Ministry of Health and
Social Protection of Population
The Republic of Tajikistan

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF MEDICAL EQUIPMENT AT NATIONAL MEDICAL COMPOUND OF TAJIKISTAN "SHIFOBAKHSH"
IN
THE REPUBLIC OF TAJIKISTAN

DECEMBER, 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSORTIUM OF
BINKO INTERNATIONAL LTD.
AND
KOEI RESEARCH AND CONSULTING CO.,LTD

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to the Consortium of Binko International Ltd and Koei Research and Consulting co., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of Tajikistan, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Tajikistan for their close cooperation extended to the survey team.

December, 2018

Ms. Mitsuko KUMAGAI
Director General,
Human Development Department
Japan International Cooperation Agency

SUMMARY

1. Overview of the Country

The Republic of Tajikistan (Tajikistan) is located in the middle of the Eurasian continent, in the northeast part of Central Asia, bordered by Uzbekistan to the west, Uzbekistan and Kyrgyzstan to the north, People's Republic of China to the east, and Afghanistan to the south.

Tajikistan's capital city is Dushanbe, its area is about 143,100 square kilometers (about 40% of the Japan), 93%[1] of the land is mountainous, half of it is above 3, 000m, and the eastern border with China is part of the Pamir Plateau, which reaches an elevation of 7,000m. The altitude of the capital Dushanbe is not very high around 700 - 800 m, the Fergana Basin in the northwest is the lowest in the entire region, around 300 to 500m above sea level, bordering Uzbekistan and Kyrgyzstan. On the other hand, the altitude of Khorog, the regional capital of the Gorno-Badakhshan Autonomous Oblast[2] (GBAO) in the Pamir region exceeds 2,000m above sea level. The total extension of domestic railroad is about 680km, connecting the metropolitan area of the west part of Tajikistan and neighboring countries Uzbekistan and Turkmenistan. The main road is about 30,000km, most of which was built before 1991 during the Soviet Union period. The road connecting the northern part and the southern part, which is one of the main highways, connects Dushanbe to the northwestern Khujand beyond the mountains. The main highway extending to the east connects Dushanbe to Khorog of GBAO and continues to the north-eastern part beyond the mountains and goes to the neighboring Kyrgyz's Osh.

Tajikistan is landlocked, the climate is continental climate, and it varies with altitude. Temperatures in urban areas such as the capital Dushanbe and Khujand rise beginning April, and in the summer, it gets hot. The average temperature in July is 32°C, sometimes over 40°C. From December to February, the temperature is below 0°C and snow piles up. Dushanbe's average winter temperature is 9°C and it is around 13°C in December-January. On the Pamir Plateau, the average temperature in January is -18°C and the average temperature in July is 14°C at an altitude of 3,600 m.

The population is 8.9 million (2017: United Nations Population Fund), the ethnic composition is Tajik (84.3%), Uzbek (12.2%), Kyrgyz (0.8%), Russian (0.5%) and others (2.2%)[3]. The official language is Tajik, but Russian is also widely used.

In 1991, the country became independent from the Soviet Union. Overall standard of living declined due to a civil war after independence. Since the civil war came to an end with Comprehensive Peace Agreement signed in June, 1997, the economy has begun to grow, but the unemployment rate is still high, and the economic situation is severe. The International Monetary Fund (IMF) and the World Bank (WB) are working together to promote economic growth and development. Since the global financial crisis in October 2008, the impact of the economic recession in the economically relevant Russia and Kazakhstan reduced the remittances from overseas migrant workers and slowed the growth of Gross Domestic Product (GDP).

In the primary industry, major industries are agriculture mainly in cotton cultivation, pastoralism, in the secondary industry the textile industry is relatively developed. Although small, it has mineral resources such as gold, silver, copper, molybdenum and antimony. In addition, it has abundant water

[1] www.maff.go.jp, Japanese Ministry of Agriculture, Forestry and Fisheries, accessed in October 2018.
[2] Oblast is a type of administrative division in several post-Soviet states. The word "oblast" is also translated as "region" in this text.
[3] Agency for Statistics under the President of the Republic of Tajikistan

resources and one of the major industries is hydroelectric power generation. GDP is 7.3 billion dollars inflation rate is 7.3%[4].

2. Background and Outline of the Project

As Tajikistan run into financial difficulties after the dissolution of the Soviet Union, investment in technical aspects such as medical facilities and training for medical personnel became insufficient compared to that in the Soviet era, resulting in the decline of the quality of medical services.[5]

In Tajikistan's health care services, hospital management budget has been allocated according to shifting the emphasis on treatment and number of beds since the former Soviet era, and it is characterized by problems such as inefficient medical treatment activities due to highly segmented expertise. Health reform has been underway since the late 2000s in order to get out of this situation and to shift from emphasis on treatment to Primary Health Care (PHC). In order to give the free health care services that continued from the former Soviet era, each medical facility is unable to introduce the latest medical equipment. Now, “improvement of medical quality” has been an urgent issue. In addition, although the Ministry of Health and Social Protection of Population (MoHSPP) provide operating costs to the core hospitals run by MoHSPP, the Regional (Oblast) health department fund the regional level, the city and district (Rayon[6]) health department fund the city and district level, and the problem of the medical disparities between the regions is pointed out.

The total government health expenditure was 6.9% of GDP[7] as of 2014 and the health financial environment is not good. Therefore, sufficient training for health personnel cannot be secured, facilities and equipment not being adequately maintained due to lack of resources. It might be difficult to say that the demand is adequately supported. The reliability of the people in the medical administration has declined due to serious patient examination and treatment waiting problem and the deterioration of the facilities and equipment. In particular, the disease structure has also changed from infectious diseases to Non-Communicable Diseases (NCDs) and NCDs accounts for nearly 60% of deaths[8].

The improvement of the quality of medical services, in particular for the National Medical Center located in the “Shifobakhsh” National Medical Compound of Tajikistan (the National Medical Center) and the Cardiovascular Surgery Center, is urgently needed to promote the health of the people especially socially vulnerable people, to further modernize health care and develop medical personnel. Since both centers are the top referral medical facilities in the national health system, they receive patients from all over the country and provide free medical services to the persons living in impoverished circumstances.

The National Medical Center is located in the capital city Dushanbe and is one of the 9 advanced medical centers of the “Shifobakhsh” National Medical Compound. It has 2,000 hospital beds, 17 medical departments for adults, 18 medical departments for pediatrics and specialized medical departments such as orthopedic surgery, ophthalmology, Ear, Nose and Throat (ENT) and hematology. During the former Diakov Hospital, Government of Japan (GoJ) implemented the Project for the Improvement of Medical Equipment in Diakov Hospital in Tajikistan[9] (the 2006 Diakov Project) for targeting the pediatric departments of the

[4] IMF estimation, 2017
[5] Health system in transition 2010, European observatory on Health systems and policies
[6] Rayon is a type of administrative unit of several post-Soviet states. The word "rayon" is translated as "district" in this text.
[7] Health system in transition 2010, European observatory on Health systems and policies
[8] NCD Country Profiles 2018,WHO
[9] Singed for Exchange of Notes (E/N) on Feb.,2005, and handed over the equipment in 2006

hospital. The Project for Improvement of Medical Equipment in the National Medical Center "Shifobakhsh" and in the State Institution "Republican Scientific Center of Cardiovascular Surgery" (the Project) supported the improvement of equipment for diagnosis and treatment with provision of a Computed Tomography (CT), a general X-ray and fluoroscopic unit. While some of the equipment has been in use for over 10 years, the existing Soviet era equipment has now been used due to financial difficulties. For this reason, diagnostic and treatment activities are still being conducted using obsolete equipment. Since breakdowns and hence repairs are occurring frequently due to aging equipment and aged deterioration, maintenance and repair costs have increased resulting in further negative pressure on the hospital management.

The Cardiovascular Surgery Center is located in northern part of Dushanbe city and provides both medical treatment such as catheterization, stenting and bypass surgery for patients with cardiovascular diseases from all over the country including referred patients from the National Medical Center. In recent years, cardiovascular disease has become the leading cause of death in Tajikistan. There is urgent need to take measures to lower the mortality rate through improvement of treatment for cardiovascular diseases such as acute myocardial infarction and early detection of vasoconstriction site. The center has a teaching function as a specialized medical facility for cardiovascular diseases. Although it has become a designated hospital for medical students majoring in cardiovascular diseases, it is difficult to provide them with sufficient clinical training due to lack of equipment.

3. Outline of the Survey Results and Description of the Project

As for recent disease trends, NCDs, cardiovascular disease and cancer are increasing. Therefore, appropriate measures against the diseases are required. Furthermore, with the development of the transportation network, vehicle traffic increases, and consequently the number of trauma patients by traffic accidents also increased. Existing medical equipment at target medial facilities is obsolete, and it is impossible to provide essential data such as diagnostic images and laboratory investigation results for the establishment of treatment procedure. As a result, facilities provide limited diagnostic and treatment with insufficient diagnostic accuracy, resulting in difficulties in the provision of quick and accurate diagnosis and treatment.

Under the Project, the National Medical Center needs to replace some of the aged equipment which was provided in Japan's Grant Aid project in 2006, and to respond to new public health issues such as NCDs by replacing and procuring new medical equipment. Mainly, it is necessary to replace, supplement or procure the following equipment. These are indispensable for improving the quality of medical services such as image diagnosis and clinical examination data and for planning of treatment, such as improvement of intraoperative and postoperative care, etc.

① Image diagnostic equipment, expected to improve accuracy of diagnostic function
② Equipment which would contribute to less invasive and effective diagnostic and treatment
③ Equipment which would contribute to treatment of post-operative patients at Operation Theatre and Intensive Care Unit (ICU)
④ Clinical laboratory equipment which would contribute to diagnosis and follow-up after treatment

There are two sets of Angiography system manufactured in 2000 and 2011 deployed at Cardiovascular surgery center, and only one system made in 2011 is in operation. Since it is over 7 years old and its function

has deteriorated remarkably due to aging, it is difficult to high-accurately, quickly diagnose and treat. For this reason, patients are inevitably forced to wait for extended time for treatment, and emergency serious patients are forced to consult at expensive private medical facilities. In order to improve this situation, the Project is to renew one Angiography system that is essential for the treatment of cardiovascular disease.

The selection of medical equipment and related equipment procured under the Project, including its maintenance and the quantity, is considered from an overall perspective such as purpose of use, necessity on demand side, urgency of maintenance, technical level, operating system, maintenance management system, operation and maintenance expenses. As a result, 42 items are selected as the procurement targets. For some medical equipment requiring advanced maintenance and management, it is required to conclude a maintenance management contract such as Comprehensive Maintenance Contract (CMC) or Annual Maintenance Contact (AMC). The following Table i shows the "maintenance contract" section of the equipment scheduled for the maintenance management contract. The maintenance contract fee is included in the Project for two years after the end of the manufacturer's warranty period. In addition, for the smooth launch of procured equipment, and for promoting long continuous utilization in good condition, the Project will introduce soft components giving training to improve maintenance and its system of equipment through practical activities such as daily inspection of equipment and periodic inspections. For planned installation rooms where CT, General X-ray and Fluoroscopy unit and Angiography system will be installed, Air Conditioners will be deployed under the Project in order to ensure temperature required by equipment for environmental management at each room.

Table i　Planned Equipment List

【National Medical Center 】

No.	Name of Equipment	Q'ty	Function and Contents	Maintenance Contract
1	Ventilator for adult	6	Used to provide assisted respiration and forced breathing to respiratory failure patients. Plan for equipment with 3 kinds of specifications for adults, pediatrics, and operation theatre. Select suitable model that corresponds to the setting of ventilation volume and breathing mode.	AMC*1
2	Ventilator for pediatrics	2		
3	Ventilator for OT	9		
4	High Pressure Steam Sterilizer	2	Essential equipment for the central sterilization supply department. Used to sterilize surgical instruments and linen used in the center with high pressure steam in a short time.	AMC
5	Laparoscope set for OT (adult)	2	Used to perform abdominal examination and surgery through the image from video camera and specialized devise for endoscopes. Since the endoscopes are inserted from small cuts on the abdomen, the wounds are small compared with the conventional laparotomy operation, and the invasiveness to the patient is kept low. Thus, patient's recovery from the operation is quick, and rate of postoperative complication such as ileus obstruction is low. Plan for suitable size for both adult patient and pediatric patient.	
6	Laparoscope set for OT (pediatrics)	1		
7	Bronchoscope, Video system for adult	1	Used for diagnosis of respiratory diseases such as lungs and bronchi. This scope is insert from the mouth to observe lungs, bronchi directly, and also collect tissues and cell for diagnosis and treatment of diseases such as bronchial strictures etc. Plan for suitable size for both adult patient and pediatric patient.	AMC
8	Bronchoscope, Video system for pediatrics	1		

No.	Name of Equipment	Q'ty	Function and Contents	Maintenance Contract
9	Colonoscope video system for adult	1	Used to perform observation of lesion, diagnosis and treatment from the rectum to the colon or ileal terminal by inserting scope video camera from the anus. Plan for suitable size for both adult patient and pediatric patient.	AMC
10	Colonoscope video system for pediatrics	1		
11	Gastroscope video system for adult	1	Used to observe the lesion of the upper gastrointestinal tract such as esophagus and stomach, and also to collect tissue and cells for diagnosis. Plan for suitable size for both adult patient and pediatric patient.	AMC
12	Gastroscope video system for pediatrics	1		
13	Duodenoscope for ERCP	1	Used for Endoscopic Retrograde Cholangiopancreatography (ERCP) examination that can detect abnormality of the gall bladder, bile duct and pancreatic duct at an early stage	AMC
14	Cabinet for fiberscope, UV lamp	2	Used for keeping the endoscope cleanly before and after use.	
15	Ultrasound Scanner, Doppler	1	Used for diagnosis of cardiovascular diseases such as congenital heart disease, and diagnosis of abdomen and superficial tissues etc. Plan to provide linear, convex and sector transducers for diagnosis of abdomen, chest, and heart etc.	
16	Ultrasound Scanner	3	Used to conduct a rapid diagnosis of abdominal organs such as liver, kidney and gall bladder. Plan to provide linear and convex transducers to see various parts such as abdomen and chest.	
17	Defibrillator	4	Used to promote normal restoration of heart contraction of patient who has ventricular fibrillation or atrial fibrillation by delivering direct-current electricity shock percutaneously.	
18	Operation Light	4	Used to keep the operative field bright with shadowless lamp. It is planned an LED type that can perform safe and accurate surgery.	
19	Neurosurgery set	2	Instrument set such as scalpel, tweezers, scissors used for fine brain surgery operation	
20	Microtome Rotary	1	Used for preparation of ultra-thin section for observation under microscope.	
21	Tissue Processor	1	Used for automatic pathological sample preparation by fixation, dehydration, degreasing, paraffin penetration of pathological tissue samples.	
22	CT	1	Used to take a tomographic image of the body by radiation. It is planned 64 slices or more that is effective for diagnosis of tumor, cancer and fracture etc.	CMC[*2]
23	Surgical C-arm X-ray unit	1	Used for intraoperative fluoroscopic imaging such as orthopedic surgery. It is also used for confirming the position of the spine, and the position of the implantable device such as a pacemaker, etc.	AMC
24	Mobile X-ray unit	1	Used for X-ray examination of serious patients who cannot be moved. The unit can be moved to bedsides for X-rays. It is planned a digital type that does not require printing film.	AMC
25	General X-ray and Fluoroscopy unit	1	Used for X-ray examination of gastrointestinal contrast such as general radiography of the chest and abdomen, examination of upper gastrointestinal contrast (esophagus, stomach, and duodenum), lower digestive tract contrast (large intestine), kidney, ureter and bladder.	AMC
26	Arthroscope set	1	Used for observation and treatment of the lesion of the joint part of the lower limbs such as the knee joints. To make a small cut near affected parts for inserting endoscope for observation, diagnosis and treatment.	

No.	Name of Equipment	Q'ty	Function and Contents	Maintenance Contract
27	Ultrasound Scanner for ophthalmology	1	Used to provide information necessary for diagnosis, such as image information visualizing the shape, properties or dynamics of the eyeball and its surroundings, measurement information of the thickness of the cornea, and the axial length, and the like.	AMC
28	Spirometer	2	Used for diagnosis of respiratory function by measurement of pulmonary capacity etc.	
29	Audiometer for infant up to one year	3	Used for the detection of congenital hearing abnormality by Distortion Product Otoacoustic Emission (DPOAE).	
30	Cysto-Urethroscope set (adults)	1	Used for observation and treatment in the urethra and the bladder. It is also possible to collect stones that have been crushed by a lithotripter (ultrasonic type). It is planned for both pediatrics and adult devices.	
31	Cysto urethroscope set (pediatrics)	1		
32	Biochemistry analyzer	1	Used to analyze various components of blood and body fluids and observe biological information such as abnormalities of organs and presence or absence of inflammation.	AMC
33	Hematology analyzer	1	Used for diagnosis of health condition and diseases by investigating quantitative changes, quantification and functions of blood cell components of erythrocytes, white blood cells and platelets.	AMC
34	ELISA system	1	Used for detecting and quantitatively measuring the concentration of antibody or antigen contained in the sample and for positive / negative judgment such as hepatitis B and C or HIV / AIDS.	
35	Phacoemulsifier	1	Used for incision of corneal, incision and pulverization of crystalline lens nucleus for patient such as cataract	AMC
36	ENT surgery and endoscope set	2	Used for diagnosis and treatment for patients such as sinusitis through directly observe the back and angled parts of the nose with endoscopes. It is possible to perform delicate surgery by using it together with ENT instrument set to be procured with this set.	AMC
37	General orthopedic surgical set	3	Instrument set used for performing various orthopedic surgery.	
38	Surgical set	5	A complete set of instruments used for general surgeries such as laparotomy and open chest surgery.	
39	Lithotripter ultrasonic	1	Used to crush and remove urinary calculus by ultrasonic shock waves from outside the body.	AMC
40	Operating microscope for ophthalmology	1	Used for performing ophthalmic microsurgery by enlarging the operative field by the microscope.	
41	ENT Treatment unit and Chair	1	Used for patients who need diagnosis and treatment of otolaryngology, and it is possible to treat with appropriate position and posture by sitting the patient on a dedicated chair.	

【Cardiovascular surgery center 】

No.	Name of Equipment	Q'ty	Function and Contents	
42	Angiography system	1	Used for coronary angiography examination for ischemic heart disease and emergency percutaneous coronary angioplasty (PCI) treatment. The X-ray tube indicator is the ceiling mounted type that is currently in use, and the detector part is a digital type flat panel detector.	CMC

*1 This includes periodic inspection, unlimited on-call maintenance, repair in case of breakdowns, but does not include cost of spare parts necessary for repair.

*2 This includes periodic inspection, unlimited on-call maintenance, repair in case of breakdowns, and cost of spare parts. It can also be called full maintenance contract.

4. Project Schedule and Cost Estimate

When the Project covered here is implemented under Japan's Grant Aid, it takes 3.5 months for detailed design and bidding and 10.0 months for procurement and installation supervision, totaling 13.5 months. In addition, it takes 13.5 months from the beginning to the end of the soft component. The total cost to be borne by the Tajikistan side is estimated at approximately 2 million yen.

5. Project Evaluation

5-1. Relevance

Regarding the Project covered here as a project to improve the quality of healthcare services and skills of health personnel of Tajikistan, the Project is relevant for implementation in points shown below. Therefore, the Cooperation is appropriate for implementation under Japan's Grant Aid project.

(1) Focus of project beneficiaries

Beneficiaries (patients), users of the National Medical Center and the Cardiovascular Surgery Center are both adult and pediatric patients. These National Centers are advanced and specialized medical care centers in Tajikistan, furthermore they could be the only medical centers in this country providing diagnosis and treatment for complicated diseases and injuries. The Project's contribution ensures quality of medical services for citizens nationwide, and solves health issues the country faces. Therefore, the implementation of the Project is deemed highly relevant.

(2) From a Human Security Standpoint

Tajikistan is located in geopolitical key area in the region, which is connected with Asia, Europe, Russia and the Middle East. Therefore, the stability of Tajikistan is important to the stabilization of Central Asia and Eurasia region, and is also important for international society's efforts toward stability and self-sustained development in neighboring Afghanistan. At the same time, the national income in Tajikistan has been the lowest level among the Commonwealth Independent States (CIS) countries, and Tajikistan faces huge challenges such as poverty reduction and social service provision including medical service. Thus, the implementation of the Project is significant from a human security standpoint.

(3) Contribution to achieving Tajikistan's mid to long term development targets

The Project contributes to the achievement of the goals set forth in "National Development Strategy (NDS) (Expected results for health care and longevity)", "National Health Strategy (NHS)" and "Strategy for prevention and control of NCDs and injuries" by strengthening medical services provided by the National Medical Center and the Cardiovascular Surgery Center.

(4) Consistency with Global Goals

The outcomes expected through the implementation of the Project are consistent with Sustainable Development Goals (SDGs), "reduce premature mortality from NCDs" and "achieve Universal Health Coverage (UHC)".

5-2. Effectiveness

Trough the implementation of this Project, the following quantitative and qualitative impacts are expected, the Project is deemed effective.

(1) Quantitative effects

After implementation of the Project, quantitative indicators are set as shown in Table ii as outputs expected to improve the quality of medical services provided at the National Medical Center and the Cardiovascular Surgery Center, planned target facilities. These indicators determine the level of achievement of the Project goals.

Table ii Quantitative Effects

Target facility	Indicators	Unit	Baseline in 2017 [Actual value]	Target value in 2023 [Three years after project completion]
National Medical Center	1. Number of CT examination	Cases/year	1,198 (2015)	3,000
	2. Number of examinations with a general X-ray and fluoroscopy unit	Cases/year	8,388	12,000
	3. Number of treatments with lithotripter ultrasonic	Cases/year	0	477
Cardiovascular Surgery Center	4. Number of cases of angiography and angioplasty	Cases/year	886	1,772

Source: Created by the survey team

(2) Qualitative Effects

Qualitative effects expected from the Project are as shown in Table iii.

Table iii Qualitative Effects

1.	The introduction of the equipment under the Project will improve the quality of medical services, which the advanced and specialized medical facilities provide, as well as enhance the reliability of the target facilities.
2.	The introduction of equipment at target facilities, which play the role of teaching institutions, increases number of diagnosis and treatment carried using latest medical equipment, and enables the provision of diverse cases, thereby enhancing training contents for physicians and medical students working in the hospitals.

Questionnaire survey will be conducted among local residents using the facilities where the Project implemented, as well as medical students and physicians who receive trainings at those facilities after the Project.

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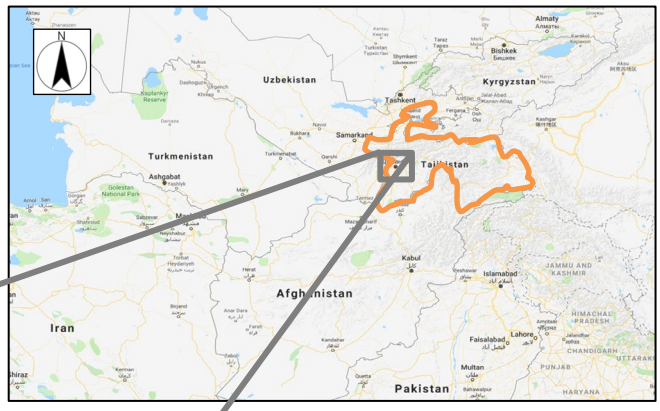
APPENDICES

LOCATION MAP

Map data © 2018 Google



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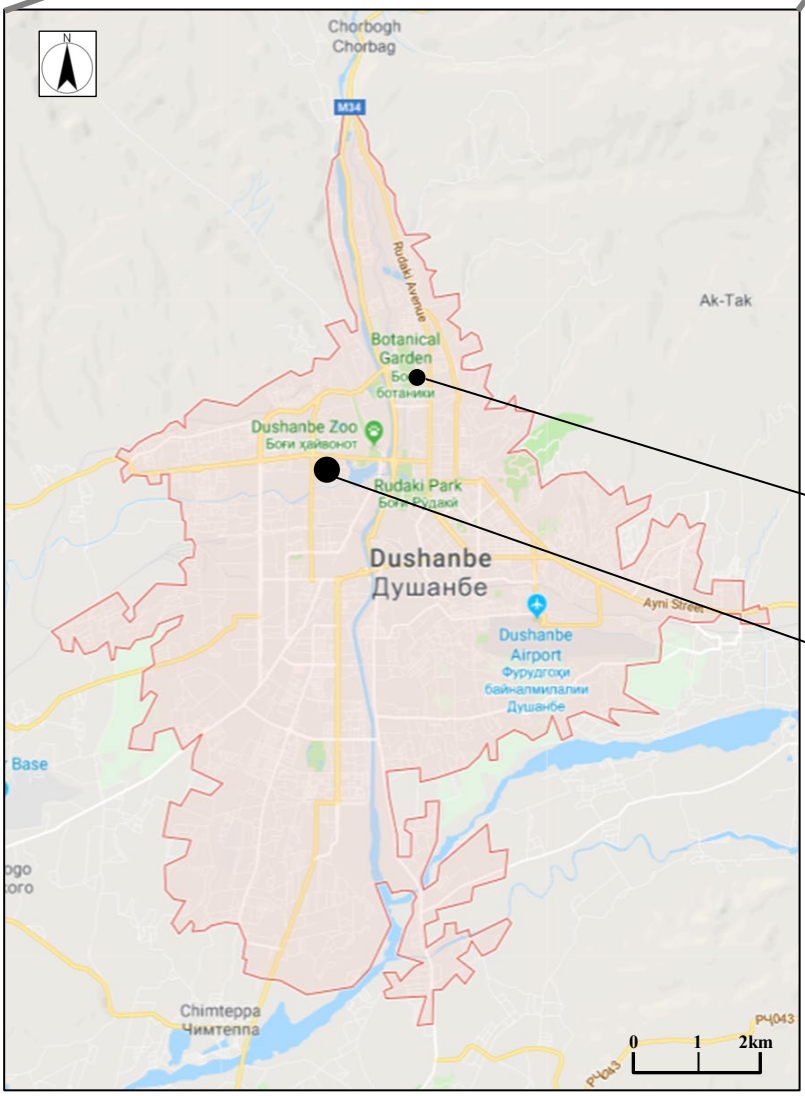


Cardiovascular Surgery Center

National Medical Center in “Shifobakhsh” National Medical Compound

Map data © 2018 Google

LIST OF FIGURES & TABLES

ABBREVIATIONS

Abbreviations	Official Name
AIDS	Acquired Immunodeficiency Syndrome
AMC	Annual Maintenance Contract
A/P	Authorization to Pay
B/A	Banking Arrangement
CIS	Commonwealth Independent States
CMC	Comprehensive Maintenance Contract
CSSD	Central Sterilization and Supply Department
CT	Computed Tomography
ELISA	Enzyme-Linked Immuno-Sorbent Assay
E/N	Exchange of Notes
ENT	Ear, Nose and Throat
ERCP	Endoscopic Retrograde Cholangiopancreatography
G/A	Grant Agreement
GBAO	Gorno-Badakhshan Autonomous Oblast
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
GoJ	Government of Japan
GoT	Government of Tajikistan
GQP	Good Quality Practice
JICA	Japan International Cooperation Agency
ICU	Intensive Care Unit
IMF	International Monetary Fund
KfW	Kreditanstalt für Wiederaufbau
MoHSPP	Ministry of Health and Social Protection of Population
HIV	Human Immunodeficiency Virus
IABP	Intra-Aortic Balloon Pumping
MRI	Magnetic Resonance Imaging
NCDs	Non-Communicable Diseases
NDS	National Development Strategy
NHS	National Health Strategy
PHC	Primary Health Care
PP-R	Polypropylene Random copolymer
SDGs	Sustainable Development Goals
UHC	Universal Health Coverage
VAT	Value Added Tax
WB	World Bank

CHAPTER 1
BACKGROUND OF THE PROJECT

Chapter 1 Background of the Project

1-1 Background and Outline of the Project

(1) Background and history of Grant Aid

The Republic of Tajikistan (Tajikistan) has been reforming various health and medical systems since independence in 1991, but it has maintained the former Soviet era system and the improvement of health care service has not progressed. The number of patients who visit the national medical facilities is one million per year, and the number of inpatients is up to 30,000 people a year, meanwhile demand continues to increase. In addition to the chronic shortage of equipment, medical equipment procured in the Soviet era has been used beyond its useful life, and therefore, the medical facilities are unable to provide adequate health care services.

The “Shifobakhsh” National Medical Compound is located in the capital city, Dushanbe, a complex medical facility consisting of the National Medical Center (formerly Diakov National Hospital) and nine advanced medical centers and has 2,000 beds. In 2006, it was renamed from former Diakov National Hospital to National Medical Center. In 2017, as a complex medical facility including existing advanced specialized centers, it was designated as the national primary medical facility that provides highest level diagnosis, treatment, and emergency medical service for patients from all over the country. In the days of the former Diakov National Hospital, Japan implemented a Grant Aid for the hospital’s pediatric department under the "Diakov National Hospital Medical Equipment Development Plan" (2006) and supported the procurement of equipment necessary for diagnosis and treatment such as Computed Tomography (CT) and General X-ray and Fluoroscopy unit. This equipment has been used for more than ten years, and there are frequent failures and repairs due to aging. In addition, existing advanced specialized centers are required to deal with diagnosis and treatment of Non-Communicable Diseases (NCDs) such as cardiovascular and cancer which have emerged as a public health issue. However, they are not able to provide adequate medical services due to lack of equipment and aging.

One of the priorities of the government's long-term strategy “National Department Strategy (NDS) 2016-2030” and “National Health Strategy (NHS) 2010-2020” is to improve the quality, access and efficiency of health services. The “Shifobakhsh” National Medical Compound Medical Equipment Improvement Plan aims to provide appropriate medical services by improving medical equipment at republican top referral medical facilities. It is regarded as a high priority project in the country's development strategy aiming at achieving Universal Health Coverage (UHC).

1-2 Situation of project site and surroundings

1-2-1 Status of related infrastructure development

(1) General Condition of Plumbing System within the Facility Compound

Among the equipment scheduled to be deployed under the project, some advanced medical equipment requires qualified temperature control. However, water supply facilities of the target centers, especially hot water heating facilities have deteriorated due to aging, and there seems to be problems that could affect maintenance of the equipment to be procured. For this reason, the survey on the current situation was conducted, summarizing countermeasures for the improvement of the temperature environment necessary

for maintenance of target equipment, and proposal for a renovation work plan for the water supply pipe equipment in the entire site as a more permanent measure. The outline of the survey is as follows.

Within the "Shifobakhsh" National Medical Compound, five main pipes run parallel - cold water supply pipe, district heating water supply and return pipes, and hot water supply and return pipes. The external pipes run throughout the site, which extends 1km north and south, and 500m east and west, and have a total length of 5km. The pipes were originally installed underground in the 1960's, however, when they reached their service life in the 1980's they were renewed and installed above the ground, exposed (completed in 1986). With regard to the hot water supply, individual electric water heating systems were employed, and the pipes have been left unused ever since.

The current external pipes have already been in use for 30 years and have already exceeded their service life, resulting in deterioration causing water leakage and bad appearance. Water leakage occurs 4 to 5 times a year in the heating pipes and 1 to 2 times in cold water pipes and are repaired each time. Such repair work takes one or two days, while heating water supply is suspended to destination buildings, where the temperature drops, and condensation occurs occasionally. Condensation may lead to short circuit in medical equipment and could cause malfunction. Also, the heating water supply is suspended once in a week or two for general repair and maintenance.

Likewise, the cold water and heating pipes in buildings have deteriorated and water leakage occurs. It occurs, in the entire facility, approximated 20 times in heating pipes and 3 to 4 times in cold water pipes a year, which are repaired each time. Repairs are usually finished in one day by replacing a portion of pipe at the spot of leakage. Iron pipe is welded to the existing same material, or Polypropylene Random copolymer (PP-R) pipe is connected by specially designed joints. To date 20 to 30 per cent of the entire internal pipes have already been replaced with PP-R pipe by the repair works. Furthermore, the key apparatus located in the basement of each building such as constant flow valve and water distributor have deteriorated too.

Cold water is drawn from the city water pipe and connected and supplied directly to each building via a pump room and the above external pipes. In the pump room, two Japan-made booster supply pumps, installed in the 2006 Diakov Project, are operating. The city water supply is stable and generally has a pressure of 1.8 kg/cm^2, however, it tends to drop around the summer time and the water may not reach to the upper floors of each building. The pumps are operated when the water pressure drops below 1.0 kg/cm^2 and supply water to the entire facility. The pumps develop 22kW and have a capacity of 5.0 kg/cm^2, however, due to the deteriorated external pipes the water supply is pressurized up to 2.0 kg/cm^2 only. Although the pumps are said to be operating properly, they have already exceeded their service life and age-related deterioration is observed by their appearance. In addition, leakage was observed at the joints with pipes, where substitute packing was applied.

Although the city water quality is good (detailed descriptions to follow), no water tests are conducted in the Compound, though a dust filter apparatus is equipped in the pump room and maintained regularly.

In order to check the water quality from the city supply and at the supply points in the facility, a water quality test by a public institution was carried out. As described in Table 1-1, all items met the Tajikistan water quality standard.

Test executed by: Hygiene and Epidemiology Center
Samples taken at: (1) Pump Room (Which is the closest to the intake point)
(2) A branching point from the main pipe to Building No.9
(3) Building No.9 Emergency Reception 1st floor

Table 1-1 Water Quality Test Result

Items			Tajik Standard	Sample (1)	Sample (2)	Sample (3)
Bacterium	Coliform group	(pcs/100mL)	Not detected	Not detected	Not detected	Not detected
	Bacteria		≦50	≦50	≦50	≦50
	Infectious bacteria	(pcs/20mL)	Not detected	Not detected	Not detected	Not detected
Physical	Smell		≦3	1.0	1.0	1.0
	Color		≦30	5.0	5.0	5.0
	Turbidity		≦2	0.0	0.0	0.0
Chemical	PH		6-9	7.70	7.75	7.70
	Mineral	(mg/L)	1,000-1,500	less than RV	less than RV	less than RV
	Hardness	(mg/L)	≦7	1.56	1.54	2.00
	Calcium	(mg/L)	30-140	70.0	75.0	86.0
	Magnesium	(mg/L)	20-85	31.0	32.0	35.0
	Sulfide	(mg/L)	15-50	25.0	29.0	30.0
	Chloride	(mg/L)	≦350	75.0	75.2	75.6

Source: Hygiene and Epidemiology Center

(2) The Need of Renewal Work

As described above, the cold and heating water supply system within the compound and in the buildings has severely deteriorated. Suspension of the heating water supply may cause damages such as condensation, not only to the CT and other image diagnostic equipment that are to be procured under the Project, but also to the existing equipment. Furthermore, the stoppage of cold-water-supply will not only affect the use of equipment that require water such as autoclave, but could also affect the entire clinical activities that are supposed to be improved by the equipment supply. Thus, early and total renewal of the system should be considered. A survey of the condition of water infrastructure outside the compound was also conducted and there were no particular issues.

(3) Renewal Work and Construction Schedule

Renewal work plan of the system and an estimated cost are presented below. The renewal of the external cold and heating water supply system can be carried out by local contractors using locally procured materials, however, both high quality and high durability are expected because the system is an important key facility. Although cast iron products - usually Russian - are generally used locally for pipes and valves, durable materials such as stainless steel should be used for the Compound. For the internal pipes, the use of PP-R pipe – usually Turkish - is recommendable instead of existing iron pipe.

1) Renewal of External Cold and Heating Water Supply System

A summary of the renewal works is presented in Table 1-2 and Table 1-3. The new pipes should be installed in newly constructed underground concrete pits, considering maintenance and the site landscape.

