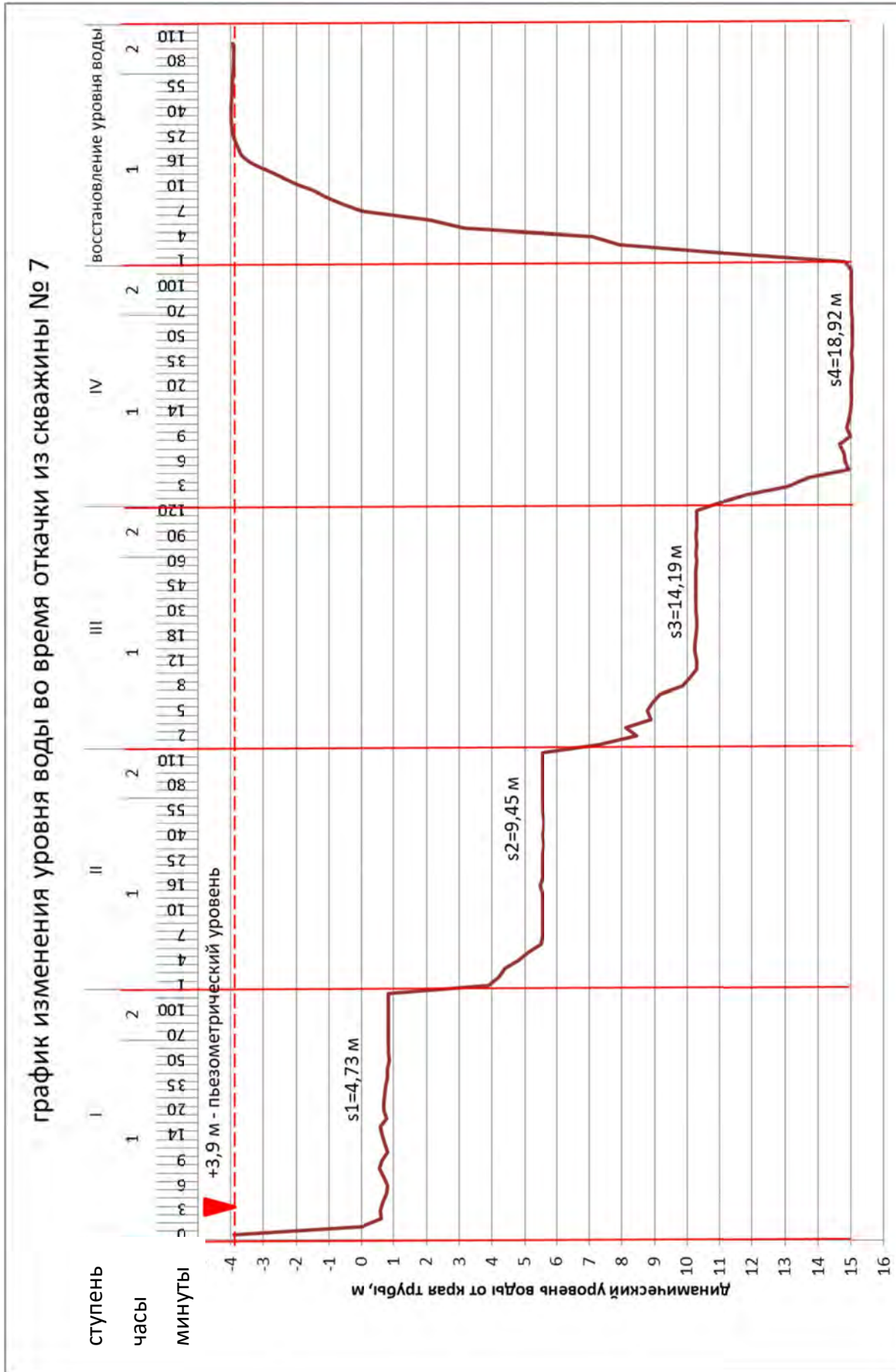
