

## 4. PLANING ISSUES

### 4.1. Principle of Disaster Management

In the process of rehabilitation and reconstruction of the city, involvement of various actors into the plan is significant. The principle for formulating the disaster management plan consists of self-assistance, public assistance, and mutual-assistance. In the Study, the principal of disaster management should take into consideration of the formulation of urban rehabilitation and reconstruction plan. Each item and respective role is indicated in the table below:

**Table 4.1.1 The Study Viewpoint according to Rehabilitation/Reconstruction Principles and Activity**

Principle (Actors)	Activity for Rehabilitation and Reconstruction
Self-Assistance (Individual and Family)	<ul style="list-style-type: none"> <li>• Reconstruction of Individual Housing including Temporary Housing</li> <li>• Restoration of Citizens' Lives</li> </ul>
Public-Assistance (Public Sector)	<ul style="list-style-type: none"> <li>• Restoration of Government Function</li> <li>• Rehabilitation and Restoration of Public Services</li> <li>• Formulation of Urban Rehabilitation and Reconstruction Plan and its Implementation</li> </ul>
Mutual-Assistance (Community)	<ul style="list-style-type: none"> <li>• Mutual Cooperation in the Communities</li> <li>• Operation and Management of Temporary Urban Areas</li> <li>• Discussion on Formulation of Permanent Urban Areas at Community Level and Consensus Building</li> </ul>

Source: JICA Study Team

The past experience of the Japan shows that involvement of community and community organization is vital for implementing rehabilitation and reconstruction efficiently and effectively. The issue posed to this study is how to involve the community organization in the whole rehabilitation and reconstruction process, especially in most and moderate damaged areas. Community involvement is essential for smooth implementation of the projects.

### 4.2. Formulation of Strong Urban Structure against Natural Disaster

The most important issue of rehabilitation and reconstruction of urban area is formulation of a strong city against natural disaster. After the earthquake, the Study Team analyzed situations in terms of landslide potential, seismic risk, slope classification, etc. and formulated a hazard map. Based on this analysis, zoning for urbanized area and preservation area was developed, and it was recommend to allow developing only suitable areas for urbanization.

In formulation of urban planning, several issues should be addressed in future urban structures. These issues include transportation network, parks and open space arrangement, building codes, and construction. Before the earthquake, the city could have been characterized as haphazard urban formulation without consideration of natural disaster, narrow roads, insufficient open places, and weak building structures against earthquakes. Moreover, many people lived in steep slope areas, which were potential landslide areas. Combining these situations, Muzaffarabad was vulnerable to natural disaster.

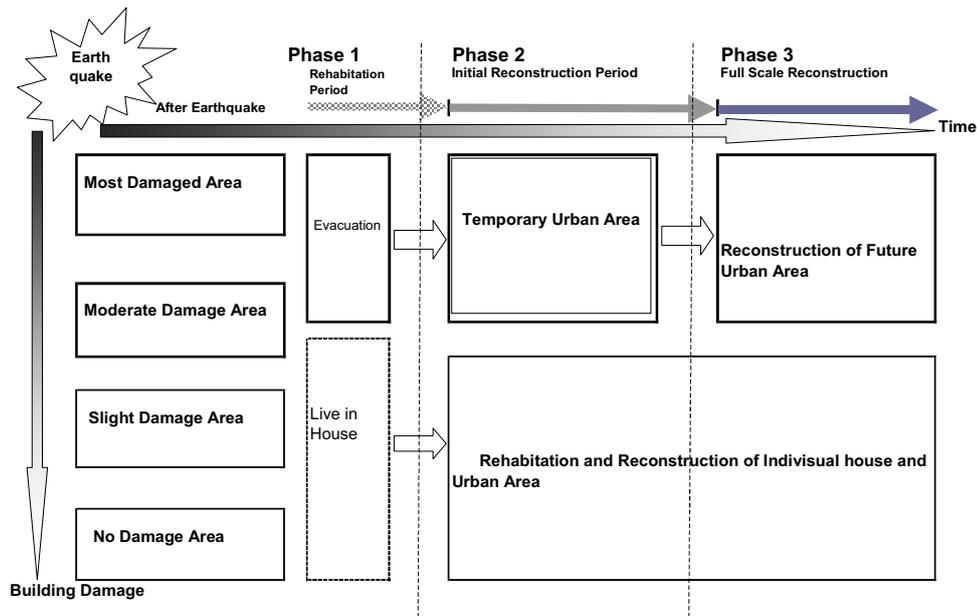
The master Plan study should propose strong urban structures against earthquakes. The strong urban structure can be defined in physical and non-physical terms. Road networks should be strengthened to establish a road hierarchy, and parks and open spaces should be arranged in a hierarchical manner. New buildings should be built according to design with seismic resistance standards. The people in Muzaffarabad must be informed about the earthquake mechanism and response methods. Combining these measures will allow Muzaffarabad city to become a strong city against natural disaster.

### **4.3. Rehabilitation and Reconstruction process**

Study Team implemented damage assessment survey for each urban block. Based on the survey results, each urban block's damage ratio was identified. Building damage was classified into four categories: "most damaged area" of more than 80% of heavily damaged or more, "moderate damaged area" of 50% to 80% of heavily damaged or more, "slight damaged area" of less than 50% of heavily damaged or more, and "no damaged area". Combined with land use map, which was developed in this study, damage ratio difference implies multiple approaches for the future rehabilitation and reconstruction process. Reconstruction of the most damaged area and moderate damaged areas require provision of temporary urban areas because it takes considerable time for transforming from temporary urban areas into permanent ones.

In the Study, urban rehabilitation and reconstruction is divided into three phases (rehabilitation period, initial reconstruction period and full-scale reconstruction period), and so phased reconstruction plan is as follows:

- Phase 1: Rehabilitation Period involves evacuation and formation of temporary planned urban area
- Phase 2: Initial Reconstruction Period involves transforming temporary planned urban to permanent urban area
- Phase 3: Full-scale Reconstruction Period involves completing of the permanent urban area



Source: JICA Study Team

**Figure 4.3.1 Time Schedule of the Rehabilitation and Reconstruction Process**

The rehabilitation and reconstruction plan of the city describes the reconstruction process from the urban areas destroyed by the earthquake to ones in permanent stage and draws up plans for permanent urban structures.