Table 1-2 Summary of the External Pipes Renewal Works

Work Types	Work Items	Specifications Summary
Removal	Removal of abandoned pipe pits	Concrete
	Removal of existing overhead pipes and valves, and distribution facility in each Building	Cold Water: Iron φ100 etc. Heating: Iron φ220, φ100 etc. (Supply and return)
	Removal of pressurizing supply pumps	Single suction multistage pump x 2 nos. φ 125 1.5m^3 / min x 55m 22kW
New Installation	Pipe pits	Precast Concrete 1500w x 900h, 1200w x 600h, 900w x 450h, 600w x 450h
	External cold-water-pipes and valves	Stainless steel pipe (Made in Japan) Φ100 etc.
	External heating pipes and valves	Stainless steel pipe (Made in Japan) φ200, φ100 etc.
	Distribution facility in each Building	Pressure reducing valve, constant flow valve etc.
	Booster supply pumps	Single suction multistage pump (Made in Japan) x 2 nos. (Equivalent spec to existing)

Source: Survey Team

Table 1-3 Summary of Internal Cold and Heating Water Pipes Renewal Works

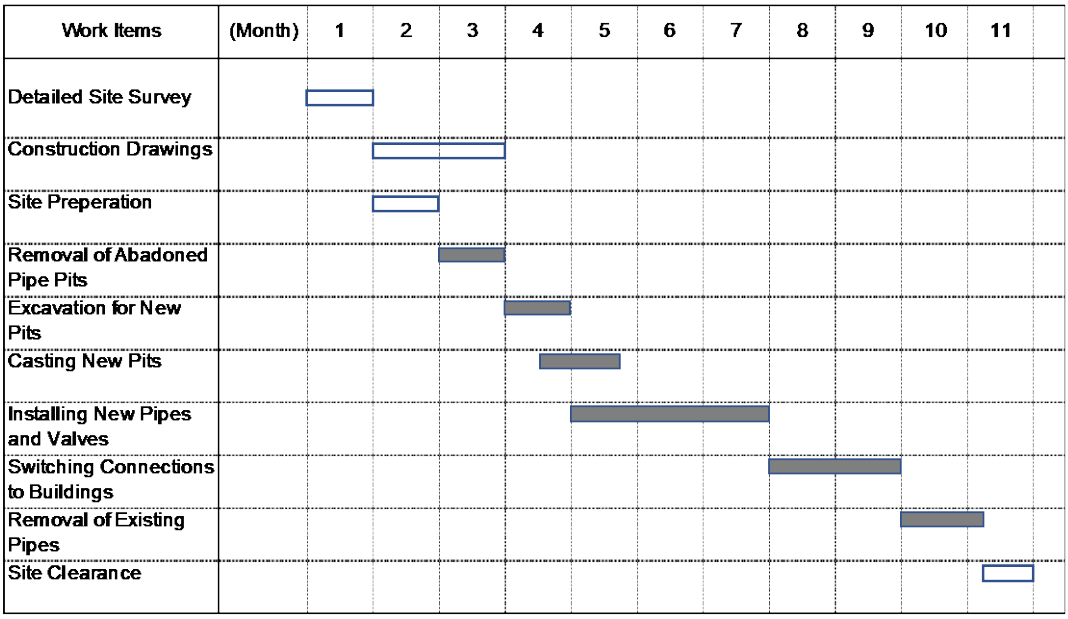
Work Items	Specifications of existing pipes	Specifications of new pipes
Renewal of cold-water-pipes	Iron pipe φ 20 etc. Parts already replaced: PP-R pipe φ 20 etc.	PP-R pipe φ 20 etc.
Renewal of heating pipes	Iron pipe φ 25 etc. Parts already replaced: PP-R pipe φ 25 etc.	PP-R pipe φ 25 etc.

Source: Survey Team

2) Construction Process Planning

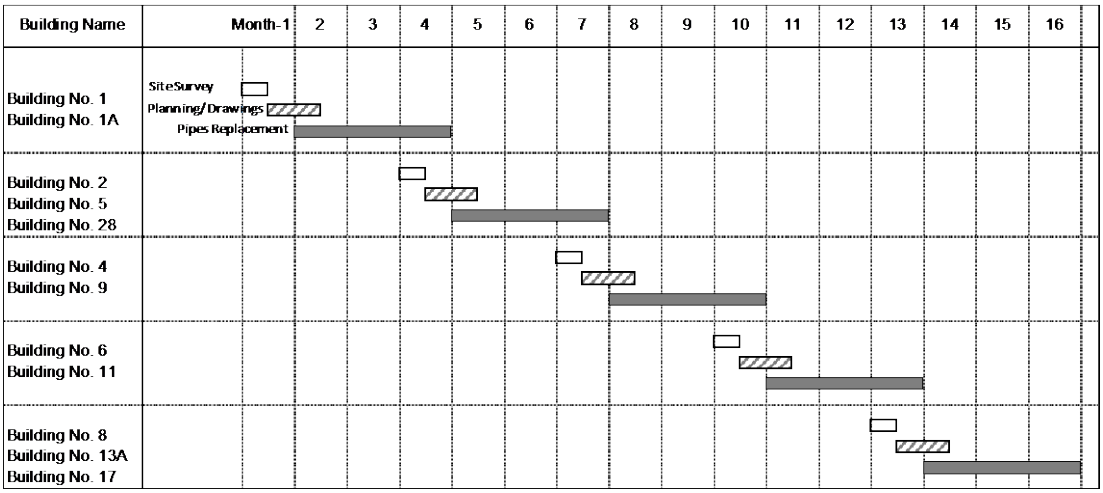
The proposed construction schedule is in Table 1-4. The construction period depends on the number of workers to be engaged, but if general civil engineering piping construction is assumed, in order to minimize the interference with the clinical activities during the construction, the idle period of district heating supply between March and November is recommendable to be utilized. Also, in order to minimize the interference with the access routes for the patients, staff, ambulances and material supplies, reasonable time should be recommendable to secure for the work schedule so that the work will not occupy much area at any time. Switching of the connections to each building is recommendable to be carried out during the weekend closure.

Table 1-4 Construction Schedule Planning for External Pipes Renewal Works



Source: Survey Team

Table 1-5 Construction Schedule Planning for Internal Pipes Renewal Works



Source: Survey Team

(4) Condition of Water Infrastructure outside the Compound

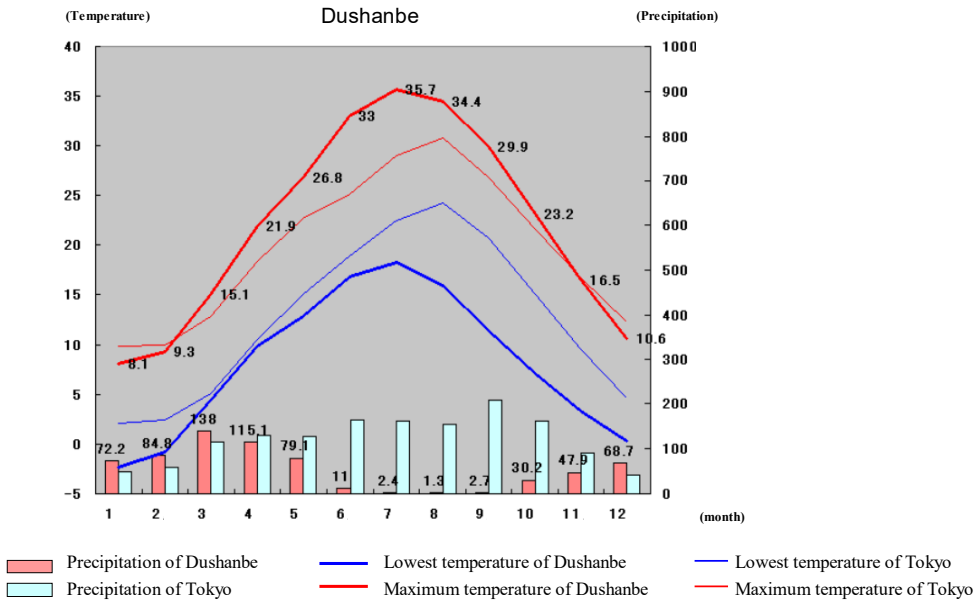
An underground pipe draws cold water into the compound from the city water pipe running under the frontal road. It is supplied by the water company Vodo Kanal, stable quality and quantity 24 hours a day throughout the year. It is sourced from Varzob River and is supplied to Dushanbe city from four water purification plants. The water to the neighborhood of the Center is supplied from the OCCB and OCHB supply points. The sloped topography from the north to the south is utilized to transport the water by gravity.

During the era of Diakov Hospital, the system deterioration and malfunction resulted in water quality problems, however, it has been upgraded to the current level as the result of the comprehensive

improvement work carried out since 2005. The quality is controlled by the Tajik water standard "MKCT" and 72 items are checked every day.

1-2-2 Natural Conditions

The following graph, Figure 1-6 shows the annual temperature change in the capital Dushanbe. The climate of Tajikistan 's capital, Dushanbe is similar to that of northern part of Japan. Although the temperature does not fall below freezing in winter, dew condensation due to temperature difference between day and night occurs in facilities with insufficient heating facilities, and there is concern that malfunction of advanced medical equipment may occur due to electric leakage, etc. For rooms scheduled for deployment of advanced medical equipment, care must be taken in management of temperature and humidity.



Source: http://www2m.biglobe.ne.jp/~ZenTech/world/kion/Tajikistan/Tajikistan.htm (2018)

Figure 1-1 Climate of Dushanbe

1-2-3 Social and Environmental Considerations

Since this cooperation target project is the replacement and supplement of medical equipment to medical facilities currently in operation, there is no cause for environmental and social impact.

CHAPTER 2
CONTENTS OF THE PROJECT

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Background of the Project

As Tajikistan run into financial difficulties after the dissolution of the Soviet Union, investment in technical aspects such as medical facilities and training for medical personnel became insufficient compared to that in the Soviet era, resulting in the decline of the quality of medical services.[1] The improvement of the quality of medical services, in particular, the National Medical Center located in the "Shifobakhsh" National Medical Compound of Tajikistan (the National Medical Center) and the Cardiovascular Surgery Center is urgently needed to promote the health of the people especially socially vulnerable people, to further modernize health care and develop medical personnel. Since both centers are the top referral medical facilities in the republic health system, they receive patients from all over the country and provide free medical services to the persons living in impoverished circumstances. The current state of both facilities is as follows:

The National Medical Center is located in the capital city Dushanbe and is one of the 9 advanced medical centers of the "Shifobakhsh" National Medical Compound. It has 2,000 hospital beds, 17 medical departments for adults, 18 medical departments for pediatrics and specialized medical departments such as orthopedic surgery, ophthalmology, Ear, Nose and Throat (ENT) and hematology. It is Tajikistan's only provider of medical service, such as spinal surgery, pediatric cardiac rheumatism and cardiovascular disease. In addition, it is a teaching hospital for medical personnel in the Tajikistan, providing medical education to medical students, in-service training for rural doctors (every 5 years), and so on.

During the former Diakov Hospital, Japan implemented the Project for the Improvement of Medical Equipment in Diakov Hospital in Tajikistan[2] (the 2006 Diakov Project) for targeting the pediatric departments of the hospital. The Project for Improvement of Medical Equipment in the National Medical Center "Shifobakhsh" and in the State Institution "Republican Scientific Center of Cardiovascular Surgery" (the Project) supported the improvement of equipment for diagnosis and treatment with provision of a CT, a general X-ray and a fluoroscopic unit. While some of the equipment has been in use for over 10 years, the existing Soviet era equipment has not been replaced due to financial difficulties. For this reason, diagnostic and treatment activities are still being conducted using obsolete equipment. Since breakdowns and hence repairs are occurring frequently due to aging equipment and aged deterioration, maintenance and repair costs have increased resulting in further negative pressure on the hospital management. In addition, as for recent disease trends, NCDs, cardiovascular disease and cancer are increasing and they are the top 2 causes of death, hence appropriate measures against the diseases are required. Furthermore, with the development of the transportation network, vehicle traffic increases, and consequently the number of trauma patients received due to traffic accidents also increased. Existing medical equipment at target medial facilities is obsolete, and it is impossible to provide essential data such as diagnostic images and laboratory investigation results for the establishment of treatment procedure. As a result, facilities provide limited

[1] Health system in transition 2010, European observatory on Health systems and policies
[2] Singed for Exchange of Notes(E/N) on Feb.,2005, and handed over the equipment in 2006

diagnostic and treatment with insufficient diagnostic accuracy, resulting in difficulties in the provision of quick and accurate diagnosis and treatment.

The Cardiovascular Surgery Center is located in northern part of Dushanbe city and provides both medical treatment such as catheterization, stenting and bypass surgery for patients with cardiovascular diseases from all over the country including referred patients from the National Medical Center. In recent years, cardiovascular disease has become the leading cause of death in Tajikistan. There is urgent need to take measures to lower the mortality rate through improvement of treatment for cardiovascular diseases such as acute myocardial infarction and early detection of vasoconstriction site. There is only one Angiography system in the center. Thus, the number of equipment is insufficient for the number of patients who need catheter treatment, resulting in forced waiting. The center has a teaching function as a specialized medical facility for cardiovascular diseases. Although it has become a designated hospital for medical students majoring in cardiovascular diseases, it is difficult to provide them with sufficient clinical training due to lack of equipment.

2-1-2 Overall Goals and Project Purpose

In the long-term strategy "NDS to 2030", The Government of Tajikistan (GoT) declared to increase the average life expectancy at birth to at least 76 years old by 2030, by the reducing young mortality due to NCDs etc. and maternal mortality rate to 20 in 100,000 live birth. In addition, the following 3 goals are set in the "NHS 2010-2020," which is the highest development plan of the health sector; 1) Improve the population's health and create a healthier living environment, 2) Systemic transformation and modernization of health care, 3) Health care resource and finance development. The following priorities are set in order to achieve these 3 goals: strengthening of mother, new born, child and adolescent health (improvement of neonatal mortality rate, infant mortality rate and under-five mortality rate), reducing the burden of NCDs and chronic diseases (improvement of early detection rate for ischemic heart disease and cancers), and healthy lifestyle (improvement of mortality and morbidity rates due to trauma and injury).

The Project is aimed at improving shortage and aging medical equipment at the National Medical Center and the Cardiovascular Surgery Center, the top medical facility in Tajikistan. It strengthens the diagnosis and treatment system in the target hospital, and contributes to the improvement of the quality of the medical service and is positioned as a high priority project in the country's development strategy.

2-1-3 Project summary

Under the Project, in order to achieve the above objectives, the National Medical Center needs to replace some of the aged equipment which was provided in Grant Aid Project in 2006, and to respond to new public health issues such as NCDs by replacing and procuring new medical equipment. Mainly, it is necessary to replace, supplement or procure the following equipment ① to ④. These are indispensable for improving the quality of medical services such as image diagnosis and clinical examination data and for planning of treatment such as improvement of intraoperative and postoperative care, etc.

① Image diagnostic equipment, expected to improve accuracy of diagnostic function
② Equipment which would contribute to less invasive and effective diagnostic and treatment
③ Equipment which would contribute to treatment of post-operative patients at Operation Theatre and Intensive Care Unit (ICU)
④ Clinical laboratory equipment which would contribute to diagnosis and follow-up after treatment

It is also planned to replace Angiography system which is required for treatment of cardiovascular diseases at the Cardiovascular Surgery Center. Furthermore, soft component program is planned aimed at improving equipment maintenance system through preventive maintenance activities such as daily check and periodic check, resulting in smooth starting for utilization of procured equipment and facilitating continuous use in good condition.

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

The Project aims to improve medical equipment essential for diagnosis and treatment in line with the current and near future demands of medical services of the National Medical Center in the "Shifobakhsh" National Medical Compound, and the Cardiovascular Surgery Center, which has a referral relationship with the National Medical Center. Facility renovation works such as underground installation of water supply and drainage pipes of "Shifobakhsh" National Medical Compound as requested by Tajikistan will not be included in the Project because the contents do not match the purpose of the Project directly. However, in order to prevent the influence of temperature environment fluctuation on the procured equipment due to malfunction of water supply and drainage facilities, improvement of the installation environment is carried out by installing air-conditioning equipment for the equipment installation room.

(1) Equipment Selection Policy

The target facilities, the National Medical Center and the Cardiovascular Surgery Center are the highest-level medical facilities in Tajikistan and are also designated as teaching hospitals for medical personnel for both pre and post-graduate education. For this reason, the Project will improve equipment that is essential for improving diagnostic, treatment and practical training contents provided by both facilities. In formulating the equipment plan, the operating status of existing equipment including equipment provided under the 2006 Diakov Project, the evaluation of following conditions will determine the specifications and quantities of the equipment: urgency of clinical needs, necessity, relevance, educational effect, technical level of medical personnel, the operation and maintenance system including financial budget, maintenance service by the local agents, procurement condition of replacement parts, consumables etc. Details are shown in below table;

Planned equipment

① Equipment essential for diagnosis and treatment for NCDs with high morbidity in the country such as cardiovascular diseases and cancer
② Image diagnostic equipment essential for improvement of diagnostic accuracy
③ Equipment essential for less invasive and effective diagnostic and treatment
④ Equipment essential for treatment of post-operative patients at Operation Theatre and ICU
⑤ Clinical laboratory equipment for condition diagnosis and treatment procedure selection
⑥ Equipment which the current medical personnel at both target facilities can operate
⑦ Equipment for fiscal administration of the facilities by anticipating remuneration for medical services
⑧ Equipment for training of medical students and in-service training for current medical personnel, hence improvement of future medical services in the rural areas
⑨ Uninterruptible Power Supply (UPS) for medical electronic equipment that require stable power supply

Equipment which is not covered under the Project

① Equipment that is expensive to operate and maintain, and target facilities cannot cover costs
② Equipment which can substitute necessary services by existing equipment
③ Equipment to be used for special disease diagnosis, research etc.
④ Relatively inexpensive equipment considered to be available for purchase by Tajikistan side
⑤ Equipment that does not have an agent that can provide maintenance services in Tajikistan or neighboring countries

(2) Policy on Natural Conditions

Tajikistan has a continental climate, and this country receive more rainfall compared with other Central Asian countries. In the capital city of Dushanbe, where equipment will be installed, the temperature ranges from 35 to 40 degrees Celsius in the summer and it's dry, while in winter it can reach minus 13 degrees. The characteristics of the climate are that the daily temperature difference is large, seasonal temperature variation is also large, and very dry air. In consideration of such natural environment, the following policy is adopted.

- To protect medical equipment during transport, moisture-proof barrier packaging will be applied to the equipment to be procured under the Project.
- Since ambient temperature and humidity should be controlled properly for image diagnostic equipment, the Japanese side will install air conditioning equipment (air conditioners with dehumidifier) in designated rooms

(3) Policy on Socioeconomic Conditions

In Tajikistan, private medical facilities are increasing with economic growth. These medical facilities provide diagnosis and treatment services using the latest equipment, but it is difficult for economically vulnerable people to receive services due to high user cost. On the other hand, the target facilities, as

public medical facilities, provide free medical services to people with disabilities, elderly people, pediatrics under 1 year old, etc., and reasonably priced medical services to the public. However, medical equipment owned by public medical facilities is inadequate, since the equipment is obsolete and has low features. It is difficult to conduct quick examination for many patients, and services that can be provided are limited providing only high-risk surgical procedures which are highly invasive, and with high risks for infection.

In response to this situation, the Project aims to improve the quality of medical services of both facilities through the provision of the latest medical equipment. Thus, it can lead to the improvement of the welfare of the people including socially vulnerable people and contribute to the stability of people's livelihood.

(4) Policy on Procurement Conditions

In principle, medical equipment to be procured under the Project shall be made in Japan and/or in Tajikistan. Since there is no manufacturing of medical equipment in Tajikistan and in case there are no manufacturers in Japan, third country products will be considered as procurement source, taking into consideration prices, superiority in operability, presence or absence of maintenance management system, etc. The equipment that requires corrective maintenance and periodic check by manufacturers must have local agent registered in Tajikistan or neighboring countries (Kazakhstan, Russian capital Moscow, Turkey etc.). This will ensure the availability of operation and maintenance systems of the equipment including procurement of consumables and spare parts, and equipment quality after procurement, so that the target facilities can effectively use the medical equipment for a long time.

(5) Policy on Use of Local Agents

Engineers who have certified by manufacturer may possibly perform installation, commissioning and training (i.e.: initial operation training, operational guidance) after installation of medical equipment to be procured under the Project. The technical guidance will be conducted in Tajik or Russian.

(6) Policy on Operation and Maintenance

Even though there are technicians[3] assigned to the National Medical Center and the Cardiovascular Surgery Center, who are responsible for the maintenance of electrical, water supply and drainage systems, there are no technicians who exclusively handle medical equipment. For this reason, when medical equipment is out of order, target facilities requests corrective maintenance services from MedTechnica,[4] which is under the Medicine and Medical Equipment Department of Ministry of Health and Social Protection of Population (MoHSPP). Maintenance of sophisticated management medical equipment such as CT and Angiography system requires services by certified engineers, so local agents and medical facilities conclude maintenance contracts.

Equipment that requires advanced maintenance among the medical equipment to be procured under

[3] As of April 2018, technicians specialized in medical equipment are not assigned in both facilities. Specialized technicians are scheduled to be deployed for better operation of medical equipment to be procured.

[4] An organization specializing in maintenance service of medical equipment for public medical facilities

the Project will have Comprehensive Maintenance Contract (CMC)[5] or Annual Maintenance Contract (AMC)[6] to ensure that after handing over the equipment, local agents will provide maintenance services for 3 years[7] whenever equipment trouble occurs. After these maintenance periods are over, the plan is to provide guidance on how to conclude the maintenance contracts as part of training content of the Soft Component, so that the Tajikistan side can update the maintenance contract with the agencies using its own budget. Details of the plan are shown in the table below.

Table 2-1 Contents of maintenance contract for the Equipment procured under the Project

Description	Kinds of maintenance contract	Contents of maintenance contract (after 2 years)
Angiography system Whole body CT scanner	Comprehensive Maintenance Contract (CMC) (Full maintenance)	**Guarantee period:** One-year-manufacturer's universal warranty plus 2 years **Contents of warranty**: Periodic checks (4 times/year), calibration, and corrective maintenance services and any time on call corrective maintenance **Replacement of spare parts**: all spare parts are free of charge. However, expensive parts such as X-ray tube, detectors are free only for one time.
Ventilator High Pressure Steam Sterilizer Endoscope (gastro, colon, broncho and ENT) Duodenoscope Surgical C-arm X-ray unit Mobile X-ray unit General X-ray and Fluoroscopy unit Laboratory equipment (Biochemistry analyzer, Hematology analyzer) Lithotripter ultrasonic Ultrasound Scanner for ophthalmology Phacoemulsifier	Annual Maintenance Contract (AMC)	**Guarantee period:** One-year-manufacturer's universal warranty plus 2 years **Contents of warranty:** Periodic checks (4 times/year), calibration, and corrective maintenance services and any time on call corrective maintenance **Replacement of spare parts:** all spare parts are with charges.

(7) Policy on Grades and Specifications of Equipment

In the targeted facilities, replacement and supplement of medical equipment were partially done by own budget and assistance from other donors such as German Kreditanstalt für Wiederaufbau (KfW). For this reason, there are variations among equipment deployed in the facilities from obsolete ones to relatively recently procured ones. As a result, it becomes difficult to establish comprehensive treatment plan, provision of series of medical services from treatment to postoperative care due to the poor function of the existing old model equipment. The number of patients with NCDs increase in recent years, urgently requires the improvement of diagnostic equipment with less invasive, rapid and high accuracy. With consideration above, under the Project, it is a policy to improve the equipment to the grade

[5] This includes periodic inspection, unlimited on-call maintenance, repair in case of breakdowns, and cost of spare parts.
[6] This includes periodic inspection, unlimited on-call maintenance, repair in case of breakdowns, but does not include cost of spare parts necessary for repair.
[7] It is known as failure rate curve (bath tub curve) that there are many early failures during 3 years after installation. 3 years consist of one year warranty period with 2 years maintenance contract covered under the Project.

corresponding to the current and near future medical demands such as the diagnosis of cancer and stroke, which have been rising in both morbidity and mortality rates in recent years, and traffic trauma with many emergency patients being transported to the National Medical Center. As a result, the Project can contribute to the improvement of the quality of medical services that can be offered at Tajikistan's top referral medical facilities.

(8) Policy on Procurement of Consumables and Spare Parts

Consumables for new or supplement equipment shall be procured from Japan or a third country, and it will take time to establish a procurement route. Therefore, it is planned to procure 3 months' supply of consumables to be delivered at the handing over of the equipment so that the target facilities can provide normal medical services during that time. Consumables related to initial operation guidance by a Japanese equipment supplier (the Supplier) shall be included in the 3 months' supply of consumables. Regarding spare parts that need replacement after a certain period of use, such as X-ray tubes for CT and Angiography system, shall be included in the CMC, which is called a full maintenance contract.

(9) Policy of Soft Component after Equipment Installation

The target facilities do not have an established preventive maintenance system including implementation of daily checks and periodic checks, hence the maintenance management system of equipment is vulnerable. In order to improve the situation, and to ensure smooth and continuous operation of the equipment to be procured under the Project, it is planned to implement Soft Component for equipment maintenance after installation of the equipment. The target personnel are special doctors, nurses, maintenance department staff and MedTechnica technicians, who are in charge of maintenance.

(10) Policy on the Procurement Method and the Implementation Schedule

Procurement under the Project is expected to be completed in about 13.5 months after the signing of the Exchange of Notes (E/N) and Grant Agreement (G/A). In Tajikistan, there is about one week of Navroz Festival (Nowrūz in Farsi), the New Year celebration every March and it is a national holiday. For this reason, considering the cultural practices of the recipient country, this period shall be avoided when designing the implementation schedule for equipment delivery, installation, training, etc. Moreover, the Project is expected to be completed in 36 months after the provision of the equipment since some image diagnostic equipment and endoscope related equipment to be procured under the Project shall be accompanied by a two-year-maintenance contract after the end of the warranty period.

2-2-2 Basic Plan

2-2-2-1 Overview of the Project

(1) Changes under the Project

Original request from Tajikistan to the Government of Japan (GoJ) was mainly composed of equipment procurement for the National Medical Center, the Cancer Center, the Cardiac Center, the status survey of the water supply facilities on the premises, and the equipment procurement for the Cardiovascular Surgery Center. The Cardiovascular Surgery Center is not located in the "Shifovakhsh" National Medical Compound, and was initially excluded from the Project since it was thought it is remotely related to the referral system and medical service activities of "Shifovakhsh" National Medical Compound. For this reason, the Japanese survey team conducted site survey of only the 3 facilities on the premises of "Shifovakhsh" National Medical Compound and the water supply facilities. However, during the survey, it was found that cardiac disease patients at the National Medical Center requiring surgery were referred to the Cardiovascular Surgery Center, and return to the National Medical Center and Cardiac Center for after post-operative medical treatment. Japanese side again received a request for the improvement of Cardiovascular Surgery Center as part of the Project in order to strengthen the referral system and as a countermeasure against cardiovascular diseases. In addition, a decision was made to exclude the Cancer Center and the Cardiac Center as targeted facilities after Tajikistan suggested that the facilities could receive assistance from other donors. The changes in requested content are shown in the table below.

Table 2-2 Changes in requests and requested items / quantity from each facility

Original Request		Final request after discussion and change	
1.National Medical Center	(85 types, 666 units)	1.National Medical Center	(86 types, 209 units)
2.Cardiac Center	(11 types, 39 units)	2.Cardiovascular SurgeryCenter	(7 types, 17 units)
3.Cancer Center	(17 types, 54 units)	Total items and Total quantity	(93 types, 226 units)
4. Cardiovascular Surgery Center	(28 types, 120 units)	3. Survey and Improvement of Water Supply Facilities of "Shifobakhsh" National Medical Compound of Tajikistan	
Total items and Total quantity	(141 types, 879 units)		
5.Survey on Water Supply Facilities of "Shifobakhsh" National Medical Compound of Tajikistan			

For equipment improvement, 141 types (879 units) of medical equipment were requested from 4 facilities in the original request. After discussion, final requested items were narrowed down 93 types (226 units) of equipment necessary for the quantitative and qualitative improvement of the services to be provided by the top referral medical facilities. This will help overcome current problems with existing medical equipment in the provision medical services at the National Medical Center and Cardiovascular surgery center and combat NCDs (particularly cancer and cardiac disease) which, in recent years, have been increasing in both morbidity and mortality rates. Comparison of the original and final request from each facility is as shown in Table 2-2.

Table 2-3 Requested equipment list after discussion and modification

National Medical Center (86 types)

No.	Description	Q'ty	Priority
1	Ventilator for adult	6	A
2	Ventilator for pediatrics	2	A
3	Ventilator for OT	9	A
4	Autoclave for CSSD	2	A
5	Laparoscope for OT (adult)	1	A
6	Laparoscope for OT (pediatrics)	1	A
7	Laparoscope for admission (adult)	1	A
8	Bronchoscope, Video system for adult	1	A
9	Bronchoscope, Fiver pediatrics	1	A
10	Bronchoscope, Video system for pediatrics	1	A
11	Colonoscope fiver adult	1	A
12	Colonoscope Video system for adult	1	A
13	Colonoscope pediatrics	1	A
14	Colonoscope Video system for pediatrics	1	A
15	Gastroscope video system for adult	1	A
16	Gastroscope video system for pediatrics	1	A
17	Duodenoscope for Endoscopic Retrograde Cholangiopancreatography (ERCP) with accessories for adult	1	A
18	Cabinet for fiberscope, UV lamp	2	A
19	Ultrasound Scanner, Doppler	1	A
20	Ultrasound Scanner, General	1	A
21	Defibrillator	1	A
22	Operation Light	2	A
23	Neurosurgery set	1	A
24	Microtome Rotary	1	A
25	Tissue Processor	1	A
26	CT	1	A
27	Surgical C-arm X-ray unit	1	A
28	Mobile X-ray Apparatus, w/X-ray Shield Apron	1	A
29	General and Fluoroscopy, X-ray Apparatus with UPS (for PC part)	1	A
30	Arthroscope adult	2	A
31	Ultrasound unit for ophthalmology	1	A
32	Device for cleaning instruments with Ultrasound	1	A
33	Apparatus for determining external respiration	2	A
34	Audiometer for infant up to one year	3	A
35	Urethroscope adults	1	A
36	Urethroscope pediatrics	1	A
37	Biochemistry analyzer	1	A
38	Hematology analyzer	1	A
39	ELISA system	1	A
40	Blood gas analyzer	1	A
41	Hemodialysis machine	2	A
42	H_2O_2 sterilizer	2	A
43	Plasma phoresis	1	A
44	Phacoemulsifier	1	A
45	ENT surgery and endoscope set	2	A
46	General orthopedic surgical set	3	A
47	surgical set	5	A
48	Arthroscope pediatrics	1	A

49	Lithotripter ultrasonic	1	A
50	Operating microscope for ophthalmology	1	A
51	Infant incubator	4	B
52	Patient Monitor	27	B
53	Infusion Pump	5	B
54	Syringe Pump	5	B
55	Suction Unit, general	3	B
56	Suction Unit, OT	11	B
57	Laparoscope for admission (pediatrics)	1	B
58	Bronchoscope fiber, adult	1	B
59	Gastroscope fiber, adult	1	B
60	Gastroscope fiber, pediatrics	1	B
61	Hot Air Sterilizer	9	B
62	Ophthalmoscope	3	B
63	Paraffin Bath	1	B
64	Coagulator	1	B
65	Traumatology set	2	B
66	Binocular Lamp of Neurosurgeon	2	B
67	Slit Lamp	1	B
68	Electrosurgical unit	5	B
69	ENT Combination	1	A
70	Rheoencephalography	2	B
71	Laboratory refrigerator	2	B
72	Thermostat	2	B
73	Impedance meter	2	B
74	Electric drill	3	B
75	Orthopedic table	4	B
76	Gips cutter, electric (for fixing: metal plate with screw holes)	10	B
77	Retractor and fixation for abdomen and tracho	3	B
78	Negatoscope	1	B
79	Gips table	2	B
80	Operating table	4	B
81	Centrifuge	1	B
82	Binocular microscope	1	B
83	Cystoscope set adult	1	B
84	Cystoscope set pediatrics	1	B
85	Cell saver	1	B
86	Training doll for surgical procedure	1	B

Cardiovascular surgery center (7 types)

No.	Description	Q'ty	Priority
1	Angiography system	1	A
2	Ultrasound scanner with TEE probe	1	B
3	IABP (Intra-aortic balloon pumping) system	1	B
4	Ventilator for adult	6	B
5	Ventilator for neonate/infant	6	B
6	Hemodialysis machine	1	B
7	Heart lung machine	1	B

(2) Study of Requested Equipment

For the above-mentioned 93 types (226 units) of medical equipment, equipment improvement is divided into 2 categories, A: High priority for urgent improvement and B: Moderate priority for improvement even though need for improvement is recognized. At the end, category A equipment was narrowed down to 51 types (61 units) for the National Medical Center and one type (one unit) for the Cardiovascular Surgery Center.

2-2-2-2 Overall plan

The Project has formulated the scale, scope, direction of cooperation according to the following 4 objectives.

1. Image diagnostic equipment essential for improvement of diagnostic accuracy
2. Equipment essential for less invasive and effective diagnostic and treatment
3. Equipment essential for treatment of post-operative patients at Operation Theatre and ICU
4. Central laboratory equipment essential for diagnosis and follow-up

The target facilities, the National Medical Center and the Cardiovascular Surgery Center, which are Tajikistan's top referral medical facilities, and have been improving medical equipment through bilateral donors from Japan and German KfW and self-financing. However, those inputs alone cannot be expected to improve the quality and quantity of medical services. In consideration of this current situation, the Project proposes an improvement plan aimed at responding to the increasing NCDs, providing rapid high accuracy diagnostic treatment services.

It is feasible to replace existing equipment at the medical facilities that are under operation, and installation space and electric power supply is available. The layout of the image diagnostic equipment to be installed at both facilities is as described in 2-2-3 "Outline Design Drawing".

2-2-2-3 Equipment planning

(1) Selection criteria of equipment planning

Requested equipment for both target facilities were evaluated in terms of ①Necessity for Improvement, ②Relevance for improvement, ③Technical level, ④Operation system, ⑤ Maintenance system and ⑥ Operation costs. As a result, improvement plan under the Project was decided.

Table 2-4 Equipment Selection Criteria for Requested Equipment

Criteria	Selection standard
① Necessity for Improvement	Equipment essential for provision of medical and clinical services as the top referral medical facility and equipment that urgently requires replacement or supplemental due to aging etc.
②Relevance for improvement	Equipment leading to improvement of medical services by enabling early detection and treatment of NCDs-related diseases, which have been increasing in recent years
③ Technical level	Equipment that medical personnel at target facilities can utilize with their current technical level
④ Operation system	Medical personnel has been allocated or are expected to be allocated for appropriate operation.
⑤ Maintemance system	Equipment with the manufacturer's agents located in Tajikistan or neigoboring countries who can conduct pediodic checks and corrective maintenance, and supply spare parts and consumables.
⑥ Operation costs	Equipment that is relatively inexpensive to operate and maintain using the current budget of the Tajikistan side.

Based on the evaluation result, following equipment will be improved under the Project.

- Image diagnostic equipment such as multi-slice CT, Ultrasound scanner with Doppler essential for the diagnosis of NCDs
- Video endoscopes (gastro, colon, duodenoscope etc.), rigid endoscope (laparoscope, arthoroscope, and cysto-urethroscope etc.), and lithotripter ultrasonic to enable less invasive diagnostics and treatment
- Clinical laboratory equipment such as Hematology analyzer, biochemistry analyzer and Enzyme-Linked Immuno-Sorbent Assay (ELISA) system which provide essential information for the formulation of treatment plan
- Operation theatre and ICU equipment such as Ultrasound Scanner for ophthalmology, Phacoemulsifier, and ventilator, etc. which contributes to diagnosis and treatment of patients at pre, during and post operation.

Based on the selection criteria of the above equipment, Table 2-5 shows the examination of requested equipment. For the evaluation items ① to ⑥, the relevant equipment is indicated by ○, and the non-relevant items are indicated by X.

In the overall evaluation, ◎ means that all criteria have been met, so it shall be provided under the Project. Equipment judged as non-relevant in any one evaluation item will be indicated by X and shall be excluded from the improvement plan under the Project.

