Republic of Uzbekistan
Ministry of Health

Preparatory Survey on Health and Medical Service Improvement Project in the Republic of Uzbekistan

Final Report (Advanced Release Version)

January 2025

Japan International Cooperation Agency (JICA)

Oriental Consultants Global Co., Ltd.
International Techno Center Co., Ltd.
K.ITO Architects & Engineers Inc.

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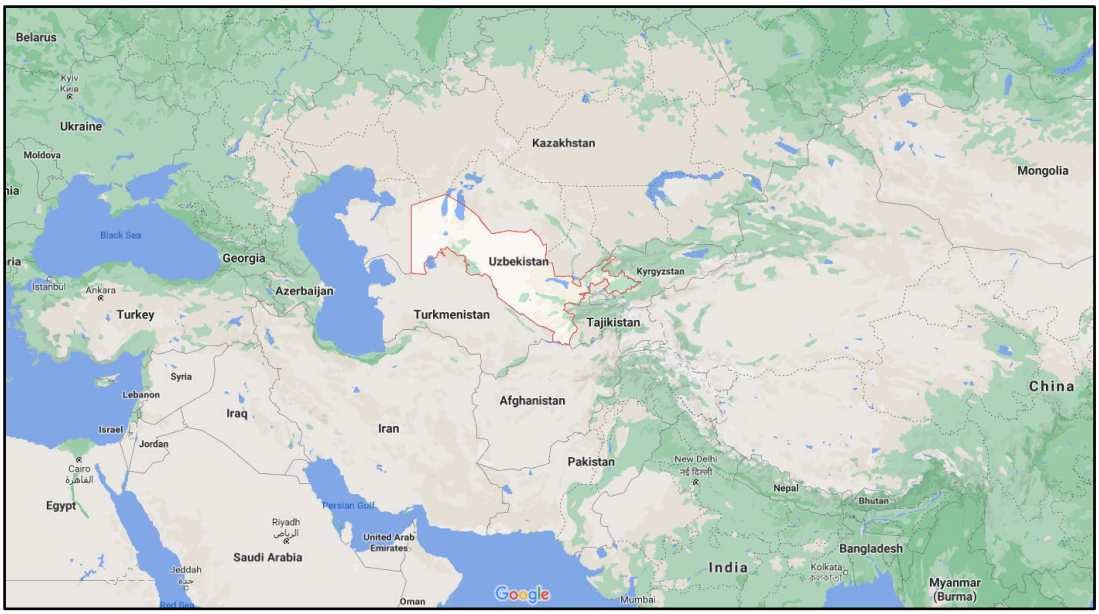
Project Location Maps



Source: Google Maps, 2021

Figure 1 Location of Uzbekistan

Source: Google Maps, 2021

Figure 2 Japan-Uzbekistan Flight Route

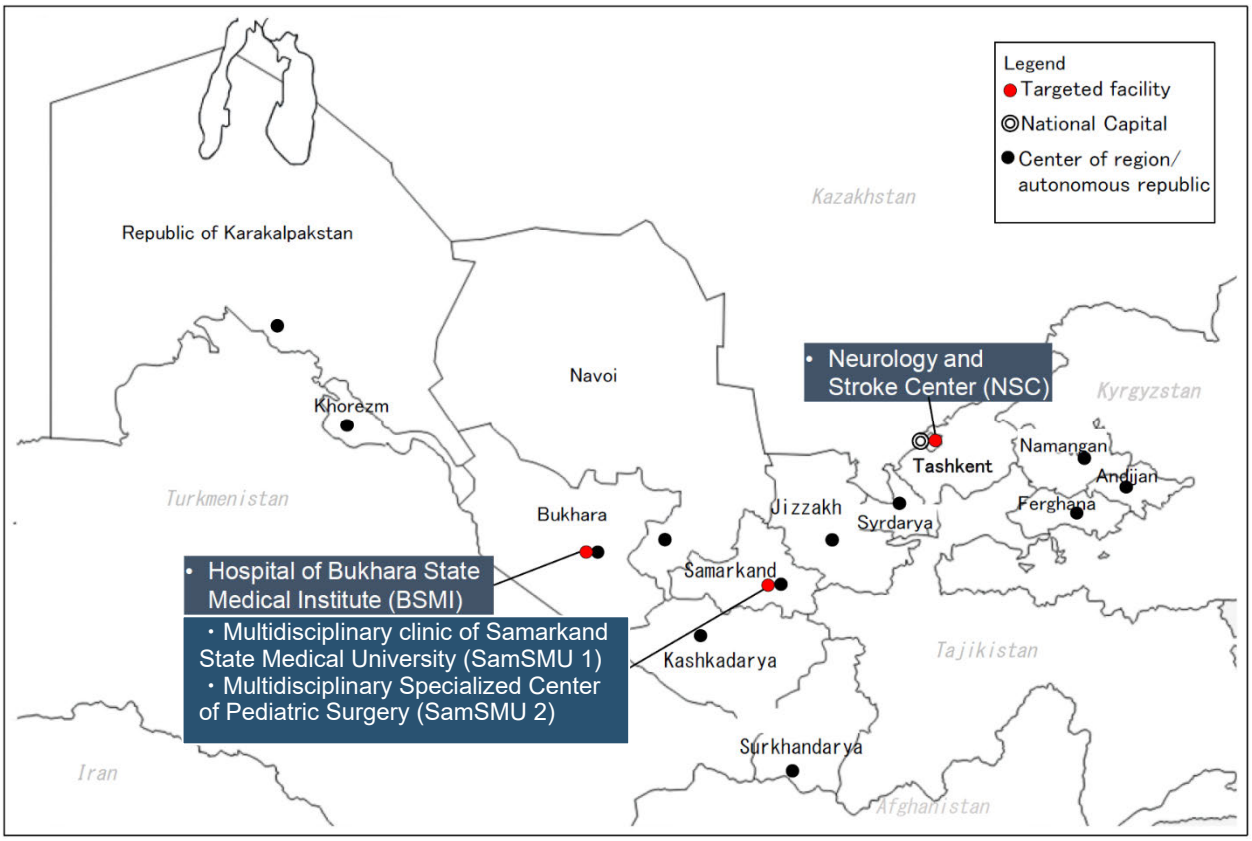


Figure 3 Locations of Project Sites in Uzbekistan

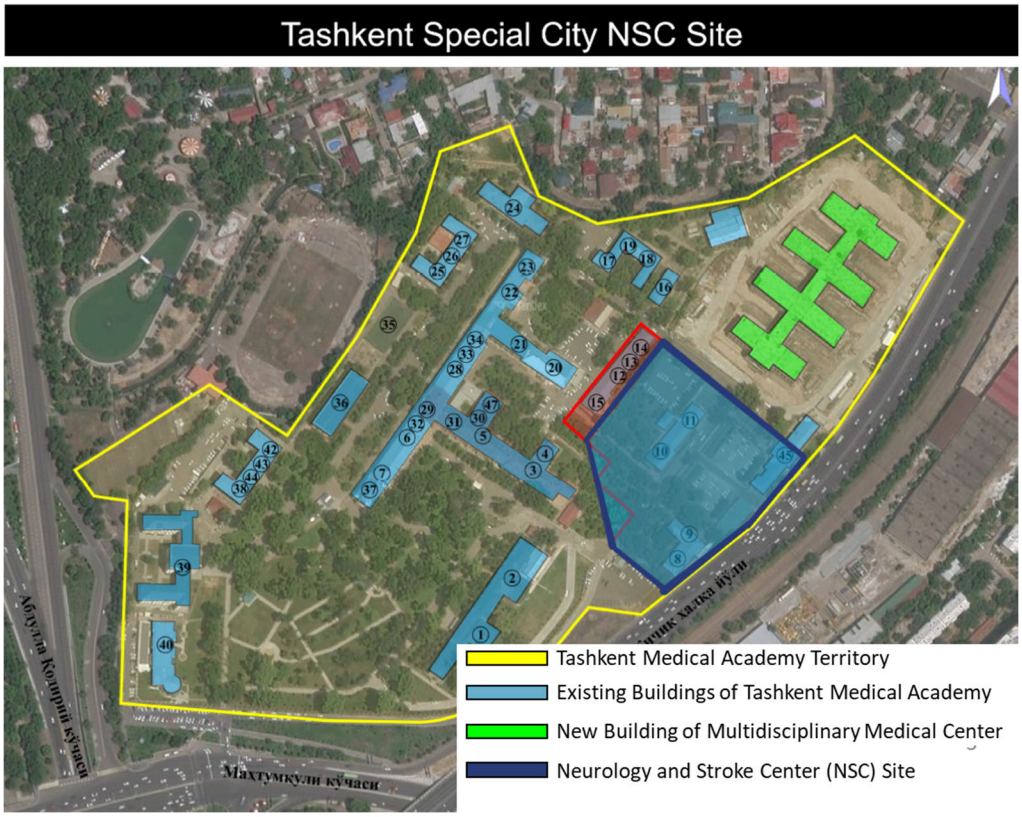


Figure 4 Neurology and Stroke Center (NSC) Site, Tashkent Special City

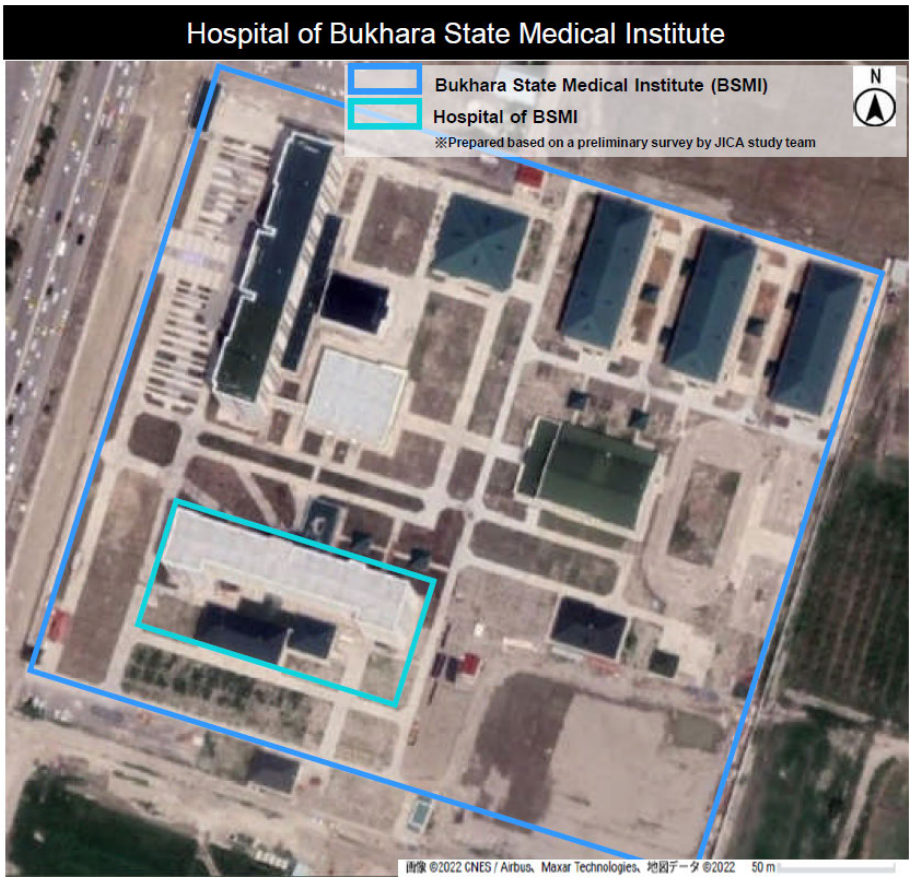


Figure 5 Bukhara State Medical Institute (BSMI)

Figure 6 Multidisciplinary Clinic of Samarkand State Medical University (SamSMU 1)

Figure 7 Multidisciplinary Specialized Center of Pediatric Surgery (SamSMU 2)

Abbreviations

Abbreviation	Description
ADB	Asian Development Bank
ADL	Activities of Daily Living
ADRC	Asian Disaster Reduction Center
AIDS	Acquired Immunodeficiency Syndrome
AV	Audio and Visual
AVM	Arteriovenous Malformation
AVR	Automatic Voltage Regulator
BOD	Biological Oxygen Demand
BSMI	Bukhara State Medical Institute
CATV	Cable Television
CCTV	Closed Circuit Television
CIS	Commonwealth of Independent States
CNS	Central Nervous System
COVID-19	Coronavirus Disease 2019
CSSD	Central Sterile Supply Department
CT	Computed Tomography
EEG	Electroencephalography
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
EMG	Electromyography
EMS	Emergency Medical Services
ENPV	Economic Net Present Value
EP	Evoked Potential
EUR	European Monetary Unit
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
F/S	Feasibility Study
GAVI	The Global Alliance for Vaccines and Immunizations
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GP	General Practitioner
HCU	High Care Unit
HIS	Hospital Information System
HIV	Human Immunodeficiency Virus
ICB	International Competitive Bidding

Abbreviation	Description
ICT	Information and Communications Technology
ICU	Intensive Care Unit
IT	Information Technology
JICA	Japan International Cooperation Agency
JMA	Japan Meteorological Agency
JST	JICA Study Team
KFAED	Kuwait Foundation for Arab Economic Development
KfW	Kreditanstalt für Wiederaufbau
KMK	Building Code (in English)
KOICA	Korean International Cooperation Agency
KTMP	Multidisciplinary Central Polyclinic (in English)
MEF	Ministry of Economy and Finance
MIIT	Ministry of Investment, Industry and Trade
MOF	Ministry of Finance
MOH	Ministry of Health
MRA	Magnetic Resonance Angiography
MRI	Magnetic Resonance Imaging
MSK	Medvedev–Sponheuer–Karnik
MSN	Interstate Building Regulations (in English)
NCDs	Noncommunicable Diseases
NEB	Neurology and Stroke Center Establishment Body
NSC	Neurology and Stroke Center
ODA	Official Development Assistance
OP	Family Polyclinic (in English)
OShP	Family Medical Center (in English)
PA	Public Address
PACS	Picture Archiving and Communication System
PET-MRI	Positron Emission Tomography Magnetic Resonance Imaging
PHC	Primary Health Care
PIU	Project Implementation Unit
POR	Post-Operative Recovery
PQ	Pre-Qualification
PSC	Project Steering Committee
PX	Patient Experience
QOL	Quality of Life
RMU	Rural Medical Union

Abbreviation	Description
ROW	Right-of-Way
RRCEM	Republican Research Center of Emergency Medicine
rt-PA	Recombinant Tissue Plasminogen Activator
SamSMU	Samarkand State Medical University
SamSMU 1	Multidisciplinary Clinic of Samarkand State Medical University
SamSMU 2	Multidisciplinary Specialized Center of Pediatric Surgery of Samarkand State Medical University
SanPiN	Sanitary Rules and Standards (in English)
SCEEP	State Committee of the Republic of Uzbekistan for Ecology and Environment Protection
SCU	Stroke Care Unit
SDGs	Sustainable Development Goals
SEE	Statement of Environmental Effects
SHNK	City Planning Code (in English)
SPECT-CT	Single Photon Emission Computed Tomography
STEP	Special Terms for Economic Partnership
SVP	Selsky Vrachebny Punkt (rural clinics in rural areas)
t-PA	Tissue Plasminogen Activator
UNICEF	United Nations Children's Fund
UPS	Uninterruptible Power Supply
USD	United States Dollar
UZS	Uzbekistani so‘m (the currency in Uzbekistan)
VIP	Very Important Person
VR	Virtual Reality
WHO	World Health Organization

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1. Introduction

1.1 Background of the Project

In the Republic of Uzbekistan (hereinafter referred to as "Uzbekistan"), the estimated average life expectancy at birth is 71.7 years, which is approximately similar to that of surrounding countries such as Kazakhstan (74.4 years), Kyrgyzstan (72.1 years), Tajikistan (71.3 years), and Russian Federation (72.6 years). These life expectancies are short compared to the average in European countries (80.8 years) (World Bank, 2022). In addition, the main causes of death are changing in Uzbekistan, with non-communicable diseases (NCDs) now accounting for 85.7% of all deaths. The NCDs that become the top causes of death are cardiovascular diseases (60.3%), ischemic heart disease (24.9%), malignant neoplasms (9.8%), and cerebrovascular diseases (8.5%) (WHO, 2019). In this situation, there are concerns about the economic and social impacts of NCDs.

For ischemic heart disease and cancer, a countermeasure system has already been established, in which the national specialty centers in the capital city work with their branches in each region to provide specialized medical services and train medical specialists nationwide. In contrast, for neurological diseases, the modernization and sophistication of medical care are lagging behind. Therefore, it is essential to establish a new national center to provide specialized medical services and establish a foundation for human resource development.

As tertiary care facilities in rural areas, Bukhara State Medical Institute (BSMI) and Samarkand State Medical University (SamSMU) are important bases for providing services for NCDs and for training health human resources in the country. However, for SamSMU, with the aging of its medical equipment, it is difficult to provide high-quality medical services and train specialists using modern equipment. Therefore, the rejuvenation of equipment is an urgent issue.

In the fourth pillar of the "Strategy for Action 2017-2021," under "Social Development," the Government of Uzbekistan indicates that it will work to improve health services to reduce national mortality and increase healthy life expectancy. Several health sector-related policies have also been set out in presidential decrees to improve the health system and strengthen the development and professionalism of the health workforce, who will provide a wide range of quality health services for NCDs and other diseases. "On the Development Strategy of New Uzbekistan for 2022-2026" also mentions the provision of global standard medical services. Likewise, several presidential decrees in the health sector have also stated the policies to improve the health system to provide a wide range of quality health services for NCDs and others and to strengthen the development and professionalization of health personnel.

Under these circumstances, the Government of Uzbekistan requested cooperation with JICA on the development of the new facility and equipment for the Neurology and Stroke Center (NSC) and the development of equipment for medical research institutes in rural areas.

1.2 Outline of the Project

This Project aims to improve the health of the people by strengthening the medical service delivery system for NCDs through the development of facilities and equipment, as well as the capacity of medical personnel for tertiary-level medical facilities across the country that serve as a base for providing medical services and developing human resources for NCDs such as neurological diseases.

The target region of the Project includes all of Uzbekistan (including Tashkent, Bukhara, and Samarkand). The executing agency of the Project is the Ministry of Health (MOH) of Uzbekistan.

The components of the Project are as follows:

- Development of Neurology and Stroke Center (NSC) in Tashkent with 250 beds including diagnostic, surgical, and rehabilitation units,
- Procurement of medical equipment including MRI, CT, X-ray machines, diagnostic equipment such as endoscopes, surgical equipment, etc. for NSC, BSMI (about 200 beds) and SamSMU (about 700 beds in total for Hospitals No.1 and No.2), and
- The consulting services include land condition survey (topographic survey, sub-soil and geotechnical survey), basic and detailed design, tender assistance, construction supervision, and capacity building of medical personnel (hospital facility management, medical equipment maintenance, etc.).

1.3 Outline of the Survey

The purpose of this survey is to collect and analyze information necessary for the examination of the Project as a Japanese Official Development Assistance (ODA) Loan Project, such as the purpose, outline, project cost, project implementation system, operation and maintenance system, and environmental and social considerations, and to formulate a draft outline of the Project.

The scope of this survey includes the following:

- Verifying the necessity and appropriateness of the Project, and
- Conducting the basic design, formulation of the project plan, and estimation of the project cost, as requested by the Government of Uzbekistan.

The JICA Study Team (JST), composed of consultants under contract with JICA, was in charge of conducting the survey over a 58-month period from April 2020 to January 2025. The survey included collection of information and data related to the Project, as well as various related surveys. Due to the COVID-19 pandemic situation, the survey was conducted remotely from Japan from April 2020 to January 2021. The JST subcontracted a service provider for the data collection survey, preliminary design review works, as well as assistance and coordination on domestic feasibility study process. A total of three field surveys in 2021, two field surveys in 2022, and one survey in 2023 had been conducted. The first field survey was conducted in February 2021, the second in May 2021, the third in November 2021, the fourth in July 2022, the fifth in November 2022, and the sixth in November 2023 . In addition, during the survey period, a series of coordination meetings was held between the JST, MOH, and JICA.

Table 1-1 Milestones and coordination meetings with MOH for this survey

Milestone	Date	Coordination Meeting with MOH
Questionnaire	12 May 2020	Supplementary explanation regarding the Questionnaire.
Inception Report	28 August 2020	Discussions on Confirmation of Scope of the Project, Project Implementation Unit, Answer for the Questionnaire, Necessary Official Document for Land Data Collection
Interim Report	2 November 2020	Explanation about Interim Report on JICA Survey
NSC Site Survey	3-19 February 2021	Explanation about Project Scope, Procurement Packaging, Schedule and Cost, etc.
Online Meeting with MOH	6 April 2021	Explanation of Project Outline, Updated Cost Estimation, and Points from the Medical Aspect
Online Meeting with MOH	20 April 2021	Explanation of Special Terms for Economic Partnership (STEP), Overview of Cost Breakdown, Overview of Implementation Schedule and Procurement Flow under Japanese ODA Loans
Draft Final Report	May-June 2021	Explanation of Draft Final Report on the JICA Survey
Draft Final Report Vol.2	November 2021	Explanation about Draft Final Report Vol.2 on JICA Survey
Draft Final Report Vol.3	July 2022	Explanation about Draft Final Report Vol.3 on JICA Survey
Final Report	January 2025	Submission of Final Report on JICA Survey

Source: JICA Study Team

2. Background, Issues, and Needs of the Project

2.1 Development Policies

2.1.1 National Development Policy

In Uzbekistan, the “National Action Strategy on Five Priority Development 2017-2021” and the "Development Strategy for New Uzbekistan for 2022-2026" were formulated with Presidential Decree (No. UP-4947, 7 February 2017) and Presidential Decree (PF-60 No. 28/1/2022), respectively, as the national five-year development plans. The “Uzbekistan 2030” strategy, a mid-term development strategy from 2023 to 2030, was issued in 2023 under the Presidential Decree (PF-158 No. 2023/9/11). The strategy follows the previous five-year plans and describes five priority areas and 100 goals. In particular, the economic goals are to increase gross domestic product to $160 billion and gross domestic product per capita to $4,000 by 2030 and to enter upper middle-income countries. (See **Table 2-1**)

Table 2-1 Outline of the “Uzbekistan 2030” strategy

Priority areas	Key goals
1. Creating suitable conditions for each person to realize their potential	• Reforms of education system and strengthening of research field • Improvement of health issues related to tuberculosis, non-communicable diseases, perinatal mortality, and other health problems • Promotion of healthy lifestyles • Implementation of digital technologies in all health facilities • Reforms in Social Service Delivery and Poverty Reduction • Promoting the national policy on youth and the development of the sports sector • Development of cultural sectors including arts and literature.
2. Ensuring the well-being of the population through sustainable economic growth	• Increase GDP to $160 billion and per capita income to $4,000 • Further development of domestic industry, including increases in the volume of exports • Expansion of the financial market • Development and expansion of digital technology • Promotion of tourism including medical and educational tourism
3. Conservation of water resources and environmental protection	• Ensuring safe water and promoting efficiency of water use • Reduction of environmental pollution with green energy and improvement of waste management • Environmental-friendly conservation of natural resources for climate change and biodiversity
4. Ensuring the rule of law, establishing a public administration “At the service of the people”	• Reform of the Judicial System • Improvement of the civil service system • Promoting privatization of public services • Liberal citizen participation and development of media activities
5. Continuing the work of turning the country into a safe and peace-loving state	• Establishing balanced and continuous dialogues on regional and global issues with partners. • Participation in the WTO and promotion of trade • Safe use of global information networks and improving computer literacy among people • Promoting friendly relationships with other countries

Source: Presidential Decree of the Republic of Uzbekistan No. PF-158, 11 September 2023

2.1.2 National Health Policy

The Government of Uzbekistan promulgated a presidential decree on the "National Program of Health Care Reform (1998-2005)" in 1998, which aimed at strengthening the medical and health care systems. The concept of the national program states 12 cornerstones, including equal access to health and medical services; strengthening of the emergency medical system; effective system for mother and child health care services; provision of PHC in guaranteed quality and improvement of health financing system. In the concept, the priority areas and matters to be reformed are indicated, and it appears that the concept aims to break away from the system of the former Soviet Union era. On the other hand, to avoid confusion, the drastic change promoted reforms based on its own "gradualism."

In 2018, under the government of President Shaykat Mirziyoyev, the Presidential Decree "On comprehensive measures to fundamentally improve the healthcare system of the Republic of Uzbekistan" (No. UP-5590, 7 December 2018) was promulgated, in which the "Concept of Health System Development 2019-2025" as a medium- to long-term health policy was launched.

The concept highlights nine priority areas to be tackled by 2021 with the following aims: (1) improvement of the nation's health including extending life expectancy, (2) reforming the health system for equal resource allocation and health service access, and (3) strengthening the capacity building and leadership development in health management (see the table below).

Table 2-2 Outline of the health system development concept

1. Improving legislation in the field of healthcare	• Legislation on reproductive health, legislation on infant nutrition was enacted. • Clarifying the scope of medical care to be financed by the government (free of charge) • Legislation on compulsory health insurance enacted, establishment of a code of ethics for healthcare professionals
2. Improving the system of organization and management of healthcare	• Strengthening the capacity of Ministry of Health staff in planning and management • Establishing standards for medical equipment, workforce allocation and building standards • Optimizing primary health care, introducing home therapy and home nursing • Establishing a licensing system for medical and pharmaceutical organizations
3. Improving the health financing system	• Establishing and piloting a mandatory health insurance fund, Establishing reimbursement tariffs • Private sector entry into insurance services, promoting public-private partnerships
4. Improving the quality and availability of medical care, supporting a healthy lifestyle, preventing and combating infectious and non-infectious diseases	• Developing a program (2019-2022) to prevent non-communicable diseases and improve lifestyles • Developing programs to improve prevention, diagnosis and treatment of infectious diseases • Establishing a medical model for the elderly • Revising clinical guidelines for major diseases • Optimizing state-level medical institutions and setting up of multidisciplinary medical institutions, Strengthening the Foundation for Higher Medical Education • Renewing medical technology (radiosurgery, robot surgery, bypass surgery, photodynamic therapy, etc.).

5. Improving the system of providing medical care to mothers and children	• Improving the quality of medical care for mothers and children • Improving in the early detection, treatment, rehabilitation, and care of congenital diseases • Analyzing maternal deaths and crisis signs in maternity facilities • Ensuring access to perinatal/neonatal/pediatric care • Participating in the European region's international program on school health and childhood obesity • Measures for micronutrient deficiencies, starting a nutrition program, improvement in the quality of low-birth-weight baby care • Establishing a state-level obstetric emergency team • Establishing a neurosurgery department in a children's hospital and a gynecological laparoscopy department in the regional core hospital
6. Development of public-private partnerships and medical tourism	• Outsourcing some health services to the private sector • Privatizing of hospital additional and auxiliary functions • Selecting public medical institutions for international certification • Developing a medical tourism program plan, Promotion of medical tourism and development of a system to receive medical tourists
7. Further development of the pharmaceutical industry	• Implementing measures to prevent the illegal sale of pharmaceuticals • Case studies on distribution of pharmaceuticals in other countries
8. Formation of an effective system of training, retraining and advanced training of medical and pharmaceutical personnel, development of medical science	• Curriculum revision in medical, nursing, and other health-related education • Collaborating with foreign medical education institutions • Elevating medical education institutions to international standards • Improvements of the Tashkent State Dental Institute, training in advanced technologies through the private sector
9. Widespread introduction of information and communication technologies and "e-health"	• Promoting the adoption of an integrated electronic health information system • Improving the internet environment in medical facilities • Developing a network of medical facilities

Source: Presidential Decree No. UP-5590 (issued on 7 December 2018)

2.2 Health situation

2.2.1 Demographic situation

The total population in Uzbekistan is 36,024,900 (2023) and is growing at a rate of 1.5% to 1.7% per year. The share of the young population (under 15 years of age) in the total population is decreasing, while the share of the old population (65 years of age and older) has remained below 5%. The total fertility rate has remained above 2.5 after 2018, and there are no significant signs of the aging population.

Table 2-3 Uzbekistan population by region (2023)

Region	Population (thousands)	Population density (Pop. / km^2)	Total fertility rate
Uzbekistan	36,024.9	80.2	3.4
Tashkent City	2,956.4	6,592.7	3.5
Andijan	3,322.7	772.7	3.6
Fergana	3,976.3	588.2	3.6
Namangan	2,997.5	402.9	3.6
Tashkent	2,993.4	197.7	3.3
Syrdarya	896.6	209.5	3.1
Surkhandarya	2,806.5	139.6	3.8
Kashkadarya	3,482.3	121.9	3.6
Samarkand	4,118.2	245.6	3.5
Jizzakh	1,475.5	69.6	3.4
Bukhara	2,009.7	50.0	3.0
R. Karakalpakstan	1,976.2	11.9	2.8
Navoiy	1,055.5	9.5	3.3
Khorezm	1,958.1	323.7	3.1

Source: The State Committee of the Republic of Uzbekistan on Statistics, Demography

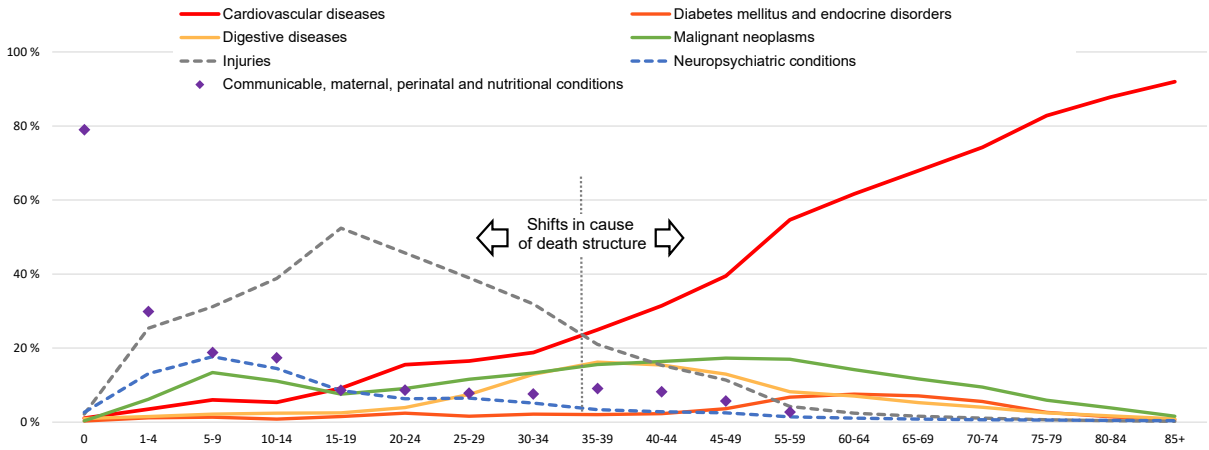
2.2.2 Mortality profile

Half of the total population resides in urban areas, and population growth has occurred almost exclusively in urban areas. Over the past 15 years, child mortality rates have been halved and life expectancy at birth has increased from 69.6 years (2011) to 71.7 years (2022). According to the WHO mortality database[1], the leading cause of death in Uzbekistan is cardiovascular disease, which accounted for 93,260 out of 154,479 cases (60.4%) of annual deaths in 2019. This number includes the rate of cerebrovascular disease. The high prevalence of cardiovascular diseases is a major feature in Commonwealth of Independent States (CIS) countries, especially in Uzbekistan. Cardiovascular diseases (93,260 cases, 60.4%) were caused by ischemic heart diseases, hypertensive diseases, and cerebrovascular diseases. Compared with the percentage of all causes of death, ischemic diseases (38,490 cases, 24,9%), hypertensive heart disease (21,921 cases, 14.2%), and cerebrovascular diseases (13,213 cases, 8.5%) account for nearly half of all diseases. In addition to the NCDs mentioned above, mortality rates attributed to malignant neoplasms (15,210 cases, 9.8%), diabetes mellitus, and endocrine disorders (5,984 cases, 3.9%) are also high.

The percentage of major causes of death in each age group in Uzbekistan is shown in the figure below. As mentioned above, the leading cause of death in Uzbekistan is cardiovascular disease, with the highest rate of ischemic heart disease after the early 40s. The percentage of deaths due to ischemic heart disease increases from the 30s onward, and those due to hypertensive and cerebrovascular diseases from the 40s onward. On the other hand, the largest percentage of causes of death among those under 40 years of age are external causes such as unintentional accidents, with drowning being the most common cause of death among young children and traffic accidents among older children. Suicide is also one of the leading causes

[1] Source: WHO mortality database (https://platform.who.int/mortality, accessed 26 June 2024)

of death in teens. The age period from late 20s to early 40s is a point in time when the causes of death in the young and adult populations switch. Especially around age 40, the number of deaths due to ischemic heart disease and neoplasms (cancer) exceeds the number of deaths from external causes. The mortality rate due to liver diseases (mainly cirrhosis) is also high in people around 40 years of age. This trend has been the same for more than 20 years.



Source: Mortality Database, WHO

Figure 2-1 Trends in major causes of death by age (2019)

2.2.3 Current stroke situation

(1) Trend in stroke cases

The number of patients with neurological disorders, as well as other non-communicable diseases, is sharply increasing in Uzbekistan. According to the statistical data received from MOH, the estimated annual number of stroke cases in the country is about 70,000 in 2019. It is also estimated that more than 80% of patients have post-stroke complications, many of which are severe. Furthermore, in 2021, WHO data[2] indicate that 68 deaths per 100,000 population were due to stroke, or about 24,500 deaths based on the total population. This number is the second most common cause of death after ischemic heart disease (208.49 deaths per 100,000 population). According to the WHO mortality database in 2014, the total deaths caused by cerebrovascular diseases was 14,261 cases. The breakdown of the mortality number comprised cerebral hemorrhage (5,139 cases), cerebral infarction (2,074 cases), subarachnoid hemorrhage (327 cases), and others (6,721 cases). It is important to highlight that about 38% of cerebrovascular diseases are ICD-10 "Cerebrovascular disorders in diseases classified elsewhere" (3,443 cases) and "Other cerebrovascular diseases" (1,960 cases). It is assumed that a certain number of them have not been diagnosed. Since the percentage of cerebrovascular diseases by classification was assumed to be unchanged as of 2024, it can be estimated that the number of cases would have increased. These include cerebral aneurysms that are preventable if they can be early diagnosed and treated.

The initial point of access for stroke patients in Uzbekistan is the nearest medical facility. If the facility cannot handle the patient, the patient will be referred to a regional hub hospital with a specialist

[2] Source: Global Health Observatory, https://www.who.int/data/gho (accessed: 15 July 2024)

(neurologist) for further examination and treatment. In Tashkent City, stroke patients are referred to the Republican Emergency Care Research Center and Republican Research Center of Neurosurgery which is under construction for renovation. After the NSC is established, it will be one of the referral hospitals accepting stroke patients in Tashkent [see **4.6.3. (2)**]. Although initial treatment is available at some regional hub hospitals, many of them are assumed to have developed complications. Therefore, appropriate early rehabilitation for reintegration into the community is not provided. This situation is also the case in Tashkent City.

The establishment of the NSC is expected to enable rehabilitation for the acute stage after the onset of stroke and rehabilitation for neurological diseases. It is also expected to contribute to the development of human resources capable of providing integrated support for rehabilitation from the acute stage to the maintenance stage in the future.

(2) Diagnosis, treatment, and stroke rehabilitation in Uzbekistan

The MOH has developed protocols for non-traumatic intracranial hemorrhage and ischemic stroke. The protocols have been developed in 2020 and will be reviewed every few years or as per the emergence of new key evidence. These provide guidelines for diagnosis, treatment, and stroke rehabilitation. The table below indicates the target diseases in the clinical protocols.

Table 2-4 Clinical protocols and target diseases

Clinical Protocol	Name of Disease (ICD-10 Code)
National Clinical Protocol for Diagnostics and Treatment of Patients with Non-Traumatic Intracranial Hemorrhage	Subarachnoid hemorrhage (I60)
	Intracerebral hemorrhage (I61)
	Other non-traumatic intracranial hemorrhage (I62)
National Clinical Protocol for Diagnostics and Treatment of Ischemic Stroke	Cerebral infarction (I63)

Sources: National Clinical Protocol for Diagnostics and Treatment of Patients with Non-Traumatic Intracranial Hemorrhage
National Clinical Protocol for Diagnostics and Treatment of Ischemic Stroke

1) Diagnosis of stroke

Stroke can be categorized as subarachnoid hemorrhage, intracerebral hemorrhage, and cerebral infarction. Treatment is different upon the site of the hemorrhage or infraction as well as the type of stroke. Therefore, the appropriate and sufficient examination should be selected to make a differential diagnosis and to rule out other possible causes of the symptoms such as brain tumors. According to the protocols, the following examinations (see table below) are conducted to determine the pathological condition and to make a differential diagnosis. CT scan or MRI is strongly recommended for diagnosis of stroke. However, if there is no CT or MRI scanner in the facilities, it is diagnosed by thorough physical examination including neurological examination, taking a medical history, and conducting other tests which can be carried out in such facilities.

Table 2-5 Examination of stroke patients in Uzbekistan

Examination	Examination items
Interview and examination by neurologist	Interview: Medical history, family history, medication history General examination Neurological examination: Assessment of consciousness and wakefulness level, meningeal symptoms, cranial nerve disorder, motor system disorder, cerebellar and vestibular function disorder, sensory disorder, higher cerebral functions, and visual disorder
Imaging diagnosis	Ultrasound: Carotid ultrasonography, Transcranial Doppler ultrasonography (TCD), duplex ultrasonography, echocardiography, lower limb venous ultrasound, abdominal ultrasound Radiography: Skull, cervical spine, chest X-ray, Computed Tomography (CT), MRI Computed Tomography Angiography (CTA), Magnetic Resonance Angiography (MRA)
Specimen test	Urine test, hematology test, biochemical test, blood coagulation test, blood gas test, infectious disease test, cerebrospinal fluid test
Physiological function test	Blood pressure, Electrocardiogram (ECG), Holter ECG, Electroencephalography (EEG)
Consultation with other specialists	Neurosurgeon Other specialists: Physician, ophthalmologist, psychiatrist, endocrinologist, cardiologist, surgeon, urologist, rehabilitation physician, etc.

Sources: National Clinical Protocol for the Diagnostics and Management of Patients with Non-Traumatic Intracranial Hemorrhage, Ministry of Health of the Republic of Uzbekistan, 2020; National Clinical Protocol for Diagnostics and Treatment of Ischemic Stroke, Ministry of Health of the Republic of Uzbekistan, 2020

2) Treatment of stroke

- Subarachnoid hemorrhage

  A subarachnoid hemorrhage is caused by a ruptured cerebral aneurysm. A clipping with craniotomy or coiling embolization with endovascular treatment is carried out for cerebral aneurysm. The type of surgery depends on the size, area, age, and severity of the aneurysm.

  According to the stroke protocols, the following requirements must be met for providing surgical treatment:

  - Neurosurgeons with experience in microsurgery for cerebral aneurysms
  - Endovascular surgeons with experience in endovascular treatment
  - Facilities equipped with CT angiography (or MR angiography) and microsurgery

- Intracerebral hemorrhage

  It is a hemorrhage in the brain caused by hypertension or rupture of an arteriovenous malformation (AVM) in the brain. Craniotomy, endovascular therapy, and radiotherapy are the treatments of choice, although radiotherapy is not currently common in Uzbekistan. Medications such as antihypertensive drugs and drugs for relieving cerebral edema are used for medical treatment because blood pressure control is extremely important. A craniotomy or endoscopic surgery is selected in case hematoma removal is required.

- Cerebral infarction

  The treatment of cerebral infarction depends on its type, but fundamentally, medication is the mainstream treatment. A recombinant tissue plasminogen activator (rt-PA) therapy (thrombolytic therapy) is selected when administered within 3 hours of symptom onset. Strict

criteria, including exclusion criteria, are indicated in the protocol and require management by specialists with sufficient experience and knowledge. An intra-arterial thrombolysis (endovascular treatment) is acceptable within 6 hours of symptom onset. It is required that patients stay at a high-level stroke center with round-the-clock access to cerebral angiography when intra-arterial thrombolysis will be provided. Antithrombotic therapy, antiplatelet therapy, and cerebral protection therapy are also selected depending on the type and severity. Surgical treatment includes decompressive craniectomy, carotid endarterectomy, carotid artery stenting, or extracranial intra-cranial bypass selected depending on the conditions. However, as of the guideline issuance in 2020, sufficient evidence for surgical treatment other than decompression craniectomy has not been established in Uzbekistan.

Table 2-6 Treatment for cerebral infarction patients in Uzbekistan

Medication treatment	rt-PA therapy, intra-arterial thrombolysis (endovascular treatment), antithrombotic therapy, antiplatelet therapy, cerebral protection therapy
Surgical treatment	Decompressive craniectomy, carotid endarterectomy, carotid artery stenting, extracranial-intracranial bypass

Source: National Clinical Protocol for Diagnostics and Treatment of Ischemic Stroke, Ministry of Health of the Republic of Uzbekistan, 2020

3) Rehabilitation of stroke

According to the stroke protocols, the basic principles of stroke rehabilitation are as follows:

- Early start of rehabilitation
- Continuous and consistent rehabilitation through the stages (acute, recovery, and maintenance stage)
- Complexity and multidisciplinary rehabilitation
- Individualized rehabilitation
- Active participation of patients and their relatives in the rehabilitation

Based on these principles, rehabilitation includes drug therapy, massage, exercise, and speech therapy shall be provided by a rehabilitation specialist during the acute, recovery, and maintenance stages (see table below). Appropriate rehabilitation also contributes not only for the improvement of Activities of Daily Living (ADL) and Quality of Life (QOL) but also to the reduction of medical costs such as shortened hospitalization. However, there is lack of support systems for post-stroke patients in Uzbekistan. A few private hospitals provide post-stroke care, including maintenance rehabilitation, but the number is limited and there is a great need for a leading center in the country.

The basic principles and contents of rehabilitation are described in the protocols, but many health facilities focus only on physical therapy with massage and equipment. Occupational therapy and speech therapy are not sufficiently provided. In addition, there are few rehabilitation specialists with sufficient skills and knowledge, but it has been pointed out that they are lacking in the ability to adequately assess patients and provide evidence-based rehabilitation.

As described in Presidential Decree No. 3925, various measures are being taken to assist post-stroke people to return to society. As part of these measures, Uzbekistan is considering introducing Japanese rehabilitation methods in the NSC. The basic concept is similar to the Japanese standard shown in the table below. It is expected that the NSC will not only provide advanced treatment for stroke and patients with neurological disorders but also improve rehabilitation services and the ability of medical personnel to perform rehabilitation. Therefore, the rehabilitation treatment provided in Japan can be used as a reference for the development of a rehabilitation program in NSC.

Table 2-7 Rehabilitation stages

	Acute stage	Recovery stage	Maintenance stage (Living stage)
Progress	Onset and hospitalization 1 ~ several weeks		several months ~ half a year
Purpose	Early mobilization- active exercise for prevention of disuse syndrome	Functional recovery through intensive rehabilitation, and Improvement of Activities of Daily Living (ADL)	Maintain, continue, and improve recovered functioning and participate in social activities
Examples of Rehabilitation	• Position change, good limb retention • Training of joint range of motion • The gradual shift from passive exercise to active exercise • Feeding training • Excretion training	• Training to walk, stand, etc. • ADL training (range of motion exercise, meal, excretion, changing clothes, etc.) • Training for dysarthria, dysphagia, etc.	• Rehabilitation at home • Training in an outpatient rehabilitation facility, etc.
Place	• Intensive care unit • Acute care ward, etc.	• Recovery rehabilitation ward • Rehabilitation hospital, etc.	• Home • Long-term care unit • Day-care center, etc.
Place in Uzbekistan*	• Angio-Neurological department • Neurological department	• Outpatient follow-up care • Rehabilitation department • Rehabilitation center	• Rehabilitation center • Home

Sources:Japanese Guidelines for the Management of Stroke 2015, Japan Stroke Society; National Clinical Protocol for Diagnostics and Treatment of Ischemic Stroke, Ministry of Health of the Republic of Uzbekistan, 2020

(3) Challenges in providing medical services for stroke patients

The following challenges were identified based on information from the MOH and NSC Director, as well as statistical data. Firstly, there is a lack of a systematic emergency transport system for stroke patients. Prompt treatment starting time after the onset of stroke will affect the severity of future recovery. However, the system inadequately has pre-hospital medication and transports patients to a well-equipped medical facility for treatment in the case of emergencies such as Republican Centers in Tashkent and each regional hospital. Secondly, there is a lack of necessary equipment such as CT and/or angiography for diagnosis of stroke and neurological disorders. In many cases, outdated medical equipment is generally used in the medical facilities. Finally, there is no leading institution at republican level for stroke and neurological disorders. According to President Decree No. 3925, the government strongly considers establishing a republican center and regional centers belonging to the republican center.

Although the National Neurosurgery Center and the National Emergency Center are currently the top referral hospitals that provide services for stroke cases, they are no longer able to deal with the swiftly increasing number of stroke patients. In addition, both centers do not have personnel training and scientific research functions in stroke. Besides, there are no rehabilitation centers for post-stroke people who are in the recovery stage and maintenance stage. Therefore, in the future, the NSC will be expected to become the top referral hospital for stroke and other neurological disorders.

2.2.4 The effects of Coronavirus disease 2019 (COVID-19) in Uzbekistan

After COVID-19 was first confirmed in China in November 2019, a worldwide epidemic (pandemic) was ensured. Uzbekistan confirmed its first case in March 2020, and the outbreak spread across the country. There were several outbreaks of COVID-19 in Uzbekistan. The number of cases and deaths increased sharply in the six months starting June 2020 and in the year from April 2021 until April 2022. Under this situation, a mass vaccination program was started in April 2021 in the framework of COVAX (COVID-19 Vaccines Global Access) led by WHO, the Global Alliance for Vaccines and Immunizations (GAVI), and other assistance agencies.

The number of cases has been flat at less than 100 cases/month since March 2022. As of the end of October 2023, the number of cases in the country stood at more than 251,000 (including 1,637 deaths). Since March 2022, there have been no confirmed deaths due to COVID-19 and it has been mostly controlled.

2.3 Health service delivery

2.3.1 Categories of health facilities and services

The healthcare service system in Uzbekistan has three major categories: outpatient service, inpatient service, and specialized treatment. They have followed the Health Reform, which has been phased in since 1998. Currently, outpatients can access the family medical center (*Oilaviy Shifokolik Punkt, OShP*) and the family polyclinic (*Oilaviy Poliklinika, OP*) as the primary healthcare facilities. People are initially visited at these PHC facilities and, if necessary, are referred to higher-level health facilities as described later in this section.

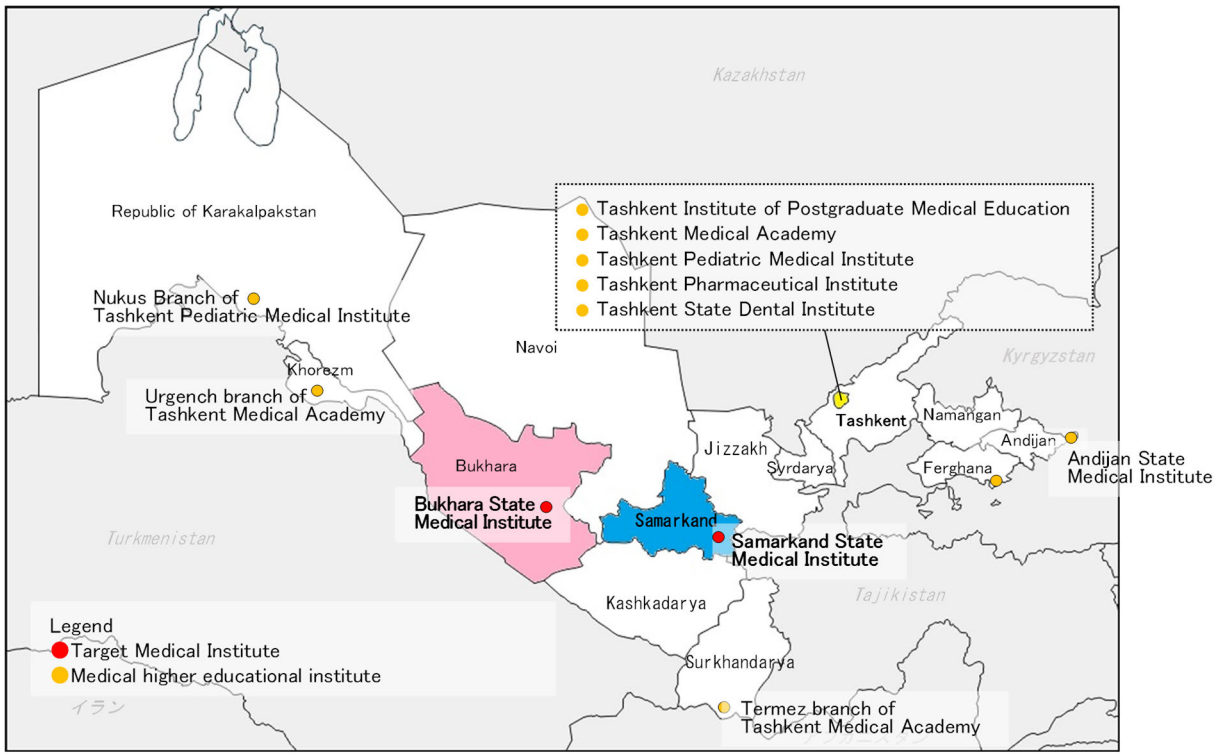
Inpatient care is provided by the regional hospital, and the multidisciplinary central polyclinic (*Ko'p Tarmoqli Markaziy Poliklinika, KTMP*), which is a 100 to 300-bed health care facility at the district level. Also, at the regional level, the general medical center and the state specialty hospital provide inpatient care. The state general medical center also provides outpatient services to improve efficiency in terms of follow-up of inpatients. Highly specialized treatments that cannot be completed at the state level are treated at national research centers, national specialty centers, national hospitals, and national university hospitals at the republican level.

Table 2-8 Health facilities in Uzbekistan

Service	Type of health facilities
Specialized treatment	Republican Research Center, Republican Specialized Center, National Children's Medical Center in Tashkent, Republican Hospital, Republican Medical Academy Hospital, etc.
Hospitalization	Regional Hospital Multidisciplinary Central Polyclinic (Ko'p Tarmoqli Markaziy Poliklinika, KTMP)
	Specialized Medical Center
Outpatient services	Family Policlinic (Oilaviy Poliklinika, OP)
	Family Medical Center (Oilaviy Shifokolik Punkt, OShP)

Sources: Answer to Questionnaire by MOH

There are more than 10 medical higher educational institutions in the country. At the regional level, the institutions are located in Andijan, Samarkand, Bukhara, Fergana, Surkhandarya, Khorezm regions, and in the Republic of Karakalpakstan. The government has addressed the development of Hospital Institutions (university hospital). In each of these regions, it is evident that the aim is to have a "community-integrated healthcare system," a system expected to complete tertiary care in each region. By completing medical care in each region, it is possible to contribute to the health of as wide a population as possible. Hospitals of Medical Institutions in Andijan and Samarkand are established before the country's independence, with important roles of both healthcare service providers and medical institutions.



Sources: Ministry of Health of Uzbekistan Website (https://www.minzdrav.uz/en/agencies/all.php?SECTION_ID=1136)
Survey on Medical Higher Education Institutions of Republic of Uzbekistan, JICA

Figure 2-2 Higher medical educational institutions in Uzbekistan

2.3.2 Specialized treatment facilities

Patients who are unable to be accepted in the regional hospital are treated in specialized treatment centers such as research centers and specialized centers, which are all in Tashkent. All the centers provide the highest tertiary care in their specialty areas. The following centers are specialized treatment centers.

Table 2-9 Republican Research Centers and Republican Specialized Centers in Uzbekistan

Research Centers
• Republican Emergency Care Research Center • Republican Oncology Research Center • Republican Research Center of Neurosurgery
Specialized Centers
• Republican Specialized Cardiology Center • Republican Specialized Center of Surgery named after academician V. Vakhidov • Republican Specialized Center of Urology • Republican Specialized Eye Microsurgery Center • Republican Specialized Scientific Research Medical Center of Physiology and Pulmonology • Republican Specialized Scientific-Practical Medical Center of Dermatology and Venereology • Republican Specialized Scientific-Practical Medical Center of Endocrinology • Republican Specialized Scientific-Practical Medical Center of Obstetrics and Gynecology • Republican Specialized Scientific-Practical Medical Center of Pediatrics • Republican Specialized Scientific-Practical Medical Center of Therapy and Rehabilitation

Source: Ministry of Health of the Republic of Uzbekistan, https://reg.ssv.uz/Doctors/Index?activeTab=tabLiHospitals (accessed: 26 June 2024)

In addition to Tashkent, there are national university hospitals for higher-level care in Andijan, Bukhara, Ferghana, Karakalpakstan, Samarkand, and Khoresm provinces.