In past experiences of urban reconstruction, it has taken considerable time for transforming from temporary urban area into permanent one; therefore, it is expected to take several years from developing the temporary urban area until its withdrawal. It is also well known that the temporary urban areas would play a significant role for developing permanent urban areas in later years.

#### 4.4. Minimize Relocation and Dislocation

In the past experience of rehabilitation and reconstruction, victims of earthquake are forced relocate and be dislocated from their original place. Relocation and dislocation will happen just after the incident and in the transitional period. In the reconstruction process, some of the residents should be relocated from original place because of formulation of new urban structures. The principal of the master plan is to minimize the relocation and dislocation of the residents and prepare alternative solutions for the residents.



## **5. MUZAFFARABAD REHABILITATION AND RECONSTRUCTION MASTER PLAN**

### **5.1. Framework for Rehabilitation and Reconstruction Master Plan**

#### **5.1.1. Framework of Master Plan**

##### **(1) Target of Master Plan**

A main objective of this study is to prepare a rehabilitation and reconstruction master plan for Muzaffarabad. The term “master plan” sometimes causes misunderstanding and confusion, because each individual and society has different perceptions regarding the meaning of master plan. Therefore, a clarification of the meaning of master plan is provided here.

The traditional urban master plan is a planning approach to the control of physical growth of the city in terms of comprehensive (multi-sectoral) and long-term (20- to 30-years) perspectives. That is, the traditional urban master plan shows long-term goals and end-state of physical structure of the city. This master plan approach has been criticized in the planning field, giving the argument that the master plan is too idealistic and gives a static picture of the long-term future and is sometimes divorced from real issues and the people<sup>1</sup>.

The master plan in this study is not the same as the traditional approach of urban master plan mentioned above. Rather, it focuses on process of recovery and reconstruction of the city from damages of the earthquake disaster. In this context, the time frame of the master plan in this study is not a long-term future nor end-state but a process to recover the city for the next 10-years targeting the year 2016. That is, the master plan aims at providing a comprehensive guideline of rehabilitation and reconstruction efforts to be implemented by government agencies and people in Muzaffarabad. The master plan includes not only physical aspects of the city’s reconstruction but also social and institutional aspects of recovery of people’s lives.

##### **(2) Vision of Muzaffarabad City Toward 2016**

In the process of preparing the rehabilitation and reconstruction master plan in Muzaffarabad city, it is important to share a common vision of the city among various stakeholders. Vision of the City is not a static picture but a policy statement to show how the city will be recovered from the earthquake disaster and what functions and roles the city will establish in the future. Without a common vision, the master plan cannot be prepared properly nor be used after its preparation.

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<sup>1</sup> International City Management Association, “The Practice of Local Government Planning”, 1988, Washington DC, p. 75.

Since February 2006, the Study Team has conducted field investigations and a series of meetings and discussions with relevant agencies, such as Earthquake Reconstruction and Rehabilitation Authority (ERRA), AJK government and Municipal Corporation Muzaffarabad (MCM), as well as CBOs and citizens of Muzaffarabad city. Through the intensive discussions, the following vision of the city toward 2016 was prepared:

**Vision of Muzaffarabad City toward 2016**

*“Muzaffarabad City will be recovered from the damages of earthquake for the next 10-years by the efforts of Earthquake Reconstruction and Rehabilitation Authority (ERRA), Azad Jammu and Kashmir (AJK) state government, Municipal Corporation Muzaffarabad (MCM) as well as the citizen. The City should be reconstructed with strong urban structure against natural disaster, and it will function as a modern capital city of AJK and a gateway in Kashmir.”*

**(3) Muzaffarabad City in Regional Context**

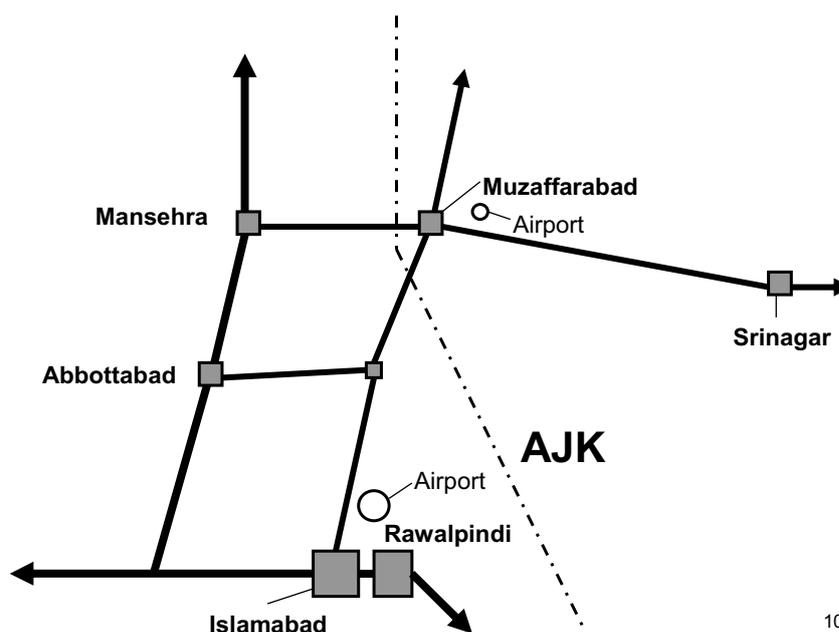
Muzaffarabad city is the capital of the Azad Jammu and Kashmir (AJK) state and it is a gateway city from other parts of Pakistan, connected by roads to Islamabad in the south and to Abbotabad and Mansehra in the west. The city is also a gateway from Indian side of Kashmir, connected by road to Srinagar in the east. If the border, or so called Line of Control, is opened in a near future, Muzaffarabad city would be an important trading center between Pakistani and Indian sides of Kashmir. The city has a small airport, which is one of two airports in AJK<sup>2</sup>. Figure 5.1.1 illustrates the regional road network.