Table 2-5　Consideration of Requested Equipment

National Medical Center (51 kinds)

No.	Name of Equipment	① Necessity for Improvement	② Relevance for improvement	③ Technical level	④ Operation system	⑤ Maintenance system	⑥ Operation costs.	**Overall Evaluation**
1	Ventilator for adult	●	●	●	●	●	●	◎
2	Ventilator for pediatric	●	●	●	●	●	●	◎
3	Ventilator for OT	●	●	●	●	●	●	◎
4	High Pressure Steam Sterilizer	●	●	●	●	●	●	◎
5	Laparoscope set for OT (adult)	●	●	●	●	●	●	◎
6	Laparoscope set for OT (pediatrics)	●	●	●	●	●	●	◎
7	Laparoscope for admission (adult)	●	●	●	●	●	●	◎
8	Bronchoscope, Video system for adult	●	●	●	●	●	●	◎
9	Bronchoscope, Fiver pediatrics	●	X	●	●	●	●	X
10	Bronchoscope, Video system for pediatrics	●	●	●	●	●	●	◎
11	Colonoscope fiver adult	●	X	●	●	●	●	X
12	Colonoscope video system for adult	●	●	●	●	●	●	◎
13	Colonoscope pediatrics	●	X	●	●	●	●	X
14	Colonoscope video system for pediatrics	●	●	●	●	●	●	◎
15	Gastroscope video system for adult	●	●	●	●	●	●	◎
16	Gastroscope video system for pediatrics	●	●	●	●	●	●	◎
17	Duodenoscope for ERCP	●	●	●	●	●	●	◎
18	Cabinet for fiberscope, UV lamp	●	●	●	●	●	●	◎
19	Ultrasound Scanner, Doppler	●	●	●	●	●	●	◎
20	Ultrasound Scanner	●	●	●	●	●	●	◎
21	Defibrillator	●	●	●	●	●	●	◎
22	Operation Light	●	●	●	●	●	●	◎
23	Neurosurgery set	●	●	●	●	●	●	◎
24	Microtome Rotary	●	●	●	●	●	●	◎
25	Tissue Processor	●	●	●	●	●	●	◎
26	CT	●	●	●	●	●	●	◎
27	Surgical C-arm X-ray unit	●	●	●	●	●	●	◎
28	Mobile X-ray unit	●	●	●	●	●	●	◎
29	General X-ray and Fluoroscopy unit	●	●	●	●	●	●	◎
30	Arthroscope set (adult)	●	●	●	●	●	●	◎
31	Ultrasound Scanner for ophthalmology	●	●	●	●	●	●	◎

No.	Name of Equipment	① Necessity for Improvement	② Relevance for improvement	③ Technical level	④ Operation system	⑤ Maintenance system	⑥ Operation costs.	**Overall Evaluation**
32	Device for cleaning instruments with Ultrasound	●	X	●	●	X	●	X
33	Spirometer	●	●	●	●	●	●	◎
34	Audiometer for infant up to one year	●	●	●	●	●	●	◎
35	Cysto-Urethroscope set (adults)	●	●	●	●	●	●	◎
36	Cysto-Urethroscope set (pediatrics)	●	●	●	●	●	●	◎
37	Biochemistry analyzer	●	●	●	●	●	●	◎
38	Hematology analyzer	●	●	●	●	●	●	◎
39	ELISA system	●	●	●	●	●	●	◎
40	Blood gas analyzer	●	●	●	●	X	X	X
41	Hemodialysis machine	●	●	●	●	X	X	X
42	H_2O_2 sterilizer	●	X	●	●	X	●	X
43	Plasma phoresis	●	●	●	●	X	X	X
44	Phacoemulsifier	●	●	●	●	●	●	◎
45	ENT surgery and endoscope set	●	●	●	●	●	●	◎
46	General orthopedic surgical set	●	●	●	●	●	●	◎
47	Surgical set	●	●	●	●	●	●	◎
48	Arthroscope set (pediatrics)	●	X	●	●	●	●	X
49	Lithotripter ultrasonic	●	●	●	●	●	●	◎
50	Operating microscope for ophthalmology	●	●	●	●	●	●	◎
51	ENT Treatment unit and Chair	●	●	●	●	●	●	◎

Cardiovascular surgery center (1 kind)

No.	Name of Equipment	① Necessity for Improvement	② Relevance for improvement	③ Technical level	④ Operation system	⑤ Maintenance system	⑥ Operation costs	Overall Evaluation
1	Angiography system	●	●	●	●	●	●	◎

Table 2-6 Planned List of Equipment

Target Facilities	No.	Name of Equipment	Q'ty
National Medical Center	1	Ventilator for adult	6
	2	Ventilator for pediatrics	2
	3	Ventilator for OT	9
	4	High Pressure Steam Sterilizer	2
	5	Laparoscope set for OT (adult)	2
	6	Laparoscope set for OT (pediatrics)	1
	7	Bronchoscope, Video system for adult	1
	8	Bronchoscope, Video system for pediatrics	1
	9	Colonoscope video system for adult	1
	10	Colonoscope video system for pediatrics	1
	11	Gastroscope video system for adult	1
	12	Gastroscope video system for pediatrics	1
	13	Duodenoscope for ERCP	1
	14	Cabinet for fiberscope, UV lamp	2
	15	Ultrasound Scanner, Doppler	1
	16	Ultrasound Scanner	3
	17	Defibrillator	4
	18	Operation Light	4
	19	Neurosurgery set	2
	20	Microtome Rotary	1
	21	Tissue Processor	1
	22	Whole body CT scanner	1
	23	Surgical C-arm X-ray unit	1
	24	Mobile X-ray unit	1
	25	General X-ray and Fluoroscopy unit	1
	26	Arthroscope set	1
	27	Ultrasound Scanner for ophthalmology	1
	28	Spirometer	2
	29	Audiometer for infant up to one year	3
	30	Cysto-Urethroscope set (adults)	1
	31	Cysto-Urethroscope set (pediatrics)	1
	32	Biochemistry analyzer	1
	33	Hematology analyzer	1
	34	ELISA system	1
	35	Phacoemulsifier	1
	36	ENT surgery and endoscope set	2

Target Facilities	No.	Name of Equipment	Q'ty
National Medical Center	37	General orthopedic surgical set	3
	38	Surgical set	5
	39	Lithotripter ultrasonic	1
	40	Operating microscope for ophthalmology	1
	41	ENT Treatment unit and Chair	1
Cardiovascular Surgery Center	42	Angiography system	1
Total			78

*No.5 and No.7, Laparoscope for adult, are combined as one item because specification is same, besides designated location is different.
*Requested cystoscopes (for adult and pediatric) are incorporated into No.30 and No.31 urethoscopes. Then, name of equipment became cysto-urethroscope.

(2) Outline of examination of main requested equipment and installation location

【National Medical Center 】

1) Radiology Department

1. CT

Under the Project, Multi-slice CT with more than 64 slices will be installed. A 12 years old single-slice CT provided by the 2006 Diakov Project, reached the end of its life due to major breakdown in 2016 and could not be repaired. Around 2010, when the equipment was in good working condition, it performed 5 to 6 examinations per day mainly for the patients from the Cancer Center and the National Medical Center. However, in 2015 a year before the operation was stopped, number of examinations performed was 1,198 (about 4 per day). The number of tests gradually decreased due to deterioration.

The multi-slice CT to be installed under the Project can be applied to NCDs (cancer, stroke, etc.) patients. The existing single slice CT had limited image diagnostic information due to low image resolution. The proposed type can perform high speed examination, hence quick diagnosis of serious trauma patients.

In addition, since the National Medical Center is also a teaching hospital, medical students and rural local practitioners are expected to benefit from practical training programs such as construction and interpretation method of multi-slice CT images, which are likely to be introduced even in rural areas in near future. The place for CT installation has the radiation shielding structure and sufficient space since it will be replacing the one provided under the 2006 Diakov Project.

2. General X-ray and fluoroscopy unit

It is planned to replace one General X-ray and Fluoroscopy unit. One of the two machines provided under the 2006 Diakov Project is still in operation. It can perform, per day, about 25 cases of general X-ray photography for chest and abdomen, and about 25 cases of fluoroscopy of digestive system or urological system. Although the equipment is currently in operation, it is

old, and if the equipment breaks down, it is difficult to secure spare parts.

Therefore, under the Project, it is planned to install digital type machine that is popular in developing countries. This equipment will make it possible to analyze images and improve image diagnostic capabilities which cannot be done with conventional equipment. Simultaneously, maintenance cost will be reduced because of digital system which does not require printing of images. The place for installment has the radiation shielding structure and sufficient space because it will be replacing the existing equipment.

3. Ultrasound scanner

The Project will procure 4 ultrasonic scanners, consisting of 3 general use Ultrasound Scanner and one Ultrasound Scanner with Doppler. There are 3 existing ultrasonic scanners. Two, a general use Ultrasound Scanner and Ultrasound Scanner with Doppler are installed in the pediatric department of the building No.9, through the 2006 Diakov Project. One unit for adults was procured by Tajikistan's budget and is installed in the building No. 5. Both pediatric and adult ultrasound scanners are also utilized for emergency patients, and total of 30,017 examinations (12,006 in adults and 18,011 in pediatric) were performed for both emergency patients and inpatients in 2017. 2 ultrasound scanners in the pediatric department are over 12 years old. The images are now blurred due to aging, breakdowns occur frequently, resulting in disruption of clinical activities. When the ultrasound scanner breaks down, on average, it takes 3 to 5 days to repair, and it interferes with medical care activities of both emergency patients and inpatients. Ultrasound scanner for adults is more than 10 years old, and needs replacement because replacement of probes no longer improves the resolution.

Examination with ultrasound scanner is important in the gathering of essential information on emergency patients and hospitalized patients as well as deciding treatment procedure. Thus, it is reasonable to replace the existing equipment. Furthermore, diagnostic capabilities are expected to improve since newer equipment have better image resolution compared with the equipment procured under the 2006 Diakov Project. The ultrasound scanners will be operated by ultrasound scanner technicians, so that they will be operated without problems.

2) Operation Theatre

There are 21 Operation Theatres in total. Operation Theatre for Ophthalmology and ENT departments is located in building No.2 which was renovated by German KfW. Ophthalmology department also received equipment donation, though it was second hand. There is an operation theatre for pediatric thoracic surgery and neonatal surgery in the west wing of building No.9, currently under renovation by German KfW. The equipment will be supplied once construction is completed in autumn of 2018. The following equipment has been requested under the Project for the operation theatre: Ventilator for OT, laparoscope set, Operation Light, Surgical C-arm X-ray unit, an arthroscope, a cysto-urethroscope, Lithotripter ultrasonic, phacoemulsifier, Ultrasound Scanner for ophthalmology. The relevance of each requested equipment is shown below.

1. Ventilator (for Operation Theatre)

It is planned to improve 9 ventilator units for operation theatre. Surgery is performed under intravenous anesthesia regardless of the length of surgery time. For respiratory management of patients under intravenous anesthesia, a Russian made anesthesia machine with ventilator is used. One anesthesia machine with ventilator is installed in each of the above-mentioned 21 operation theatres, and are about 6 to 9 years old. Thus, those were procured in recent years compared with the equipment in other departments. However, the respiratory control mode of said ventilators is limited, and also there is no synchronized ventilation mode which performs respiratory management according to spontaneous breathing. For this reason, it is difficult to properly manage respiration during surgery. Particularly, the existing ventilator is not appropriate for the patients with weak lung function due to diseases such as cancer. Therefore, among 21 operation theatres, it is planned to replace existing ventilators in 4 general surgical operation theatres of the building No. 4, which are frequently used and perform surgery for both adults and pediatrics, 3 trauma patient operation theatres and 2 orthopedics operation theatres. Although the age of existing equipment is about 6 to 9 years, since equipment improvement under the Project will be after 2020, the necessity for replacement is high.

2. Laparoscope set

It is planned to replace and supplement 3 Laparoscope sets in total; 2 sets for adult (one in Admission, and one in General Surgery Operation Theatre), and one set for pediatrics (General Surgery Operation Theatre). At present, one laparoscope set, provided by the 2006 Diakov Project, is installed in the Emergency (admission) Operation Theatre. This set is utilized for diagnosis and treatment under laparoscopy for abdominal pain patients such as appendicitis (804 cases/2017), and Echinococcus (20 cases/2017). The set is in good condition, and it is possible to use in the future.

Since there is no laparoscope in the adult and pediatric general operation theatres, there is no choice except laparotomy surgery even though it is an invasive method.

As of 2018, the demand for laparoscopic surgery is expected about 800 and 1,000 cases per year for pediatrics and adults respectively, and laparoscopic surgery ensures less invasive surgery. Thus, the improvement under the Project is appropriate.

3. Operation light

It is planned to improve 4 operation light units. The operation light in the 3 operation theatres in the west wing of building No.9 is being improved by German KfW. One operation light unit located in underground of No.5 building was improved by Tajikistan. In addition, German KfW renovated the ophthalmology and ENT operation theatre and installed the operation light. Operation lights provided under the 2006 Diakov Project and installed in neurosurgery operation theatre in building No.5 and pediatric emergency operation theatre in building No.9 can continue to be used. 4 operation light units installed in general surgery operation theatres in building No.4 are around 10 to 12 years old, and there is great need to replace them because of many operations

they handle and it is impossible to procure repair parts due to discontinuation of manufacturing.

The Project will renew the operation lights from the old halogen bulb type to an LED type in the 4 most used general surgical operation theatre, which are perform surgery for adults and pediatrics. This clears the surgical field enables surgery with higher accuracy. At the same time, it leads to a decrease in maintenance cost. Thus, the improvement is appropriate.

4. Surgical C-arm X-ray unit

It is planned to replace one Surgical C-arm X-ray unit. Under the 2006 Diakov Project, 2 units were installed, one in the trauma department (building No.4) and the other in the pediatric operation theatre (building No.9). With large number of surgery cases in the trauma department, continued use of the C-arm X-ray TV system has become difficult, because clear images can no longer be obtained due to deterioration of the X-ray image intensifier, in addition to high frequency of use. In the trauma department, the surgical demand using this equipment for cases such as orthopedic cases and spinal injured cases is high about 4 to 5 per day, so it is reasonable to replace one unit in the trauma department under the Project.

5. Arthroscope

It is planned to improve one Arthroscope set. The National Medical Center performed 1,480 cases of muscle and bone surgery for adults and 785 cases for pediatrics in 2017. Among these muscle and bone surgeries, the ratio of knee surgery for adults and pediatrics is large, but only surgical treatment can be performed because there is no arthroscope at present. Surgical treatment is regarded as a problem because physical burden on the patient such as prolonged hospitalization period, the risk of infection and massive bleeding from the wound site during surgery. Therefore, procurement of one Arthroscope set is highly relevant, it makes it possible to perform less invasive surgery, and the postoperative risk such as infection can be reduced.

6. Cysto-urethroscope, Lithotripter ultrasonic

It is planned to provide one cysto-urethroscope set for adult and pediatric each, and one lithotripter ultrasonic unit. Under the 2006 Diakov Project, one cysto-urethroscope set for pediatric was provided at operation theatre, and at present, this set is mainly used for diagnosis in pediatric urology endoscopy room. Although the equipment provided can be used for pediatrics for 12 years or more, but the diameter of the endoscope is too thick for use on pediatric patients aged 3 to 12 who make the bulk of those in need of diagnosis and treatment in the urology department. The adult section does not have cysto-urethroscope, and lithotripter (laser or ultrasonic) so there is no choice but to perform laparotomy surgery. Urethral organ disorder at the center is the fifth cause of death in adults and the sixth cause of death in pediatrics. Particularly, urolithiasis morbidity and mortality rates are high. It is reported that this is partly due to the current medical service that can only perform a high risk surgical procedures.

In order to improve this situation, it is planned to procure both non-contact ultrasonic lithotripter and contact ultrasonic endoscope, that is, basket type used with cysto-urethroscope.

With this equipment, it will be possible to perform a series of treatments such as destroying a large stone with ultrasonic lithotripter and collecting the disintegrated material out of the body with ultrasonic endoscope. In addition to removal of urinary tract stones, cysto-urethroscopes can be used for cystitis, ureteral catheter insertion, foreign body removal, urethral expansion, etc.

7. Phacoemulsifier, Ultrasound scanner for ophthalmology

The Project will install one Phacoemulsifier and one Ultrasound scanner for ophthalmology. Currently, the National Medical Center does not have the equipment. Regarding ultrasound scanner, there is a compact B mode ultrasound device compatible only for ages 15 years or more, which malfunctioned several years ago and cannot be repaired and used.

The National Medical Center currently annually conducts more than 2,000 ophthalmic surgeries, such as cataracts and glaucoma, (1,700 cases for adults, 332 cases for pediatric patients).

With an Ultrasound scanner, it will be possible to provide more detailed and useful image information for major ophthalmology diseases such as cataract, glaucoma and detachment of the retina, resulting in accurate capture of disease condition. Phacoemulsifier enables less invasive cataract surgery. Therefore, it is reasonable to procure the equipment to strengthen diagnostic capabilities and for less invasive surgeries.

3) ICU / Ventilator for adult, Ventilator for pediatrics

It is planned to procure and install 6 ventilator units for adult and 2 ventilator units for pediatrics under the Project. At present, there are 24 beds in ICU of the National Medical Center. There are 6 beds for adults in building No. 5 and 6 beds for pediatrics in building No. 9 to accommodate patients with respiratory syndrome or acute stroke who require artificial respiration care after operation. At present, 3 adult anesthesia machines with ventilator are installed in the adult ICU made in Russia, and they are about 5 to 8 years old. Pediatric ICU also has equipment similar to the one in adult ICU and an oxygen concentrator provided under the 2006 Diakov Project. The Anesthesia machines with ventilator in ICU have limited functions such as limited ventilation mode, no mode of withdrawal, no flow adjustment according to spontaneous breathing. Thus, respiratory management cannot be done sufficiently.

At the time of the delivery under the Project, the existing equipment will 7 to 10 years old, and nearly at the end of its useful life. Therefore, it is appropriate to replace and supplement with ventilator capable of managing respiration according to the patient's condition.

4) Central Sterilization and Supply Department (CSSD)

It is planned to procure and install high pressure steam sterilizer at Central Sterilization and Supply Department. Currently, pediatric departments use vertical sterilizer whose capacity is approx. 80L procured under the 2006 Diakov Project for surgical instruments, and approx.150L hot air sterilizer is used for linen sterilization. At present, a total of 310L sterilization capacity is available mainly used for sterilization of medical instrument for adult departments. There is one large water distillation plant, 2 vertical high pressure steam sterilizer units, and approx.150L horizontal high

pressure steam sterilizer. Sterilization and supply of medical instruments used in operation theatre and wards of adult department is done twice a day, total capacity of about 620 L. However, these sterilizers are at least 15 years old, it is time for replacement. Under the Project, it is planned to replace 2 high pressure steam sterilizers taking into consideration the increase in the numbers of operations as the quality of medical services improve in future. After these improvements, sterilization capacity increase, resulting in smooth sterilization for surgical related items.

5) Central laboratory department

Under the Project, it is planned to install one Biochemistry analyzer unit, ELISA system and blood cell counter. In 2017, Central Laboratory department was conducting about 120 specimen tests per day such as blood test and urine test for emergency patients and inpatients. However, the biochemistry analyzer is at least 10 years old and its diagnostic results, such as variations in test accuracy, have become unreliable and it is time for replacement. Since the clinical laboratory department does not have an ELISA system, it uses a test kit to investigate hepatitis B and C, Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS), etc., but the test kit is expensive and the tests are not very accurate. Using ELISA system for the measurement of serum antibody values, it is possible to diagnose the above-mentioned diseases with high accuracy. Furthermore, for echinococcus that is common in Tajikistan, ELISA system can also be used to test for echinococcus antibodies, however the National Medical Center currently examines patients suspected of echinococcus using laparoscopy.

In addition, currently the blood cell count is done manual under a microscope, and it takes a lot of time to inspect. Since there are accuracy issues such as difference of counting results by individuals, automatic blood cell counter is required.

In order to improve the clinical test function, it is appropriate to make replacement or new procurement of the 3 essential equipment mentioned above.

6) Endoscopy department

The endoscopy department is divided into an adult section and a pediatric section. It is planned to install broncho video endoscope, colon video endoscope, gastro video endoscope, and endoscope cabinet. In addition to these, one duodeno-scope is also installed at adult section.

The pediatric endoscopic section has a broncho video endoscope, a colon video endoscope and a gastro video endoscope provided under the 2006 Diakov Project, but due to deterioration and breakage of the fiber portion, images are no longer clear, hindering diagnosis and treatment.

The adult endoscopic section self-funded equipment; broncho video endoscopes, colon video endoscopes and gastro video endoscopes, are aged and images have become blurred, and continued usage has become difficult.

Since the fourth largest cancer in Tajikistan male is liver cancer,[8] there is high the demand for ERCP, which enable the early detection of abnormalities in the gallbladder, bile duct and pancreatic

[8] GLOBOCAN 2012

duct. For this reason, it is planned to procure new duodeno-scopes set for ERCP. The adult section does not have a duodeno-scope, so it is requested under the Project. Currently, it is borrowed from other public medical facilities as needed in order to perform ERCP under surgical X-ray TV system. And, since the endoscope cabinet is also an essential device for keeping the endoscope clean, it is planned to procure one each for adults and pediatric section. Although Ultrasonic washing machine and hydrogen peroxide sterilizer are requested for washing and sterilizing the endoscope, since there are no particular problems with the current cleaning method, i.e., putting endoscopes in glutaral, these devices are not part of the Project.

7) Pathology department

It is planned to procure one Microtome Rotary unit and one Tissue Processor at pathology department. Under the 2006 Diakov Project, one microtome unit was installed in the pathology department located away from central laboratory department. It is used frequently because the equipment is the only equipment that can create sections in pathology department, and it needs to be replaced since it is 12 years after installation. On the other hand, since the pathology department does not have a tissue processor necessary for fixing specimens, the department request the central laboratory department within the premises to create paraffin embedded specimens.

It has been pointed out that is specimens contamination caused by moving specimens and delayed paraffin embedding the central laboratory department. Therefore, it is necessary to develop a system to do all the examination processes in the pathology department.

Cancer is the second leading cause of death in Tajikistan and the requests from the surgical department to the pathology department for specimen examination for malignant or benign cancer will increase in the future, so it is necessary to install automatic tissue processor in the department.

It is reasonable to install automatic tissue processor and microtome for microscope slicing of immobilized specimens and the introduction of these equipment will improve diagnostic services at the center.

8) Other Departments

It is planned to install ENT Treatment unit and Chair, Audiometer (for infant up to one year) for ENT department and spirometer for functional diagnostic department, one unit respectively. ENT treatment unit was procured by Tajikistan in 2015, it was installed in adult's clinic, but there is no unit in pediatric clinic, which has many patients. For this reason, although adult unit could be used for pediatric patients, it is difficult to observe and treat their ears and throat in the correct posture. It is necessary to install the unit for pediatric ENT treatment.

Audiometer for adults was installed in the 1970's, but there is no dedicated equipment for hearing test for newborns. And average inherent demand is about 300 to 320 cases[9] per year but it is impossible to conduct inspection for early detection of hearing congenital abnormalities. Spirometer

[9] Ear and throat (ENT) department of the National Medical Center has received neonates from all around the country and maternity hospital etc. located in Dushanbe city because it is the only facility for treatment in the Tajikistan.

was installed under the 2006 Diakov Project in the respiratory department, but continued use is now difficult due to aging. In Tajikistan, there are many respiratory diseases patients and it is the second largest cause of death for both adults and pediatrics in the National Medical Center, so the respiratory function test by spirometer is important.

【Cardiovascular Surgery Center】

It is planned to install one Angiography system. As of April 2018, there are 2 cardiac catheter treatment rooms equipped with Angiography system, but it is difficult to procure repair parts for the one manufactured in 2000, rendering it dysfunctional. Another unit manufactured in 2011 is operating on a single plane, but after replacing the tube and detection parts in 2017, the image quality has deteriorated. As a result, there is a decline in treatment accuracy such that it takes nearly twice as long as conventional diagnosis and treatment, and it is impossible to handle the planned number of patients. In order to improve this situation, it is planned to replace one Angiograph system that needs the most urgent improvement at the center. The list of planned equipment of the National Medical Center and the cardiovascular surgery center and their main functions are shown in the table below. The criteria of planned equipment are general content as the top referral level medical facility.

Table 2-7　Planned Equipment List and Its Specifications

【National Medical Center 】

No.	Name of Equipment	Q'ty	Main Specifications	Function and Contents
1	Ventilator for adult	6	Main composition: 1) Main unit, 2) Heater humidifier, 3) Circuit holder, 4) Test lung, 5) High pressure air hose, 6) High pressure oxygen hose, etc. Main specifications: 1) Control mechanism: microcomputer control, volume / pressure control 2) Ventilation control: volume and pressure control 3) Ventilation mode: IMV, SIMV, PSV, CPAP or more	Used to provide assisted respiration and forced breathing to respiratory failure patients. Plan for equipment with 3 kinds of specifications for adults, pediatrics, and operation theatre. Select suitable model that corresponds to the setting of ventilation volume and breathing mode.
2	Ventilator for pediatrics	2	Main composition: 1) Main unit, 2) Mobile stand, 3) Heated humidifier, 4) Circuit holder, 5) Reservoir bag, etc. Main specifications: 1)Target patient: Neonates to Pediatrics 2) Control mechanism: microcomputer control, volume / pressure control 3) Ventilation control: volume and pressure limited control 4) Ventilation mode: PEEP, Apnea backup, IMV, SIMV, PSV, CPAP, or more	
3	Ventilator for OT	9	Main composition: 1) Main unit, Main specifications: 1) Control mechanism: microcomputer control, volume / pressure control 2) Ventilation control: volume and pressure control 3) Ventilation mode: SIMV, PEEP, etc.	
4	High Pressure Steam Sterilizer	2	Main composition: 1) Main unit, 2) Water softener, 3) Sterilization drum (M, L) etc. Main specifications: Main unit Type: swing or horizontal type Capacity: 260 L or more Sterilization temperature: 121℃ to: 134 ℃ Safety device: no-water burning prevention function and over-pressure prevention function, or more	Essential equipment for the central sterilization supply department. Used to sterilize surgical instruments and linen used in the center with high pressure steam in a short time.

5	Laparoscope set for OT (adult)	2	Main composition: 1) Laparoscope set, 2) Insufflator (CO^2 gas), 3) Light source, 4) Instrument set, 5) Endo-abdominal rinsing & suctioning apparatus, 6) Electrosurgical unit etc. Main specifications: 1) Telescope A: 10 mm (viewing direction 0°) 2) Telescope B: 10 mm (viewing direction 30°) 3) Light source: xenon or LED 4) Monitor: Color: 19 inches or more	Used to perform abdominal examination and surgery through the image from video camera and specialized devise for endoscopes. Since the endoscopes are inserted from small cuts on the abdomen, the wounds are small compared with the conventional laparotomy operation, and the invasiveness to the patient is kept low. Thus, patient's recovery from the operation is quick, and rate of postoperative complication such as ileus obstruction is low. Plan for suitable size for both adult patient and pediatric patient.
6	Laparoscope set for OT (pediatrics)	1	Main composition: 1) Laparoscope set, 2) Insufflator (CO^2 gas), 3) Light source, 4) Instrument set, 5) suction-irrigation pump unit, 6) Electrosurgical unit etc. Main specifications: 1) Telescope A: 5 to 5.5 mm (viewing direction 0°) 2) Telescope B: 5 to 5.5 mm (viewing direction 30°) 3) Light source: xenon or LED 4) Monitor: Color: 19 inches or more	
7	Bronchoscope, Video system for adult	1	Main composition: Main unit, Video processor, monitor, light source equipment etc. Viewing Angle: Within: 120° to: 140° range Working length: 600 mm or more	Used for diagnosis of respiratory diseases such as lungs and bronchi. This scope is insert from the mouth to observe lungs, bronchi directly, and also collect tissues and cell for diagnosis and treatment of diseases such as bronchial strictures etc. Plan for suitable size for both adult patient and pediatric patient.
8	Bronchoscope, Video system for pediatrics	1	Main composition: Main unit, Video processor, monitor, light source equipment etc. Viewing Angle: Within: 120° to: 140° range Working length: 600 mm or more External pipe diameter: 3.8 mm or less	
9	Colonoscope video system for adult	1	Main composition: Main unit, Video processor, monitor, light source equipment etc. Viewing angle: 140° or more Working length: 1680 mm or more	Used to perform observation of lesion, diagnosis and treatment from the rectum to the colon or ileal terminal by inserting scope video camera from the anus. Plan for suitable size for both adult patient and pediatric patient.
10	Colonoscope video system for pediatrics	1	Main composition: Main unit, Video processor, monitor, light source equipment etc. Viewing angle: 140° or more Working length: 1680 to 1700 mm or more Outer diameter: 11 mm ±: 10%	
11	Gastroscope video system for adult	1	Main composition: Main unit, Video processor, monitor, light source equipment etc. Viewing angle: 140° or more Working length: 1030 mm or more Outer diameter: within the range of 8.8 - 10.7 mm	Used to observe the lesion of the upper gastrointestinal tract such as esophagus and stomach, and also to collect tissue and cells for diagnosis. Plan for suitable size for both adult patient and pediatric patient.
12	Gastroscope video system for pediatrics	1	Main composition: Main unit, Video processor, monitor, light source equipment etc. Viewing angle: 140° or more Working length: 1050 mm or more	

13	Duodenoscope for ERCP	1	Main composition: Main unit, Video processor, monitor, light source equipment etc. Main specifications: 1. Duodenoscope Viewing angle: 98° to 105° (rear perspective) Bending direction: four directions up, down, left, and right Bending angle: upper: 120° to 130°, lower 90°, right 90° to 110°, left 90° to 110°	Used for ERCP examination that can detect abnormality of the gall bladder, bile duct and pancreatic duct at an early stage
14	Cabinet for fiberscope, UV lamp	2	Main Composition: 1. Main unit, 2. UV sterilization lamp (6W×3) Main Specifications: (1) Type: front door open, for 3 endoscopes	Used for keeping the endoscope cleanly before and after use.
15	Ultrasound Scanner, Doppler	1	Main composition: 1. Main unit, 2. Sector probe, 3. Convex probe, 4. Linear probe, 5. Printer, etc. Main specifications: 1. Main unit: Beam former: Digital Scanning method: electronic convex, electronic linear, electronic sector Display modes: B, B/B, M, B/M, B/D, CFM (B) /PWD, THI, Power, CWD Image depth: 24 cm or more Zoom: possible Monitor: 12inch or larger, LCD color monitor Transducer connection: 3 or more	Used for diagnosis of cardiovascular diseases such as congenital heart disease, and diagnosis of abdomen and superficial tissues etc. Plan to provide linear, convex and sector transducers for diagnosis of abdomen, chest, and heart etc.
16	Ultrasound Scanner	3	Main composition: 1. Main unit, 2. Convex probe, 3. Linear probe Main specifications: 1. Main unit Beam former: Digital Scanning method: Electronic convex, electronic linear Display modes: B, B/B, M, CW, PW, B/D, CFM (B)/PWD, Depth of image: 24 cm or more Monitor: 12 inches or more, LCD color monitor Probe connector: 3 or more	Used to conduct a rapid diagnosis of abdominal organs such as liver, kidney and gall bladder. Plan to provide linear and convex transducers to see various parts such as abdomen and chest.
17	Defibrillator	4	Main composition: 1. Main unit, 2. Cart Main specifications: 1. Main unit (1) Electrification waveform: 2 phases (bi-phasic) (2) paddle: adult, pediatric application (3) Defibrillation 1) Type: manual and synchronous 2) Maximum energizing energy: wide range 2 to 200 J	Used to promote normal restoration of heart contraction of patient who has ventricular fibrillation or atrial fibrillation by delivering direct-current electricity shock percutaneously.

18	Operation Light	4	Main composition: 1. Main unit (main light), 2. Main unit (secondary light), 3. Double arm assembly, 4. Support mechanism etc. Main specifications: 1. Used light source: LED type 2. Light source (main): 26 LED or more 3. Light source (sub): 26 LED or more 4. Main unit: Main light: 120,000 LUX or more (adjustable) 5. Main unit: Secondary lamp 85,000 LUX or more (adjustable)	Used to keep the operative field bright with shadowless lamp. It is planned an LED type that can perform safe and accurate surgery.
19	Neurosurgery set	2	Main composition: 1. Sterilization case (1) 2. Scalpel handle #3 (1) 3. Scalpel handle #4 (1) 4. Pean homeostatic forceps without teeth (2) 5. Backhaus cloth forceps (8) 6. Surgical scissors sharp/blunt (1) 7. Mayo Stille scissors straight (1) 8. Mayo Stille scissors curved (1) 9. Metzenbaum scissors curved (1) 10. Adson forceps without teeth (2) 11. Adson forceps with teeth (2) 12. Pott-Smith forceps - carbide (2) 13. Cushing forceps with teeth (1) 14. Dietrich vascular forceps with teeth (1) 15. Micro mosquito homeostatic forceps straight (6) etc.	Instrument set such as scalpel, tweezers, scissors used for fine brain surgery operation
20	Microtome Rotary	1	Main composition: 1) Main unit, 2) manual wheel, 3) manual handle, 4) adjustment handle, 5) cover, 6) disposable blade, etc. Main specifications: 1) Dimension to block holder: 50 mm or more 2) Section width: 0.5 to 60 μm wider range 3) Inspection sample block holder: Universal cassette clamp	Used for preparation of ultra-thin section for observation under microscope.
21	Tissue Processor	1	Main composition: 1) Main unit, 2) Paraffin bath, 3) reagent station, 4) Tissue basket etc. Main specifications: 1) Paraffin tank capacity: 1.5 L or more 2) Reagent station capacity: 1.8 L 3) Tissue basket: 1 or more	Used for automatic pathological sample preparation by fixation, dehydration, degreasing, paraffin penetration of pathological tissue samples.

22	CT	1	Main composition: 1. Scan gantry, 2. Patient table, 3. Operation console, 4. Workstation for radiologist, 5. Medical application software, 6. System-wide UPS etc. Main specifications: 1. Scan gantry (1) Number of detectors: 64 detector rows / 64 slices or more (2) Scan Purpose: Whole body scan including head (3) Scan items Field of view: φ 500 mm or more Tilt angle: ± 25 degrees or more (4) scanning Operation system: 360° continuous rotation / spiral rotation Full scan time: within 0.8, 1.0, 1.5 seconds (full rotation) Slice thickness: 0.5 or 0. 625, 1 or 1. 25, 2 or 2.5, 3 or 3. 75, 5, 7.5, 10 mm or more Shooting area: diameter 200 - 500 mm Continuous scan time: Maximum 60 seconds or more	Used to take a tomographic image of the body by radiation. It is planned 64 slices or more that is effective for diagnosis of tumor, cancer and fracture etc.
23	Surgical C-arm X-ray unit	1	Main composition: 1. Main unit, 2. TV monitor, 3. Sterilization cover, 4. Foot switch, 5. Cassette (for cassette holder) 4 pieces / set, 6. Cassette holder etc. Main specifications: 1. Main unit (C arm type) (1) Distance: 90 cm or more (2) Position opening: 55 cm or more (3) C arm forward and backward movement stroke: 20 cm or more (4) C arm slide rotation: 115° or more (5) C arm vertical movement stroke: 40 cm or more (6) C arm swing: ± 10° or more (7) C arm rotation: ± 180° or more	Used for intraoperative fluoroscopic imaging such as orthopedic surgery. It is also used for confirming the position of the spine, and the position of the implantable device such as a pacemaker, etc.
24	Mobile X-ray unit	1	Main composition: 1. Main unit (including), (1) X-ray control device, (2) X-ray generation device, (3) X-ray tube device, (4) mobile cart device, (5) collimator device, (6) X-ray beam control device, (7) X-ray supporter, (8) high-voltage cable set, (9) hand switch, (10) FPD Main specifications: 1. Main unit (1) X-ray control device: inverter type (2) X-ray generator (with HT cable) 1) KV range: wider than 40 to 100 kV 2) mA range: maximum 35 mA or more 3) mAs range: 0.25 to 25 mAs or more 4) Maximum output: 2.5 kW or more (3) X-ray tube apparatus 1) Type: rotating anode 2) Focal size: 1.0 mm or less 3) Movable range: Vertical direction: 50 ~ 185 cm or more Horizontal direction: 1:15 ~ 120 cm or more (4) Mobile cart system: with two or more stoppers	Used for X-ray examination of serious patients who cannot be moved. The unit can be moved to bedsides for X-rays. It is planned a digital type that does not require printing film.