2.3.3 Emergency medical system

As described in "**2-1-2 National Health Policy**," the strengthening of the emergency medical system in Uzbekistan, together with the restructuring of PHC, was one of the pillars of reforms in the Presidential Decree on the National Health Care Reform Program (UP-2107) which was promulgated in 1998. This decree promoted the establishment of emergency medical centers and the development of facilities and equipment in each state. In 2017, the Presidential Decree “on measures to further improve the emergency medical care system (UP-4985)” was promulgated, which provided ambulances to the emergency care centers in each region and strengthened the capacity of physicians and nurses for them. The emergency system is being strengthened, led by the Republican Emergency Medical Center in Tashkent. In contrast to other republican centers offering advanced medical care, the emergency center handles all diseases that require emergency treatment. It is very effective to start rt-PA therapy within 3 hours of symptom onset, thus, the emergency medical system needs to be strengthened.

2.3.4 Human resources in the health sector

The education system in Uzbekistan consists of pre-school education (3-6 years old), primary education (4 years), secondary education (7 years), and higher education, of which compulsory education is 11 years (7-18 years old). Secondary education is provided in either a 7-year general secondary school or a 5-year

general secondary school followed by a 2-year vocational school. Higher education is provided at universities and other higher education institutions and usually requires 4 years of study for a bachelor's degree, 2 years for a master's degree, and 3 years for a PhD. After completing compulsory education, there is also a route to vocational education colleges to acquire a professional degree. Uzbekistan's education system has undergone several changes. The current system is regulated by the Republican Education Act (No. ZRU-637), issued in September 2020.

The educational curriculum for the training of medical professionals is regulated by the Presidential Decree "On measures to further develop the system of medical and pharmaceutical education and science (PP-4310, 6 May 2019)." This presidential decree sets evaluation indicators and targets for the development of medical education by 2025. Furthermore, the decree also shows the goals' outlines for strengthening medical education institutions in the country, including the implementation of simulation centers and professional staffing. The number of required years in training for each medical specialty qualification has also been defined (see table below)

Table 2-10 Necessary training periods for higher and secondary professional education

Area of Specialization	Years of Training	Qualification Gained After Completion
Required Years of Study for Higher Education		
Medicine	6 years	General Practitioner, General Pediatrician
Dentistry	5 years	General Dentist
Pharmacy	5 years	Pharmacist
Higher Nursing (After completion of secondary vocational education)	3 years	Higher Nursing Specialist
Required Years of Secondary Vocational Education		
Nursing	2 years	General Practice Nurse Physiotherapy (massage) Nurse
Dental Care	2 years	Dental Assistant
Pharmacy	2 years	Pharmacist's Assistant

Source: On measures to further develop the system of medical and pharmaceutical education and science (No. PP-4310 05/06/2019)

It is necessary to complete 6 years of medical education to become a general practitioner. An additional two to three years of training are required to become a specialist. According to interviews with MOH, as of 2021, there were 86 medical colleges in Uzbekistan. In addition, specialist training programs were available at 11 institutions. It is required to complete nursing school (2 years) to become a nurse. In addition, some universities offer a 3-year curriculum to further train higher-skilled nurses. Rehabilitation professionals are rehabilitation specialists and nurses who specialize in physiotherapy. Biomedical engineers are trained at universities that have medical device-related curriculums. The tables below show that the number of doctors and nurses in Uzbekistan is sufficient compared to those of neighboring countries, but other professionals such as rehabilitation technicians and paramedics need to be trained urgently.

Table 2-11 Number of major healthcare professionals

Type	Number of Professionals Each Year				
	2017	2018	2019	2020	(per 10,000 people[1])
General practitioner	11,309	11,780	12,671	13,908	4.1
Doctor (Physician)	72,215	75,387	76,541	77,586	22.9
Doctor (Neurosurgeon)	372	404	397	385	0.1
Nurse[2]	328,194	334,877	344,653	345,216	101.8
Physical Therapist	265	254	248	227	0.07

Notes: [1] Calculated from the population in 2020 as published by Statistics Agency, Uzbekistan

Source: Answers to Questionnaire by MOH

Table 2-12 Number of healthcare professionals in neighboring countries

Country	Per 10,000 people (2020)			
	Medical Doctors	Nurse, Midwife	Dentist	Pharmacist
Uzbekistan	27.8	57.6	1.1	0.5
Russia	38.3	62.4	2.8	0.4
Kyrgyzstan	21.5[1]	44.2	1.8	0.3
Kazakhstan	40.3	69.4	2.4	3.4
Tajikistan	21.2	53.7	1.6	2.6
Pakistan	10.8[2]	4.7	1.2	1.5*[2]
Japan	26.1	124.5	8.3	20.0

Notes: [1]2021 data; [2]2019 data

Sources: Global Health Observatory, WHO

2.4 Health finance

2.4.1 Health finance and medical cost in government budgets

Uzbekistan's fiscal year runs from 1 January to 31 December, and in December the parliament approves the state budget, consisting of the "General Fund Budget," the "Republican Trust Fund" and the "Republican Reconstruction and Development Fund." The Republican Trust Fund is a pooled fund for different purposes such as pension management, road maintenance, employment promotion, and infrastructure development for educational and medical facilities. The Republican Trust Fund is a fund for large-scale infrastructure development using the surpluses obtained from gold exports and other sources.

The regulation “On approval of the regulations on the procedure for compiling, approving and registering cost estimates and staffing tables of budgetary organizations and recipients of budgetary funds (No. 2634, 15 December 2014)” promulgated by the Minister of Finance forms the basis of the distribution of the annual budget by region and hospital.

Table 2-13 Trends in national budget (in billions of UZS)

	2017	2018	2019	2020	2021	2022
1. Total Revenue		99,144.9	133,179.8	128,460	164,799.4	201,863.7
1.1 Revenue	49,681.0	62,229.5	102,627.6	128,460	164,799.4	201,863.7
(1) Tax	45,955.2	57,291.9	93,191.3	119,665.5	138,257.2	159,750.0
(5) Other incomes and other nontax revenue	3,725.8	4,937.6	9,436.3	8,794.5	26,542.2	42,113.7
1.2 Incomes of State Trust Funds	(N.A.)	31,451.9	24,195.1	(N.A.)	(N.A.)	(N.A.)
1.3 Revenues of the Fund for Reconstruction and Development of Uzbekistan	(N.A.)	5,463.5	6,357.1	(N.A.)	(N.A.)	(N.A.)
2. Total Expenditure		102,600.9	140,944.1	131,104.5	188,257.1	236,692.0
2.1 Expenditure	49,343.7	62,170.0	107,118.4	131,104.5	188,257.1	236,692.0
(1) Social Expenses	27,223.3	35,034.0	58,012.2	65,049	92,013.6	117,691.9
(2) Economic spending	5,280.7	6,957.8	14,099.8	13,643	21,169.7	34,090.9
(3) Expenditures for financing centralized investments	3,234.7	3,047.6	3,960.2	13,977	29,900.1	27,807.0
(4) Maintenance of bodies of state power, administration, justice and prosecution	1,931.1	2,409.5	4,069.3	5,685	9329.0	12,586.2
(5) Maintenance of citizens' self-government bodies	498.6	1,160.7	16,666.0	8,090.5	2,534.4	2879.9
(6) Debt repayment expenses			2,522.5	2,617	2,238.2	3,528.5
(7) Others	11,175.3	13,560.4	22,787.9	22,043	31,072.1	38,107.6
2.2 State Trust Fund Expenditures	(N.A.)	31,451.9	27,508.1	(N.A.)	(N.A.)	(N.A.)
2.3 Expenditures of the Fund for Reconstruction and Development of Uzbekistan	(N.A.)	8,979.0	6,317.6	(N.A.)	(N.A.)	(N.A.)
Balance (1.– 2.)	-337.3*	-3,456.0	-7,764.3	-2,644.5	-23,457.7	-34,828.3

* Income and Expenditure for General Account Only

Sources: Citizens' Budget, Ministry of Economy and Finance of the Republic of Uzbekistan (https://www.imv.uz/)
Presidential Decree of the Republic of Uzbekistan (No. PP-4086, 26 December 2018)

General account expenditure in 2022 was about 237 trillion UZS, about 1.3 times higher than the previous year. General account expenditure is broken down into the following categories: (1) social sector, (2) production sector, (3) spending on intensive investment, (4) public, administrative and judicial operations, (5) local administration and municipal budgets, (6) debt repayment costs, and (7) other expenditures. The social sector budget accounts for about half of the expenditure. The healthcare budget is included in the social sector budget, which has the second largest share after the education area budget. The healthcare budget for 2021 was 16.58 trillion UZS and it has been increasing year by year. The healthcare budget allocation for each region is shown in the table below.

Table 2-14 Health budgets by state in 2020 (billion UZS)

State	Total expenses
Tashkent City	1,106.75
Ferghana Region	1,472.70
Samarkand Region	1,244.67
Tashkent Region	1,136.03
Andijan Region	1,125.09
Kashkadarya Region	1,097.10
Namangan Region	1,064.50
Surkhandarya Region	920.46
Republic of Karakalpakstan	907.27
Bukhara Region	862.04
Khorezm Region	710.74
Jizzakh Region	552.67
Navoi Region	512.46
Syrdarya Region	435.33
Total for Local Budgets	13,147.81
Republican Budget	1,707.70
Total	**14,855.51**

Source: Answer to Questionnaire by MOH

According to "Prevention and control of noncommunicable diseases in Uzbekistan (2018)" published by WHO, the cost of combating NCDs is about 30% of the total health expenditure. Although the health budget has been increasing, the expenditure is also increasing year by year due to the increase in the number of NCD patients. In addition, as a countermeasure against NCDs, advanced medical care and training of specialized medical personnel were introduced, which resulted in the increase of per capita medical expenses. Thus, the expenditure on NCDs is rapidly increasing every year. This trend is a common health issue in all countries, and is also the same in Uzbekistan. In addition, as described in "**2.2.3 Current stroke situation**," many people in Uzbekistan have severe post-stroke disability, which interferes with their return to the workforce. As a result, it is presumed that this results in the reduction of labor force. In order to stimulate economy, extending healthy life expectancy[3] is a common health issue worldwide.

2.4.2 Health insurance system

Reform of the health insurance system is one of the key objectives in the health system development concept. One aspect of health care reform is to encourage private sector participation in the insurance sector. The aim is to gather capital from the market through private sector participation and invest that money to stimulate economic growth. It also aims to improve the population's access to health care by introducing mandatory health insurance.

[3] Average number of years that a person can expect to live in "full health" by taking into account years lived in less than full health due to disease and/or injury. [Source: Healthy life expectancy (HALE) at birth, WHO (accessed: 25 January 2021)]

For the legal and regulatory framework concerning the introduction of compulsory health insurance, relevant legislation has been prepared and submitted to the Cabinet. In the Republic of Uzbekistan, a draft of the legislation "On Compulsory Health Insurance" was formulated and submitted to the Council of Ministers with an agreement with the relevant organizations in order to establish a regulating system for the introduction of mandatory health insurance. As of December 2020, this bill was for approval by the Administration of the President of the Republic of Uzbekistan. The legislation describes the approval of a strategy to improve the funding mechanism for the health care sector for 2020-2025, the creation of a mandatory health insurance fund, and the pilot introduction and national rollout of mandatory health insurance. With the support of WHO/Europe, a pilot project was started in the Syrdarya region in 2022. And then, the target areas are gradually expanding to other regions. On health care coverage available to people, it was stipulated in the Cabinet Decree "On approval of the regulations on the procedure for the formation of the list of guaranteed volumes of medical care covered by the state budget of the Republic of Uzbekistan (No. 832, 30 September 2019)." In addition, there is no charge for treatment of the diseases and the target population listed in the table below.

Table 2-15 Target diseases and patients of free medical care

Target Diseases/ Patients
1) Significant diseases with social impact (1) Tuberculosis (2) Oncological diseases, malignant new growths (3) Diseases, sexually transmitted diseases (4) HIV/AIDS (5) Leprosy (6) Mental diseases
2) Outpatient treatment for the following: (1) Patients with oncological diseases (2) TB patients (3) Patients with leprosy (4) Patients with endocrinological diseases (5) Patients with mental diseases (6) HIV-positive people (7) Persons who underwent an operation on prosthetics of the valve of heart and organ transplantation (8) Pensioners living alone who need outside assistance (9) Participants and disabled veterans of 1941-1945, and also persons equated to them (10) Members of the labor front in the years of war of 1941-1945 (11) Disabled people from among persons who were taking part in liquidation of the Chernobyl accident (12) Soldiers-internationalists (13) Persons of retirement age passing military service on nuclear test sites and other radiation and nuclear objects
3) Primary care
4) Emergency care

Source: Health Care Systems in Transition: Uzbekistan (2014), WHO

2.5 Development cooperation in the health sector

2.5.1 Japanese cooperation in the health sector

Japan and Uzbekistan have started to receive trainees and dispatch experts as ODA partners since the establishment of diplomatic relations in 1992. JICA has started grant aid projects in 1994 and loan aid projects in 1995. In particular, the healthcare sector is providing support with a focus on the provision of medical equipment. Regarding Japan's assistance to Uzbekistan, the basic policy (the main goal) is the "implementation of assistance to promote economic growth and reduce disparities."

Three priority areas (medium-term goals) are being implemented: (1) sustainable economic growth and industrial diversification and advancement, (2) building a fair and sustainable society, and (3) strengthening governance.

For health services, post-independence, the quality of health care has been affected by the decline in the technical level of health care workers and the outdated medical equipment due to a reduction in the national budget scale. There has been a qualitative shift from Soviet-style services to services based on economic rationality and cost reduction. There are also issues such as supporting the self-reliance of the disadvantaged socially vulnerable groups in the market economy. In response to these development issues, Japan's strategy is to provide technical assistance to improve the quality of medical care and support system improvement, with a view of preventive medicine as well. Japan also provides enhanced social welfare services such as support for people with disabilities.

Table 2-16 Japan's main assistance to Uzbekistan in the health sector

Scheme	Year	Project Name
Grant Aid	2022	Project for the Improvement of Medical Service at the Innovative Clinic under the Medical Institute of Karakalpakstan
ODA loan	2021	COVID-19 Crisis Response Emergency Support Loan
Technical Cooperation	2020	Project for Prevention and Control of Non-Communicable Diseases
Grant Aid	2015	Project for Improvement of Equipment of Navoi Regional Multidisciplinary Medical Center
Grant Aid	2015	Non-Project for Medical Equipment Grant Assistance
Technical Cooperation	2010	Project on Preventive Care Measures for Non-Communicable Diseases
Survey	2008	The Study on the Reform of Health Care Services in the Navoi Region
Grant Aid	2008	Project for Improvement of Equipment for National Center of Rehabilitation and Prosthesis of Invalids
Grant Aid	2007	Project for Improvement of Medical Equipment for Obstetrics and Gynecology Research Institute
Grant Aid	2006	Project for Improvement of Primary Medical Services in Tashkent and Djizak Regions
Technical Cooperation	2004	Nursing Education Improvement Project
Grant Aid	2002	Project for Improvement of Nursing Education System
Grant Aid	2001	Project for Upgrading the Emergency Medical System in Tashkent City
Survey	2001	The Study for Restructuring Health and Medical System

Sources: ODA Web page, JICA (accessed 26 June 2024),
Country Assistance Policy for Uzbekistan, Ministry of Foreign Affairs of Japan (accessed 26 June 2024)

2.5.2 Overview of assistance from other development partners

International assistance to Uzbekistan in the care healthcare sector has been provided by various organizations. In particular, the WHO and the World Bank have continued to assist Uzbekistan since its independence. At present, foreign assistance is mainly in the field of NCDs and emergency medicine. Additionally, there is a large amount of support from the ADB, the Republic of Korea, and the Kuwait Foundation for Arab Economic Development (KFAED). KFAED is also supporting the Andijan State Medical Institute and Samarkand State Medical Institute which are the target institutes of the Project. Since the early 2000s, the Government of Japan has provided grant aid for the development of facilities and equipment for a specialized hospital in Tashkent, and more recently for the development of equipment for the Navoi Regional General Medical Center, as well as a project to improve nurse education.

Table 2-17 Overview of assistance from other development partners

Organization	Project	Year	Amount (Thou.US$)	Overview
WHO	The Health 2020 policy framework	2012-	n/a	A wide range of activities aimed at improving population health and well-being, reducing health disparities, strengthening public health, and building universal, equitable, sustainable, and quality health systems.
UNICEF	Vitamin A Supplement Program	2017	n/a	Vitamin A supplements are distributed to children under 5 years old.
Global Fund	Strengthening of the Achieved Results and Supporting Measures on Elimination of Malaria in Uzbekistan	2010-2011	2,100	Material support to the National Epidemic Control Center, training of experts, provision of medicines, procurement of medical and non-medical equipment, and control of infectious diseases at the source of malaria transmission by mobile teams.
	Program to strengthen and expand DOTS due to the spread of multidrug-resistant Mycobacterium tuberculosis	2010-2014	12,100	Procurement of equipment, reagents, and medicines for the Republican Tuberculosis and Respiratory Institute, the Ministry of the Interior Prison Hospital, the Disciplinary Institution, and the State Tuberculosis Prevention Clinic. Purchase, training, and monitoring of tuberculosis drugs, reagents, laboratory consumables, food sets, and printed materials.
World Bank	Health System Improvement Project (Health 3)	2011-2019	101,000	The overall development objectives of the Health System Improvement Project are to improve access to quality health care at the primary level and RMUs; and to strengthen the Government's public health response to the rise in NCDs.
	Emergency Medical Services Project	2018-2024	100,000	The development objective of the Emergency Medical Services Project for Uzbekistan is to increase the effectiveness and efficiency of the emergency medical services (EMS) system.
Asian Development Bank	Prevention and Control of HIV/AIDS and Other Communicable Diseases in Central Asia Regional Economic Cooperation Countries	2013-2015	1,800 (Total 5 countries)	Strengthening of surveillance of infectious diseases to reduce the incidence of preventable infectious diseases such as HIV/AIDS in Central Asian countries.
	Primary Health Care Improvement Project	2016-2021	800	Strengthen the rural health sector by providing the Family Polyclinics with the latest diagnostic equipment and training medical personnel to expand their service offerings.
	Preparing the Integrated Perinatal Care Project	2019-2021	1,200	The project aims to improve the quality of medical services and expand the service area. In particular, the project supports the reduction of maternal and child mortality rates and the correction of medical disparities between rural and urban areas.

Organization	Project	Year	Amount (Thou.US$)	Overview
Kuwait Fund for Arab Economic Development	Medical Equipment Improvement Project for Medical School and Republic Hospital	n/a	22,000	The project aims to introduce the latest medical equipment to medical schools and national hospitals as part of the health sector financing project. Target facilities are medical schools and national hospitals in major cities.
KOICA	National Partnership Strategy	2016-2020	n/a	It has provided several supports for education, water and sanitation, and health, as well as for strengthening the administrative system. In the health sector, the focus is on community support for maternal and child health, including support for infectious disease control, supply of medical equipment and medicines for diagnosis and treatment of parasitic diseases, and training of medical personnel. In recent years, it has supported the construction of the National Children's Hospital.
KfW/ GIZ	National Tuberculosis Control Program IV	2008-2011	3,500	Supporting TB diagnostic capacity building for TB prevention clinics in Bukhara, Surkhandarya, Kashkadarya, Fergana, Khorezm, Namangan, and Tashkent provinces, the Tashkent TB and Respiratory Institute, and the Ministry of Interior prisons
	Advanced training for medical and technical professionals to work with modern high-technology equipment in Uzbekistan	2013-2018	n/a	Although high-tech medical equipment is now available, a shortage of skilled health workers is compromising service quality and delivery. To address this issue, GIZ and the MoH of Uzbekistan initiated the project “Advanced training for medical and technical professionals working with high-tech medical equipment.”
	Efficient use of advanced medical technology	2019-2023	n/a	Selected medical and technical services relating to the utilization and management of advanced medical technology have been improved in Uzbekistan.

Sources: Webpage of each donor agency

(1) World Health Organization (WHO)

The WHO Regional Office for Europe has proposed four priority policy actions as the Health 2020 policy framework. The four priority areas are to: 1) invest in health through a life-course approach and empower citizens, 2) tackle Europe’s major disease burdens of non-communicable and communicable diseases, 3) strengthen people-centered health systems and public health capacity, including preparedness and response capacity for dealing with emergencies; and 4) create supportive environments and resilient communities. The Uzbekistan Country Office also provides support in these areas as a priority area. Especially in the country, the rapid increase in the number of NCDs is a major health challenge, and the organization provides advocacy and technical assistance in this area. For COVID-19, which caused a global pandemic from the end of 2019, WHO is supporting the MOH to procure necessary supplies and monitor the cases.

(2) World Bank

The MOH has been implementing health system strengthening projects continuously since 1998, with a loan from the World Bank. The Health System Improvement Project (also named Health III Project), launched in 2011, aimed to strengthen facilities and human resources as well as optimize health financing at the primary healthcare healthcare levels and regional levels to serve the increasing number of patients with NCDs.

On the other hand, the objective of the development of the Emergency Medical Services Project for Uzbekistan launched in 2018 is to enhance the effectiveness and efficiency of the emergency medical system (EMS). The project supports emergency system management and enhanced monitoring and training of personnel engaged in EMS. In the scheme of the project, medical equipment, including CT scanners, was upgraded in each emergency center branch in 2022.

(3) Asian Development Bank (ADB)

Since the early 2000s, the Asian Development Bank has been supporting the maternal and child health sector, measures to control HIV/AIDS and other communicable diseases, and strengthening services in primary health care facilities. In addition to the above-mentioned service enhancements, the establishment of an e-health information system for universal access of the population, specified in "Uzbekistan, 2019-2023-Supporting Economic Transformation" published in 2019, is described as one of the goals by 2023.

(4) Kuwait Foundation for Arab Economic Development (KFAED)

KFAED's support for Uzbekistan, which covers a wide range of areas, has been ongoing since the country's independence. KFAED has recently conducted the "Equipping Clinics of Medical Higher Schools and Republican Clinical Hospitals with Modern Medical Equipment Project" as part of a loan project in the health sector. The project aimed to modernize the medical equipment of Republic Hospitals in Tashkent, Samarkand, and Bukhara. Target equipment includes radiological equipment such as MRI, CT, and other equipment, as well as ventilators and surgery-related equipment. In addition, the project also included training programs for specialists and health providers.

(5) Korea International Cooperation Agency (KOICA)

The Korean government has been aiding Uzbekistan since 1995 through the activities of the Korea International Cooperation Agency (KOICA). At present, as part of the Country Partnership Strategy (2016-2020), three priority areas of support are being provided: education, water management and health, and public administration. The health sector, in particular, focuses on community-level assistance on maternal and child health. It also supports the control of communicable diseases that cause maternal and child mortality, supplies medical equipment and medications for the diagnosis and treatment of parasitic diseases, and develops the skills of medical personnel.

2.5.3 Assistance from development partners related to COVID-19

As described in **Section 2.2.4**, the COVID-19 pandemic had a significant impact on the care healthcare system in Uzbekistan. Donor agencies have provided urgent support to Uzbekistan since early April 2020. The Presidential Decree "On measures to attract external assistance funds to support the population, budget, basic infrastructure, and business entities during the coronavirus pandemic" was promulgated on 22 April 2020. The following items are described in this Presidential Decree: 1) Strengthening the health system (USD 277.5 million), 2) Supporting entrepreneurs and the banking system (USD 700 million), 3) Supporting the public budget (USD 1.7 billion + EUR 150 million), 4) Ensuring rapid functioning of power

and energy companies (USD 300 million), and 5) Grant funding (USD 30.6 million). This assistance for COVID-19 countermeasures will be provided with support from foreign donors including Japan.

2.6 Outline of the Project

2.6.1 Relation to the national goals and overall health care system

In the "Uzbekistan 2030 Strategy," the Government of Uzbekistan indicates that it will work to improve health services to decrease premature deaths due to non-communicable diseases and to extend the life expectancy of the population to 78 years. Several health sector-related policies have also been set out in presidential decrees to improve the health system and strengthen the development and professionalism of the health workforce to provide a wide range of quality health services to NCDs and others. In Uzbekistan, there has been a shift in the epidemiological transition, with 84% of deaths in the population caused by NCDs. Under these circumstances, because of the economic and social impact of NCDs, the government has decided to take measures against the three major diseases which are ischemic heart disease, cancer, and stroke. For ischemic heart disease and cancer, the national specialty centers in the capital provide medical services as top referral facilities.

On the other hand, the modernization and advancement of stroke care have been weak. For this reason, it is essential to establish a new national specialized center for advanced medical care and to train personnel who can provide specialized medical services.

In addition, the medical research institutes in Samarkand and Bukhara are important tertiary care facilities in rural areas, but they are not able to provide sufficient medical services for NCDs and train personnel due to the lack of medical equipment and outdated equipment. In view of the above, it was decided to construct the Neurological Stroke Center and to install medical equipment for the facility, to upgrade the equipment of the Medical Research Institute of Bukhara and Samarkand, and to strengthen the medical service system for NCDs through strengthening the capacity of medical personnel.

2.6.2 Content of the Project

(1) Development of a medical facility in NSC

Establishment of the NSC in Tashkent, with a total number of 250 beds. The facility includes the following departments (see **Table 5-2** for details):

- Emergency Unit,
- Outpatient Clinic and Diagnostic Facilities,
- Inpatient Clinic - Medical and Surgical Units,
- Neurorehabilitation Center,
- Training Center and Scientific-Research Departments, and
- Administrative Section and Hospital Management.

(2) Procurement of medical equipment for BSMI, SamSMU 1 and 2

The target medical facilities are as follows:

- Newly established NSC (250 beds) in Tashkent,
- Bukhara State Medical Institute (BSMI) hospital (200 beds) in Bukhara,
- Multidisciplinary clinic of Samarkand State Medical University (SamSMU 1) (388 beds) in Samarkand, and
- Multidisciplinary Specialized Center of Pediatric Surgery (SamSMU 2) (200 beds) in Samarkand.

Procurement of medical equipment for the NSC includes equipment such as MRI, CT, Hybrid Operating room, X-ray machines, endoscopes, surgical equipment, rehabilitation equipment, and simulation equipment for carrying out the following objectives:

- Provision of diagnosis, treatment, and rehabilitation of neurological and related diseases as a Republican specialized medical facility
- Provision of preventive health services such as medical checkups to prevent stroke-caused lifestyle diseases, especially stroke
- Human resource development in the neurology field

Procurement of medical equipment for BSMI hospital, SamSMU 1, and SamSMU 2 includes equipment such as MRI, CT, X-ray machines, endoscopes, and surgical equipment for carrying out the following objectives:

- Provision of diagnosis, treatment, and rehabilitation of NCDs as tertiary hospitals in the regions
- Human resource development in the regions

(3) Consulting services

The consulting services include land condition survey (subsoil and geotechnical survey), basic and detailed design, bid assistance, construction supervision, and capacity building of medical personnel (hospital facility management, medical equipment maintenance, etc.).

3. Current condition of the NSC site

3.1 Geographical conditions

3.1.1 Location

The Project site is located in the center of Tashkent City. This location is at the intersection of Little Ring Road and Taraqqiyot Street, about 2 km east of Amir Temur Square. There are several metro stations near the site.

Source: JICA Study Team

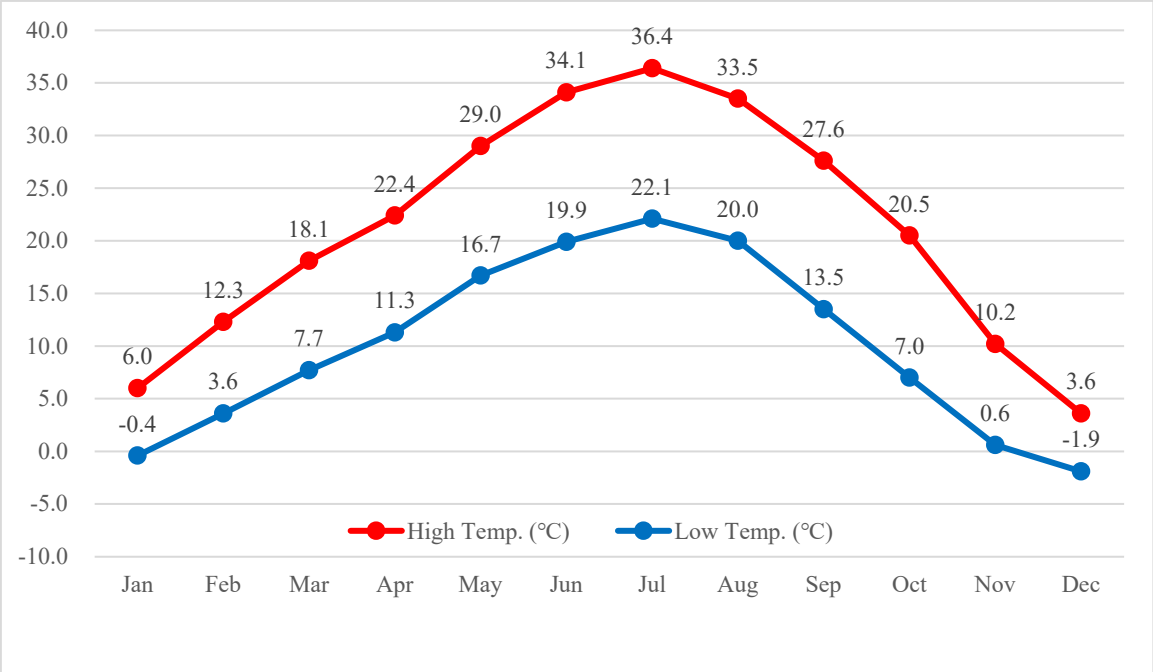
Figure 3-1 Project site map

3.1.2 Natural conditions

(1) Climatic conditions

Tashkent's climate is continental, with a large temperature difference between winter and summer. It has four seasons, with a short spring and autumn, a hot, dry, and sunny summer, and very cold, sometimes cloudy winters. Temperatures range from -2°C to 36°C throughout the year. The record high temperature

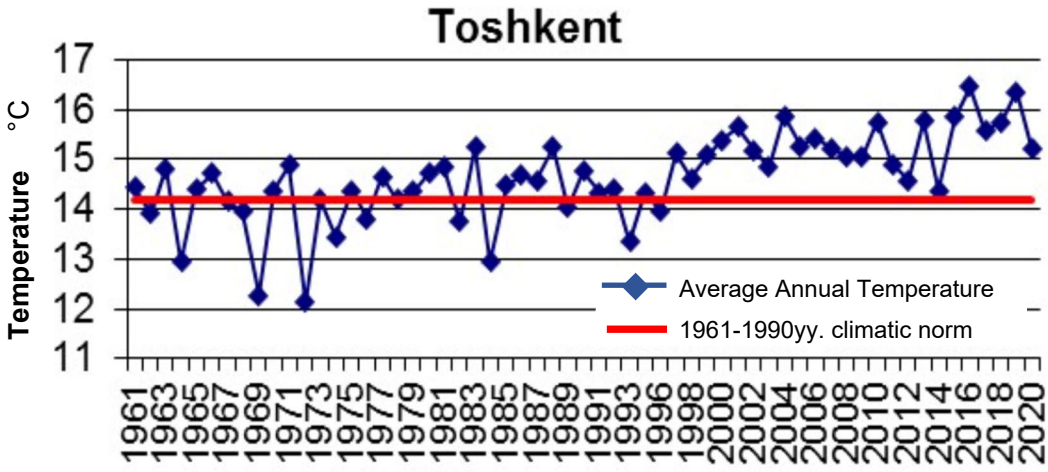
is 45°C, and the annual average temperature has risen by about 1.5°C in 20 years, so it is possible that there will be more days with temperatures over 40°C.



Source: Japan Meteorological Agency 2021

Figure 3-2 Average monthly highest and lowest temperatures in Tashkent, Uzbekistan in 2020

As Uzbekistan is a landlocked country, there are large annual and diurnal variations in temperature, with extremely cold or hot days and hours. It is, therefore, necessary to take these exceptions into account when designing buildings and air conditioning systems. The following table shows the long-term changes in the average annual temperature in Tashkent.



Source: Republic of Uzbekistan Hydrometeorological Service Center

Figure 3-3 Long-term changes in the average annual temperature in the regional centers of Tashkent

According to the data book “Building Climatology 23-01-2013,” which is a collection of meteorological data for building design in the countries and regions of the former Soviet Union, the following records are available for the city of Tashkent regarding the specific days of the cold and hot seasons.

In the periods of observation from 1881 to 1985

- Minimum temperature that has a 2% chance of occurring in cold weather: -19°C
- Minimum temperature that has a 6% chance of occurring in cold weather: -16°C
- Historical minimum temperature: -30°C
- Average daily temperature difference in the coldest month: 9.6°C
- Average temperature during the coldest period (129 days): 2.7°C
- Temperature over 2% of the warmest period: 37.5°C
- Temperature in the 5th percentile of the warmest month: 33°C
- Average maximum temperature in the hottest month: 35.4°C
- Historical maximum temperature: 45°C
- Average daily temperature difference in the hottest month: 16.8°C

In addition, the monthly and annual average temperatures in Tashkent, as stated in this data book, are listed in the table below with an average annual temperature of 13.6°C. Buildings and air-conditioning systems should be designed for cold climates.

Table 3-1 Average monthly and annual temperatures (ºC) in Tashkent, Uzbekistan

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Average Temperature (ºC)	-0.4	2.0	7.9	14.7	20.2	24.9	27.1	25.1	19.6	12.8	6.7	2.0	13.6

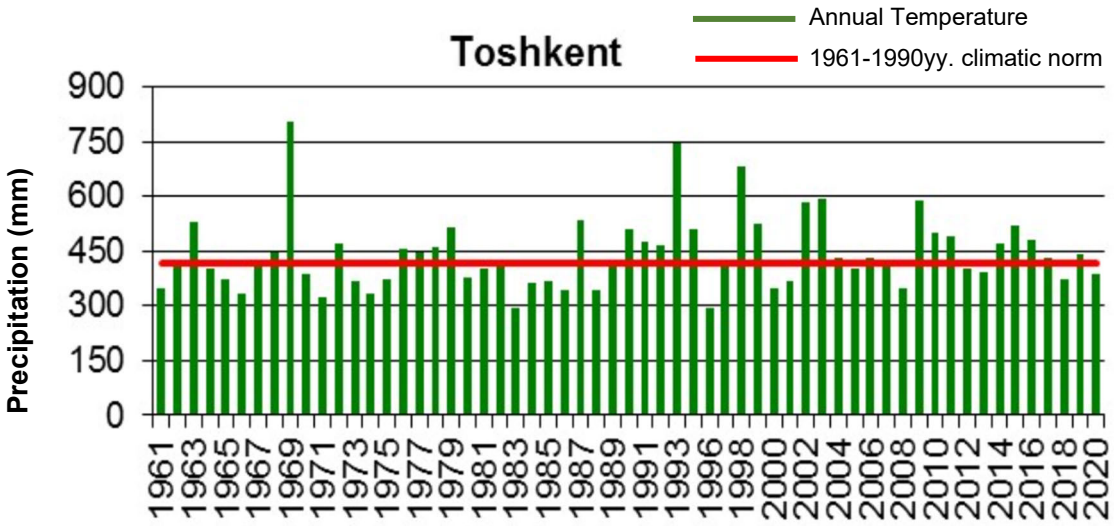
Source: Building Climatology 23-01-2013

The average precipitation, wind direction, and wind power in Tashkent are shown below. The annual rainfall is relatively low (200-300 mm), but according to the "Building Climatology 23-01-2013,” the city has recorded rainfall of 50 mm per day in the past, and there is a possibility of torrential rains on rare occasions. There is a north-easterly prevailing wind, which is stronger in summer than in winter. **Figure 3-4** shows the long-term changes in annual precipitation, with occasional years of nearly double the annual precipitation of a full year appearing. Tashkent has a north-easterly prevailing wind, with steady strong monsoon winds from December to April and calm winds from June to October. **Figure 3-5** shows the monthly wind speed distribution, with winds rarely exceeding 28 km/h in February and March. As shown in **Table 3-2**, there is snowfall in winter, but even in the heaviest months of January and February, it is only 7 cm per month.

Table 3-2 Amount of Rainfall in Tashkent, Uzbekistan

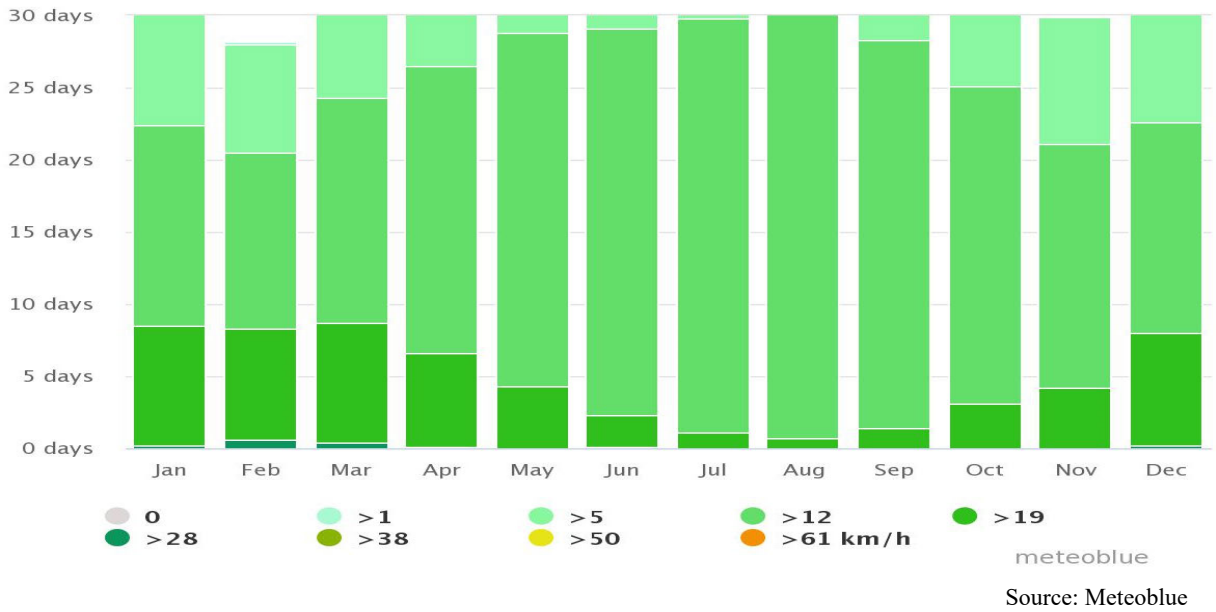
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Amount of Rainfall (mm)	53	51	75	61	36	12	5	2	4	28	46	56
Amount of Snowfall (mm)	7	7	3	0	0	0	0	0	0	0	3	5
Wind Direction (Prevailing wind)	East	East	East	East or North	North	North	North	North	North	East or North	East	East
Wind Speed (km/h)	8.2	8.8	9.3	9.7	10.3	11.4	12.0	11.4	10.3	9.2	8.3	8.0

Source: Weather Spark (https://weatherspark.com/)



Source: Republic of Uzbekistan Hydrometeorological Service Center

Figure 3-4 Long-term change in annual precipitation in the regional centers of Tashkent



Source: Meteoblue

Figure 3-5 Wind speed and number of days of occurrence for each month

Information on recent disasters in Uzbekistan caused by heavy rains and strong winds is shown below, and these exceptions should be considered.

Table 3-3 Report on Disasters in Uzbekistan

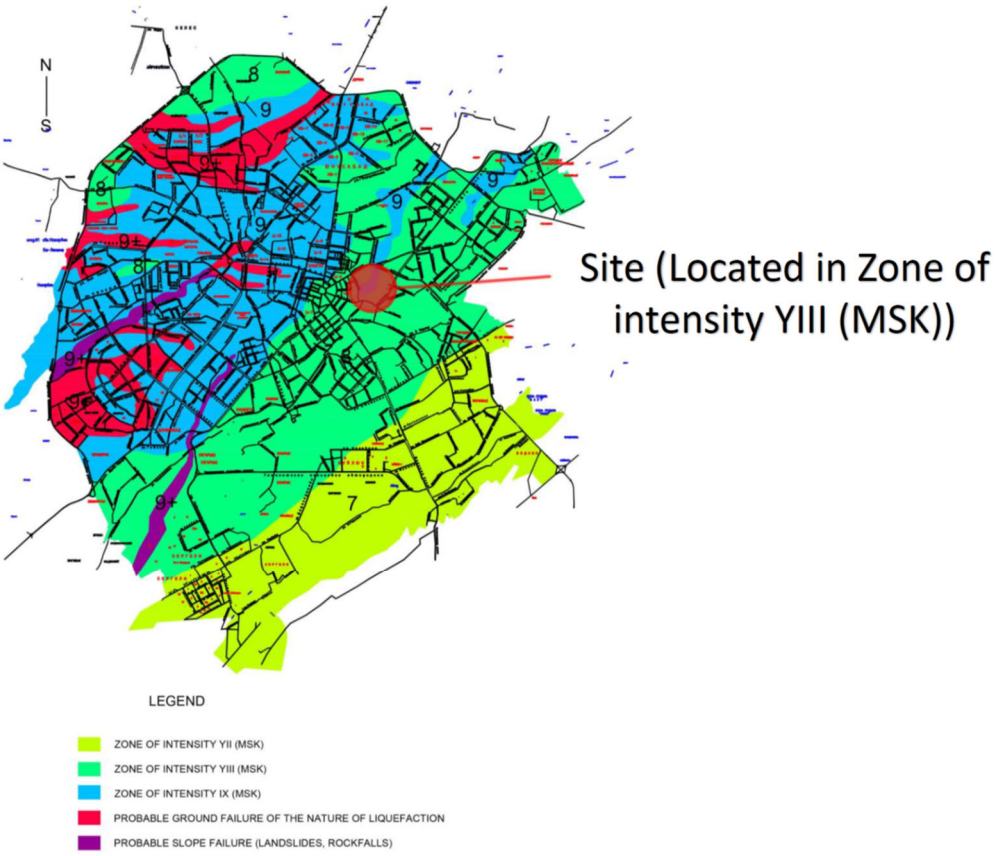
	Disaster Type	Occurrence Date	Overview
Report 1	Flood	2020/05/01	Torrential rains and strong winds overflowed the Sardoba dam reservoir, located near the border between northern Uzbekistan and southern Kazakhstan, causing damage. According to reports, 50 people were injured and at least 70,000 people in 22 villages in the Syrdarya region were displaced in Uzbekistan.
Report 2	Flood, Landslide	2021/07/13	Uzbekistan authorities said eight people were killed and six people were heavily injured. In a mudslide caused by heavy rains on the border between Uzbekistan and Kyrgyzstan.

Source: Asian Disaster Reduction Center (ADRC) (https://www.adrc.asia/)

(2) Seismic risk

Tashkent's seismic zoning map designates the proposed construction site as Zone VIII, shown in the figure below. This means that the maximum expected seismic intensity in the site is estimated to be a level VIII of the Medvedev–Sponheuer–Karnik (MSK) scale. Earthquakes with level VIII intensity of MSK scale are described to be "damaging," in which many people find it difficult to stand even outdoors, furniture may be overturned, waves may be seen on very soft ground, large cracks and fissures may open up, rock falls may occur, and older structures may partially collapse or sustain considerable damage. Compared to the Japan Meteorological Agency (JMA) Seismic Intensity Scale, level VIII in the MSK scale is equivalent to level 5, or lower in the JMA scale[4].

[4] The formula applied for MSK 5-8 is M = 1.5J+0.75, where M is the MSK intensity and J is the JMA intensity. Source: Takuzo Hirono, Kaoru Sato, (1971) MSK Intensity Scale as Compared with JMA Intensity Scale, Papers in Meteorology and Geophysics Vol. 22, Nos. 3-4, pp. 177-193, November 1971.



Note 1: creating a seismic-resistant design, the seismic code KMK 2.01.03-96: "Norms and Regulations for Construction in Seismic Zones" is being referred to. The present norms establish the requirements for designing and constructing new and reconstructed buildings in areas with seismic intensities of VII, VIII, IX (in MSK-scale), and more.

Note 2: The proposed construction site is not located in an area categorized as "Probable Ground Failure of the Nature of Liquefaction" and "Probable Slope Failure (Landslides, Rockfalls)."

Source: JICA Study Team

Figure 3-6 Seismic zoning of Tashkent territory in points

3.2 Status of the construction site

3.2.1 Access and on-site traffic

The proposed construction site is located in the combined campus of the Tashkent State Dental Institute and Tashkent State Medical Academy 3 (hereinafter collectively referred to as "the Medical Academy") facing "Small Ring Road" approximately 30 meters wide. There is a traffic light in front of the entrance and a gate at the entrance. The land level of the site is about 1 meter lower than the road, and there is a downward slope from the gate to the site. The existing parking lot and roads on campus are crowded because many cars access the Academy from this entrance.

The nearest metro station is Khamid Alimdjan, which is about a 20-minute walk via the adjacent park (Mirzo Ulugbek Recreation Park). The local bus services are also used as a means of transportation to the hospital because the buses stop in front of the entrance gate.

Small ring road in front of the entrance

Entrance gate and parking lot on campus

Source: JICA Study Team

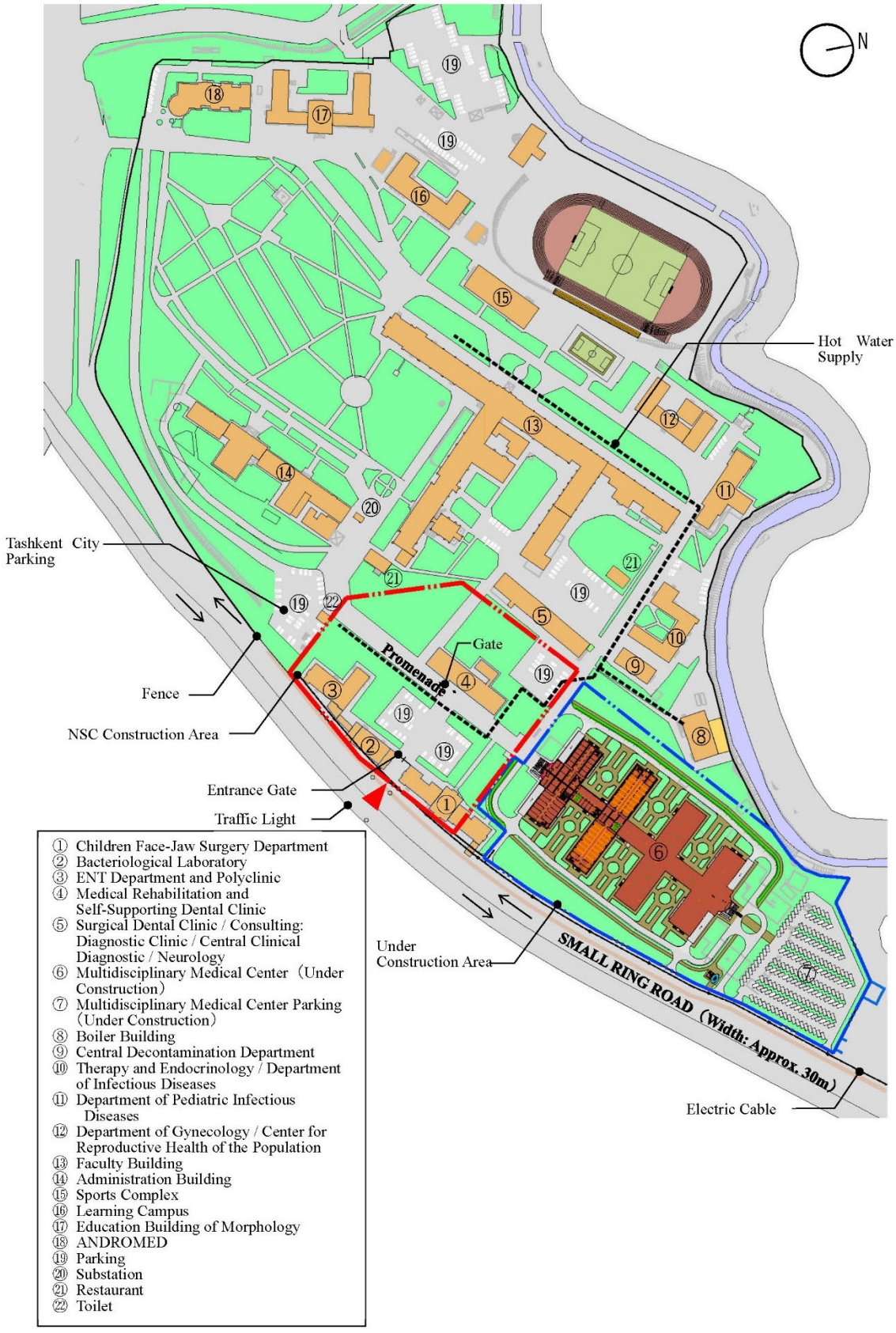
Figure 3-7 Proposed construction site

3.2.2 Site boundary

An area of 2.4 hectares has been allocated for the construction of the NSC within the premises of the Medical Academy by presidential decree, and the area in the red frame in the figure below has been determined within the MOH. It has been confirmed in consultation with Tashkent City that the construction site is located on land owned by MOH and no new site registration is required for the project, only notification of the site boundary of the NSC facility from MOH to Tashkent City is required. After the confirmation of the site boundary, archived data on infrastructure, etc. will be provided by Tashkent City. There are no plans to widen or change the alignment of the road in front of the site, except for the installation of sidewalks on the current road. Currently, the MOH is in the process of registering the land.

Source: MOH

Figure 3-8 Site boundary



Source: JICA Study Team

Figure 3-9 Campus map

3.2.3 Existing facilities

(1) College facilities

Most of the campus is occupied by the facilities of the Tashkent State Medical Academy 3 (see Figure 3-10). The faculty building (picture no. 1 in **Figure 3-11**) is a historical building constructed during the Imperial Russian era, and there are walkways with lush greenery around it (picture no. 2 in **Figure 3-11**).

Source: JICA Study Team

Figure 3-10 Layout of the existing buildings

(2) Multidisciplinary medical center

Initially planned as a hospital affiliated with the Tashkent State Dental Institute, it was converted into a 600-bed multidisciplinary medical center (pictures no. 3 and 4 in **Figure 3-11**). Reinforced concrete structure, a half-basement, and four stories above ground. The center has a capacity of 600 beds and more than 200 types of outpatient and inpatient medical services such as surgery, intensive care, eye microsurgery, general therapy, nephrology, pulmonology, hepatology, allergology, cardiology, vascular surgery, cardiac resuscitation, dentistry, gastroenterology, endocrinology, and other specialized areas will be provided.

(3) Tashkent City's parking

A parking lot adjacent to the proposed site of the NSC will be provided. It is owned by the city of Tashkent and can be accessed without passing through the academy campus. It is separated by a fence and gate but can be used from the academy campus. There is a public toilet adjacent to the parking lot (picture no. 5 in **Figure 3-11**).

(4) Hot water pipeline

There is a hot water supply system that is owned and managed by the Medical Academy, and its supply and return pipes are laid in pairs above ground and diverted underground or above to cross the road (picture no. 6 in **Figure 3-11**). The pipeline in the NSC site needs to be relocated and removed before construction starts.

The current hot water supply system mainly provides hot water (20°C to 25°C) for heating in winter, but the main facility is being upgraded to increase capacity and temperature. The fee for the use of hot water is paid to the Medical Academy. It is recommended by the government that public facilities should have their own energy centers for emergency response.

(5) Existing buildings in the proposed NSC construction site

There are three existing buildings on the proposed site of the NSC, which are used for outpatient, laboratories, and rehabilitation. All these facilities need to be relocated or demolished for the construction of the NSC.

1) Bacteriological laboratory building

It faces the road and is located on the left side of the entrance (picture no. 7 in **Figure 3-11**). It is a one-story building connected to the outpatient building of the ENT Department. It belongs to the Tashkent State Medical Academy 3.

2) ENT department and polyclinic building

It is a classical two-story building with traditional brickwork (picture no. 8 in **Figure 3-11**). Some of the brick arches are on the verge of collapsing, which could be dangerous if left unattended. As there are traces of renovation in several places, it is considered to be of low value as a historical heritage.