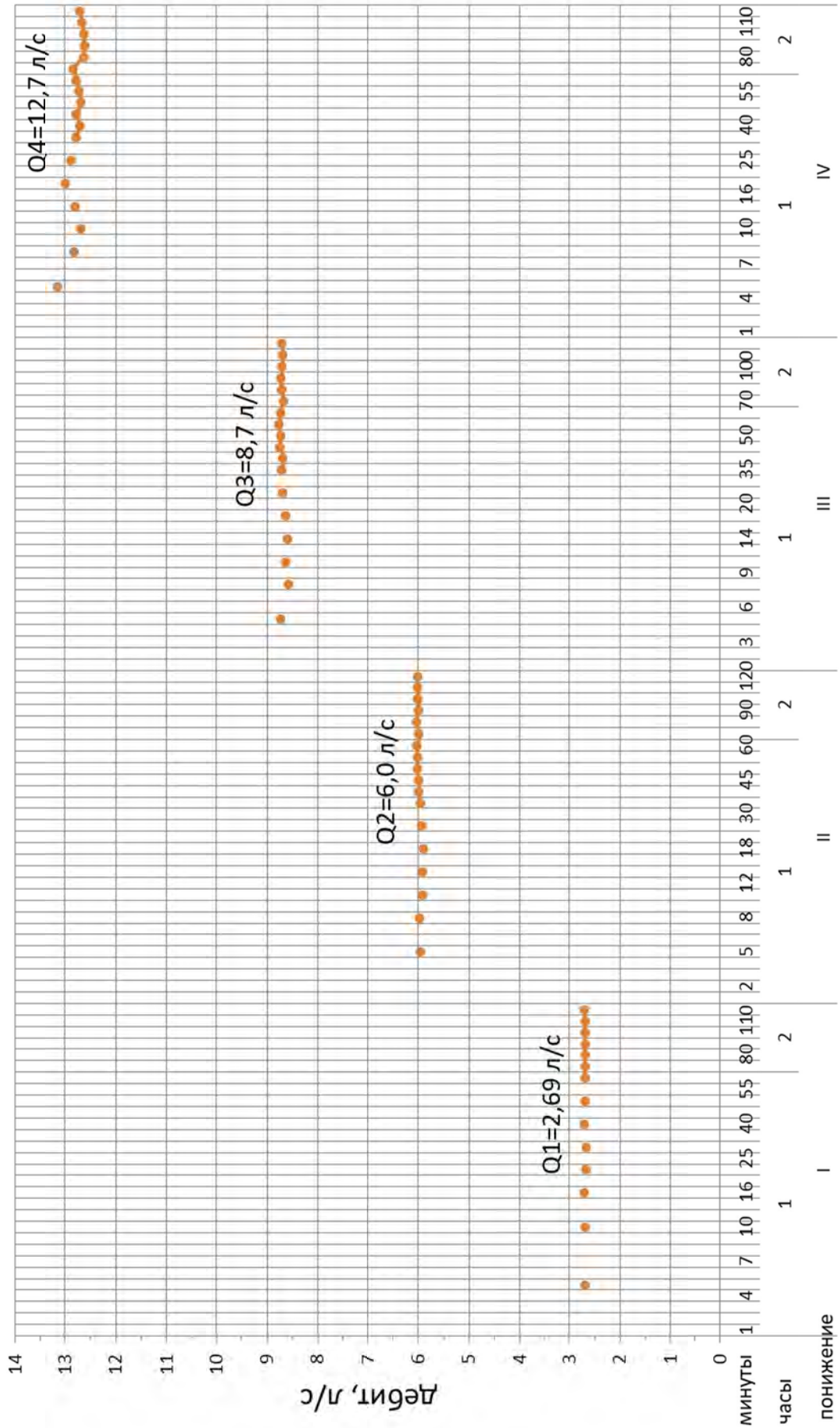