The city has functioned as political and administrative centers in the AJK; the secretariat of the AJK state government and Muzaffarabad district headquarters<sup>3</sup> are both located in Muzaffarabad city. The official residences of Prime Minister and President of the AJK government are located in the city. In addition, higher education, such as university and colleges, and major medical facilities (Combined Medical Hospital) are concentrated in the city. Accordingly, Muzaffarabad city is characterized as a regional center with the functions of transportation hub as well as administrative, political and economic centers in the AJK.

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<sup>2</sup> There are two airports in AJK: one is in Muzaffarabad and the other is in Rawalakot. The flight service is presently suspended at both airports.

<sup>3</sup> AJK consists of 8 districts: Muzaffarabad, Neelum, Rawalakot, Bagh, Sudhnoti, Mirpur, Kotli and Bhimber.



Source: JICA Study Team

**Figure 5.1.1 Regional Road Network**

## 5.1.2. Population Projection

### (1) Past population trend

According to Census data, Muzaffarabad City had a population of 37,445 persons in 1981 and 80,355 persons in 1998. The average annual population growth rate was 4.6% from 1981 to 1998, while Muzaffarabad district was 2.8% during the same period<sup>4</sup>. Since then, the city's population has increased more significantly and reached 114,864 persons in 2005 (pre-earthquake period) and the average annual growth rate was 5.2% from 1998 to 2005<sup>5</sup>. It can be said that the City's population has tripled for the last two and half decades and about half of the increased population was migration from rural areas outside the City. The population of Muzaffarabad district, on the other hand, increased from 466,100 persons in 1981 to 745,750 persons in 1998 and the average annual growth rate was 2.8% during the period. Muzaffarabad City occupied about 15% of the district population in 1998.

The earthquake in October 2005 caused heavy damages to the City with nearly 3,400 death and casualties, and about 7,000 buildings were completely destroyed<sup>6</sup>. After the earthquake, several thousands of people have evacuated from the City to other areas, such as Islamabad.

<sup>4</sup> The average annual population growth rate of Muzaffarabad District was 4.68% in urban population and 2.55% in rural population from 1981 to 1998.

<sup>5</sup> Data from Municipal Corporation Muzaffarabad (MCM)

<sup>6</sup> Data from Municipal Corporation Muzaffarabad (MCM).

On the other hand, many people who lost their houses and livelihoods by the earthquake have moved into Muzaffarabad City from other damaged areas in the AJK. Hence, it has been difficult to identify exact number of population in the post-earthquake period. Currently, the Municipal Corporation Muzaffarabad prepared a latest figure of post-earthquake population. According to this data, the current population was 103,487 persons at the end of April 2006<sup>7</sup>, which was about 11,400 persons less than the pre-earthquake population of 2005.

**Table 5.1.1 Population Projection of Muzaffarabad City, 2006-2016**

Year	Population	Average Annual Growth Rate
1981	37,445*	-
1998	80,355*	4.6% from 1981 to 1998
2005	114,864**	5.2% from 1998 to 2005
2006	103,487**	-

Note: \* the data from census.  
 \*\* the data from MCM.

Source: Population Census, MCM

**(2) Population projection in 2016**

A future population of Muzaffarabad city in 2016 was projected on the basis of post-earthquake population of 103,487 in April 2006. It is expected that the city’s population will be recovered soon due to intensive rehabilitation and reconstruction efforts by the government. In our estimation, the average growth rate will increase to 6.0% per annum for the next 5-years from 2006 to 2011, which is 0.8 point higher than the average growth rate from 1998 to 2005. This is derived from the lessons that many cities which had earthquake disaster experienced higher population growth due to population inflow and active reconstruction work during the recovery period. Thus, the city’s population is forecast to increase from 103,490 persons in 2006 to 138,490 persons in 2011. Then, the average growth rate is estimated to drop to 5.0% per annum from 2011 to 2016, and the population will reach 176,750 persons in 2016.

Table 5.1.2 summarizes population projection of the city from 2006 to 2016. The total increased population estimation is 73,260 persons for the next 10-years. One of major questions in this master plan study is where and how the increased population will be accommodated in the city.

<sup>7</sup> It is not included the people living in temporary camps in the municipality, who came from outside the city.

**Table 5.1.2 Population Projection of Muzaffarabad City, 2006-2016**

Year	Population	Estimated Average Annual Growth Rate
2006	103,490	-
2011	138,490	6.0% from 2006 to 2011
2016	176,750	5.0% from 2011 to 2016

Source: JICA Study Team

### 5.1.3. Land Use Framework

#### (1) Urban Promotion and Preservation Zones

This section discusses land availability for future urbanization of the city. Based on the result of hazard assessment, the Study Team classified the lands in the Municipality into two zones<sup>8</sup>: one is *urban promotion zone* and the other is *preservation zone*. The urban promotion zone is the areas designated as suitable and secure land for future urbanization, and its total land areas amount to about 905 ha in the Municipality. The preservation zone is, on the other hand, the areas designated as unsuitable land for future urbanization due to potential hazard risk, such as landslides, and its total areas amount to about 1,350 ha.<sup>9</sup> Figure 5.1.2 illustrates the locations of urban promotion zone (yellow color) and preservation zone (green color).