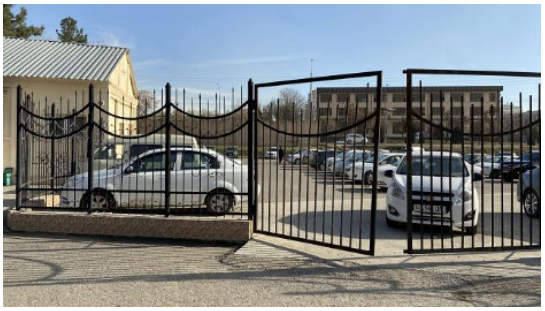
3) Medical rehabilitation and self-supporting dental clinic

It is right across from the entrance gate (picture no. 9 in **Figure 3-11**). It is a one-story brick building, which seems to be a combination of two buildings. It belongs to the Tashkent State Medical Academy 3 and provides rehabilitation of physical functions through massage and physical therapy.

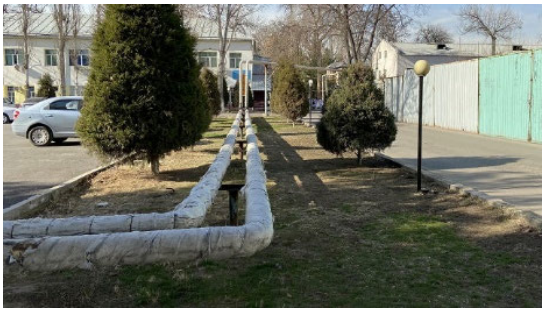
1. Historical buildings (Faculty Buildings)

2. Green space and promenade on campus

3. Exterior view of the NSC side



4. Tashkent City's parking



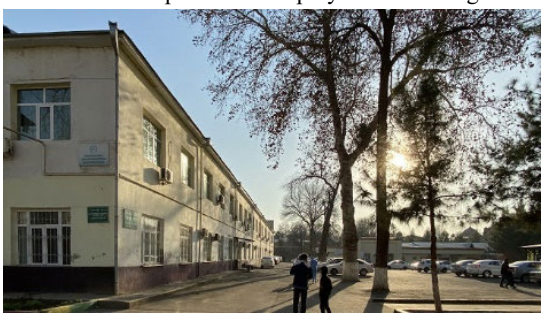
5. Hot water pipeline

6. Boiler building

7. Bacteriological laboratory building

8. ENT department and polyclinic building

9. Medical rehabilitation and self-supporting dental clinic



10. Surgical dental clinic / Consulting: Diagnostic clinic / Central clinical diagnostic / Neurology

Source: JICA Study Team

Figure 3-11 Existing buildings at the proposed NSC construction site

3.2.4 Soil condition

At present, the boundary of the NSC site has not been determined. A topographic survey at the site where the building is to be constructed has been conducted, but a geological survey has not been conducted. Therefore, the geological conditions of the site are analogized from the geological survey report (hereinafter referred to as "the report") of the Multidisciplinary Medical Center (former Dental Institute), which is under construction on the adjacent site.

In the report, 12 soil samples were extracted from the construction site of the Multidisciplinary Medical Center and analyzed for chemical and physical properties through laboratory soil tests. The soil composition and estimated bearing capacity are as follows:

Table 3-4 Soil composition and bearing capacity at the construction site of Multidisciplinary Medical Center

No.	Soil Name	Depth (m)	Expected Bearing Capacity (kPa)
1	Embankment (Debris Mixing)	0～1.0	-
2	First Cohesive Soil Layer	0.5～7.2	70～280
3	Second Cohesive Soil Layer	3.5～7.5	300
4	Sand Layer Mixed with Gravel	Unevenly distributed between No. 3 and No. 5	500 (Maximum)
5	Sand Gravel Layer	6.1～	600 (Maximum)

Source: Prepared by the JICA Study Team based on the geological survey report of the Multidisciplinary Medical Center

According to the report, approximately 1 m from the ground surface is a layer of embankment containing household garbage and construction materials, which is not expected to provide bearing capacity. The first cohesive soil layer, which is distributed within 7.2 m from the ground surface, has varying survey values, and the possibility of ground subsidence has been pointed out. In case this layer is used as a bearing layer, it is necessary to confirm the bearing capacity by load tests and then select an appropriate foundation. The second cohesive soil layer appearing in the depth range of 3.5 m to 7.5 m has a ground bearing capacity of approximately 300 kPa, and it is possible to set the area around 5 to 6 m from the ground surface as the supporting ground. The sand layer mixed with gravel, which is unevenly distributed in the first and second cohesive soil layers, consists of coarse sand including gravel, and has a high bearing capacity, and it is an intermediate layer with thin thickness. The sand gravel layer deeper than 6.1 m is a sandy soil containing gravel and cobbles and possesses a high ground bearing capacity, and design ground bearing capacity up to about 600 kPa can be expected. Groundwater has been identified at a depth of 7.5 m or more below the ground surface, and the freezing depth is 0.7 m.

Based on the above, assuming that the geological conditions of the NSC are the same as those of the neighboring land, it is possible to construct the NSC with spread foundations because there is a solid supporting ground at a relatively shallow depth (5 to 6 m) from the ground surface. However, water sealing and drainage may be necessary when excavating more than 7 m below ground level. In addition, it is advisable to lay the foundations of structures and water pipes deeper than 0.7 m to avoid freezing the ground in winter.

In the detailed design of the NSC, it is necessary to carry out the same geological investigations and loading tests on the bearing soil within the construction site.

3.2.5 Infrastructure

(1) Electric power

In Tashkent City, the power distribution voltage to buildings is 6 or 10 kV and the power is supplied by an underground cable system. The power cable installation is to be done by the power company Uzbekenergo. In Tashkent City, power outages are increasing due to the rise in energy consumption, and outdated wiring and transformers. To ensure the safety of hospital operations, a stand-by power generating system is needed.

(2) Telecommunication

Telephone and LAN cables are supplied directly by the provider companies. Major 3 internet providers in Tashkent are as follows:

- Uzbektelecom
- Technoprosistem LLC
- Turon Telecom

(3) Water supply and drainage

The water supply and drainage are to be installed by the Tashkent Municipal Water Supply Corporation (Vodokanal). The average volume of water supplied to Tashkent per day is 2,066,616 m^3 while the number of water users is 2,309,000. Water supply to the city of Tashkent is carried out from seven water intake facilities, with an actual capacity of 2,100 thousand m^3/day. Liquid chlorine and sodium hypochlorite are used for water purification. Residual chlorine bound 0.8-1.2 mg/dm^3.

There are several sewage treatment plants in Tashkent City. All these are equipped with a full range of biological treatments, including disinfection of wastewater treated with sodium hypochlorite. Cleaning quality meets basic regulatory requirements. The water quality standards of the effluent are in accordance with the norms listed in the attachment - SanPiN RUz No. 0172-06 (СанПиН РУз № 0172-06).

(4) City gas supply

City gas will be newly laid and used as a heat source for heating and hot water supply. The natural gas will be piped and connected by the Tashkent City Corporation (Tashgaz).

3.2.6 Applicable regulations to the Project site

The Project will comply with local building and fire codes/standards for the construction of the new hospital. The major regulations for the construction of the new hospital are shown below.

- Green area: According to Clause 2.12 of SanPiN 0292-11 Sanitary Rules and Norms for Designing, Construction, and Operation of Medical and Preventive Institutions, at least 50% of the total site

area of the Tashkent State Dental Institute and Tashkent State Medical Academy 3 is required to be a green area.

- Road around the building: According to Clause 7.1a and 7.2 of the normative act, SHNK 2.01.02-04 Fire Safety of Buildings and Structures, there must be access road around the building for fire truck to approach the building in case of fire disaster.
- Maximum floor height of the uppermost floor: According to Clause 7.10 of the normative act, SHNK 2.01.02-04 Fire Safety of Buildings and Structures, elevation of the uppermost floor should not be higher than 28 meters. Here, the uppermost floor means the highest floor with rooms where people regularly use and rescue activities are required in case of fire.
- Other related building regulations, standards, and codes are shown in **Appendix 1**.

4. Concept for the development of the NSC

4.1 Role and position in the national goals and health care system

The Government of Uzbekistan decided to establish the Republican Neurological Center which will provide a continuum of medical services, from prevention to rehabilitation for stroke sequelae, through the issuance of "Presidential Decree No. 3925 on measures to improve neurological assistance to the population" dated 30 August 2018. The following table shows the outline of Presidential Decree No. 3925 on measures to improve neurological assistance to the population.

Table 4-1 Outline of "Presidential Decree No. 3925 on measures to improve neurological assistance to the population"

No.	Outline
1	Improvement of regulatory framework to improve medical service in the field of neurology
2	Improvement of preventive measures and early diagnosis of neurological disease including stroke
3	Promotion of human resource and international cooperation in the field of neurology
4	Development and introduction of new technology for prevention, diagnosis, and treatment of neurological disease including stroke, and implementation of basic, advanced, and innovative training
5	Strengthening of the medical technology base through collaboration with medical institution related to neurological diseases.

Source: Presidential Decree No. 3925, dated 30 August 2018

4.2 Management system and budget

The annual operating cost had been planned as of June 2021, but due to the outbreak of COVID-19, it had been difficult to allocate the originally planned budget. It will be planned at the period of opening preparation by the MOH. Regarding medical fees, emergency and urgent care treatment cases in the hospital are free of charge. However, diagnostic examinations, inpatient care, outpatient care, consultation, non-emergency catheterization and other treatments are being considered as chargeable services. This insurance service was planned to start by the end of 2022; however, it is not started yet as of September 2024 (see "**2.4.2 Health insurance system**").

4.3 Basic concept on medical services provision

- The considerations taken in planning the basic concept on the medical services provision are as follows:
- Implement international standards for diagnosis and treatment for neurological diseases and stroke.
- Reduce existing morbidity, disability and mortality risks.
- Carry out stroke preventing measures in a more effective manner.
- Reduce the number of visits of Uzbekistani to foreign clinics.
- Establish a system for the provision of neurological rehabilitation care and provide facilities and equipment for continuous and specialized rehabilitation from the acute to the recovery phase.
- Establish a 24-hour, 7 days a week emergency unit.

- Establish a clinical laboratory and diagnostic imaging department that can quickly and accurately diagnose stroke and neurological diseases.
- Develop an intensive care unit, including a Stroke Care Unit (SCU).
- Develop a surgical department including a hybrid operating room, an endoscopic operating room, and a cerebrovascular interventional department.

4.4 Basic concept for medical personnel training

- The considerations taken in planning the basic concept for the medical personnel training are as follows:
- Establish a Simulation Center and Surgical Training Laboratory, including a cadaver laboratory, and become unique in the region.
- Establish a Scientific Education Department which offers a destination for learning and sharing of knowledge through hands-on workshops and surgical training programs hosted by the medical industry and national or international professional organizations.
- Establish training and education for all members of the health care team and for medical students.
- Develop research together with specialists from Japan.

4.5 Basic concept for maintenance and operation

- The considerations taken in planning the basic concept for maintenance and operation are as follows:
- Create a "healing environment" as well as treatment functions.
- Create a safe and easy-to-use building with consideration for people with disabilities and promote a universal design that allows all hospital users to use shared spaces in a comfortable and safe manner.
- Create a comfortable work environment for all medical staff.
- Create functional departmental arrangement, efficient flow planning, and classification of clean and soiled linen.
- Consider introduction of IT environment to improve business efficiency and medical quality.
- Establish a self-sustainable facility system that can provide medical care even in the event of disaster such as earthquake.
- Reduce energy consumption and environmental impact as much as possible and make the facility easy to maintain.
- Establish flexibility and expandability to respond to future medical needs and technological advances.

4.6 Target diseases

Stroke, rehabilitation for stroke sequelae, central nervous system disorders, peripheral neuropathies, muscular disorders, and others are target diseases in NSC. However, brain tumor and trauma cases will not be received in NSC, and it will be referred to in other republican specialized hospitals.

For patients of stroke or other neurological diseases that need urgent treatment, a mechanism to receive patients based on their geographic location will be considered. It is being considered that they will be accepted to the Republican Emergency Center, Tashkent Medical Academy Hospital, or the NSC, according to their geographic location.

4.6.1 Allocation of roles with other national medical centers

Table 4-2 Demarcation between NSC and other republican medical centers for neurological surgery

Diagnosis and specialized care of disorders	NSC	Republican Research Center of Neurosurgery (National Neurosurgery Center)	Republican Emergency Care Research Center	Republican Specialized Scientific-Practical Medical Center of Therapy and Rehabilitation	Republican Oncology Research Center
Stroke & other urgent neurological cases	X	X	X		
Neurological pathologies					
• Movement disorders	X	X			
• Neurovascular diseases	X				
• Epilepsy	X	X			
• Demyelinating disorders	X				
Neurorehabilitation					
• Early post-stroke recovery	X		X		
	X				
• Programmed rehab	X			X	
• Outpatient rehab					
Cerebrovascular disorders					
• Aneurysm	X	X	X		
• AVM	X	X	X		
• Stroke	X		X		
• Carotid artery diseases	X		X		
Spinal disorders	X	X	X		
• Acute trauma					
• Degenerative disease					
• Spinal cord tumors					
• Spine tumors					

Note:

The above is the planned demarcation after the establishment of NSC. Currently, about 40% of stroke cases in Tashkent are handled by the National Emergency Center, while the rest is handled by public city hospitals with inadequate medical equipment. Other cases are also in a similar situation without a centralized system.

Source: Data from NSC

4.6.2 Medical departments

The NSC will cover hemorrhagic or ischemic stroke, rehabilitation for stroke sequelae, epilepsy, dementia, central nervous system disorders such as Alzheimer's and Parkinson's diseases, peripheral neuropathies such as Guillain-Barre syndrome, and muscular disorders such as muscular dystrophy. For those diseases, medical and surgical treatment will be provided in the NSC. The following departments for inpatients shall be established.

Table 4-3 Departments to be established for inpatients

No.	Inpatient Department
1	Department of Angioneurology
2	Department of Multiple Sclerosis and Demyelinating Disorders
3	Department of Peripheral Neural Disorders
4	Department of Epilepsy
5	Department of Neurorehabilitation
6	Department of Early Post-Stroke Recovery
7	Department of Neurosurgery
8	Department of Vascular and Interventional Neurosurgery
9	Postoperative Recovery (POR)
10	Intensive Care Unit (ICU)
11	Stroke Care Unit (SCU)
12	Emergency Ward

Source: Data from NSC

Neurological disease often shows various symptoms related to cardiology, endocrinology, ophthalmology, urology, otolaryngology, psychology, etc. Therefore, differential diagnosis by a specialized outpatient clinic is essential. Pediatric practice is generally complicated, therefore, a specialist is needed. The following departments for outpatients shall be established.

Table 4-4 Departments to be established for outpatients

No.	Outpatient Department
1	Department of Neurology
2	Department of Neurosurgery
3	Department of Cardiology
4	Department of Endocrinology
5	Department of Ophthalmology
6	Department of Urology
7	Department of Otolaryngology
8	Department of Psychiatry
9	Department of Pediatrics

Source: Data from NSC

4.6.3 Medical service coverage area

(1) Specialized medical service

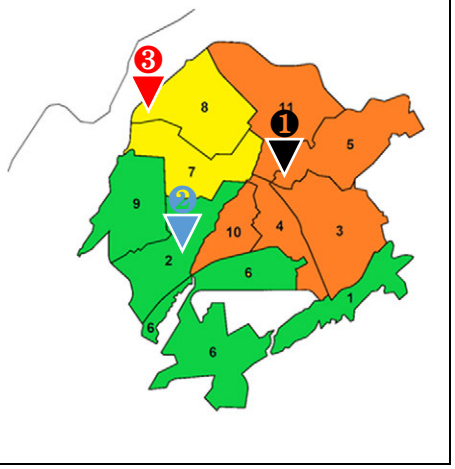
As the NSC will be at the top of the referral system, the entire country is its specialized medical service areas. Furthermore, in the future, regional centers for providing stroke care will be established in each region under the NSC like emergency centers and oncology centers.

(2) Emergency medical service

For emergency patients, the service area of the NSC is limited to Yashnabad District, Mirabad District, Mirzo Ulugbek District, Yakkkasaroy District, and Yunusabad District in Tashkent City as shown in the table below.

Table 4-5 Geographically distributed demarcation in Tashkent for stroke and other urgent neurological emergency cases.

Institution	District
(1) NSC	3. Yashnabad
	4. Mirabad
	5. Mirzo Ulugbek
	10. Yakkkasaroy
	11. Yunusabad
(2) Republican Emergency Care Research Center	1. Zangiota
	2. Chilanzar
	6. Sengeli
	9. Uch-Tepa
(3) Clinic of Tashkent Medical Academy	7. Shaykhontokhur
	8. Olmazor



Source: Data from NSC

4.7 Estimated number of patients

The annual number of patients is expected to be 80,000 for outpatients, 11,000 to 12,000 for inpatients, and 3,000-4,000 for emergency patients. The number of patients by disease is expected to be 1,400 for hemorrhagic stroke, 2,500 for ischemic stroke, 25,000 for central nervous system disorders, and about 20,000 for peripheral neuropathy.

Table 4-6 Expected annual number of patients in NSC

Patient type	Expected annual number of patients
Outpatient	80,000
Inpatient	11,000 ~ 12,000
Emergency patient	3,000 ~ 4,000

Source: Answers to Questionnaire by MOH

Table 4-7 Expected annual number of patients at NSC by disease category[1]

Category	Expected no. of patients	Actual no. of patients in Uzbekistan (2019)	% of the patients in Uzbekistan covered by NSC
Hemorrhagic stroke	1,400	9,100[2]	15%
Ischemic stroke	2,500	28,900[2]	8.7%
Central nervous system disorders	25,000	300,000	8%
Peripheral neuropathy	20,000	500,000	4%
Spinal Cord Disease	1,200	2,000	60%
Myopathy	1,000	1,500	67%

Note: The expected annual number of patients mentioned in **Table 4-6** includes other diseases such as neurogenic infection, head trauma, etc.

Source: [1] Based on answers to the Questionnaire by MOH
[2] Estimated data (2020) based on MOH statistics

4.7.1 Expected average number of general outpatients per day at NSC

Three hundred twenty outpatients per day are expected on the average and 480 outpatients will be expected on the busiest days, considering the following reasons:

- 80,000 outpatients per year (see **Table 4-6**)
- 250 days of operation per year
- 80,000 persons / 250 days = 320 persons are estimated for the average number of daily outpatients.
- Patients on the busiest days will be about 1.5 times of the number during normal days.

4.7.2 Expected average number of emergency patients per day at NSC

Eleven emergency patients per day are expected on the average, and 22 emergency patients will be expected on the busiest days, considering the following reasons:

- 4,000 emergency patients per year (see **Table 4-6**)
- 365 days of operation per year
- 4,000 persons / 365 days = 11 persons are estimated for the average number of daily emergency patients
- Patients on the busiest days will be 2 times of the number during normal days.

4.7.3 Necessary number of inpatient beds at NSC

A total of 250 beds is required for inpatient care, considering the following reasons:

- 11,000 new admission inpatients per year (see **Table 4-6**)
- 7 days for average Length of Stay (ALOS)
- 85% for expected occupancy rate of hospital beds
- 11,000 beds x 7 days / 365 days / 0.85 = 248 beds → 250 beds are estimated as the necessary number of beds

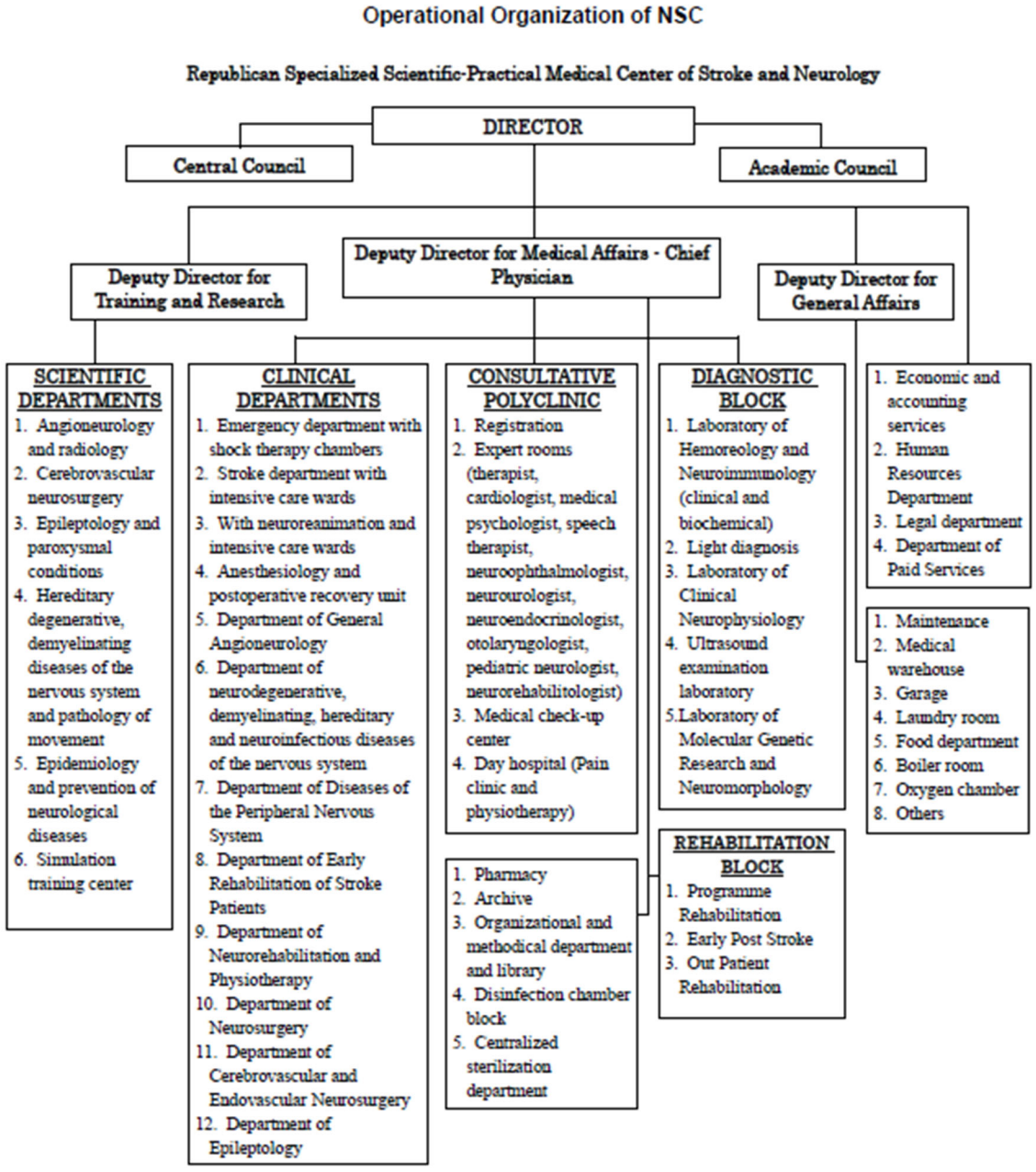
5. Concept of operation and facility plan for the NSC

5.1 Operation and maintenance management system

5.1.1 Operational organization

The operational organization structure of the NSC planned by the MOH is shown in the following figure. Refer to **Section 5.2**

For detailed operation plan and required facilities.



Source: Answer from NSC Director

Figure 5-1 Organizational plan of the NSC

5.1.2 Personnel plan

It is assumed that specialists such as neurologists, neurosurgeons, nurses, radiologists, and other medical and general staff should be allocated as shown in the table below. The personnel shall be procured and deployed 6 months before the NSC opens.

The recruitment of doctors is based on a comprehensive evaluation of their domestic and international work experience and training in the related field they have completed. In addition, neurosurgeons, neurologists, neurosurgical rehabilitators, anesthesiologists, and radiologists are required to undergo a certain amount of training at overseas hospitals, national neurosurgical centers, and national emergency centers.

The medical personnel required by the NSC should be trained in the Training Center attached to the NSC. Technical cooperation from Japan might be considered during preparation for and after the opening of the hospital.

Table 5-1 Human resource allocation plan

Role	Number
Neurologist	35
Neurosurgeon + Duty Neurosurgeon	17
Shift Neurologist	7
Nurses	250
Radiologist	5
Medical Engineer	18
Operating Rooms / Physiotherapy	40
Administration	18
Anesthetist-Resuscitator	4
Functional Diagnostics Doctor	1
Cardiologist	1
Psychiatrist	1
Neurologist	1
Neuro-Endocrinologist	1
Otolaryngologist	1
Speech Therapist (ST)	2
Physical Therapist (PT)	12
Occupational Therapist (OT)	6
Neurophthalmologist	1

Note: Personnel Allocation Plan of NSC shall be consistent with NSC Operational Organization.

Source: Answers to Questionnaire by MOH

5.2 Operation plan and required facilities

The facilities of the NSC are classified into the following categories, and the operation plan and required rooms and spaces are described below.

Table 5-2 Classification of facilities

Major Classification	Medium Classification	Required Facilities
Emergency unit		ER Reception, ER Treatment Rooms, CT Room
Outpatient Clinic and Diagnostic Facilities	Outpatient Clinic	Reception Hall, International Relation Office, Consultation Rooms, Treatment Rooms, Examination Rooms, Isolation Clinic
	Radiology	Diagnostic Radiology Rooms, Control Room, Staff Room
	Clinical Laboratory	Specimen Testing Laboratory, Physiological Function Testing Rooms, Pathological Anatomy Room
	Endoscopy	Endoscopy Room, Pre-Treatment and Recovery Room
	Pharmacy	Dispensing Room, Formulation Room, Inpatient Drug Supply Room
	Medical Checkup Center	Reception and Office, Waiting Room, Changing Room, Examination Rooms
Inpatient - Medical and Surgical Units	Inpatient Wards	General Wards, Intensive Care Units (ICU, SCU, POR), Emergency Wards, VIP Wards
	Operation and Intervention	Operating Rooms, Angiography Room, Central Sterile Supply Department (CSSD)
Neurorehabilitation Center		Rehabilitation Center (for outpatient and inpatient), Rehabilitation Spaces in Wards, Outdoor Rehabilitation Facility
Administrative Section and Hospital Management	Administration	General Office, Executive Office, Conference Room, Registration and Accounting Office, Medical Information and Server Room, Technical Staff Office
	Supplies Management	Kitchen, Laundry, Linen Storage, Goods Storage, Control Office
	Facilities Management	Machine Rooms, Central Monitoring Room, Guard Room, Cleaning Staff Room, Waste Storage
	Staff Welfare and Patient Services	Shops, Café, Patient Lounge, Staff Dining Room, Staff Changing Room

Source: JICA Study Team

Table 5-3 Classification of departments of the Training Center

Major Classification	Medium Classification	Facilities and Functions
Training Center	Surgical Training Center	Cadaver Lab., Microsurgery Training Lab.
	Simulation Center	Multidisciplinary Simulation Center, 3D Neuroanatomy and VR Lab., Neurosurgical and Endovascular Simulation Lab.
	Scientific-Education	Scientific and Research Departments, Academic Institutional Department, Hospital Administration
	Common Facilities	Auditorium, Library, Conference Rooms, Administration Office

Source: JICA Study Team

5.2.1 Emergency Unit

(1) Operation plan

- To develop a 24-hour/7-day emergency department to improve survival rates from stroke
- To emphasize the speed with the concept of "Time Saving is Life Saving"
- The stroke care team should be organized by the cerebrovascular neurologist, vascular neurosurgeon, physiatrist, and emergency medicine.
- To enable accurate and immediate diagnosis of emergency patients
- To include physical examination, blood tests, CT scan, MRI, carotid ultrasound, cerebral angiogram and echocardiogram in diagnostic tests
- To equip the treatment room with mobile equipment for initial on-site diagnostics
- To shorten access between the Stroke Care Unit (SCU), angiography suite, and operation suite
- For future patient air transport, provide a concrete floor on the roof where a helipad can be installed

(2) Facility plan

- To place it on the ground floor with easy access for patients and ambulances
- To separate entrance for this department with marked proper lighting and signs with easily visible and accessible from the street
- To locate it close to the radiology department. In particular, a CT scan room should be in the emergency unit for priority use
- To keep close coordination with the admissions department, medical records, cashier's booth, laboratory services, blood bank, and inpatient wards
- To place it close to the elevators to transport patients to other floors quickly
- To provide an isolation room for infected patients, which is directly accessible from the outside
- To establish an emergency ward (5 beds) for follow-up observation

Table 5-4 Required facilities for Emergency Unit

Applications	Rooms and Functions
Entrance, Reception, Waiting Area	24/7 Emergency Reception, Walk-In Patient Entrance, Transport Patient Entrance, Patient/Attendant Waiting Room, Ambulance Drop-Off Point, Decontamination Room
Examination and Treatment	First Aid Treatment Unit, Isolated Treatment Unit (for infectious diseases), CT scan room accessible from ER
Observation and Nursing	Emergency Ward (5 Beds)
For Patients	Toilets (Men, Women, and Multipurpose)

Source: JICA Study Team

5.2.2 Outpatient Clinic and Diagnostic Facilities

(1) Outpatient Clinic

1) Operation plan

- Subspecialized neurologists should provide diagnosis and care.
- Consulting service should be done by a neurosurgeon, neuro-urologist, orthopedist, neuro-endocrinologist, psychiatrist, otolaryngologist, ophthalmologist, pediatrician, and anesthesiologist.
- Evaluation of rehabilitation potential of diseased and control of ongoing therapy effectiveness should be performed.
- The number of consultation rooms is assumed to be a total of 12 rooms. However, spare rooms shall be prepared for future extension.
- An isolated consultation unit shall be prepared for patients suspected of having infectious diseases.
- Consultation room shall consist of a doctor's office that receives the patient and a waiting area for the patient and his/her relatives.
- Otolaryngology, urology, ophthalmology, pediatrics, and neurosurgery consultation rooms shall be equipped with treatment rooms and examination rooms as needed.

2) Facility plan

- To place it on the ground level with an adequate parking facility
- To place it close to the admitting area, emergency, radiology, laboratory services, and pharmacy
- To provide an adequate reception, registration, and waiting area
- To equip patient toilets with wheelchair-accessible space and separate staff toilets from patients' toilets
- To allow the intake of natural light in the waiting area to reduce stress during the waiting period
- To introduce a "Wayfinding System" that combines interior design, art, and signage to sensitively guide people to their destinations

Table 5-5 Required facilities for Outpatient Clinic

Applications	Rooms and Functions
Waiting Area	Central Waiting Hall, Clinic Waiting Area, Hospital Street
Reception and Information	General Information, Reception, Accounting, and Medical Affairs Office,
Outpatient Clinic	Consultation Rooms (12 units and spare rooms), Examination Rooms, Treatment Rooms
For Patients	Lounge, Counselling Room, Shop, Café, Toilets (Men, Women, Multipurpose)
For Staff	Workspace, Conference Room, Toilet, Equipment Storage, Linen Storage, Goods Storage, Waste Disposal Room

Source: JICA Study Team

(2) Radiology

1) Operation plan

- To establish a diagnostic imaging department that conforms to international standards for rapid and accurate diagnosis of stroke and neurological diseases
- To introduce CT and MRI of the brain in different central nervous system (CNS) pathologies
- To introduce a Picture Archiving and Communication System (PACS) to improve the quality of diagnostic imaging technology

2) Facility plan

- To locate it preferably on the ground floor or basement, where it is easily accessible to the outpatient department, emergency unit, and inpatient wards
- To consider convenient patient flow with minimization of crisscross traffic
- To provide adequate waiting area
- To separate patient and staff flow lines
- To provide common control rooms and workspaces for staff
- To shield the X-ray rooms from radiation in accordance with international standards, and to shield the MRI rooms from electromagnetic waves in accordance with the specifications and performance of the equipment
- To install floor wiring pits or free access floors for the installation of high-voltage cables and frequent replacement of equipment
- To reserve the expansion space for addition or upgrades of the radiological equipment in advance

Table 5-6 Required facilities for Radiology

Applications	Rooms and Functions
Radiological Diagnosis	MRI (1Room), CT (2 Rooms, 1 for Emergency), X-Ray (1 Room), Spare Room
For Patients	Waiting Area, Changing Rooms, Briefing Rooms, Toilets
For Staff	Receptionist's Office, Control Room, Interpretation Room, Conference Room, Staff Room, Toilet, Storage, Waste Disposal Room

Source: JICA Study Team

(3) Clinical Laboratory

1) Operation plan

- To centralize the clinical laboratory department to expedite specialized tests, including genetic and immunologic diagnostics of congenital and orphan neurological diseases
- The specimen testing laboratory should include general, hematology, biochemistry, immunology, serology, transfusion-related testing, genetic testing, molecular biological testing, and pathology.
- The physiology laboratory should include Electroencephalography (EEG), Electroneuromyography (EMG), Evoked Potentials (EP) testing, Transcranial magnetic stimulation, and intraoperative neuro-monitoring.
- To establish a pathological autopsy room and associated morgue and specimen room

2) Facility plan

- To locate the physiological testing room close to the outpatient examination room and the radiology department
- To perform EEG, EMG, and sleep tests in a shielded room to protect from external noise and electromagnetic waves, and a control room should be attached to the outside
- To locate the blood and urine sampling room adjacent to the laboratory to shorten the distance for transporting specimens
- To locate the laboratory close to the elevators to shorten the transportation of specimens and blood products
- To equip the pathology and biological laboratory with air conditioning facilities to protect against infection and chemical materials such as organic solvents, and to install safety cabinets as needed

Table 5-7 Required facilities for Clinical Laboratory

Applications	Rooms and Functions
Specimen Tests	Blood Collection Room, Urine Collection Toilet, Blood and Biochemistry Laboratory, Pathology Laboratory, Molecular Biological Laboratory
Physiological Function Tests	General Testing Rooms, Electromagnetic Shield Testing Rooms, Control Room
Pathological Autopsy	Autopsy Room, Cadaver Storage Room, Specimen Room, Cemetery
For Patients	Waiting Area, Changing Rooms
For Staff	Reception Office, Conference Room, Toilet, Storage, Waste Disposal Room

Source: JICA Study Team

(4) Endoscopy

1) Operation plan

- In case of hematemesis or hematochezia during the use of anti-thrombotic medication, an endoscope will be used to find the bleeding point and stop the bleeding.
- The unit should be equipped with 2 gastroscopy, 1 colonoscopy, and 4 bronchoscopy devices and an endoscopy department should be established in the outpatient department.
- Bronchoscopy devices should be needed for each SCU, ICU, and emergency unit, and one should be for backup in case a device is being sterilized after use.

2) Facility plan

- To provide an endoscopy suite in the outpatient department consisting of an endoscopy room, a preparation room, and a procedure room
- To provide facilities for cleaning, disinfection, and storage of endoscopes

Table 5-8 Required facilities for Endoscopy

Applications	Rooms and Functions
Endoscopy	Endoscopy Room, Cleaning and Disinfection Room
For Patients	Changing Room, Pre-Treatment and Recovery Room, Briefing Room, Toilet for Colonoscopy Prep.
For Staff	Reception Office, Staff Room, Storage, Waste Disposal Room

Source: JICA Study Team

(5) Pharmacy

1) Operation plan

- To control, dispense, and provide the medicines needed for treatment
- To provide drug information for physicians, nurses, and patients
- To limit prescribing to in-hospital prescriptions and not for outpatients

2) Facility plan

- To locate it close to the elevator and conveniently located for transporting drugs to the wards
- To set up a location where drugs can easily be brought in from the outside
- To provide a temperature-controlled drug stage
- To provide a pharmacist's office and a room to give drug information
- To provide drug pass boxes and cart pool for the delivery of drugs

Table 5-9 Required facilities for Pharmacy

Applications	Rooms and Functions
Pharmacy	Dispensing Room, Formulation Room, Drug Storage, Drug Delivery Room
For Staff	Reception, Pharmacist's Office, Workspace, Conference Room, Toilet, Waste Storage

Source: JICA Study Team

(6) Medical Checkup Center

1) Operation plan

- To perform brain scans to improve health and prevent disease, specifically detect and treat cerebrovascular and cerebral neurological diseases in the asymptomatic or non-diagnosed stage
- The cost of the examination may be at the candidate's own expense.
- The items and the contents of the checkup are assumed to be as follows:

Table 5-10 Inspection items at Medical Checkup Center

Inspection Item	Inspection Contents
Physical measurements	Height, weight, and abdominal circumference
Examination	Doctor's examination
Urinalysis	General urine test
Blood tests	Red blood cell count, white blood cell count, hematocrit, hemoglobin content, platelet count, white blood cell image, CRP, biochemical tests (liver function, kidney function, lipids, fasting blood sugar)
Cardiovascular	Blood pressure measurement, ECG, chest x-ray
MRI scan	MRI and MRA of the head
Ultrasonography	Cervical ultrasonography

Source: JICA Study Team

2) Facility plan

- To perform physical measurements, doctor's examination, blood sampling, and urine collection in a dedicated room
- To locate the waiting room and reception area separate from the general patients
- To share hospital facilities for MRI, CT, and other sophisticated examinations
- If there is a sharp increase in the number of patients with infectious complications such as COVID-19, the medical checkup center shall be used as an isolated consultation room.

Table 5-11 Required facilities for Medical Checkup Center

Applications	Rooms and Functions
Medical Examination	Measuring Room, Examination Room, Blood Collection Room, Urine Collection Room.
For Patients	Waiting Room, Changing Room, Toilet (urine sampling)
For Staff	Reception Office, Staff Room, Toilet, Storage, Waste Disposal Room

Source: JICA Study Team

5.2.3 Inpatient - Medical and Surgical Units

(1) Inpatient Wards

1) Operation plan

The number of beds allocated by department and function is as follows:

Table 5-12 Allocation of hospital beds

General Wards	Number of Beds
Department of Multiple Sclerosis and Demyelinating Disorders	30 Beds
Department of Peripheral Neural Disorders	30 Beds
Department of Epilepsy	30 Beds
Department of Angioneurology	30 Beds
Neurorehabilitation Department	30 Beds
Department of Early Poststroke Recovery	20 Beds
Department of Neurosurgery	20 Beds
Department of Vascular and Interventional Neurosurgery	20 Beds
Total	**210 Beds**
Intensive Care Units	**Number of Beds**
Postoperative Recovery (POR)	6 Beds
Intensive Care Unit (ICU)	15 Beds
Stroke Care Unit (SCU)	12 Beds
Total	**33 Beds**
Other Wards	**Number of Beds**
Emergency Ward	5 Beds
VIP Ward	2 Beds
Total	**7 Beds**
Grand Total	**250 Beds**

Source: JICA Study Team

For General Wards, the points to be considered are as follows:

- Commonly, two bedrooms and some private rooms should be provided, and each patient room should be equipped with wheelchair-accessible toilets and shower rooms to enable patients to practice their daily lives.
- A functional training room should be on each floor so that rehabilitation can be carried out within the wards.
- To provide a day room, a lounge, and a dining room in the wards so that they can be used during family visits, etc.
- The neurological rehabilitation ward shall be arranged on the same floor as the central rehabilitation room so that intensive rehabilitation can be performed.

For Intensive Care Units, the points to be considered are listed below.

- Basic requirements are as follows:
- To locate them on the same floor or with convenient access from the operation theatre suit, angiography suit, and emergency department
- To locate them close to the elevators and easily accessible to or from the wards
- To allow for direct observation of the patient by nursing and medical staff
- To install surveillance for physiological monitoring
- To provide and efficiently use routine and emergency diagnostic procedures and interventions
- To record and maintain patient information
- Post-operative recovery (POR) should directly connect to the operation suite.
- The Stroke Care Unit (SCU) shall be equipped with the necessary equipment and facilities for the rt-PA and other counter-stroke procedures. The SCU is preferably staffed by a neurologist, a full-time rehabilitation technician, and at least one nurse per three patients at all times.

For other wards, the points to be considered are as follows:

- The emergency ward will be attached to the Emergency Unit and should receive emergency patients 24 hours a day.
- The VIP ward should have two suites with a guest room and bathrooms. The entrance should be locked with personal identification systems.

2) Facility plan

- Inpatient rooms should be designed to be safe and aesthetically pleasing to assist in the quick recovery of the patient.
- Nurse control stations should be located and designed in a way that allows nurses to easily observe the patient rooms.
- A negative pressure switchable room should be provided for patients with infectious diseases.

- Corridors and patient room entrances should be wide enough for bed transport.
- To provide a briefing room for patients and their families to explain the patient's condition, the purpose of the treatment, and details of procedures
- To provide a waste disposal room, and cleaning materials room
- To provide one shower room on each floor for patients who need assistance

Table 5-13 Required facilities for Inpatient Wards

Applications	Rooms and Functions
General Ward	Two-Bed Room with Bathroom, Private Room with Bathroom, Isolation Room (Negative Pressure)
Intensive Care Unit	ICU (15 Beds), SCU (12 Beds), POR (6 Beds), including Isolation Unit (Negative Pressure), Anteroom, Changing Rooms, Nurse's Counter
Emergency Ward	Shared Bedroom (5 Beds), Nurse's Counter, Isolation Unit (Negative Pressure)
VIP Ward	VIP Suite with a Guest Room and a Bathroom (2 Units)
Rehabilitation	Physical Function Training Room, Treatment Room
For Patients and Families	Day Room (Dining Room), Lounge, Shower Room
For Staff	Nurse Control Center (Staff Station), Chairman or Head's Office, Superintendent's Office, General Doctor's Office, Doctor's Lounge, Head Nurse's Office, Matron's Office, Linen/ Equipment Storage, Conference Room, Dressing Room, Toilet and Shower for Staff

Source: JICA Study Team

(2) Operation and Intervention

1) Operation plan

The Operating Rooms and the Angiography Rooms should be equipped as described below.

Table 5-14 Outline of Operating Rooms

Room Name	Purpose and content	Number
General Operating Room	Functional Neurosurgery, Stereotactic/ Navigation Surgery, Central Nervous System Disorder, Brain Tumor, Stroke, Parkinson's Disease	**2**
Hybrid Operating Room	Endovascular Surgery (Neuro-Interventional) Stroke, Carotid Endarterectomy, Spine, Intraoperative Imaging	**1**
Endoscopic Operating Room	Spine (Cervical, Thoracic, Lumbar), Discectomy, Laminectomy, Laminotomy, Foraminotomy, Spinal Fusion	**1**
Day Surgery/ Procedure Suite	Outpatient Minor Surgery, Nerval Pain Control	**1**
Angiography Suite	Stroke, Cerebrovascular Intervention	**1**

Source: JICA Study Team

- Surgical operating rooms should be located on the same floor with ICU and anesthesiology unit with post-operative recovery unit and equipped with advanced medical imaging devices. Operating rooms must contain space for equipment.
- Day surgery/procedure suite should be located and designed as a part of the outpatient department, in such a way that the nurses can observe the patient's room.
- Angiography suite should be in diagnostic unit with the day surgery unit for easy access from emergency room, ICU, and the surgical unit.

- The operating department and the Central Sterile Supply Department (CSSD) should be located adjacent to each other, allowing for one-way flow of clean materials supply and used materials transfer.
- The waiting area should be designed on the same floor, maintaining information about continuing surgery and displaying the information on screen.

2) Facility plan

The operating rooms and the angiography rooms are equipped with a strict temperature and humidity control air conditioning system, medical gas system, and an uninterruptible power supply system. Air cleanliness levels should be as follows:

Table 5-15 Air cleanliness levels

Classification	Applied part
Clean Area	Operating Room, Sterile Supply Storage
Semi-Clean Area	Day Surgery/Procedure Suite, Angiography Room Preoperative Room, Reception, Central Hall, Equipment Hall, Anesthesiologist's Room, Doctor's Room, Staff Station, Medicine Control Room

Source: JICA Study Team

- Anteroom (pre-chamber) should be provided for the entrance and exit of the surgical patients.
- The interior of the operating room should be constructed to prevent the accumulation of dust, and equipment storage should be recessed into the wall.
- Various monitors, medical gas. and medical power supply should be suspended from the ceiling to minimize the floor wiring and cords to facilitate staff activities.
- The hybrid operating room should be designed to be radiation-protected and with a control room.

Table 5-16 Required facilities for Operation and Intervention

Applications	Rooms and Functions
Reception and Administration	Anteroom, Reception, Administration Office
Surgery and Ancillary Facilities	Operating Room, X-ray Control Room, Clean Hall, Return Corridor, Equipment Storage, Waste Disposal Room, Cleaning Room
Intervention	Angiography Room, Control Room, Hemostasis and Recovery Room, Equipment Storage, Sterile Material Storage, Waste Disposal Room, Cleaning Room
Disinfection and Sterilization (CSSD)	Washing and Disinfection Room, Assembly and Sterilization Room, Sterilized Material Storage, Disposable Material Storage, Administrative Office
For Patients	Briefing Room, Waiting Room, Patient Changing Room
For Staff	Changing Room, Staff Room, Anesthesiologist's Room, Doctor's Room, Conference Room, Toilet, Shower Room

Source: JICA Study Team

(3) Neurorehabilitation Center

1) Operation plan

- To introduce Japanese rehabilitation methods with a proven track record in facilitating stroke and neurological disease recovery and social reintegration

- To establish sufficient facilities and equipment for specialized rehabilitation
- By the time the hospital opens, to develop skills of personnel who are familiar with the facilities and can perform to the best of their abilities
- To provide physical therapy, occupational therapy, speech and hearing therapy, and activities of daily living (ADL) training in a systematic manner according to the condition of the patient
- To provide rehabilitation from the acute phase to the convalescence phase in a continuous inpatient and outpatient manner

Table 5-17 Phases and duration of rehabilitation

Phase	Program	Duration
Impetuous Phase	Early Post-Stroke Recovery	24-48 hours after stroke
Recovery Period-1	Intensive Rehab program	For 2-4weeks
Recovery Period-2	Outpatient Rehab Clinic	A few hours at the facilities 2 times a week

Source: JICA Study Team

2) Facility plan

- The whole range of neurorehabilitation facilities should be developed.
- Under the concept of "rehabilitation anywhere in the hospital," a central rehabilitation room, in-patient functional training facilities, and an outdoor rehabilitation space should be established.
- The rehabilitation room should be designed so that the staff can overlook the patient's training and can easily cooperate with other staff in training.
- Rehabilitation rooms should be located on the middle floor where both outpatients and inpatients are easily accessible.
- The neurological rehabilitation unit should be located on the same floor to reduce vertical movement between the rehabilitation room and the ward.
- The rooftop garden should be used as an outdoor rehabilitation space.

Table 5-18 Required facilities for Neurorehabilitation Center

Applications	Rooms and Functions
Reception and Consultation	Reception Office, Consultation Room, Waiting Room
Rehabilitation	Physical Therapy Area, Occupational Therapy Area, Speech and Hearing Therapy Area, Equipment Storage
Ward Rehabilitation	Functional Training Room (for high-risk patients and patients with mobility difficulties)
Outdoor Rehabilitation	Rooftop Garden (walking training, wheelchair transfer training, horticultural therapy, relaxation space)
For Patients	Changing Rooms, Interview Rooms, Multipurpose Toilets
For Staff	Staff Room, Conference Room, Storage, Toilet

Source: JICA Study Team

5.2.4 Administrative Section and Hospital Management

(1) Administration

1) Operation plan

- To be composed of general affairs, human resources and accounting, and support the operations of the medical staff from the side
- To be responsible for management of MRD (medical record) and IT system for hospital, medical, and patient information
- To establish ME Center for centralized management, maintenance, and servicing of medical equipment; ME Center should be operated by a trained clinical engineer.

2) Facility plan

As shown in the table below.

Table 5-19 Required facilities for Administration

Applications	Rooms and Functions
Medical Affairs	Central Reception Counter, Registration/Reservation Counter, Accounting Counter, Consulting Room, Medical Affairs Office
Medical Information Management	Medical Record Room, Server Room, SE Office
ME Center	Medical Equipment Storage and Workshop, Clinical Engineers' Office
Administration	Executive Office, Hospital Management Office, Technical Staff's Office, Common Meeting Room.
Doctor's Office	Doctor's Office, Resident's Room
On Duty	Duty Room, Shower Room, Toilet
Meetings	Conference Rooms, Reception Rooms

Source: JICA Study Team

(2) Supplies Management

1) Operation plan

- To manage goods and information that are distributed within the hospital; This refers to managing the supplies storage facility and overseeing the receiving orders from and transporting goods within the hospital.
- To provide nutritionally controlled meals for inpatients
- To supply, collect, disinfect, and wash bedding, clothing, and medical linen

2) Facility plan

As shown in the table below.

Table 5-20 Required facilities for Supplies Management

Applications	Rooms and Functions
Goods Management	Administrative Office, Goods Storage, Receiving and Inspection Room
Linen Management	Reception, Laundry Room, Clean Linen Storage, Used Linen Storage
Food Service	Kitchen, Nutrition Office, Food Distribution Center, Dedicated Elevator, Ward Pantry

Source: JICA Study Team

(3) Facility Management

1) Operation plan

- To be responsible for the overall condition of the hospital building and its comprehensive, rational and effective operation. In other words, the department is responsible for facilities management, cleaning and waste management, and fire prevention.
- To maintain the building and physical environment necessary for medical practice, including building facilities such as electricity, air conditioning, water supply and drainage, and medical gases
- To post security guards 24 hours a day to maintain safety in the hospital
- To carry out medical waste disposal by a specialized organization under an agreement with the hospital. It is necessary to provide a room or building where medical waste should be collected.
- To carry out utilization of general waste by a specialized city organization SUE "MAXSUSTRANS" under an agreement with the hospital. It is necessary to provide for a concrete area with a fence and equipped with containers. The site must be supplied with water supply and sewerage system.
- To do hospital cleaning and maintain cleanliness by hospital staff or outsourcing. It is necessary to provide dedicated storage and staff room.

2) Facility plan

As shown in the table below.

Table 5-21 Required facilities for the Facility Management

Applications	Rooms and Functions
Machine Control	Central Monitoring Room, Electrical Machine Room, Air Conditioning Machine Room, Water Supply Machine Room, Fire Equipment Machine Room, Medical Gas Machine Room
Security	Security Guard's Office
Cleaning	Cleaners' Waiting Room, Cleaning Equipment Storage
Waste Disposal	Medical Waste Storage, General Waste Storage, Sorting and Recycling Room, Kitchen Waste Storage

Source: JICA Study Team

(4) Staff Welfare and Patient Services

1) Operation plan

- To provide patient convenience facilities such as shops and snack services (cafeteria)

- To provide facilities for patient attendants, such as waiting rooms during surgery
- To set up a dining room where staff can have their meals in the hospital
- To provide amenity facilities for staff, including changing rooms, shower rooms, and nap rooms

2) Facility plan

As shown in the table below.

Table 5-22 Required facilities for Staff Welfare and Patient Services

Applications	Rooms and Functions
Convenience Facilities	Shops, Cafeteria
Patient Amenities	Lounge, Family Waiting Room, Pray Room
Staff Meal Service	Staff Dining Room
Staff Amenities	Changing Room, Shower Room, Powder Room, Nap Room
Others	Volunteers Room and Multipurpose Room

Source: JICA Study Team

5.2.5 Training Center

(1) Surgical Training Center

1) Operation plan

- The Surgical Training Laboratory has “Sectional Microsurgical Lab (Lab-A)” and “Anatomy-Cadaver Lab (Lab-B).”
- Lab-A provides microsurgical training required for the latest neurosurgical education. It can be configured to support different approaches, depending on the educational goals.
- Lab-B allows surgeons to practice and refine various neurosurgical techniques before the actual surgery by utilizing cadavers.

2) Facility plan

- Lab-A should be a practice room with 15 units of workstations equipped with microscopes and micro-instrument sets.
- Lab-B should be a practice room with 15 anatomy tables. It should avoid intersections with general traffic lines. It should be equipped with independent air-conditioning systems and accessed through a changing room. There should be an attached sterilization room and waste storage room.

Table 5-23 Required facilities for the Surgical Training Center

Applications	Rooms and Functions
Sectional Microsurgical Lab (Lab-A)	Practice Room (15 workstations), Office, Storage
Anatomy-Cadaver Lab (Lab-B)	Cadaver Autopsy Room (15 anatomy tables), Changing Room (40 males, 10 females, with separate shower room), Sterilizing Room, Preparation Room, Waste Disposal Room, Storage

Source: JICA Study Team

(2) Simulation Center

1) Operation plan

- Simulation Center has a "Multidisciplinary Simulation Center," "3D Neuroanatomy and Virtual Reality Lab" and "Neurosurgical and Endovascular Simulation Lab."
- Multidisciplinary Simulation Center has high-fidelity manikin-based simulators managed and controlled by the physiological appearances of patients undergoing health crises by using computer controls.
- 3D Neuroanatomy and Virtual Reality Lab has 3D virtual reality technology as an educational tool for neurologists and medical students.
- Neurosurgical and endovascular have simulators for neurosurgeons and residents to practice and develop specialized skills in craniotomy, spine surgery, and endoscopic neurosurgery.