График изменения дебита во время откачки воды насосом ЭЦВ 8-40-60
из скважины № 7



Journal of experimental pumping of water by airlift from well No. 6

hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
pumping progress	0	1.23	1.23	0				
	1	1.23	8.15	6.92				
	2	1.23	17.21	15.98				
	3	1.23	22.34	21.11				
	4	1.23	22.30	21.07				
	5	1.23	21.65	20.42				
	6	1.23	21.51	20.28				
	7	1.23	21.34	20.11				
	8	1.23	21.22	19.99				
	9	1.23	21.65	20.42				
	10	1.23	21.39	20.16				
	12	1.23	21.46	20.23				
	14	1.23	21.72	20.49				
	16	1.23	21.66	20.43				
	18	1.23	21.45	20.22				
	20	1.23	21.29	20.06				
	25	1.23	21.57	20.34				
30	1.23	21.63	20.40		240	20.19	11.9	0.58
35	1.23	21.80	20.57					
40	1.23	21.55	20.32		240	21.34	11.2	0.55
45	1.23	21.73	20.50					
50	1.23	21.68	20.45		240	20.64	11.6	0.57
55	1.23	21.49	20.26					
60	1.23	21.33	20.10		240	19.05	12.6	0.63

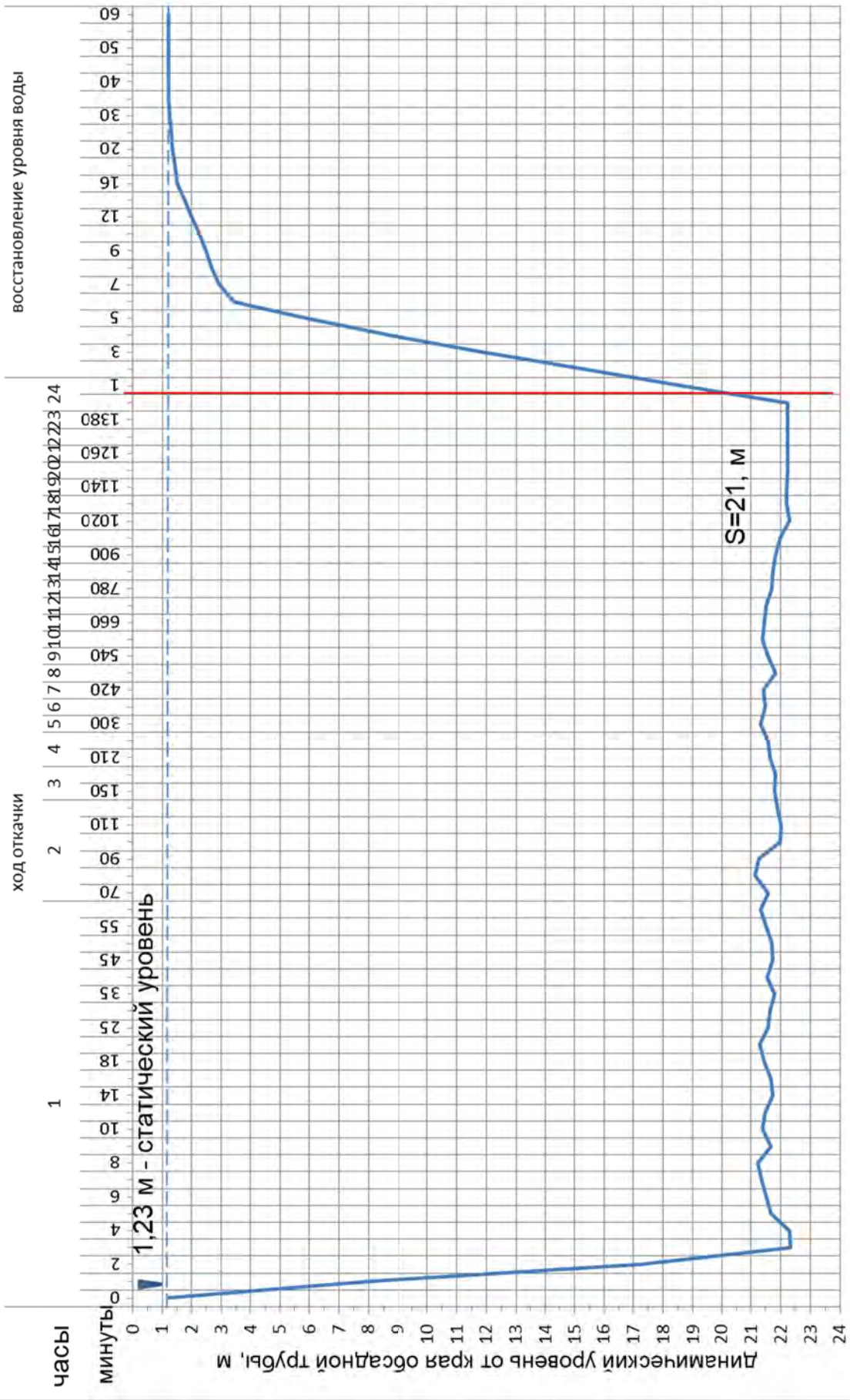
	hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
	2	70	1.23	21.58	20.35				
		80	1.23	21.12	19.89				
		90	1.23	21.25	20.02				
		100	1.23	21.97	20.74				
		110	1.23	22.00	20.77				
		120	1.23	21.88	20.65	240	19.45	12.3	0.60
		150	1.23	21.79	20.56				
	3	180	1.23	21.81	20.58				
		210	1.23	21.64	20.41				
	4	240	1.23	21.58	20.35	240	19.71	12.2	0.60
		300	1.23	21.33	20.10				
	6	360	1.23	21.46	20.23	240	20.36	11.8	0.58
		420	1.23	21.40	20.17				
	8	480	1.23	21.83	20.60	240	19.48	12.3	0.60
		540	1.23	21.57	20.34				
	10	600	1.23	21.39	20.16	240	19.54	12.3	0.61
		660	1.23	21.45	20.22				
	12	720	1.23	21.51	20.28	240	19.87	12.1	0.60
		780	1.23	21.69	20.46				
14	840	1.23	21.73	20.50	240	19.88	12.1	0.59	
	900	1.23	21.82	20.59					
16	960	1.23	21.99	20.76	240	19.73	12.2	0.59	
	1020	1.23	22.30	21.07					
18	1080	1.23	22.19	20.96	240	19.81	12.1	0.58	
	1140	1.23	22.20	20.97					