25	General X-ray and Fluoroscopy unit	1	Main composition: 1. Fluoroscopy table, 2. X-ray tube device, 3. X-ray high voltage device, 4. Bucky stand, 5. Bucky table, 6. Image intensifier, 7. Remote control desk, 8. image processing unit, 9. pediatric belt, 10. Cassette holder (donation), 11. Fluoroscopic / general shooting foot switch, 12. Interphone (for communication between control room and imaging room) etc. Main specifications: 1. Fluoroscope (1) Fluoroscope shooting table size: 2,000×650 mm or more (2) Maximum allowable load: 135 kg (3) Table height: 890 mm or less (4) Movable tube longitudinal direction movable range: 90 cm or more (5) Table variable angle: 90° to 0° to -30° or more (6) Distance between focal point and film: in the range of 1000 to 1200 mm	Used for X-ray examination of gastrointestinal contrast such as general radiography of the chest and abdomen, examination of upper gastrointestinal contrast (esophagus, stomach, and duodenum), lower digestive tract contrast (large intestine), kidney, ureter and bladder.
26	Arthroscope set	1	Main composition: 1. Main unit (1) Suction/cleaning pump, (2) tube set, (3) light source device, (4) optical fiber cable, (5) chip camera control unit, (6) chip camera head, (7) flat screen monitor, (8) Power shaver basic set, (9) High speed shaver hand piece, (10) Multifunction hand piece, 2. Knee appliance set, 3. Electric scalpel etc. Main specifications: 1. Main unit (1) Suction/cleaning pump 1) Flow rate range: 0 to 1000 mL or wider 2) Pressure range: 15 to 120 mmHg or wider 3) Switch: Pedal type foot switch (2) Tube set: 2 puncture needles, sterilized 10 pcs / pack (3) Light source device 1) Light source: LED 2) Silicone tube set: 250 cm or more	Used for observation and treatment of the lesion of the joint part of the lower limbs such as the knee joints. To make a small cut near affected parts for inserting endoscope for observation, diagnosis and treatment.
27	Ultrasound Scanner for ophthalmology	1	Main composition: 1. Main unit, 2. Recording sheet Main specifications: 1. Main unit (1) Possible scan modes: A mode, B mode (2) A mode: axial length measurement (3) B mode: high resolution, movie playback function: display function	Used to provide information necessary for diagnosis, such as image information visualizing the shape, properties or dynamics of the eyeball and its surroundings, measurement information of the thickness of the cornea, and the axial length, and the like.
28	Spirometer	2	Main composition: 1. Main unit, 2. Nose clip, 3. Paper mouthpiece (100 pieces/box), 4. Antibacterial filter (100 pieces/box), etc. Main specifications: 1. Main unit (1) Measurement items: SVC, FVC, MVV, BD inhalation test (2) Flow rate: A range wider than ± 0.05 to ± 14 liters (3) Capacity detection: integrated flow rate (4) Capacity range: ± 0.1 to ± 10 liter (5) Capacitance accuracy: Within ± 3% or within ± 0.5 L (6) Display: Liquid crystal display	Used for diagnosis of respiratory function by measurement of pulmonary capacity etc.

29	Audiometer for infant up to one year	3	Main composition: 1. Main unit, 2. AA batteries (4) etc. Main specifications: 1. Main unit (1) Application: Early detection of hearing impairment in infant hearing screening (2) Inspection item: ear acoustic reflex (3) Power source: 4 AA batteries or AC 220 V 50 Hz or battery operated (4) Number of channels: 1 or more (5) Stimulation type: CE-chirp stimulation (6) Stimulation rate: 93 seconds or more	Used for the detection of congenital hearing abnormality by Distortion Product Otoacoustic Emission (DPOAE).
30	Cysto-Urethroscope set (adults)	1	Main composition: 1. Cysto-urethroscope set, 2. Bladder lithotripter, 3. Resect scope, 4. Electrosurgical unit etc. Main specifications: 1. Cystourethroscope set (1) Telescope A: diameter 4 mm, length 30 cm (viewing direction 0°) Telescope B: diameter 4 mm, length 30 cm (viewing direction 30°) Telescope C: diameter 4 mm, length 30 cm (viewing direction 120°) Telescope D: diameter 2.9 mm, length 30 cm (viewing direction 0°) Telescope E: diameter 2.9 mm, length 30 cm (viewing direction 30°) (2) Cystourethroscope sheath : 25Fr.&20Fr. Luer lock connection 2pcs.attached, 1pc/each (3) Telescope bridge (4) Optical forceps and scissors (for tissue collection and removal of foreign matter) (5) Biopsy Forceps (Small) (6) Visual obturator, cystoscope adapter (7) Universal cystourethroscope (8) Cystourethroscope sheath : length 22cm, instrument channel 5Fr. Luer lock connection 2pcs.attached (9) Instrument set for transurethral mucous injection (used with telescope B) (10) Flexible instruments for universal bladder/urethroscope	Used for observation and treatment in the urethra and the bladder. It is also possible to collect stones that have been crushed by a lithotripter (ultrasonic type). It is planned for both pediatrics and adult devices.

31	Cysto urethroscope set (pediatrics)	1	Main composition: 1. Main unit, 2. Electrosurgical unit, 3. Monitor etc. Main specifications: 1.-1 Cystourethroscope set for neonates (1) Telescope A: Diameter: 1.9 mm (viewing direction 0°), autoclave sterilization compatible (2) Telescope B: Diameter: 1.9 mm (viewing direction 30°), autoclave sterilization compatible (3) Cystourethroscope outer tube A: 7 Fr., with 2 luer lock connectors (4) Cystourethroscope outer tube B: 8.5 - 9 Fr., with 2 luer lock connectors, instrument channel 3 Fr. (5) Gripping forceps: flexible, 3 Fr., length 28 cm (6) Biopsy Forceps: double action jaw, flexible, 3 Fr., length 28 cm (7) Electrode: ball type, 3 Fr., length 53 to 58 cm 1.-2 Cystourethroscope set for Pediatrics (1) Telescope A: diameter 1.9 mm / 2.1 mm, length 18 cm (viewing direction 0°) autoclave sterilization compatible (2) Cystourethroscope outer tube A: 9.5 Fr., length 14 cm, instrument channel 4 Fr., obturator with 2 luer lock connectors (3) Gripping Forceps: flexible, 3 Fr., length 28 cm (4) Biopsy forceps: double action jaw, flexible, 3 Fr., length 28 cm (5) Electrode A: button or ball type, 3 Fr., length 53 to 58 cm (6) Electrode B: needle mold, 3 Fr., length 26 to 53 cm	
32	Biochemistry analyzer	1	Main composition: 1. Main unit, 2. Startup reagent (100 tests/set), 3. Printer paper (100 tests / set), 4. UPS etc. Main specifications: 1. Main unit (1) Shape: Tabletop type / Floor type (2) Reagent: open type (3) Analysis: Spectrophotometer measuring (4) Measurement: End point, time fixed, kinetic, bichromatic (5) Throughput: 30 test / hour or more (6) Reaction disk: 25 to 37 °C (7) Wavelength: 340 to 620 nm or more	Used to analyze various components of blood and body fluids and observe biological information such as abnormalities of organs and presence or absence of inflammation.
33	Hematology analyzer	1	Main composition: 1. Main unit, 2. Reagent: 100 test/set, 3. Power cord Main specifications: 1. Main unit (1) Type: fully automatic (2) Measurement item: at least white blood cells, 5 categories NE, LY, MO, EO, BA or more Whole blood mode: at least 17 measured values Trace mode: at least 8 items (3) Processing capacity: at least 80 samples/hour (4) Sample volume: 25 μL or less (5) Data storage function: required (6) Data display: With LCD screen or CRT backlight	Used for diagnosis of health condition and diseases by investigating quantitative changes, quantification and functions of blood cell components of erythrocytes, white blood cells and platelets.

34	ELISA system	1	Main composition: 1. Main unit: (1) Trace reaction colorimeter, (2) cleaning device, 2. printer, 3. Recording paper, 4. Test reagent (50 tests) Main specifications: 1. Main unit (1) Trace reaction colorimeter 1) Metering method: 1 wavelength, 2 wavelengths 2) Wavelength range: wider than 400-700 nm 3) Filter: 405, 450, 490 or 620, 630 or 690 nm 4) Light source: halogen or tungsten 5) Measurement time: 8 seconds (96 well) or less 6) Applicable reaction plate number: 96 well or more 7) Indicator: Liquid crystal or same level 8) Battery: Built-in (2) Cleaning apparatus 1) Applicable reaction plate number: 96 well or more	Used for detecting and quantitatively measuring the concentration of antibody or antigen contained in the sample and for positive / negative judgment such as hepatitis B and C or HIV / AIDS.
35	Phacoemulsifier	1	Main composition: 1. Main unit, 2. Ultrasound hand piece, 3. irrigation auxiliary bottle, 4. Suction pump, 5. Mobile stand Main specifications: 1. Body (1) Technology: emulsify cataract part with ultrasonic vibration (2) Pulse mode: Possible: Up to 100 pulses per second or pulse interval adjustment set available (3) Foot switch: required	Used for incision of corneal, incision and pulverization of crystalline lens nucleus for patient such as cataract
36	ENT surgery and endoscope set	2	Main composition: 1. ENT Video endoscope, 2. ENT instrument set Main specifications: 1. ENT Video endoscope (1) Type: Video fiber (2) Effective length: 320 mm or more (3) Tip diameter: Φ3.5 mm or less (4) diameter of insertion unit: Φ3.2 mm or less (5) Viewing angle: 90° or more (6) Curved angle: UP: 130° / DOWN: 100° or more (7) Observation depth: 3-50mm range (8) Light guide cord: 1500 mm or more	Used for diagnosis and treatment for patients such as sinusitis through directly observe the back and angled parts of the nose with endoscopes. It is possible to perform delicate surgery by using it together with ENT instrument set to be procured with this set.
37	General orthopedic surgical set	3	Main Composition: 1. Surgical scissors (1) 2. Mayo scissors, straight (1) 3. Mayo scissors, curved (1) 4. Metzenbaum scissors (1) 5. Wire scissors (2) 6. Mosquito hemostatic forceps straight (2) 7. Mosquito hemostatic forceps curved (2) 8. Kelly hemostatic forceps straight (2) 9. Kelly hemostatic forceps curved (2) 10. Crile hemostatic forceps (2) 11. Pean hemostatic forceps 16cm curved (4) 12. Pean hemostatic forceps 18cm curved (4) 13. Ochsner hemostatic forceps 14cm curved (4) 14. Ochsner hemostatic forceps 18cm curved (4) 15. Cloth forceps (4) etc.	Instrument set used for performing various orthopedic surgery.

38	Surgical set	5	Main Composition: 1. Surgical scissors (1) 2. Mayo scissors, straight (1) 3. Mayo scissors curved (1) 4. Metzenbaum scissors 18cm curved (1) 5. Metzenbaum scissors 23cm curved (1) 6. Wire scissors (1) 7. Mosquito homeostatic forceps (2) 8. Crile homeostatic forceps 14.5cm curved (4) 9. Crile homeostatic forceps 16cm curved (2) 10. Pean homeostatic forceps (2) 11. Ochsner homeostatic forceps 16cm straight (2) 12. Ochsner homeostatic forceps 20cm straight (2) 13. Cloth forceps (4) 14. Knife handle #3 (2) 15. Knife handle #4 (2) etc.	A complete set of instruments used for general surgeries such as laparotomy and open chest surgery.
39	Lithotripter ultrasonic	1	Main composition: 1. Main unit, 2. Patient monitoring system, 3. LCD monitor, 4. Keyboard, 5. Patient bed, 6. Ultrasonic generator Main specifications: 1. Main unit (ESWL device) (1) Maximum focus pressure: 59 Mpa Irradiating diameter: 180 mm Focal depth: 170 mm Focal size: Φ 6 mm × 70 mm Energy adjustment: 11 steps	Used to crush and remove urinary calculus by ultrasonic shock waves from outside the body.
40	Operating microscope for ophthalmology	1	Main composition: 1. Main unit Main specifications: 1. Main unit (1) Type: Floor mounted type (2) Surgical microscope Motorized zoom system with apochromatic optics, 1:6 zoom ratio, Magnification factor: 0.4x to 2.4x Eyepiece: widefield 10X Motorized, focusing range: 70 mm Objective lens focal length: f = 200 mm Binocular tube: Invertertube	Used for performing ophthalmic microsurgery by enlarging the operative field by the microscope.
41	ENT Treatment unit and Chair	1	Main composition: 1. Otolaryngology (ENT) treatment unit, 2. ENT treatment chair Main specifications: 1. ENT treatment unit (1) The suction device must be equipped with an unloader function and 3000 cc suction bottle with cap. Stainless steel handle with built-in oil-free pump. (2) The spray device must have an unloader function and a compressor with automatic drain trap, and stainless steel compressed air tank. 2. ENT treatment chair (1) Raising and lowering: electric type (2) Stroke: 300 mm or more (3) Seat height (lowest position): 520 mm or less (4) Seat height (highest position): over 750 mm (5) Lowering: Automatic/manual setting possible (Footswitch only)	Used for patients who need diagnosis and treatment of otolaryngology, and it is possible to treat with appropriate position and posture by sitting the patient on a dedicated chair.

【Cardiovascular surgery center 】

No.	Name of Equipment	Q'ty	Main Specifications	Function and Contents
42	Angiography system	1	Main composition: 1. Ceiling mounted, C arm X-ray tube support, 2. Operation and image system (console), 3. X-ray generator, 4. X-ray detectors (FPD), 5. X-ray tube device, 6. Angio collimator, 7. Patient bed (with footswitch and lead skirt), 8. Footswitch, 9. Workstation, 10. Monitor suspension, 11. Operation theatre monitor, 12. Medical application software, 13. Mobile lead shield (with LED check light) Main specifications: 1. X-ray tube support type: ceiling mounted C arm 2. Programmable position setting:64 or more 3. C-arm rotational direction (LAO/RAO): 240° (RAO 120° / LAO 120°) or more 4. Supporting arm rotation angle range (CAU/CRA): 45°/ 45° or more 5. Operation and image system (console) 6. X-ray generator (1) Type: microcomputer control, high frequency inverter (2) Maximum output: 100 kW or more (3) Fully automatic calculation, exposure data optimization function based on perspective value: equipped required 7. Medical application software: ECG Interface, Recording, storage and display of an ECG lead, Stent enhancement application, Enhances visibility of stent structure in real time, QCA standard software etc.	Used for coronary angiography examination for ischemic heart disease and emergency percutaneous coronary angioplasty (PCI) treatment. The X-ray tube indicator is the ceiling mounted type that is currently in use, and the detector part is a digital type flat panel detector.

2-2-2-4 Renovation work plan and electric facility plan

(1) Renovation work under the Project

There is no renovation work planned.

(2) National Medical Center

Electricity and facility plan, medical gas and installation plan of Image Diagnostic equipment for CT and General X-ray and Fluoroscopy unit,

【Electricity and Facility Planning】

The center receives electricity supplied from 3 substations of Barki Tojik electric power company through 10 kV transmission lines, to the 5 receiving and transforming facilities on the premises. The three-phase 380 V electricity is distributed to each building on the premises. the distribution board inside each building distributes single phase 220 V electricity. Voltage measurements done for 24 hours during the survey period, showed that the voltage fluctuation is within ± 10% of the range permitted by medical equipment, so there is no particular problem. However, since blackouts occur 2 to 4 times a month, CT and General X-ray and Fluoroscopy unit are equipped with 2 UPS, a single phase UPS covering the computer control and a three-phase UPS covering whole system.

Table 2-8 Result of Voltage Measurement (National Medical Center)

Rated Voltage	Max. Voltage	Rate of fluctuation	Min. Voltage	Rate of fluctuation
220V	242.5V	+10.2%	224.3V	+1.95%
Measured hour (from 14：00 to14:00, 24 hours)	0:42		16:07	

Source: Prepared by Survey Team

【Medical Gas】

Each building supplies medical oxygen gas to operation theatres and ICU departments, directly piping from cylinder storage pits installed outdoors for each. Besides there are places where oxygen pressure is deficient. Medical nitrogen gas is arranged in the departments of Adult Maxillofacial Surgery in the Building No. 4. The departments of Pediatric Maxillofacial Surgery supply medical oxygen gas and compressed air by cylinder storages installed in containers outside and manifold devices inside of the buildings which have been provided by donors.

【Improvement plan for installation of CT】

Renovation work for CT installation is unnecessary. It has already confirmed that space, electric capacity is sufficient at installation place. Because the CT will be installed in the pediatrics on the 1st floor of Building No. 9, where the 2006 Diakov Project installed CT (now non-functional). However, in order to keep the usage environment constant in Tajikistan where the temperature difference is high, it is planned to install air conditioner with dehumidification function to keep ideal environment. Also, since the current operation theatre window is extremely small and the radiologist can hardly observe the patient, it is planned to procure lead glass and carry out small renovation work to enlarge the

operation theatre window as part of the equipment installation work.

【Improvement plan for installation environment for general X-ray and Fluoroscopy units】

The space and electric capacity of installation place are sufficient because the units will be replacing existing equipment. However, in order to keep constant operating environment in Tajikistan where the temperature difference is high, it is planned to install air conditioner with dehumidification function to keep ideal environment. Also, since the window of the operation theatre window is small and it is difficult to take X-rays remotely, Japanese side will procure lead glass and expand the operation theatre window as part of equipment installation work.

(3) Cardiovascular Surgery Center

Electricity and facility plan, medical gas and installation plan for Angiography system

【Electricity and Facility Planning】

The center receives electricity from 10 kV transmission lines, at the receiving and transforming facilities on the premises, and three-phase 380 V electricity is distributed to each building on the premises. The distribution board inside each building distribute single phase of 220 V electricity.

Voltage measurements done for 24 hours during the survey period, showed that the voltage fluctuation is within ± 10% of the range permitted by medical equipment, so there is no particular problem. Generator circuits with 25 kVA has been installed at each operation theatre and ICU department. Angiography system is supplied with power by UPS in case of power failure. However, since blackouts occur once or twice a year and there are planned blackouts in winter, Angiography system will be equipped with 2 UPS, one is a single phase UPS covering the computer control and the other one is a three-phase UPS covering whole system.

Table 2-9 Result of voltage measurement (Cardiovascular Surgery Center)

Rated voltage	Max. voltage	Rate of fluctuation	Min. Voltage	Rate of fluctuation
220V	245.6V	+11.6%	227.3V	+3.3%
Measured hour (from 15：30to 15:30,24 hours)	7:03		18:13	

Source: Prepared by Survey Team

【Medical Gas】

The center supplies medical oxygen gas to operation theatres and ICU departments, directly piping from medical gas cylinder pit installed outdoor.

【Improvement plan for installation environment for Angiography system 】

The place planned to be installed under the Project is the catheter treatment room on the second floor, which will replace existing equipment. For this reason, X-ray protection has been done and the under ceiling steel frame can be used as it is. Electric facilities also do not need new retraction, and

power requirement backup for the 2 cardiac catheter rooms is UPS for the Angiography system. The UPS room (160 kVA / power supply capacity of about 30 minutes) is located on the first floor. The old UPS installed at the same time as the Angiography system in 2002, is now out of order and cannot be repaired due to aging. Therefore, under the Project, it is planned to procure UPS to cover the whole Angiography system. Regarding air conditioning equipment, hot water supply service is equipped in the X-ray diagnostic room. Also, although the wall-mounted air conditioner is installed in the operation theatre, continued use is difficult since it has not used for a long time. For this reason, the Japanese side will procure the air conditioner with a dehumidifier so that the equipment can be used in an ideal environment.

2-2-3 Outline Design Drawing

【Overall Map for “Shifobakhsh” National Medical Compound】

The National Medical Facility site map is as follows and the target medical facility that is the National Medical Center is located around upper parts of the site.

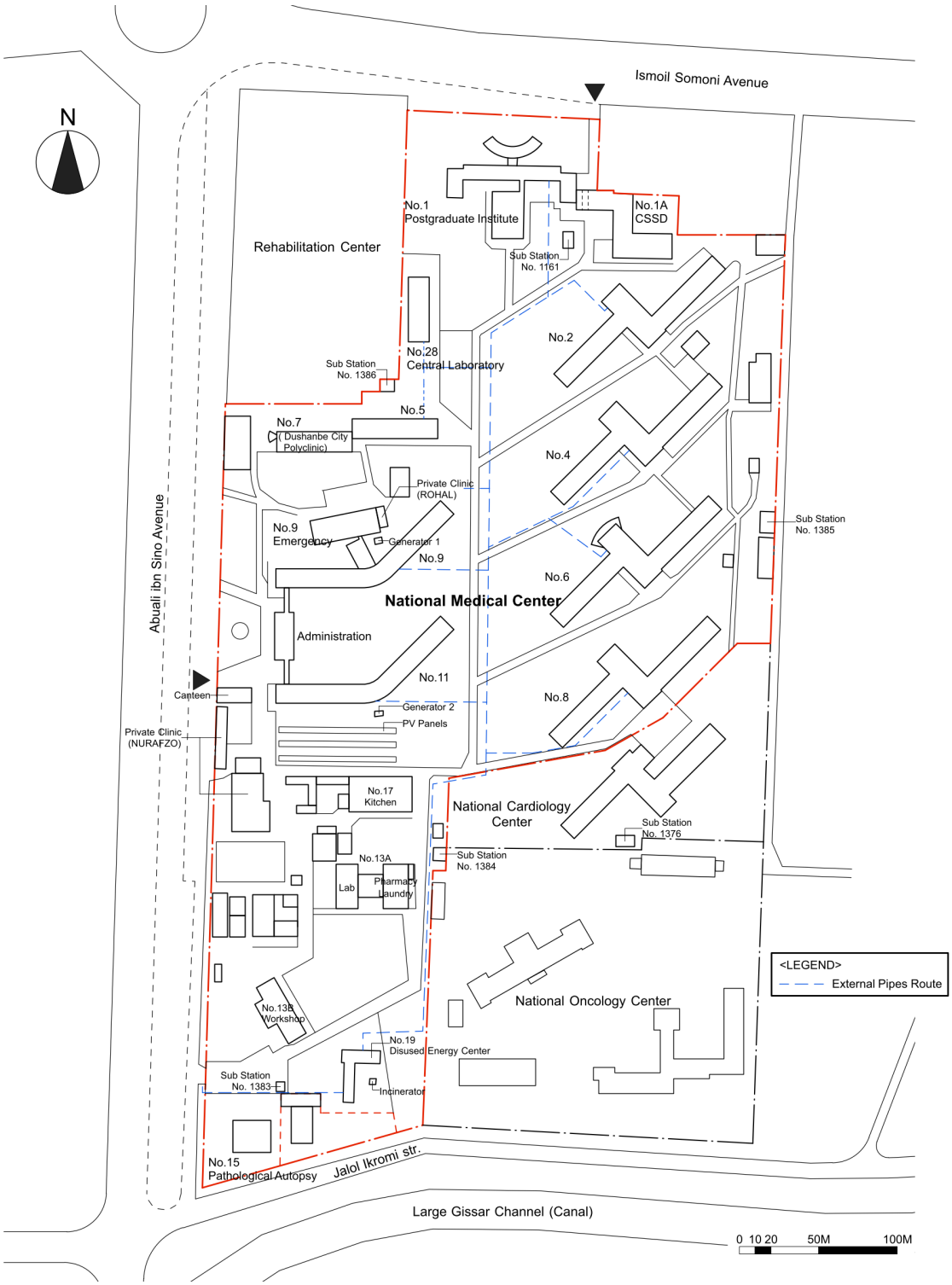


Figure 2-1 Overall Map for “Shifobakhsh” National Medical Compound

The layout of major equipment is as follows.

【CT Room】

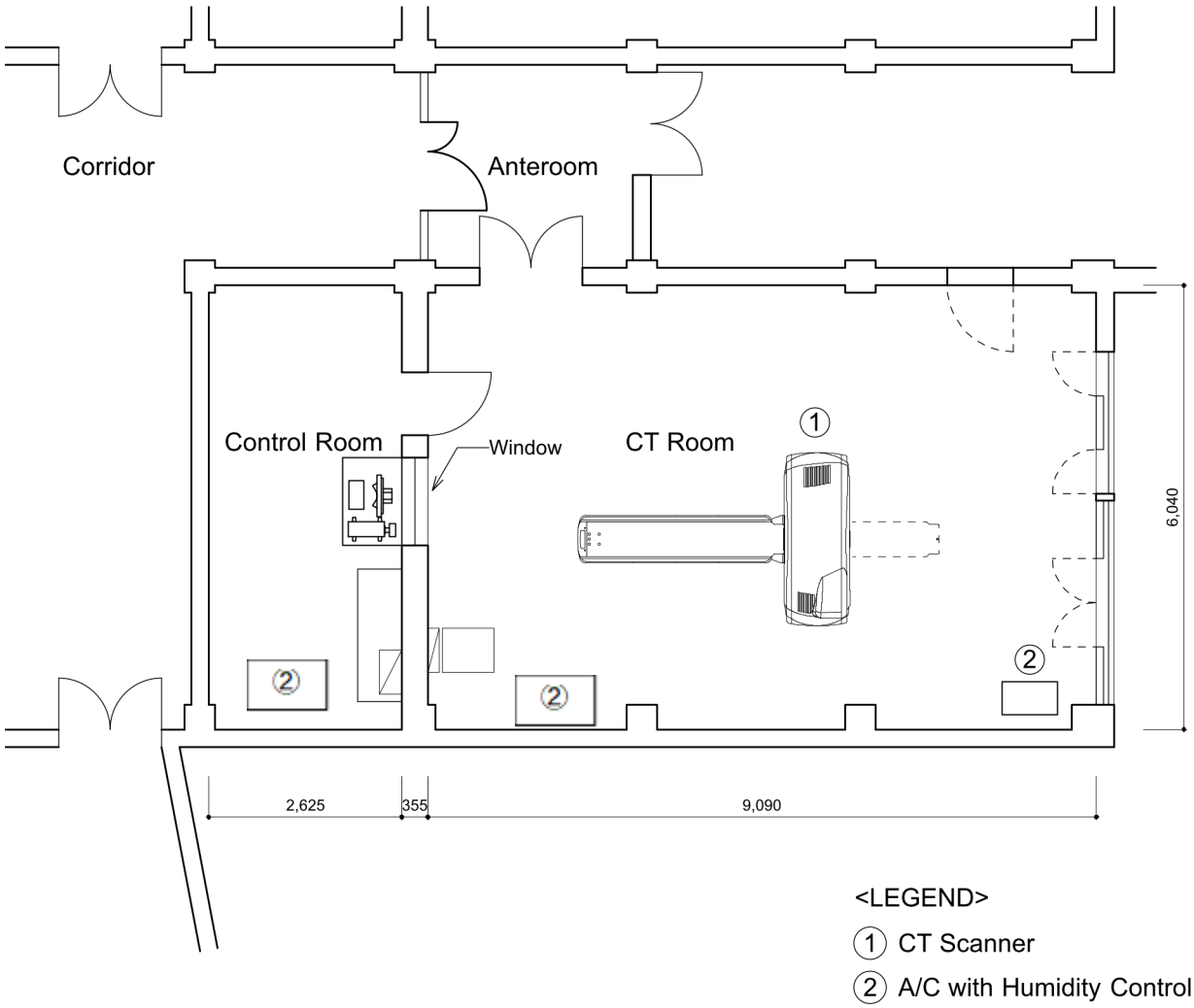


Figure 2-2　THE National Medical Center Building No.9 Emergency (Admission)
CT Room　(S=1:100)

【General X-ray and Fluoroscopy unit】

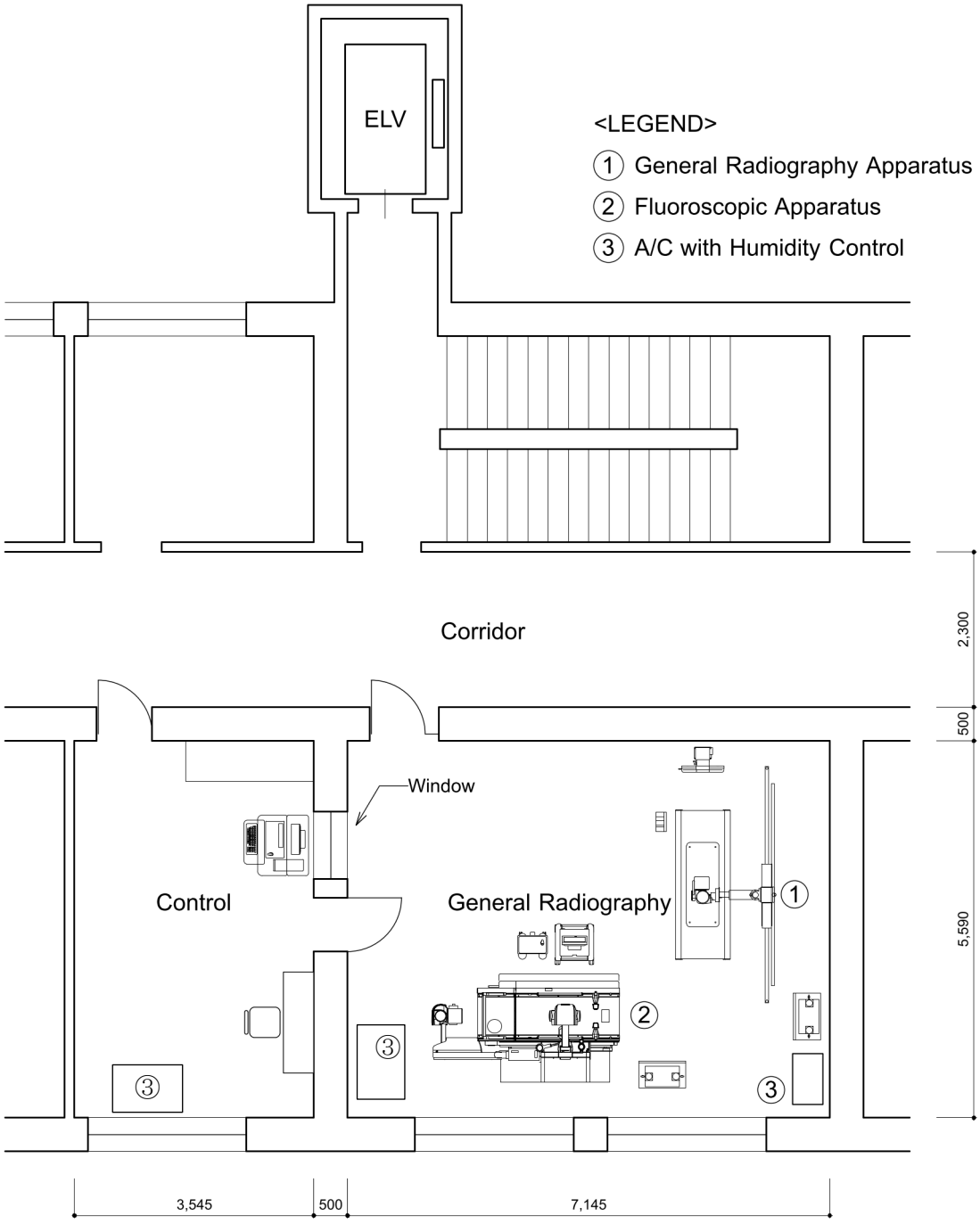


Figure 2-3 The National Medical Center Building No.9 Emergency (Admission)
General X-ray and Fluoroscopy unit (S=1:100)

【CSSD】

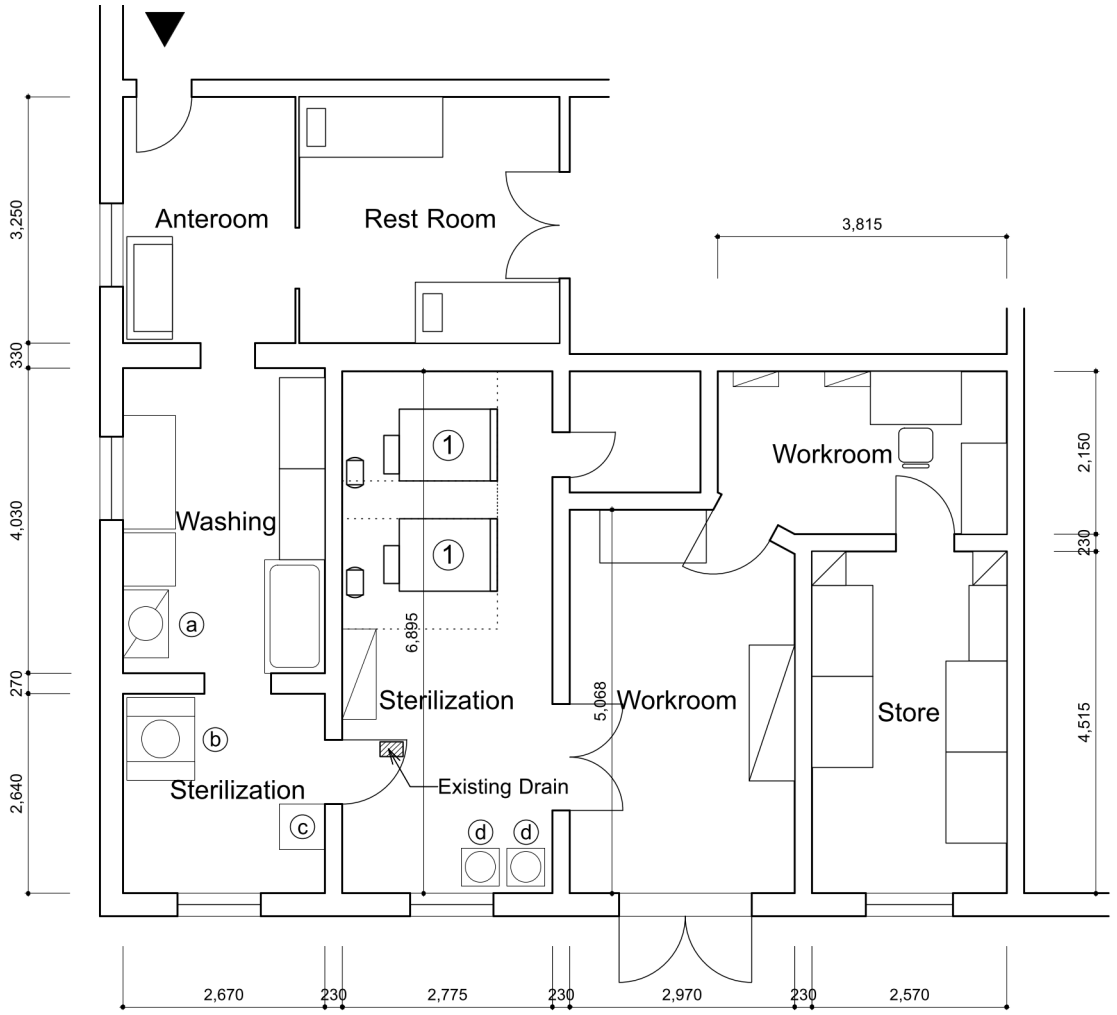


Figure 2-4 The National Medical Center 1A Building CSSD (S=1:100)

The Cardiovascular Surgery Center

【Angiography system】

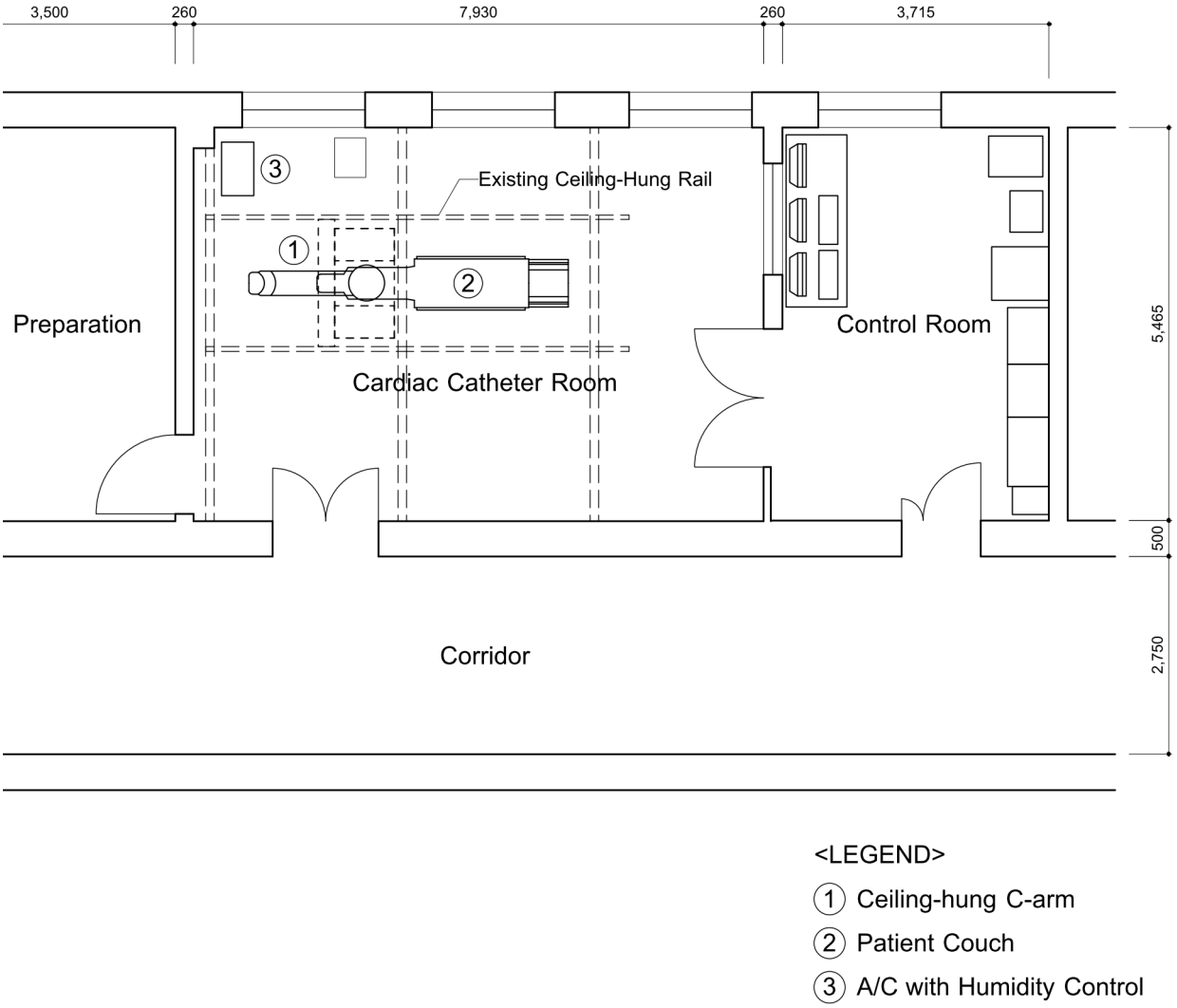


Figure 2-5　The Cardiovascular Surgery Center Cardiac Catheter Room　(S=1:100)

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Essentials of Project Implementation

The Project shall be carried out within the framework of Japan's Grant Aid scheme. Thus, after the GoJ approves the Project at a Cabinet meeting, the GoJ and the GoT shall sign an E/N, and the the GoT and Japan International Cooperation Agency (JICA) shall sign a G/A. Then, the executing agency of the Tajikistan side shall conclude a consultancy agreement with a Japanese consultant (the Consultant) in charge of the Project implementation, and the Consultant shall commence the Detailed Design, duties for the bidding, and supervision of the Project implementation. After completion of the Detailed Design, bidding will be held to decide the Supplier, that is, a Japanese corporate body. The Supplier decided upon in the said bidding shall carry out procurement for equipment and installation work.