2) Facility plan

- The Multidisciplinary Simulation Center should have a mock emergency room, operating room, and ICU to allow all medical personnel to experience real medical procedures.
- The other Simulation Lab should be a practice room for physician training and should be equipped with the necessary equipment.

Table 5-24 Requested facilities for the Simulation Center

Applications	Rooms and Functions
Multidisciplinary Simulation Center	Mock Operating Room, Mock ICU, Mock SCU, Mock ER, and Monitor Room
3D and VR Lab	Practice Room with 12 sheets with 3D image translation equipment
Neurosurgical and Endovascular Simulation Lab	Practice Room with various simulating devices such as neurosurgical virtual reality simulator, endovascular simulator, neuro-endoscopy simulator.

Source: JICA Study Team

(3) Scientific Education

1) Operation plan

- Scientific-Education Department has "Scientific and Research Departments," "Academic Institutional Department" and their associated office departments.
- Scientific and Research Departments mainly deal with the following categories:
  - Angioneurology
  - Epilepsy
  - Demyelinating diseases
  - Movement disorders
  - Stroke preventive measures
- Associated office departments include the following sections:
  - Academic Institutional Department

- Scientific Secretary of NSC
- Public Health Office
- Department of Statistical Analysis
- Nurse Education Office

2) Facility plan

The required rooms for each department are as follows:

Table 5-25 Required facilities for Scientific Education

Applications	Rooms and Functions
Scientific & Research Dept.	5 Rooms and 1 Conference Room
Academic Institutional Dept.	4 Rooms and 2 Conference Rooms
Hospital Administration Dept.	5 Rooms and 1 Conference Room
Common	Faculty Lounge

Source: JICA Study Team

(4) Common facilities

1) Operation plan

- The Training Center should be a separate building attached to the main hospital building. The operation and management of the facility should be independent, but the energy supply and the loading and unloading of goods should be combined as needed.
- Auditorium, library, exhibition hall, conference room, and lounge should be provided as common facilities.

2) Facility plan

- The auditorium will be cinema-style (stair seats) with a capacity of 200 people and will have audio-visual equipment.
- A remote conference system should be introduced in the conference room.
- People are allowed to bring their own food in the lounge area.
- Separate entrances and exits should be provided to avoid confusion.

Table 5-26 Required facilities for Training Center (Common Facilities)

Applications	Rooms and Functions
Common Facility	Auditorium (200 audiences), Library, Exhibition Hall, Conference (22 seats, 12 seats), Dining Lounge
For Staff	Administrative Office, Storage, Toilet

Source: JICA Study Team

6. Building plan for the NSC

6.1 Architectural design

6.1.1 Architectural overview

Table 6-1 Architectural overview

Category	Data
Land Area	2.4 ha
Building Area	6,500 m^2
Structure	RC (Reinforced Concrete)
Stories	1 Basement, 6 Stories, 1 Roof Deck and Technical Space
Floor Area	Hospital Building: 25,600 m^2 (including Technical Space) Training Center: 3,500 m^2 Mechanical Building: 900 m^2 Total Floor Area: 30,000 m^2
Other Constructions	Roof Top Rehabilitation Terrace: 520 m^2 Ramp way to the basement and Dry Area: 850 m^2 Landscape: 8,600 m^2 (Road, Pavement, Plantation, and Exterior Facilities)
Total Number of Beds	250 Beds

Source: JICA Study Team

6.1.2 Site development plan

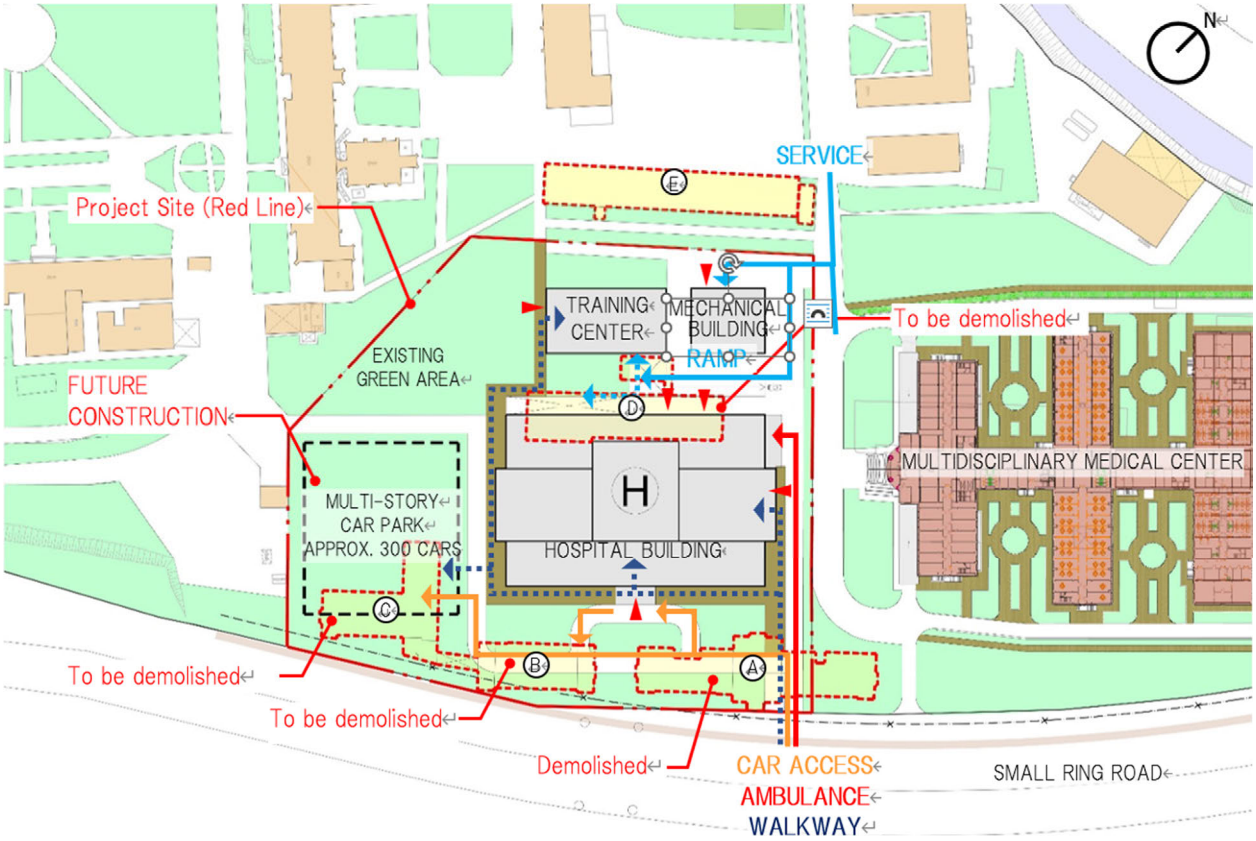
(1) Building layout plan

All facilities shall be constructed within the "Red Line" shown in **Figure 3-8**. The Training Center and the Mechanical Building shall be constructed as separate buildings behind the Hospital Building. Traffic of pedestrians, general vehicles, ambulances, and service vehicles shall be separated as much as possible to avoid cross traffic. The three existing buildings (A-C below) shall be demolished before the start of construction. Land for a multi-story car parking shall be reserved at the site. The buildings shall be set back 6 m away from right-of-way (ROW).

The traffic plan for the site is described below.

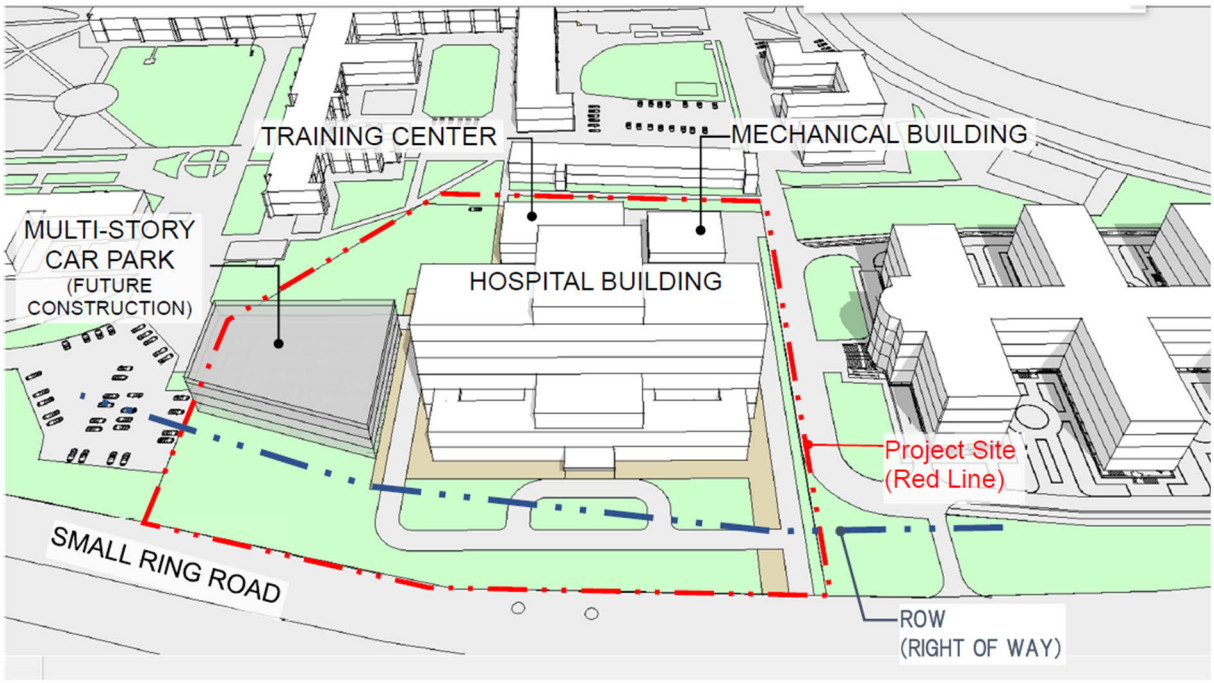
- General vehicles should be directed to the multi-story parking lot from the front side of the hospital building to avoid traffic congestion. Provide a porch at the entrance of the hospital building so that outpatients can get off right in front of the entrance door.
- Sidewalks around the hospital building and the Training Center should be provided to allow access to the various entrances without intersecting the roadway.
- The shortest way should be constructed for ambulances to access the emergency entrance from the front road.
- Service vehicles should access the back of the hospital building through a ramp to the underground entrance. The Energy Center should be located at the entrance for service vehicles.
- Passageways for firefighting vehicles should be provided around the main buildings.

Existing trees should be preserved as much as possible, and vacant areas should be greened as much as possible. An appropriate distance with the buildings outside the site should be maintained as required by laws and regulations.



Source: JICA Study Team

Figure 6-1 Proposed Layout Plan

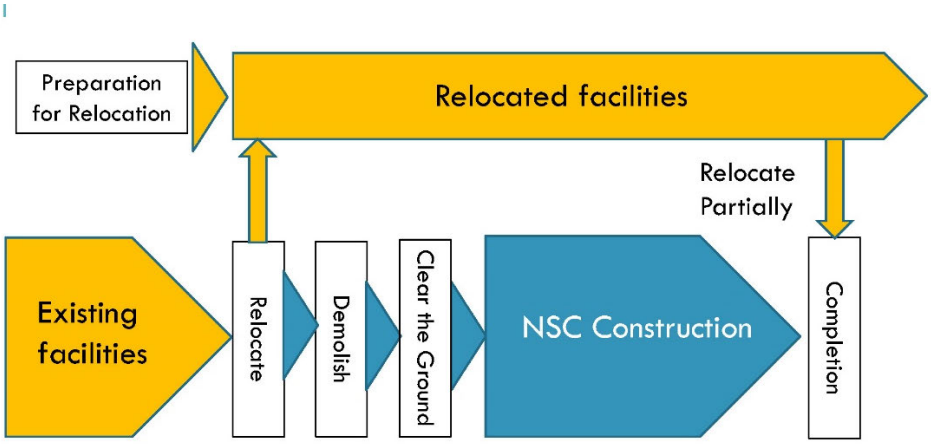


Source: JICA Study Team

Figure 6-2 Bird's-eye view

(2) Demolition of existing facilities

The four existing buildings (A-D in **Figure 6-1**) should be demolished before the start of construction of NSC by following the process shown in the diagram below. Relocation site preparation, moving, demolition (including underground structures), and land clearing are not eligible for the ODA loan.



Source: JICA Study Team

Figure 6-3 Procedures for the demolition of existing buildings

The affiliations of the buildings to be demolished and their relocation sites before demolition are shown in the table below. The relocation schedule is subject for confirmation of MOH.

Table 6-2 Required facilities

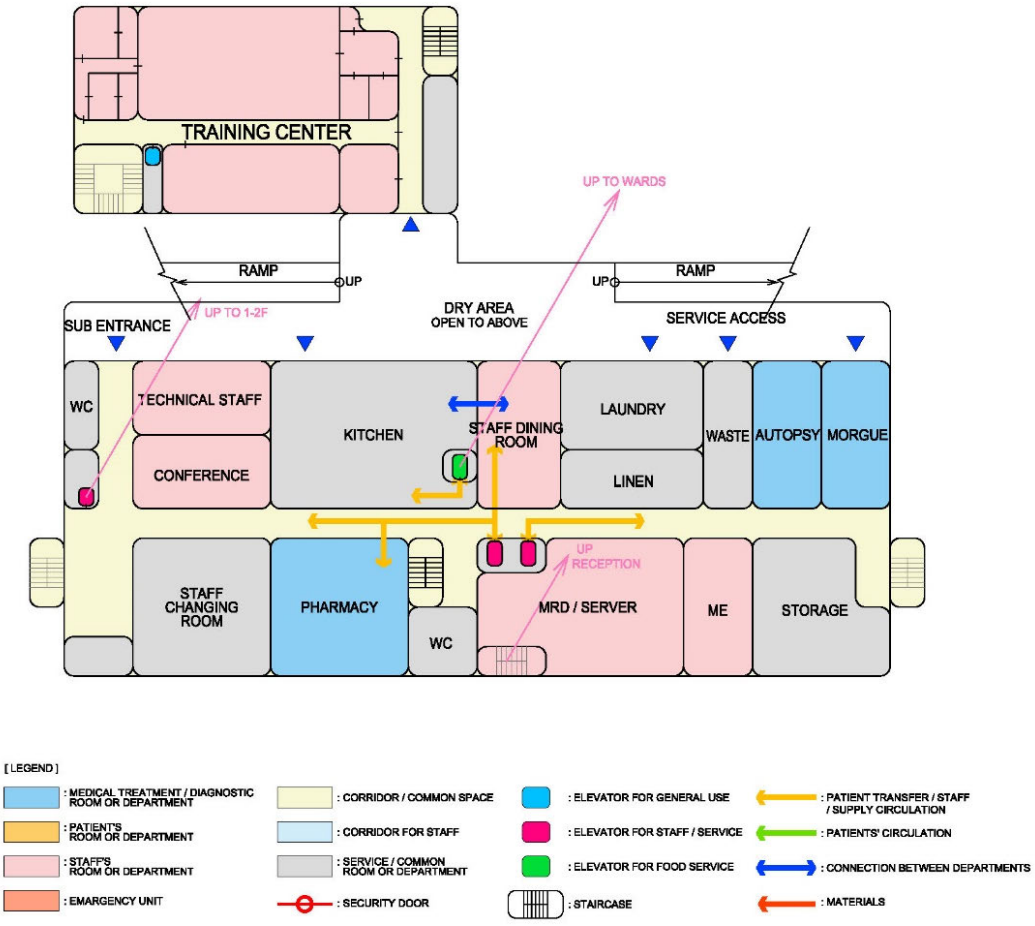
Symbols	Contents	Affiliation	Relocation site
B	Bacteriological Laboratory	Tashkent Medical Academy	Multidisciplinary Medical Center
C	ENT Department and Polyclinic	Tashkent Medical Academy	Multidisciplinary Medical Center
D	Medical Rehabilitation, Self -Supporting Dental Clinic	Tashkent Medical Academy	Multidisciplinary Medical Center

Note: The Children Face-Jaw Surgery Department had been demolished in July 2024.

Source: JICA Study Team

6.1.3 Floor plan

(1) Basement floor of the hospital building



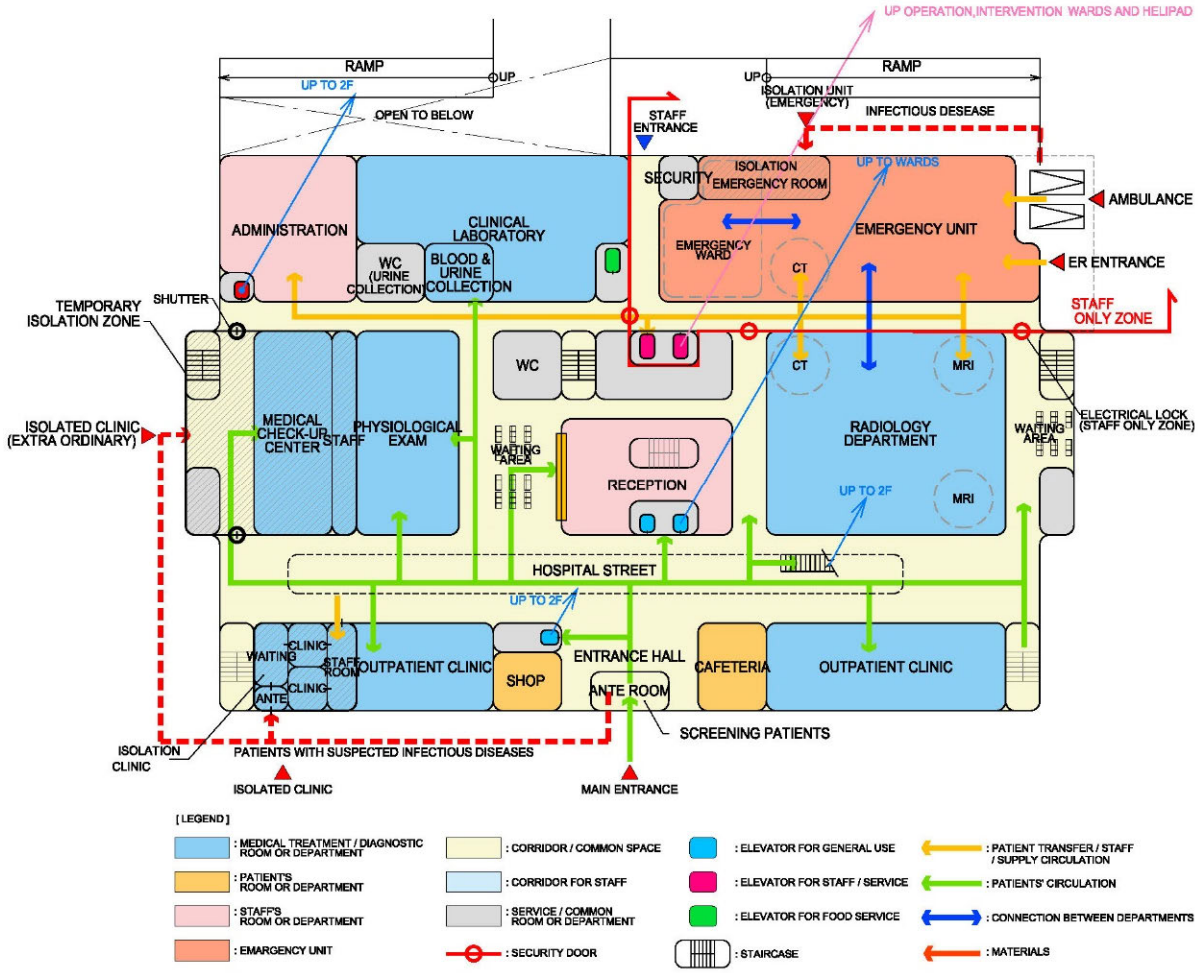
Source: JICA Study Team

Figure 6-4 Floor plan of the basement of the hospital building

- The basement will be used mainly for the goods and service supply departments such as kitchen, laundry, and goods storage. A ramp and a dry area will be constructed at the back of the building to allow trucks and other vehicles direct access to the basement. This service access will be shared with the training center.

- A staff changing room and an office for technical staff will be provided, with a sub-entry for staff. In addition, a staff elevator leading to the third floor will be provided to make it easier to get to each workplace.
- As there are few restaurants in the vicinity, a staff dining room will be provided, and the kitchen will serve both inpatients and staff to improve efficiency.
- Establish a medical record room underneath the reception on the first floor and make it possible to connect by stairs. With the digitization of medical information, it is anticipated that the medical record room will be downsized and replaced with a server room.
- Establish a ME Center near the elevators so that delivery and retrieval of the medical equipment will be easy and speedy.
- The pharmacy department will be near the staff elevators and medicine will be brought in from the basement, as it does not administer medication to outpatients, but only to inpatients.
- The autopsy room and morgue will be located on the basement floor so that the transportation of bodies will not be exposed.
- The basement floor will be reserved for hospital staff only, with limited access to patients and the public.

(2) First floor of the hospital building

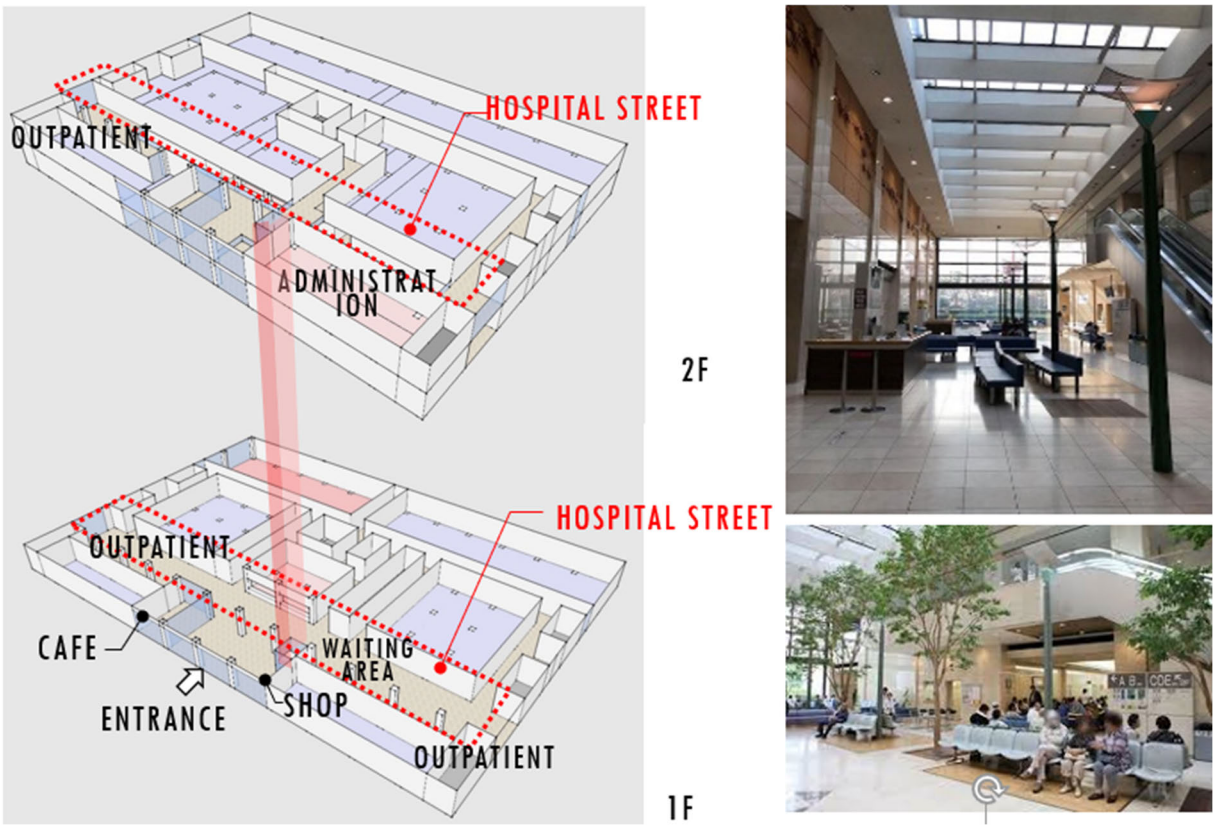


Source: JICA Study Team

Figure 6-5 Floor plan of the First Floor of the hospital building

- The outpatient department, the emergency units, and related diagnostic facilities will be on the first floor for an easy patient access and ambulance transportation.
- A reception is in front of the main entrance, and outpatients will be taken to the outpatient departments on either side of the building after registration.
- The waiting area is illuminated with natural light to reduce the stress on patients, and the basic outpatient clinic functions are compactly arranged along the Hospital Street with consultation rooms, radiology rooms, and physiological function testing rooms, medical checkup centers, cafeterias, and shops. (An image of the Hospital Street is shown in the figure below.)
- The emergency units will have an entrance for direct transport of patients from the ambulance. The radiology and clinical laboratory, which are closely related to the emergency unit, will be located near the emergency unit to enable rapid examination and diagnosis.
- A separate entrance for patients with suspected infectious diseases is provided so that emergency procedures can be performed in the isolation unit.

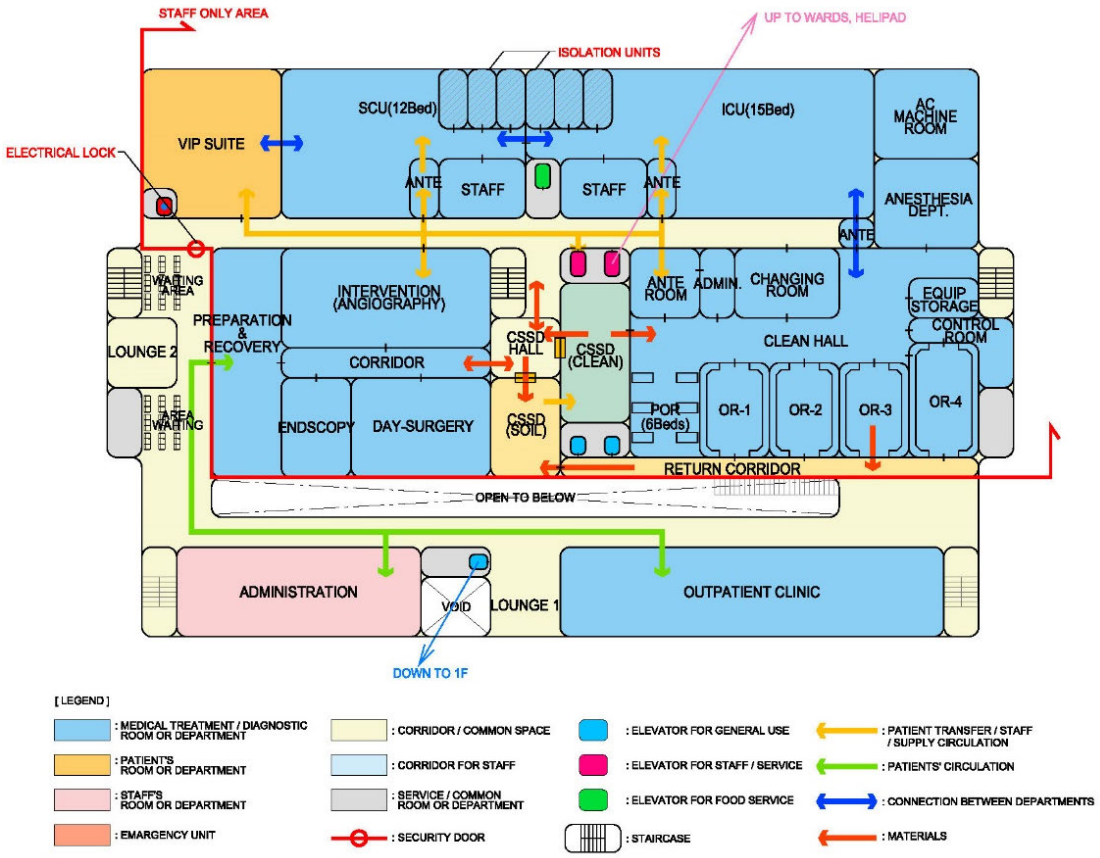
- The emergency department will be in front of the staff elevators to facilitate transportation to the ICU and operation rooms on the upper floors and from the helipad.
- A front room is set up at the main entrance to screen patients with fever. Patients suspected of having infectious diseases will be directed to an isolation examination room at a separate entrance.
- In case of an outbreak of infectious diseases such as COVID-19, the medical screening center will be converted into a temporary isolation outpatient unit, accessible through a dedicated entrance.



Source: JICA Study Team

Figure 6-6 Floor plan of the First Floor of the hospital building

(3) Second floor of the hospital building

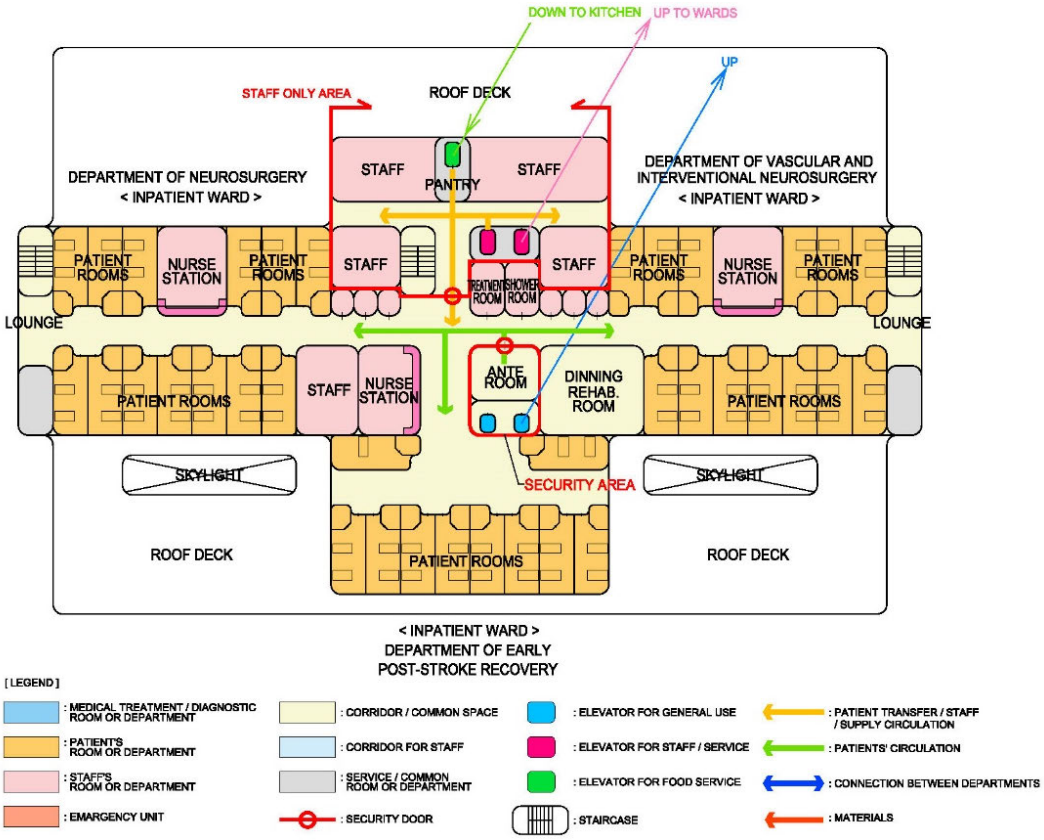


Source: JICA Study Team

Figure 6-7 Floor plan of the Second Floor of the hospital building

- The second floor will be arranged for the outpatient department, administrative offices, operating rooms, angiography suites, and intensive care units.
- Access to the outpatient consultation rooms on the second floor is available via the elevator or the stairs on Hospital Street dedicated for the outpatient department.
- The surgery department will be sectioned off as a staff-only area, with the entry for outpatients and the public will be restricted with electric locks.
- The operation department, post-operative recovery room and ICU will be directly connected, and the angiography suite will be located near the SCU, each of which will be planned to facilitate coordination between departments. The angiography suite, day surgery room and endoscopy room are combined in one block and share a treatment and recovery room.
- A Central Sterile Supply Department (CSSD) will be located adjacent to the operating department. The supply of sterilized materials and collection of used materials can be done in one way.

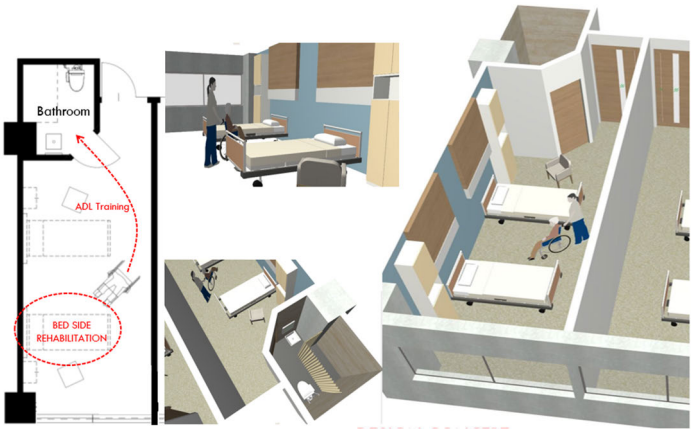
(4) Third floor of the hospital building



Source: JICA Study Team

Figure 6-8 Floor plan of the Third Floor of the hospital building

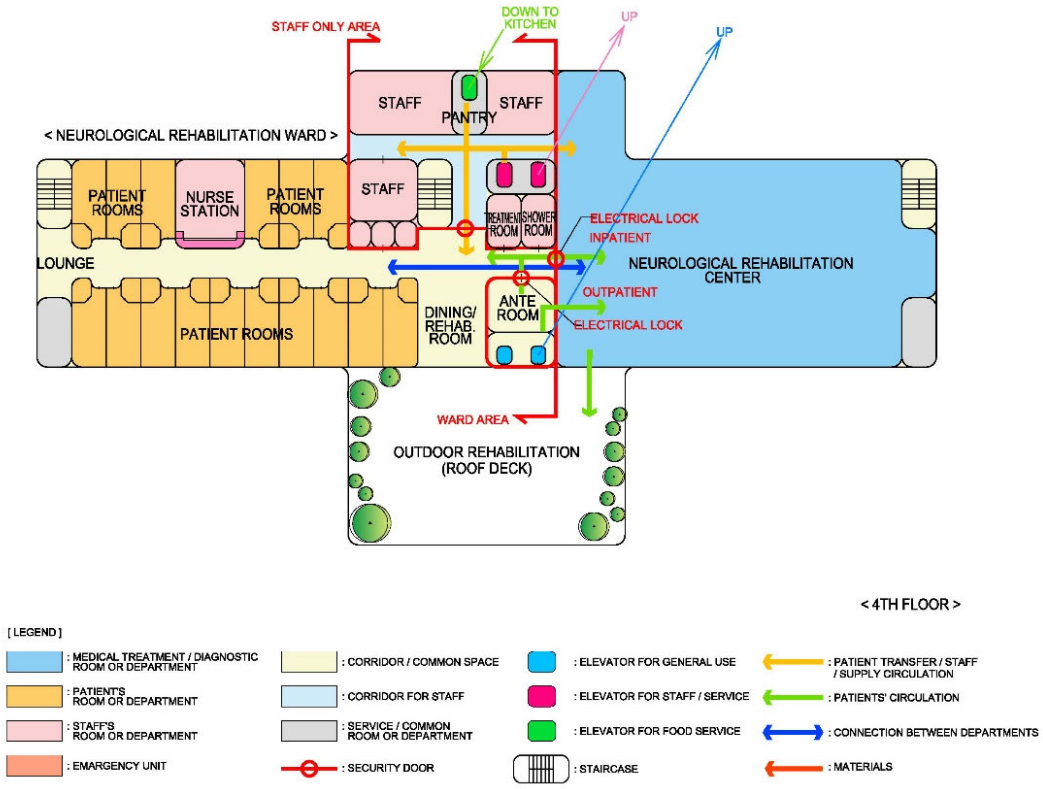
- Wards consisting of three surgical departments (nursing units) will be arranged.
- The required number of rooms and beds will be allocated to each department, and the same types of departments will be grouped and located on same floor to allow for efficient use of beds and shared space.
- Standard hospital rooms will be two-bed rooms. Each room will be equipped with a toilet and shower, and have sufficient space for bedside and in-room rehabilitation.



Source: JICA Study Team

Figure 6-9 Standard Ward Plan

(5) Fourth floor of the hospital building

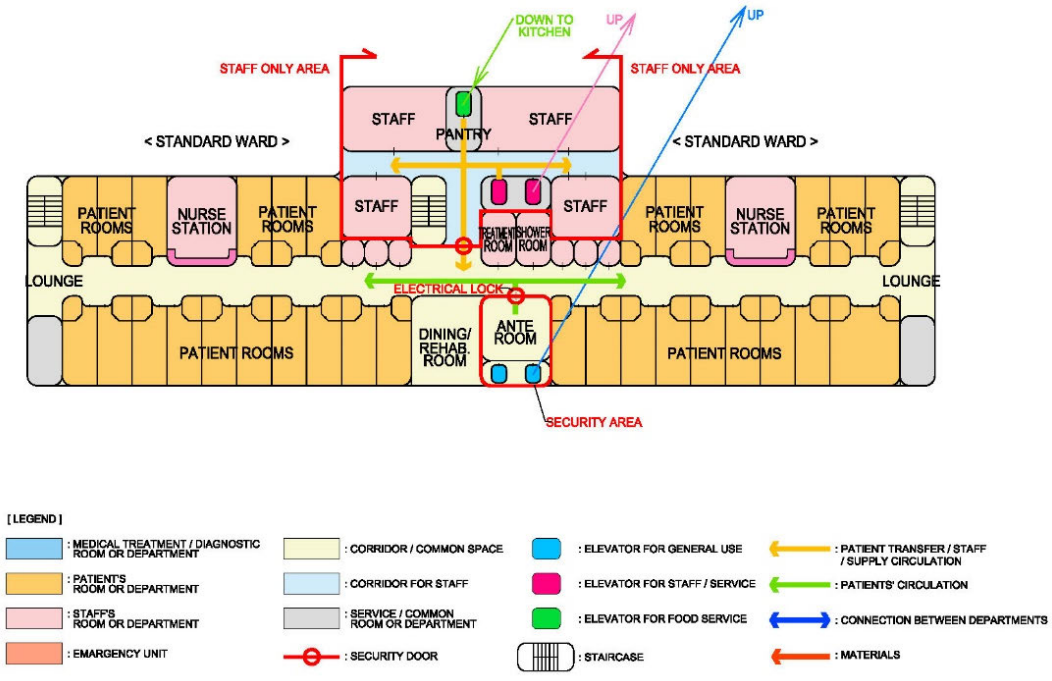


Source: JICA Study Team

Figure 6-10 Floor plan of the Fourth Floor of the hospital building

- The neurological rehabilitation center and the neurorehabilitation ward will be on the fourth floor. There will also be an outdoor rehabilitation space on the roof deck.
- By placing the rehabilitation center and the rehabilitation ward on the same floor, inpatients will be able to move around without the use of elevators, reducing the burden on both patients and nursing staff.
- Since the rehabilitation center is used by both outpatients and inpatients on other floors, the rehabilitation center can be accessed directly from the elevator hall.
- A rooftop terrace, where rehabilitation can be done in the open air and with sunlight, will motivate patients and help them recover quickly.

(6) Fifth and sixth floors of the hospital building



Source: JICA Study Team

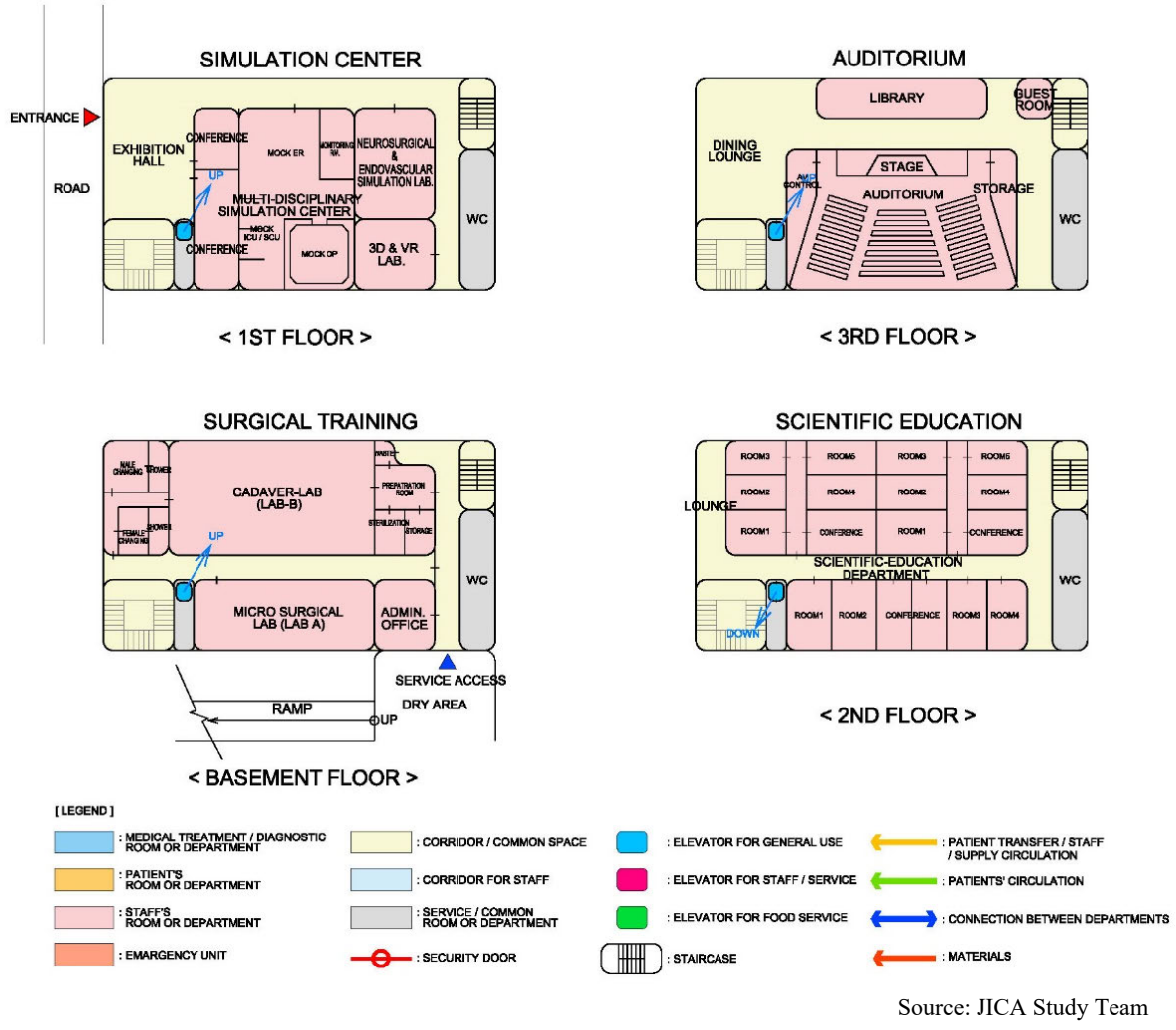
Figure 6-11 Floor plan of the Fifth and Sixth Floors of the hospital building

- There will be two nursing units each on the fifth and sixth floors of the hospital building, with 30 beds for one nursing unit.
- Between the two wards, there will be a shared dining room and a rehabilitation room.
- There will be a one-bedroom near the staff station to accommodate patients who need to be specifically observed, while the other wards will be based on a two-bedroom.
- The staff stations of the two wards will be in the center of the wards and connected by a staff-only area to share related rooms. The preparation room will be provided at the staff station and the treatment room will be located nearby.
- The staff area will include a doctor's office, head nurse's office, matron's office, and a common meeting room.

(7) Roof deck and helipad of the hospital building

- The roof deck of the hospital building will be mainly used as a machine room.
- A concrete flat roof will be prepared for the construction of a helipad in the future at the top of the building.

(8) Training Center



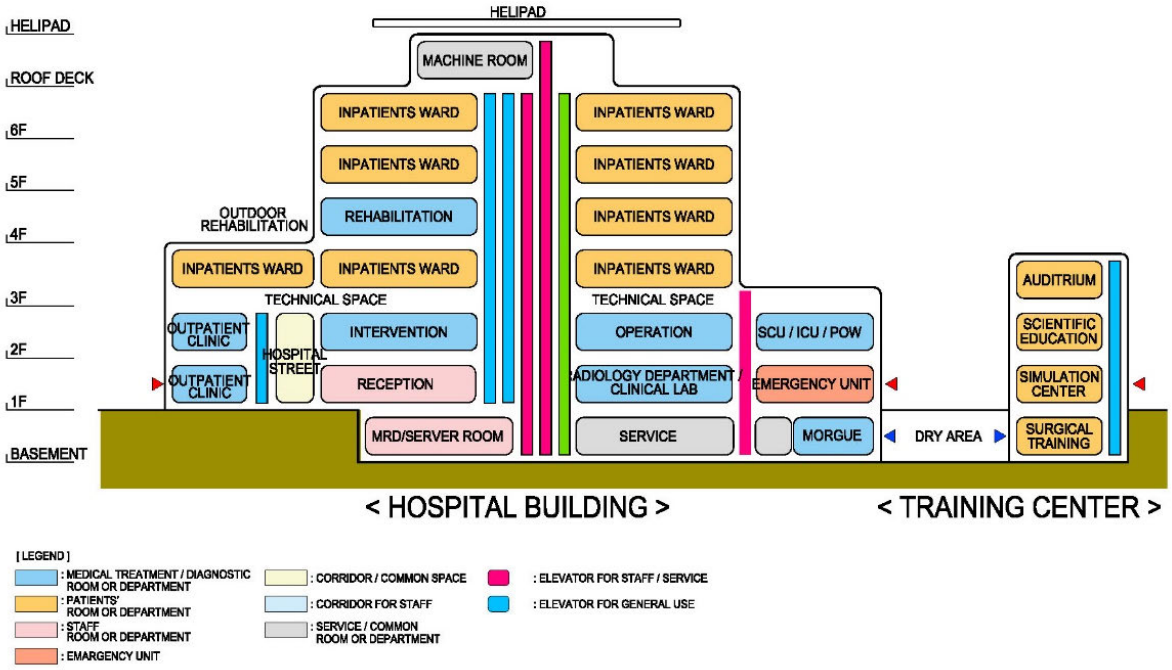
Source: JICA Study Team

Figure 6-12 Floor plan of the First Floor of the Training Center

- On the basement floor, a service entrance to be used for staff access and supply will be set up at the dry area connecting to the Hospital Building. An administration office, a surgical training center with a microsurgery training room (Lab-A), and a cadaver training room (Lab-B) will be located on the basement floor.
- On the first floor, there will be an entrance hall with exhibition spaces, a conference room for teleconferences, a simulation center, and a surgical training center.
- On the first floor, there will be a doctors' simulation center with virtual reality simulators and a multidisciplinary simulation center where trainees can experience life-saving procedures in a mock-up hospital facility.
- On the second floor, there will be a Scientific Education Division including the Scientific Research Division, the Academic Division, and the Hospital Administration Division. Each division will have its own office and meeting room.
- On the third floor, there will be an auditorium, a library, and a dining lounge.

6.1.4 Sectional plan

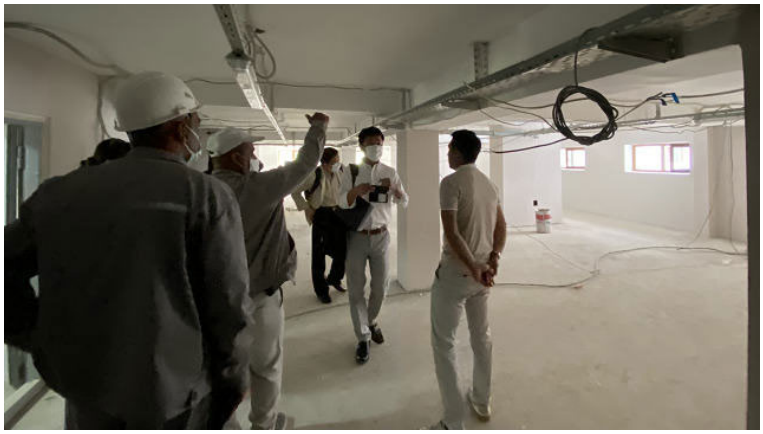
The sectional plan is as shown below.



Source: JICA Study Team

Figure 6-13 Sectional plan of the NSC

- The building will have one basement floor and six stories above ground. On the rooftop will be a machine room and a concrete roof that can be used as a helipad in the future.
- The hospital building, and training center will share service access at the basement level.
- There will be separate elevators for general use and for staff use. In addition, there will be a dedicated elevator to transport food from the kitchen in the basement to the wards.
- There will be a technical floor (intermediate floor) between the third and fourth floors. In this space, the drainage pipes for the toilets and showers in the wards will be horizontally deployed to prevent water leakage into the operating rooms, etc., and air conditioning systems for the operating rooms and ICUs will be installed to make maintenance easier.



Source: JICA Study Team

Figure 6-14 Example of a technical floor (National Emergency Center)

6.1.5 Structural plan

The structure should have appropriate seismic resistance considering the seismic risk (level VIII of MSK scale) and the importance of the facility. The basic policy is to adopt a reinforced concrete structure, which is commonly used locally. The local construction method is generally a reinforced concrete frame with brick or sand block walls. In hospitals, the basic span is 7 m, which is the width of a couple of double bedrooms, and spans of 9 m are also partially adopted. The concrete work is carried out using tower cranes and other heavy equipment, assembly scaffolding, and steel pipe supports. In this project, 7 m x 7 m column span should be used for the upper floors, and 7 m x 9 m column span should be used for the lower floors to accommodate the operating rooms and large ICU rooms. Recently, LGS board-clad internal partitions have been used, and their adoption should be considered to reduce the building weight and speed up the construction process. In addition, special loads should be considered for the places where heavy equipment such as MRI should be installed.

According to the soil investigation at the neighboring site, a piling foundation is not required for the assumed NSC facility. However, a boring survey and bearing test should be conducted in the implementation stage to obtain the ground data for structural design.

6.2 Building facility plan

6.2.1 Basic concept for facilities planning

- Create safe, functional, and sustainable building facility systems in consideration of a large-scale and important hospital.
- Adopt materials, devices, and systems that can be easily replaced in the future and have high failure response capabilities.
- Introduce energy-saving and environment-friendly systems that meet the global demands in recent years.

6.2.2 Electrical systems

(1) Power receiving and transforming system

- 3φ 3 W 50 Hz 6 or 10 kV 1 circuit high voltage city cable is to be taken into the electrical room.
- Estimated power demand is 1,200 kW (assumption of 40-50 W per m^2).
- Assumed transformer capacity is 3,000 kVA (1,500 kVA x 2 units) / 3-phase 4-wire 10 kV / 380・220 V 50 Hz. Transformer capacity intensity is assumed to be 3 times the assumed demand.
- The power cable installation is to be done by Uzbekenergo, which is non-eligible for the ODA loan.

(2) Stand-by generator system

- A diesel engine generator should be installed in consideration of hospital function continuity and medical device safety.
- Assumed generator capacity is 3φ 3 W 380 V 1,000 kVA, which covers approximately 60% of the power demand.
- Two sets of generators (500 kVA) should be installed in order to enable long-term operation and to provide backup during maintenance.

(3) Uninterruptible Power Supply (UPS) system

- A UPS system should be installed to supply uninterruptible power for the important facilities such as operation room, ICU and other critical care rooms.
- Assumed generator capacity: 3φ 3 W 380 V 100 kVA, the demand rate is assumed to be 50% of operating rooms (10 kVA/room), ICU, and other critical care rooms (3 kVA/bed).

(4) Grounding and lightning protection system

- Ground terminal board should be installed in the electrical room, generator room, and other necessary rooms in conformity with the local codes and standards.
- Lightning protection system should be installed in conformity with to the local codes and standards.

(5) Lighting and power socket

- LED lighting should be adopted in terms of long life and high efficiency. The energy efficiency should be more than 100 lm/W and the lifetime should be more than 40,000 hours.
- An emergency lighting system should be installed with a built-in battery and an emergency power supply.
- Emergency exit lighting should be installed in accordance with the local regulations.
- The total load capacity of outlets per circuit should be about 80% of the breaker capacity.
- In principle, the maximum number of power sockets per circuit should be 8 outlets.
- Earth leakage breaker circuits should be provided in the wet area.