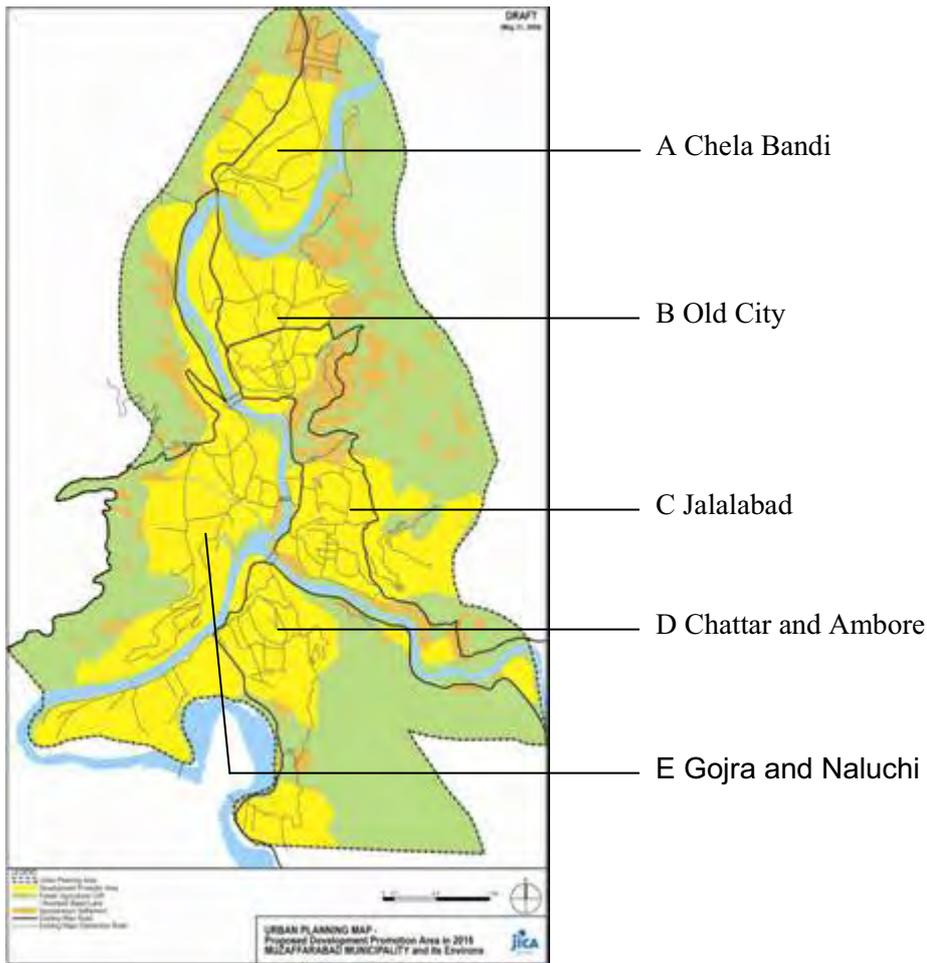
Existing built-up areas are mostly located in the urban promotion zone. However, some densely populated settlements are located in the preservation zone, especially in the areas of Tariqabad (Wards 6 and 7) and Dherian (Wards 11). In our estimation, there were some 85,900 habitants in the urban promotion zone and about 28,900 habitants living in the preservation zone in the pre-earthquake period of 2005<sup>10</sup>.

Future directions of urban development will be different in each zone. The urban promotion zone will become a major urban area and intensive rehabilitation and reconstruction works should be implemented. It is recommended that future population should be accommodated mainly in the urban promotion zone. In the preservation zone, on the other hand, new construction should be limited and strong earthquake resistance measures must be applied in rehabilitation and reconstruction of damaged buildings. Table 5.1.3 summarizes the pre-earthquake conditions and future development directions in the urban promotion and preservation zones.

<sup>8</sup> According to hazard assessment, the lands in the Municipality were classified into three zones: primary urban zone, secondary urban zone and rural zone. In terms of urban planning perspective, there is not much difference between the primary and secondary urban zones as these zones were designated as urban promotion zone. The rural zone was designated as preservation zone in terms of urban planning perspective.

<sup>9</sup> The total area of urban promotion and preservation zones is 2,255 ha, which is bigger than the area of the municipality (2,133 ha). The master plan includes some areas with a total of 122 ha adjacent to the municipality.

<sup>10</sup> The city's total population in 2005 was divided into two categories: population in the urban promotion and population in the preservation zones, based on number of buildings in each zone. The Study Team used data of number of buildings prepared by NESPAK.



Source: JICA Study Team

**Figure 5.1.2 Urban Promotion and preservation Zones**

**Table 5.1.3 Pre-Earthquake Conditions and Future Development Directions in Urban Promotion and Preservation Zones**

	Urban Promotion Zone	Preservation Zone
Pre-Earthquake Conditions	<ul style="list-style-type: none"> <li>• Total area is about 905 ha</li> <li>• About 85,900 habitants lived in this zone in 2005</li> <li>• The zone is located along the Neelum and Jhelum rivers</li> <li>• Agglomeration of existing residential area</li> </ul>	<ul style="list-style-type: none"> <li>• Total area is about 1,350 ha</li> <li>• About 28,900 habitants lived in this zone in 2005</li> <li>• The zone is mainly occupied by steep slope area with more than 20% degree or flood-prone area</li> <li>• Hazardous area of potential land slide</li> </ul>
Rehabilitation and Reconstruction Directions	<ul style="list-style-type: none"> <li>• Promote urban development and new construction of buildings</li> <li>• Promote rehabilitation and reconstruction of damaged buildings.</li> <li>• Increase population density except in old city</li> </ul>	<ul style="list-style-type: none"> <li>• Restrict new construction of buildings.</li> <li>• Allow rehabilitation of damaged buildings with strong hazard resistance structure</li> <li>• Promote agricultural development.</li> </ul>

Source: JICA Study team

## (2) Capacity of Population in the City

The Study Team made an analysis of future population density in each geographical district or urban block in order to estimate the capacity of future population within the city. For this purpose, the urban promotion zone is further divided into five urban blocks. They are: A. Chela Bandi, B. Old City, C. Jalalabad, D. Chattar and Ambore, and E. Gojra and Naluchi (see Figure 5.1.2).

The capacity of population in each urban block was estimated based on the following assumptions:

- 1) The increased population from 2006 to 2016 will be mainly concentrated in the urban blocks in the promotion zone, especially Chattar and Ambore (Block-D) in the south and Gojra and Naluchi (Block-E) in the west. Since Old City (Block-B) is already over concentration of population, further accommodation of population should be restricted.
- 2) New development in the preservation zone should be restricted, but reconstruction of damaged buildings in this zone can be allowed with strong earthquake resistance structures. Thus, the population in the preservation zone is estimated to increase only by the natural growth<sup>11</sup>.
- 3) The future population density in each urban block is estimated taking into account the pre-earthquake population densities and geographical conditions. Generally, future population density in the city is classified into three categories: high density (over 180 persons/ha); medium density (120-180 persons/ha); and low density (80-120 persons/ha).