Since the Project includes implementation and supervision of maintenance contracts for some procured equipment, it is necessary to consider the following items when supervising the plan.

① To avoid interference with one another, the executing agency of Tajikistan, the Consultant and the Supplier shall consider the implementation schedule, define the scope of works to be carried out by the Japanese and Tajiki sides, set out the starting time of each stage and adjust the completion time.

② It is a policy to complete delivery, installation of the planned equipment and initial operation training within a short period of about one month from delivery of procured equipment in order to allow the target medical centers to operate and engage in healthcare activities while the Project is in progress. Particularly, it shall be made obligatory in the bidding documents that the Supplier must investigate target facilities at least one month before the commencement of the delivery to confirm the route of delivery and installation site of the equipment to be procured.

③ To ensure basic operation appropriate maintenance of the planned equipment, Japanese engineers or engineers of local agents authorized by manufacturers shall be sent to provide engineers of the target facilities with initial operation training of the Supplier.

④ As some of the planned equipment include maintenance contracts for a total of 3 years, the Consultant shall regularly perform annual inspection, a total 3 of times.

(2) Project Implementation System

The Project shall be carried out by the following 4 parties mentioned from ① to ④.

①The Tajikistan executing agency

The executing agency for the Project shall be the MoHSPP of Tajikistan, the National Medical Center and the Cardiovascular Surgery Center.

②The Consultant

The Project shall be carried out as Japan's Grant Aid project. As regulated by the grant aid cooperation scheme, a Japanese consultant shall conclude a consultancy agreement with the Tajikistan executing agency. Based on the agreement, the Consultant shall provide guidance, advice and coordination services and perform duties necessary for the smooth implementation of the Project in a fair manner throughout the entire stages of the Project including bidding and procurement.

③The Supplier

According to Japan's Grant Aid scheme, a Japanese trading company selected through the bidding process shall procure the equipment.

④JICA

JICA shall conclude a G/A with the Tajikistan executing agency and supervise the Project implementation to ensure that it will be appropriately carried out under Japan's Grant Aid scheme. JICA shall consult with the executing agency if necessary, and facilitate the Project's implementation.

2-2-4-2 Implementation Condition

(1) Local Situations and Regional Characteristics

1) Medical equipment agents

In Dushanbe, the capital of the country, there are several local agents of Japanese and European medical equipment manufacturers, which deal with planned equipment as well as spare parts and consumables under the Project. Those agents can also perform maintenance service for the equipment based on the maintenance contract, and had experience to provide services for existing equipment such as CT, Angiography system installed at the National medical center and cardiovascular surgery center.

If there is no manufacturer's local agent in Tajikistan, equipment, spare parts and consumables will be procured from local agents located in neighboring countries such as Kazakhstan, Turkey or Moscow in Russia. In this case, equipment maintenance based on the maintenance contract will be carried out by contractors of medical equipment in the neighboring countries.

Therefore, maintenance of the equipment to be procured under the Project can be sufficiently dealt with by utilizing locally established knowledge of Tajikistan and the neighboring countries.

(2) Notes on Procurement of the Equipment

As the Project intends to procure and provide equipment, procurement is expected to take about 13.5 months after the conclusion of the E/N and G/A. It is because manufacturing period of CT and Magnetic Resonance Imaging (MRI) to be procured under the Project is a bit longer. The procurement period shall include the bidding process to select the Supplier and the period up to the delivery of the planned medical equipment. The following matters shall be considered to avoid any delay of the schedule.

- To avoid interference with healthcare services and other ordinary operations of target facilities, MoHSPP, personnel of target facilities concerned, the Consultant and the Supplier shall fully discuss the schedule, procedures and arrangements for the delivery and installation of the equipment before formulation of implementation schedule. In addition, they shall regularly hold meetings to manage the schedule.

- The Supplier shall study target facilities at least one month ahead of the delivery of the equipment; confirm the delivery routes, places to store the equipment, scheduled installation places, the conditions of electricity, water supply and drainage, and other conditions; and prepare a timetable for the delivery and installation of the equipment.

- Installation of CT, general X-ray and fluoroscopy unit shall involve removal of existing equipment to secure installation space. Furthermore, because general X-ray and fluoroscopy unit provided under the 2006 Diakov Project are still in operation, removal, delivery and installation plan with minimal impact on clinical activities shall be formulated.

2-2-4-3 Scope of Works

The Project shall be implemented through Japan's Grant Aid cooperation scheme under the mutual cooperation between Japan and Tajikistan. The Japanese and Tajikistani sides have discussed obligations of both parties in the procurement and installation of the equipment. These matters are summarized as follows.

(1) Obligations of the Japanese Side

The Japanese side shall perform the following duties involved in consulting, and procurement and installation of the equipment.

1) Consulting services

- Creation of technical specifications of the planned equipment, detailed design documents and bidding requirements
- Assistance for works related to selection and contract conclusion with the Supplier
- Supervisory work related to delivery and installation of the equipment, initial operation training
- Technical assistance so called soft component

2) Work related to procurement and installation of the Equipment

・Small window expansion work of operation theatre of CT and general X-ray and fluoroscopy unit is carried out as part of equipment work
・Electrical connection work between UPS and Image Diagnostic Equipment such as CT, general X-ray and fluoroscopic diagnostic unit, and Angiography system to the UPS circuit
・Procurement and transport of the Equipment
・Delivery, setting and installation, testing, commissioning and initial operation training of the Equipment

(2) Obligations of the Tajikistani Side

1) Target facilities

・Removal of the existing equipment which is scheduled to be replaced with new ones under the Project
・Securing of a place to store materials and equipment
・Appropriate use and maintenance of the Equipment to be procured
・Procurement, etc. of spare parts and consumables to utilize the Equipment to be procured

2) Regarding Procedures taken during the Project Implementation

・Payment of fees for banking arrangement (B/A), authorization to pay (A/P) and payments arising from the contract value
・Exemption and Refund from customs duty on import materials and equipment, and related procedures
・Pre-registration of medical equipment to be procured to the Medicine and Medical Equipment Department of MoHSPP (acquisition of import license)
・Exemption and refund from domestic tax on service procurement, and related procedures
・Prompt arrangement for inland transport of materials and equipment
・Provision of convenience for the entry and stay of Japanese in Tajikistan
・All the necessary expenses other than those to be borne by the Japanese side

3) Tax exemption and refund procedure

In Tajikistan, tax exemption is applied in the case of procuring equipment and maintenance services under the Grant Aid, both overseas and domestically. To facilitate this procedure, it is necessary to prepare procured equipment list and-maintenance contract list under the Project in Japan and attach it to G/A as "master list". In addition, it is necessary for the G/A to clearly state tax exemption and tax refund measures. To facilitate the procedures below, close contact between the concerned parties is requested to Tajikistani side.

1. Medical Equipment

For tax exemption and tax refund procedure, the master list is submitted from the target facilities to the executing agency, MoHSPP. The equipment is then reviewed and approved.

Thereafter, the Treasury Department issues tax exemption permit and tax refund permit.

For medical equipment procured inside and outside of Tajikistan, the invoice for the medical equipment shall be submitted with attachment of the tax exemption permit.

Tax exemption and tax refund will be realized after custom decision. Tax exemptions are subject to import taxes, tariffs, Value Added Taxes (VAT) and imported value taxes on medical equipment procured outside of Tajikistan including Japan, and VAT and other domestic taxes on medical equipment procured in Tajikistan.

2. Provision of maintenance management service

Under the Project, 3 years of CMC applied to advanced medical equipment such as CT and Angiography system and AMC applied to endoscope etc. will be provided as a part of Japan's Grant Aid. The actual maintenance service will be provided from the manufacturer's agents in the country or in a neighboring country, so the VAT for CMC and AMC is subject to tax refund.

In addition to the master list, the Supplier shall apply for the tax refund by submitting certificate issued by the target facilities that clearly state that maintenance services will be implemented for target facilities and bills maintenance contract fees or receipts to Ministry of Finance via MoHSPP. A tax refund will be executed after approval by the Ministry of Finance.

2-2-4-4 Consultant Supervision

(1) Policy for Supervision of Procurement

The Consultant shall fully take into account Japan's Grant Aid scheme, and objectives and contents of the detailed design, and perform its duties throughout the Project, ranging from the detail design, activities related to the bidding, and supervision of equipment procurement to handover to the executing agency. For supervision of the Project implementation, the Consultant shall smoothly and accurately contact and report to personnel in charge at relevant organizations in both countries, and seek to ensure that the equipment procurement will be completed without any delay, but with the predetermined quality.

(2) System of Procurement Supervision, and Contents of Work

To manage the progress of the entire Project and supervise the procurement of the Equipment, the Procurement Supervisor, Resident Procurement Supervisor and Inspection Engineer shall organize a supervisory system, each of whom shall perform the following duties.

1) Procurement Supervisor (Japanese): 1 person

- Procurement Supervisor shall be sent to Tajikistan to manage the progress of the entire project, and supervise the overall procurement schedule in Japan.
- To confirm the schedule concerning the timing of removal of existing equipment and start of delivery and installation of procured equipment with meeting with stakeholders concerned with target facilities and the Supplier. And to formulate the delivery and installation plan that does not hinder clinical activities of the target hospitals.

・To obtain approval from the Tajikistan side for reports that explain the entire implementation of the Project including certificates of final inspection and handover of the equipment issued by the Chief Consultant.

2) Resident Procurement Supervisor (Japanese): 1 person

・Resident Procurement Supervisor shall be sent to Tajikistan in time for the arrival of the Equipment at the target facility.

・Resident Procurement Supervisor shall confirm acceptance of the Equipment by the target facility, the Equipment delivered, and the entire installation work including numerical inspections of the Equipment; and supervise initial operation training and works involved in the delivery.

3) Inspection Engineer (Japanese): 2 persons

・Inspection Engineer shall be sent to Tajikistan once a year for a total 3 times, for the purpose of continuing procedures for CMC every 3 years.

・ For the planned equipment under the Project, CT, Angiography system, ventilator, endoscope related equipment, etc. are subject to CMC or AMC. For equipment, inspection engineer shall be sent to confirm whether service is appropriately provided before expiration of manufacturer's warranty period and every 3 years. If any defect is found, Inspection Engineer shall instruct the manufacturers or the Supplier to perform maintenance services.

・For equipment procurement, Inspection Engineer shall be present at various inspections including confirmation of drawings, and act as a liaison to contribute to ensuring the quality and work schedule without delay.

2-2-4-5 Quality Control Plan

(1) Equipment to be procured

The Project shall procure medical equipment that confirms to JIS, CE, and FDA. The equipment must be manufactured at factories that meet ISO13485, a quality control management standard for medical equipment, or factories that comply with GMP[10], GQP[11] or other standards set forth under the Pharmaceutical Affairs Act,[12] if the equipment is Japanese product. Together with these standards, local agents shall be selected in comprehensive consideration of sales performance to public medical facilities, stock of spare parts and consumables, the number of well-trained service engineers and other factors.

[10] It is an abbreviation of Good Manufacturing Practice that means quality assurance standard of medicine.
[11] It is an abbreviation of Good Quality Practice that means quality assurance standard of medicine.
[12] When it was revised in November 2013, it was renamed to "Law concerning the quality, effectiveness and safety of pharmaceuticals, medical devices, etc."

(2) Materials and Equipment

The following matters shall be taken into account to secure and confirm the quality of materials and equipment to be procured by the Supplier.

① Pre-shipment inspections shall be conducted on major materials and equipment
② Temporary storage for materials and equipment before they are delivered to the final destinations on site shall be confirmed.
③ The storage shall be a place unaffected by rainfall and sunlight.
④ Containers shall be used to prevent deterioration of the products.

2-2-4-6 Procurement Plan

(1) Country of Origin of the Equipment

The Equipment shall be procured principally in Japan or Tajikistan. However, some of the equipment shall be procured from third countries, if they fall under any of the following 6 conditions:

(i) Equipment which is not manufactured in Japan.
(ii) Equipment is manufactured in Japan, but competition in the bidding will not be effective if the country of origin is confined to Japan, and thus it is highly unlikely to be able to secure a faire bidding process.
(iii) Equipment which is considerably expensive because of the transport or other costs if the country of origin is confined to Japan, and thus has no economic rationality.
(iv) Equipment that there is a possibility that sufficient maintenance will be difficult because, for example, there is no local agent in Tajikistan
(v) Equipment which has to be procured urgently, or there are any other unavoidable reasons.
(vi) There is no manufacturer's local agent of the equipment in Tajikistan or neighboring countries (Kazakhstan, Turkey and Russia), and it will be impossible to appropriately and continuously maintain them.

(2) Countries to procure Spare Parts

Spare parts made in Japan and third countries shall be procured, for which sales agents are available in Tajikistan, and which can be regularly and easily procured in the market in Tajikistan. If there is no local agent in Tajikistan, spare parts of manufacturers which have agencies in neighboring countries (Kazakhstan, Turkey, and Russia) shall be procured.

(3) Transport of the Equipment

Among the procured equipment from overseas, Japanese products have been landed at the Lianyungang port in China from the sea route, transported on land via. Kazakhstan, Kyrgyzstan, etc., then cleared at Dushanbe customs in Tajikistan. For third country's products, after collecting cargo in Germany, those are passed through Poland, Belarus, Russia, Kazakhstan and Uzbekistan, then cleared at Dushanbe customs in Tajikistan and then transported to the target facilities.

2-2-4-7 Initial Operation Training, Operational Training

For setting of the Equipment and installation work, the Supplier shall make arrangements to send engineers to the target facility through manufacturers of the medical equipment or their local agents, and the engineers shall conduct initial training (including guidance on maintenance) for the equipment.

2-2-4-8 Soft Component Plan

The Project shall provide the technical guidance in the soft components for the use and maintenance of the equipment to the end-users such as specialized doctors, nurses, maintenance department, "MedTechnika" technicians so that the Equipment will be smoothly and continuously operated. The soft component plan is summarized as follows.

① Practical guidance on preventive maintenance such as managing equipment operational condition, repair record, etc. by using individual equipment management sheets and confirming proper operation and appearance according to the check items of daily check sheets by appointing a person in charge of equipment management for each equipment,
② Technical transfer on formulation of maintenance management plan shall be made so that appropriate maintenance methods according to the actual usage of the equipment can be defined.
③ To provide technical guidance on how to monitor the influence of changes in temperature and humidity of advanced medical equipment (image diagnostic equipment, ME equipment used in the operation theatre such as ventilator), inspection and operation of the indoor temperature control method, cleaning, operation record, correspondence when equipment became malfunction etc.
④ To provide guidance for managing the repair history of the equipment and grasp the operation status of the equipment
⑤ To provide guidance how to establish a maintenance system centered on equipment management in charge etc.
⑥ To provide guidance how to formulate periodic replacement plan for equipment and guidance on budget planning method of systematic procurement of consumables and spare parts.

The soft component consists of 2 sessions. The first session shall be conducted immediately after delivery of the Equipment, and the second session 11 months after the first session.

The timing of the first session has been determined on the grounds that trainees will have just received initial and ordinary operation training from the Supplier. The training under the soft component is likely to be more effective if it is conducted immediately after they have gained certain knowledge about the equipment.

The second session shall be conducted about 11 months after the delivery on the assumption that trainees will have dealt with some diseases and repair and thus have got used to the equipment by then. It is also a good timing to see if they have smoothly procured consumables, so that it will be possible to see if they have appropriately used the equipment.

2-2-4-9 Implementation Process

The Project, if it is to be carried out as a grant aid project of the GoJ, shall follow the procedures given below after the signing and conclusion of an E/N and G/A.

(1) Detail Design and Bidding (3.5 months)

The Consultant shall conclude a consultancy agreement with the Tajikistan executing agency and create bidding documents (including technical specifications of the Equipment and design documents) while fully taking objectives and contents of the Detail Design into account. Based on these, the Consultant shall conduct a calculation of the Detail Design and obtain an approval of JICA for the predetermined bid price. Accordingly, the Consultant shall discuss with the Tajikistani executing agency and obtain its approval for the bidding documents.

After the bidding documents being approved, the Consultant shall act as a proxy of the executing agency to announce the bidder to Japanese trading companies. Then, the preparation period of 60 days shall be given to participants, and the competitive bidding shall be held in the witness of Tajikistan and Japanese personnel concerned. The bidders who offer the lowest price which is below the predetermined bid price and a proposal that is considered technically appropriate shall conclude a Supplier's Contract with the Tajikistani executing agency.

(2) Supervision of Procurement and Facility Rehabilitation (10.0 months)

Following the conclusion of the Supplier's Contract, the Supplier shall send their personnel to the target facility.

The equipment installation work shall be carried out while target facility is in service as usual. Thus, the safety control of facility users, storage of materials and equipment must be taken into account. At the same time, the efficiency of procurement work by personnel of the Consultant and the Supplier from Japan must also be secured. Accordingly, a total of 10.0 months shall be allowed for the procurement work. The equipment procurement shall take the following procedures.

1) Equipment Procurement

The Supplier shall conduct product inspections in its process and pre-shipment inspections at factories, and witness pre-shipment inspections by an inspection agency assigned by the Consultant to secure the quality of the equipment. The Consultant shall supervise these inspections. The equipment shall be shipped from Japan or third countries by the designated due dates. To meet the timing of arrival of the equipment at target facilities, personnel in charge of procurement management shall be sent to target facilities, and the installation work shall commence. Then, testing and commissioning shall be performed, and initial operation guidance shall be provided to medical personnel of target facilities who will actually operate the equipment. If assistance appears to be necessary from engineers of medical equipment manufacturers, the Supplier shall make arrangements. At the time of the delivery, the Consultant shall confirm a series of inspections and performance assurance for the procured equipment, and submit a completion certificate of to the Tajikistan side.

2) Supervision of Technical Assistance (Soft Component) (13.0 months)

Under the Project, the soft component shall be provided after the delivery and installation of the equipment, focusing on guidance on preventive maintenance skills for the equipment. The soft component consists of 2 sessions. The first session shall be conducted immediately after the delivery of the equipment, and the second session 11 months after the first session. The sessions will continue for about 20 days and 14 days respectively, in total around 1 month.

For the soft component, the Consultant shall select trainees, provide assistance to preparation of instruction guidance and coordinate duties involved.

As a summary of the above-mentioned procedures, the Project implementation schedule is presented as follows. The total project term shall be 27.0 months.

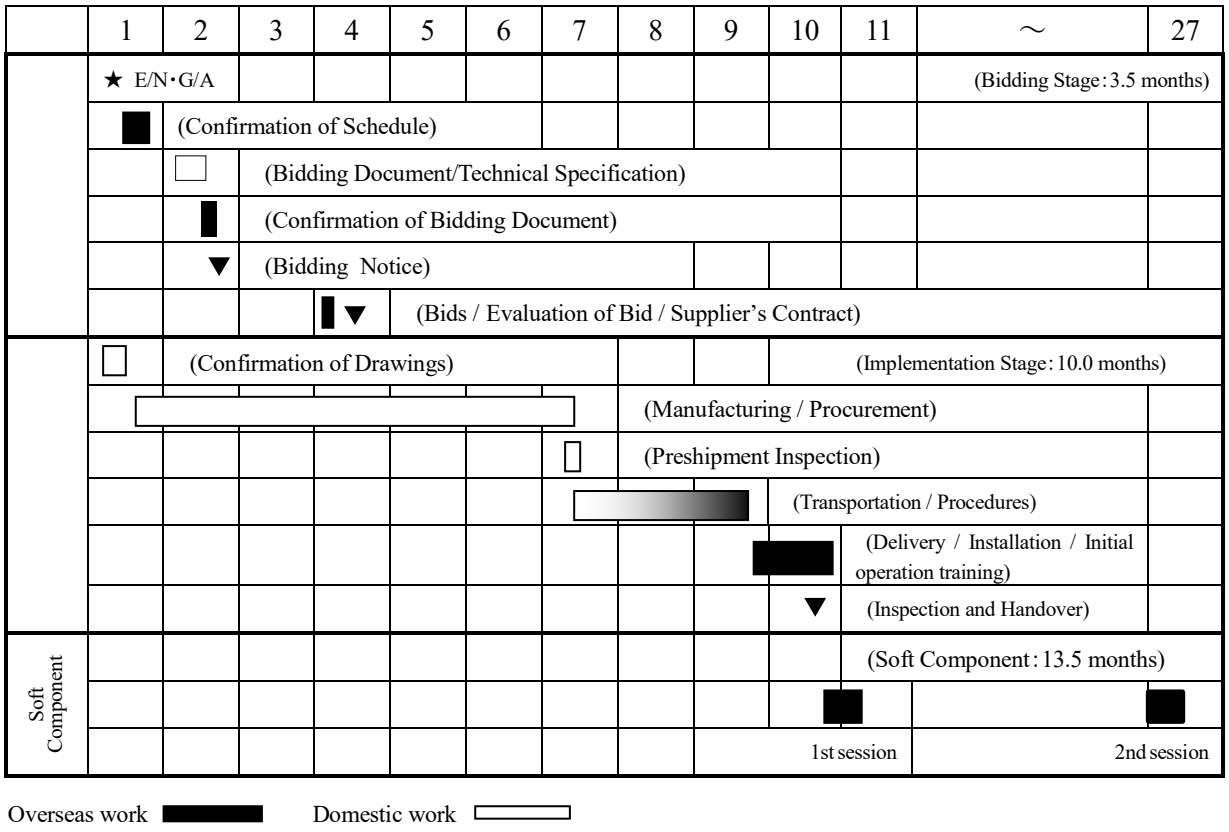


Figure 2-6 Implementation Schedule

2-3 Obligation of Recipient country

The Tajikistan side shall assume the following obligations involved in the Project implementation.

(i) To pay fees for B/A and A/P.
(ii) To remove existing equipment to be replaced with the equipment to be procured under the Project.
(iii) To complete arrangements for necessary infrastructure (power outlets, circuit breaker, water supply and drainage, etc.) before the installation of the equipment.
(iv) To provide any convenience that facilitates the procedures for the landing, customs clearance, inland transport of materials and equipment to be imported for the Project.
(v) To secure routes to bring in materials and equipment, and provide safe space to provisionally store them.
(vi) To arrange exemption from customs duties, VAT and other domestic taxes on the procurement of materials and equipment, labor and other goods and services involved under the Project.
(vii) To provide any convenience necessary for Japanese and other people from third countries to stay in Tajikistan for the Project implementation, and secure the security of these people.
(viii) To secure necessary budgets and personnel (medical personnel, etc.) so that the Equipment and facility provided and rehabilitated under Japan's Grant Aid project will be appropriately and effectively utilized and maintained. It shall conclude maintenance contracts with local agents of the medical equipment that particularly requires special skills for maintenance.
(ix) To regularly report to the GoJ on the state of use and maintenance of the equipment and facility to be provided and rehabilitated under Japan's Grant Aid project.
(x) To bear all the necessary expenses other than those covered by Japan's Grant Aid project.

Of the obligations above, works to be carried out by the recipient country are listed in the following table.

Table 2-10 Obligations of the Recipient Country

Name of Target Facilities	Installation equipment	Overview of obligations	Deadline
National Medical Center	CT	Removal of existing equipment	2 months before introduction/installation of the equipment
	General X-ray and fluoroscopy unit	Removal of existing equipment	Before delivery/installation of the equipment
	High pressure steam sterilizer M High pressure steam sterilizer L	Removal of existing equipment	Before delivery/installation of the equipment
Cardiovascular Surgery Center	Angiography system	Removal of existing equipment	2 months before delivery /installation of the equipment

2-4 Project Operation and Maintenance Plan

The equipment to be improved under the Project is operated, maintained and managed by the target facilities, but securing new personnel is not necessary. For operation and maintenance, it shall be done in the following way. Regarding ① and ②, technical guidance will be given in the soft components under the Project.

① Preventive maintenance activities through daily check

Before using the equipment, perform daily checks on appearance and operating conditions of each equipment by using daily check sheet. In addition, frequency of use per day, presence or absence of any defects and necessity of repair and other information about individual equipment shall be managed, and the equipment shall be inspected once a day. This will help to prevent severe malfunction and failure.

② Ensuring to conclude maintenance contract

For advanced medical equipment such as image diagnostic equipment that requires maintenance by manufacturer's certified engineers, in consideration with the specifications and maintenance costs, it is necessary to conclude CMC or AMC with the manufacturer's local agents.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

According to the cost estimation shown in the following (2), the breakdown of expenses based on the Tajikistan scope of works is estimated as follows. Note that this estimated project cost does not reflect on the amount of grant upper limit on E/N.

(1) Estimated Cost to be borne by Tajikistan side

Table 2-11 Estimated Cost to be Borne by Tajikistan side

Obligations	Estimated expenses (Unit: TJS)	Japanese yen (thousand yen)	Remarks
Removal of existing equipment	162	1959	Whole body CT scanner, Angiography system, General X-ray and fluoroscopy unit, High pressure steam sterilizer etc.
Fee for B/A	40.53	490	Fee for A/P (0.05%)
Total	202.53	2449	

Exchange rate: TJS to JPY (1TJS＝12.09 円)[13]

(2) Cost Estimation Condition

- Time of estimation: April 2018
- Exchange Rate: 1US Dollars =109.22 yen, 1€＝134.64 yen
- Procurement period: As shown in the Implementation Schedule
- Others: The Project shall be carried out under Japan's Grant Aid scheme.

[13] Access on June 2018 1TJS＝12.09JPY https://www.oanda.com/lang/ja/currency/converter/

2-5-2 Operation and Maintenance Cost

(1) Maintenance contract fee

Among the planned equipment under the Project, CT and Angiography system shall be procured with CMCs, ventilator and endoscopes and other diagnostic equipment shall be procured with AMCs. The Project intends to conclude the CMCs or the AMCs for 2 years after the expiry of the manufacturers' warranty periods of these devices, but afterwards the Tajikistan side must conclude these CMCs or AMCs at its own expense for appropriate maintenance. The maintenance contract cost of the equipment at both facilities is estimated to be 1,568 thousand TJS (18,957 thousand yen) annually.

Table 2-12　Estimated cost for annual maintenance contract fee

①National Medical Center

Unit: Thousand TJS

Contract and Contents	Target equipment	Q'ty	Annual maintenance fee		Remarks
			Unit	Amount	
CMC Contents：Periodic check, on-call corrective maintenance, replacement of spare parts free of charge	CT	1	324	324	*1
AMC Contents：Periodic check and On-call corrective maintenance	Ventilator	17	12	204	*1
	High Pressure Steam Sterilizer	2	32	64	*1
	Gastroscope video system	2	28	56	*1
	Colonoscope	2	28	56	*1
	Bronchoscope Video system	2	28	56	*1
	Duodenoscope for ERCP	1	32	32	*1
	Lithotripter ultrasonic	1	243	243	*1
	Biochemistry analyzer	1	12	12	*1
	Hematology analyzer	1	12	12	*1
	ELISA system	1	15	15	*1
	Ultrasound scanner for ophthalmology	1	15	15	*1
	Phacoemulsifier	1	17	17	*1
	Surgical C-arm X-ray unit	1	24	24	*1
	Mobile X-ray unit	1	24	24	*1
	General X-ray and fluoroscopy unit	1	49	49	*1
Total (annual)				1,203 (14,544 thousand JPY)	

*1 Maintenance contract fee for 3 years for the National Medical Center after handover is borne by the Project.

②Cardiovascular surgery center

Unit: Thousand TJS

Contract and Contents	Target equipment	Q'ty	Annual maintenance contract fee		Remarks
			Unit	Amount	
CMC Contents : Periodic check, on-call corrective maintenance, replacement of spare parts free of charge	Angiography system	1	365	365	*2
Total (Annual)				365 (4,413 thousand JPY)	

*2 Maintenance contract fee for 3 years for Cardiovascular Surgery Center after handover is borne by the Project.

The maintenance contract fee for the target facilities required from the fourth year is estimated at 1,203 thousand TJS (14,544 thousand yen) at the National Medical Center and 365 thousand TJS (4,413 thousand yen) at the Cardiovascular Surgery Center.

(2) Maintenance cost

The annual expenses for procurement of test reagents, consumables and spare parts necessary for proper use and appropriate maintenance of the equipment under the Project are shown in the following table. (Details are shown in Annex 7-1) On the other hand, maintenance cost of the equipment to be replaced under the Project has been already financed by the annual budget of target facilities. Therefore, the additional maintenance cost required for the implementation of the Project shall be only fort the consumables of medical equipment classified as "new supplementary equipment" in the table. While 131.8 thousand TJS (about 1,593 thousand) is estimated for the National Medical Center, 68.9 thousand TJS (about 833 thousand yen) annually is estimated for the cardiovascular surgery center. Finally, the total of 2 facilities will be 200.7 thousand TJS (about 2,426 thousand yen).

Table 2-13　Annual maintenance costs to be procured under the Project

① National Medical Center

Unit: thousand TJS

Category	Name of Equipment	Annual necessary amount
For Replacement of existing equipment	Ventilator for adult Ventilator for pediatrics Ventilator for OT High Pressure Steam Sterilizer Ultrasound Scanner, Doppler Ultrasound Scanner Surgical C-arm X-ray unit Mobile X-ray unit General X-ray and fluoroscopy unit Spirometer Biochemistry analyzer	**259.2** **(3,134 thousand JPY)**
For Newly procured or Supplementary procured equipment	CT Hematology analyzer ELISA system Lithotripter ultrasonic	**131.8** **(1,593 thousand JPY)**
Total Annual Maintenance Cost		**391.0** **(4,727 thousand JPY)**

② Cardiovascular surgery center

Unit: thousand TJS

Category	Name of Equipment	Annual necessary amount
Newly procured or Supplementary Procured equipment	Angiography system	**68.9** **(833 thousand JPY)**
Total Annual Maintenance Cost		**68.9** **(833 thousand JPY)**

For details, refer to the end of the document

Estimated condition：
・Assuming that the number of patients are same as of now
・Do not assume price escalation
・Consumables cost is estimated as distribution price in local market

【Cost estimation of medical materials】

Various medical materials such as a guide wire, a balloon, a stent, etc. are required for cardiovascular catheter examination and treatment using an Angiography system to be procured for the Cardiovascular Surgical Center. Currently, the Cardiovascular Surgery Center received donations

from private companies and buy large quantities of materials from local agents at a low price. If the Center procures on the same route in the future, assuming that the prices of these medical materials are not affected by inflation, the cost of medical materials required per patient will be 1,151 TJS (about 13,916 yen)[14]. It is expected that 1,772 patients will be diagnosed and treated 3 years after handover of the equipment. An increase in expenditure on medical material expenses based on the demand forecast is calculated as follows.

Table 2-14 Medical material cost newly required at Cardiovascular Surgery Center

No. of patients received in 2017 ①	Expected No. of patients 3 years after the Project ②	Material cost/person	Increased cost of materials (②－①) x material cost
886 persons	1,772 persons	1,151TJS	1,020 thousand TJS (12,332thousand JPY)

(3) Calculation of operation and maintenance costs

Based on the estimation results up to the preceding paragraph, the annual increase in operation and maintenance costs, which is the minimum amount required after the Project implementation, will be estimated as 1,220.7 thousand TJS (about 14,758 thousand yen) including maintenance contract fee, consumables, and medical materials. Target facilities are required to take following budgetary steps. 131.8 thousand TJS (approx. 1,593 thousand yen) at the National Medical Center, 68.9 thousand TJS (approx. 833 thousand yen) for the consumables cost and 1,020 thousand TJS (12,332 thousand yen) for the medical materials cost at the Cardiovascular Surgery Center.

From the fourth year onwards, since the maintenance contract borne by Japan's Grant Aid projects will expire, as the maintenance contract fee, 1,203 thousand TJS (approx. 14,544 thousand yen) at the National Medical Center 365 thousand TJS (approx. 4,413 thousand yen) at the Cardiovascular Surgery Center are newly required. In addition, as a cost of equipment consumables, 131.8 thousand TJS (approx. 1,593 thousand yen) at the National Medical Center, 68.9 thousand TJS (approx. 883 thousand yen) at the Cardiovascular Surgery Center are newly required. Also, at the Cardiovascular Surgery Center, budget measures of 1,020 thousand TJS (12,332 thousand yen) are required as medical material costs.

On the revenue side, the budget from the MoHSPP to the National Medical Center increased by 9.76% on average from 2015 to 2018. And special budget consisting of paid medical fee increased by 9.5% on average from 2015 to 2018. In particular, the special budget has increased by 22% from 2017 to 2018 (refer to Table 2-15). The budget from the MoHSPP to the Cardiovascular Surgery Center increased on average 8.83% between 2015 and 2018. Moreover, the special budget consisting of paid medical fees tends to increase by 6.6% on average from 2015 to 2018. In particular, the special budget increased by 12% from 2017 to 2018 (refer to Table 2-16).

[14] 1,020 thousand TJS which was medical material cost of Cardiovascular Surgery Center in 2017 / 886 cases which was the number of diagnosis and treatments in 2017 = 1,151.24TJS

Table 2-15 Income Details: National Medical Center

Unit: thousand TJS

Item	2015	2016	2017	2018 (Approximate request)
MoHSPP budget (compared with previous year)	19,117	20,932 (9.5%+)	24,083 (15%+)	25,228 (4.8%+)
Special budget (from paid medical fee)	11,457	12,373 (8%+)	12,178 (1.5%-)	14,870 (22%+)
Total	30,573 (369,627thousand JPY)	33,306 (402,670 thousand JPY)	36,261 (438,395 thousand JPY)	40,098 (484,785thousand JPY)

Source：Annual activity report of National Medical Center 2015-2017

Table 2-16 Income Details: Cardiovascular Surgery Center

Unit: thousand TJS

Item	2015	2016	2017	2018 (Approximate request)
MoHSPP budget (compared with previous year)	5,882	5,149 (12%-)	5,494 (6.7%+)	5,921 (7.8%+)
Special budget (from paid medical fee)	2,200	2,309 (4.9%+)	2,375 (2.9%+)	2,661 (12%+)
Total	8,082 (97,711 thousand JPY)	7,458 (90,167thousand JPY)	7,869 (95,136thousand JPY)	8,582 (103,756 thousand JPY)

Source：Annual activity report of Cardiovascular Surgery Center 2015-2017

Regarding the operation and maintenance costs that should be borne by the target facilities based on the revenue in 2017, approx. 0.36% (131.8 thousand TJS ÷ 36,261 thousand TJS) of the income at the National Medical Center, 0.87% (68.9 thousand TJS ÷ 7869 thousand TJS) of income at the Cardiovascular Surgery Center will be increased as an expenditure about 3 years after the Project implementation.

From the fourth year onwards 4 years, 3.68% (1,334.8 thousand TJS ÷ 36,261 thousand TJS) of income at the National Medical Center, 18.47% (1,453.9 thousand TJS) ÷ 7869 thousand TJS) of income at the Cardiovascular Surgery Center will increase as an expenditure.

The paid medical fee that can be expected at the present is shown in Table 2-17 below.