(6) Telephone system

- A (IP) PBX should be installed with a capacity of 200 telephone extension lines.
- A connection terminal board should be installed on each floor.

(7) Information network system

- Piping, wiring, local outlets, and switches should be installed for the local information network system.
- Internet and Wi-Fi system should be included in the facility work.
- Other ICT systems are not subject to the facility work.
- Connection and contract with the service providers are not eligible for the ODA loan.

(8) Public Address (PA) system

- A public address (PA) system that can be used in both emergency and general use should be installed.
- PA system should work with the fire alarm system.

(9) Patient call system

- Patient call button should be installed for every inpatient bed, toilets, and bathrooms.
- A master device should be installed at the nearest staff station.

(10) Cable Television (CATV) system

- TV terminals with booster amplifiers, distributors, and wiring should be installed at waiting area, lounge, inpatient wards, staff office, and other places required.
- TV sets should be installed only in public spaces such as waiting area and lounge.

(11) Fire alarm system

- A fire alarm system with receiving machine, smoke/ heat detector, and indicator/ transmitter/ alarm bell should be installed.
- The system should work with mechanical equipment, fire hydrant pumps, automation-ventilation shutdown, smoke removal, and elevators.
- The receiver should have a standby battery power supply.

(12) Security system

- Closed Circuit Television (CCTV) system should be installed for the purpose of patient monitoring and security surveillance.
- The system consists of monitor, fixed cameras, remote control cameras and video recorder, etc.
- The standby power supply allows the CCTV system to operate continuously for at least 8 hours without the main power supply.

- Electric lock system should be installed on the security lines between private and public areas.

(13) Audio-Visual (AV) System

- Video projection system, cinema screen, and sound system should be installed in the auditorium.
- Remote video conference system should be installed in the specified conference room.
- The system should be adaptable to the video source of the medical imaging systems and surgical light camera.

6.2.3 Mechanical and plumbing systems

(1) Water supply, drainage, and sanitary systems

- The city water supply is stored in the water receiving tank on the site, where a 3-day supply of water use is stored even if the city water supply stops in the event of a disaster.
- The connection to the city water pipeline is not eligible for the ODA loan.
- Average daily water consumption is assumed to be 250 m^3, and the estimated water storage is 375m^3/day including emergency use for 3 days in case of disaster.
- Wastewater is discharged to the public sewer. For the protection of public sewerage, a wastewater treatment plant should be installed for the discharged water to be of pH range 5.7-8.7, with a temperature of 40°C or less and a BOD of less than 300 mg/L.
- Blood, formalin, and other medical liquid waste should not be discharged into the sewer but should be collected as medical waste.
- Rainwater is discharged to the public drainage system.
- Connection to the public sewerage and drainage system is not eligible for the ODA loan.

(2) Air-conditioning systems

- The entire building should be equipped with air-conditioning systems, considering the harsh design temperature conditions in Tashkent. As the use of gas heat sources is relatively rare in Uzbekistan, electric and oil-based systems should be used as the main heat source in combination with a central heat source and individual systems.
- An appropriate air conditioning and ventilation system should be established for each department according to the individual feature.
- Air cleanliness classification and its corresponding methods are shown in the following table.

Table 6-3 Air cleanliness classification

Application	Rooms and Functions	Ventilation and Filtration
Clean area	Operating room CSSD clean storage	Outside air ventilation: 3 times/hour Indoor circulation ventilation: 15 times/hour Air supply final filter: High performance
Semi-clean area	Surgery hall, ICU, SCU, POR, angiography room	Outside air ventilation: 3 times/hour Indoor circulation ventilation: 10 times/hour Air supply final filter: High performance
General clean area	Inpatient room, consultation room, radiation department, rehabilitation room, etc.	Outside air ventilation: 2 times/hour Indoor circulation ventilation: 6 times/hour Air supply final filter: Medium performance
Contamination control area	Bacterial laboratory, autopsy room, isolation room for infectious diseases	Outside air ventilation: 2 times/hour Indoor circulation ventilation: 12 times/hour Air supply final filter type: Medium performance
Anti-diffusion area	Patient toilet, filthy linen storage, filth disposal room, morgue	Outside air ventilation: None Indoor circulation ventilation: 10 times/hour Air supply final filter type: Medium performance

Source: "HEAS-02-2013" Healthcare Engineering Association of Japan

- Approximate cooling capacity is 1,000kW, and heating capacity is 750kW.
- Estimated outside air processing air volume is 10,000m^3, and estimated boiler capacity is 2,000 kg/hour (steam) x 2 units.
- Automatic control equipment (centralized control in the central monitoring room) should be introduced.

(3) Firefighting system

- An indoor fire hydrant system and other fire extinguishing equipment that conforms to the local standards should be installed.

(4) Fuel gas system

- City gas should be used as a part of the heat sources and used for hot water supply and gas cooking equipment.
- Connection to the city gas system is not eligible for the ODA loan.

(5) Elevators

- Elevators should be designed separately for general use and staff use so that the flow lines do not overlap.
- At least 2 elevators should be equipped with standby generator power.
- Uses and number of units are described below.

Table 6-4 Types and number of elevators

Type	Purpose	Stopping Floor	Quantity
Passenger (for disabled)	General use OPD (panoramic) Staff and VIP Training Center	1F-6F 1F-2F BF-2F BF-3F	2 1 1 1
Bed Cum Passenger	Staff, Goods, Patient Transfer	BF-6F BF-7F	1 1
Cargo	Food Supply	BF-6F	1

Source: JICA Study Team

6.2.4 Hospital-specific facilities

(1) Operating room interior finishing and facilities

- The operating room should be equipped with an advanced unit-panel room based on the latest medical standards in developed countries. An integrated air-conditioning system suitable for neurological surgery that has a high follow-up to the room temperature and humidity settings, a ventilation system to ensure cleanliness for surgery, a medical gases supply, an uninterruptible power supply, and all types of integrated medical equipment that can complete required procedures in the operating room should be provided.

(2) ICU medical panel

- Integrated medical panel with emergency outlets, medical gas outlets, various medical equipment outlets, and information equipment interface should be installed for each ICU bed. Water supply and drainage units should be provided for specified bed types for hemodialysis.

(3) Various shield facilities

- X-ray shield that complies with international standards should be provided for radiation equipment rooms. Electromagnetic and soundproof shields should be provided for the specified physical function testing rooms such as EMG and EEG. Shielding work for the MRI room should be included in the equipment supply.

(4) Medical gas system

- Oxygen (O_2), suction, compressed air, nitrogen (N_2), and nitrous oxide (N_2O) should be supplied by the central piping system for the operating rooms, ICUs, emergency units, radiation rooms, and other diagnostic and treatment rooms as needed.
- A liquid oxygen tank should be installed if cost performance is better than supply of medical gas cylinders.
- A central monitoring system should be established so that pressure abnormalities and supply abnormalities can be constantly monitored in the monitoring room.

- Estimated numbers of outlets are 300 for oxygen, 300 for suction, 100 for compressed air, 50 for nitrogen, and 50 for nitrous oxide.

(5) Kitchen equipment

- Kitchen system and equipment that can stably supply inpatient and staff meal in a short time with hygienic cooking environment should be provided.
- The main cooking room, cart pool, storage room, processing room, and washing room should be clearly separated. Clean and unclean areas should be clearly divided.
- Estimated number of processed meals is 1,000/day (including meals for inpatients and employees).

(6) Laundry equipment

- Provide equipment for washing, drying, and pressing of bedding, lab coats, surgical gowns, uniforms, towels, and patient gowns for use in the hospital.
- Provide a separate storage for clean linen and used linen attached to the laundry room.
- As for the washing machines that mainly use ordinary alkaline detergent, a special neutralization equipment is not needed due to the consideration of merging with a large amount of general wastewater discharged from a large hospital. In cases where the discharge of alkaline detergent is conspicuously large, it should be necessary to install a neutralization device to adjust the pH value.

6.2.5 Hospital Information System (HIS) plan

The introduction of an IT system is essential for stroke treatment, where every minute is critical. If a paper-based medical record system is introduced at the time of hospital opening, data transfer should be a major problem when switching to an IT system later on. On the other hand, IT systems tend to be complex and expensive, so the following tips can be used to reduce the cost of implementation at the time of hospital opening.

a. Specialize in the minimum system required for medical information management and separate it from the medical billing system and other systems.
b. Simplify the system by introducing one that overlooks the systems attached to each medical device.

Initial human resources, security, maintenance management, bug fixing, update work, backups, education of medical personnel on usage, and training of IT managers are issues to be addressed for the introduction of an IT system, and a post-installation maintenance contract should be considered. The following IT systems are being considered.

- Clinical information systems
- Medical care support
- Electronic medical record
- Consultation/ treatments
- Examinations

- Background management systems
- External collaboration with VPN

6.3 Furniture plan

The furniture plan is shown in the table below. It is planned that the procurement of furniture is included in the scope of work for construction work.

Table 6-5 Proposed Furniture List

Division	Uses	Remarks
Ward	For Patients	Bedstands, hospital room furniture, bed tables, dining room furniture, lounge furniture, treatment tables, stretchers, wheelchairs
	Nurse Station	Workbenches, storage shelves, various carts, chairs, desks
	For Staff	Desks, chairs, storage shelves, lockers, conference tables, sofas
Outpatient	Examination Room Treatment Room	Doctor's desks and chairs, patient chairs, treatment tables, blood collection tables, stretchers, laboratory tables
	Waiting Room	Couch, wheelchairs
	For Staff	Desks, chairs, storage shelves, conference tables
Pharmacy	Dispensing Room	Dispensing tables, medicine cabinets, various carts, storage shelves
	For Staff	Desks, chairs, storage shelves, conference tables
Clerical and Administrative		Desks, chairs, storage shelves, conference tables, reception sets, library, cabinets, executive office furniture, lockers (changing rooms)
Education and Training		Auditorium chairs, library shelves, reading desks, display panels furniture for seminars, lectures, meetings, office desks and chairs, storage shelves, lockers
Amenities		Cafe terrace furniture, lounge furniture, planters, art furniture

Source: JICA Study Team

7. Medical equipment plan for the NSC

7.1 Basic concept for medical equipment plan

In this Project, priority shall be given to equipment planning related to reliable diagnosis, treatment, and recovery rehabilitation for emergency stroke patients. Additionally, neurological disorders are not only associated with the brain, but also with neurological and spinal cord lesions, and symptoms similar to those of neurological disorders may also occur in other areas. Therefore, the JST shall establish a diagnosis structure for related departments (neurology, ophthalmology, otolaryngology, urology, etc.) and develop a tertiary-level medical institution. The equipment shall be procured according to the following principles:

- To procure the necessary equipment to provide diagnosis, treatment, and rehabilitation of stroke and other neurological disorders as a top referral hospital in Uzbekistan
- To procure the equipment for medical checkups to prevent stroke caused by lifestyle diseases
- To procure the training/ teaching equipment for human resources development in the neurology field

7.1.1 Outpatient clinic

- To procure basic diagnostic equipment including those for specialized outpatient clinics such as ophthalmology, otolaryngology, or urology
- To procure essential equipment for primary treatment in the emergency ward

7.1.2 Inpatient wards

- To procure basic equipment for inpatient care such as vital signs measurement equipment and nursing care equipment

7.1.3 ICU, SCU, POR

- To procure equipment for intensive care
- To procure a few hemodialysis units in the ICU for patients with acute kidney failure

7.1.4 Radiology department

- To procure CT and MRI scanners for patients with neurological diseases and people who come for medical checkups. One or more units of CT and MRI are considered.
- To procure equipment for early detection of patients with symptoms suspected of cerebrovascular diseases.
- Nuclear medicine facility such as SPECT-CT was considered to be established in the future, as shown in the Concept and Operational Plan for Neurology and Stroke Center of Uzbekistan (**Appendix 2**). However, as a result of the discussion with the Uzbekistan side, it will not be included in the Project.

7.1.5 Physiological Function Testing

- To procure general physiological function testing equipment such as ultrasound apparatus and electrocardiogram, as well as equipment for examinations specific to the neurological disease.
- The equipment to be procured is also intended to be used for not only the patient but also people who come for medical checkups.

7.1.6 Clinical Laboratories

- Specimen testing laboratory, pathological laboratory, and molecular biology laboratory shall be in place to diagnose patients comprehensively.
- Equipment shall be considered so that reagents can be procured continuously.

7.1.7 Operation and Intervention

- A total of 4 operating rooms and 1 day-surgery room will be in place for the prompt and appropriate treatment of acute cerebrovascular disorder, so-called stroke, with the installation of medical devices such as angiography, stereotactic navigation system, and intraoperative diagnostic imaging system to accomplish the minimal-invasive endovascular treatment and accurate approach.
- Specific medical devices will be installed for the safe and efficient treatment of central nervous system and/or spine disorders which cause functional and sensory lesions or paralysis.

7.1.8 Rehabilitation Center

- Equipment will be considered based on the stroke protocols in Uzbekistan.
- According to the protocols, drug therapy, massage, exercise, and speech therapy should be provided by rehabilitation specialists during the acute, recovery, and maintenance stages, so that equipment can be procured to help those in rehabilitation.
- Under the concept of "rehabilitation anywhere in the hospital," rehabilitation equipment such as parallel bars shall be installed not only at the rehabilitation center but also on other floors.

7.1.9 Training Center

- Equipment for training and simulation equipment shall be procured to develop human resources such as medical doctors, nurses, and other health professionals.
- The Training Center shall be for all members of the health care team and medical students as a destination for learning and sharing knowledge through hands-on workshops and surgical training programs as planned in the Concept of Training Center and Scientific Education Departments of NSC (**Appendix 3)**.

7.1.10 Others

- Ambulances are also required for the operation of the hospital. However, it must be coordinated with the entire national plan. The priority of procurement of ambulances shall be considered by MOH.

7.2 Equipment list

The list of medical equipment was planned based on discussions with NSC. The following table shows the major equipment list of the NSC. The detailed list is shown in **Appendix 4**. The equipment list and its specifications will be further discussed in the detailed design stage.

Table 7-1 Major equipment list for the NSC

Department		Equipment
Out-patient		Medical thermometer, Blood pressure monitor, Pulse oximeter, Glucometer, Height meter, Medical scales, Stretcher*, Wheelchair*, Examination table, Patient monitor*, Defibrillator*, etc.
	Ophthalmology	Slit lamp*, Tonometer*, Perimeter*, Ophthalmoscope*, etc.
	Otolaryngology	Instrument set (ENT)* ENT workstation*, etc.
	Urology	Uroflow meter, Urodynamic apparatus, etc.
In-patient ward		Medical thermometer, Blood pressure monitor, Pulse Oximeter, Glucometer, Height meter, Medical scales, Stretcher*, Wheelchair*, Examination table, Patient bed*, Portable toilet, etc.
ICU, SCU, POR		ICU bed*, Ultrasonic Nebulizer*, Defibrillator*, Syringe pump*, Infusion pump*, Ventilator*, Patient monitor*,Hemodialysis unit*, etc.
Radiology		CT*, MRI*, Digital X-ray apparatus*, Mobile X-ray apparatus*, etc.
Physiological Function Testing		EEG* ,EMG+evoked potentials*, ECG*, Polysomnography (PSG) *, Spirometer*, Ultrasound Apparatus*, etc.
Clinical Laboratory	Specimen Testing Laboratory	Hematology analyzer*, Blood cell counter*, Blood coagulation analyzer*, Biochemical analyzer*, Blood gas analyzer, Urine chemistry analyzer*, Micropipette, Centrifuge*, Binocular microscope*, etc.
	Pathological Laboratory	Laminar flow hoods*, Instrument set*, Microtome*, Tissue processor*, Automatic immuno-Stainer*, Cassette printer*, Automatic Stainer*, Thermo Shaker*, etc.
	Molecular biology laboratory	Safety cabinet*, Mini-high-speed microcentrifuge*, Gas chromatograph*, Electrophoresis system, Spectrophotometer*, Immunological analyzer, PCR analyzer, Real-time PCR, Refrigerator*, Deep Freezer*, etc.
Operation and Intervention	Operating Room 1	Operating table* Operating light *C-arm*, Surgical microscope, Endoscope Anesthesia machine, Electro surgical unit, etc.
	Operating Room 2	Operating Light*, C-arm*, Surgical microscope, Anesthesia machine, Electro surgical unit, etc.
	Operating Room 3	Operating light*, C-arm*, Surgical microscope, Anesthesia machine, Electro surgical unit, etc.
	Operating Room 4	Hybrid OR (CT/Angiography) Intraoperative imaging system, Operating table* Operating light*, Anesthesia machine, Electro surgical unit, etc.
	Angiography Room	Angiography (Bi-plane), etc.
	CSSD	Ultrasonic washing machine*, Endoscope preprocessor* Glassware Drying Oven*, Autoclave*, Plasma Sterilizer*, etc.

Department		Equipment
Rehabilitation Center		[Exercises and Movements therapy] Massage table*, Stall bars*, Parallel bar with overhead flame set *, Body-Weight Supported Treadmill*, Tilt table*, Treadmill*, Ergometer*, Gymnastic apparatus*, Robot-assisted gait training system, etc. [Physio therapy] Laser therapy apparatus*, Functional Electrical Stimulation apparatus*, Electrical Stimulation Therapy apparatus*, Ultrasound therapy apparatus *, Microwave therapy apparatus * Shock Wave Therapy apparatus, Water Bed Massager *, etc. [Occupational therapy/ADL training] Lifting table* Peg board*, Mock living dining, Toilet unit, kitchen unit, Digi-Flex, Robot assisted training apparatus, etc. [Rehabilitation and Nursing care in wards] Worker*, Parallel bar*, Shower bed/Chair *
Training Center	Multidisciplinary Simulation Center:	Training simulators (airway, cardiac perfusion, endoscopic) * High-fidelity manikin-based simulators * Operating Room equipment* etc.
	3D Neuroanatomy & VR Lab	Anatomical models of brain and nervous system, 3D image table
	Neurosurgical and Endovascular Simulation Lab	Neurosurgical virtual reality simulator, Endovascular simulator, Simulator for Neuro-Endoscopy, etc.
	Lab A – Sectional Microsurgical Lab	Microscopes, Micro-instrument sets, High Speed Drill, Head and animal Holder Frames,etc.
	Lab B – Anatomy-Cadaver Lab	Endoscopic towers, C-arm*, Microscopes with camera and video monitor, Operating table*, Suction machine*, Autoclave*, etc.

Total of approximately 280 items
*Equipment shall be procured from Japan

Source: JICA Study Team

With regard to reconsideration of the cost estimation discussed at Tashkent in February 2021 and online meeting in April 2021 with MOH, JICA study team proposed the updated equipment plan. Its policies changed the specifications of equipment and deleted some equipment from the list. The proposed equipment plan by JICA study team in June 2024 was considered and the prioritization of medical equipment will be discussed within the stakeholder of MOH in July 2024.

- Change the specification

  The JICA Study Team suggested that half of patient beds (electric) shall be changed to manual units and MOH accepted this.

- Delete some equipment from the list.

  The JICA Study Team suggested that robotic-assisted equipment for rehabilitation (4 items) shall be deleted from the list. To utilize advanced equipment such as robotic-assisted equipment, a rehabilitation specialist is required with high-level knowledge and skill in assessment. In the current situation, there are challenges in training rehabilitation personnel in Uzbekistan, so the priority is human resource development rather than the introduction of advanced rehabilitation equipment. With regard to this suggestion, MOH accepted that 3 of 4 items can be prioritized as “C.” However,

MOH concluded that robot-assisted upper limb training apparatus is required for advanced rehabilitation and prioritized as "A."

- Prioritization of equipment (see **Appendix 4**)
  - 274 of 280 equipment were prioritized as "A."
  - Only CT (320-slice) was prioritized as "B." MOH considered that CT (320-slice) is over specification for the neurological diagnosis. Necessary diagnosis can be provided because CT (64-slices) will be procured.
  - 5 equipment were prioritized as "C" including MRI (1.5T). Necessary diagnosis can be provided because MRI (3T) will be procured. Considering the maintenance cost, one MRI is more reasonable for operation at NSC.

7.3 Operation and maintenance of medical equipment

7.3.1 Operation and maintenance management organization and related organization

It is important to keep medical equipment in optimal condition throughout and maintain their safety and effectiveness to provide safe and accurate medical service to patients. In Uzbekistan, both the facility engineer and technician are in charge of medical equipment maintenance for minor failures, and complicated failures will be handled by local agents authorized by the manufacturer. Inventory management and purchase procedure for consumables and parts replacement are typically handled by the manager of departments. Thus, NSC needs to 1) secure the budget for the procurement of consumables and spare parts and maintenance contract fee for some equipment every year. Furthermore, it is required to 2) educate health staff for daily maintenance and inventory management, and 3) secure a person who has working experience at hospitals or agents for at least five years with knowledge and skill in maintenance of medical equipment. Note that the maintenance of medical equipment does not require repair of equipment, but having the most up-to-date knowledge on preventive maintenance and being able to communicate with the appropriate authorized agent in the event of equipment failure.

7.3.2 Maintenance service

The maintenance service may be included in the loan. The Project recommends a three-year maintenance service (1-year warranty + 2-year maintenance service) for radiological equipment. Therefore, it is preferable to include a maintenance service that meets the following conditions:

- Equipment that significantly affects the diagnostic and treatment by suspension due to failure to function.
- Equipment that requires periodic maintenance by the manufacturer's engineer.
- Equipment that includes expensive spare parts such as an X-ray tube.

Moreover, the following conditions shall be included in the maintenance service, and understanding among the stakeholders is required.

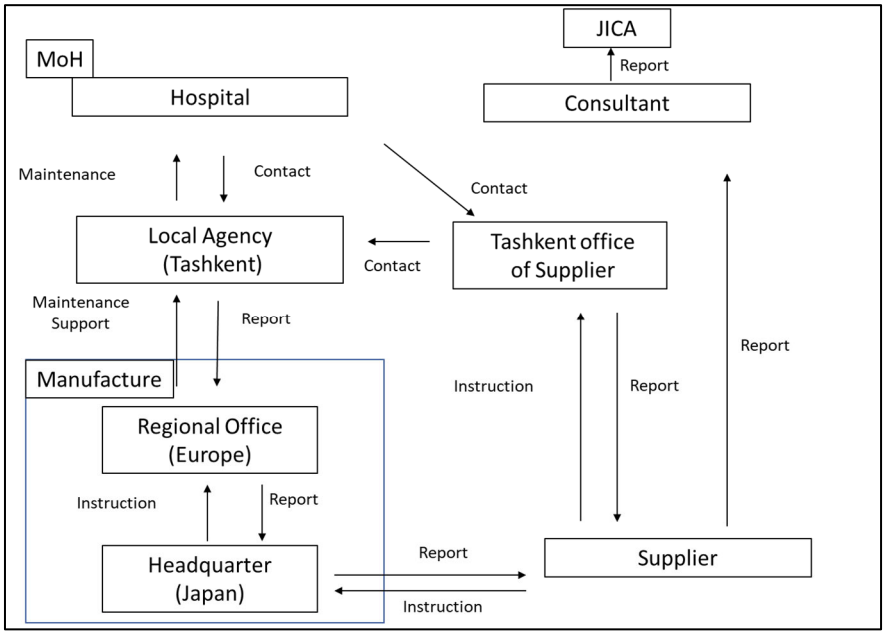
Condition of Maintenance Service (Draft)

- ✓ Periodic maintenance (at least two times/ year)
- ✓ On-call support
- ✓ Replacement of X-ray tube or other expensive spare parts
- ✓ Repair work

Exemption Clauses

- Failure or damage due to any installation, relocation, or service not provided by the manufacturer's service representative or the manufacturer's designated contractor
- Failure or damage caused by the product of other companies (except those purchased from the manufacturer)
- Failure or damage due to repairs using non-manufacturers certified service parts
- Failure or damage due to non-compliance with the notices and procedures set forth in the manual
- Failure or damage due to any operating environment deviating from the requirements set forth in the manual
- Failure or damage due to natural disasters such as power surges, rain, fire, earthquake, flood, and thunder.

The figure below shows the possible structure of the maintenance service for the Project. A local agency or manufacture provide maintenance service for the equipment in the target hospital based on the contract between the MOH and the supplier. In case a problem occurs, the hospital contacts the local agency, and then the local agency addresses the issue or requests technical support from the regional office of the manufacturer.



Source: JICA Study Team

Figure 7-1 Possible structure of maintenance service

8. Current situation of medical institutes in Bukhara and Samarkand

8.1 Outline of medical institutes in Bukhara and Samarkand

Target hospitals are Bukhara State Medical Institute (BSMI) Hospital, Multidisciplinary Clinic of Samarkand State Medical University (SamSMU 1), and Multidisciplinary Specialized Centre of Pediatric Surgery (SamSMU 2). These are important referral hospitals as tertiary and teaching hospitals from the viewpoint of university hospital allocation. As the importance of measures against NCDs is increasing in Uzbekistan, hospitals are required to play a role as referral hospitals by providing acute and chronic treatment for NCDs and complications as tertiary hospitals at the regional level. At the same time, hospitals also play a role as medical educational institutions for human resource development. Note that BSMI hospital was newly opened in December 2022.

Some of the equipment in these hospitals has been in use since the time of the former Soviet Union. Therefore, it takes a long time to procure spare parts or repair work, and clinical services are occasionally suspended. In addition, it is difficult to develop human resources, especially doctors, due to outdated medical equipment.

Table 8-1 Outline of target hospitals in Bukhara and Samarkand

Information	BSMI (Planned)	SamSMU 1	SamSMU 2
Location	Bukhara City	Samarkand City	Samarkand City
Year Established	2022	1927	1987
Type	Tertiary hospital	Tertiary hospital	Tertiary hospital
No. of Beds	200 (Operating rooms: 5)	378 (Operating rooms: 13)	200 (Operating rooms: 12)
No. of staffs	Total: 1,556 Doctors: 52, Nurses: 142	Total: 765 Doctors: 123, Nurses: 298	Total: 378 Doctors: 43, Nurses: 143
No. of patients/year	Outpatients: 8,000-14,000 Inpatients: 600	Outpatients:100,000 Inpatients:19,000 Emergency:3-4,000 Operation: 6,000 Delivery: 3,000 Bed occupancy: 100% Average period of hospitalization: 7.1 days	Outpatients: 22,000 Inpatients: 15,000 Emergency: 3-4,000 Operation: 8,000 Bed occupancy: 98%~100% Average of hospitalization: 5.4days
Major diseases	Cardiac disease, stroke, cancer, trauma, etc.	Cardiac disease, Lung disease, Gastrointestinal disease, Diabetes, Cancer, Trauma, etc.	Neonatal complications, Infections, Sepsis, Malignancies (e.g., osteosarcoma)
Budget (2020)	61,754,000,000 UZS (Approx. 630 million JPY)	23,982,954,000 UZS (Approx. 250 million JPY)	9,331,296,000 UZS (Approx. 100 million JPY)
Assistance from other donors	None	KFAED (procurement of medical equipment/ in progress)	Korea (procurement of medical equipment)

Source: Answers to Questionnaire by MOH

8.2 Bukhara State Medical Institute (BSMI) Hospital

8.2.1 Basic function

BSMI Hospital is a 200-bed new university hospital in Bukhara that opened in 2022. The number of outpatients expected is approximately 8,000 to 14,000 for the initial three years. Approximately 80% of

patients will be from the Bukhara region (see below table). It will be a valuable tertiary hospital in Bukhara region (with population of 2 million) and surrounding regions.

Table 8-2 Expected patients of BSMI Hospital

	2023	2024	2025
Bukhara City	2,200	3,500	4,800
Bukhara Region	4,500	5,200	7,500
Subtotal	**6,700**	**8,700**	**12,300**
Navoi Region	450	650	700
Samarkand Region	250	380	400
Kashkadarya Region	200	250	280
Surkhandarya Region	200	250	280
Khorezm Region	100	120	140
Jizzakh Region	80	100	120
Subtotal	**1,280**	**1,750**	**1,920**
Russian Federation	-	-	1
Republic of Kyrgyz	-	2	5
Republic of Tajikistan	1	7	11
Republic of Kazakhstan	-	2	4
Subtotal	**1**	**11**	**21**
Total	**7,981**	**10,461**	**14,241**

Source: Answers to Questionnaire by MOH

Table 8-3 Departments in BSMI

Consultation Polyclinic (Outpatient)	Inpatient Department	Functional Diagnostics Department	Management Department
• Reception • Specialists 1. Cardiologist 2. Plastic surgeon 3. Pulmonologist 4. Ophthalmologist 5. Neuropathologist 6. Endocrinologist 7. Obstetrician /Gynecologist 8. ENT doctor 9. Dentist 10. Traumatologist-orthopedic 11. Surgeon 12. Gastroenterologist 13. Urologist 14. Neurosurgeon 15. Maxillofacial surgeon 16. Haematologist 17. Thoracic surgeon 18. Vascular surgeon	• Cerebrovascular Pathology (20) • Endourology (12) • Therapy (20) • Interventional cardiology (12) • Neurosurgery/traumatology/ orthopedics (26) • Maxillofacial surgery (15) • Surgery (25) • Gynecology (10) • Cardio surgery (10) • ICU (12) • Operating block • Angiography room • Blood transfusion department • CSSD	• Radiology Diagnostics (X-ray, CT, MRI) • Ultrasound Room • ECG Room, Stress Tests, Holter Monitor, EEG, FGDS, Colposcopy • Laboratory Department (Clinical laboratory, Biochemical laboratory)	• Financial and accounting service • Human resource • Lawyer • Organizational and Methodological • Internal Pharmacy • Medical Archive

Source: Answers to Questionnaire by MOH

8.2.2 Medical service provision

The table below indicates the number of patients in BSMI. Note that the number of patients is not as many compared to the expected numbers mentioned in **Table 8-2**. This is because the hospital is not fully operated as of July 2024. The main departments are Maxillofacial Surgery, Neurosurgery/Orthopedics, Cerebrovascular Pathology, Endourology, Interventional Cardiology, Multidisciplinary Therapy, Reproduction and Screening, Surgery and Transplantology, and Cardiac Surgery. The number of medical staff is calculated based on the number of beds, and 68 medical doctors, 114 nurses, and other staff are allocated. According to the hospital, serious cases are not hospitalized because it is not fully operational.

Table 8-4 Number of beds by department in BSMI

Department	No. of Beds	No. of treated patients
		2023
Maxillofacial Surgery	15	320
Neurosurgery/Orthopedics	26	720
Cerebrovascular Pathology	20	360
Endourology	12	450
Interventional Cardiology	12	540
Multidisciplinary Therapy	20	600
Reproduction and Screening	10	430
Surgery and Transplantology	25	420
Cardiac Surgery	10	120
Total	**150**	3,960

Source: Answers to Questionnaire by MOH

8.2.3 Budget and expenditure (Non-disclosure)

*This section shall be closed during a certain period.

8.2.4 Current situation of the facility and medical equipment

(1) Facility

As mentioned above, the construction work was completed in 2022, and the facility partially opened (only diagnostic functions) at the end of the same year. It is planned to fully open in September 2024.

(2) Medical equipment

Some medical equipment such as CT, MRI, patient monitor, ventilator, and patient beds have already been procured. The remaining portion is planned to be procured through the project. BSMI provides diagnostic services such as CT and MRI, laboratory service, pediatrics, neurology, and internal medicine as well as other medical services. Thereafter, the hospital will gradually upgrade its surgical equipment and accept patients from neurosurgery, trauma department, and other departments. Although there are many requests for surgical equipment, the hospital plans to partially self-procure and perform minor surgeries.

(3) Maintenance and management of medical equipment

A medical engineer responsible for the maintenance of medical equipment will be allocated in the hospital. Although minor failures are handled by medical engineers, high-tech equipment are outsourced to private company. Maintenance services are provided by its firm. It is necessary to apply for a budget to the MOH in case of purchasing a medical equipment.

8.3 Multidisciplinary clinic of Samarkand State Medical University (SamSMU 1)

8.3.1 Basic function

The multidisciplinary clinic of Samarkand State Medical University (SamSMU 1) is located in Samarkand region in the center of Uzbekistan. It provides advanced medical service as a regional referral hospital in Samarkand and the surrounding five regions: Jizzakh, Kashkadarya, Surkhandarya, Navoi, and Bukhara. SamSMU 1 receives a million outpatient and 20,000 inpatients, utilizing 388 beds and serviced by 13 clinical departments and other diagnostic departments. SamSMU 1 was established in 1930, making it the oldest and biggest general hospital in central Asia. In the past, the name of the hospital was Republican Hospital because Samarkand was the capital of the Uzbek Soviet Socialist Republic.

Although it is a tertiary hospital, there is no high-end diagnostic equipment such as CT or MRI. The patient who needs CT or MRI diagnosis has to visit a private clinic in the region for examination. As a tertiary hospital in the region, SamSMU 1 requested JICA and KFAED for the procurement of medical equipment for diagnostic, treatment, and rehabilitation.

Table 8-5 Departments and other facilities in SamSMU 1

Medical Department	Diagnostic department Hospital auxiliary services	Management department	Other departments
• 1st -Therapy (Rheumatology) • 2nd -Therapy (Cardiology) • Neurology • Surgery • Proctology • Neurosurgery • Ophthalmology • Otorhinolaryngology • Gynecology • Maternity house • Pediatric neurology • Pediatric • Resuscitation	• Consultation polyclinic • Emergency Dept. • X-ray Dept. • Laboratory • Pathological Anatomy • Hyperbaric oxygenation • Physiotherapy • Personal room for physical exercise • Dentist office • Drug store • Oxygen service • Central sterilization • Disinfection chamber • Muffle furnace • Preparation and distribution center of disinfectant solutions	• Medical board • Accounting • Medical Tourism development dept. • Statistic cabinet • Human resource dept. • Nurse board • Archive • Medical library	• Kitchen • Boiler room • Laundry • Garage • Automatic telephone station • Construction and repair • Store room • Security service

Source: Answers to Questionnaire by MOH

8.3.2 Medical service provision

The following table indicates the number of patients and operations in SamSMU 1. There are approximately 70 patients and 20-25 operations per day. Major diseases handled are musculoskeletal disease, cardiac disease, and cerebrovascular diseases. The hospital addresses a broad range of diseases through its various departments. Its pediatrics department only receives internal medicine and neurology patients while surgical diseases are treated in SamSMU 2.

Eighty percent of total referral-in patients are from Jizzakh, Kashkadarya, and Surkhandarya. Patients from foreign countries such as Tajikistan are also accepted in the hospital. Emergency patients with cancer, tuberculosis, and infectious diseases are referred to a specialized hospital in the region or Tashkent City. The total number of staff is 765 including 123 doctors, 298 nurses, 174 medical assistants, and others.

Table 8-6 Number of patients and operations by department in SamSMU 1

Department	No. of Beds	No. of treated patients			No. of operations		
		2021	2022	2023	2021	2022	2023
1st -Therapy (Rheumatology)	35	1,277	1,250	1,350	-	-	-
2nd -Therapy (Cardiology)	25	1,059	1,111	1,218	-	-	-
Neurology	40	882	909	1,117	-	-	-
Surgery	25	858	897	914	884	838	871
Proctology	20	765	766	771	713	689	705
Neurosurgery	40	1,280	1,388	1,423	374	642	689
Ophthalmology	35	2,241	2,341	2,577	1,096	1,086	1,192
Otorhinolaryngology	20	704	436	419	464	251	419
Gynecology	20	669	707	701	464	192	402
Maternity house	48	3,954	4,427	4,345	1205	973	1,064
Pediatric neurology	40	2,116	2,100	1,853	-	-	-
Pediatric diseases	40	1,468	1,505	1,555	-	-	-
Resuscitation	12	45	51	61	-	-	-
Angio surgery and X-ray endovascular surgery	20	-	-	-	-	-	-
Rehabilitation	20	-	-	-	-	-	-
Total	450	17,318	17,888	18,549	5,160	4,671	5,342

Source: Answers to Questionnaire by MOH

Table 8-7 Major diseases treated in SamSMU 1

	No. of patients				
Name of disease	2019	2020	2021	2022	2023
Inflammatory and vascular diseases	1,212	804	1,707	1,634	1,704
Ischemic heart disease/Stenocardia	1,109	1,224	1,978	1,436	1,597
Inflammatory joint diseases	1,567	977	1,200	1,236	1,331
Osteochondrosis and disc herniations	1,219	868	1,103	1,205	1,308
High blood pressure/upper respiratory diseases	1,557	872	1,516	1,230	1,281
Eye cataract	687	474	745	748	807
Gastrointestinal disease	1,014	733	1,354	926	801
Ventral hernia	850	585	886	812	743
Nasal septum curvature and mild middle ear disease	676	174	402	408	398
Glaucoma	323	226	266	272	280

Source: Answers to Questionnaire by MOH

Table 8-8 Referral patients to SamSMU 1 from other regions and countries

Regions/ Countries	2019	2020	2021	2022	2023
Jizzakh Region	620	450	651	660	672
Kashkadarya Region	451	302	506	542	568
Surkhandarya Region	470	371	452	458	501
Navoiy Region	188	52	203	206	214
Bukhara Region	37	15	45	49	52
Syrdarya Region	73	47	81	78	74
Khorezm Region	22	11	19	17	26
Tashkent City	17	7	21	19	18
Fergana Region	12	2	17	13	14
Subtotal	1,890	1,257	1,995	2,042	2,139
Republic of Tajikistan	39	-	51	52	59
Russian Federation	1	-	5	6	7
Kyrgyz Republic	2	1	4	2	4
Moldavia	4	-	2	2	-
Afghanistan	2	-	15	14	11
Subtotal	620	450	651	660	672
Total	451	302	506	542	568

Source: Answers to Questionnaire by MOH

8.3.3 Budget and expenditure (Non-disclosure)

*This section shall be closed during a certain period.

8.3.4 Current situation of the facility and medical equipment

(1) Facility

The hospital has a plan for increasing the number of beds from 388 to 400. A five-story surgical building (department of neurosurgery, proctology, otorhinolaryngology, ophthalmology, and urology) and a two-story diagnostic center were constructed in 2023.

(2) Medical equipment

Although SamSMU1 is an important regional referral hospital, there is no CT and MRI equipment to be able to conduct advanced diagnosis. Thus, a patient who needs a CT or MRI examination is referred to a private hospital. Private hospitals are also overcrowded, and consultation is very time-consuming, thus causing a burden on patients. In addition, it is also a problem that getting the examination and diagnosis takes a long time from the primary consultation. Furthermore, the lack of equipment and the outdated equipment are additional problems. There are only two ultrasound apparatuses available. An X-ray apparatus has been in use since the 1970s. As a result, it is difficult to provide sufficient diagnosis.

(3) Maintenance and management of medical equipment

Hospital medical engineers are responsible for the maintenance of medical equipment in the hospital. Although minor failures are handled by medical engineers, high-tech equipment maintenance is outsourced to a private company.

8.4 Second Hospital of Samarkand Medical Institute (SamSMU 2)

8.4.1 Basic function

SamSMU 2 was established in 1987 as a specialized pediatric surgery hospital affiliated with the Samarkand Medical Institute. The hospital plays the role of a leading hospital for pediatric surgery in Central and Western Uzbekistan. Surgical treatments, including endoscopic surgery, are provided to children up to 18 years of age. Moreover, internal medicine patients are treated in SamSMU 1. SamSMU 2 receives 20,000 outpatients and 12,000 inpatients utilizing 200 beds, 9 clinical departments, and other diagnostic departments. The number of operations is more than 8,000 cases per year.

Table 8-9 Departments and other facilities in SamSMU 2

Inpatient Department	Diagnostic department Hospital auxiliary services	Methodical department	Other departments
• Thoracic surgery • Urology • Emergency neonatal surgery • General Surgery No. 1 • Maxillofacial Surgery • General Surgery No. 2 • Cardiac Surgery • Anesthesiology and Resuscitation with ICU • One Day Surgery	• Functional diagnostics dept. • Radiology dept. • Endoscopy dept. • Clinical laboratory • Clinical immunology • Biochemical laboratory • Bacteriological laboratory • Pathological laboratory • Physiotherapy dept/room • Central sterilization dept. • Pharmacy • Medical archive	• Medical statistic dept. • Methodical office • Information technology and monitoring center • Follow-up office	• Financial and accounting service • Catering unit • Engineering service • Material warehouse • Laundry • Economic service • Disinfection chamber • library • Garage • Inspirator • Boiler room

Source: MOH

8.4.2 Medical service provision

The table below indicates the number of patients and operations in SamSMU 2. About 45 patients visit, and more than 30 operations are carried out per day. About 20% of the patients are under one year old and 80% are from 1 to 14 years old. The number of mortalities is 168 cases of which 138 cases comprised infant mortality. Major diseases treated are gastrointestinal diseases, congenital diseases, skin diseases, and tumors. SamSMU 2 is the first hospital in the Samarkand region which introduced video laparoscopy and bronchoscopy in order to provide operation for congenital deformities, respiratory, urological, and liver diseases in the field of pediatrics surgery in Samarkand region.

Most of the referral inpatients are from Jizzakh, Kashkadarya, and Navoi. Most of the referral in cases are for surgical treatment purposes, while patients with endocrine diseases and cancer are referred to specialized hospitals in the region, SamSMU 1 or Samarkand Multidisciplinary Hospital. The total number of staff is 378 including 43 doctors, 143 nurses, 72 medical assistants, and others.

Table 8-10 Number of patients and operations by department in SamSMU 2

Department	No. of Beds	No. of treated patients			No. of operations		
		2021	2022	2023	2021	2022	2023
Thoracic surgery	30	604	503	525	269	210	278
Urology	40	1,521	1,784	1,758	1,121	1,303	1,263
Emergency neonatal surgery	30	912	1,201	1,367	442	658	656
General Surgery No. 1	40	1,585	1,692	1,992	730	889	893
Maxillofacial Surgery	10	382	382	387	346	336	322
General Surgery No. 2	40	1,542	1,972	2,190	1,005	1,194	1,209
Cardiac Surgery	10	215	658	660	23	26	20
ICU	12	842	1,013	1,094	−	−	−
One Day Surgery	10	2,052	1,088	1,345	866	976	1,156
Total	222	9,655	10,293	11,318	4,802	5,592	5,797

Source: MOH

Table 8-11 Major diseases in SamSMU 2

Name of disease	No. of patients				
	2019	2020	2021	2022	2023
Gastrointestinal disease	794	853	1985	2,494	2,603
Congenital anomaly	413	404	1157	1,166	1,479
Malignant tumor	266	226	586	1,050	1,106
Skin/Subcutaneous tissue diseases	293	176	511	746	858
Urinary tract disease	247	374	903	1,038	731
Trauma/Poisoning	173	163	0	449	640
Respiratory disease	280	538	440	292	287
Perinatal-related diseases	66	98	171	197	196
Musculoskeletal disease	72	92	231	220	187
Cardiovascular disease	103	57	9	41	130

Source: MOH

Table 8-12 Referral patients to SamSMU 2 from other regions and countries

Region/ Country	2019	2020	2021	2022	2023
Kashkadarya Region	745	397	1,599	1,449	1,476
Jizzakh Region	429	469	1,479	1,438	1,276
Navoi Region	220	212	653	656	671
Surkhandarya Region	22	75	156	215	293
Bukhara Region	18	27	31	56	41
Tashkent Region	7	20	43	51	40
Khorezm Region		5	20	10	19
Syrdarya Region	4		6	12	13
Karakalpakstan			1	7	12
Andijan Region			5	7	10
Fergana Region	1		4	4	8
Namangan Region		1	3	3	9
Subtotal	1,446	1,206	3,999	3,901	3,856
Rusia				26	17
Republic of Tajikistan	9		4	49	51
Turkey				6	8
Subtotal	9	0	4	81	76
Total	1,455	1,206	5,367	5,486	5,718

Source: MOH

8.4.3 Budget and expenditure (Non-disclosure)

*This section shall be closed during a certain period.

8.4.4 Current situation of the facility and medical equipment

(1) Facility

The building was renovated from January 2019 to June 2020 as part of the government's investment program. Large equipment, such as CT or MRI machines, to be procured by the project, will be installed in the existing building and a new four-story building that is under construction as of July 2024. Therefore, it is necessary to consider the layout plan and installation of equipment. Note that the new four-story building will be constructed with the budget for FY2025-26.

(2) Medical equipment

The used CT scanner from Tashkent was installed in 2023 by the Uzbekistan government. However there is no MRI in SamSMU 2, therefore, patients who need advanced examination are referred to a private hospital. The facility has been renovated but the equipment is not sufficient, especially operation equipment such as laparoscope. There are more than 10 operating rooms with only one laparoscope. Given the disinfection and sterilization time, operating room equipment is inadequate. Operating rooms are not utilized effectively.

(3) Maintenance and management of medical equipment

Same as maintenance and management of medical equipment in SamSMU 1.

8.5 Assistance of development partners to BSMI and SamSMU

In recent years, BSMI has received international assistance and has been a recipient of domestic investment programs. As a part of Japan's grassroots grant aid, the Government of Japan has supported the procurement of medical equipment in 2015. Also, China donated a total of 4.2 billon UZS for medical equipment such as CT scanner and ultrasound apparatus. KfW provided the training for laparoscopic surgery and developed training facility. Moreover, KFAED will provide support for the procurement of medical equipment (see 8.5.1 for details).

SamSMU 1 has received endoscope equipment through the Grant Assistance for Grassroots Projects by the Government of Japan. KFAED will support procurement of medical equipment (see **8.5.1** for details).

Furthermore, SamSMU 2 has received several medical equipment through the assistance from the Government of Korea. It is confirmed that no other donor will provide medical equipment until December 2024.

Table 8-13 Assistance from development partners to BSMI, SamSMU 1, and SamSMU 2

Donor	BSMI	SamSMU 1	SamSMU 2
KFAED	Procurement of medical equipment / In progress	Procurement of medical equipment / In progress	-
China	Procurement of medical equipment, 2016	-	-
KfW	Technical cooperation in laparoscopy	-	-
Korea	-	-	Procurement of medical equipment
Japan	Procurement of medical equipment, 2015 (Japan's grassroots grant aid)	Procurement of medical equipment (Japan's grassroots grant aid)	-

Source: MOH

8.5.1 Assistance from KFAED

KFAED supported SamSMU 1 in the procurement of medical equipment under the "Equipping Clinics of Medical Higher Schools and Republican Clinical Hospitals with Modern Medical Equipment Project." According to information from Uzbekistan side, KFAED provided SamSMU 1 support for the procurement of a total of 23 items of medical equipment including MRI, CT scanner, and ventilator in the amount of approximately 370 million JPY. It is confirmed that there is no duplication between the KFAED's equipment list and that of the Project's equipment list.

9. Medical equipment plan for medical institutes in Bukhara and Samarkand

9.1 Basic concept of medical equipment plan

The medical institutes of Bukhara and Samarkand are important regional referral hospitals. However, it is difficult for them to provide sufficient medical services due to insufficient and deteriorating equipment. As tertiary hospitals, the equipment necessary for diagnosis, treatment, and rehabilitation of NCDs will be procured through the Project. Thus, they are expected to strengthen the medical service in the region and surrounding regions.

As tertiary care facilities in the region, they are expected to have the necessary equipment for the diagnosis, treatment, and rehabilitation of NCDs. Specifically, procurement of diagnostic equipment (CT, MRI, X-ray, endoscopy, etc.), laboratory equipment, surgical instruments, ICU equipment, and rehabilitation equipment shall be planned. Also, the target facilities are educational institutions with important roles in training medical personnel so that equipment items and specifications will be considered to enhance the level of medical personnel. Furthermore, the Project carefully considers the level of medical personnel, the capacity to manage the equipment and related facilities, and the maintenance costs associated with operating the equipment, including maintenance services. The equipment and specifications shall be reviewed to match the plans for these facilities because other donors have supported those facilities as well as the investment program by the Government of Uzbekistan.

9.2 Equipment list

The list of medical equipment expected is shown in the tables below. The detailed lists are shown in **Appendices 5, 6, and 7.**

Table 9-1 Major equipment list of BSMI Hospital

Department	Equipment	No. of items
Radiology & Diagnostic	Angiography*, Digital X-ray machine*, C-arm*, Ultrasound machine*, Mobile Ultrasound machine* etc.	5
Treatment/ monitoring	Syringe pump*, Infusion pump*, Defibrator, Suction unit*, etc.	8
Operating Room	Operating table*, Operating light*, Anesthesia machine*, Neurosurgical microscope, Lung-heart machine, Ultrasonic dissector, Laparoscope set, endoscope set* etc.	27
Laboratory	Hematology analyzer*, Blood coagulation analyzer*, Blood gas analyzer, etc.	8
Functional Diagnostic	Holter ECG, ECG, EEG, etc.	5
Others	Plasma Sterilizer, ENT unit, Gynecology table, ICU bed, stretcher, wheelchair, etc.	6
	Total	59
	(Priority A equipment)	(18)

*Equipment shall be procured from Japan

Source: JICA Study Team

Table 9-2 Major equipment list of SamSMU 1

Department	Equipment	No. of items
Words/ICU	Wheelchair*, EMG*, Ventilator* , etc.	4
Operating Room	Instrument set*, Electric drill for neurosurgery, Microscope for neurosurgery, Operating light, etc.	27
Radiology & Diagnostic	Mobile c-arm*, Angiography*, Ultrasound machine*, Mobile X-ray machine*, etc.	5
Endoscopy	Duodenoscopy*, Colonoscopy*, Automated Endoscope Reprocessor, etc.	4
Ophthalmology	Laser photo coagulator*, Perimeter*, Phacoemulsification system*, Ophthalmologist Workstation*, Ultrasound machine for ophthalmology* , etc.	10
Otolaryngology	Binocular microscope for ENT microsurgery, ENT unit * , etc.	4
Pathology	Microtome, Fluorescence microscope, etc.	4
Laboratory	Hematology analyzer*, Blood coagulation analyzer*, Electronic microscope, etc.	7
CSSD	Distiller*, Autoclave*, Sterilizer*, etc.	3
Rehabilitation	Physiotherapy machine (Ultrasound, magnetron, shock wave), Transcranial magnetic stimulation, etc.	6
	Total	74
	(Priority A equipment)	(19)

*Equipment shall be procured from Japan

Source: JICA Study Team

Table 9-3 Major equipment list of SamSMU 2

Department	Equipment	No. of items
Words/ICU	CPAP, Infant Warmer*, Incubator*, Dental unit*, Phototherapy unit * Remote lithotripter, etc.	14
Operating Room	Instrument set*, Electric drill, Microscope for neurosurgery, Operating light*, Electro surgical unit, Heart-lung machine, Anesthesia Machine, etc.	15
Radiology & Diagnostic	CT *, MRI, Digital X-ray machine*, Mobile X-ray machine*, C-arm*, Dental X-ray machine*, Ultrasound machine*, EEG*, ECG*, etc.	11
Endoscopy	Gastro- Duodenoscopy*, Colonoscopy*, Bronchoscope*, Laparoscope, Cystourethroscopy, Nephoscopy, Arthroscope, etc.	12
Rehabilitation	Physiotherapy machine (UHF, Microwave , magnetron, ultrasonic , shock wave), Parallel bar*, Body-Weight Supported Treadmill *	12
Laboratory	Hematology analyzer*, Blood coagulation analyzer*, Automatic biochemistry analyzer*, Bacteriological analyzer, Blood gas analyzer, Gene analyzer	10
CSSD	Safety cabinet*, Binocular microscope*, etc.	5
	Total	79
	(Priority A equipment)	(27)

*Equipment shall be procured from Japan

Source: JICA Study Team

9.3 Operation and maintenance of medical equipment

The annual budget of BSMI and SamSMU hospitals consists of human resource cost, social security cost, and operation cost, of which 60-70 % is allocated for human resources. The budget for the procurement of medical products, operation, and maintenance of medical equipment is only 3-5%. According to the hospitals, there had been instances in which medical products such as spare parts could not be purchased immediately due to lack of budget for operation and maintenance cost. There is no additional operational cost, such as for electricity or water, in case of replacement of medical equipment in this Project. Medical equipment has become more energy efficient in recent years, and energy cost can be reduced today. However, it is expected that SamSMU 2 will incur higher utility costs because large equipment, such as CT and MRI machines, will be installed for the first time. Maintenance service for some equipment shall be included in the loan, so that the Government of Uzbekistan and target hospitals do not need to secure the budget for a maintenance service. It is recommended that the Uzbekistan side prepares the budget for the maintenance service before the end of the contract, because its cost shall be borne by the Uzbekistan side after the end of the contract.