Based on these assumptions, the capacity of population in each urban block and preservation zones was estimated as shown in Table 5.1.4. According to the estimation, the total capacity of population within the city will amount to 154,870 persons in 2016, including 118,510 persons in the urban promotion zone and 36,360 persons in the preservation zone. The average population density in the urban promotion zone will increase from 95 persons/ha in 2005 to 131 persons/ha in 2016. In the preservation zone, the average population density will increase from 22 persons/ha in 2005 to 27 persons/ha in 2016 due to strict land use control.

Accordingly, it can be said that there is lack of space within the Municipality to accommodate the future population of 176,750 persons in 2016. It will need some measures to accommodate another 21,880 persons by 2016.

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<sup>11</sup> Since there is no data available in AJK, the Study used the natural growth rate of 2.1% in 2000 in Pakistan based on Pakistan Demographic Survey.

**Table 5.1.4 Capacity of Population in 2016 by Zone and by Urban Block**

Zone and Urban Block	Land Area (hectare)	2005 (pre-earthquake)		2016	
		Population	Population Density (person/ha)	Estimated Population	Estimated Population Density** (person/ha)
Urban Promotion Zone	905	85,934	95	118,510	131
A Chela Bandi	119	7,630	64	11,900	100
B Old City	155	34,547	223	31,000	200
C Jalalabad	164	7,797	47	13,120	80
D Chattar & Ambore	252	16,848	67	30,240	120
E Gojra & Naluchi	215	19,103	89	32,250	150
Preservation Zone	1,350	28,930	22	36,360*	27
Total	2,255	114,864	51	154,870	69

Note: \* The population in the preservation zone is estimated to increase by the natural growth rate of 2.1%.

\*\* The future population density of each urban block in 2016 was estimated based on the population density in 2005 and geographical conditions.

Source: JICA Study Team

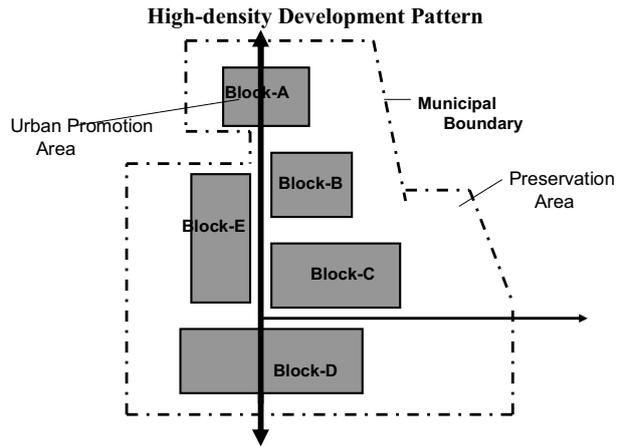
#### 5.1.4. Urban Development Scenarios

##### (1) Alternatives of Future Urban Structure

As seen in the previous section, there is a shortage of urban land to accommodate a population of nearly 22,000 persons in 2016. This section will discuss several options of future urban structure to accommodate this population. There are three types of development scenarios: (1) higher-density and high-rise development in the urban promotion zone; (2) intensive residential development in the preservation zone; and (3) new satellite town development outside Municipal boundary. These three development scenarios are summarized as follows:

##### **a. Option-1: Higher-density and high-rise development in the urban promotion zone**

In this scenario, urban development will further concentrate in the urban promotion zone, which will absorb another 21,880 persons in 2016. The population in the urban promotion zone will increase from 85,934 in 2005 to 140,390 in 2016 and the population density will become 155 persons/ha in 2016. In this scenario, more and more high-density and high-rise development will be needed in the urban promotion zone. This development pattern is illustrated in Figure 5.1.3.

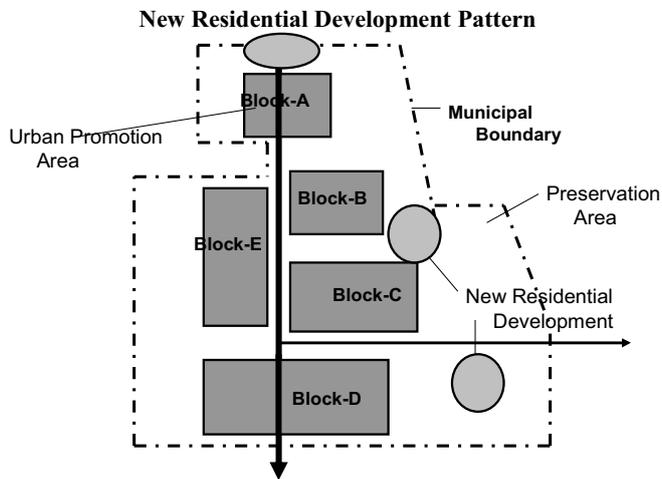


Source: JICA Study Team

**Figure 5.1.3 High-Density and High-Rise Development Pattern in the Urban Promotion Zone**

**b. Option-2: New residential development in the preservation zone**

In this scenario, urban development will extend to some areas in the preservation zone and it will absorb nearly 58,240 persons in total in 2016. Large-scale of hazard protection measures will be needed in development of the preservation zone. This development pattern is illustrated in Figure 5.1.4.