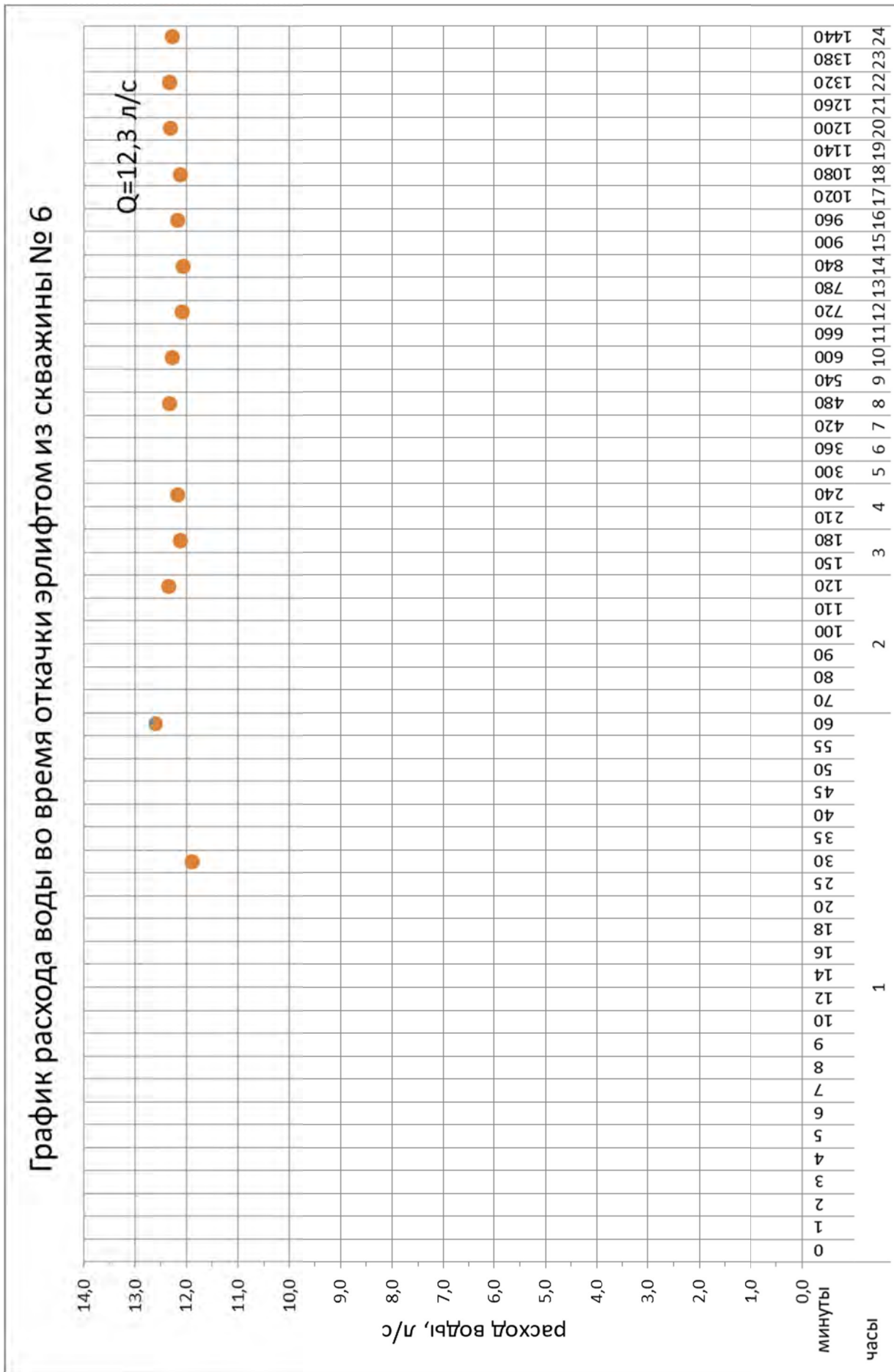
hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
20	1200	1.23	22.24	21.01	240	19.5	12.3	0.59
21	1260	1.23	22.23	21.00				
22	1320	1.23	22.23	21.00	240	19.46	12.3	0.59
23	1380	1.23	22.23	21.00				
24	1440	1.23	22.23	21.00	240	19.55	12.3	0.58
	1		18.73					
	2		15.23					
	3		11.83					
	4		8.73					
	5		5.93					
	6		3.42					
	7		2.92					
	8		2.67					
	9		2.47					
	10		2.26					
	12		1.99					
	14		1.75					
	16		1.50					
	18		1.43					
	20		1.35					
	25		1.30					