9.4 Necessity of facility construction in connection with equipment procurement

The table below shows large equipment to be procured and planned to be installed at the site. Installation sites are existing buildings, including buildings under construction, so that it is not necessary to construct new buildings. However, the removal or enlargement of doors, provision of a power source, and air-conditioning system are required when the large equipment (such as CT scanner or MRI) are installed into existing building. Furthermore, radiation shielding for radiation equipment and electromagnetic shielding work for MRI are required. These physical work cost shall be included in the Project.

Table 9-4 Large equipment and planned installation site

Facility	Equipment	Planned Installation Site
BSMI	Angiography	New building (Constructed in 2023)
	Digital X-ray apparatus	Outpatient clinic
SamSMU 1	Fluorography	New building (Constructed in 2023)
	Angiography	New building (Constructed in 2023)
SamSMU 2	CT	New building (Constructed in 2023)
	MRI (3.0T)	New building (Under construction)
	Digital X-ray apparatus	New building (Under construction)

Source: JICA Study Team

10. Training on strengthening capacity for hospital management and medical equipment maintenance

10.1 Background of consideration

In this chapter, three types of technical assistance are described from the viewpoints of hospital management and medical equipment maintenance. These are as follows:

- Strengthening the capacity of administrative competence of hospital management for the NSC preparation
- Strengthening the capacity of daily maintenance and preventive maintenance of medical equipment
- Hospital engineering seminars/hospital management seminars

10.2 Strengthening the capacity of administrative competence of hospital management for the NSC preparation

The strengthening of the competence of hospital management is effective in the continuous operation of advanced healthcare services. The technical assistance experts and specialists shall work with NEB and the scope of work for technical assistance to hospital management may include the following tasks:

(a) Assessing current hospital management systems and processes: This involves conducting a thorough examination of the hospital management systems, workflows, and processes to identify areas of improvement and potential challenges;

(b) Developing and implementing strategic plans: Work with NEB to develop and implement strategic plans that align with the NEC's mission and goals;

(c) Improving operational efficiency: Identify opportunities to improve operational efficiency, reduce costs, and optimize resource allocation including streamlining administrative processes, implementing performance tracking systems, and identifying areas for automation and digitization;

(d) Enhancing financial management: Assess and improve financial management practices, including budgeting, revenue cycle management, cost control, and financial reporting;

(e) Strengthening human resource management: Work with NEB to evaluate the hospital's human resource policies and procedures, including recruitment, training, performance management, and employee engagement;

(f) Enhancing quality and patient safety: Work with NEB to develop and implement quality improvement initiatives and patient safety protocols.

The required expertise for technical assistance may include expertise in hospital management, human resources, healthcare administration, finance and information technology.

10.3 Strengthening the capacity of daily maintenance and preventive maintenance of medical equipment

It is proposed that training for medical equipment users shall be included in the scope of consulting services in the implementation stage for strengthening the capacity of medical equipment maintenance. The expected results are as follows:

- Medical staff in the target hospitals understand the concept and importance of daily maintenance and preventive maintenance of medical equipment.
- Daily maintenance and preventive maintenance of medical equipment are established as routine work.
- Medical staff in the target hospitals learn the correct and safe usage of general medical equipment.

10.4 Hospital engineering seminars / hospital management seminars

It is proposed that a seminar program for capacity building of medical personnel, including facility managers, such as hospital engineering seminars or hospital management seminars, should be included in the scope of consulting services in the implementation stage.

11. Possibility of future technical cooperation by JICA

11.1 Background of consideration

Uzbekistan is in a transitional period in which it is renewing the healthcare system from the former Soviet era and building a new healthcare system. Therefore, its medical resources are not yet sufficiently developed, although its healthcare system is undergoing reform. While hospitals specializing in cardiology and oncology have been established and human resource development is ongoing in Uzbekistan, the development of specialists in neurological disorders, including stroke care, is urgently needed. Three challenges were identified in the development of human resources of neurological disorders in Uzbekistan, and these are listed below. The possibility of Japan's technical cooperation to solve these issues, especially in stroke care, was discussed.

(1) Lack of specialists in advanced and specialized medical care

(2) Lack of human resources who can provide comprehensive rehabilitation services from the acute phase to post-discharge; and

(3) Lack of awareness of team approach to medical care that crosses the barriers between healthcare professionals

In stroke care, the initiation of appropriate treatment and general management immediately after the onset of stroke is critically important and has a significant impact on outcomes. The implementation of early rehabilitation can improve the patient's return to social activities. In addition, patients are likely to be mentally unstable in response to sudden changes in their physical environment due to stroke. Therefore, in the acute phase, doctors, nurses, and other health professionals should perform their roles in their respective specialties and do their best to provide holistic care to patients. Based on the above concepts, a proposal for technical cooperation is presented.

(A) Strengthening the capacity of specialists in highly specialized medical care

(B) Strengthening the capacity of healthcare workers in the rehabilitation field

(C) Strengthening the capacity of administrative competence for hospital management

Furthermore, the concept of inter-professional collaboration is included in the technical cooperation in (A) and (B), which is believed to help develop the philosophy of a "team approach to medical care" that involves healthcare staff who provide stroke care as well as patients and their families. The strengthening of the capacity of hospital administrators through (C) effectively ensures seamless interprofessional collaboration.

Table 11-1 Proposed targets for technical cooperation

	hyperacute phase (Onset – about 6h)	acute phase	recovery phase
(A) Neurologist/ Neurosurgeon	- General Care in ICU/SCU - Prevention of complications	- General Care - Treatment in response to changes in conditions	- Developing a treatment plan for discharge - Follow-up after discharge
(A) Physiatrist	- Setting Rehabilitation Plans/Goals - Range of Motion training on the bed (passive exercise)	- Early ambulation/Early rehabilitation under general care (including training to other medical staff in this regard) - Range of Motion training on the bed (passive -> active exercise)	- Developing a rehabilitation plan for discharge - Developing a post-discharge rehabilitation plan
(B) Rehabilitation technician (Physio therapist, Occupational therapist, etc.)	- Range of Motion training on the bed (passive exercise)	- Range of Motion training on the bed (passive -> active exercise) - Swallowing training - Prevention of disuse syndrome - ADL assessment/training	- ADL/IADL assessment/training - Training with walking frames /tools
(B) Nurse	- General Care in ICU/SCU - Prevention of disuse syndrome - Prevention of complications	- Prevention of disuse syndrome - Rehabilitation in ward - ADL assessment/training	- Rehabilitation and medical support for daily life in ward - ADL/IADL assessment/training - Education for patients and family on maintaining and improving their existing functions throughout their daily life

Source: JICA Study Team

11.2 Strengthening the capacity of specialists in highly specialized medical care

Neurologists/Neurosurgeons are responsible for a wide range of neurological diseases. In case of emergency, it is important to assess the condition and immediately start the treatment after the patient arrives at the hospital, especially in case of cerebrovascular diseases such as stroke. The treatment for cerebrovascular diseases involves various medical approaches, which may include medication or, in some cases, surgical treatment. In such cases, the surgeon is required to perform sensitive and complex procedures. NSC shall be a top referral hospital for neurological diseases as well as a training facility for medical personnel and students. Thus, technical cooperation from Japan shall be effective in contributing to the development of human resources that will lead to better quality healthcare in Uzbekistan.

In Japan, doctors are required to spend 2 years in cross-disciplinary fields as a residency after obtaining their medical license. After completing the residency, the doctors spend 5 years of clinical experience in the specialty of their preference to become a specialist. Similarly, experience in a hospital accredited by an academic society in that specialty is also required. The designated hospitals have training programs that are clearly defined for the certification of a medical specialist. Neurologists and neurosurgeons will be trained in NSC in the future, and support from Japan will be effective in the development of training curricula and its implementation/facilitation by Japanese experts.

11.3 Strengthening the capacity of healthcare workers in the rehabilitation field

Immediate treatment after the onset of stroke affects the severity of future recovery. Further, an appropriate early rehabilitation has a significant effect on the retention of the patients' existing abilities. Thus, the rehabilitation doctors have to immediately make a rehabilitation plan with risk control and start the rehabilitation. Furthermore, they have to collaborate with the nurses and rehabilitation technicians to manage various challenges. However, the concept of rehabilitation is not well established in Uzbekistan. Realization of the concept that continuous and specialized rehabilitation from acute to the recovery phases is necessary; further, it is important to empower the health care workers in the rehabilitation field to improve the healthcare situation in Uzbekistan. In this context, the technical assistance from Japan shall be effective.

In Japan, inter-professional team collaboration is becoming more widespread; however, as a prerequisite, it is important to acquire the skills and knowledge that each professional needs to perform his/her role. In other words, the rehabilitation doctor is responsible for the suggestion and implementation of practical rehabilitation. The nurses and other health workers are responsible for the implementation of rehabilitation in the context of daily care. In fact, each professional must understand and share the concept of continuous rehabilitation form the acute to the recovery phases. In Japan, the professionals in the field of rehabilitation are not only rehabilitation doctors but also rehabilitation specialists such as physiotherapists, occupational therapists, and speech therapists. Furthermore, there are certified nurses for stroke rehabilitation. Those specialists are trained in specialized institutions and, thus, provide high-level rehabilitation in Japan. In conclusion, the technical assistance from Japan will be effective in improving rehabilitation in Uzbekistan.

11.4 Training in Japan on acute stroke rehabilitation

The “National Clinical Protocol for Diagnostics and Treatment of Ischemic Stroke (2020)” in Uzbekistan has indicated the following basic principles for the implementation of stroke rehabilitation:

- Early start of rehabilitation
- Continuous and consistent rehabilitation throughout the recovery phase (acute, recovery, and maintenance stages)
- Combined rehabilitation
- Personalized rehabilitation
- Proactive participation of patients and their families in rehabilitation

Based on these principles, rehabilitation, including drug therapy, massage, exercise therapy, and speech therapy, should be provided by rehabilitation professionals in the acute, recovery, and maintenance stages. Appropriate rehabilitation not only improves activities of daily living (ADL) and quality of life (QOL), but also contributes to reducing medical costs such as shorter hospital stays. However, Uzbekistan still lacks support systems for post-stroke patients.

This training program focuses mainly on strengthening the capacity of the newly established NSC staff. In addition, it is expected that after attending this training, the NSC staff will be able to provide effective acute rehabilitation services to stroke patients and lead the training of staff engaged in rehabilitation.

This training program is expected to be comprised of two courses. The first is "basic training for stroke care," which will be conducted mainly for medical staff who will be assigned to the NSC before it is established, and the second is follow-up training for managers of the NSC.

The main goals, objectives, and training plans for both training programs are as follows:

(1) Basic training for NSC staff

Purpose:	To be able to provide services in acute, recovery, and maintenance stages by the latest scientific findings to expand ADL and improve QOL of stroke patients, with the awareness of being a member of the staff engaged in rehabilitation in Uzbekistan.
Objectives:	To acquire medical expertise and specialized treatment procedures related to rehabilitation for patients with disabilities and post-stroke sequelae mainly associated with stroke, and to acquire the ability to serve as a leader in practice based on scientific evidence.
Timing	One year before the NSC opened
Duration	8 weeks / 1 course
Target trainees:	Approximately 10 persons / 1 course x 5 courses (Total 50 persons) Doctor, nurse, rehabilitation staffs and manager who will be assigned to the NSC
Contents	Rehabilitation for acute stroke patients, including support for expansion of patients' ADLs. Reference will be made to the curriculum for clinical certification of physical therapists and the education curriculum for certified nurses in rehabilitation of stroke patients. The candidate hospitals will be selected with reference to the "Tokyo Metropolitan Acute Stroke Medical Institutions List" and other sources, focusing on hospitals that have a track record of accepting foreign trainees.

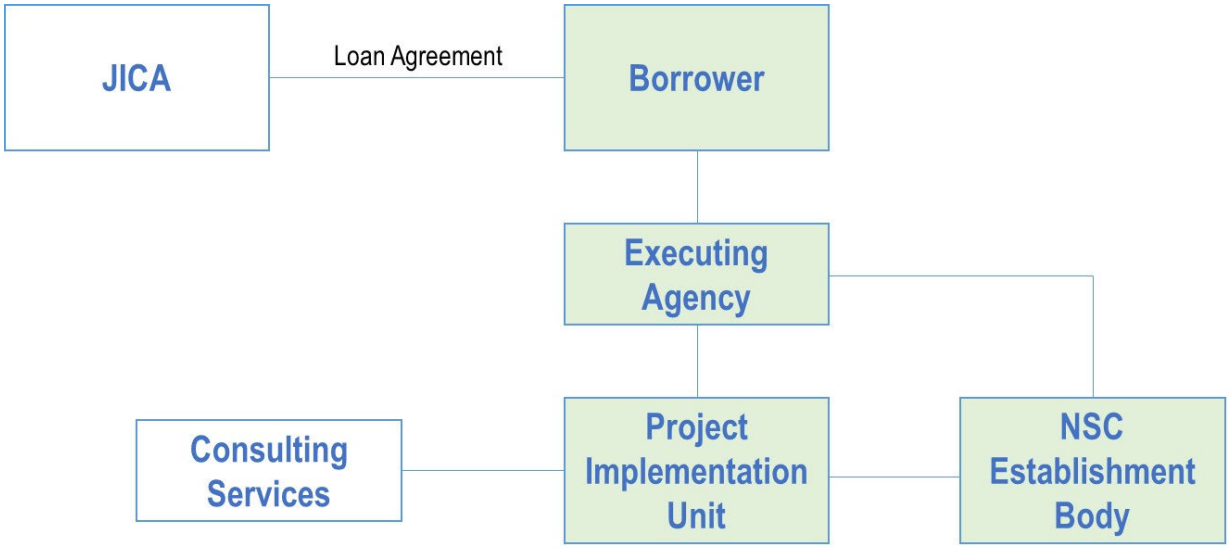
(2) Follow-up training for managers of the NSC

Purposes:	To be aware of his/her responsibilities as a leader in acute stroke care in Uzbekistan and supervise other staff members of the NSC. To be able to identify issues in acute stroke care and develop appropriate patient support plans.
Objectives:	To be able to identify and analyze problems occurring in the NSC and develop a roadmap for problem solving. To be able to discuss appropriate intervention plans for staff guidance and patients.
Timing	Approximately one year after the opening of the NSC
Duration	3 weeks / 1 course
Target trainees:	10 persons / 1 course x 3 courses (Total 30 persons) NSC staff working in rehabilitation, including doctors and nurses, as well as those involved in staff supervision and management.
Contents	A review of the basic training and reflection among participants on the current situation after the opening of the NSC, analysis of current problems and improvement plans will be discussed. After the training, action plans will be developed through workshops to be tackled by the NSC.

12. Project implementing organization

There are several Japanese ODA Loan projects for energy, transportation, and agriculture sectors in Uzbekistan but there are no Japanese ODA Loan projects in the healthcare sector. MOH has experience in implementing loan projects with international development partners for Uzbekistan's healthcare sector.

The Overall Project Implementing Organizational Structure is prepared based on the discussion with MOH in June 2024 as shown below.



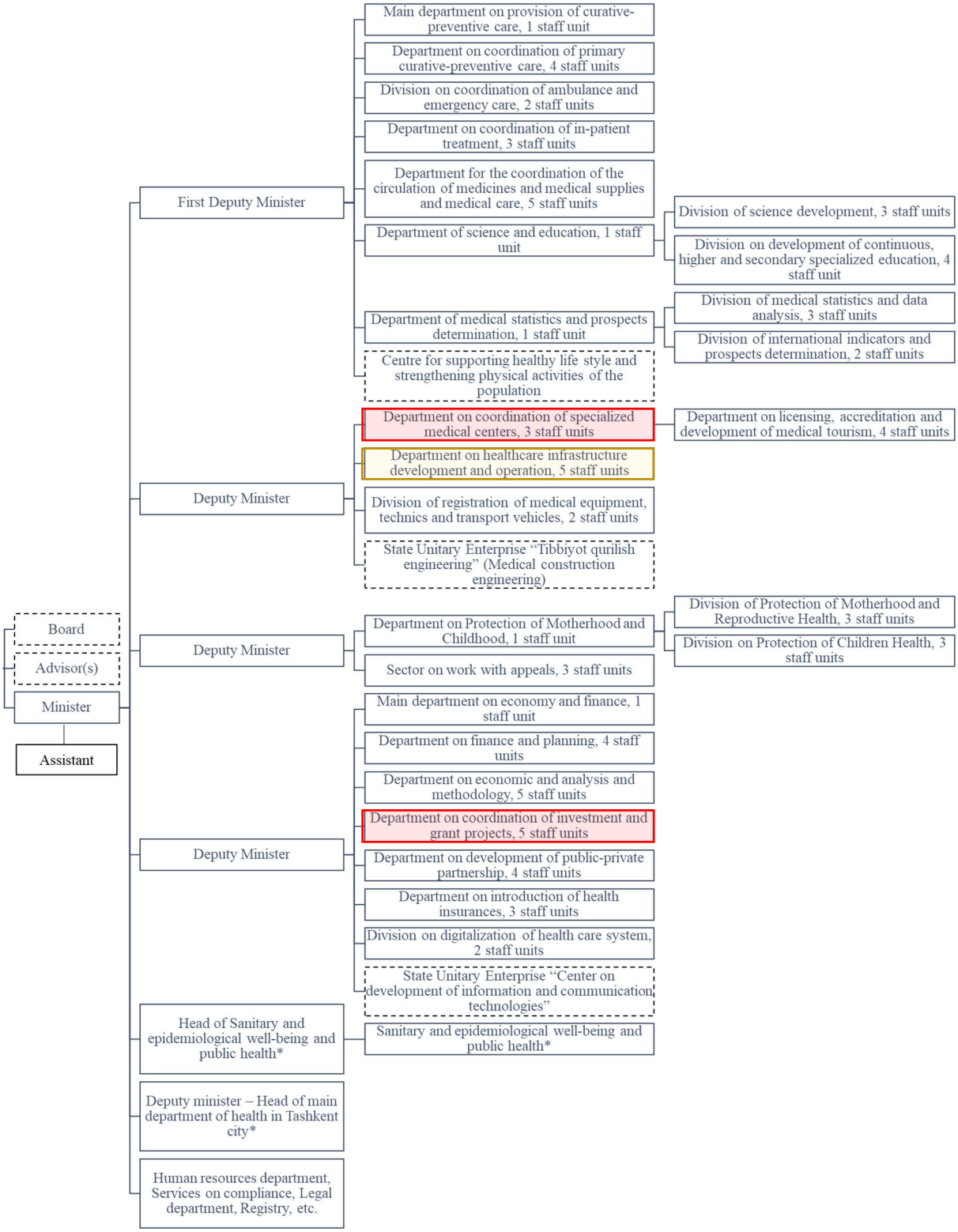
Note: The Borrower of Japanese ODA Loan is MOF or MEF/MIIT. Executing Agency is MOH.

Source: JICA Study Team

Figure 12-1 Implementing Organizational Structure

12.1 Executing agency

The Deputy Minister of MOH (finance, investments, and material security) represents the counterpart for the Project in the feasibility study phase. The department on coordination of investment projects is the focal point for foreign assistance under the reorganization of the MOH in October 2020. The structure of MOH has been reorganized in May 2021.



Notes: Total number of management personnel financed by the state budget is 127 staff units.

* Sanitary and epidemiological well-being and public health and main department of health personnel in Tashkent City are not part of the total number of personnel of the central apparatus.

** At the expense of the Fund for Development and Material Incentives of Healthcare Management Bodies.

Source: Presidential Decree No. PP-5124 (issued on 25 May 2021)

Figure 12-2 Organizational chart of the MOH and Project-related departments

MOH will be the Executing Agency in the implementation stage. The Executing Agency will be responsible for necessary external and internal coordination with parties concerned for the smooth implementation of the Project. In addition, the Executing Agency will be responsible for coordination with NSC Establishment Body for the smooth opening and operation of NSC.

The organizational chart of MOH and Project-related departments as responsible departments has been confirmed in the meeting with MOH as follows:

- Department on Coordination of Investment and Grant Projects, and;
- Department on Coordination of Specialized Medical Centers.

12.2 Implementing agency

The Project Implementation Unit (PIU) will be established under the MOH.

Table 12-1 The planned structure of the PIU

No	Job title	Number of Members	Required Experience
1.	Head of PIU	1	• Experience in international DP: 5 years or more • At least one project experience of leading a PIU as Head or a Deputy Head
2.	Construction, communications and safety engineer	1	• Experience in construction, communications, and safety engineer under international DP of 5 years • At least one project experience as a construction, communications and safety engineer
3.	Equipment and Procurement Specialist	1	• Experience in procurement of supply of goods under international DP: 5 years • At least one project experience as a procurement specialist
4.	Chief Project Coordinator	1	• Experience as chief project coordinator under international DP: 5 years • At least one project experience as a project coordinator
5.	Finance Account Specialist	1	• Experience in finance under international DP: 5 years • At least one project experience as a financial specialist
6.	Monitoring Specialist	1	• Experience in Project: 5 years or more • At least one project experience as Monitoring Specialist

Note: Person in charge of all relevant ministries and major departments is included.

Source: JICA Study Team

PIU will be set up under the Department on coordination of investment and grant projects of MOH. PIU is responsible for all finance, technical, and administrative matters of the Project, including procurement (such as the selection of consultants, selection of contractors for all packages, supervision of contractors and consultants' works), reporting, and management of disbursement in accordance with the Loan Agreement and applicable JICA guidelines. PIU is headed by the Head of PIU and supported by other members, such as Procurement Specialists (Construction and Equipment), Translator, Finance Specialist, and Monitoring Specialist, etc.

In addition, obligations of PIU are:

A. Adopting internal procedures regarding the Project for its successful implementation;

B. Coordinating the activities of the various ministries, agencies, and institutions involved in project monitoring of the Project components;

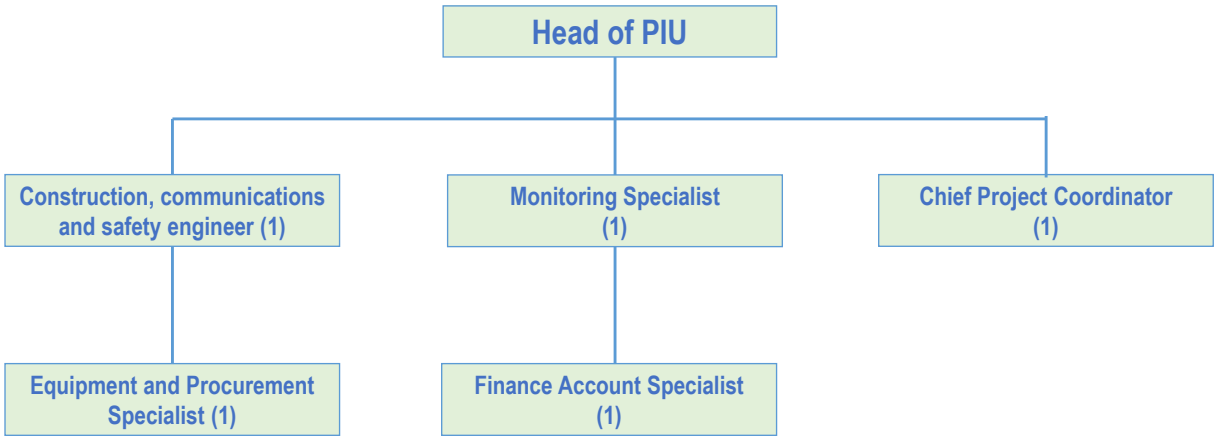
- Component 1: Civil Works and Equipment for Republican specialized scientific and practical medical center of neurology and stroke
- Component 2: Procurement of Equipment for Medical Institutes
- Component 3: Consulting Services

C. Reviewing and approving procurement within the project and Managing project procurement including contracting process in accordance with Loan Agreement and applicable JICA guidelines;

D. Reviewing and approval of performance and reports made by Contractors/ Suppliers and Consultant;

E. Preparation and submission of loan disbursement requests to Ministry of Finance in maintaining the financial records of project;

F. Collecting, maintaining all information, indicators, and parameters of the project.



Note: **PIU: Headed by the Head of PIU who should be assigned on a full-time basis**, its members should include persons in responsible departments of MOH.

Source: JICA Study Team

Figure 12-3 Structure of PIU

12.3 NSC Establishment Body (NEB)

The NEB, under the director of NSC, shall be established for overall management and coordination of the NSC in coordination with the PIU. The establishment of a new center does not only include the construction and procurement of equipment, but also the establishment of a new center management system. Therefore, in addition to the PIU which will be in charge of project implementation, the NEB shall be stablished to be in charge of the hospital management. The establishment of this management team should be started before the commencement of the actual design of the NSC. The members of the NEB are proposed as shown in the table below.

Table 12-2 Proposed members of the NEB

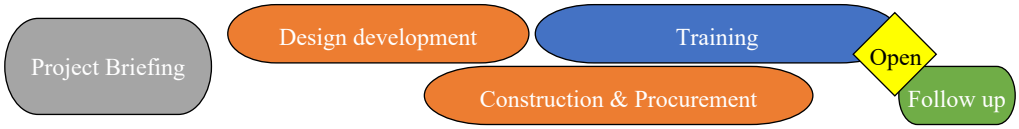
No.	Title	Position/ Specialty
1	Chairman	Director of NSC
2	Financial Manager	Economist with knowledge of health insurance system
3	General Office Manager	Hospital Management Specialist
4	Human Resource Manager	Personnel Specialist
5	Nursing Care Manager	Nursing Care Specialist
6	Medical Service Manager	Medical Doctor
7	Rehabilitation Service Manager	Rehabilitation Specialist
8	Medical Check-up Service Manager	Medical Check-Up Doctor
9	Medicine Service Manager	Pharmaceutical Logistics Specialist
10	Food Service Manager	Nutrition Logistics Specialist
11	Logistics Service Manager	Medical Consumables Logistic Specialist
12	Laboratory Manager	Laboratory Technician
13	Information Manager	IT Specialist
14	Facility Manager	Building Facility Specialist
15	Training and Research Department Manager	Training Specialist

Source: JICA Study Team

Final facility and equipment design cannot be decided without a good business plan of the NSC. This body requires a full time, hardworking team, not just a committee of professors working part time for the Project. Because its cost is non-eligible in Japanese ODA Loan, it is recommended that enough funding to recruit the members of this body should be secured by Government of Uzbekistan.

The following chart shows the standard procedures to set up a new hospital with IT management system for efficiency.

Table 12-3 Hospital Establishment Flow

Flow					
Phase	**Phase 1**	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**
Management System	[Project Brief] • Catchments area analysis • Medical policy/ philosophy • Management policy/ philosophy • Functions and roles • Number of patients (outpatients and inpatients) • Project cost estimate (consultation, infrastructure, building, equipment, furniture) • Preconditions of Construction	[Preparatory Committee] • Selection of committee • Appointment of department heads	[Recruitment] • Human resource allocation • Appointment of key personnel	[Budgeting] • Evaluation of initial cost • Initial O&M cost analysis • Staff recruitment	• Preparation for Opening • Simulation • Procurement of medicine and consumables
Operation System		[Operation Concept] • Survey at existing hospital • Estimation of operation quantity • Facility design specifications • Operation basic plan	[Development of System] • Detail demarcation of work among each unit • Preparation of operation procedure of each unit • Financial estimation of each unit	[Preparation of Manual] • Overall operation manual • Manual of each unit • Operation format and forms • Provisions for various committees • Accounting formats/ forms	• Preparation for Opening • Demonstration • Test running • Follow-up of operation
Information Technology System		[Planning] • Survey at existing hospital • IT concept formation • IT design specification	[Specifications for Tender] • Analysis of IT demand • TOR for IT Tender and contracting	[Supervision] • System evaluation with management system • Supervision of IT specification fulfilment	• Preparation for Opening • Demonstration • Test running • Follow-up of operation
Logistics Management		[Survey and Analysis] • Survey at existing hospital • Logistic management concept	[Development of System] • Logistic procedure • Material DB preparation • Supply data base preparation	[Preparation of Manual] • Logistic manual • Integration into IT system	• Preparation for Opening • Demonstration • Test running • Follow-up of operation
Facility Design		[Design Development] • Detailed design specification • Layout with equipment list • Building specification • Equipment specification	[Tender] • TOR for Tender • Evaluation of Tender	[Supervision] • Construction supervision • Procurement supervision	• Building operation training • Equipment operation training

Source: JICA Study Team

The following are details of consultancy service for the establishment of NSC.

Phase 1 Project Brief (Development of concept design and basic design)

- In the concept design stage, the Consultant research and forecast demand and supply of medical services in the region as the external environment, and analyze hospital operation, management, and facilities as the internal environment. The Consultant then formulates the policy of the new hospital, necessary medical functions, and medical supply system.
- In the basic design stage, the Consultant develops the facility design, functions, organization, and plan for income and expenditure based on the concept design. The Consultant also embodies preconditions of the hospital building design.

Operation System

Operation system is developed aiming to facilitate daily work of hospital staff. It involves human (staff and patients), material (drug, medical record), and information. Operation system is developed in the following steps:

1. Formulation of operation policy
2. Fixing scope of work and functions
3. Formulation of operational organization
4. Rules and procedures of operation

In the last step, the Consultant formulates the operation manual for stabilization and continuity of the operation and follow up with the hospital until its opening. Following effects are expected utilizing the manuals.

- Effective utilization of personnel and material, optimization of work, and cutting of administration cost.
- Enhancement of entire level of the hospital work by optimized steps in the manuals.

Logistics Management System

Controlling the cost, especially the material cost, is very difficult for most hospitals because it is not easy to systemize it. Therefore, the Consultant will give appropriate advice on how to manage logistics and propose how to operate economically and smoothly for the routine work of the hospital.

13. Project schedule and cost

Project schedule and cost shall be planned in accordance with applicable JICA standard and regulation as well as regulatory framework in Uzbekistan. Especially, the construction and procurement method and plan are key factors to set project schedule and cost in the targeted project.

13.1 Construction method and plan

13.1.1 Construction regulatory framework in Uzbekistan

JST confirmed the systems such as laws and permits related to design and construction activities from building code, related laws, regulations, and rules collected from the related ministries and the local consultant. JST has collected Decision of the Cabinet of Ministers of the Republic of Uzbekistan, Republican Law, Connection Cabinet of the Republic of Uzbekistan, Uzbekistan Building Code, Sanitary Rules and Standards (SanPiN), Building Code (KMK) including its related amendments, Interstate Building Regulations (MSN), and City Planning Code (SHNK) as listed in **Appendix 1**.

(1) On Additional Measures to Improve State Regulation in the Sphere of Construction

The Presidential Decree of the Republic of Uzbekistan No. UP-5577 "On Additional Measures to Improve State Regulation in the Sphere of Construction" dated 14 November 2018 sets out the key issues in the construction sector in Uzbekistan such as lack of market mechanisms in construction regulation, uniformed method of legislation for design and construction, absence of professional systems of education in construction norms and rules, along with directions for accelerated reforms and the development of a competitive environment in the construction sector. The key directions are summarized as follows:

- From 1 January 2019, certificates and other permits issued by the members of the Organization for Economic Cooperation and Development (OECD) for designing and construction activities will be applicable in Uzbekistan. Currently, the OECD is comprised of 36 highly developed countries including Japan;
- From 1 March 2019, the Cabinet of Ministers of the Republic of Uzbekistan was instructed to prepare a plan for phased transition to the BIM (Building Information Modeling) technologies and together with the National Agency of Project Management and the Association of Engineer Consultants to review the list of licensed activities in the construction sector in respect of their regulation by certification, accreditation, or licensing, and
- Energy saving technologies in design and construction of housing buildings will become mandatory from 1 January 2020 but excluding public facility. The only exception will be the objects certified in accordance with the BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environment Design) international standards.

(2) On Additional Measures to Expand Reforms in the Construction Industry

A new procedure has been established by the Presidential Decree of the Republic of Uzbekistan No. 5963 "On Additional Measures to Expand Reforms in the Construction Industry of the Republic of Uzbekistan" dated 13 March 2020, according to which some foreign regulatory documents may be applied in the sphere of regulating urban development activities until 31 December 2028. At the same time, such application is stipulated by the facts that such documentation must be adapted and the cost of paying for services to foreign specialists, if necessary, must be covered by the customer. The list of acceptable documents in the field of technical regulation includes:

- The Eurocodes (European Codes, EU);
- British standards (British Standards, AS);
- Chinese national construction standards (GB, CJ, JC, JG, etc.);
- Korean building codes;
- Building codes and regulations (SNiP);
- International building codes of the USA (international building code, IBC);
- National standards of Japan (Japanese Industrial Standards, JIS).

The acceptable documents are allowed to be used simultaneously with the Uzbek national regulatory documents, but subject to the adaptation of the project documentation to the regulatory framework of Uzbekistan, with the development of special technical conditions and payment for the services of independent specialists.

(3) Strategy for the Development of the Construction Industry of Uzbekistan for 2021-2025

The strategy was developed in accordance with Presidential Decree No. UP-5963 from 13 March 2020. Its goal is to realize transformations in the construction industry and aims at developing modern management methods, increasing investment attractiveness in the implementation of projects and introducing innovative solutions. The corresponding Presidential Decree was adopted on 27 November 2020. The following development should be considered in the implementation stage;

- Interim regulation on the procedure for conducting electronic public procurement in construction;
- The Unified Administrative Building Regulation;
- Zero Injury at Construction Sites Program based on the implementation of the International Social Security Association (ISSA) Concept;
- Principles of insurance in design, survey and construction activities based on the study of international best practices, and;
- Anti-corruption compliance system of the Ministry of Construction.

13.1.2 License for Construction Activities in Uzbekistan

Certain types of construction activities are subject to licensing. Therefore, a contractor must have a license to provide services for certain activities such as:

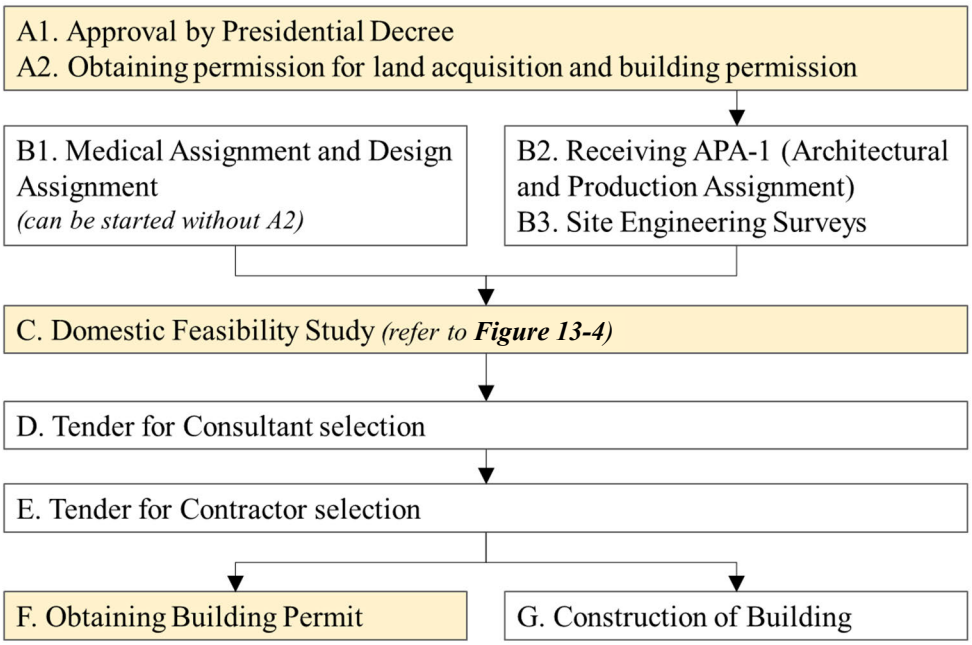
- Design, construction and operation of high-risk and potentially hazardous production facilities;
- Development of architectural and urban planning documentation; and
- Production of repair, construction, and installation works at heights by methods of industrial mountaineering.

According to our investigation result, this licensing is not applicable for the NSC.

On the other hand, no licenses are required from a foreign general contractor. It is necessary to provide a resume that indicates what the construction contractor has completed over the past five years.

13.1.3 Required permissions procedure before construction

According to information from the local consultant, the required permissions for construction are shown in the figure below.



Notes: Yellow boxes show activities that require permit or approval. The Presidential Decree No.3925 has been issued as A1 dated August 2018. Since the land is owned by MOH, a notification letter about boundary of NSC site based on a topographic site survey result shall be issued by MOH to Tashkent City as A2.

Source: JICA Study Team

Figure 13-1 Flows of required permissions before construction

Below is explanation about each of the procedure shown in **Figure 13-1**.

- A1. Approval by Presidential Decree: First of all, projects need to be approved by Presidential Decree.
- A2. Obtaining permission for land acquisition and building permission: For this Project, since NSC site is public owned, once the land has been registered to Tashkent City, the procedure of land acquisition and building permission is completed.

- B1. Medical Assignment and Design Assignment: Medical assignment is a hospital plan developed by medical experts, then approved by the Hospital Director. The plan includes the required number and types of offices, operating rooms, patient wards, medical equipment, laboratories, etc. The development normally takes 10 days. Design assignment is conducted by engineers after the development of the medical assignment. This hospital plan determines the number of stories, floor area, floor heights, list of utilities, list of medical equipment, etc. The development normally takes 10 days.
- B2. Receiving APA-1 (Architectural and Production Assignment): After A2, it is necessary to prepare a letter to the Architecture and Construction Department of Tashkent City under the State Committee to obtain the APA-1. The process normally takes 10 days.
- B3. Site Engineering Surveys: This includes surveys of site geology, site topography, site hydrogeology, building's seismic resistance, and utilities connection. All the surveys normally take 50 days.
- C. Domestic Feasibility Study: Please refer to **Figure 13-3** for detailed procedure.
- D. Tender for Consultant Selection: This includes selection of Consultant who is responsible for design development. As a month must pass from the Tender announcement to the start of the selection, it requires at least 1 month.
- E. Tender for Contractor Selection: This includes development of Tender documents such as Specifications, BOQ, and drawings. Then, the MOH checks their compliance with the medical standards and the Republican State Expertise check their compliance with other standards such as fire safety, seismic standards, and financial standards. This Tender requires a total of more than 3 months.
- F. Obtaining Building Permit: The permit is to be obtained from the State Committee with registration through a single window system. It normally takes 10 days.
- G. Construction of Building: After construction is completed, the Acceptance Committee issues Acceptance for operation of completed construction site. It normally takes 5 days.

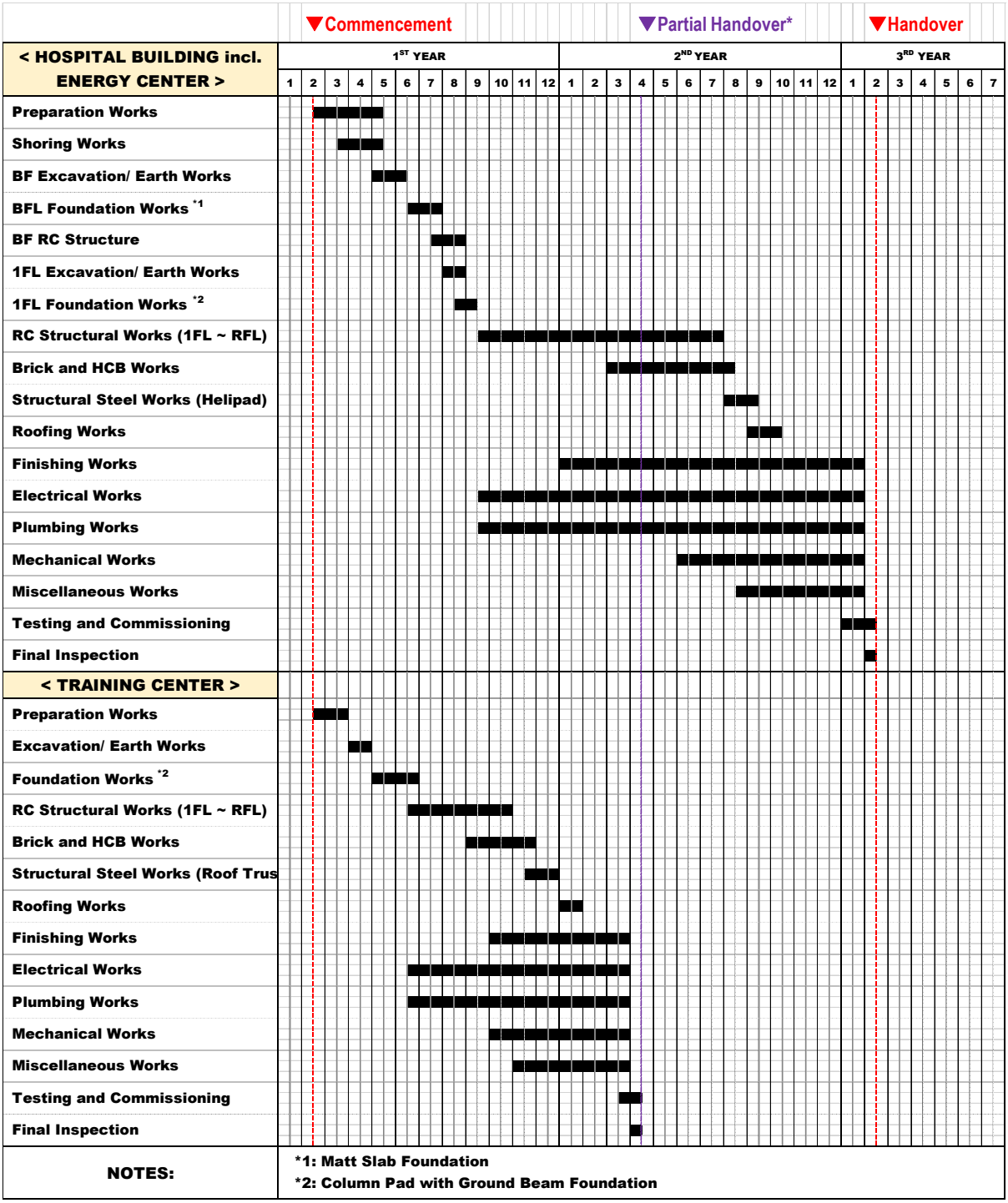
According to the investigation, the Design Institute under the MOH assigns specialists in design, electricity, fire prevention, medical care, medicine, etc. to give approval for the design. Thus, it is necessary for the design to fulfill the requirements for their approval. In addition, since approval by the State Committee, firefighting application, and approval regarding environmental consideration are also required, collection of related information is necessary.

13.1.4 Construction Method and Schedule

The official documents to be issued by the MOH, which will determine a territory on the NSC, are required to obtain land condition and infrastructure-related information of the target site from relevant departments of Tashkent City. The detailed construction method and schedule should be examined in the implementation stage. Based on the conventional construction method, the JST prepared a construction plan for the NSC as shown in the figure below.

The construction period is estimated as follows:

- NSC Hospital Building including Energy Center Building: 24 months, and
- Training Centers: 14 months.



*Needs to coordinate with equipment procurement schedule.

Source: JICA Study Team

Figure 13-2 Proposed Construction Schedule for NSC

13.2 Procurement method and plan

Based on the survey results on the procurement situation, bidding method, contract conditions, etc. of similar projects in Uzbekistan, the JST examined an appropriate procurement package division considering the STEP adaptation and schedule.

In this Project, it is expected that Japanese companies will utilize the excellent technology in the medical field, and it is important to make the conditions that Japanese companies can actively participate. In addition, since this Project includes both the construction of a new NSC facility and equipment procurement for multiple hospitals, several possibilities are considered for the procurement package divisions. Through several discussion between JICA and MOH, the following package division is examined to be the most appropriate method.

Table 13-1 Packaging plan

Option		Division per site	Procurement Conditions
NSC, Tashkent	Facility	Package-1	STEP* (The bilateral tied condition)
	Equipment	Package-2	STEP*
BSMI, Bukhara	Equipment	Package-3	STEP*
SamSMU, Samarkand	Equipment		

Note: *Special Terms for Economic Partnership of Japanese ODA Loan (STEP)

Source: JICA Study Team

The procurement and implementation method and conditions of this Project is prepared in consultation with the implementing agency of Uzbekistan as shown in the table below.

Table 13-2 Procurement method and conditions

	Design-Bid-Build[1)] Method
Construction Works (Works)[2)] and Procurement of Equipment (Goods)[3)]	• Construction Works (Works): International Competitive Bidding with the latest version of JICA standard bidding documents including guidelines (with Pre-Qualification). Option A Single-Stage Two Envelop Bidding. • Procurement of Equipment (Goods): International Competitive Bidding with the latest JICA standard bidding documents including guidelines (without Pre-Qualification).
Consulting Services	• Quality and Cost-Based Selection (QCBS) with the latest version of JICA standard bidding documents including guidelines.

Remarks:

1) The Borrowers of Japanese ODA Loans are responsible for carrying out the procedure, and in principle, International Competitive Bidding is applied. JICA sets the Standard Bidding Documents for various types of goods and services and requires the Borrowers and the Executing Agencies of ODA Loans to use the latest version of the Standard Bidding Document for smooth implementation of these procedures.
2) Design-Bid-Build is a traditional method for construction projects where the owner separately contracts with a designer and a building contractor.
3) Works are related to civil works, which includes new construction of structures of buildings.
4) Goods are physical products purchased or manufactured on request, such as medical supplies and equipment. There is usually an element of service involved, such as installation and maintenance of the purchased goods.

Source: JICA Study Team

13.3 Project implementation schedule

The Project implementation schedule plans in the table below are prepared with the assumption that the pledge date is in August 2024 and the signing date of loan agreement is in October 2024. The required months for Single-Stage Two Envelope Bidding with Pre-Qualification is set as shown in the table below.

Table 13-3 Required months for Single-Stage Two Envelope Bidding with Pre-Qualification (PQ)

No.	Single-Stage Two-Envelope Bidding with Pre-Qualification	Required Months
1	Preparation of PQ Documents	1
2	No Objection by JICA	0.75
3	PQ Advertising	1.5
4	PQ Evaluation	1
5	No Objection by JICA	0.75
6	Preparation of Bid Documents	3
7	No Objection by JICA	1.5
8	Advertising	3
9	Technical Bid Evaluation	1.5
10	No Objection by JICA	1
11	Price Bid Evaluation	1
12	No Objection by JICA	0.5
13	Negotiation/Preparation for contract and construction	2
14	No Objection by JICA	0.5

Source: JICA Study Team

The Implementation Schedule is examined with the following conditions:

- Pledge date: August 2024
- Signing date of Loan Agreement: October 2024
- Selection period of Consultant by Uzbekistan: 10.5 months from September 2024
- Pre-Qualification period for each package: 5 months
- Basic and Detailed Design including preparation of Bidding Documents: 12 months
- Tender period for each package: 14 months
- Construction Period: 24 months
- Procurement of Equipment: 16 months
- Preparation period of NSC opening: 4 months
- Opening of NSC: October 2029
- Defects Liability Period: 12 months after completion of taking over
- Warranty period: 36 months after completion of handing over

13.4 Implementation plan for consulting services

The objective of the Design and Supervision Consulting Services is to facilitate the implementation of the Project by assisting the PIU. The implementation plan for consulting services is prepared based on the mentioned Implementation Schedule. The main service contents assumed are the following two points:

1. Preparation Services
    (i) Detailed land condition investigations (topographic survey, subsoil and geotechnical survey);
    (ii) Preparation of basic and detailed designs, specifications, and contract documents;
    (iii) Pre-Qualification of Contractors/ Suppliers; and
    (iv) Evaluation of Bids and recommendations regarding award of contract.
2. Implementation Services
    (i) Supervision of construction work and equipment procurement;
    (ii) Technical and administrative services for the implementation and management of the project; and
    (iii) Training for hospital management (see **Chapter 10.2** for detailed information).

13.5 Approximate project cost (Non-disclosure)

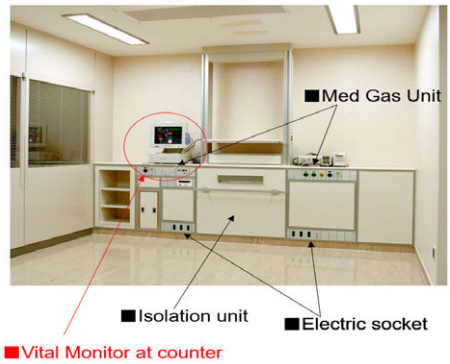
*This section shall be closed during a certain period.

13.6 Utilization of Japanese technology

13.6.1 Proposed Japanese technologies for hospital facility

The table below shows the list of Japanese technologies that are applicable for the hospital facility.

Table 13-4 List of applicable Japanese technology

Item	Image	Features
Operating room panel		Clean room interior system with seamless metal or ceramic panel system that incorporates air-conditioning equipment and electrical/ medical gas outlets. A state-of-the-art technology of Japan.
ICU console		Unit type ICU console that integrates medical gas units, electrical outlets, and other equipment used for intensive care. Cleanliness and durability are the result of Japanese technology.
Heat exchanger		A ventilation device that maintains the temperature of a heated or cooled room. High energy-saving at low cost. Superior Japanese technology in the world.
Package Air-conditioner		Optimal systems can be configured to meet the various conditions required by the hospital. Available in a wide range of variations, the products offer excellent durability, efficiency, and reduced environmental impact. After-sales service is also comprehensive after the equipment is installed.

Item	Image	Features
LED lighting		Energy efficiency is more than 100 lumens per watt, and reliable lifetime is more than 40,000 hours with excellent maintainability.
X-ray and electro-magnetic shield		Responsible construction ensures reliable performance. The lead-free barium board for X-ray shielding is environmentally friendly.
Medical gas System	 Medical gas main device  Medical gas surveillance alarm system  Medical gas bedside facilities	Advanced system equipment, including various pressure monitor management systems, can be installed in a responsible manner. Excellent durability and maintenance. Standard installation can be done by procuring materials from manufacturers in various countries and installing them in combination with piping.

Source: JICA Study Team

13.6.2 Proposed Japanese medical equipment

The table below shows the list of equipment that is expected to be procured from Japan. Manufacturers that produce large diagnostic equipment such as CT, MRI and angiography systems have provided services with local agencies in Uzbekistan. Furthermore, much equipment produced by Japanese manufacturers listed below were procured through the JICA grant aid project "Project for Improvement of Equipment of Navoi Regional Multidisciplinary Medical Center," which proves that a high proportion of Japanese equipment can be procured. Many of the Japanese manufacturers of equipment procured in the aforementioned project have either established local agencies in Uzbekistan because of the project or had existing agencies in place prior to it. While some Japanese companies have changed their agencies or withdrawn from the country, it has been confirmed that maintenance contracts, especially for radiological equipment, which require critical upkeep, are continuously being signed between the target hospitals and the local agencies.

Table 13-5 Proposed Medical equipment to be procured from Japan and its manufacturers

Medical Equipment	Major Japanese Manufacturers
MRI, CT scanner	Canon, Fujifilm
Angiography	Canon, Shimadzu
X-ray apparatus, C-arm, X-ray TV system	Canon, Shimadzu, Fujifilm
Ultrasound apparatus	Canon, Fujifilm
Endoscope	Fujifilm, Olympus
Operation table	Mizuho
Surgical set	Mizuho, Takasago Medical Industry
Operation light	Yamada Shadowiness lamp
Anesthesia apparatus	ACOMA
Ventilator	ACOMA, Nihon Kohden, Metran
Patient monitor, ECG, AED, Neuro products	Nihon Kohden, Fukuda denshi
Infusion pump, Syringe pump	Nipro, Terumo, JMS
Hematology, Coagulation, Urinalysis	Sysmex
Biochemistry analyzer	Fujifilm
Pathology, Autopsy equipment	Sakura Finetek Japan
Autoclave	Sakura Seiki
Dry sterilizer, Distiller	YAMATO
Otolaryngology equipment	Daiichi Medical, RION, Nagashima Medical
Ophthalmology equipment	Inami, Nidek
Dental equipment	Morita
Rehabilitation equipment	OG Giken, Minato
Patient Bed	Paramount bed, France Bed, Seahonence
Blood Storage Equipment	Daido Industries
Simulator for Medical Education and Radiology Phantom	Kyoto Kagaku

Source: JICA Study Team

13.7 Calculation of ratio of the goods and services to be procured from Japan (Non-disclosure)

*This section shall be closed during a certain period.