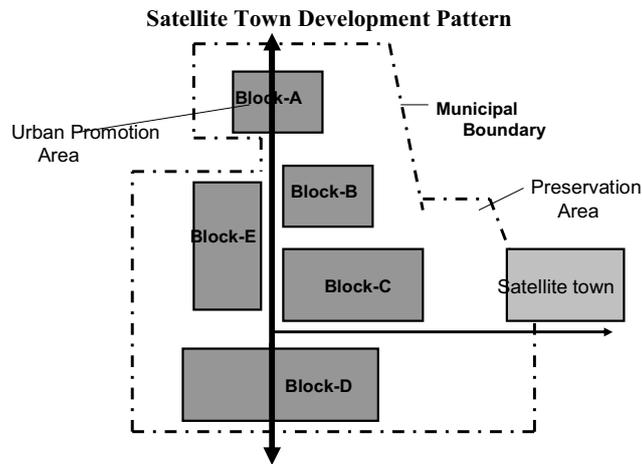
Source: JICA Study Team

**Figure 5.1.4 New Residential Development Pattern in the Preservation Zone**

**c. Option-3: Development of satellite town outside the city**

In this scenario, a new satellite town will be developed outside the municipal boundary and it will absorb the population of 21,880 persons by 2016. Potential site for satellite town is the

area near airport. Future urbanization of the city will extend to the east along the Jhelum River. This development pattern is illustrated in Figure 5.1.5



Source: JICA Study Team

**Figure 5.1.5 New Satellite Town Development Pattern outside the Municipality**

## (2) Recommendation of Future Urban Structure

Table 5.1.5 shows a comparison of three development scenarios. The higher-density and high-rise development in the urban promotion zone (option-1) is not suitable, because higher population density in the urban promotion zone causes further traffic congestions and deterioration of urban environment. In order to accommodate increased population, the construction of multi-story buildings will be essential, which needs strong earthquake resistance measures. Additionally, land use regulation and building code must be applied in the development of urban promotion zone. The AJK government also mentioned that the lifestyle living in multi-story buildings is not common in Kashmir including Muzaffarabad city.

The intensive residential development in the preservation zone (option-2) is also not suitable because new development in steep slope area will cause high risk to the residents by the natural hazard. With such hazardous land condition, large scale of civil works would be necessary to minimize the potential hazard risk. In case of promoting this option, strong engineering measures must be applied in development of preservation zone.

The satellite town development outside the city (option-3) is the best option, because the potential site near the airport has more than 300 ha of land with moderate slope and it is just outside of municipal boundary, about 3-5 km from Jalalabad. Although further studies are needed, the area seems to be quite suitable for future extension of the city. Additionally, this

option (satellite town development) is more feasible in further growth of the city beyond 2016.

**Table 5.1.5 Comparison of Three Development Scenarios**

Item	Option-1:	Option-2:	Option-3:
Urban Structure	<ul style="list-style-type: none"> <li>High-density and high-rise development in urban promotion zone</li> </ul>	<ul style="list-style-type: none"> <li>Intensive residential development in the preservation zone</li> </ul>	<ul style="list-style-type: none"> <li>Development of new satellite town outside the municipal boundary</li> </ul>
Seismic Perspective	<ul style="list-style-type: none"> <li>Need strong earthquake resistance structures in the construction of high-rise buildings</li> </ul>	<ul style="list-style-type: none"> <li>Need large-scale of civil works to protect from natural disaster</li> </ul>	<ul style="list-style-type: none"> <li>Relatively secure from natural disaster, but need further study</li> </ul>
Possibility of Further Expansion	<ul style="list-style-type: none"> <li>No sufficient space for further expansion in the urban promotion zone</li> </ul>	<ul style="list-style-type: none"> <li>No sufficient space for further expansion in the preservation zone</li> </ul>	<ul style="list-style-type: none"> <li>Possible for further expansion</li> </ul>
Necessity of Infrastructure Development	<ul style="list-style-type: none"> <li>Need upgrading of existing infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Need development of large-scale infrastructure to protect against natural hazard</li> </ul>	<ul style="list-style-type: none"> <li>Need development of access road and new infrastructure</li> </ul>
Issues in Implementation	<ul style="list-style-type: none"> <li>Enforcement of building code for design and construction of high-rise buildings</li> </ul>	<ul style="list-style-type: none"> <li>Enforcement of building code for strong earthquake-resistant structure in new building construction</li> </ul>	<ul style="list-style-type: none"> <li>Need hazard assessment study in potential site</li> </ul>
Social and Institutional Issues	<ul style="list-style-type: none"> <li>Lifestyle living in multi-story building is not common in Kashmir</li> </ul>	<ul style="list-style-type: none"> <li>Need development of strong land use regulation</li> </ul>	<ul style="list-style-type: none"> <li>Need expansion of municipal boundary</li> </ul>
Investment Cost by Government	<ul style="list-style-type: none"> <li>Moderate of public investment cost</li> </ul>	<ul style="list-style-type: none"> <li>Relatively large amount of investment, including infrastructure development</li> </ul>	<ul style="list-style-type: none"> <li>Large amount of investment, including land acquisition and infrastructure development</li> </ul>

Source: JICA Study Team

### (3) Discussion about Shifting Some Urban Facilities to Outside the City

During the course of this master plan study, there have been discussions between ERRRA and AJK government about shifting some urban facilities damaged by the earthquake to outside the municipality. Recently, it was made an agreement that old and new University campuses located in Old City and Chela Bandi respectively would be transferred to and integrated at Chatter Kalas, about 20 km south from Muzaffarabad city. Chatter Kalas has flat land with more than 60 ha (1,200 kanal). The shift of the university campuses will encourage decentralization of population to a certain extent. Furthermore, the former sites of the

university campuses can be used for other urban purposes, such as park, residential and commercial area, vocational center, and so on.

More recently, there have been some discussions between ERRRA and AJK government about relocating some of the government facilities including district headquarters to outside the city. The potential new sites for relocation are Rawani area near airport (just outside of municipal boundary and about 3 km from Jalalabad), Langarpura (about 16 km in the east from the city), and Garhi Dopatta (about 25 kilometer in the south-east from the city). Final decision on the relocation of district headquarters is still not made by the end of July 2006.