recovering water level

	hours	minutes	Static water level (m)	Dynamic water level (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		30		1.25					
		35		1.23					
		40		1.23					
		45		1.23					
		50		1.23					
		55		1.23					
		60		1.23					

График изменения уровня во время откачки эрлифтом из скважины № 6





Journal of experimental pumping by ECV 8-40-60 pump from well No. 6

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
I	1	0		1.23						
		1	1.23	6.10	4.87					
		2	1.23	5.96	4.73					
		3	1.23	5.94	4.71					
		4	1.23	5.95	4.72					
		5	1.23	5.89	4.66	240	96.10	2.50	0.54	
		6	1.23	5.91	4.68					
		7	1.23	5.90	4.67					
		8	1.23	5.88	4.65					
		9	1.23	5.92	4.69					
		10	1.23	5.90	4.67	240	95.49	2.51	0.54	
		12	1.23	5.95	4.72					
		14	1.23	5.92	4.69					
		16	1.23	5.92	4.69	240	95.24	2.52	0.54	
		18	1.23	5.92	4.69					
		20	1.23	5.92	4.69	240	96.31	2.49	0.53	
		25	1.23	5.92	4.69					
		30	1.23	5.92	4.69	240	96.12	2.50	0.53	
		35	1.23	5.92	4.69					
		40	1.23	5.92	4.69	240	96.39	2.49	0.53	

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)	
II		45	1.23	5.92	4.69					
		50	1.23	5.92	4.69	240	96.87	2.48	0.53	
		55	1.23	5.92	4.69					
		60	1.23	5.92	4.69	240	96.45	2.49	0.53	
		70	1.23	5.92	4.69	240	96.48	2.49	0.53	
		80	1.23	5.92	4.69	240	96.35	2.49	0.53	
		90	1.23	5.92	4.69	240	96.29	2.49	0.53	
		100	1.23	5.92	4.69	240	96.00	2.50	0.53	
		110	1.23	5.92	4.69	240	96.33	2.49	0.53	
		120	1.23	5.92	4.69	240	96.58	2.48	0.53	
		1	1.23	10.65	9.42					
		2	1.23	10.68	9.45					
3	1.23	10.67	9.44							
4	1.23	10.64	9.41							
5	1.23	10.64	9.41	240	44.87	5.35	0.57			
6	1.23	10.66	9.43							
7	1.23	10.68	9.45							
8	1.23	10.65	9.42	240	44.91	5.34	0.57			
9	1.23	10.61	9.38							
10	1.23	10.64	9.41	240	44.25	5.42	0.58			
12	1.23	10.6	9.37							

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		14	1.23	10.62	9.39	240	44.47	5.40	0.57
		16	1.23	10.62	9.39				
		18	1.23	10.64	9.41	240	44.39	5.41	0.57
		20	1.23	10.64	9.41				
		25	1.23	10.60	9.37	240	44.12	5.44	0.58
		30	1.23	10.65	9.42				
		35	1.23	10.62	9.39	240	44.23	5.43	0.58
		40	1.23	10.60	9.37	240	44.21	5.43	0.58
		45	1.23	10.60	9.37	240	44.56	5.39	0.57
		50	1.23	10.60	9.37	240	44.42	5.40	0.58
		55	1.23	10.60	9.37	240	44.37	5.41	0.58
		60	1.23	10.60	9.37	240	44.26	5.42	0.58
2		70	1.23	10.60	9.37	240	44.36	5.41	0.58
		80	1.23	10.60	9.37	240	44.36	5.41	0.58
		90	1.23	10.60	9.37	240	44.28	5.42	0.58
		100	1.23	10.60	9.37	240	44.27	5.42	0.58
		110	1.23	10.60	9.37	240	44.21	5.43	0.58
		120	1.23	10.60	9.37	240	44.23	5.43	0.58
III	1	1	1.23	16.00	14.77				
		2	1.23	15.98	14.75				
		3	1.23	15.98	14.75				