Table 2-17　Estimated paid medical fee

① National Medical Center

Name of examination	Current No. of examination (2017) *1	Estimated No. of examination 3 years after the Project	Increase No. of examination	Unit fee*2 (Unit: TJS)	Expected increase amount (Unit：TJS)
CT	1,198 *3	3,000	1,802	145	261,290
Endoscope	5,761	7,289	1,528	50 *4	76,400
Laparoscope	1,538	3,138	1,600	15	24,000
Arthroscope	0	1,100	1,100	1,500	1,650,000
Cysto-Urethroscope	0	1,000	1,000	1,508	1,508,000
General X-ray and Fluoroscopy unit	8,388	12,000	3,612	10	36,120
Lithotripter	0	477	477	1,383	659,691
Biochemistry test	34,770	41,724	6,954	20 *5	139,080
Hematology test	27,836	38,970	11,134	15	167,010
ELISA test	11,487	13,784	2,297	20 *6	45,940
Total					4,567,531 (55,221 thousand JPY)

② Cardiovascular Surgery Center

Name of examination	Current No. of examination 2017	Estimated No. of examination 3 years after the Project	Increase No. of examination	Unit fee (Unit：TJS)	Expected increase amount (Unit：TJS)
Catheter diagnosis and treatment	886	1,772	886	2,034	1,802,124
Total					1,802,124 (21,788 thousand JPY)

*1 Source：Hospital statistics *2 Source：Tariff chart of public medical facilities　*3 Performance in 2015(after this year, it became fully malfunctioned)

*4 The endoscopic examination differs depending on the site, but here, the average value of the examination fee is used

*5*6 It is assumed that one patient will be examined in 4 items. (Examination fee for 1 item =5TJS x 4 items＝20 TJS)

In trial calculations, it is expected that the medical fees, 4,568 thousand TJS (about 55,221 thousand yen) for the National Medical Center and 1,802 thousand TJS (about 21,788 thousand yen) for the Cardiovascular Surgery Center will increase 3 years after the provision of equipment under the Project. The increase is about 3.4 times that of 1,334.8 thousand TJS, which is needed as maintenance costs at the National Medical Center, and about 1.24 times that of 1,453.9 thousand TJS, which is needed as maintenance costs at the Cardiovascular Surgery Center.

The introduction of minimally invasive surgery shortens the length of hospital stay and improves bed turnover rate so that more patients can be treated than before. Therefore, there is no problem in securing operation and maintenance costs. Regarding the cardiovascular surgical center, as the number of catheter examinations and treatments increases, the procurement quantity of medical material also increases, so it is assumed that the materials can be procured at a lower price than at present.

From the above, the increase in operation and maintenance costs related to the implementation of the Project is relatively small compared to the total income (the MoHSPP budget + special budget) of the facilities, and it is expected an increase in each facility. Thus, it is judged that there is no particular problem will arise.

CHAPTER 3
PROJECT OF EVALUATION

Chapter 3 Project Evaluation

3-1 Preconditions

In the implementation of the Project, Tajikistan will implement the Project assignments described in "2-3 Obligation of Recipient Country" at the appropriate timing before or during the procurement period. This is an important prerequisite for the smooth progress of the entire project process.

3-2 Necessary Inputs by Recipient Country

In order to develop and maintain the effectiveness of the Project, the Tajikistan side should implement the following items.

- Procurement of consumable items, replacement parts, pharmaceuticals, medical materials etc. necessary for maintaining and managing procured medical equipment.
- Secure medical professionals and technicians who make appropriate and effective use and maintenance of equipment procured under the Project.
- After completing the free warranty period of the procured medical equipment, conclude a maintenance agreement with the manufacturer's local distributor, and carry out continuous stable maintenance and management.

3-3 Important Assumptions

In order to develop and maintain the effectiveness of the Project, the following external conditions need to be satisfied.

- The Tajikistan government will continue its long-term strategy "NDS 2016-2030".
- Ministry of Health and Social Protection will continue "NHS 2010-2020".
- Secure a budget size equal to or larger than that of 2017 from the MoHSPP.
- Continue the paid medical care cost system enforced from 2010 and secure special budget.

3-4 Project Evaluation

The Project is relevant for implementation as Japan's Grant Aid project in points shown below.

3-4-1 Relevance

(1) Focus of project beneficiaries

Beneficiaries (patients), users of the National Medical Center and the Cardiovascular Surgery Center are both adults and pediatric patients. These National Centers are advanced and specialized medical care centers in Tajikistan, furthermore they could be the only medical centers in this country providing diagnosis and treatment for complicated diseases and injuries. The Project's contribution ensures quality of medical services for citizens nationwide, and solves health issues the country faces. Therefore, the implementation of the Project is deemed highly relevant.

(2) From a Human Security Standpoint

Tajikistan is located in geopolitical key area in the region, which is connected with Asia, Europe, Russia and the Middle East. Therefore, the stability of Tajikistan is important to the stabilization of Central Asia and Eurasia region, and is also important for international society's efforts toward stability and self-sustained development in neighboring Afghanistan. At the same time, the national income in Tajikistan has been the lowest level among the Commonwealth Independent States (CIS) countries, and Tajikistan faces huge challenges such as poverty reduction and social service provision including medical service. Thus, the implementation of the Project is significant from a human security standpoint.

(3) Contribution to achieving Tajikistan's mid to long term development targets

The Project contributes to the achievement of the goals set forth in "NDS (Expected results for health care and longevity)", "NHS" and "Strategy for prevention and control of NCDs and injuries" by strengthening medical services provided by the National Medical Center and the Cardiovascular Surgery Center.

(4) Consistency with Global Goals

The outcomes expected through the implementation of the Project are consistent with Sustainable Development Goals (SDGs), "reduce premature mortality from NCDs" and "achieve UHC".

3-4-2 Effectiveness

The following quantitative and qualitative impacts are expected from the implementation of the Project.

(1) Quantitative effects

After implementation of the Project, quantitative indicators shown in Table 3-1 are set as expected outputs of the improvement of quality of medical services provided at the National Medical Center and the Cardiovascular Surgery Center, target facilities of the Project. These indicators represent achievement of the Project objective.

Table 3-1 Quantitative Effects

Target facility	Indicators	Unit	Baseline in 2017 [Actual value]	Target value in 2023 [Three years after project completion]
National Medical Center	1. Number of CT examination	Cases/year	1,198 (2015)	3,000
	2. Number of examinations with a general X-ray and fluoroscopy unit	Cases/year	8,388	12,000
	3. Number of treatments with lithotripter ultrasonic	Cases/year	0	477
Cardiovascular Surgery Center	4. Number of cases of angiography and angioplasty	Cases/year	886	1,772

Source: Created by the survey team

[Indicator 1: Number of CT examinations (cases)]

The CT provided by Japan's Grant Aid in 2006 had been operating in the National Medical Center until 2016. As a result of aging, the number of examinations was only about 1,200 cases from 2015 to 2016 due to functional deterioration. At that time, the demand for CT examination was estimated around 2,000 cases including patients from the cancer center in the National Medical Center. However, the number of actual examinations was about 60 % due to malfunction. As the renewed CT is the 64 multi-slice type, it is possible to perform detailed examinations for stroke and cancer patients. In addition to 2,000 examinations by the existing model, high function model can handle about 1,000 cases. Therefore, it will be possible to do about 3,000 examinations per year.

10 examinations per day × 300 days (working days excluding public holidays) = 3,000 examinations

[Indicator 2: Number of examinations with a general X- ray and fluoroscopy unit (cases/year)]

One equipment provided in 2006 is operational in the pediatric department of the National Medical Center's building No. 9. However, as it is difficult for this equipment to take a series of X-rays due to reduced functionality, it took only a total of 28 photographs in general X-ray images and fluoroscopic images out of 50 per day. In addition, the equipment was non-operational for about 20 days due breakdown in 2017. It makes the service worse in pediatric department and pediatric patients need to be refer to the adult department. The original demand was approx. 40 cases a day for general X-ray and fluoroscopic imaging such as chest, stomach and urinary tract. By introducing new equipment under the Project, and if it works continuously, the number of examinations is expected to increase by about 43%.

40 examinations per day × 300 days (working days excluding public holidays) = 12,000 examinations

[Indicator 3: Number of treatments with lithotripter (ultrasonic type) (cases/year)]

Urinary tract disease is the fifth main disease of hospitalized adults (995 patients in 2017) and the sixth of hospitalized pediatric patients (770 in 2017) at the target facility. Among them, since the prevalence rate of urolithiasis is high and less invasive equipment is not yet installed; high-risk treatment of abdominal operation is adopted for the disease, which also increases the mortality rate. The "lithotripter ultrasonic" planned under the Project will provide less invasive treatment services for urolithiasis patients, who account for 25 to 30% of patients with urinary tract diseases. A trial calculation of treatments using lithotripter for adult and pediatric patients is as follows. Since most of urolithiasis pediatric patients are to be treated by less invasive methods, assuming that they account for a maximum 30 % of annual cases using the equipment.

Number of annual treatments using lithotripters (adult) 995×25%	= 248.75 (about 249)
Number of annual treatments using lithotripters (pediatric) 760×30%	= 228
Total	= 477

[Indicator 4: Number of Angiography and Angioplasty (cases/year)]

In the Cardiovascular Surgery Center, 886 cases of catheter examinations and treatments were performed in the catheter treatment room in 2017. This includes 80 cases of catheter diagnoses, 502 cases of coronary angiography, 83 cases of peripheral angiography (total of 665 exams), 6 cases of peripheral vascular stenting, 190 cases of coronary artery stenting, 190 cases of coronary artery stenting, 20 intravascular treatment of patients with congenital heart disease and 5 cases of peripheral angioplasty (total of 221 treatments). As the center has been conducting examinations and treatments with one unit of equipment, it is insufficient for the number of patients with cardiovascular disease who need examination or treatment. Patients wait for examination or treatment for about one month to three months at the longest. Hence, serious patients are forced to seek and receive expensive treatment in private institutions.

The introduction of new equipment under the Project results in a total of two units It is expected that the number of patients will increase, and the number of examinations and treatments will double from the current average of 3 cases per day to 6 cases per day.

2 units of Angiography system × (catheter examination and treatment results in 2017: 886 cases) = 1, 772 cases

Increasing cases of cardiovascular catheter diagnostic and treatment for patients gathered from across the country leads to the fulfillment of cardiovascular treatment in the country's advanced and specialized medical facilities. Therefore, this outcome indicator is appropriate.

(2) Qualitative Effects

Expected qualitative effects of the Project are as shown in Table 3-2. Questionnaire survey will be conducted among local residents using the facilities where the Project implemented, as well as medical students and physicians who receive trainings at those facilities after the Project.

Table 3-2 Qualitative Effects

1. The introduction of the equipment under the Project will improve the quality of medical services, which the advanced and specialized medical facilities provide, as well as enhance the reliability of the target facilities.
2. The introduction of equipment at target facilities, which play the role of teaching institutions, increases number of diagnosis and treatment carried using latest medical equipment, and enables the provision of diverse cases, thereby enhancing training contents for physicians and medical students working in the hospitals.

APPENDICES

1. Member List of the Study Team

2. Study Schedule

3. List of Parties Concerned in the Recipient Country

4. Minutes of Discussions (M/D)

5. Soft Component Plan

6. References

7. Other materials / information

Appendix 1. Member List of the Survey Team

(1) Field Survey I (12th of March – 14th of April, 2018: 34 days)

	Name	Position	Organization
JICA	Tatsuya ASHIDA	Team Leader	Health Team 4, Health Group 2 Human Development Dept.
	Mitsuo ISONO	Technical Adviser	Senior Advisor
	Masato MATSUNO	Cooperation Planning	Health Team 4, Health Group 2 Human Development Dept.
Consul-tant	Yasuko ASANUMA	Chief Consultant / Equipment Planning 1	Binko International Ltd.
	Shinichi KIMURA	Deputy Chief / Equipment Planning 2	Binko International Ltd.
	Yusuke ICHIMASA	Procurement Planning / Cost Survey 1	Koei Research and Consulting co., Ltd.
	Toshitsugu MATSUMURA	Facility Planning	Binko International Ltd.
	Keiko KOBAYASHI	Health Planning	Koei Research and Consulting co., Ltd.
	Kenji SAWAI	Coordinator	Binko International Ltd.

(2) Explanation of Draft Final Report (23rd of August – 1st of September, 2018: 10 days)

	Name	Position	Organization
JICA	Mitsuo ISONO	Team Leader	Senior Advisor (Health Sector)
	Yukari MAEDA	Cooperation Planning	Health Team 4, Health Group 2 Human Development Dept.
Consul-tant	Yasuko ASANUMA	Chief Consultant / Equipment Planning 1	Binko International Ltd.
	Shinichi KIMURA	Deputy Chief / Equipment Planning 2	Binko International Ltd.
	Kenji SAWAI	Coordinator	Binko International Ltd.

Appendix 2. Survey Schedule

(1) Field Survey I　(12th of March – 14th of April, 2018: 34 days)

No	Date		JICA Mitsuo ISONO Tatsuya ASHIDA Masato MATSUNO	Project Manager Equipment planning-1	Equipment planning-2	Equipment procurement /Cost estimation	Facilities planning	Health planing
				Yasuko Asanuma	Shinichi Kimura	Yusuke Ichimasa	Toshitsugu Matsumura	Keiko Kobayashi
1	2018/3/12	Mon		Dep. Narita⇒Seoul⇒Almaty				
2	2018/3/13	Tue		Almaty⇒ AM Arr. Dushanbe Courtesy visit JICA Tajikistan office Health and Social Protection Ministry visit / discussion Meeting with Local Consultant				
3	2018/3/14	Wed		National Compound of Tajikistan "Shifobakhsh" (Explanation of Inception Report / Check itinerary) National medical equipment maintenance center, Medtechnika Hearing survey on medical equipment				
4	2018/3/15	Thu		National Compound of Tajikistan "Shifobakhsh" Hearing survey on medical equipment / ambulances		Dep. Narita⇒Seoul⇒Almaty		
5	2018/3/16	Fri		No.51 Dushanbe Municipal Emergency Clinic Hospital, No.52 Maternity Hospital No.1 Hearing survey on Ambulances		Almaty⇒AM Arr. Dushanbe No.52 Maternity Hospital No.1 Hearing survey on Ambulances（Same as PM / Equipment plannig)		
6	2018/3/17	Sat		National Compound of Tajikistan "Shifobakhsh" Hearing survey on Pediatric Dep, Ob/Gy Dep			National Compound of Tajikistan "Shifobakhsh" Hearing survey on Medical facilites	National Compound of Tajikistan "Shifobakhsh" Hearing survey on budget, etc
7	2018/3/18	Sun		DRS, No.4 Tursunzoda city ,No5 Shahrinav Hearing survey on Ambulances, Survey methods meeting (Project team and Local consultant team)			Internal Meeting / Documentation	
8	2018/3/19	Mon		Dep. Dushanbe⇒Khujand DRS, No.9 Varzob Soghd Oblast, No.64 Ayni, No.66 Shahriston Hearing survey on Ambulances (Halt at Khujand)	Dep. Dushanbe⇒Darvoz DRS, No.8 Nurobod No.13 Sangvor (Tavildara) GBAO, No.63 Darvoz Hearing survey on Ambulances (Halt at Darvoz)	Hearing survey on medical equipment manufacturer's local agencies	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Medical facilites planinig	National Compound of Tajikistan "Shifobakhsh" Baseline survey (Survey on Emergency Health care sevices)
9	2018/3/20	Tue		Soghd Oblast No.47 Spitamen No.58 Soghd Region Hospital No.44 Khujand city Hearing survey on Ambulances (Halt at Khujand)	Dep.Darvoz⇒Khorugh GBAO Oblast, No.55 GBAO Region Hospital GBAO, No.60 Khorog city Hearing survey on Ambulances (Halt at Khorugh)	Hearing survey on local forwarder insurance company	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Medical facilites, Water Supply and Drainage System	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Health care services
10	2018/3/21	Wed		Soghd Oblast No.49 Mastchoh No.65 Zafarobod Hearing survey on Ambulances (Halt at Khujand)	GBAO, No.61 Ishkoshim Hearing survey on Ambulances (Halt at Khorugh)	National Medical Compound "Shifobakhsh" Hearing survey on Medical equipment	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Medical facilites, Water Supply and Drainage System	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Health care services
11	2018/3/22	Thu		Soghd Oblast No.43 Konibodom No.39 Bobojon Ghafurov Hearing survey on Ambulances (Halt at Khujand)	Dep.Khorugh⇒Darvoz GBAO, No. 62 Rushon No.59 Vanji Hearing survey on Ambulances (Halt at Darvoz)	National Compound of Tajikistan "Shifobakhsh" Meeting/ discussion(Estimation of renovation cost etc.)		National Compound of Tajikistan "Shifobakhsh" Baseline survey (Survey on Emergency Health care sevices)
12	2018/3/23	Fri		Dep. Khujand⇒Dushanbe Soghd Oblast No.48 J.Rasulov Hearing survey on Ambulances	Dep.Darvoz⇒Dushanbe DRS, No.2 Vahdat Hearing survey on Ambulances	Hearing survey on medical equipment manufacturer's local agencies	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Medical facilites, Water Supply and Drainage System	National Compound of Tajikistan "Shifobakhsh" Additional baseline survey (Survey on Health care sevices)
13	2018/3/24	Sat		No.53 Maternity Hospital No.2 No.54 Maternity Hospital No.3 Hearing survey on Ambulances		Hearing survey on local forwarder insurance company, survey on customs related circumstances at local forwarder company	National Compound of Tajikistan "Shifobakhsh" Meeintg on renovation plan draft	Same as PM / Equipment plannig-1
14	2018/3/25	Sun		Internal Meeting / Documentation				
15	2018/3/26	Mon		Dep. Dushanbe ⇒Qurghonteppa Khatlon Oblast No,56 Khatlon Region (Qurghonteppa) Hospital No.14 Bokhtar No.31 Qurghonteppa city Hearing survey on Ambulances （Halt at Qurghonteppa）	Dep. Dushanbe ⇒Kulob city Khatlon Oblast No.57 Khatlon Region (Kulob) Hospital No.15 Kulob city No.16 Vose Hearing survey on Ambulances （Halt at Kulob city）	Ministry of Finance, Hearing survey on tax exemption Hearing survey on local forwarder insurance company, survey on equipment procurement and maintenance ability of medical equipment manufacturer's local agencies	National Compound of Tajikistan "Shifobakhsh" Hearing survey on construction site and MRI/CT installation location	Same as PM / Equipment plannig-1
16	2018/3/27	Tue		Dep. Qurghonteppa ⇒ Dushanbe Khatlon Oblast No.36 Sarband city No.24 Danghara Hearing survey on Ambulances, Meeting with JICA Technical Cooperation Project Team ,	Khatlon Oblast No.30 Muminobod No.35 Khovaling Hearing survey on Ambulances （Halt at Kulob city）	Dep. Dushanbe ⇒ ⇒ Almaty Hearing survey on medical equipment manufacturer's local agencies	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Medical facilites, Water Supply and Drainage System	Same as PM / Equipment plannig-1
17	2018/3/28	Wed		Internal Meeting / Documentation	Dep. Kulob city ⇒Dushanbe Khatlon Oblast No.38 Baljuvon No,34 Norak city Hearing survey on Ambulances	Hearing survey on medical equipment manufacturer's local agencies	National Compound of Tajikistan "Shifobakhsh" Hearing survey on Medical facilites, Water Supply and Drainage System	Health and Social Protection Ministry Hearing survey on Emergency Health care sevices, Implementation structure relevant policies
18	2018/3/29	Thu	Dep. Narita⇒Seoul⇒Almaty	National Compound of Tajikistan "Shifobakhsh" Hearing survey on National Medical Center(Radiology dep, Laboratory dep), Republican Specialized Center(Cardiology/Oncology)		Hearing survey on local forwarder insurance company, survey on customs related circumstances at local forwarder company	National Compound of Tajikistan "Shifobakhsh" Additional Survey on Medical facilites, Water Supply and Drainage System	Health and Social Protection Ministry Survey of healthcare system etc
19	2017/3/30	Fri	Almaty⇒Arr.Dushanbe PM: Internal Metting	Survey of other donner (WB, WHO, KfW) Survey of Dushanbe fire work station		Dep. Almaty ⇒Seoul	Survey on construction related laws and regulations(Radiation protection provision, Electromagnetic wave regulation etc.)	Same as PM / Equipment plannig-2
20	2017/3/31	Sat	Health and Social Protection Ministry visit / discussion Survey of Similar facilities in Dushanbe city (Municipal Isitis hospital)			⇒Arr. Nrita	Survey for private hospital	
21	2017/4/1	Sun	Internal Meeting / Documentation				Dep. Dushanbe ⇒ Almaty	
22	2017/4/2	Mon	Survey for National Compound of Tajikistan "Shifobakhsh"				Almaty⇒Seoul⇒Arr.Narita	

No	Date		JICA Mitsuo ISONO Tatsuya ASHIDA Masato MATSUNO	Project Manager Equipment planning-1	Equipment planning-2	Equipment procurement /Cost estimation	Facilities planning	Health planing
				Yasuko Asanuma	Shinichi Kimura	Yusuke Ichimasa	Toshitsugu Matsumura	Keiko Kobayashi
23	2017/4/3	Tue	Dushanbe City Clinical Hospital of Emergency Medical Aid Maternity Hospital No.1(No.52) Hearing survey on medical equipment and ambulances		Survey of Similar Facilities (International Clinic Ibn Sina, Survey on medical services and its situations)			
24	2017/4/4	Wed	Minutes of Discussions					
25	2017/4/5	Thu	Meeting with JICA Technical Cooperation Project Team	National Compound of Tajikistan "Shifobakhsh" Hearing survey on National Medical Center(Radiology dep, Laboratory dep), Republican Specialized Center(Cardiology/Oncology)				
26	2017/4/6	Fri	Minitu of signing Interime report for JICA Tajikistan office					
27	2017/4/7	Sat	Internal Meeting / Documentation	Survey of other donner (USAID etc) Additional survey on Dushanbe Municipal Emergency Clinic Hospital				
28	2017/4/8	Sun	Dep. Dushanbe ⇒ Almaty	Internal Meeting / Documentation				
29	2017/4/9	Mon	Almaty⇒Seoul⇒Arr.Narita	Additional survey on National Compound of Tajikistan "Shifobakhsh"				
30	2017/4/10	Tue		National Compound of Tajikistan "Shifobakhsh" Hearing survey on hospital maintenance, Meeting on soft component				
31	2017/4/11	Wed		Additional survey on Health and Social Protection Ministry, Confirmation of Implementation Structure				
32	2017/4/12	Thu		Confirmation of hospital finance etc, Finalization of technical note				
33	2017/4/13	Fri		Dep. Dushanbe ⇒ Almaty				
34	2017/4/14	Sat		Almaty⇒Seoul⇒Arr.Narita				

PM: Project Manager
KfW: Kreditanstalt für Wiederaufbau
WB: World Bank
WHO: World Health Organization

(2) Explanation of Draft Final Report (23rd of August – 1st of September, 2018: 10 days)

			Mission Members from JICA		**Consultant Team**	
			Mitsuo ISONO	Yukari MAEDA	Yasuko ASANUMA	Shinich KIMURA
			Team Leader	Cooperation Planning	Chief Consultant / Equipment Planner 1	Equipment Planner 2
23-Aug	Thr				Departure from Narita - Incheon - Almaty Stay at almaty	
24-Aug	Fri	AM			Arrival at Dushanbe	
		PM			Sama as JICA member Data collection from MoHSPP or target facilities	
25-Aug	Sat	AM			Courtesy call for MoHSPP WHO for emergency medical services	
		PM			National Medical Center Cardiovascular surgery center	
26-Aug	Sun		PM:Arrival at Dushanbe Internal meeting with consultant		AM: Preparation of MM Russian version or other documents PM: Internal meeting with JICA members	
27-Aug	Mon		Explanation of Minutes of Discussion		AM: National Medical Center for detail explanation of technical spec PM: Explanation / Discussion of Minutes	
28-Aug	Tue		Explanation of Minutes of Discussion Signing of Minutes of Discussion		Sama as JICA member Data collection from MoHSPP or target facilities	
29-Aug	Wed		AM: Reporting to EOJ / JICA Tajikistan office PM: back to Japan		AM: Reporting to EOJ / JICA Tajikistan office PM: Cardiovascular surgery Center for detail explanation of technical spec	
30-Aug	Thu		Arrival in Japan		National Medical Center for detail explanation of technical spec Local agent survey	
31-Aug	Fri				Dushanbe - Almaty - Incheon	
1-Sep	Sat				Inchon - Narita	

EOJ: Embassy of Japan
MOHSPP: Ministry of Health and Social Protection of Population
MM: Minutes of Meeting
WHO: World Health Organization

Appendix 3. List of Parties Concerned in the Recipient Country

1. Ministry of Health and Social Protection of Population

Name	Position
Dr. Nasim OLIMZODA	Minister
Mrs. Zulfiya Azizova	Senior expert, Sanitary and Epidemiological Department for Emergency Situations and Emergency Care
Mr. Marufov Ashurmat	Deputy director, Department of pharmacy and procurement of medical goods under the MOH
Dr. Mahmudzoda Isfandiyor	Head, Department of Reforms, PHC, and International Relations
Ms. Rano Rahimova	Head of International Relation Unit, Department of Reforms, PHC, and International Relations
Mr. Abdurakhimov Jumakhon	Head of department, Department of Transport under the MOH
Mr. Rakhmatuloyev Sherali	Head of department, Maternity and pediatric healthcare and planning
Mr. Sharipov Shaidullo	Head of department, Department for organizational medical services delivery
Mr. Dilorom Sodiqova	First Counselor of the Minister

2. National Medical Center

Name	Position
Dr. Khayotzoda Nurkhon	General Director
Dr. Sharipov Khairullo Samaridinivich	First Deputy Director
Dr. Giyosov Kholnazar Amonovich	Deputy Head pediatric surgery
Dr. Khomidov Maruf Gadoyevich	Deputy head on surgery
Dr. Rakhmatova Rukhshona	Head of Pediatric reanimation
Dr. Shamseeloyev Imatullo	Head of Pediatric somatic reanimation, intensive therapy Dep
Dr. Nozon Abdurakhmon	Head of Newborn therapy
Dr. Sharipev Asbar	Head of Pediatric abdominal
Dr. Nidoyev Bakhtiyoz	Head of Functional diagnostic
Dr. Sharipor shokiz	Head of Pediatric Pulmonology
Dr. Saidjauolov Komil	Head of Pediatric Ophthalmology
Dr. Chariyev Shukhrat	Head of Neurosurgical pediatric
Dr. Rakhmonov Shokin	Head of Neonatal surgery
Dr. Khobov Qurbon	Head of Septic surgery
Dr.Tarifore Kholmurod	Head of Addition Pediatric Surgery
Dr. Dodojonav Yaldosh	Head of Operation Block
Dr. Yabboron Sukhrof	Head of Urology Dep, Pediatric
Dr. Dzhuraev Alim	Head of Pathology

3. Cardiovascular Surgery Center

Name	Position
Dr. Rahmonov Jamahhon	General Director
Dr. Shamsidin Burhonov	Cardiac surgeon
Dr. Shamsidin Yurayev	Intervention cardiologist

Appendix 4. Minutes of Discussions (M/D)

(1) Field Survey

(2) Explanation of Draft Final Report

(1) Field Survey

Minutes of Discussions
on the Preparatory Survey for
the Project for Improvement of Medical Equipment
at the National Medical Center
and the Cardiovascular Surgery Center

Based on several preliminary discussions between the Government of the Republic of Tajikistan (hereinafter referred to as "Tajikistan") and Japan International Cooperation Agency (hereinafter referred to as "JICA") Tajikistan Office, JICA dispatched the Preparatory Survey Team for Outline Design (hereinafter referred to as "the Team") on the Project for Improvement of Medical Equipment at the National Medical Center and the Cardiovascular Surgery Center (hereinafter referred to as "the Target Hospitals") to Tajikistan, headed by Mr. Tatsuya ASHIDA, Director, Health Team 4 Human Development Department, JICA, from March 30th to April 8 2018.

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, April 6th 2018

Mr. Tatsuya ASHIDA
Leader, Preparatory Survey Team
Japan International Cooperation Agency

Mr. Nasim OLIMZODA
Minister
Ministry of Health and Social Protection of the Population

ATTACHMENT

1. Objective of the Project

   The objective of the Project is to improve medical services through provision of medical equipment to the National Medical Center and the Cardiovascular Surgery Center, thereby contributing to improve the quality of medical service in Tajikistan

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 Medical Equipment at the National Medical Center and the Cardiovascular Surgery Center".

3. Project Site

   Both sides confirmed that the sites of the Project are the National Medical Center and the Cardiovascular Surgery Center which are shown in Annex 1.

4. Responsible authority for the Project

   The Tajikistan side and the Team confirmed that the Ministry of Health and Social Protection of the Population (hereinafter referred to as "MoHSPP") will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). 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.

5. Items Requested by Tajikistan

   5-1. As a result of discussions, both sides confirmed that the items requested by the Government of Tajikistan are shown in Annex 3.

   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 before the appraisal of the Project, which is scheduled in July, 2018.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Tajikistan side agreed that the procedures and basic principles of Japanese Grant as described in Annex 4 shall be applied to the Project.

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 April 13th 2018.

7-2. An official request to the Government of Japan will be submitted before July, 2018.

7-3. JICA will prepare a draft Preparatory Survey Report in English and Russian and dispatch a mission to Tajikistan in order to explain its contents around September 2018.

7-4. If the contents of the draft Preparatory Survey Report is 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 first half of 2019.

7-5. The above schedule is tentative and subject to change.

8. Other Relevant Issues

8-1. Selection Criteria for Medical Equipment

Equipment puts high priority for selection with following points.

a) Diagnostic imaging equipment
b) Equipment which enables less invasive diagnosis/treatment
c) Equipment used in operation theatre and Intensive Care Unit
d) Clinical laboratory equipment

8-2. Tax Exemption and Custom Clearance

The Tajikistan side will take necessary measures 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.

8-3. Removal of Existing Equipment

The Tajikistan side agreed to remove the existing CT and general X-ray and fluoroscopy unit in the National Medical Center and the Angiography in the Cardiovascular Surgery Center through appropriate measures in a timely manner to prepare the suitable places where the new equipment is to be installed.

8-4. Operation and Maintenance of the Equipment

The Both sides agreed on the importance of operation and maintenance of the equipment for ensure sustainability of the equipment use and its utility. Based on this consideration,

a) Maintenance Service Contract

The Both sides agreed that the importance of maintenance service contract for major equipment to be procured. The varieties of maintenance services covered by the contract will be decided depending on the risk and necessary cost of repair for each of the equipment.

b) Maintenance Budget

The Tajikistan side agreed to secure enough budgets for operation and maintenance cost of the equipment which are not covered by the maintenance service contract incorporated in the Project. The budgets are allocated by MoHSPP and each of the Target Hospitals. The detail of the maintenance budget which shall be allocated by Tajikistan side is as follows;

1) Maintenance budget after expiring Comprehensive Maintenance Contract (CMC) as for the equipment with CMC;
2) Necessary budget for the purchase of spare parts and consumable and the maintenance budget after expiring Annual Maintenance Contract (AMC) as for the equipment with AMC covered by the Grant Aid;
3) Necessary budget for the maintenance after warranty period as for the equipment without maintenance contract.

c) Maintenance Structure and System

The Tajikistan side confirmed that maintenance for the equipment will be implemented through trained technical staffs of the Target Hospitals in collaboration with local state enterprises responsible for maintenance and repair.

8-5. Soft Components and Operational Trainings

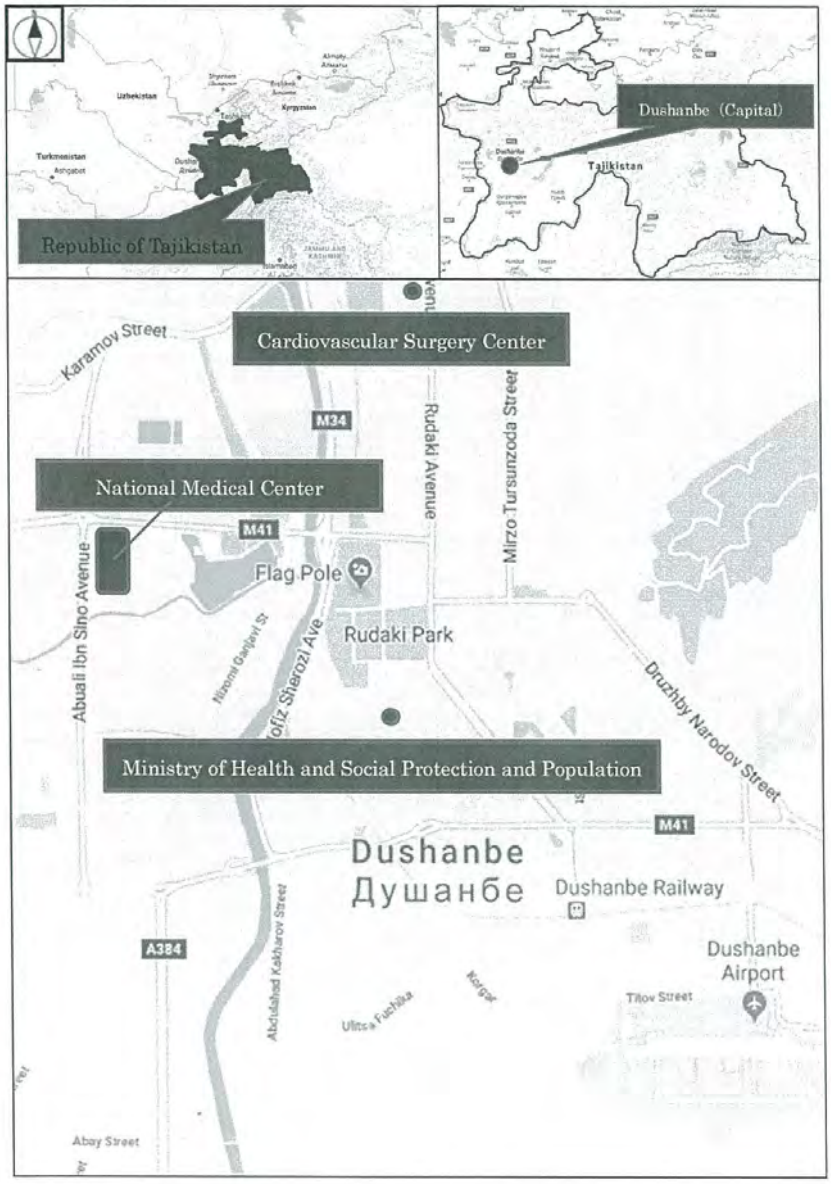
The Tajikistan side took note of the importance of maintenance activities for equipment to be newly provided and request to consider to incorporate soft components into the Project. The Team agreed to plan to include preventive and routine maintenance as soft components which will be provided by the consultant. It is also confirmed that the operational trainings for equipment will be provided by the suppliers.

8-6. Survey results for Water Supply Facilities

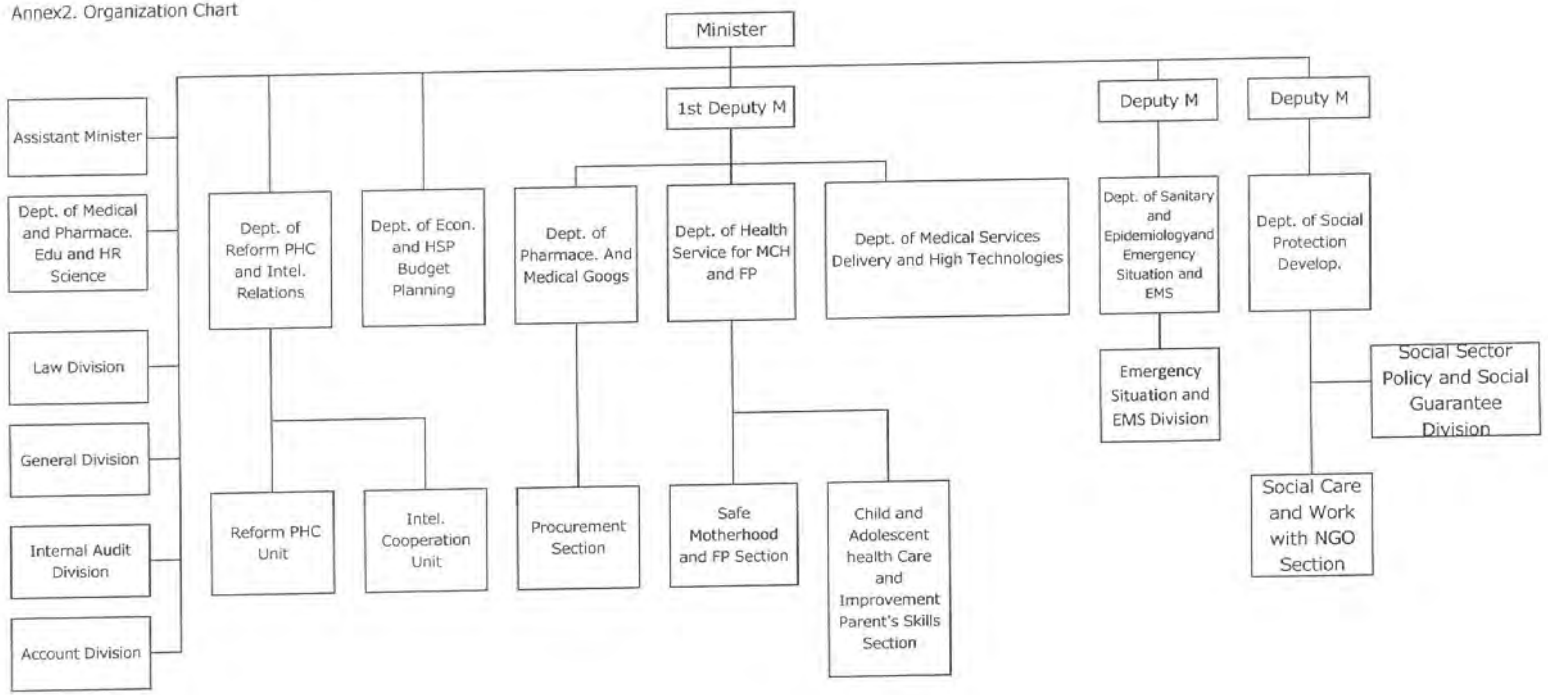
Both side agreed that the Team is conducting a basic survey upon the water supply facilities at the Medical Compound "Sifobakhsh" and plans to develop an improvement plan for water supply facilities and report the result to Tajikistan side within Preparatory Survey Report to be submitted.