#### **(4) Justification of New Satellite Town Development**

Development of new satellite town is essential for successful reconstruction of the city from earthquake disaster. There is strong justification for the development of new satellite town. First, because of steep slope topography in the city, there is no suitable land for future urbanization in the existing municipal boundary. The area near the airport, a potential site for satellite town, is only available land near the city with a gentle slope. Second, high-rise and high-density reconstruction policy is not appropriate in Muzaffarabad city, because it will cause further traffic congestion and deterioration of urban environment. New satellite town development will encourage decentralization of population and a multi-core urban structure. Third, Muzaffarabad city, capital of Kashmir, will grow its population with about 40,000 for the next 10 years. The development of a new satellite town is essential to accommodate the increased population. Forth, because of recurrent hazard risk in the steep slope areas in the city, many people cannot start rehabilitation and construction of their original houses. They are looking for new life in the area where is not far away from the original houses. Fifth, the widening of the narrow streets is one of the most important tasks to create secure city. The satellite town will be the place to accommodate the people who are affected by road widening.

Accordingly, the development of satellite town is a key to expedite a recovery of the city and life of the people. It is noted that the development of satellite town needs a long term effort and it should take a phased approach to meet a real demand of the people.

## 5.2. Urban Planning

### (1) Basic Planning Policies for Strong Urban Structure

Urban planning is a key component of the rehabilitation and reconstruction master plan, and it focuses on physical aspects of recovery of the city. The urban planning framework is guided by a set of basic policies for creating safe and strong urban structure against natural disaster. These policies are summarized below:

#### a. Develop a multi-core urban structure

Old City was a densely populated and congested urban area without sufficient road network and open space. This situation caused heavy damages and large number of casualties in the earthquake disaster. It is recommended that the city should be reconstructed with a multi-core urban structure to be safer and stronger against natural disaster. Further concentration of population in Old City should be restricted and new development should be directed toward the south and the west bank of the Neelum River and the east along the Jhelum River. New development of satellite town near the airport will strengthen a multi-core urban structure.

#### b. Restrict new construction in potential hazardous areas

New constructions in the preservation zone should be restricted to avoid recurrent disaster. Particularly, the northern Chela Bandi and Tariqabad had heavy damages because of seismic vulnerability and landslides. It is recommended that new constructions in the potential hazardous areas should be extremely limited, but that rehabilitation and reconstruction of damaged buildings in the preservation zone can be allowed with strong earthquake resistance structures.

#### c. Apply special land use control and building construction measures in reconstruction on the areas of potential faults

It is known that there are two potential faults running through the city: One is Himalayan Frontal Thrust<sup>12</sup> in the east; and the other is Jeelum Thrust in the west. In order to reduce potential hazard risk caused by movement of the faults, special land use control and building construction measures should be applied to the area within 200 m of both sides from the potential faults. The special land use control and building construction measures are:

- Avoid new construction of large-scale public facilities, such as hospitals, schools, government buildings, etc.
- Avoid new development of tall buildings.

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<sup>12</sup> It is said that main part of ground acceleration of 2005 Kashmir Earthquake was caused by the slip of the fault of Himalayan Frontal Thrust (HFT).

- Enforce earthquake resistance structures, when new buildings will be constructed.
- Encourage reinforcement of existing buildings with strong earthquake resistance structures.

**d. Establish parks and open space network**

Parks and open space network are important elements in the rehabilitation and reconstruction urban planning to establish safer and securer urban structures from natural disaster. The city should establish a parks and open space network, which would be used for recreational space in ordinary times and as evacuation and rescue space in case of emergency. Furthermore, parks and open spaces along with the natural landscape of the city would contribute to resources of tourism attraction.

**e. Reduce flood risk**

The city has been developed along the Neelum and Jhelum rivers and has experienced several flood damages in its history. In the flood-prone areas in the city, new constructions of buildings should be restricted and existing buildings in the areas are recommended to relocate to secure land areas. The areas along the rivers should serve as public open space and provide footpath and riverside walk, which will become one of the tourism attractions.