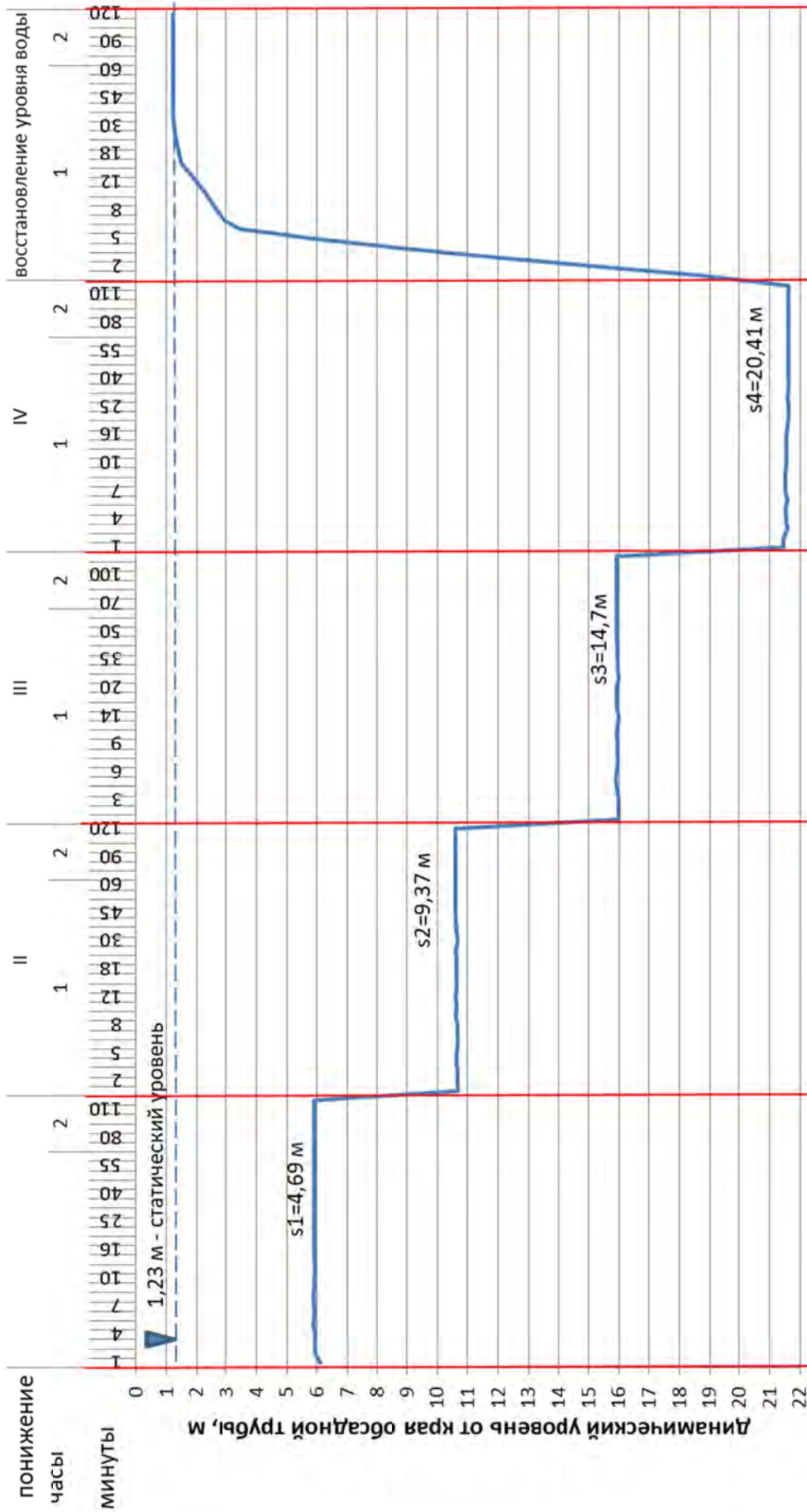
Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		4	1.23	15.95	14.72				
		5	1.23	15.90	14.67	240	29.39	8.17	0.56
		6	1.23	15.91	14.68				
		7	1.23	15.95	14.72				
		8	1.23	15.96	14.73	240	29.42	8.16	0.55
		9	1.23	15.96	14.73				
		10	1.23	15.94	14.71	240	29.88	8.03	0.55
		12	1.23	15.97	14.74				
		14	1.23	15.99	14.76	240	29.72	8.08	0.55
		16	1.23	15.94	14.71				
		18	1.23	15.91	14.68	240	29.69	8.08	0.55
		20	1.23	15.93	14.70				
		25	1.23	15.98	14.75	240	29.59	8.11	0.55
		30	1.23	15.97	14.74				
		35	1.23	15.97	14.74	240	29.67	8.09	0.55
		40	1.23	15.95	14.72	240	29.72	8.08	0.55
		45	1.23	15.94	14.71	240	29.58	8.11	0.55
		50	1.23	15.92	14.69	240	29.43	8.15	0.56
		55	1.23	15.92	14.69	240	29.31	8.19	0.56
		60	1.23	15.93	14.70	240	29.40	8.16	0.56
	2	70	1.23	15.93	14.70	240	29.26	8.20	0.56