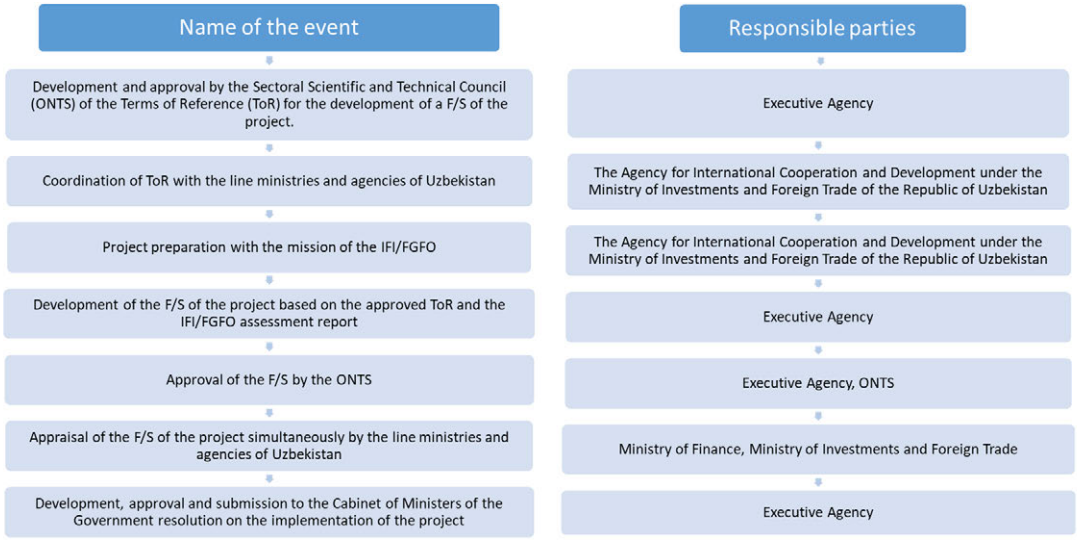
13.8 Scope to be borne by Government of Uzbekistan

The following are the items to be borne by the Government of Uzbekistan during Project implementation.

- Demolition of existing facilities in the Project site of the NSC, Tashkent
- PIU and NEB administration cost
- Project expenses uncovered by Japanese ODA Loans (including various taxes)

13.9 Consistency with the Domestic Feasibility Study (F/S) implemented by the Government of Uzbekistan

According to the Uzbekistan Presidential Decree No. PP-3857 (16 July 2018), which relates to the procedures for implementing projects utilizing loans from foreign governments and international financial institutions, the domestic F/S implemented by the Government of Uzbekistan can be organized as shown in the figure below.



Source: JICA Study Team

Figure 13-3 Project implementation procedures utilizing financing from foreign governments and international financial institutions in Uzbekistan (Presidential Decree No. PP-3857)

On the other hand, according to a survey conducted, the Ministry of Economy and Finance (MEF) and the Ministry of Investments, Industry and Trade (MIIT) of Uzbekistan will serve as the National Investment Committee. In other words, F/S approval from the MEF and MIIT is required. In addition, the government's domestic F/S period is usually 3 months, and the information required to obtain approval is as shown in the table below.

Table 13-6 Information required to obtain F/S approval from MEF and MIIT

I. Project Description
  1.1 Project Goals and Objectives
  1.2 Project Beneficiaries
II. Main Project Parameters
  2.1 Main Technical-Economic Parameters of the Project
  2.2 Project Components and Cost Categories of the Project
  2.3 Project Financing Scheme and Implementation Mechanism
  2.4 Results Monitoring and Evaluation
  2.5 Procurement Plan
  2.6 Project Implementation Schedule
  2.7 Preliminary Terms of Reference for Project Consultants
III. Project Analysis and Evaluation
  3.1 Technical Evaluation
  3.2 Analysis of Economic and Financial Efficiency of the Project
  3.3 Financial Analysis of the Initiator (included if the loan (credit) is to be repaid in full or in part at the expense of the project initiator)
  3.4 Servicing the Loan(s) Raised by the IFIs/IPFIs
  3.5 Project Risk Analysis
IV. Social and Environmental Aspects
V. Conclusions

Remarks:

1) The feasibility of projects is considered by the ONTS, which is composed of several people. In accordance with the Decree of the President of the Republic of Uzbekistan No. PP-3857 "On measures to improve the efficiency of preparation and implementation of projects with the participation of international financial institutions and foreign governmental financial organizations" dated 16 July 2018, there is a need to conduct a preliminary feasibility study of the Project.
2) Section I indicates a brief description of the need for the project, sector and description of the situation in the sector, the main goals and objectives of the project, the project's compliance program implemented in the country, the basis for the preparation of the project, the participants of the project, etc.
3) Section II explains the content of the project, a breakdown of project costs by component, source of funding, by year and by category of project costs.
4) Section III includes the results of financial and economic analysis of the project (calculation of FNPV, FIRR, ENPV and EIRR), calculation of total investment costs, distribution of financing needs by project stages and sources of financing, calculation of production costs (operating costs), calculation of other project costs, including staff training, calculation of production costs, tariffs, selling prices of products (services), calculation of sales revenues, calculation of retained and net profits, consolidated calculation of cash flow STV, analysis of the project using simple financial valuation techniques, including calculation of the payback period, the simple rate of return, debt coverage ratio, a sensitivity analysis of key parameters (sales volume, sales price, direct costs), the form of financial statements of the project participants, liquidity assessment of an enterprise; assessment of the autonomy of the enterprise; assessment of return on equity; assessment of the profitability of invested funds taking into account obligations; assessment of financial risks, determining the main risk factors, the estimated nature and range of changes, the proposed measures to reduce risks.
5) Section IV reflects the social and environmental aspects of the project and the benefits of project implementation by beneficiaries.
6) Section V reflects the main advantages and disadvantages of the project, the main risks of the project, other conclusions.
7) If any requirements for the content and structure of the feasibility study are not applicable to the projects due to its nature, then these provisions or the calculations are not reasonably included in the feasibility study.

Source: JICA Study Team

14. Environmental and social considerations

14.1 Environmental considerations

At present, this Project is classified as Category C because it has been judged that its undesirable impact on the environment is minimal according to the "JICA Guidelines for Environmental and Social Considerations" (proclaimed in April 2010). However, consideration should be given to the possibility of introducing medical equipment that uses radiation, generates medical waste, and the impact of removal of existing facilities.

According to the following Uzbekistan related laws, local Environmental Impact Assessment (EIA) called the Environmental Impact Statement (EIS) may be required.

- The Law of the Republic of Uzbekistan on the Protection of Nature No. 754-XII dated 9 December 1992
- The Law of the Republic of Uzbekistan on Environmental Expertise No. 73-II dated 25 May 2000
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On Approval of the Regulations on State Environmental Expertise"

As defined in Regulations No. 541, the development of local EIS materials comprises three stages, which are implemented in the following sequence: (1) EIS draft during the planning stage, (2) EIS on demand of the State Committee of the Republic of Uzbekistan for Ecology and Environment Protection (SCEEP) in case of the need for further research, and (3) the development of the Statement of Environmental Effects (SEE) of an object on the environment before commissioning.

During the planning stage, the local EIS draft should be prepared at the Project planning stage and submitted to the SCEEP. The validity of conclusions of the SCEEP is 3 years. In case the validity of conclusion expires or changes during the design process, the local EIS draft must be resubmitted for state geological scrutiny. When considering the local EIS draft, in case any lack of data and/ or the survey results are identified, the SCEEP decides on EIS redevelopment.

In the preparation stage for object commissioning, the statement of environmental effects (environmental regulations for the enterprise) marks the final stage of the local EIS procedure and must be prepared and submitted to the SCEEP before commercial exploitation of the projected object. Commissioning of the facility is not permitted without a positive conclusion of the SCEEP of Uzbekistan, in which environmental standards for emissions, discharges and waste, for which the company makes payments, as well as action plans to reduce the impact on air, water, and waste management are approved.

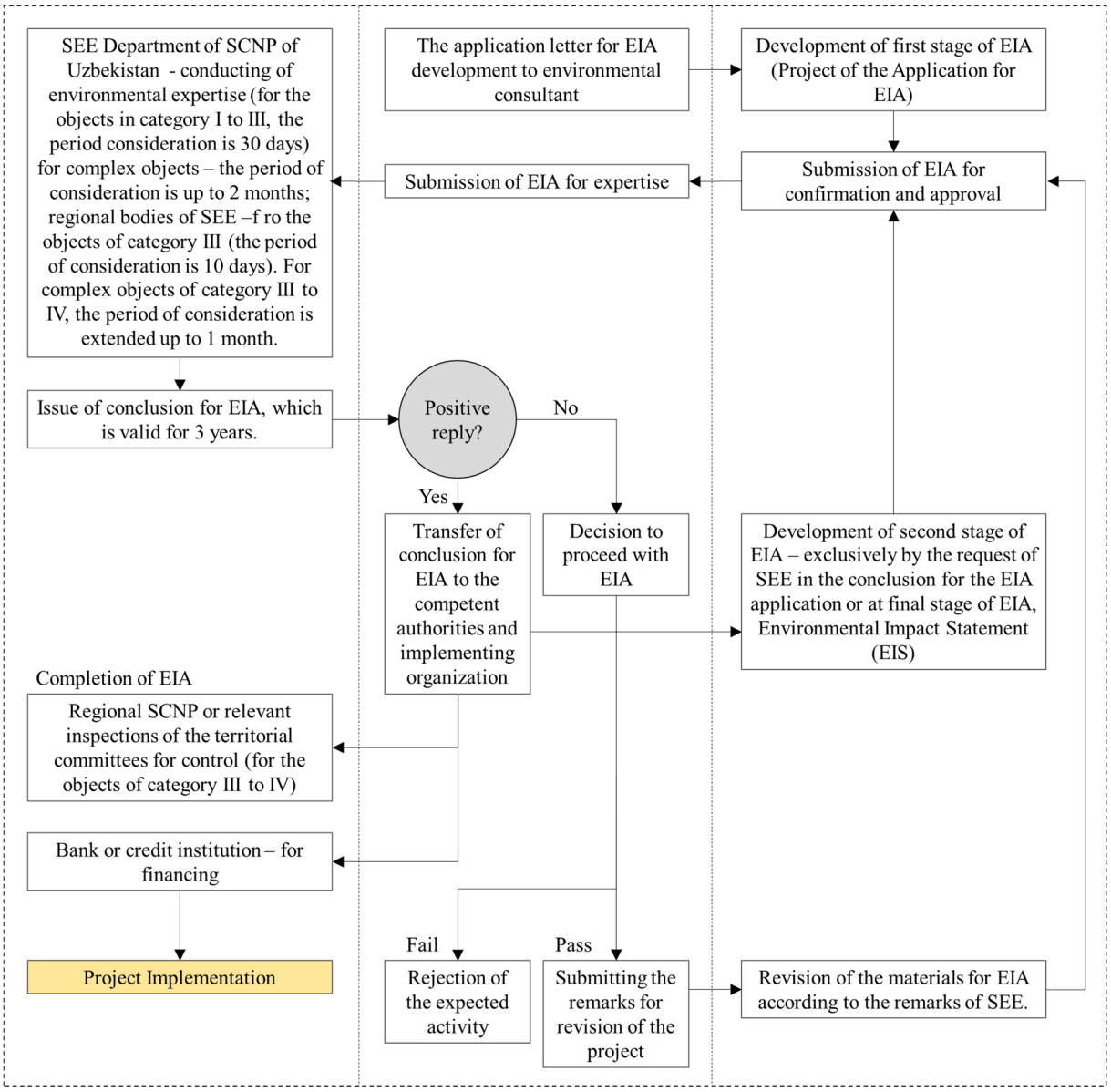
The procedure difference by category is shown in the table below. This Project is categorized as Category IV in the local Environmental Impact Statement (EIS), therefore only local EIS draft may be required (under confirmation with MOH).

Table 14-1 Local EIS procedure difference by category in Uzbekistan

Point	Category I	Category II	Category III	Category IV
Preparation of pre-project and project documentation before commissioning of the object.	Stage I: EIS draft Stage II: EIS* Stage III: SEE	Stage I: EIS draft Stage II: EIS* Stage III: SEE	Stage I: EIS draft Stage II: SEE	Stage I: EIS draft
Considering authorities	SCEEP	SCEEP	Regional SCEEP	Regional SCEEP
Fee for petition to conduct expertise of the application	Minimum salary of 25 people	Minimum salary of 15 people	Minimum salary of 7.5 people	Minimum salary of 0.5 person
Period of ecological expertise	20 days	15 days	10 days	5 days

* Developed only based on the demand of SCEEP by results of consideration of the Local EIS draft, in case there is lack of data to establish the impact on the environment.

Source: JICA Study Team



Source: JICA Study Team

Figure 14-1 Procedure of Local EIS in Uzbekistan

Information regarding environmental and social considerations are shown in the table below and the environmental checklist in JICA format can be found in **Appendix 8**. In particular, there is a standard (SanPiN No. 0292-11) regarding the construction of health care facilities.

Table 14-2 Items confirmed regarding environmental and social considerations

Items confirmed	Survey results
Reconfirmation of information that is the basis of environmental category classification and verification of the appropriateness of the category.	The Project is classified as 'Category C' in accordance with the JICA Guidelines for Environmental and Social Consideration, and Category IV in accordance with Uzbekistan's Local Environmental Assessment decision.
Roles of related organizations such as confirmation of environmental and social consideration systems and organizations in Uzbekistan, as well as laws and standards related to environmental considerations (EIS, information disclosure, etc.)	See **Table 14-1** and **Figure 14-1**.
Confirmation that land acquisition and relocation of residents are not necessary, that the planned site for facility construction is expected to be secured, and that the target medical institution has a system in place to properly perform treatment for medical wastewater and solid waste.	The site is within the Tashkent Medical Academy campus, so there is no resettlement required. For the protection of public sewerage, a wastewater treatment plant will be installed. For solid waste, operational service of the hospital collects all waste products in a special container and a specialized organization takes it out for disposal.
Environmental and social impacts associated with the implementation of this Project, including facility construction and equipment delivery and use, and their countermeasures.	To minimize future environmental and social impacts associated with the implementation of the Project, the MOH will prepare the environmental monitoring as regulated in the Annex No. 1 to the Resolution of the Cabinet of Ministers No. 737, dated 5 September 2019.

Source: JICA Study Team

14.2 Social considerations

Since the target site is within the Tashkent Medical Academy campus, there are no residential areas, local archeological, historical, cultural, and religious heritage, or landscape to pay special attention to, and there are no ethnic minorities and indigenous people living within the Project site. Furthermore, the height, shape and texture of the building design will be considered to keep in harmony with the local landscape at the implementation stage so that the impact to landscape will not occur. Therefore, social considerations such as resettlement and considerations toward local heritage will not be required.

Regarding the increasing traffic volume due to comings and goings to the site, this will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents). Therefore, it is required that the impact should be predicted for EIS based on the traffic volume and access routes setting at the implementation stage. If a significant impact is predicted, the development plan should be changed to satisfy the environmental standards by re-examination of dispersion of the traffic volume. Also, an environmental management plan such as the establishment of traffic signs and the implementation of traffic safety campaign is required.

14.3 Gender mainstreaming needs and poverty reduction effects

Based on the experience of the JICA Study Team, to promote gender mainstreaming and universal design in the implementation stage, it is important to raise the counterpart's awareness by conducting gender training or disability equality training in the preparatory survey stage. In addition, this survey will be conducted with considerations toward the MOH as the executing agency and the establishment of a cooperation system.

In addition, referring to the "Guidelines for Promoting Gender Mainstreaming in JICA Projects," JST will consider hospital design and equipment arrangement from a gender perspective. Examples of design concepts with consideration of gender issues are shown below.

- Number of changing rooms and toilets for female staff shall be determined in consideration of the actual needs of female staff in medical facilities.
- Establishment of nursing rooms not only for patients but also for accompanying family members.
- Establishment of diaper changing rooms for a society where everyone regardless of gender can raise children. Therefore, installing diaper changing rooms in men's toilets can be considered.
- Compliance with standards and guidelines of the Government of Uzbekistan.

15. Evaluation of the Project

The position of the Project in the whole health care system of Uzbekistan (status and future plan of each facility, referral system including primary and secondary hospitals, status of specialist doctors' deployment, etc.), as outlined in "**2.6 Outline of the Project**," was summarized and the validity of the project was confirmed. The direction of the new NSC was determined based on the results of the analysis of the background of the project and the local information, and after thorough consultation with Uzbekistan's relevant organizations and JICA regarding the scale and policy for the development of the facilities and equipment.

15.1 Post-project operation monitoring indicators

In the monitoring and evaluation of the Project, the effects of the Project are categorized into (1) quantitative effects and (2) qualitative effects. For quantitative effects, quantitative indicators (operational and effectiveness indicators) will be set, and then, baseline values (actual values for 2024) and target values for the target year (at the time of expiration of warranty period of equipment: 3 years after handing over) will be set as well. Data collection and monitoring related to the indicators shall be done by the PIU.

The proposed quantitative indicators for this Project are as follows:

15.1.1 Quantitative effects

The following indicators are assumed to be quantitative measures at Tashkent NSC. Operational indicators will be measured by 1) bed occupancy rate, 2) number of CT, MRI, and angiography procedures per day, 3) number of cerebral endovascular catheterizations and thrombolysis procedures per day, and 4) number of rehabilitation patients. Effectiveness measures will include 5) the number of stroke deaths in Tashkent, 6) the number of referrals per new patient admitted, and 7) the number of graduated trainees.

Table 15-1 Monitoring indicators (quantitative indicators)

Quantitative Indicator	Item	Target Facility	Figure	
			Base line	Target
Operational indicators	1. Bed occupancy rate (%)	NSC	0	90
	2. Number of operations of (a) CT, (b) MRI, and (c) angiography 3. per year (case/year)	NSC	(a) 0 (b) 0 (c) 0	(a) 5,040 (b) 3,360 (c) 1,200
		SamSMU 1	(c) 0	(c) 1,200
		SamSMU 2	(a) 1,800 (b) 0	(a) 3,600 (b) 1,200
		BSMI	(c) 0	(c) 1,200
	4. Number of cerebral intravascular catheter surgeries (case/year)	NSC	0	360
	5. Number of rehabilitation patients (case/year)	NSC	0	1,000
Effectiveness indicators	6. Number of referred patients out of new patients (people/year)	NSC	0	2,500
	7. Number of graduated trainees (people/year)	NSC	0	400

Source: JICA Study Team

15.1.2 Qualitative effects

Qualitative indicators include: 1) improvement of hospital quality management, 2) improvement of clinic efficiency, 3) improvement of health care system to improve the health of residents, 4) reinforcement of nosocomial infection control to reduce the risk of infectious diseases, and 5) contribution to SDGs (Goal 3).

Table 15-2 Monitoring indicators (qualitative indicators)

Qualitative indicators	Target (Draft)
1. Improving quality management in hospitals	Along with the construction of new facilities and the introduction of equipment, skill transfer in terms of management methods will improve the 5Ss in the hospital (Sorting, Setting-in-Order, Shining, Standardizing, and Sustaining).
2. Improving the efficiency of medical care	An increase in the number of resident physicians received will improve the quantity and quality of health care workers in Uzbekistan. In addition, the strengthening of the referral system will result in the effective use of medical resources. These numerical data will be also collected for reference purposes.
3. Improving the health of residents by improving the health care system	The provision of facilities and equipment to deal with NCDs will strengthen the capacity of health workers and further improve the health care system. As a result, the health of the population will be promoted and preventive measures against NCDs will be disseminated. It will also reduce the number of NCDs patients in rural areas where access to high quality health care is difficult, leading to reducing poverty and regional disparities.
4. Curbing the risk of infections by strengthening nosocomial infection control	The nosocomial infection control measures implemented at the target facilities will be used as a reference for other hospitals in the country to control the risk of infectious diseases.
5. Contribution to the SDGs (Goal 3) Achievement Plan	Contributing to the achievement of Goal 3 according to the achievement targets plan adopted by the government in September 2018 ("On Measures to Implement the National Goals and Targets in the Field of Sustainable Development for the Period Until 2030")

Source: JICA Study Team

15.2 Financial and economic analyses (Non-disclosure)

*This section shall be closed during a certain period.

16. Introduction of Japanese facilities and medical equipment

Due to the situation brought about by the COVID-19 pandemic, it had been difficult to conduct a safe and effective invitation program to Japan. Therefore, the JST conducted an online program on "Introduction of Japanese Facilities and Medical Equipment" to understand more about Japanese facilities and medical equipment as well as their manufacturers. The program was held on 4, 11, and 18 December 2020 supported by the major medical equipment manufacturers. Medical doctors of NSC, ADMI, and SamSMU participated from Uzbekistan. The materials of manufacturers and recorded programs were shared with participants from Uzbekistan after the program. The following table shows participating manufacturers and their products which were introduced in the program.

Table 16-1 List of participating companies

Date and Time		Company Name	Products
4 December 2020	10:00	Shimadzu Corporation	Angiography, XTV, C-arm, General X-ray etc.
		FUJIFILM Corporation	Digital X-ray diagnostic system, Endoscopy, Ultrasound, In-vitro diagnostics
		Sysmex Corporation	Laboratory equipment (Hematology, Coagulation, Urinalysis)
		ACOMA Medical Industry Co., Ltd.	Anesthesia machine, Ventilator, Electric Surgical Unit
	11:00	Sakura Seiki Co., Ltd.	Sterilizer, Washer disinfector, Dryer, etc.
		Sakura Finetek Japan Co., Ltd.	Histopathology equipment
		Kyoto Kagaku Co., Ltd.	Simulator for Medical Education and Radiology Phantom
		Nidek Co., Ltd.	OCT / Fundus, Gonioscope
11 December 2020	10:00	Yamada Shadowless Lamp Co., Ltd.	Operation lamp, examination lamp
		Central Uni Co., Ltd.	Medical gas piping system, modular operating theater
		OG Wellness Technologies Co., Ltd.	Rehabilitation equipment
		FRANCEBED Co., Ltd.	Patient bed
	11:00	Daiichi Medical	ENT treatment unit, surgical instrument, microscope
		Olympus Corporation	Endoscope
		Daido Industries INC.	Blood Storage Equipment (refrigerator, rapid freezing freezer, platelet incubator with agitator, cool packs)
18 December 2020	10:00	Mizuho Corporation	Operating tables, neuro devices, instruments, etc.
		Hitachi, Ltd.	MRI, CT, X-ray, ultrasound system
		Nihon kohden corporation	Patient monitor, ECG, AED, neuro products, ventilator, etc.
		Inami & Co., Ltd.	Ophthalmic instruments, ophthalmic surgical instruments
	11:00	RION Co., Ltd	Audiometer, etc.
		Paramount Bed Co., Ltd.	ICU bed
		J. MORITA MFG. CORP.	Diagnostic and Imaging Equipment (CBCT)

Source: JICA Study Team

17. Conclusions and recommendations

17.1 Conclusions

Through the examination of the Project as Japanese Official Development Assistance (ODA) loan Project, a draft outline of the Project is formulated as follows:

17.1.1 Purpose of the Project

This Project aims to improve the health of the people by strengthening the medical service delivery system for NCDs through the development of facilities and equipment. It also aims to improve the capacity of medical personnel for tertiary level medical facilities across the country that serve as a base for providing medical services and developing human resources for NCDs such as neurological diseases.

17.1.2 Outline of the Project

The Project includes the following:

- Development of Neurology and Stroke Center (NSC) in Tashkent with 250 beds including diagnostic, surgical, and rehabilitation units and Training Center;
- Development of medical equipment including MRI, CT, X-ray machines, diagnostic equipment such as endoscopes, surgical equipment, etc. for NSC, BSMI* (200 beds) and SamSMU* (about 700 beds in total for Hospitals No.1 and No.2), and;
- Consulting Services including land condition survey (topographic survey, sub-soil and geotechnical survey), basic and detailed design, tender assistance, construction supervision, capacity building of medical personnel (hospital facility management, medical equipment maintenance, etc.).
- Note: * Limited to Radiation Department, Endoscopy Department, and Surgery Department

17.1.3 Project cost

Based on the survey results of the construction cost and procurement of equipment, the JST estimated project cost considering STEP adaptation. The project cost is summarized in **Section 13.5**.

17.1.4 Project implementation units

In coordination with the Ministry of Health (MOH) as the executing agency for this Project and other organizations, the project implementation system was examined as follows:

- Project Implementation Unit (PIU): Ministry of Health (MOH)
- NSC Establishment Body (NEB): JST proposed that the NEB shall be established to totally manage coordination of the NSC, under the director of NSC, in coordination with the PIU for project implementation.

17.1.5 Operation and maintenance system

(1) Facility

It is proposed that a seminar for capacity building of medical personnel, including facility manager, such as hospital engineering seminars/ hospital management seminars, etc., should be included in the scope of consulting services in the implementation stage.

(2) Medical Equipment

Both the facility engineer and biomedical engineer are in charge of medical equipment maintenance in Uzbekistan. Once any problem in the equipment has been identified, the assigned engineers diagnose the causes of the equipment failure. Minor failures are repaired by the assigned engineers, while complicated failures are repaired by a local agent authorized by the manufacturer. Equipment that requires advanced technology for maintenance or repair is outsourced to private companies. The hospital budget includes its outsourcing cost.

The maintenance service may be included in the loan. The Project recommends three-year maintenance service (1-year warranty + 2-year maintenance service) for radiological equipment. Therefore, it is preferable to include a maintenance service that meets the following conditions:

- Equipment that significantly affects the diagnostic and treatment by suspension due to failure,
- Equipment that requires periodic maintenance by the manufacturer's engineer, and
- Equipment that includes expensive spare parts such as an X-ray tube.

17.1.6 Environmental and social considerations

This Project falls under Category C under JICA Guidelines for Environmental and Social Considerations (April 2010) under the following conditions:

I. Medical waste is properly disposed with a license, and

II. Pathogen at Biosafety Levels (BSL) 3 and 4 is not handled.

The environmental and social considerations process for the Project is classified by JICA as Category C.

On the other hand, in accordance with Uzbekistan's related laws, local Environmental Impact Statement (EIS) may be required. As a result of the investigation, this Project can be categorized as Category IV in local EIS (under confirmation with MOH), so only local EIS draft will be required.

17.2 Considerations and recommendations for the implementation of the Project

17.2.1 Site territory registration

Since the targeted site for NSC was changed from its initial place, the official site registration is required in Uzbekistan. The official documents to be issued by the MoH, which will determine a territory on the NSC, are required to obtain land condition and infrastructure-related information of the target site from relevant departments of Tashkent City. After the completion of site/ territory registration, the site layout plan should be determined. In the implementation stage, additional survey and examination are recommended as the scope of Consulting Services or PIU;

- Land condition survey (subsoil and geotechnical survey);
- Examination of detailed construction method and schedule;
- Examination of consistency with Tashkent Medical Academy's Master Plan; and
- Examination of the necessity of demolition of existing facilities in the Project site of the NSC.

17.2.2 Domestic Feasibility Study (F/S) to be implemented by the Government of Uzbekistan

According to the Uzbekistan Presidential Decree No. PP-3857, which relates to the procedures for implementing projects utilizing loans from foreign governments and international financial institutions, the domestic F/S will be implemented by the Government of Uzbekistan. It is recommended that the domestic F/S shall be consistent with the result of JICA study.

17.2.3 Contract package

The number of contract packages are three (3):

Package 1 for NSC facility construction works,

Package 2 for NSC equipment procurement,

Package 3 for BSMI and SamSMU equipment procurement.

17.2.4 Project Implementation Unit (PIU)

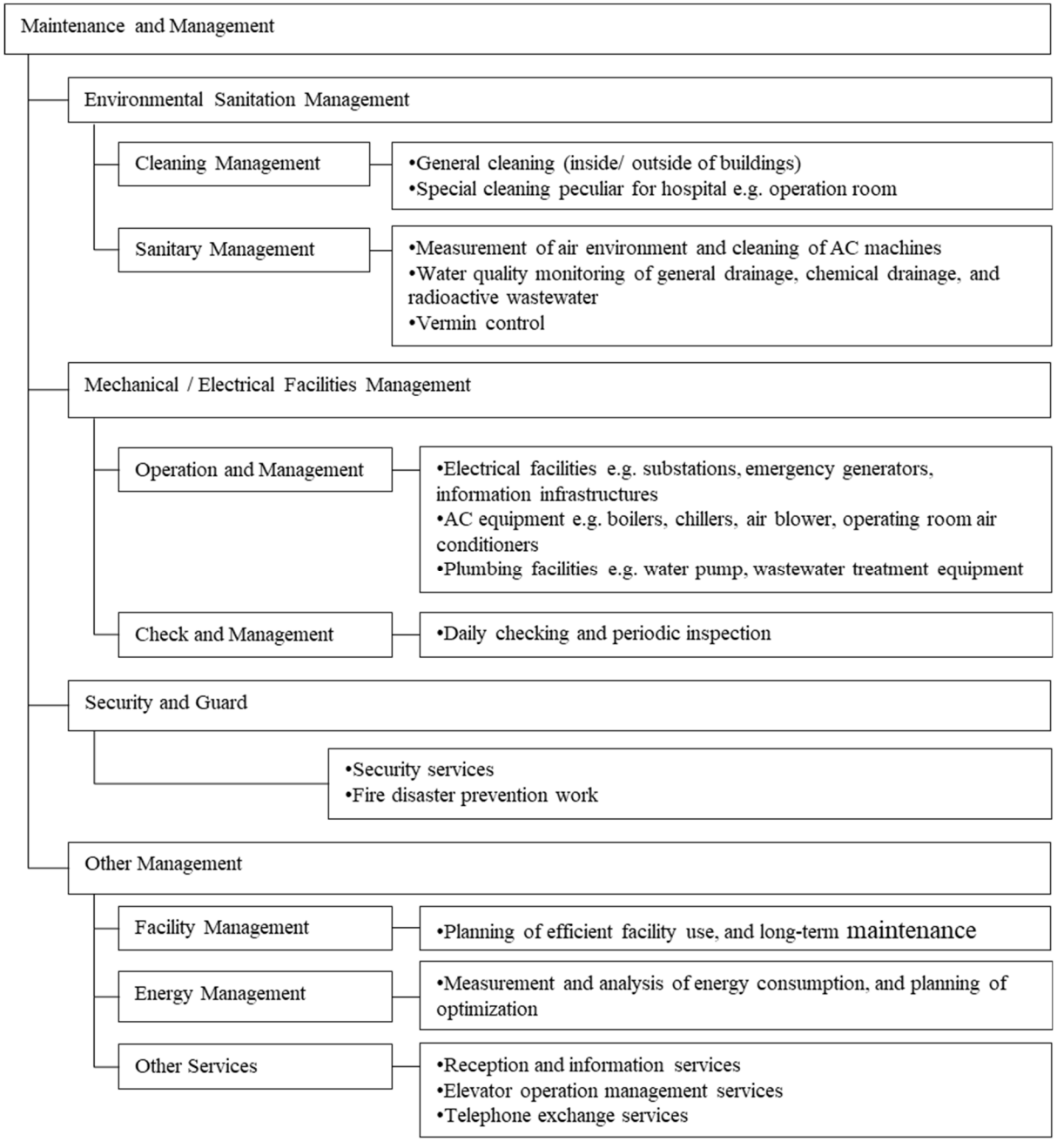
PIU in MOH is recommended to be established prior to the signing of the Loan Agreement. The delay of establishment of PIU can cause the delay of Project commencement. MOH should initiate the early establishment of implementation arrangement.

The necessary budget to be borne by the Government of Uzbekistan for the operation of PIU shall be secured at the timing of their establishment. It is necessary to confirm the budget allocation for the building construction and the operation of PIU of the first year before conclusion of Loan Agreement and the MOH and PIU need to confirm the budget allocation every fiscal year and share the budget information with JICA and the Consultants.

17.2.5 Operation and maintenance

(1) Operation and maintenance plan for NSC facility

In consideration of the contents and functions of the NSC, the following plan is required for maintenance and management of facilities.



Source: JICA Study Team

Figure 17-1 Maintenance and managemenet plan scheme

Human resources with a high degree of skill and expertise are required to complete the above scheme. The classifications of necessary professionals are recommended as follows:

Table 17-1 Human resources required for facility maintenance and management

Field	Required Human Resources
Facility Management	• Facility Management for Overall Facility maintenance and Management: 1 person
Sanitary Management	• Cleaning experts (qualified technicians with the know-how of various cleaning needs of hospitals): 1 person • Cleaning work supervisors (supervisors with the knowledge of hospital infection prevention and clean management): 1 person • Air and water quality measurement practitioner: 1 person
Mechanical/Electrical Facilities Management	• Electrical engineer: 1 person • Mechanical engineer: 1 person • Boiler operating engineer and refrigerator operating engineer: 1 person • Medical engineer (management of medical gas equipment): 1 person • System engineer (management of information infrastructures): 1 person • Elevator inspectors: Ad-hoc • Fire equipment inspectors: Ad-hoc
Security and Guards	• Security guard: 4 persons • Security system manager (operation and management of security monitors, remote control locks, etc.): 1 person

Source: JICA Study Team

To maintain the building and facilities properly, it is necessary to arrange above-mentioned professional personnel in the in-hospital facility administration section, or to outsource professionals who have the knowledge and know-how of each field.

For example, the guard supplier which does the operation and the management of the monitoring camera and the electric lock, the building management supplier which undertakes the management of the general operation and the maintenance of the facility equipment, and so on should be considered.

Also, it is desirable to create an agency and a maintenance service, and to implement regular maintenance of the elevators, the medical care gas systems, and so on.

(2) Operation and maintenance plan for BSMI, SamSMU 1, and SamSMU 2

1) Operation cost

There is no additional operational cost, such as electricity or water, in SamSMU 1 because the large equipment to be procured in this Project will replace the existing medical equipment. However, it is expected that BSMI and SamSMU 2 will incur higher utility costs because large equipment such as CT and MRI will be installed for the first time. According to the hospitals, procurement of medical products requires operation and maintenance cost of 3-5% of total budget. It is required that three hospitals need to secure the budget of consumables, spare parts cost, and maintenance cost for equipment.

2) Necessity of facility construction in connection with equipment procurement

The table below shows large equipment to be procured and planned installation sites. Installation sites are existing buildings including buildings under construction, so that it is not necessary to construct new buildings. However, the removal or enlargement of doors, provision of a power source, and air-conditioning system are required when the large equipment (such as CT scanner or MRI) are installed

in existing buildings. Furthermore, radiation shielding for radiation equipment and electromagnetic shielding work for MRI are required. Costs of these physical works shall be included in the project.

Table 17-2 Large equipment and planned installation sites

Facility	Equipment	Planned Installation Site
BSMI	CT scanner	Replacement of the existing CT in Radiology department (existing building)
	Digital X-ray apparatus	Out-patient clinic
	Fluorography	Radiology department (existing building)
SamSMU 1	Fluorography	New building (under construction)
	Angiography	New building (under construction)
SamSMU 2	CT	New building (under construction)
	MRI	Existing building
	Digital X-ray apparatus	New building (under construction)

Source: JICA Study Team

(3) Maintenance of medical equipment

Both the facility engineer and biomedical engineer are in charge of medical equipment maintenance in Uzbekistan. Once any problem on the equipment is identified, the assigned engineers diagnose the causes of the equipment failure. Minor failures are repaired by the assigned engineers, while complicated failures are repaired by a local agent authorized by the manufacturer. Equipment that requires advanced technology for maintenance or repair is outsourced to private companies. The hospital budget includes its outsourcing cost.

Table 17-3 Human Resources Allocation for maintenance of medical equipment

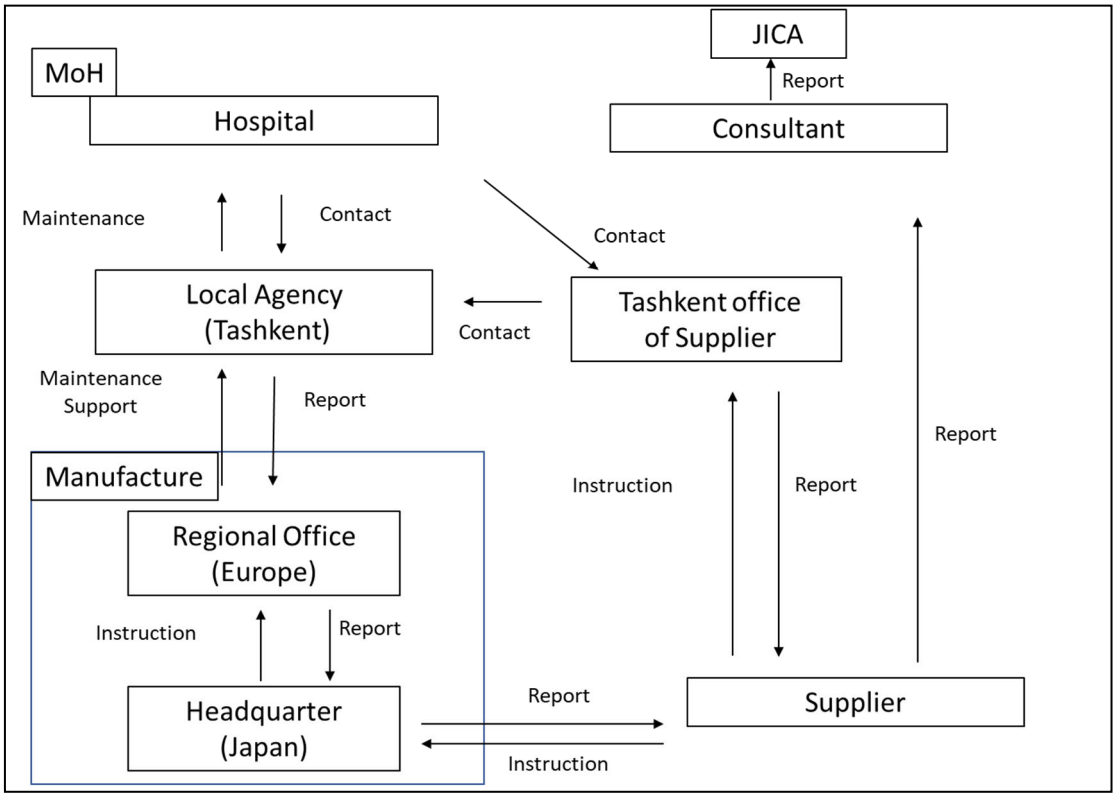
Category	NSC	BSMI	SamSMU 1	SamSMU 2
Facility Engineer	1	-	-	-
Biomedical Engineer	2	2	2	2

*The figures are as of July 2024

Source: JICA Study Team

The maintenance service may be included in the loan. The Project recommends three-year maintenance service (1-year warranty + 2-year maintenance service) for radiological equipment. It is recommended that the Uzbekistan side prepares the budget for the maintenance service before the end of the contract because its cost shall be borne by the Uzbekistan side after the end of the contract.

The figure below shows the possible structure of the maintenance service for the Project. A local agency or manufacturer provides maintenance service for the equipment in the target hospital based on the contract between the Ministry of Health and the supplier. In case a problem occurs, the hospital contacts the local agency, and the local agency addresses the issue or requests for technical support from the regional office of the manufacturer.



Source: JICA Study Team

Figure 17-2 Possible structure of the maintenance service

Appendix 1 List of collected related laws, regulations and rules

List of Related Laws, Regulations and Rules of Uzbekistan Collected by JST

No.	Regulation code or type	Regulation title	Issuing authority	Place and time of issue
1	Presidential Decree No. UP-5577	About Additional Measures to Improve State Regulation in the Sphere of Construction	President of the Republic of Uzbekistan Sh. Mirziyoyev	14 November 2018
2	Presidential Decree No. UP-5590	On comprehensive measures to fundamentally improve the healthcare system of the Republic of Uzbekistan	President of the Republic of Uzbekistan Sh. Mirziyoyev	7 December 2018
3	Presidential Decree No. UP-5963	On Additional Measures to Expand Reforms in the Construction Industry of The Republic of Uzbekistan	President of the Republic of Uzbekistan Sh. Mirziyoyev	Tashkent, 13 March 2020
4	Presidential Resolution No. PD-3550	On Measures to Improve the Order of Examination of Pre-Design, Design, Bidding Documentation and Contracts	President of the Republic of Uzbekistan Sh. Mirziyoyev	Tashkent, 20 February 2018
5	Presidential Resolution No. PD-3857	On Measures to Increase the Efficiency of Preparation and Implementation of Projects with the Participation of International Financial Institutions and Foreign Government Financial Ogranizations	President of the Republic of Uzbekistan Sh. Mirziyoyev	Tashkent, 16 July 2018
6	Republican Law	On Nature Conservation	President of the Republic of Uzbekistan I. Karimov	Tashkent, 9 December 1992
7	Republican Law	Environmental Review	President of the Republic of Uzbekistan I. Karimov	Tashkent, 25 May 2000
8	Republican Law	On Government Procurement	President of the Republic of Uzbekistan Sh. Mirziyoyev	Tashkent, 9 April 2018
9	Republican Law	Board of Tax and Budgetary Policy for 2019	President of the Republic of Uzbekistan Sh. Mirziyoyev	Tashkent, 24 December 2018
10	Connection Cabinet of the Republic of Uzbekistan	On Measures to Improve the System of Competitive Bidding in Capital Construction	President of the Republic of Uzbekistan I. Karimov	Tashkent, 3 July 2003
11	Connection Cabinet of the Republic of Uzbekistan	On Approval of the Regulations on the State Environmental Expert Review	Prime Minister of the Republic of Uzbekistan A. Aripov	Tashkent, 22 November 2018
12	Decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 532	On Obligatory Insurance of Construction Risks when Construction of Objects at the Expense of State Funds and Loans Under Government Guarantee	Cabinet of Ministers of Uzbekistan	20 December 1999
13	Decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 509	On Approval of the Regulations on the Order of Registration of Construction Objects and Issuance of Permission to Start Construction and Installation Works	Cabinet of Ministers of Uzbekistan	29 December 2000
14	Decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 737	Regulations on Monitoring the Natural Environment in the Republic of Uzbekistan	Cabinet of Ministers of Uzbekistan	5 September 2019
15	Appendix No. 3 to the Resolution of the Cabinet of Ministers	Administrative Regulations for the provision of public services for the development of an architectural and	Cabinet of Ministers of Uzbekistan	18 May 2018

	of 18 May 2018 No. 370	planning assignment		
16	Appendix No. 4 to the Resolution of the Cabinet of Ministers of 18 May 2018 No. 370	Administrative regulations for provision of state services in coordination of design and estimate documentation and simultaneous examination of design solutions for compliance of facilities with fire safety and seismic requirements	Cabinet of Ministers of Uzbekistan	18 May 2018
17	Appendix No. 5 to the Resolution of the Cabinet of Ministers of 18 May 2018 No. 370	Administrative regulations for the provision of public services in the direction of notification of the beginning of construction and installation work	Cabinet of Ministers of Uzbekistan	18 May 2018
18	Order	On the Approval of the Electrical Installation Rules (Section 1)	The Head of the State Agency for Supervision of Electric Power Industry	13 February 2004
19	SanPiN 0172-06	Hygienic requirements for the protection of surface waters in the territory of the Republic of Uzbekistan	Chief State Sanitary Doctor of the Republic of Uzbekistan B. I. Niyazmatov	Tashkent, 2006
20	SanPiN 0292-11	Sanitary Rules and Norms for Designing, Construction and Operation of Medical and Preventive Institutions	Chief State Sanitary Doctor of the Republic of Uzbekistan S. S. Sai	Tashkent, 2011
21	KMK 2.01.03-96	Construction in Seismic Areas	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent
22	Text of amendments to KMK 2.01.03-96 by order No. 99	Construction in Seismic Areas	State Committee of Architecture and Construction of the Republic of Uzbekistan	1 December 1995
23	KMK 2.03.01-96	Concrete and Reinforced Constructions	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1997
24	KMK 2.04.02-97	Water Supply Outdoor Networks and Structures	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1997
25	Change Number 2 to KMK 2.04.02-97	Water Supply Outdoor Networks and Structures	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2011
26	KMK 2.04.03-97	Canalisation Warning Networks and Conventions	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1997
27	KMK 2.04.05-97	Heating, Ventilation and Air Conditioning	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2011
28	Change Number 1 to KMK 2.04.05-97	Heating, Ventilation and Air Conditioning	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2006
29	KMK 2.04.18-97	Outdoor lighting of cities	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1997
30	KMK 2.09.11-97	Storage of dry mine fertilizers and plants	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1997

31	KMK 2.01.05-98	Natural and Artificial Lighting	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1998
32	KMK 2.04.01-98	Buildings Internal Water Supply and Sewerage	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1998
33	Change Number 2 to KMK 2.04.01-98	Buildings Internal Water Supply and Sewerage	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2006
34	KMK 2.04.17-98	Electrical Equipment of Residential and Public Buildings	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1998
35	KMK 2.04.20-98	Communication devices, signaling and dispatching engineering equipment for residential and public buildings	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1998
36	KMK 2.04.13-99	Boiler Plants	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 1999
37	SHNK 2.07.01-03	Planning for the development and development of the territory of urban and rural settlements	State Committee of Architecture and Construction of the Republic of Uzbekistan	2003
38	SHNK 2.01.02-04	Fire Safety Buildings and Structures	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2005
39	SHNK 2.07.02-07	Environmental Design Life Activity Taking Into Account the Needs of Disabled People and Mobile Populations	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2007
40	SHNK 2.04.09-2007	Fire Automation Buildings and Structures	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2007
41	SHNK 2.02.03-12	Pile Foundations	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2012
42	SHNK 2.03.05-13	Steel Structures and Design Standards	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2013
43	SHNK 1.03.01-16	Composition, Design, Negotiation and Approval Process Design and Estimate Documentation for Capital Construction of Enterprises, Buildings and Structures	State Committee of Architecture and Construction of the Republic of Uzbekistan	Tashkent, 2016
44	MSN 23-01-2013	Building Climatology	Interstate Scientific and Technical Commission for Technical Regulation, Standardization and Construction Assessment (MHTKC)	2013

Source: JICA Study Team

01/06/2020

Concept and Operational Plan for Neurology and Stroke Center of Uzbekistan

More than 70 000 stroke cases in Uzbekistan each year

Around 8000 stroke cases in Tashkent city only

Post stroke disability reaches 92%, of which 72% severe disability

Mean age of neurologically disabled patient is 50, treatment of which cost more than 5 550 000 uzbek sum a year

There is no Neurological center in the country, as a result of which we have:

- Poor diagnostic system
- Poor well-timed emergency medical care
- Absence of equipment and high-tech treatment
- Deficiency of subspecialized neurologists and neurosurgeons
- Outdated post-stroke rehabilitation
- Lack of preventive medical facilities

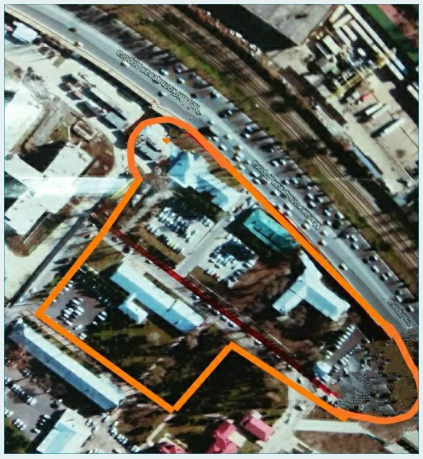
These issues will be solved by establishment of the Republican Specialized Scientific-Practical Medical Center for Neurology and Stroke

Objective of a conceptually new NSC:

- Implement international standards for diagnosis and treatment for neurological diseases and Stroke
- Reduce of existing morbidity, disability and mortality
- Create a modern training and simulation center with a cadaver lab and become unique in the region
- Develop research together with specialists from Japan
- Carry out stroke preventing measures in a more effective and manner
- Reduce the number of visits of our citizens to foreign clinics

Project overview

- *Purpose of the project*: construction and establishment of conceptually new Neurology and Stroke Center, dedicated to provide high-tech medical care for neurological patients
- *Construction area:* Multidisciplinary hospital of Tashkent Medical Academy area (former First Tashkent Medical Institute)
- *Total area*: 2.2 hectare (236806 sq/ft)
- *Capacity*: total 250 beds

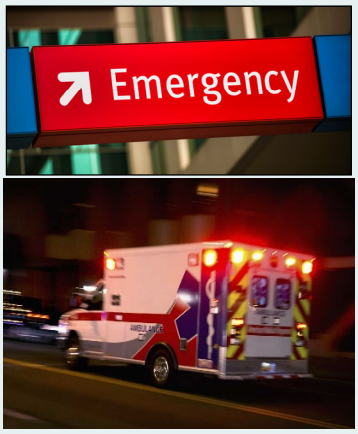


Scheme of NSC organization

- Emergency unit
- Outpatient Clinic and Diagnostic Facilities
- Inpatient - Medical and Surgical units
- Neurorehabilitation Center
- Training Center and Scientific-Research Departments
- Administrative section and Hospital management

Emergency Unit

- should be located on ground floor with easy access for patients and ambulances
- should has separate entrance for department
- with marked proper lighting and signs with easily visible and accessible from the street
- should be close to the admitting department, medical records and cashier's booth, radiology department, lab services, blood bank, elevators and wards
- ER equipped with mobile equipment for initial on-site diagnostics



Emergency Care

Diagnostic tests include:

- a physical exam
- Blood tests
- CT scan
- MRI
- Carotid ultrasound
- Cerebral angiogram
- Echocardiogram

Stroke care team:

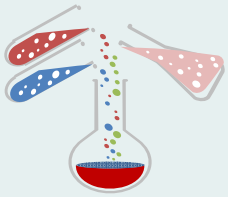
- Cerebrovascular neurologist
- Vascular neurosurgeon
- Physiatrist
- Emergency medicine

Outpatient Clinic & Diagnostic Facilities

- Adequate reception and registration area
- Preferably on the ground level with a separate entrance and adequate parking facilities
- should be close to admitting area , MRD, emergency, radiology, lab services and pharmacy
- Attention should be paid to circulation, which results in the smooth flow of various traffic lines Traversing the department
- Properly signed

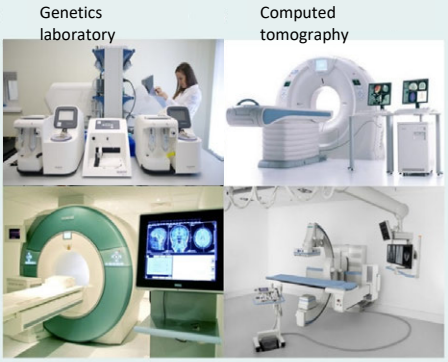
Diagnostic Facilities
(Radiology & Lab)

- Should be easily accessible to the OPD, casualty and the inpatient wards
- Preferably be sited on the ground floor or basement
- Convenient patient flow with minimization of criss-cross traffic
- Adequate waiting area
- Separate entrance for accident and emergency cases in busy hospital
- Provision of room for technical functioning
- Flexibility, expandability and upgradability need to be kept in mind while sitting the department



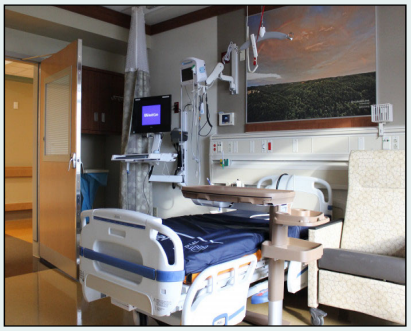
Outpatient & Diagnostic Services

- subspecialized neurologist provide diagnosis and care
- diagnosis of vascular, demyelinating and neurodegenerative diseases, CNS tumors etc.
- diagnosis of complicated CNS pathologies, disease prognostication
- Evaluation of rehabilitation potential of diseased, control of ongoing therapy effectiveness
- SPECT-CT and MRI-perfusion of the brain in different CNS pathologies
- Genetic and immunologic diagnostics of congenital and orphan neurological diseases
- EMG, Evoked Potentials for early diagnosis of demyelinating and neuromuscular diseases.



Medical and surgical unit

- **Inpatient Room -** These may be private/semi private rooms or multi-bed general wards. They should be designed to be safe and aesthetically pleasing so as to assist in quick recovery of patient. They must contain space for equipment, staffs and various need of the patient
- **Nurses Control Station -** should be located and designed in such a way that the nurses can observe the patient room
- **The Work Area -** related to handling materials necessary for patient care, maintaining communication and records etc.