Annex 1. Project Site
Annex 2. Organization Chart
Annex 3-1. Requested Items from the National Medical Center
Annex 3-2. Requested Items from the Cardiovascular Surgery Center
Annex 4. Japan's Grant Aid
Annex 5. Major Undertakings to be taken by the Government of Tajikistan

Annex 1. Project Site



Annex2. Organization Chart



Annex3-1 Requested items from National Medical Center

No.	Description Eng.	Q'ty	Priority
1	Ventilator for adult	6	A
2	Ventilator for pediatrics	2	A
3	Ventilator for OT	9	A
4	Autoclave for CSSD	2	A
5	Laparoscope for OT (adult)	1	A
6	Laparoscope for OT (pediatrics)	1	A
7	Laparoscope for admission(adult)	1	A
8	Bronchoscope, Video system for adult	1	A
9	Bronchoscope, Fiber pediatrics	1	A
10	Bronchoscope, Video system for pediatrics	1	A
11	Colonoscope fiber, adult	1	A
12	Colonoscope video system for adult	1	A
13	Colonoscope pediatrics	1	A
14	Colonoscope video system for pediatrics	1	A
15	Gastroscope video system for adult	1	A
16	Gastroscope video system for pediatrics	1	A
17	Duodenoscope for ERCP with accessories for adult	1	A
18	Cabinet for fiberscope, UV lamp	1	A
19	Ultrasound Scanner, Doppler	1	A
20	Ultrasound Scanner, General	3	A
21	Defibrillator	4	A
22	Operation Light	4	A
23	Neurosurgery set	2	A
24	Microtome Rotary	1	A
25	Tissue Processor	1	A
26	CT scanner with UPS	1	A
27	Surgical C-arm X-ray unit	1	A
28	Mobile X-ray Apparatus, w/ X-ray Shield Apron	1	A
29	General and Fluroscopy,X-ray Apparatus with UPS(for PC part)	1	A
30	Arthroscope adult	1	A
31	Ultrasound unit for opthalmology	1	A
32	Device for cleaning instruments with ultrasound	1	A
33	Apparatus for determining external respiration	2	A
34	Audiometer for infant up to one yaer	1	A
35	Urethoroscope adults	1	A
36	Urethroscope pediatrics	1	A
37	Biochemistry analyzer	1	A
38	Hematology analyzer	1	A
39	ELISA system	1	A
40	Blood gas analyzer	1	A
41	Hemodialysis machine	2	A
42	H2O2 sterilizer	2	A
43	Plasma phoresis	1	A
44	Phacoemolsifier	1	A
45	ENT surgery and endoscope set	2	A
46	General orthopedic surgical set	3	A

No.	Description Eng.	Q'ty	Priority
47	Surgical set	5	A
48	Arthroscope pediatrics	1	A
49	Lithotriptor ultrasonic	1	A
50	Operating microcope for opthalmology	1	A
51	Infant incubator	4	B
52	Patient Monitor	27	B
53	Infusion Pump	5	B
54	Syringe Pump	5	B
55	Suctuion Unit, general	3	B
56	Suction Unit, OR	11	B
57	Laparoscope for admission(pediatrics)	1	B
58	Bronchoscope, Fiber adult	1	B
59	Gastroscope fiber, adult	1	B
60	Gastroscope fiber pediatrics	1	B
61	Hot Air Sterilizer	9	B
62	Opthalmoscope	3	B
63	Paraffin Bath	1	B
64	Coagulator	1	B
65	Traumatology set	2	B
66	Binocular Lamp of Neurosurgeon	2	B
67	Slit Lamp	1	B
68	Electrosurgical unit	5	B
69	ENT Combination	1	A
70	Rheoencephalography	2	B
71	Laboratory refrigerator	2	B
72	Thermostat	2	B
73	Impedance meter	2	B
74	Electric drill	3	B
75	Orthopedic table	4	B
76	Gips cutter, electric (for fixing: metal plate with screw holes)	10	B
77	Retractor and fixation for abdomen and tracho	3	B
78	Negatoscope	1	B
79	Gips table	2	B
80	Operating table	4	B
81	Centrifuge	1	B
82	Binocular microscope	1	B
83	Cystoscope set adult	1	B
84	Cystoscope set pediatrics	1	B
85	Cell saver	1	B
86	Training doll for surgial procedure	1	B

Priority A: High priority is given as planned equipment.
B: Further analisys is required in Japan

Quantity : Might be changed during analysis in Japan

Annex3-2 Requested Items from Cardio Vascular Surgery Center

No.	Description	Q'ty	Priority
1	Angiography sysem single plane	1	A
2	Ultrasound scanner with TEE probe	1	B
3	IABP(Intra-aortic baloon pumping) system	1	B
4	Ventilator for neonate/infant	6	B
5	Ventilator for adult	6	B
6	Hemodialysis macine	1	B
7	Heart lung machine	1	B

Priority A: High priority is given as planned equipment.
B: Further analisys is required in Japan
*Above mentioned list is in priority order.

Quantity : Might be changed during analysis in Japan

Annex 4. Japan's Grant Aid

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 Table "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 (hereinafter referred to as "the E/N")
- 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

Table "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 E/N and the G/A which will be signed before approval by GoJ	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.

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 singed between the GOJ and the

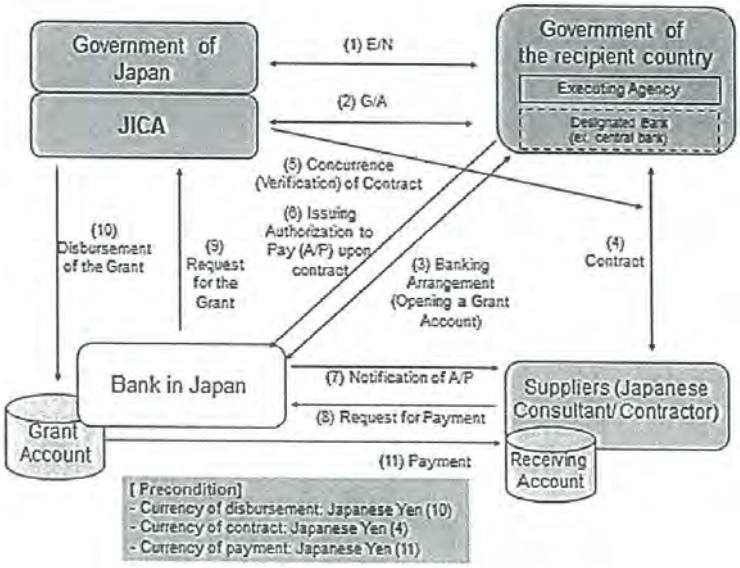
Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and 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 Figure "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.

Figure "Financial Flow of Japanese Grant (A/P Type)"



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) Objective of monitoring and evaluation

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) Implementation of Ex-post monitoring and evaluation

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) 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.

4) Export and Re-export

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

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
1	To open bank account (B/A)	within 1 month after the signing of the G/A	MOF	
2	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract	MoHSPP	

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

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after the signing of the contract(s)	MoHSPP	
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A			
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	MoHSPP	
	2) Payment commission for A/P	every payment	MOF	
3	To accord Japanese nationals 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	MoHSPP	
4	To ensure prompt customs clearance and to assist the Supplier(s) with internal transportation in recipient country	during the Project	MoHSPP	
5	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	MoHSPP	
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	MoHSPP	

7	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within one month after completion of each work	MoHSPP	
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	MoHSPP	
	3) To submit a report concerning completion of the Project	within six months after completion of the Project	MoHSPP	
8	1) To take appropriate measures for removal of existing CT , and general X-ray and fluoroscopy unit in the National Medical Center and Angiography in the Cardiovascular Surgery Center to prepare the suitable space where the new equipment is to be installed	Before installment of equipment	MoHSPP	
	2) To assign new technical staffs to the Target Hospitals	Before installment of equipment	MoHSPP	

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost
1	To maintain and use properly and effectively the equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine and preventive maintenance/Periodic inspection	After completion of the installment	MoHSPP/ Target Hospitals	

(2) Explanation of Draft Final Report

Minutes of Discussions
on the Preparatory Survey
for
the Project for Improvement of Medical Equipment in the National Medical Center "Shifobahsh" and in the State Institution "Republican Scientific Center of Cardiovascular Surgery"
(Explanation on Draft Preparatory Survey Report)

On the basis of the discussions with the Government of Tajikistan (hereinafter referred to as "Tajikistan") from March 30 to April 8 2018 during a field survey, and the subsequent technical examination of the results in Japan, the Japan International Cooperation Agency (hereinafter referred to as "JICA") prepared a Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") on the Project for Improvement of Medical Equipment in the National Medical Center "Shifobahsh" and in the State Institution "Republican Scientific Center of Cardiovascular Surgery" (hereinafter referred to as "the Project").

In order to explain the Draft Report and to consult with the concerned officials of the Tajikistan side on its contents, JICA sent to Tajikistan the Preparatory Survey Team for the explanation of the Draft Report (hereinafter referred to as "the Team"), headed by Dr. Mitsuo ISONO, Senior Advisor, Human Development Department, JICA, and is scheduled to stay in Tajikistan from August 26 to 31, 2018. As a result of the discussions, the Tajikistan side and the Team confirmed the main items described in the attached sheets.

Dushanbe, August 30, 2018

Dr. Mitsuo Isono
Leader, Preparatory Survey Team
Japan International Cooperation Agency

Mr. Nasim OLIMZODA
Minister
Ministry of Health and Social Protection of the Population

ATTACHMENT

1. Objective of the Project

   The objective of the Project is to strengthen the capacity of diagnosis as well as treatment for medical services through provision of medical equipment to National Medical Center "Shifobahsh" (hereinafter referred to as "the National Medical Center") and in the State Institution "Republican Scientific Center of Cardiovascular Surgery" (hereinafter referred to as "the Cardiovascular Surgery Center"), thereby contributing to improve the quality of medical service in Tajikistan.

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 Medical Equipment in the National Medical Center "Shifobahsh" and in the State Institution "Republican Scientific Center of Cardiovascular Surgery".

3. Project Site

   Both sides confirmed that the sites of the Project are the National Medical Center and the Cardiovascular Surgery Center which are shown in Annex 1.

4. Executing Agency and Implementing Agency

   Both sides confirmed the executing agency and implementing agency as follows:

   4-1. The executing agency is Ministry of Health and Social Protection of the Population (hereinafter referred to as "MoHSPP"), which 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 timely manner.

   4-2. The implementing agencies are the National Medical Center and the Cardiovascular Surgery Center. The implementing agencies shall coordinate with the Executing Agency to ensure smooth implementation as well as monitoring of the Project and ensure the sustainable utilization of the equipment provided by the Project

The organization charts are shown in Annex 2.

5. Final items to be covered
After the discussion with the Team, the items described in Annex 3 were finally requested by the Tajikistan side.

6. Contents of the Draft Report
After the explanation of the contents of the Draft Report by the Team, the Tajikistan side agreed in principle to its contents.

7. Cost Estimation
The Tajikistan side and the Team confirmed that the Project cost estimation described in the Draft Report was provisional and would be examined further by the Government of Japan for its final approval.

8. Confidentiality of the Cost Estimation and Specifications
The Tajikistan side and the Team confirmed that the Project cost estimation and technical specifications in the Draft Report should never be duplicated or disclosed to any third parties until all the contracts of the Project are concluded.

9. Japan's Grant Aid Scheme
The Tajikistan side understands the Japan's Grant Aid Scheme and its procedures as described in Annex 4 and necessary measures to be taken by the Tajikistan side for smooth implementation of the Project, as a condition for the Japan's Grant to be implemented.

10. Undertakings by the Tajikistan Side and to be Covered by the Grant Aid
The Tajikistan side and the Team confirmed the undertakings described in Annex 5. The Tajikistan side assured to take necessary measures for the smooth implementation of the Project. It is further agreed that the costs are indicative. More accurate costs will be calculated at the Detailed Design stage. Contents of Annex 5 will be updated as the Detailed Design progresses, will be the Attachment to the Grant Agreement, and will finally be used in the contract document.

11. Project Implementation Schedule
The Team explained to the Tajikistan side that the expected implementation schedule is as attached in Annex 6.

12. Expected Outcomes and Indicators

Tajikistan side and the Team agreed that key indicators for expected outcomes are as follows. Tajikistan side has responsibility to monitor the progress of the indicators and achieve the target in year 2023.

(1) Quantitative Indicators

Target facility	Indicator name	Unit	Reference value (year 2017) [Actual value]	Target value (year 2023) [Three years after project completion]
Shifobahsh National Medical Center	1. Number of CT scans	Cases/year	1,198 (2015)	3,000
	2. Number of exams with a general X-ray and Fluoroscopic Imaging Equipment	Cases/year	8,388	12,000
	3. Number of treatments with lithotripter	Cases/year	0	477
Cardiovascular Surgery Center	4. Number of cases of coronary artery imaging	Cases/year	886	1,772

(2) Qualitative Indicators

1. Through the improvement of the equipment, the quality of medical services provided by the core medical facilities is enhanced, therefore, the reliability of the target facilities are improved.
2. Through the improvement of the equipment, the number of diseases that can be diagnosed and treated at the target facilities is increased and it enables to provide clinical training based on diverse cases as well as medical services as a teaching hospitals, therefore, the training contents for doctors and medical students in the target hospitals become enriched.

13. Technical Assistance ("Soft Component" of the Project)

To assure the sustainable operation and smooth utilization of the medical equipment procured, technical assistance to improve the skill of maintenance of the equipment

for target hospitals is to be implemented under the Project. The Tajikistan side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

14. Monitoring during the Implementation

The Project will be monitored and reported every 3 months by the executing agency using the Project Monitoring Report (PMR), as per attached in Annex 7.

15. Schedule of the Study

The Team will complete the Final Report of the Preparatory Survey in accordance with the confirmed items and send it to the Tajikistan side around January 2019

16. Other Relevant Issues

16-1. Tax Exemption and Custom Clearance

The Tajikistan side agreed to ensure that they will take necessary measures to ensure the exemption of 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.

16-2. Removal of Existing Equipment

The Tajikistan side agreed to remove the existing CT and general X-ray and fluoroscopy unit in the National Medical Center and the Angiography System in the Cardiovascular Surgery Center by appropriate measures before installation of the equipment.

16-3. Operation and Maintenance of the Equipment

The Both sides agreed on the importance of operation and maintenance of the equipment to ensure sustainability of the equipment use and its utility. Based on this consideration, following items were confirmed by both sides

a) Maintenance Budget

The Tajikistan side agreed to secure enough budgets for operation and maintenance of the equipment which are not covered by the maintenance service contract incorporated in the Project. The budgets, which is suggested in the Draft Report, should be allocated by MoHSPP and each of the target hospitals. The detail of the maintenance budget which shall be allocated by Tajikistan side is as

follows;

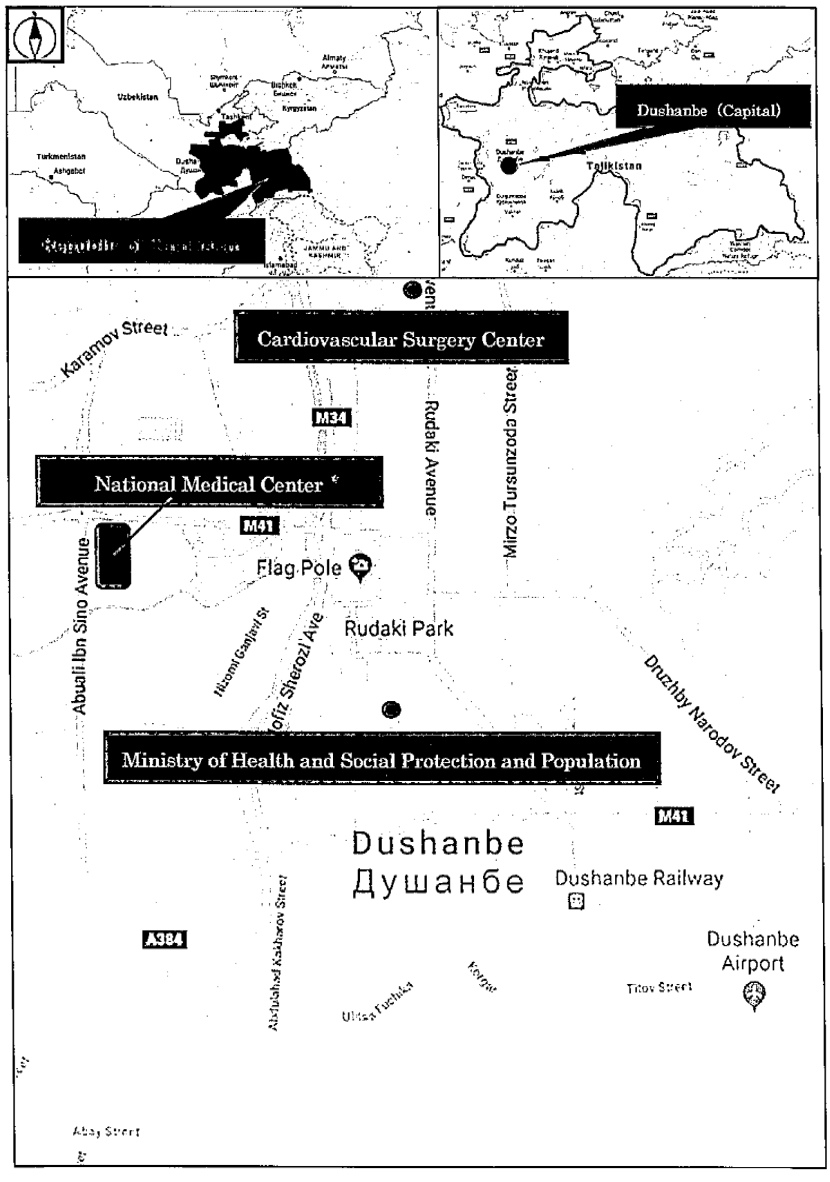
1) Necessary budget for the purchase of spare parts and consumable and maintenance service contract budget after expiring Comprehensive Maintenance Contract (CMC) as for the equipment with CMC;
2) Necessary budget for the purchase of spare parts and consumable and the maintenance service contract budget after expiring Annual Maintenance Contract (AMC) as for the equipment with AMC covered by the Grant Aid;
3) Necessary budget for the maintenance after warranty period as for the equipment without maintenance contract.

b) Maintenance Structure and System

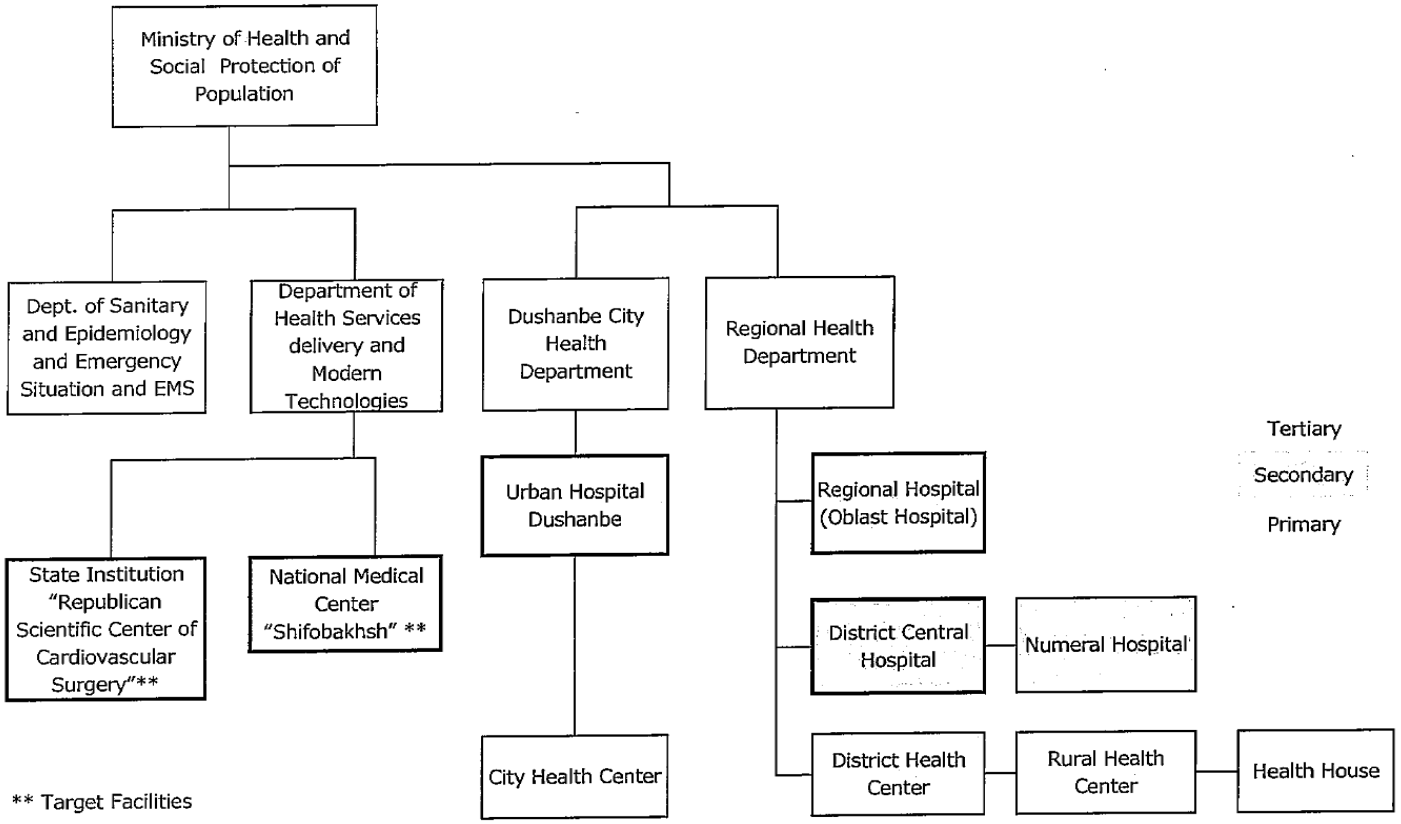
The Tajikistan side confirmed that maintenance for the equipment will be implemented through trained technical staff of the target hospitals in collaboration with local state enterprises responsible for maintenance and repair.

Annex 1. Project Site
Annex 2. Organization Chart
Annex 3. Equipment List
Annex 4. Japan's Grant Aid
Annex 5. Major Undertakings
Annex 6. Implementation Schedule
Annex 7. Project Monitoring Report

Annex 1. Project Site



Annex2. Organization Chart



** Target Facilities

Annex 3

Equipment List (National Medical Center)

No.	Target Facility	Description	Maintenance Contract	Q'ty
1	National Medical Center	Ventilator for adult	AMC	6
2	National Medical Center	Ventilator for pediatrics	AMC	2
3	National Medical Center	Ventilator for OT	AMC	9
4	National Medical Center	High Pressure Steam Sterilizer	AMC	2
5	National Medical Center	Laparoscope set for OT (adult)	-	2
6	National Medical Center	Laparoscope set for OT (pediatrics)	-	1
7	National Medical Center	Bronchoscope, Video system for adult	AMC	1
8	National Medical Center	Bronchoscope, Video system for pediatrics	AMC	1
9	National Medical Center	Colonoscope video system for adult	AMC	1
10	National Medical Center	Colonoscope video system for pediatrics	AMC	1
11	National Medical Center	Gastroscope video system for adult	AMC	1
12	National Medical Center	Gastroscope video system for pediatrics	AMC	1
13	National Medical Center	Duodenoscope for ERCP	AMC	1
14	National Medical Center	Cabinet for fiberscope, UV lamp	-	2
15	National Medical Center	Ultrasound Scanner, Doppler	-	1
16	National Medical Center	Ultrasound Scanner	-	3
17	National Medical Center	Defibrillator	-	4
18	National Medical Center	Operation Light	-	4
19	National Medical Center	Neurosurgery set	-	2
20	National Medical Center	Microtome Rotary	-	1
21	National Medical Center	Tissue Processor	-	1
22	National Medical Center	Whole body CT scanner	CMC	1
23	National Medical Center	Surgical C-arm X-ray unit	AMC	1
24	National Medical Center	Mobile X-ray unit	AMC	1
25	National Medical Center	General X-ray and Fluroscopy unit	AMC	1
26	National Medical Center	Arthroscope set	-	1
27	National Medical Center	Ultrasound Scanner for opthalmology	AMC	1
28	National Medical Center	Spirometer	-	2
29	National Medical Center	Audiometer for infant up to one yaer	-	3
30	National Medical Center	Cysto-Urethoroscope set (adults)	-	1
31	National Medical Center	Cysto-Urethroscope set (pediatrics)	-	1
32	National Medical Center	Biochemistry analyzer	AMC	1
33	National Medical Center	Hematology analyzer	AMC	1
34	National Medical Center	ELISA system	-	1
35	National Medical Center	Phacoemolsifier	AMC	1
36	National Medical Center	ENT surgery and endoscope set	AMC	2
37	National Medical Center	General orthopedic surgical set	-	3
38	National Medical Center	Surgical set	-	5
39	National Medical Center	Lithotripter ultrasonic	AMC	1
40	National Medical Center	Operating microcope for opthalmology	-	1
41	National Medical Center	ENT Treatment unit and Chair	-	1

Annex 3

Equipment List (Cardiovascular surgery center)

No.	Target Facility	Description	Maintenance Contract	Q'ty
42	Cardiovascular surgery center	Angiography system	CMC	1

* AMC includes any time on-call maintenance, repair for breakdowns, periodic check, but does not include cost of spare parts necessary for repair.

** CMC is called as full maintenance contract. This includes any time on-call maintenance, repair for breakdowns, periodic check, and cost of spare parts that require for frequent replacement.

Under the Project, in addition to one year warranty, costs of maintenance service contract for two years after warranty period are included.

Annex 4. Japan's Grant Aid

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 Table "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 (hereinafter referred to as "the E/N")
- 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

Table "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 E/N and the G/A which will be signed before approval by GoJ	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.

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of 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 singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by

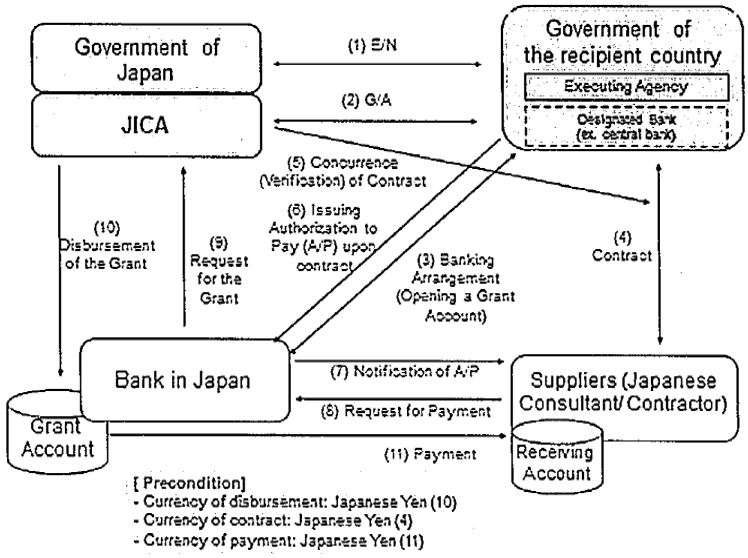
the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See Figure "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.

Figure "Financial Flow of Japanese Grant (A/P Type)"



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) Objective of monitoring and evaluation

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) Implementation of Ex-post monitoring and evaluation

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) 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.

4) Export and Re-export

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

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 Bidding

No.	Items	Deadline	In charge	Estimated Cost in TJS	Ref.
1	To open bank account (B/A)	3 month after G/A	MoHSPP (PHC) MOF	This part is closed due to the confidentiality	
2	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract	MoHSPP (PHC) MOF		
3	To submit Project Monitoring Report No. 1 (with the result of Detailed Design)	before preparation of bidding documents	MoHSPP (PHC)		

(B/A: Banking Arrangement, A/P: Authorization to pay)

(2) During the Project Implementation

No.	Items	Deadline	In charge	Estimated Cost in TJS	Ref.
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after the signing of the contract	MoHSPP (PHC) MOF	This part is closed due to the confidetiality	
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A		MoHSPP (PHC) MOF		
	1) Advising commission of A/P	within 1 month after the signing of the contract			
	2) Payment commission for A/P	every payment			
3	To ensure prompt customs clearance and to assist the Supplier(s) with inland transportation in recipient country	during the Project	MoHSPP (PHC)	-	the Draft Report
4	To accord Japanese nationals 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	MoHSPP (PHC)	As necessary	
5	To obtain import approval for procured equipment under the Project from Department of Medicine and Medical goods, MoHSPP	during the Project	MoHSPP (PHC)	-	
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	MoHSPP (PHC) MOF	-	the Draft Report
7	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the implementation of the Project	during the Project	MoHSPP (PHC)	As necessary	
8	To submit Project Monitoring Report No. 2 after the signing of contract	during the Project	MoHSPP (PHC)	-	

9	To remove existing equipment to be ready for installation of the equipment, especially Angiographies for Cardiovascular surgery center, and CT and General X-ray and Fluoroscopy unit for the National Medical Center	・Two months before the installation of the equipment provided by the Project as for CT and Angiographies ・Before the installation of the equipment provided by the Project as for General X-ray and Fluoroscopy	MOHSPP (PHC) and target facilities	162,000	the Draft Report
10	To submit Project Monitoring Report No. 3 after handover the equipment	during the Project	MoHSPP (PHC)	-	
11	To ensure that proper personnel, especially maintenance person dedicated to medical equipment will be allocated for utilizing equipment effectively including maintenance and safe operation training costs (daily allowance, transportation, lodging, etc.) for staff will be covered under the Project	during the Project	MoHSPP (PHC)	*	
12	To submit Project Monitoring Report No. 4(final)	within 2 weeks after the completion of technical trainings	MoHSPP (PHC)	-	

(PHC: Dept. of Reform PHC and Intel. Relations)

* The estimated costs to be borne by the Executing Agency will be calculated in the later stage.

(3) After the Project

No.	Items	Deadline	In charge	Estimated Cost in TJS	Ref.
1	To register the equipment provided under the Project	After completion of the Project	MoHSPP (PHC)	As necessary	
2	To maintain and use properly and effectively the equipment provided under the Grant 1) Allocation of operation and maintenance cost including medical material cost 2) Organization of operation and maintenance 3) Routine check/Periodic inspection 4) Spare parts and Consumables 5) Engagement of Maintenance Contract with concerned agents	After completion of the Project	MoHSPP (PHC)	· The National Medical Center up to 3rd year: 131,800 · 4th year and onwards: 1,334,800 (1,203,000+131,800) · The Cardiovascular surgery center up to 3rd year: 1,088,900 (68,900+1,020,000) · 4th year and onwards: 1,453,900 (365,000+68,900+1,020,000)	the Draft Report
3	To ensure that the maintenance and safe operation training costs for service staff are covered	After completion of the Project	MoHSPP (PHC)	As necessary	

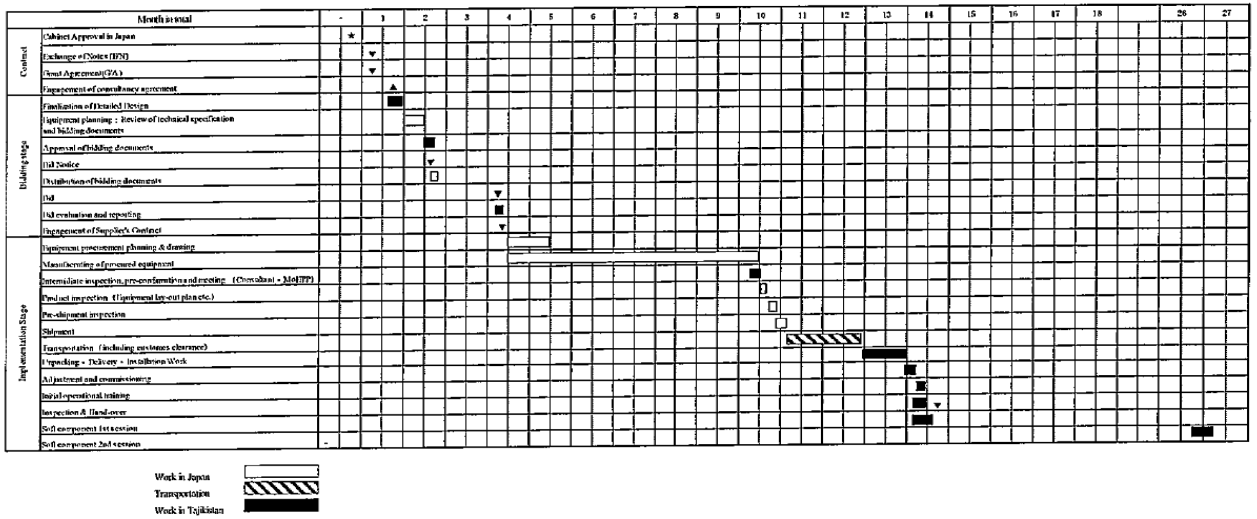
Major Undertakings to be Covered by the Japan's Grant Aid

No.	Items	Deadline	Cost Estimated (Million Japanese Yen)*
1	1) To provide equipment with installation, commissioning and training 2) To provide comprehensive maintenance services for the equipment	During the Project	This part is closed due to the confidentiality
2	To implement detailed design, tender support if any (Consultant)	During the Project	
3	Technical assistance as soft components, which will be provided by Japan's grant aid, for proper operation and preventive maintenance of the equipment.	During the Project	
	Total		

* The cost estimates are provisional. This is subject to the approval of the Government of Japan.

Annex 6

Project Implementation Schedule (tentative)
The Project for Improvement of Medical Equipment in the National Medical Center "Shifobahsh" and in the State Institution "Republican Scientific Center of Cardiovascular Surgery"



Annex 7
G/A NO. XXXXXXX
PMR prepared on DD/MM/YY

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
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:
Implementing Agency	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

1-1 Project Objective

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 *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	

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.

2-5 Project Cost

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

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	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 *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	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)*

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:
	Contingency Plan (if applicable):
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:
	Contingency Plan (if applicable):
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.

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.

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)

Attachment 6

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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Attachment 7

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%)	

Appendix 5. Soft Component Plan

Project on "Improvement of medical equipment in the National Medical Center "Shifobakhsh" and in the state institution "Republican Scientific Center of Cardiovascular Surgery".
Soft component plan

Binko International Co., Ltd.

1 Background for soft component plan

1.1 Outline of project plan

This project plan aims to improve medical equipment at the National Medical Center (formerly Diakov National Hospital) within the Shifobakhsh National Medical Center and cardiovascular surgery center which is one of the related medical centers, thereby improving the quality of health care services in the Republic of Tajikistan (hereinafter referred to as Tajikistan). The project plan to procure 42 medical equipment essential for diagnosis and treatment; An X-ray CT diagnostic device for whole body (hereinafter referred to as "CT"), diagnostic imaging equipment such as a blood vessel X-ray imaging equipment, endoscope, clinical examination equipment, etc. In addition to strengthening the diagnosis and treatment services to address issues such as non-communicable diseases that account for the top causes of death in the country, this project aims to upgrade some of the equipment in the Pediatrics department.