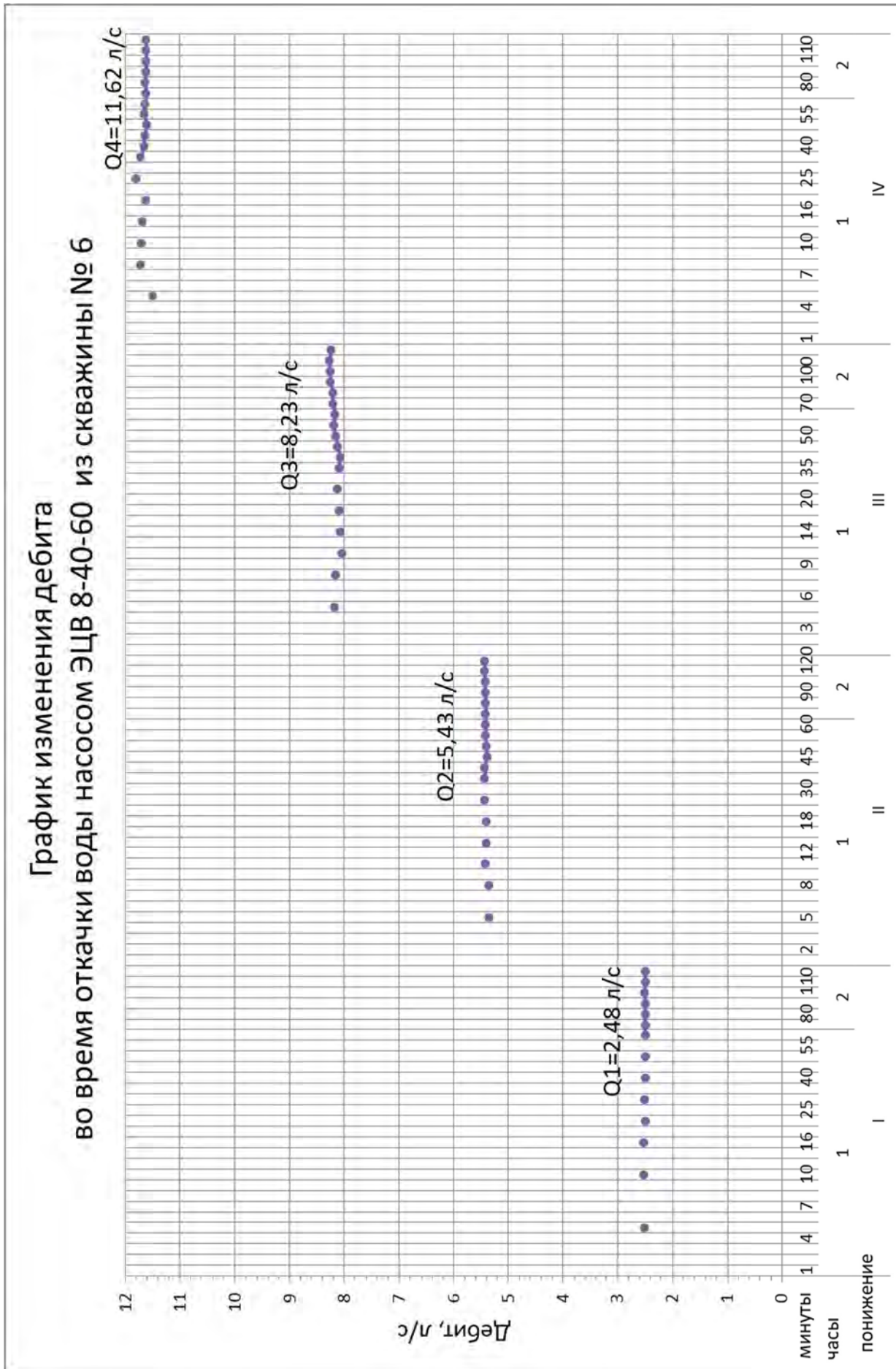
Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		80	1.23	15.93	14.70	240	29.26	8.20	0.56
		90	1.23	15.93	14.70	240	29.12	8.24	0.56
		100	1.23	15.93	14.70	240	29.08	8.25	0.56
		110	1.23	15.93	14.70	240	29.01	8.27	0.56
		120	1.23	15.93	14.70	240	29.16	8.23	0.56
		1	1.23	21.44	20.21				
		2	1.23	21.44	20.21				
		3	1.23	21.58	20.35				
		4	1.23	21.54	20.31				
		5	1.23	21.53	20.30	240	20.89	11.49	0.57
		6	1.23	21.58	20.35				
		7	1.23	21.53	20.30				
		8	1.23	21.51	20.28	240	20.48	11.72	0.58
		9	1.23	21.52	20.29				
		10	1.23	21.55	20.32	240	20.51	11.70	0.58
		12	1.23	21.54	20.31				
		14	1.23	21.57	20.34	240	20.54	11.68	0.57
		16	1.23	21.54	20.31				
		18	1.23	21.59	20.36	240	20.65	11.62	0.57
		20	1.23	21.61	20.38				
		25	1.23	21.61	20.38	240	20.34	11.80	0.58
IV	1								