Departments of Neurology

Department of Angioneurology	30 beds
Department of Multiple Sclerosis and Demyelinating Disorders	30 beds
Department of Peripheral Neural Disorders	20 beds
Department of Epilepsy	25 beds
Neurorehabilitation Department	30 beds
Department of Early Poststroke Recovery	20 beds
Department of Neurosurgery	25 beds
Department of Vascular and Interventional Neurosurgery	20 beds

Fundamental categories of neurological disorders that will be treated by inpatient service

- Stroke and other cerebrovascular diseases
- Spinal cord disorders
- Epilepsy and other seizure disorders
- Parkinson's disease and other Movement disorders
- Dementia and Cognitive Conditions
- Multiple sclerosis
- Alzheimer's disease
- Peripheral Neuromuscular Disorders
- Migraine and Headache disorders
- Polyneuropathies
- Pain associated neurological disorders
- Posttraumatic brain injuries
- Posttraumatic spinal cord injuries
- Vertigo and Syncope
- Functional neurological disorders
- Neuroinfections
- Genetic disorders
- Sleep disorders
- Chronic fatigue syndrome
- A residual category of other less common neurological disorders

Treatment options in different neurological diseases

- Advanced medicine therapy
- Botox injections for Chronic Headache
- Neuromodulation for Migraine
- Neural block (trigeminal, occipital, ganglion, etc.)
- Muscle and nerve biopsy for Neuromuscular Disorders
- Magnetic Stimulation for depression and chronic pain
- Immunotherapy for Multiple Sclerosis
- Stemcell therapy
- Interventional spine injections for Degenerative Spine
- Intrathecal Baclofen pump placement for Spasticity

Neurological disorders that will undergo surgery in Department of Neurosurgery

Cerebrovascular disorders and Stroke

- Brain aneurysm
- AVM
- Carotid artery disease
- Cavernoma malformation
- Dural Arteriovenous Fistula
- Spinal AVM
- Subarachnoid hemorrhage
- TIAs
- Hemorrhagic Stroke
- Ischemic Stroke
- Inherited Stroke Disorders
- Hemifascial Spasm

Movement disorders

- Dystonia
- Parkinson's disease and other movement disorders
- Essential tremor
- Chronic pain
- Spasticity
- Epilepsy
- Obsessive-Compulsive disorders

Spine and Peripheral Nerve disorders

- Lumbar/Cervical stenosis
- Disk herniation
- Lumbar spondylolisthesis
- Adult Spinal Deformity
- Spinal Cord tumors
- Osteoporotic and geriatric spinal pathology
- Craniovertebral trauma or pathology
- Failed fusions or adjacent level pathology
- Peripheral nerve tumor
- Plexus nerve injury

Neurosurgical services in NSC

Cerebrovascular & Stroke program

- Microsurgical clipping
- Endoscopic assisted surgery
- MicroVascular decompression
- AVM excision
- EC-IC bypass
- Carotid endarterectomy
- Coiling
- Balloon angioplasty
- Stents
- Aneurysm embolization

Functional & Stereotactic Neurosurgery program

- Deep brain stimulation (DBS)
- Pallidotomies and Thalatomies
- Spinal Cord stimulation
- Intrathecal Drug delivery
- Vagal nerve stimulation
- Selective Amigdalo-hippocampectomy
- Selective Rhizotomy

Spine & Peripheral Nerve Program

- MISS fusions (TLIF, LLIF, etc.)
- Microdiskectomy and microdecompression
- Complex Spinal Reconstruction
- Microsurgery of spinal cord tumors
- Kypho- and vertebroplasty
- Craniocervical junction surgery
- Arthroplasty/Motion preserving surgery
- Reconstructive Peripheral nerve surgery

ICU, SCU and Emergency Rooms

Intensive Care Unit	18 beds
Stroke Care Unit	15 beds
Anesthesiology with Postoperative Recovery	10 beds
Emergency rooms	5 beds

Angiography | Neurosurgical OR

Hybrid OR

ICU and Anesthesiology with Postoperative Recovery

- Should preferably be located on the second floor with convenient access from the operation theatre suit and emergency department and easy accessibility for wards
- It consists patient area, staff area, support area
- Basic requirements:
  - Direct observation of the patient by nursing and medical staff
  - Surveillance of physiological monitoring
  - Provision and efficient use of routine and emergency diagnostic procedures and interventions.
  - Recording and maintenance of patient information

Surgical Unit

Operating Theater:

1. Hybrid Operating room
2. General Operating room #1
3. General Operating room #2
4. Endoscopic Operating Room
5. Angiography Suite
6. Day Surgery/Procedure Suite

Angiography

Neurosurgical OR

Hybrid OR

Operating Rooms

• **Surgical Operating rooms** – all four operating rooms should be located on second floor, on the same floor with ICU and Anesthesiology with Postoperative Recovery Unit and equipped with advanced medical imaging devices, they must contain space for equipment, features:

- generally windowless
- controlled temperature and humidity
- special air handlers filter
- rooms with supplied wall suction, oxygen, anesthetic gases and others.

• **Angiography Suite** should be located in Diagnostic Unit as part of Radiology Department for easy access from Emergency Room and further ICU or/and Surgical Unit.

• **Day Surgery/procedure Suite -** should be located and designed on grand floor, such a way that the nurses can observe the patient room

• **The Waiting Area –** should be designed on second floor, maintaining information about continuing surgery and display it on screen.

Neurorehabilitation Center

Department of Early Post stroke Recovery
24-48 hours after stroke

Neurorehabilitation Department
intensive rehab program for 2-3 weeks

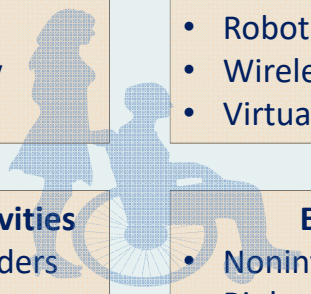
Outpatient Rehab Clinic
a few hours at the facilities a couple of days a week

Whole range of neurorehabilitation facilities

Rehabilitation program

Physical Activities
- Motor-skills exercises
- Mobility training
- Constraint-induced therapy
- Range-of-motion therapy

Technology-Assisted activities
- Functional-electrical stimulation
- Robotic technology
- Wireless technology
- Virtual reality



Cognitive-Emotional activities
- Therapy for Cognitive disorders
- Speech therapy
- Psychological treatment
- Medication

Experimental therapies
- Noninvasive brain stimulation
- Biological therapies
- Alternative medicine

Training Center and Scientific-Research Departments

Scientific & Research Departments:
- Angioneurology
- Epilepsy department
- Demyelinating diseases department
- Center for movement disorders
- Stroke Preventive Center

Basic set up of Training Center :
- Seminar and conference rooms with 3D image translation equipment
- Simulation Center
- Cadaver lab with OP facilities
- Facilities for academic institutional departments

Demarcation NSC between other National Medical Centers for stroke and neurology

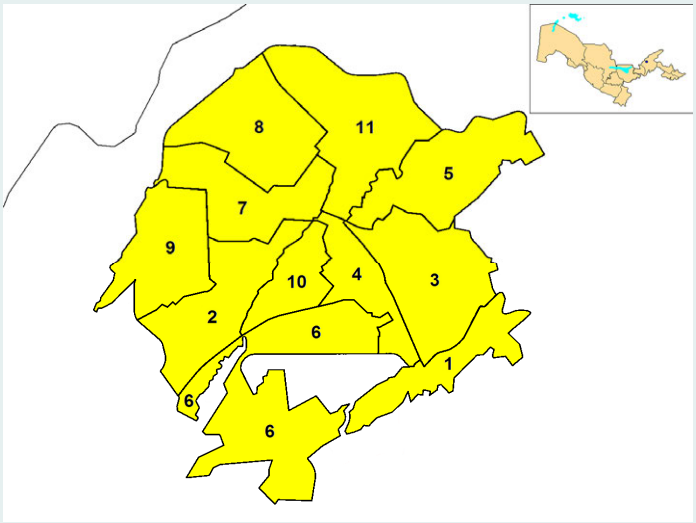
Diagnosis and specialized care of disorders	NSC	National Cancer Center	National Neurosurgery Center	National Emergency Center	National Center for Disabled and Prosthesis
Stroke & other urgent neurological cases	X			X	
Neurological pathologies					
- Movement disorders	X				
- Neurovascular diseases	X				
- Epilepsy	X				
- Demyelinating Disorders	X				
Neurorehabilitation					
- Early poststroke recovery	X			X	
- Programmed rehab	X				X
- Outpatient rehab	X				

Demarcation NSC between other National Medical Centers for neurological surgery

Diagnosis and specialized care of disorders	NSC	National Cancer Center	National Neurosurgery Center	National Emergency Center	National Center for Disabled and Prosthesis
Cerebrovascular disorders					
- Aneurysm	X		X	X	
- AVM	X		X	X	
- Stroke	X			X	
- Carotid artery diseases	X				
Neurological pathologies					
- Movement disorders	X		X		
- Epilepsy	X		X		
Spinal disorders					
- Acute Trauma				X	
- Degenerative disease	X	X	X		X
- Spinal Cord tumors	X	X	X		
- Spine tumors			X		X

Geographically-distributed demarcation in Tashkent for Stroke and other urgent neurological disorders

(districts and population in thousands)



NSC

4 – Mirabad District = 130.6
10 – Yakkasaroy District = 115.1
3 – Yashnabad District = 220.3
5 – Mirzo Ulugbek district = 262.2
11 – Yunusabad district = 315.6

Emergency Medical Center

9 – Uch-Tepa District = 255.3
2 – Chilanzar District = 223.3
6 – Sergeli District = 168.1
1 – Zangiota district = 31.5

The Clinic of Tashkent Medical Academy

7 – Shaykhontokhur District = 319.4
8 – Olmazor District = 341.8

Financial aspects of patients' care in NSC

- In case of Stroke patients and other neurological urgent cases to the hospital, services will be paid for from the state budget
- Diagnostic examinations, receiving inpatient / outpatient care, physician's appointment, elective surgical and interventional procedures will be financial cover by the patients themselves
- All non-resident patients will be self-paid for their medical expanses, cover by international health insurance or provide government-sponsored payment.
- In 2023-2024 Uzbekistan will introduce mandatory Health insurance system and NSC may become one of the first hospital that accept and proceed to Mandatory Medical Insurance.

13/09/2020

Concept of Training Center and Scientific-Education Departments of NSC

Training Center and Scientific-Education Departments

The facility should be for all members of the health care team and to medical students. This offering education program by NSC may become unique in the whole region, our institution will offer a destination for learning and sharing knowledge through hands on workshops and surgical training programs hosted be medical industry and national or international professional organizations. The training–education building should include two complex:

- **Scientific-Education Departments**
- **Simulation Center & Surgical Training Lab**

Structure and Facilities of Scientific-Education Departments

Scientific & Research Departments:
- Angioneurology
- Epilepsy department
- Demyelinating diseases department
- Center for movement disorders
- Stroke Preventive Center

→
- 5 rooms
- one conference room for 12 seats
- one faculty lounge

Academic Institutional Department →
- 4 rooms
- two conference room for 12 seats
- one faculty lounge

Hospital Administration:
- Scientific Secretary of NSC
- Public-health office
- Department of Statistical Analysis
- Nurse Education Office

→
- 4 rooms
- one conference room for 12 seats

General Facilities of Simulation Center & Surgical Training Lab

- **Auditorium**
- **Dining Room**
- **Exhibit Hall**
- **Library**
- **Conference rooms for 22 and 12 seats**
- **Changing Room**
- **Multidisciplinary Simulation Center**
- **3D Neuroanatomy & VR Lab**
- **Neurosurgical and Endovascular Simulation Lab**
- **Lab A – Sectional Microsurgical Lab**
- **Lab B – Anatomy-Cadaver Lab**

Structure of Simulation Center & Surgical Training Lab

Simulation Center:
- Multidisciplinary Simulation Center
- 3D Neuroanatomy & VR Lab
- Neurosurgical and Endovascular Simulation Lab

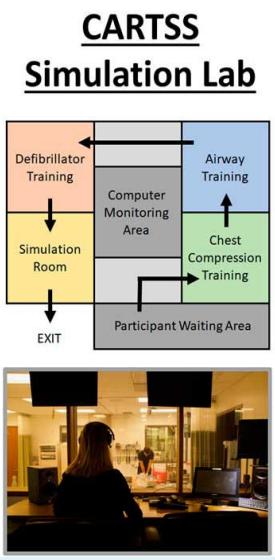
Surgical Training Lab:
- Lab A – Sectional Microsurgical Lab
- Lab B – Anatomy-Cadaver Lab

Simulation Center

Medical simulation training is often team-based, and multidisciplinary whenever possible. It can be customized for variety medical specialties

Fundamental specialties:
- Neurologists
- Neurosurgeons
- Emergency doctors
- Rehab specialists
- Nurses
- Medical students

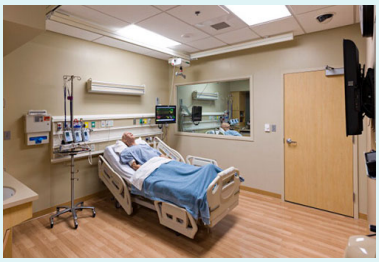
Scheme of working flow for Simulation Center



Multidisciplinary Simulation Center Facilities

Training rooms

- Emergency room suite
- Intensive care unit suite
- Stroke care suite
- Mock Operating room
- Up to 2 patient rooms can be customized as inpatient or outpatient clinical settings



Multidisciplinary Simulation Center Facilities

High-fidelity manikin-based simulators

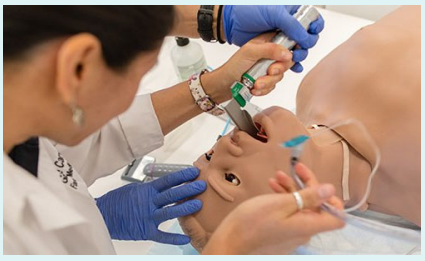
The center's high-fidelity manikin-based simulators use computer controls to manage and control the physiological appearances of patients undergoing health crises. These simulators can replicate:

- Spontaneous breathing and the ability to breathe for the patient with a bag or ventilator
- Real-time display of electronically monitored information, such as electrocardiogram and oxygen saturation
- Pulse, heart sound, breath sound, pupil size and pupil response to light
- Obstruction of various parts of the airway

Basic set up of Multidisciplanary Simulation Center

Equipment of Multidisciplinary Simulation Center :

- Advanced airway trainers
- Anesthesia machines
- Bronchoscopy equipment
- Cardiac perfusion simulators
- Defibrillators
- Endoscopic trainers
- High-fidelity manikin-based simulators
- Mechanical ventilators
- Operating room equipment

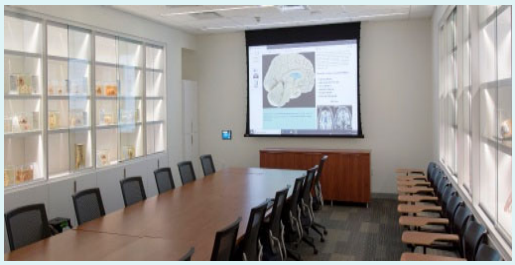


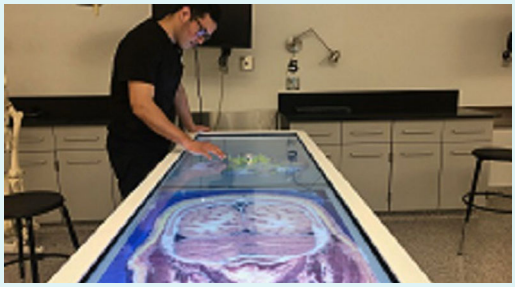
3D Neuroanatomy & Virtual Reality Lab

3D Virtual Reality technology for neurologist and medical students as education tool. It helps for neurosurgeons as patient education and surgical planning.

Basic set up :

- Conference room for 20 seats with 3D image translation equipment
- Anatomical models of brain and nervous system
- 3D image table





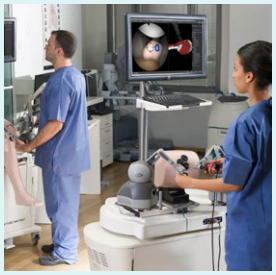
Neurosurgical and Endovascular Simulation Lab

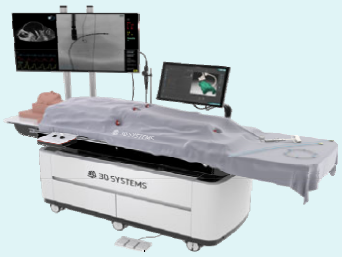
Neurological training simulator enables neurosurgeons and residents to practice and develop expert skills in open cranial, spine and endoscopic brain surgery, also in neuroendovascular procedures within an immersive, virtual-reality training environment. With modules that replicate realistic instruments, imaging, and open neurosurgical procedures, simulators allow risk-free, self-directed practice resulting in reduced medical errors and better patient outcomes.

Basic set up of Neurosurgical and Endovascular Simulation Lab

Required Equipment:

- Neurosurgical virtual reality simulator (ex.Neurotouch, NeuroVR etc.)
- Endovascular simulator with big screen (AngioMentor, NeuroCath etc.)
- Simulator for NeuroEndoscopy
- Spinal Surgical Simulator with High-Fidelity manikin (RealSpine)
- Variable Sawbones models of skull and spine surgeries





Surgical Training Center
Lab B – Sectional Microsurgical Lab

Microsurgical training is mandatory for the optimal education of modern neurosurgeons. Also this Lab can specifically design to accommodate several surgical specialties, including head and neck surgery, plastic surgery, spine surgery and peripheral nerve surgery etc. The modular Lab stations can be configured to support different approaches, depending on the educational goal.

Surgical Training Center – Lab A – Sectional Microsurgical Lab

Basic required equipment for 15 workstations:

- Microscopes (small or desktop)
- Micro-instrument sets
- High Speed Drills
- High Definition Flat Screens
- Head and animal Holder Frames
- 3D Projection of Demonstration

Surgical Training Center Lab B - Cadaver Lab

The work in the surgical-anatomy lab allows surgeons to exercise and refine techniques well before actual surgeries, using a variety of neurosurgical procedures. The lab is one of only a handful of such labs in academic medical centers across the country, and features state-of-the-art technology, including a new and advanced microscope.

Surgical Training Center
Facilities of Lab B - Cadaver Lab

Basic set up of Training Center :

- 15-Station Bioskills Lab
- Locker Rooms with Shower
- Teleconference Room,
- Dining Room
- Sterilization Room
- Cleanup area with high temperature dishwasher
- Video Production
- Live Streaming

Surgical Training Center
Lab B - Cadaver Lab

Required Lab Inventory:

- Fully equipped Endoscopic towers for brain and spine surgeries with various size scopes
- C-arm
- Microscopes with camera and video monitor
- Stainless steel tables with radiolucent tops or radiolucent operating tables
- Led aprons with thyroid shields
- Specimen holders, IV poles
- General Surgical Equipment and Instrumentation
- Autoclave and stainless steel sinks with foot pedals
- Portable suction
- Power
- Ceiling mounted camera with video wall monitor
- Wireless audio system with microphones
- Various sawbones models

Appendix 4　Equipment List for NSC as of July 2024

Equipment List for NSC

No.	Name of Equipment	Qty	MoH/NSC prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
	OPD/Ward/ICU				
N-1	Medical thermometer	180			A
N-2	Blood pressure monitor	75			A
N-3	Phonendoscope	75			A
N-4	Pulse Oximeter	75			A
N-5	Glucometer	50			A
N-6	Neurological hammer	30			A
N-7	Height meter	12			A
N-8	Medical scales	12			A
N-9	Scales for Wheel chair	5			A
N-10	Scales for bedridden patient	5			A
N-11	Stretcher	20	✓		A
N-12	Stretcher for MRI	2	✓		A
N-13	Wheelchair	80	✓		A
N-14	Wheelchair(For MRI)	2	✓		A
N-15	Wheelchair(Tilt in space high back)	15	✓		A
N-16	Transfer lift	3	✓		A
N-17	Patient bed (Electric)	100	✓		A
N-18	Patient bed (Manual)	105	✓		A
N-19	ICU Bed	50	✓		A
N-20	Antisliding mattresses	50	✓		A
N-21	Examination table	30	✓		A
N-22	Negatoscope	35	✓		A
N-23	Bedpan (Portable toilet)	25	✓		A
N-24	Infusion stand	150	✓		A
N-25	Suction machine	30	✓		A
N-26	Ultrasonic Neibulizer	20	✓		A
N-27	Defibrillator	15	✓		A
N-28	Syringe pump	120	✓		A
N-29	Infusion pump	120	✓		A
N-30	Emergency cart	20	✓		A
N-31	Resuscitation set	20	✓		A
N-32	Oxygen concentrator	20	✓		A
N-33	Oxygen Rotameter	50			A
N-34	Pressure gauge	25			A
N-35	Intermittent pneumatic pump	45			A
N-36	Ventilator	45	✓		A
N-37	Ventilator(MRI compitable)	3	✓		A
N-38	Ventilator(Portable)	3	✓		A
N-39	Hemodialysis unit	2	✓		A
N-40	Patient monitor(Operating Room)	5	✓		A
N-41	Patient monitor(ICU)	48	✓		A
N-42	Central monitoring system	6	✓		A
N-43	Laryngoscope	20	✓		A
	Out Patient Department (Ophthalmology)				
N-44	Syetem chart（Visual measuring+Polychromatic table Rankine）	1	✓		A
N-45	Slit lamp	1	✓		A
N-46	Non Contact Tono & Pachymeter	1	✓		A
N-47	Contact tonometer(portable)	2			A
N-48	Direct ophthalmoscope	1	✓		A
N-49	Indirect Ophthalmoscope(mirror)	1			A
N-50	Automatic Perimeter	2	✓		A
N-51	Spectacle lenses set	1	✓		A
N-52	Viewing table lamp	1	✓		A
N-53	Autorefractometer	1	✓		A
N-54	Gonioskope	1	✓		A
N-55	Retinoscope	1	✓		A
N-56	Monocular loupe	1	✓		A
N-57	Binocular loupes	1	✓		A
N-58	Chart Projector	1	✓		A

Equipment List for NSC

No.	Name of Equipment	Qty	MoH/NSC prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
N-59	Orchidometer	1			A
N-60	Instrument set(Ophthalmology)	1	✓		A
N-61	Binocular Indirect Ophthalmoscope	1	✓		A
N-62	Electroretinograph	1			A
N-63	Ultrasound apparatus for ophthalmology	1	✓		A
	Out Patient Department (Otolaryngology)				
N-64	Instrument set (otolaryngology A)	1	✓		A
N-65	Instrument set (otolaryngology B)	1	✓		A
N-66	ENT workstation with patient chair	1	✓		A
	Out Patient Department (Urology)				
N-67	Uroflow meter	1			A
N-68	Urodynamic apparatus	1			A
N-69	Urtrasound Apparatus (Urology)	1	✓		A
	Endoscopy Department				
N-70	Cranical Endoscope	1			A
N-71	Spinal Endoscope	1			A
N-72	Gastroscope	2	✓		A
N-73	Colonoscope	1	✓		A
N-74	Bronchoscope	4	✓		A
N-75	Cystoscope	1			A
	Operating Room				
N-76	Instrument set (general surgery)	6	✓		A
N-77	Instrument set (small surgery)	8	✓		A
N-78	Instrument set (head and spinal neurosurgery A)	2	✓		A
N-79	Instrument set (head and spinal neurosurgery B)	5	✓		A
N-80	Surgical Mobile Navigation System	1			A
N-81	Operating Table A (Angiographic X-ray Transparent)	1	✓		A
N-82	Operating Table B (Multifunctional electric X-ray transparent)	5	✓		A
N-83	Operating Table C (Jackson Spinal Surgery Modular Table)	1	✓		A
N-84	Operating Light with camera system	5	✓		A
N-85	Operating Light with camera system (Hybrid OR room)	1	✓		A
N-86	Operating Light (Mobile)	10	✓		A
N-87	Anesthesia machine	5			A
N-88	Electrosurgical Coagulator	5			A
N-89	Ultrasonic aspirator	2			A
N-90	Ultrasonic Dissection Device	2			A
N-91	Surgical suction	3	✓		A
N-92	High speed drill for nuerosurgery	3			A
N-93	Operational neurosurgical microscope	3			A
N-94	Headlamps Xenon	5			A
N-95	Stereotactic Biopsy equipment	1	✓		A
N-96	Intraoperative Neuromonitoring	2	✓		A
N-97	Mobile electromagnetic navigation station	1			A
N-98	Monitor for measuring intracranial pressure	4			A
N-99	Cerebral oximeter	2			A
N-100	Bone Scalpel	1			A
N-101	Head holder (Mayfield, Sugita)	4			A
N-102	Instrument set (MIS (XLIF,TLIF)	2			A
N-103	Instrument set(Anterior Cervical Fusion)	1			A
N-104	Instrument set(Anterior Lumbar Fusion)	1			A
N-105	Intraoperative Vascular Doppler System	2			A
N-106	Bone mill	1			A
N-107	Yasargil arm rest	2			A
N-108	Neurosurgical operating chair	2			A
N-109	Instrument set(Cranial microneurosurgery)	4			A
N-110	Intraoperative Autotransfusion-Cell Saver	1			A
N-111	Radiofrequency Ablation machine	1			A
	Central Sterile Supply Department (CSSD)				
N-112	Ultrasonic washing machine	2	✓		A
N-113	Glass washer	2	✓		A
N-114	Automated endoscope reprocessor	1	✓		A

Equipment List for NSC

No.	Name of Equipment	Qty	MoH/NSC prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
N-115	Glassware Drying Oven	1	✓		A
N-116	Drying cabinet	3	✓		A
N-117	Autoclave	2	✓		A
N-118	Plasma Sterilizer	2	✓		A
N-119	Plasma Sterilizer (small)	1	✓		A
N-120	Hot Air Sterilizer	2	✓		A
N-121	Sterilization bag sealer	2	✓		A
	Physiological Function Testing Room				
N-122	Electroencephalograph	3	✓		A
N-123	Electroencephalograph with Video	2	✓		A
N-124	Electroneuromyography+evoked potentials	2	✓		A
N-125	Transcranial Magnetic Stimulation	2			A
N-126	Polysomnography (PSG)	2	✓		A
N-127	CPAP	4			A
N-128	Electrocardiograph	11	✓		A
N-129	Spirometer	1			A
N-130	Ultrasound Apparatus	3	✓		A
N-131	Urtrasound Apparatus(portable)	1	✓		A
	Radiology Department				
N-132	MRI(3T)	1	✓	✓	A
N-133	MRI(1.5T)	1	✓	✓	C
N-134	CT(64 slice or more)	1	✓	✓	A
N-135	CT（256 slice or more)	1	✓	✓	B
N-136	CT(for Hybrid OR)	1	✓	✓	A
N-137	Angiography(for Hybrid OR)	1	✓	✓	A
N-138	Angiography	1	✓	✓	A
N-139	C-arm	2	✓	✓	A
N-140	Digital General X-ray	1	✓	✓	A
N-141	Mobile X-ray apparatus	2	✓		A
N-142	X-ray film processor	3	✓		A
N-143	X-ray protective aprons	20	✓		A
N-144	Hanger for x-ray aprons	7	✓		A
	Clinical Laboratory Department				
N-145	Binocular microscope	6	✓		A
N-146	Binocular microscope(with video camera)	3	✓		A
N-147	Urine chemistry analyzer	2	✓		A
N-148	Hematology Analyzer	4	✓		A
N-149	Blood Cell Counter	4	✓		A
N-150	Blood Coagulation Analyser	2			A
N-151	ESR(Erythrocyte Sedimentation Rate) Analyzer	3			A
N-152	Biochemical Analyzer	2	✓		A
N-153	Blood Gas Analyzer	1			A
N-154	Micropippet	11	✓		A
N-155	Micropippet(8ch)	2	✓		A
N-156	Urine centrifuge	2	✓		A
N-157	Centrifuge	9	✓		A
N-158	Hematocrit centrifuge	1	✓		A
N-159	Cleanbench	3	✓		A
N-160	Instrument Set (Autopsy)	1	✓		A
N-161	Microtome (Sledge)	1	✓		A
N-162	Tissue Processor	1	✓		A
N-163	Rotary microtome cryostat	1	✓		A
N-164	Small Linear Stainer	1	✓		A
N-165	Hystological Material Cutting Station	1	✓		A
N-166	Automatic Immunostainer with Accessories	1			A
N-167	Cassette Printer	1	✓		A
N-168	Automated Coverslipper	1	✓		A
N-169	Filing cabinet for Storing slides and block	2			A
N-170	Digital Slide Scanner and Converter	1			A
N-171	Automatic Stainer	1			A
N-172	Thermo Shaker	1			A

Equipment List for NSC

No.	Name of Equipment	Qty	MoH/NSC prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
N-173	Incubator Shaker	1			A
N-174	Water Distiller	2	✓		A
N-175	Mini-high-speed microcentrifuge	3	✓		A
N-176	Gas chromatograph	1	✓		A
N-177	Electrophoresis System	1			A
N-178	Spectrophotometer	2	✓		A
N-179	Immunological analyzer	1			A
N-180	ImmunoAssay Analyzer system	1			A
N-181	PCR analyzer	2			A
N-182	Real-time PCR	1			A
N-183	Nucleic Acid Extraction System	1			A
N-184	Sequencer	1			A
N-185	Microplate washer	1			A
N-186	Vortex Mixer	2			A
N-187	Analytical Balances	1			A
N-188	Dry block thermostat	1			A
N-189	Electronic Toploading Balances	1			A
N-190	PCR Workstations/ PCR Hood	1	✓		A
N-191	Water purification system	1	✓		A
N-192	Magnetic Lab Stirrer	1			A
N-193	pH meter	1			A
N-194	Gel Documentation	1			A
N-195	Transilluminator	1			A
N-196	Water bath	1	✓		A
N-197	Dry-air thermostat	4	✓		A
N-198	Refrigerator	10	✓		A
N-199	Deep Freezer	5	✓		A
	Rehabilitation Center				
N-200	Massage table	7	✓		A
N-201	Massage table(Electric)	6	✓		A
N-202	Examination table	2	✓		A
N-203	Examination table (Electric)	2	✓		A
N-204	Roller chair	14	✓		A
N-205	Stall bars	3	✓		A
N-206	Dual-cable exercise pulley	2	✓		A
N-207	Exercise stairs with bus step	2	✓		A
N-208	Parallel bar	6	✓		A
N-209	Parallel bar with overhead flame set	2	✓		A
N-210	Body-Weight Supported Treadmill	2	✓		A
N-211	Robot assisted gait training system	1			C
N-212	Tilt table	2	✓		A
N-213	Treadmill	2	✓		A
N-214	Ergometer	2	✓		A
N-215	Vibration trainer	1			A
N-216	Walker	25	✓		A
N-217	Leg press	1	✓		A
N-218	Leg extension	1	✓		A
N-219	Hip abduction	1	✓		A
N-220	Gymnastic apparatus	1	✓		A
N-221	Gait analysis device	1			C
N-222	Laser therapy apparatus	2	✓		A
N-223	Functional Electrical Stimulation apparatus	3	✓		A
N-224	Electrical Stimulation Therapy apparatus	2	✓		A
N-225	Ultrasound therapy apparatus	2	✓		A
N-226	Microwave therapy apparatus	2	✓		A
N-227	Electric heat packs	2	✓		A
N-228	Magnetotherapy apparatus	2	✓		A
N-229	Water Bed Massager	1	✓		A
N-230	Shock Wave Therapy apparatus	1			A
N-231	Lifting table	3	✓		A
N-232	Toilet unit	1	✓		A

Equipment List for NSC

No.	Name of Equipment	Qty	MoH/NSC prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
N-233	Wash basin & Kitchen unit	1			A
N-234	ADL training equipment	2			A
N-235	Digi-Flex	3			A
N-236	Peg board	8	✓		A
N-237	Occupational therapy set	2	✓		A
N-238	Robot assisted upper limbs training apparatus	1			A
N-239	Cognitive and upper limbs training system	1			C
N-240	Shower stretcher	4	✓		A
N-241	Shower chair	2	✓		A
	Autopsy and Morgue				
N-242	Autopsy table with HEPA filter and fan	1			A
N-243	Mortuary Refrigerator	1			A
N-244	Instrument set (Autopsy)	3			A
N-245	Mortuary trolley	1			A
N-246	Electronic Autopsy weighing scale	1			A
N-247	Autoclave (small)	1			A
	Training Center				
N-248	Advanced airway trainers	3	✓		A
N-249	Anesthesia machines	3			A
N-250	Bronchoscopy equipment	1	✓		A
N-251	Cardiac perfusion simulators	2	✓		A
N-252	Defibrillators	4	✓		A
N-253	Endoscopic trainers	1			A
N-254	High-fidelity manikin-based simulators	5	✓		A
N-255	Mechanical ventilators	3	✓		A
N-256	Operating room equipment	1	✓		A
N-257	Anatomical models of brain and nervous system	11			A
N-258	3D image table	1			A
N-259	Neurosurgical virtual reality simulator	2			A
N-260	Endovascular simulator with big screen	1			A
N-261	Neuroendoscopy simulator	1			A
N-262	Spinal Surgical Simulator	2	✓		A
N-263	Variable Sawbones model	2	✓		A
N-264	Microscope (desktop) for training	15			A
N-265	Micro-instrument sets	15	✓		A
N-266	High Speed Drills	15			A
N-267	Head and animal Holder Frames	15			A
N-268	Projector	2			A
N-269	Endoscopic towers for brain and spine surgery	1			C
N-270	C-arm	2	✓		A
N-271	Microscopes with camera and video monitor	1			A
N-272	X-ray transparent operating table	15	✓		A
N-273	X-ray protective aprons	15	✓		A
N-274	Specimen holders, IV poles	16	✓		A
N-275	Instrument set(General surgical)	16	✓		A
N-276	Autoclave	2	✓		A
N-277	Portable suction	15	✓		A
N-278	Ceiling mounted camera with video wall monitor	15			A
N-279	Wireless audio system with microphones	3			A
N-280	Deep freezer for bodies	2			A
	Others				
N-281	HIS/PACS/LIS	1			B

Appendix 5　Equipment List for BSMI as of July 2024

Equipment List for BSMI

No.	Name of Equipment	Qty	MoH/ BSMI prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
	Medical imaging equipment				
B-01	Angiography	1	✓	✓	A
B-02	Digital General X-ray	1	✓	✓	A
B-03	C-arm	1	✓	✓	A
B-04	Ultrasound machine	3	✓		A
B-05	Ultrasound machine(portable)	1	✓		A
	Treatment and monitoring				
B-06	Ventilator	5	✓		A
B-07	Defibrillators	5	✓		A
B-08	Infusion pump	10	✓		A
B-09	Syringe pump	10	✓		A
B-10	Ventilator(Portable)	7	✓		A
B-11	Video Laryngoscope	6	✓		A
B-12	Extracorporeal membrane oxygenation (ECMO) machine	1			C
B-13	Continuous Renal Replacement Therapy(CRRT) machine	1			B
	Operating room				
B-14	Operating Table (Multifunctional)	4	✓		A
B-15	Operating Table (Neurosurgery)	1	✓		A
B-16	Operating Light	5	✓		A
B-17	Anesthesia machine	5			B
B-18	Electrosurgical unit	5			B
B-19	Microscope for neurosurgery	1			B
B-20	Cell saver machine	1			B
B-21	Heart-lung machine	1			B
B-22	Ultrasonic flow meter	1			B
B-23	Ultrasonic surgical unit	1			B
B-24	Instrument set (general surgery)	1			B
B-25	Instrument set（Colonary)	1			B
B-26	Instrument set (Traumatology)	2			B
B-27	Instrument set (Maxillofacial)	1			B
B-28	Instrument set (ENT)	1			B
B-29	Instrument set (Neurosurgery)	1			B
B-30	Instrument set (Microsurgery)	1			B
B-31	Sternal saw	1			B
B-32	Laparoscope set (abdominal surgery)	1			B
B-33	Laparoscope set (gynecology)	1			B
B-34	Instrument set (minimally invasive maxillofacial)	1			B
B-35	Instrument set(Knee joint)	1			B
B-36	Endoscope set (Gastro)	1	✓		A
B-37	Endoscope set (Duoden, Colono)	1	✓		A
B-38	Bronchoscope	1	✓		A
B-39	Hysteroresectoscope	1			B
B-40	Colposcope	1			C
	Laboratory				
B-41	Blood Gas Analyzer	2			B
B-42	Hematology Analyzer	1	✓		B
B-43	Biochemical Analyzer	1	✓		B
B-44	Automatic enzyme immunoassay analyzer	1			B
B-45	Blood coagulation analyzer	1	✓		B
B-46	Real-time PCR	1			B
B-47	Binocular microscope	4	✓		C
B-48	Fluorescent microscope	1	✓		C

Equipment List for BSMI

No.	Name of Equipment	Qty	MoH/ BSMI prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
	Functional diagnostics				
B-49	Holter ECG	2	✓		B
B-50	Electrocardiograph(12ch.)	2	✓		B
B-51	Electrocardiograph(3ch.)	2	✓		B
B-52	Electroencephalograph	1	✓		B
B-53	Echoencephalograph	1			C
	Miscellaneous				
B-54	Plasma Sterilizer	1	✓		A
B-55	ENT workstation with patient chair	1	✓		B
B-56	Gynecological chair (electric drive)	3	✓		B
B-57	ICU Bed	8	✓		B
B-58	Stretcher	15	✓		B
B-59	Wheelchair	20	✓		B

Appendix 6 Equipment List for SamSMU 1 as of July 2024

Equipment list for SamSUM 1

No.	Name of Equipment	Qty	MoH/SamSUM prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
	Words/ICU				
S1-1	Wheel Chair	6	✓		B
S1-2	Electrocardiograph	4	✓		B
S1-3	Electromyograph	3	✓		B
S1-4	Ventilator for neonate(HFO)	1	✓		B
	Endoscopy				
S1-5	Rectosigmoidoscope	2	✓		A
S1-6	Colonoscope	1	✓		A
S1-7	Hysteroscope	1			B
S1-8	Automated Endoscope Reprocessor	3	✓		A
	Ophthalmology				
S1-9	Laser photocoagulator	2	✓		B
S1-10	Phacoemulsification system	1	✓		B
S1-11	Ultrasound eye scanner	1	✓		B
S1-12	Slit lamp	5	✓		B
S1-13	Instrument set (ophthalmology)	1	✓		B
S1-14	Instrument set (Microsurgery for ophthalmology)	1	✓		B
S1-15	Binocular microscope for Ophthalmology surgery	1			C
S1-16	Ophthalmology Workstation	2	✓		B
S1-17	Operating table for ophthalmology	2	✓		B
S1-18	Optical Coherence Tomography	1	✓		B
	Otolaryngology				
S1-19	Instrument set (minimal invasive Otolaryngology operations)	2	✓		B
S1-20	Binocular microscope for Otolaryngology microsurgery	1	✓		B
S1-21	Otolaryngology unit	1	✓		B
S1-22	Audiometer	2	✓		B
	Operating Room				
S1-23	Laryngoscope	5	✓		A
S1-24	Instrument set(Minor surgical)	6	✓		A
S1-25	Instrument set(General surgical)	5	✓		A
S1-26	Instrument set(Surgical)	1	✓		A
S1-27	Instrument set (proctological surgery)	1	✓		A
S1-28	Electric drill for neurosurgery	2			B
S1-29	Electrical coagulator	5			B
S1-30	Microscope for Neurosurgery	1			B
S1-31	Binocular magnifier for neurosurgery	1			B
S1-32	Operating light (mobile)	4	✓		A
S1-33	Anesthesia machine	3			B
S1-34	Laparoscopic ligation instrument	2			B
S1-35	Cystourethroscop for adults	1			B
S1-36	Ultrasound generator w/o power cord	1			B
S1-37	Phlebological laser for endovenous coagulation	1			B
S1-38	Pneumatic and ultrasonic lithotripter	1			B
S1-39	Holmium Laser	1			B
S1-40	Standard PCNL kit	1			B
S1-41	Morcelator	1			B
S1-42	Operating Table (Multifunctional electric X-ray transparent)	1	✓		A
S1-43	Flexible ureterorenoscope	1	✓		A
S1-44	Morcellator for laparoscopic hystrectomy	1			B
S1-45	Laser enucleation of the prostate	1			B
S1-46	Stitching devices for circular anastomosis	1			B
S1-47	Stitching devices for linear anastomosis	1			B
S1-48	Ultrasound machine for biopsy and kidney puncture	1			B
S1-49	Hemodialysis machine	1			B
	Radiology & Diagnostic				
S1-50	Mobile C-arm	1	✓	✓	A

Equipment list for SamSUM 1

No.	Name of Equipment	Qty	MoH/SamSUM prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
S1-51	Angiography	1	✓	✓	A
S1-52	Color Doppler echocardiography	1	✓		A
S1-53	Ultrasound apparatus	1	✓		A
S1-54	Mobile X-ray machine	1	✓		A
	Pathology				
S1-55	Instrument set (Pathology)	1			B
S1-56	Microtome	1			B
S1-57	Fluorescence microscope A	2			C
S1-58	Refrigeration chamber for body	1			B
	Laboratory				
S1-59	Electronic microscope	2			C
S1-60	Binocular microscope	2	✓		B
S1-61	Hematology analyzer	1	✓		B
S1-62	Biochemical analyzer	2	✓		B
S1-63	Thermo shaker	1	✓		B
S1-64	Blood Coagulation Analyzer	1			C
S1-65	Automatic coagulometer	1			B
	Central Sterile Supply Department (CSSD)				
S1-66	Steam sterilizer(Autocrave)	4	✓		A
S1-67	Sterilizer	2	✓		A
S1-68	Large Distiller	2	✓		A
	Physiotherapy equipments				
S1-69	Ultrasound therapy device	1			B
S1-70	Magnetotherapeutic device	1			B
S1-71	Miavolna device	1			B
S1-72	Shock wave therapy device	1			B
S1-73	Pressotherapy and lymphatic drainage device	1			B
S1-74	Transcranial magnetic stimulation -TMS	1			B

Appendix 7　Equipment List for SamSMU 2 as of July 2024

Equipment List for SamSUM 2

No.	Name of Equipment	Qty	MoH/SamSMU prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
	Words/ICU				
S2-1	CPAP	2			C
S2-2	Infant warmer	7	✓		B
S2-3	Syringe pump	6	✓		B
S2-4	Infusion pump	8	✓		B
S2-5	Laryngoscope	2	✓		B
S2-6	Pulse oximeter	3			C
S2-7	Defibrillator	3	✓		B
S2-8	Patient monitor(neonate)	3	✓		B
S2-9	Incubator	4	✓		B
S2-10	Infant phototherapy unit	3	✓		B
S2-11	Infant bed	8			C
S2-12	Uroflometer	1			C
S2-13	Remote lithotripter	1			C
S2-14	Dental Unit	1	✓		B
	Operating Room				
S2-15	Instrument set (General surgery)	6	✓		A
S2-16	Instrument set (Cardiac surgery for pediatric)	1	✓		A
S2-17	Instrument set (Small Surgery)	1	✓		A
S2-18	Instrument set (uranium plastics)	1	✓		A
S2-19	Instrument set (Otolaryngology)	1	✓		A
S2-20	Instrument set (Bone operating)	1	✓		A
S2-21	Operating Light with camera system	6	✓		A
S2-22	Operating Light (mobile)	2	✓		A
S2-23	Operating table	6	✓		A
S2-24	Suction unit	6	✓		A
S2-25	Microscope for Neurosurgery	1			B
S2-26	Electro surgical unit	5			B
S2-27	Heart-lung apparatus	1			B
S2-28	Anesthesia machine	6			B
S2-29	Video laryngoscope	3			B
	Endoscopy				
S2-30	Endoscope set(Gastro,duoden)	1	✓		A
S2-31	Endoscope set(Gastro,duoden) for neonate and peadiatric	1	✓		A
S2-32	Endoscope set(Colono)	1	✓		A
S2-33	Laparoscope set	3			B
S2-34	Cystourethroscope(peadiatric)	1			B
S2-35	Cystourethroresectoscope(peadiatric)	1			B
S2-36	Urethoroscope	1			B
S2-37	Nephroscope	1			B
S2-38	Arthroscope	1			B
S2-39	Bronchoscope for peadiatric	2	✓		A
S2-40	Bronchoscope for peadiatric and adults	2	✓		A
S2-41	Endoscope reprocessor	2	✓		A
	Radiology & Diagnostic				
S2-42	MRI（3T）	1	✓	✓	A
S2-43	CT scanner (64slice)	1	✓	✓	A
S2-44	Degital X-ray machine	1	✓	✓	A
S2-45	Mobile degital X-ray machine	1	✓	✓	A
S2-46	Dental digital X-ray machine	1	✓		A
S2-47	C-arm	1	✓	✓	A
S2-48	Ultrasound machine	1	✓		A
S2-49	Ultrasound machine for ophthalmology	1	✓		A

Equipment List for SamSUM 2

No.	Name of Equipment	Qty	MoH/SamSMU prefer Japanese Equipment	Maintenance Contract	Priolity (A,B,C)
S2-50	Electrocardiograph	1	✓		A
S2-51	Holter monitoring system	1	✓		A
S2-52	Electroencephalograph	3	✓		A
	Physiotherapy				
S2-53	Infrared Light Therapy Unit	1	✓		B
S2-54	Electrotherapy Unit	1	✓		B
S2-55	Ultra-High Frequency (UHF) Therapy Unit	2			C
S2-56	Leaser Therapy Unit	1	✓		B
S2-57	Ultrasound therapy Unit	2	✓		B
S2-58	Magnetotherapy Unit	1			C
S2-59	Parallel bar	1	✓		B
S2-60	Body-Weight Supported Treadmill	1	✓		B
S2-61	Stall bars	1	✓		B
S2-62	Ultraviolet stationary irradiator	1			C
S2-63	Stationary Lamp Solux	1			C
S2-64	Portable Lamp Solux	2			C
	Laboratory				
S2-65	Biochemistry analyzer	1	✓		B
S2-66	Bacteriological analyzer	1			C
S2-67	Blood coagulation analyzer	1			C
S2-68	Hematology analyzer	1	✓		B
S2-69	Blood gas analyzer	1			C
S2-70	Gene analyzer	1			C
S2-71	Safety cabinet	1			C
S2-72	Clean bench	1	✓		B
S2-73	Binocular microscope	4	✓		B
S2-74	Centrifuge	1	✓		B
	CSSD				
S2-75	Plasma sterilizer	2	✓		B
S2-76	Ultrasonic washing machine	2	✓		B
S2-77	Autoclave	3	✓		B
S2-78	Sterilization bag sealer	2	✓		B
S2-79	Drying Cabinet	3	✓		B

Appendix 8 Environmental checklist in JICA format

Environmental Checklist in JICA Format

	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been officially completed? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	Since the project falls under Category IV in the local EIA standards, during the planning stage, EIA draft will have to be prepared and submitted to the SCNP. Only when there is any lack of data and/ or unsatisfactory survey results are identified, the SCNP might request for EIA redevelopment. At present, the EIA draft has not been established.
	(2) Explanation to the Local Stakeholders	(a) Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? (b) Are proper responses made to comments from the public and regulatory authorities?	(a) N (b) N	The procedure for holding public hearings in Uzbekistan is not regulated, but hearings are being held. If a residential zone is located within the boundaries of the sanitary protection zone of a production facility, the *makhalin* committee gathers residents and discusses the planned activities. However, since the target site is not a residential zone, such hearings are not required.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	The original plan was a different location for the construction of NSC. However, after taking into account the social significance of the place, the current location, the Tashkent Medical Academy, was chosen.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, (such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust) emitted from the proposed infrastructure facilities and ancillary facilities comply with the country's emission standards and ambient air quality standards?	(a) Y	Traffic volume will increase due to comings and goings to the project site of medical staffs and patients. Hence, air pollutants will increase. The prediction of air pollution is required at preparation of EIA draft. If the value of prediction does not satisfy the environmental standards, the traffic management plan needs to be reevaluated and improved.
	(2) Water Quality	(a) Do effluents or leachates from various facilities, such as infrastructure facilities and the ancillary facilities comply with the country's effluent standards and ambient water quality standards?	(a) Y	For the protection of public sewerage, a wastewater treatment plant will be installed so the discharged water will have a pH range of 5.7 to 8.7, with temperature of 40°C or less and BOD of less than 300 mg/L. The treated wastewater will then be discharged to the public sewer.
	(3) Wastes	(a) Are wastes from the infrastructure facilities and ancillary facilities properly	(a) Y	In Uzbekistan, operational service of the hospital collects all wastes in a special

		treated and disposed of in accordance with the country's standards?		container and then a specialized organization takes it out for disposal. The specialized organization is responsible for determining the place of storage and disposal of the waste.
	(4) Soil Contamination	(a) Are adequate measures taken to prevent contamination of soil and groundwater by the effluents or leachates from the infrastructure facilities and the ancillary facilities?	(a) Y	Wastewater and solid waste generated in the project will be treated adequately and will not be disposed in the site. Therefore, soil contamination will not occur.
	(5) Noise and Vibration	(a) Do noise and vibrations comply with the country standards?	(a) Y	Traffic volume will increase due to comings and goings to the project site of medical staffs and patients. Hence, noise and vibration will increase. The prediction of noise pollution and vibration is required at preparation of EIA draft. If the value of prediction does not satisfy the environmental standards, the traffic management plan needs to be reevaluated and improved.
	(6) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	The Project does not plan to extract a large volume of groundwater.
	(7) Odor	(a) Are there any odor sources? Are adequate odor control measures taken?	(a) Y	Offensive odor will be generated by operation of the wastewater treatment plant, but the impact can be avoided by regular maintenance.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	The site is not located in a protected area.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N (d) N	The site is not located in a protected area. The site is located in the campus of Tashkent Medical Academy, so there are no endangered species inhabiting the site. The Project does not plan to extract a large volume of groundwater, and there is no possibility of water pollution which will impact the aquatic environment.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?	(a) N	The Project does not plan to extract a large volume of groundwater.
	(4) Topography	(a) Is there a possibility the project will cause large-scale alteration of the	(a) N	The site is almost flat and the scale of

	and Geology	topographic features and geologic structures in the project site and surrounding areas?		filling/ cutting at construction is imperceptible. So that change of topographic features and geologic structures does not occur.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? (c) Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (e) Are agreements with the affected persons obtained prior to resettlement? (f) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (g) Is a plan developed to monitor the impacts of resettlement?	(a) N (b) N (c) N (d) N (e) N (f) N (g) N	The site is within the Tashkent Medical Academy campus, so there is no resettlement required.
4 Social Environment	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) N	The traffic volume of transferring waste is very limited, so the impact is not forecasted. The increasing traffic volume by comings and goings to the site will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents). It is required that the impact should be predicted for EIA based on the traffic volume and access routes setting at DD study. If a significant impact is predicted, the development plan should be changed to satisfy the environmental standards by the reexamination of dispersion of the traffic volume. Also, an environmental management plan such as establishment of traffic signs and the implementation of traffic safety campaign is required. The disposal of wastewater and solid waste is managed adequately, therefore there is no possibility on the generation of pathologic insects or other disease vectors.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious	(a) N	There are no local archeological, historical, cultural, and religious heritage sites in the project site.

		heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?		
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	There are no landscape to pay special attention to in and around the site. And the height, shape and texture of the building design will be considered to keep a harmony with the local landscape at DD study, therefore the impact to landscape will not occur.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N (b) N	The Project site is located in the center of Tashkent Special City, so ethnic minorities and indigenous people do not inhabit the site or the area around it.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) Y (b) Y (c) Y (d) Y	The mitigation measures at construction stage will be discussed in environmental management and monitoring plan.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) Y (c) Y	The mitigation measures at construction stage will be discussed in environmental management and monitoring plan. The increase of transportation by comings and goings to the site will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents). The construction management plan should be discussed at DD stage, and the detailed one should be required to contractor to prepare in the bid document. Also, if construction staff housing is planned in the site, the establishment and implementation for wastewater and solid waste management plan should be required to contractor. Furthermore, the establishment and implementation of an environmental monitoring plan at

				construction stage should be required. The health and safety education (e.g., traffic safety, public health) for project personnel, including workers should be implemented by contractors.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) Y	The MOH will prepare the environmental monitoring. Environment monitoring is regulated in the Annex No. 1 to the Resolution of the Cabinet of Ministers dated 5 September 2019 No. 737, Regulations on monitoring the natural environment in the Republic of Uzbekistan. In accordance with the regulation, monitoring of pollution sources is carried out by the relevant analytical laboratories of the territorial bodies of the State Committee for Ecology. Objects of observation during monitoring of pollution sources are emissions of pollutants into the atmospheric air from stationary sources, wastewater discharges into surface water bodies, surface waters in the area of wastewater discharge sources, groundwater in the area of location of identified or potential sources of their pollution, and soil in the area of location of identified or potential sources of their pollution. Monitoring of sources of air pollution is carried out once a month. Monitoring of sources of sewage, surface and groundwater is carried out twice a year (in spring and autumn).

Source: JICA Study Team