1.2 Current status and issues of the medical center

In the facilities targeted under this project, since the management system of individual equipment is not sufficiently established, there is a problem of equipment malfunction in the short period after its introduction[1], and the equipment is inactivity for a long time, hence the clinical activities cannot be performed during that time. In addition, since equipment defects are not discovered early and are found after the defects have become conspicuous, it takes time to repair or cannot be repaired and the equipment life is shortened.

There are no personnel in charge of maintenance and maintenance of medical equipment, and the maintenance of equipment is left to the operating personnel of each department (medical personnel who routinely operate equipment such as doctors, nurses, and co-medical (radiographers). Since the operators are shift workers, the maintenance of equipment is based on the individual knowledge of each person, there are variations in the management level, for example, the contents of daily inspection are not uniform. As a result, the signs of equipment malfunction cannot be found early, action is taken after a serious breakdown, resulting in major repairs and high maintenance costs. Another cause is the lack of protection and management measures for advanced medical equipment against changes in temperature and humidity. Rupture and damage of plumbing pipes due to aging occurs, and indoor heating cannot be maintained especially in the winter due to damage to the hot water supply pipes, or when hot water supply is stopped for repair. These repair cases occur three to four times a month, and each time the room temperature falls, condensation occurs. The metal part of the equipment rusts when the room temperature rises and falls repeatedly. Medical electronic equipment is vulnerable to condensation, and if condensation accumulates in the electronic circuits, the collection of dust, dirt etc. causes short circuit, abnormal current, etc. within

[1] As an example, the high-pressure steam sterilizer procured through own funds was not using soft water such as distilled water as feed water, silica became sluggish. For this reason, it takes time to repair, the annual working day is about 100 days, and the occupancy rate is about 27 to 30%. (From hospital statistics reports and interviews)

two to three years. CT, X-ray fluoroscopy equipment, etc., which were provided in earlier grant aid received major repairs such as exchange of X-ray tubes within a short period of time of three to five years after their introduction. Specifically, in the radiology department of the Shifobakhsh National Medical Center, equipment such as general X-ray fluoroscopy equipment and expensive medical equipment such as CT, etc., has been damaged several times due to inadequate temperature and humidity conditions for about 10 years after the procurement in 2006, and it has been reported that a certified technician from the agent has responded to do the repairs. In addition to the deficiencies in the equipment management system, the management of the environment such as temperature and humidity environment is also an issue.

(1) Current status and issues related to maintenance system of medical equipment

As mentioned earlier, maintenance departments of medical equipment have not been in any of the facilities targeted in the project. Planned equipment can be divided into 3 classes: ① The equipment (suction machine, ECG, patient monitor, small ME equipment such as electric scalpel) with extremely low frequency of failure if one performs the checks and inspections before the start of work every day, parts replacement etc., ② Equipment (CT, Angiography system, etc.) whose maintenance including periodic check is performed only by the manufacturers or authorized technicians. ③ Equipment (microscope, microtome, water bath, etc.) that hardly breaks if consumables are replenished.

Regarding the equipment of ① above, routine maintenance of medical equipment is entrusted to nurses and radiographers who are operators of equipment in each department, but the responsibility for the operation of the equipment is ambiguous. On top of that, there is no preventive maintenance system, it is the present practice that repairs are done only after it breaks down and becomes unusable. At the start and end of work, confirmation of the operation status of the equipment using the daily check sheet is not done. Sometimes, apparent obstacles such as abnormal noise, heat generation, vibration, cracks, abnormal operation etc. of equipment are overlooked, leading to serious breakdowns. Also, since the communication system in case of equipment failure has not been established, the equipment operator will be contacted by multiple people including the hospital administration department that manages the budget, the clinical department head, etc. and finally get in touch with the director who is the final decision maker, and a repair request will be made to MedTechnica engineer. For this reason, it takes time to implement the repairs, and led to the delay in the delivery of equipment related medical services.

Regarding the equipment classified in ②, not only daily checks conducted by the person in charge of each department, but also the implementation of periodical inspections by manufacturers' certified technicians, replacement of parts, and the implementation of calibration are extremely important for proper use of the equipment. However, due to the low level of maintenance awareness by the hospital management department, the maintenance contract of the equipment that requires constant maintenance by the certified technicians is not carried out at the appropriate time, the regular inspections are not performed, and the parts that need replacement are not replaced. These factors also shorten the life of the equipment. In addition, the repair history record (the time of failure of each equipment, the re-use start date, the downtime, etc.) of the equipment is not managed, for this reason, planning equipment update, ascertaining the degree of aging and planning equipment renewal is not possible.

In addition, sufficient stock of the planned purchase of consumables is essential for equipment to operate properly: ① There is no planned procurement, the budget is allocated in order of the earliest, ② There are proposal in the hospital, departments which the director deem to be priorities, etc. will earn preferential budget[2], ③ Problems such as depleting the budget are occurring near the end of the year. As a result, it is not possible to arrange consumables at the right time, and medical services stagnates.

The targeted facility is responsible for providing advanced medical services to the poor as the nation's highest medical facility, but due to inadequacies in the equipment maintenance system, sometimes it is impossible to use the equipment for testing and treatment. As a result, it has been reported that healthcare workers have no choice but to recommend referrals to private medical institutions that may be expensive for patients.

(2) Current status and issues of the level of medical personnel using medical equipment

The medical staff in the target facilities have knowledge of the operation and utilization of the existing equipment, but each person implement different management methods with regards to the daily checks. They are generally unfamiliar with troubleshooting modern electronic medical devices.

In case of the radiology department of Shifobakhsh National Medical Center, there are problems with the CT such as the warming up of (idling) is insufficient during shooting and continuous shooting, the tube must be replaced faster at half the normal number of shots, parts replacement cycle is accelerated, and high maintenance costs.

This project will procure the latest medical equipment such as CT, ultrasound scanner, endoscopy, non-contact shock-wave lithotripter and laparoscopic systems. Operation and maintenance of these equipment will be handled by personnel in charge of each department, but there is no preventive maintenance of equipment and there is a need to strengthen the current maintenance system.

(3) Current status and problems of water supply and drainage facilities related to maintenance and management of medical equipment

The water supply and drainage facility at the Shifobakhsh National Medical Center site supplies hot water for hand washing and heating to each room and ward. However, these water supply and drainage pipes are aging, cannot withstand the supply water pressure, and there are damages and leakages in some places.

Temporarily stopping the supply of water (supply of hot water) to of the water supply and drainage pipe to repair the leakage point causes the temperature of the room with image diagnosis related equipment etc. to drop sharply. The resumption of supply water causes condensation on the medical equipment due to a sharp rise in the room temperature. As a result, dust, etc. seep into electrical circuits, which is also a cause of failure. Currently, the equipment operator in charge of the facility is not aware of the influence on the equipment caused by sudden temperature difference, and as mentioned above, examples of equipment failure due to dew condensation are obvious. Specifically, in the radiology department of the Shifobakhsh

[2] In the former Soviet era, a surgical specialist is often appointed as the director, the surgical department has power, and the facilities for this plan are no exception.

National Medical Center, equipment such as general X-ray fluoroscopy equipment and expensive medical equipment such as CT, etc., has been damaged several times due to inadequate temperature and humidity conditions for about 10 years after the procurement in 2006[3], and it has been reported that a certified technician from the agent has responded to do the repairs.

As a solution to these problems, renovation work of the hospital's water supply and drainage facilities are required, but since it will be a large-scale construction over a long period of time, it is considered unrealistic. Therefore, as another solution to this problem, it is conceivable that an air conditioner with a dehumidifier is attached to the room where highly advanced medical equipment is to be installed, and the equipment is protected from sudden temperature fluctuations. In addition, since highly advanced medical equipment is susceptible to humidity and humidity control is also important, it is necessary to provide guidance to the person in charge of equipment operations at the site and maintain the installation environment of medical equipment.

1.3 The need to introduce soft components

Considering the current maintenance and management capability, in addition to the smooth start-up of this project, and to ensure the long-term normal operation and maintenance of equipment, it is necessary to introduce soft components aiming at improving the maintenance management system such as daily checks, periodic checks, repair history management, repair communication system and consideration of operation environment required by equipment. It is necessary to encourage the formulation of the maintenance management plan as part of building of continuous sustainability of equipment, and to provide guidance including the planning periodic renewal of the equipment, the replenishment of the consumables, parts, etc. This software component aims to reduce the equipment that needs to be repaired by implementing preventive maintenance by making technical guidance on preventive maintenance management of medical equipment, prevention of failure, early detection, repair of minor faults by one’s self, etc.

The issues of the Shifobakhsh National Medical Center and Cardiovascular Surgery Center, which are the target facilities, can be summarized as follows.

[3] A major breakdown, general X-ray fluoroscopy equipment cannot cope with voltage fluctuation, and the case where it was out of order and the case where board replacement was done twice, CT had two tube replacements, and a total of three gantry replacements. Other minor troubles are occurring. (Interview Survey Result)

① The person responsible for managing the equipment (hereinafter referred to as "Equipment Manager") is not dedicated, so failure reports are delayed.

② Preventive maintenance management such as daily check, etc., is not performed, small defects lead to major failure.

③ The repair history management of the equipment is not done adequately in the management department or each medical department.

④ The operation and maintenance system has not been established, and it takes time between equipment failure and repair completion, and the medical service stagnates.

⑤ The operation of advanced medical equipment under the appropriate temperature and humidity environment is not guaranteed.

⑥ There is not planned renewal of equipment, or budget measures for procurement consumables and parts.

Of the above, for the individual tasks, this software component classifies and responds as shown below.

Table 1 Software component input contents

Input contents of soft component	Issues of target facilities
A. Appointment of person responsible for equipment management and importance of preventive maintenance management activities	①, ②, ④
B. Understand the operation status of equipment and plan for renewal	②, ③, ⑥
C. Importance of improving equipment installation environment (targeted for diagnostic imaging equipment)	⑤
D. Planning procurement plan for consumables and parts essential for equipment operation	⑥

To improve and solve these problems, introduction of the soft component is beneficial to the technicians such as physicians, nurses, maintenance personnel engineers[4], MedTechnica etc. at the Shifobakhsh National Medical Center and Cardiovascular Surgery Center.

2 Soft component goals

This plan will establish a preventive maintenance management, and equipment maintenance responsibility system with a focus on daily checks, planning of equipment renewal plans through management of repair history, and equipment installation environment management centering on image diagnostic equipment. The plan is to ensure that the parts and consumables necessary for the operation of

[4] As of April, 2018, there are no medical equipment technicians in both facilities. In the future, a specialist technician will be placed in order to operate the medical equipment which is procured in this case. The plan targets the technicians who will be deployed.

the equipment are procured, and that the medical equipment itself can be used continuously to reduce non-working hours and exceed its useful life. In addition, end users can operate procurement equipment smoothly and effectively, making clinical actions that take patient safety into account while maximizing the performance of equipment.

3 Software Component Outcomes

The outcomes of the soft component for input contents are as follows.

Table 2 Outcomes of soft components

Input contents of soft components	Expected results
A. Appointment of person responsible for equipment management and importance of preventive maintenance management activities	• The person in charge of the operation of procured equipment becomes the person responsible for equipment management and it becomes possible to manage the daily check and the repair history based on individual piece of equipment • The management department including the director and deputy director understands the necessity of maintenance management including periodic check, and it becomes possible to formulate necessary maintenance management plan according to actual usage of equipment • Determine the necessity of repair, and smooth implementation of the repair request procedures to the MedTechnica and agents, etc.
B. Understand the operation status of equipment and plan for renewal	• The repair history of the equipment is managed, it becomes easy to identify the cause of the malfunction and it becomes possible to study and implement measures to prevent recurrence • Equipment upgrade plans are formulated based on information such as equipment repair frequency and inactivity time
C. Importance of improving equipment installation environment (targeted for diagnostic imaging equipment)	• The deterioration caused by rust of the metal part caused by condensation due to room temperature rise and fall can be prevented. • It is expected to avoid accidents such as electric circuit failure, electric leakage, power short circuit caused by dew condensation
D. Planning procurement plan for consumables and parts essential for equipment operation	• Procurement plan (budgetary measures) for consumables and periodic replacement parts to be prepared is planned based on demand forecast for medical treatment activities, and smooth medical service provision is secured.

4 Confirmation method of achievement degree

The degree of achievement shall be confirmed by the following method.

Table 3 Confirmation of achievement degree

Item	Confirmation method
(i), (ii), (iv)	Written examination on technical acquisition level
(i)	Confirmation of the status of utilization of forms such as daily check slips, equipment stocks, and repair history
(iii)	About the content structure of the maintenance contract, the implementation of the presentation announcement
(iv)	Planning for equipment renewal plan (draft)
(iv)	Planning consumables and parts procurement plan (draft)
(v)	Check the management of temperature and humidity at the equipment installation environment management schedule

5 Activities of Soft Components (Input Plan)

5.1 Input time and period

As part of this collaborative project, the planned software components aim to maintain appropriate equipment in the planned facilities. The soft component consists of two sessions, one scheduled to take place shortly after the delivery of the equipment and the other after 11 months, and will be held for one month each, that's a total of two months.

The reason for the implementation of the first session immediately after the delivery of the equipment is that the participants have been instructed by the initial operation and maintenance method by the equipment supplier, and the understanding of the delivered equipment has been deepened. The training effectiveness increases if it takes advantage of the actual equipment procured in the project.

The second session will be conducted eleven months after the delivery of equipment. The reason is that the participants of the training are doing some case/repair correspondence etc. of each equipment and they are accustomed to the operation of the equipment. Also, since it is also time to check whether consumable procurement has been carried out well, it is possible to determine whether the equipment after the maintenance has been properly used.

5.2 Activity contents

The contents of the activities in the first and second sessions are as described below.

Prior to the commencement of each session, there will be confirmation of the Tajikistan side acceptance system and prepare the materials for training considering the specifications, configuration and characteristics of the medical equipment procured in this project. In addition, after each session, the implementation report, etc. is compiled.

In this case, the management department, the medical department (18 pediatrics, 17 adults departments), the facility and maintenance department and the MedTechnica are the focus of the strengthening the maintenance and management system of medical equipment.

The following table shows the equipment to be supervised by the soft components.

Table 4 Medical Equipment for Software Components

Classification of equipment	Equipment name
Image diagnostic equipment that is expected to improve highly accuracy diagnosis ability.	Ultrasound scanner for ophthalmology, ultrasound scanner, CT scanner, surgical C-arm X-ray TV system, mobile X-ray unit, digital general and fluoroscopy X-ray diagnostic equipment, Angiography system
The equipment that contributes to the diagnosis and treatment that is minimally invasive and effective.	Video endoscope (bronchi, colon, gastrointestinal, duodenum, ENT), rigid endoscope (laparoscope, arthroscope, cysto-urethroscope), lithotripters
Intensive Care Unit (ICU) related equipment for treatment after diagnosis.	Ventilator, defibrillator, Operation lamp, sterilizer, phacoemulsifier
Central laboratory equipment for diagnosis and after-treatment observation.	Biochemical analyzer, blood cell counter, ELISA system, microtome, tissue processor

(1) Activities in the first session and target audience

The first session will be carried out soon after the initial operation guidance by the supplier when the procured equipment is introduced. It will promote the penetration of the equipment management technology while confirming the equipment characteristics and attention points.

Table 5　Activity contents of the first session

Task	Lecture content	Student (number of people)
A. Appointment of person responsible for equipment management and importance of preventive maintenance management activities Related tasks: ①, ②, ④	• Clarification of equipment manager and responsibilities • Guidance on how to deal with abnormalities detected in daily check • Guidance on the establishment of equipment repair flow from time of failure to acceptance inspection • Implementation of understanding degree confirmation test • (Daily check, periodic check, medical equipment installation environment, electric safety etc.) • Daily check method guidance (appearance, operation check) ※Points of minor malfunction of devices in particular • (Abnormal noise, crack, surface heat, etc.) • Guidance on the creation of equipment management manual including daily check slips (Lecture targets small ME device categorized as ① in the background) • Importance of daily check and periodic check in preventive maintenance management activities (Lecture targets equipment in the category ① and ② described in the background, the periodic check mainly targets the equipment in category ②) • Electrical safety lecture of medical equipment (Patient safety, health worker safety, etc.) • Guidance on method of repair request procedure by equipment manager (Method for reporting the of failure status etc.) • In-hospital management of repair progress for out-of-hospital repairs o Repair request, content of failure diagnosis, content of repair o Calculation of existence of replacement parts, repair cost o Status of expenses allowance, scheduled completion of repair etc.	• Administration Division (4) • Specialized physician (35 to 40) • Administrator of equipment management (co-medical, 40 to 50) • Rehabilitation Dept. (1 to 2) • MedTechnica Technician (1 to 2)

B. Understand the operation status of equipment and plan for renewal Related tasks: ③, ⑥	• Guidance on how to use the equipment sheet in the OJT form (number of times of use of equipment, presence or absence of failure, description of malfunction, repair request status, etc.) • Lecture guidance on repair order procedure (preparation of repair request form) • Safety management training on equipment use • How to use the manual • In case of trouble, guidance on how to respond when power is cut • Method of planning equipment renewal plans o Score the equipment from operating status of equipment, years of installation o Upgrade forecast o Lecture, guidance on how reflect them on budget plan • Refer to the frequency of failure described in individual equipment notes etc. for equipment operation status	• Administrator of equipment management (co-medical, 40 to 50) • Rehabilitation Dept. (1 to 2) • MedTechnica Technician (1 to 2)
C. Importance of improving equipment installation environment (targeted for diagnostic imaging equipment) Related tasks: ⑤	• Manually confirm the setting requirement environment (temperature, humidity) (Contrast with current situation, recognition about improvement points) • How to use and read the temperature hygrometer • Practical guidance on how to fill in temperature and humidity management table for each installation room • Setting the proper temperature of the air conditioner according to the outside temperature and occasional external conditions (such as a planned power outage or repair of a winter drainage pipe) • Introduction of damage case studies given to equipment when not used in the installation environment required by equipment, learning from case study and review by instructor (Examples such as bulbs and parts affected by service life) • The importance of observance of the installation environment and how to take the temperature control records are described in the "Equipment Management Manual" (draft)	• Administrator of equipment management (co-medical, 40 to 50) • Rehabilitation Dept. (1 to 2) • MedTechnica Technician (1 to 2)
D. Planning procurement plan for consumables and parts essential for equipment operation Related tasks: ⑥	• Summarize and confirm the use history of consumables and parts used for each equipment operation. • Calculate the necessary expenses to procure supplies and parts that are essential for normal operation from agents and other sources based on the usage history, and guide the planning method of the budget plan	• Administration Division (4) • Administrator of equipment management (co-medical, 40 to 50) • MedTechnica Technician (1 to 2)
E. Summary of lecture	• Total review of the first soft component of the Class A-D • Implementation of proficiency test to confirm training proficiency • Based on the first soft component, each equipment manager is asked to create and submit an action plan. (Instructors evaluate and critique action plans)	• Administration Division (4) • Specialized physician (35 to 40) • Equipment manager (Co-medical, 40 to 50) • Rehabilitation Dept. (1 to 2) • MedTechnica Technician (1 to 2)

The following is a summary of the activities of the soft components of the first session.

① Appoint a person in charge of equipment management for each individual device, the practice of preventive maintenance management activities, such as the operation of equipment using a piece of equipment, non-operational status, and repair records, is supervised by using a daily check slip to follow the check items determined by the proper operation and appearance. Sample of the report is as shown below.

Equipment: Anaesthesia Machine	ID No: XXX
Department: Image Diagnosis	Person in charge: Pema
Manufacturer: Acoma	Model No: ABC
Distributor:	Contact No.:

Date	Operation times/day	Function		Memo, if any defect	Repair request	
		Yes	No		Requested	Not required
13 Jan 2016	5	✔				✔
14 Jan 2016	1		✔	Canister malfunction	✔	
15 Jan 2016	2	✔				✔
⋮						

Figure 1 Equipment checklist (example)

Daily Check Sheet

Month / Year (/)

Control No.		Name					Dept.					In Charge					
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Operation																
Abnormal Sound																
Cable/Others																
Signature																
Date	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Operation																
Abnormal Sound																
Lamp/Display/Switch																
Cable/Others																
Signature																

Figure 2: Daily check Sheet (The above inspection slip focuses on exterior inspection)

② Technical transfer on formulation of maintenance management plan shall be made so that appropriate maintenance methods according to the actual usage of the equipment can be defined.

③ Method of monitoring the influence of changes in temperature and humidity of advanced medical equipment (ME equipment used in the operation theatre such as image diagnosis related equipment, mechanical ventilator, etc.), inspection, operation, maintenance, cleaning, operation record of indoor temperature control equipment, operation record, failure Provide technical guidance on correspondence etc.

④ Manage the repair history of the equipment and give guidance to grasp the operation status of the equipment

⑤ Provide guidance to establish a maintenance and maintenance system centered on equipment management personnel etc.

⑥ Periodical renewal plan for equipment and guidance on budget planning method to systematically procure consumables/parts

Table 6 Software component timetable, first session

Date	The day of the week	Guidance content	Clinical engineer	Local Assistant
Day 1	Monday	Travel Narita – Incheon – Dushanbe		
Day 2	Tuesday	• Arrival in Dushanbe • Soft Component Objective Description and Opening remarks • Conducted a level of understanding confirmation test • Electrical safety lecture of medical equipment	●	●
Day 3	Wednesday	• Appointment of personnel responsible for equipment management • Daily check guidance 1 (operation theatre, ICU equipment) • Daily check guidance (image diagnostic equipment) • Appropriate temperature setting of the air conditioner according to the outside temperature and sometimes external conditions (such as scheduled power outage and winter water supply and drain pipe repair) • Practical guidance with temperature hygrometer	●	●
Day 4	Thursday	• Daily check guidance 2 (flexible, rigid endoscope) • Daily check guidance 3 (clinical testing equipment)	●	●
Day 5	Friday	• Daily check practical guidance (1 and 2)	●	●
Day 6	Saturday	• Daily check practical guidance (3 and 4)	●	●
Day 7	Sunday	• Reference arrangement	●	●
Day 8	Monday	• Establishment of repair route and guidance on repair order procedure method	●	●
Day 9	Tuesday	• How to utilize individual equipment notes (about equipment of 1 and 2) guidance • Afternoon: Practice	●	●

Day 10	Wednesday	• How to utilize individual equipment notes (about 3 and 4 equipment) Guidance • Afternoon: Practice	●	●
Day 11	Thursday	• Safety management training on equipment use • How to use the manual	●	●
Day 12	Friday	• Teaching methods for planning equipment renewal plans • (Score individual machinery by using existing equipment, predict renewal time and make plans actually)	●	●
Day 13	Saturday	• Document preparation (preparation of draft management manual draft)	●	●
Day 14	Sunday	• Document preparation (preparation of draft management manual draft)	●	●
Day 15	Monday	• Guidance on how to plan budget planning for consumables and parts procurement • Afternoon: Budget planning	●	●
Day 16	Tuesday	• Guidance on the importance of the Maintenance Management plan[5] • Afternoon: General review of the points of the first software component	●	●
Day 17	Wednesday	• Implementation of skill test to confirm training proficiency • Afternoon: criticism	●	●
Day 18	Thursday	• Morning: Report to the director • Dushanbe – Almaty	●	●
Day 19	Friday	• Almaty – Incheon – Narita	●	●
			0.63 MM	0.53MM

(2) Activities of the second session and subjects to be taken

The second session will review and strengthen technical guidance conducted in the first session in the following manner. In addition, during the 11 months after the equipment was delivered, the medical personnel at the Shifobakhsh National Medical Center and Cardiovascular Surgery Center clarified the problems and issues faced in continuing medical activities with procured equipment. Under the guidance of a soft component technician, such as a medical engineer dispatched from Japan, or a ME2 proficiency test qualified person[6], the action plan is designed.

[5] For image diagnostic equipment that requires advanced maintenance management, we collect and analyze information such as the number of defects in the past, the contents, the time required for repair (simulation of how many people were able to perform the inspection), the amount of repair paid to the agency, etc. Based on those evidences, guidance of technical / economical merit of proper maintenance management plan would be made.

[6] It refers to the second grade ME technical proficiency test conducted by the ME Technical Education Committee of Japan Biomedical Engineering Association.

Table 7　Activity contents of the second session

Task	Guidance content	Participants (number of people)
A. Appointment of person responsible for equipment management and importance of preventive maintenance management activities Related tasks: ①, ②, ④	• Implementation of a proficiency level confirmation test to evaluate the training effect of the first session o Contents of daily check o Troubleshooting method o Minor malfunction of equipment o Participation and duties of personnel responsible for equipment management etc. • As a result of conducting the appearance and work inspection using "daily check slip", discuss questions and uncertain points group by group ※Corrected as necessary for ease of use • After the end of the 1st session, if equipment problems occurred, the repair request is verified based on the route prescribed in the "equipment management manual" ※If not implemented, clarify the reason and revise and change the repair request route as necessary • Guidance on improvements by lecturers (introduction of examples of practicing troubleshooting for each group, and conducting group discussions with successful examples and examples not done) • Maintenance service implementation status by the manufacturer agency in the past 11 months, management of service reports • Confirm whether to review the operation method based on the inspection result	• Administration Division (4) • Specialized physician (35 to 40) • Equipment manager (Co-medical, 40 to 50) • Rehabilitation Dept. (1 to 2) • MedTechnica Technician (1 to 2)
B. Understand the operation status of equipment and plan for renewal Related tasks: ③, ⑥	• Discuss how to enter repair history in individual machine votes in groups, check questions on entry, problems on form ※ If necessary change the form to easy-to-use content • Using existing equipment, score the operation status of the equipment in three stages, simulate whether updating years later is appropriate, and practice updating plan formulation for each group (The lecturer reviews comments on the planned plan) • Review and practice planning of equipment renewal plans o Calculate necessary amount for each department o Budget allocation, application for consideration of delivery date etc.	• Administrator of equipment management (co-medical, 40 to 50) • Rehabilitation Dept. (1 ~ 2) • MedTechnica Technician (1 to 2)

C. Importance of improving equipment installation environment (targeted for diagnostic imaging equipment) Related tasks: ⑤	• Check the contents of the installation environment for the past 11 months, and if there is a record that does not meet the environment demanded by medical devices, grasp the situation and the reason ※Particularly, during the planned blackout, during the winter time of supply and drainage pipes • Finalization of the "equipment management manual" on the importance of compliance with the installation environment	• Administrator of equipment management (co-medical, 40 to 50) • Rehabilitation Dept. (1 to 2) • MedTechnica Technician (1 to 2)
D. Planning procurement plan for consumables and parts essential for equipment operation Related tasks: ⑥	• Bring a consumable and parts use history record of procured equipment for each medical department • Plan procurement plan of consumables and parts necessary for the next fiscal year for each device and reflect it in the budget plan • Guidance on improvements by lecturers	• Administration Division (4) • Administrator of equipment management (co-medical, 40 to 50) • MedTechnica Technician (1 to 2)
E. Summary of lecture	• In the second session, a total review of the equipment maintenance and management system including the daily check of the medical equipment procured in this project. In response to this, the creation and review of action plans for how to develop existing equipment in the hospital	• Administration Division (4) • Specialized physician (35 to 40) • Equipment manager (Co-medical, 40 to 50) • Rehabilitation Dept. (1 to 2) • MedTechnica Technician (1 to 2)

Table 8: Soft component schedule - Second session

Date	The day of the week	Guidance content	Clinical engineer	Local Assistant
Day 1	Monday	Travel Narita – Incheon – Dushanbe	●	
Day 2	Tuesday	• Second Session Soft Computer Objective Description and Opening remarks • Implementation of proficiency test • Test result review	●	●
Day 3	Wednesday	• Doubts and unknown points of 'Daily check slip' are discussed group by group (operation theatre, ICU equipment) • Afternoon: Diagnostic imaging equipment	●	●
Day 4	Thursday	• Doubts and unknown points of "Daily check slip" are discussed group by group (endoscope) • Afternoon: clinical test equipment etc.	●	●
Day 5	Friday	• Based on maintenance contracts created by a consultant in the first session, practical guidance for deciding the content of equipment requiring maintenance service, practical guidance for making actual contracts using the model • Fill in the repair request form • Confirmation of function status of repair request route at the time of trouble, discussion of improvement points	●	●

Day 6	Saturday	• Discuss how to enter repair history in individual machine notes in groups, check questions on entry, problems on form • Work on revising forms	●	●
Day 7	Sunday	• Document reorganization (revision of equipment management manual, etc.)	●	●
Day 8	Monday	• Discuss how to enter repair history in individual machine votes in groups, check questions on entry, problems on form • Work on revising forms	●	●
Day 9	Tuesday	• Schedule the operation status of the equipment in three stages by using existing equipment and practice planning update plan for each group (The lecturer reviews comments on the planned plan)	●	●
Day 10	Wednesday	• Review and practice how to plan equipment renewal plans	●	●
Day 11	Thursday	• Confirm the installation environment record contents in the past 11 months, when there are records that do not satisfy the environment required by medical equipment Understand the circumstances and reasons at that time • Plan procurement plan of consumables and parts necessary for the next fiscal year for each device, implement budget planning practice	●	●
Day 12	Friday	• In the 2nd session, a total review of the equipment maintenance system including daily checks on medical equipment procured through this project • Draft action plan	●	●
Day 13	Saturday	Dushanbe – Almaty	●	
Day 14	Sunday	Almaty – Incheon – Narita	●	
			0.47 MM	0.37 MM

6 Soft component implementation resources procurement

Two soft component lecturers are planned; one person with experience in soft component activities such as a clinical engineer or qualified ME (domestic preparation 0.3 MM, first session 0.63MM, second session 0.47 MM, domestic consolidation 0.3 MM, total 1.7MM), and one local assistant are planned (preliminary preparation of each session 0.15 MM × 2 = 0.3 MM, first session 0.53 MM, second session 0.37 MM, total 1.2MM). In this case, there are 18 adult medical departments and 17 pediatric departments who are eligible for the maintenance and management training, so coordination is essential for participants to attend the training in advance. The plan for temporary staff is as follows.

Lecture on medical equipment maintenance and management (1 person):	Clinical engineer with training expertise for medical facilities in developing countries or qualified ME etc.
Local Assistant (1 person):	The creation of soft component materials, the creation of a roster of participants, improvement of teaching materials in the soft component, and the creation of new materials (especially for video and image editing)

7 Implementation process of soft component

The first session starts a week before the installation of the equipment, fourteen and half months after the start of the implementation, and planned for approximately 0.7 months, up to two weeks after the installation. The second session will begin eleven months after the installation of the equipment is complete and planned for about 0.5 months. It takes about 14.5 months from the start to completion of this software component.

Table 9: Soft component plan implementation process (draft)

Year	2020											2021				MM	
Month	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7		
Total month of Project Implementation	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Japan	Local
1st Session Lecture on medical equipment maintenance and management (1 person)		▲ Submission of report														0.30	0.63
2nd Session Lecture on medical equipment maintenance and management (1 person)															▲ Submission of report	0.30	0.47
Submission of PMR on Soft Component		▲													▲		
Soft Component Final Report															▲		

Local operations ▭ Domestic operations ▭

8 Deliverables of soft components

8.1 component implementation report

It will be submitted at the end of July 2021.

8.2 Soft component completion report

It will be submitted at the end of July 2021. At this time, as the accompanying document, the results of the second session will be submitted in conjunction with the following.

① Written test for technical proficiency and summary of results
② Pieces of equipment
③ Daily check Slip
④ Repair Request Form
⑤ Equipment Management Manual
⑥ Soft Component Attendee List
⑦ Photos and videos of the implementation status

9 Summary of software components

Overall estimate of this software component amount is about 6.942 million yen.

10 Responsibilities of the partner country

10.1 Partner country responsibilities for implementing this soft component

In implementing this soft component, the Tajikistan side needs to coordinate the work so that the training participants, department physicians, laboratory technicians, nurses and MedTechnica, can attend the training without fail. Also, prepare payment of daily allowance and transportation expenses to the trainees when necessary for the provision of the target facility. In addition, for Japanese experts to be dispatched, if the method for applying for entry visa to the country changes from the present situation, it will be the responsibility of Tajikistan to ensure issuance of visas.

10.2 Responsibility of the partner in maintaining and managing medical equipment

With this software component, by the appointment of an equipment manager, and thorough management of individual equipment by equipment votes, the aim is to reduce the non-working hours of the medical equipment procured under this project, providing continuous and appropriate use of equipment beyond the service life, thereby providing continuous medical services. In the future, this management method can be applied to the existing equipment of the Shifobakhsh National Medical Center and Cardiovascular Surgery Center, and it will be possible provide continuous medical services. In addition, when providing high quality medical services, it is desirable to reflect the information of the equipment in the medical equipment management inventory and to centrally manage all the medical equipment.

end

Appendix 6. References

No.	Title	Size	Page	Original / Copy	Issuance	Issue year	Donation / Purchase
1	Annual statistics of “Shifobakhsh” National Medical Compound	A4	65	Soft Copy	“Shifobakhsh” National Medical Compound	2015-2018	Donation
2.	Annual statisitics of CardiovascularSergery Center	A4	23	Soft Copy	Republican Scientific Center of Cardiovascular Surgery Center	2015-2018	Donation
3	Health system in Transition, 2010	A4	154	Soft Copy	European observatory on Health system and policies	2010	Donation
4	Inventory of equipment at “Shifobakhsh” National Medical Compound	A4	58	Soft Copy	“Shifobakhsh” National Medical Compound	2015-2018	Donation
5	Country Gender Assessment -Tajikistan	A4	116	Soft Copy	Asian Development Bank	2006	Donation

Appendix 7. Other materials / information

ANNEX 7-1 Annual maintenance cost for procured equipment

Unit: thousand TJS

Item	Name of Equipment	Q'ty	Consumables necessary for equipment operation	Required Q'ty per unit (annual)	Required amount per unit (annual)	Total
Existing equipment replacement	Ventilator for adult	6	Respiratory circuit tube set	4 sets	6.5	39
	Ventilator for pediatrics	2	Reusable respiratory circuit for infant and neonate	4 sets	6.5	13
	Ventilator for OT	9	Respiratory circuit tube set	4 sets	6.5	58.5
	High Pressure Steam Sterilizer	2	Recording paper (6rolls/pack) Ink ribbon	4 packs 4 units	5.2	10.4
	Ultrasound Scanner, Doppler	1	Gel 12pcs/set Paper 100/box	8 sets 8 boxes	16.2	16.2
	Ultrasound Scanner	3	Gel 12pcs/set Paper 100/box	8 sets 8 boxes	16.2	48.6
	Surgical C-arm X-ray unit	1	X-ray film (100 pcs/box) Sterilization cover	12 boxes 4 sets	6.9	6.9
	Mobile X-ray unit	1	14"x17" Dryfilm 100pcs	12 units	5.8	5.8
	General X-ray and Fluoroscopy unit	1	14"x17" Dryfilm 100pcs 14"x14" Dryfilm 100pcs 10"x12" Dryfilm 150pcs 8"x10" Dryfilm 150pcs	20 sets 20 sets 20 sets 20 sets	31.6	31.6
	Spirometer	2	Recording paper (10m×10rolls/box) Anti-bacterial filter (100pcs./box) Paper mouthpiece (100pcs./box) Nose clip	4 boxes 20 boxes 20 boxes 200 units	6.5	13
	Biochemistry analyzer	1	Reagent Kit (960test/set) Printer paper and other consumables set (960 test / set)	4 sets 4 sets	16.2	16.2
Subtotal						**259.2 (3,134 thousand yen)**
Equipment supplementation	Whole body CT scanner	1	Injector syringe 150ml x 50pcs/set	12 sets	64.8	64.8
	Hematology analyzer	1	Reagent kit (800 tests/set) Calibration (for 3 months) Control (for 3 months)	4 sets 4 sets 4 sets	13.8	13.8
	ELISA system	1	Recording Paper Reagents for commissioning for 50 tests	4 sets 4 sets	12.2	12.2
	Lithotripter ultrasonic	1	Ultrasonic gel Silicon oil Crushing kit	5 sets 10 sets 10 sets	41	41
	Angiography system (Cardiovascular Surgery Center)	1	Injector syringe 150cc x 50units/set	8 sets	68.9	68.9
Subtotal						**200.7 (2,426 thousand yen)**
Total annual maintenance cost						459.9 (5,560 thousand yen)
Total annual maintenance cost for new equipment supplementation						**200.7 (2,426 thousand yen)**

Estimated conditions:

- Assumed that the number of patients remains the same as the present situation
- Assume not regarding inflation rise
- Estimated consumable price at local distribution price