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		30	1.23	21.60	20.37				
		35	1.23	21.63	20.4	240	20.49	11.71	0.57
		40	1.23	21.61	20.38	240	20.58	11.66	0.57
		45	1.23	21.62	20.39	240	20.61	11.64	0.57
		50	1.23	21.64	20.41	240	20.68	11.61	0.57
		55	1.23	21.64	20.41	240	20.59	11.66	0.57
		60	1.23	21.64	20.41	240	20.63	11.63	0.57
		70	1.23	21.64	20.41	240	20.66	11.62	0.57
		80	1.23	21.64	20.41	240	20.62	11.64	0.57
		90	1.23	21.64	20.41	240	20.66	11.62	0.57
		100	1.23	21.64	20.41	240	20.65	11.62	0.57
		110	1.23	21.64	20.41	240	20.65	11.62	0.57
120	1.23	21.64	20.41	240	20.65	11.62	0.57		
recovering water level	1	1		18.73					
		2		15.23					
		3		11.83					
		4		8.73					
		5		5.93					
		6		3.42					
		7		2.92					
		8		2.67					
	2								

Step	Hours	Minutes	Static water level from the pipe edge (m)	Dynamic water level from the pipe edge (m)	Amount of reduction (m)	Measuring vessel volume, 240L	Vessel filling time (sec)	Flow rate (l/s)	Specific flow rate l/(sec*m)
		9		2.47					
		10		2.26					
		12		1.99					
		14		1.75					
		16		1.50					
		18		1.43					
		20		1.35					
		25		1.30					
		30		1.25					
		35		1.23					
		40		1.23					
		45		1.23					
		50		1.23					
		55		1.23					
		60		1.23					
		70		1.23					
		80		1.23					
		90		1.23					
	2	100		1.23					
		110		1.23					
		120		1.23					

График изменения уровня воды во время откачки насосом ЭЦВ 8-40-60 из скважины № 6





Plece of collection	Anion content mg/L mEq/L %			pH	Cation content mg/L mEq/L %			Total	Hardness mEq/L		mineralization dry residue (mg/L)	
	HCO ₃ ⁻	SO ₄ ²⁻	Cl ⁻		Ca ²⁺	Mg ²⁺	Na ⁺		Total	Total Ca ²⁺ +Mg ²⁺		carbonate
Well No. 6	134	205	114		63	29	90	182			635	
	2.20	4.27	3.22	7.00	3.14	2.39	3.91	9.44	5.53	2.20	690	
	23	44	33		33	25	41	100				
Well No.7	122	206	113		63	27	96	186			627	
	2.00	4.29	3.19	7.10	3.14	2.22	4.18	9.54	5.37	2.00	642	
	21	45	34		33	23	44	100				