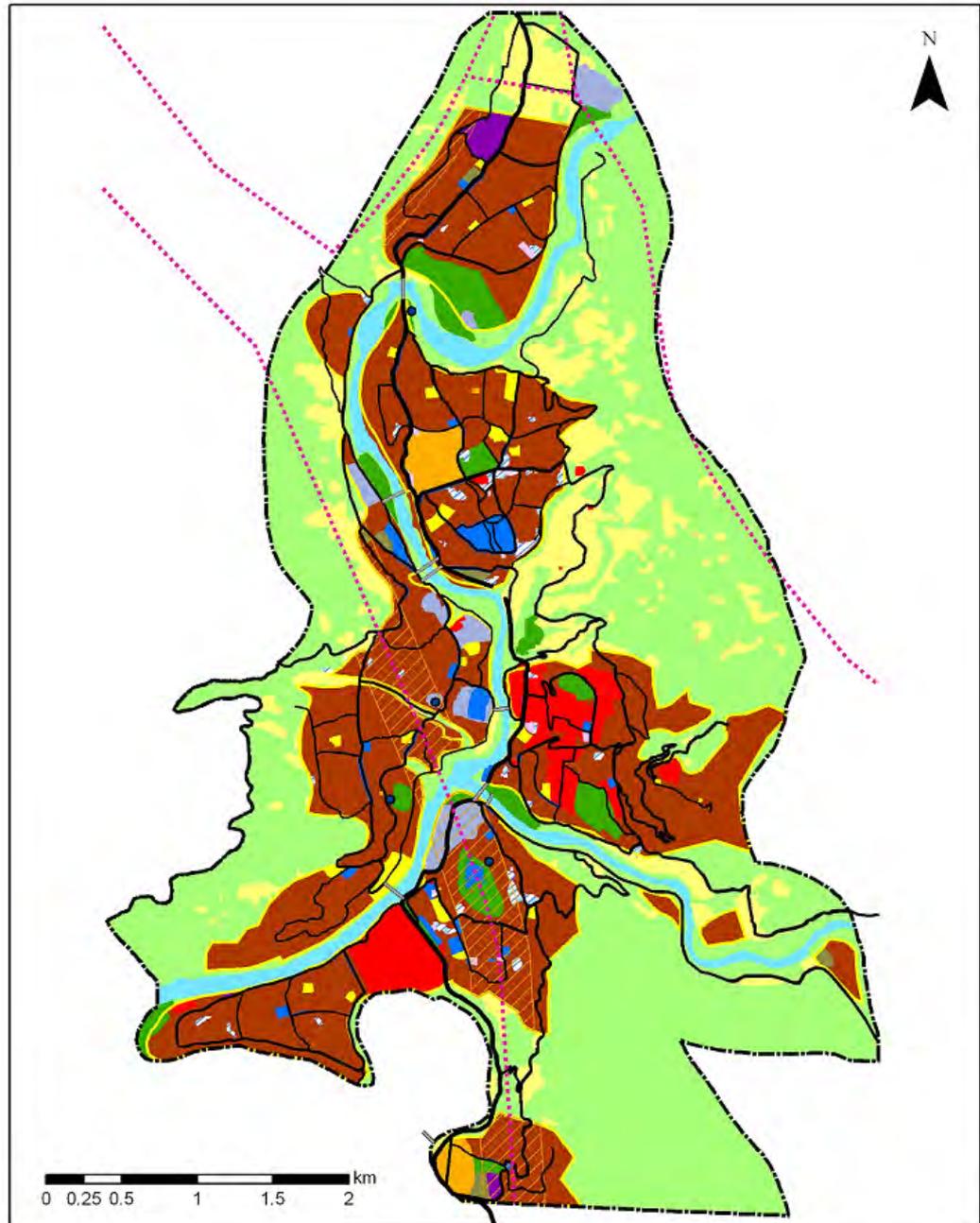
**5.2.2. Land Use Plan**

A future land use plan in Muzaffarabad in 2016 was prepared by the Study Team, with a scale of 1 :10,000. It was a result of field investigations, a series of discussions with ERRA and AJK government and public meetings with the citizens. The proposed land use plan is illustrated in Figure 5.2.1 and its composition of each category is summarized in Table 5.2.2.

**Table 5.2.1 Composition of Proposed Land Use Plan in 2016**

Category	Area (ha)	Composition (%)
Residential/Spontaneous Settlement	616.5	68.1
Commercial	23.4	2.6
Industrial	7.9	0.9
Education	16.1	1.8
Hospitals	19.8	2.2
Government	58.7	6.5
Army	21.7	2.4
Mosque/ Graveyard	13.9	1.5
Bus Terminal	6.0	0.7
Parks	41.6	4.6
Roads	80.0	8.8
Total	905.7	100.00

Source: JICA Study Team



Source: JICA Study Team

**Figure 5.2.1 Proposed Land Use Plan in Muzaffarabad City in 2016**

### **5.2.3. Key Recommendations for Urban Development**

#### **(1) Residential Development**

In Muzaffarabad city nearly 6,700 buildings were total collapsed and another 7,300 buildings were partially damaged by the earthquake. Many people lost their houses and were forced to move out from their original locations and to live in makeshift shelters. Recovery of damaged houses and reconstruction of residential area are the essential factor in the city's recovery. Key recommendations for residential development are as follows:

- In urban promotion zone, relocation and displacement of the settlement should be minimized. It is recommended that people who evacuated to temporary shelter should be allowed to return to the previous locations as soon as possible, if their buildings are in secure condition.
- Hazard-resistance standard should be established and enforced by relevant authorities.
- Promote residential development with high and medium density in the urban promotion zone to accommodate future population. Old City, however, already has over concentration of population and it is recommended to be reconstructed with more open space.
- In the preservation zone, people should be allowed to return to their previous locations. When damaged buildings are recovered, it is recommended to enforce strong earthquake-resistance structure. New construction in the preservation zone should be minimized, especially in the areas with potential hazard of landslides.
- New residential development should be encouraged in the areas of Jalalabad, Chattar, Thurri and Naluchi within the city. In addition, new satellite town should be developed in the areas of Rabani, Khand and Miani Bandi, near airport, where have more than 300 ha<sup>13</sup> of agricultural or bared lands in total with moderate slope.
- Living conditions in the temporary camps have become worse in recent days. In order to improve their living conditions, temporary housing should be considered. Potential sites for temporary housing are the plots of government facilities, former university campuses and parks in the urban promotion zone.

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<sup>13</sup> This number does not include the area of existing airport.

- The site of Maira Tanoulian Housing Scheme<sup>14</sup> is now used for the temporary camp of the victims, but it is not suitable for the site of temporary housing because of potential hazard of landslides.

## **(2) Commercial and Industrial Development**

Muzaffarabad City has served as a regional economic center in AJK. These functions were heavily damaged particularly in Old City. It is urgently needed to recover the functions of regional economic center as well as neighborhood commercial functions to support people's life. Key recommendations for commercial and industrial development are as follows:

- Muzaffarabad City will be developed as a gateway city in Kashmir. The city's historical and cultural heritage should be restored and developed as a resource for tourism attraction. Accommodation facilities, restaurants and craft shops should be developed to promote tourism industry.
- The city will continue to serve as a regional economic center in AJK. The regional commercial functions including wholesale, retail and trading should be recovered and enhanced within the City. New core commercial area should be developed in Old City as a cluster type of shops rather than ribbon or linear type, seeking safe and efficient activities for shoppers as well as smooth traffic in major truck roads.
- Neelum Road and Kohala Road will function as a primary road. New commercial development along the primary roads should be minimized to avoid further traffic congestions. The widening of these roads will become a trigger to minimize the road-side commercial shops.
- In Old City the existing commercial area along Madina Market, Main Bazar and Khawaja Bazar Roads should be redeveloped as a modern commercial center with proper access roads and car parking space. New commercial center will be pedestrian orientation to provide safe and efficient activities for shoppers.
- Neighborhood commercial center should be formulated at proper location in each urban block mentioned before. The neighborhood commercial center will provide convenient and safe shopping activities for the neighborhood dwellers.
- Manufacturing industry and warehouses should be developed at strategic locations in outskirts of the City to avoid negative environmental impact to residential areas.

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<sup>14</sup> It was proposed by Muzaffarabad Development Authority (MDA)

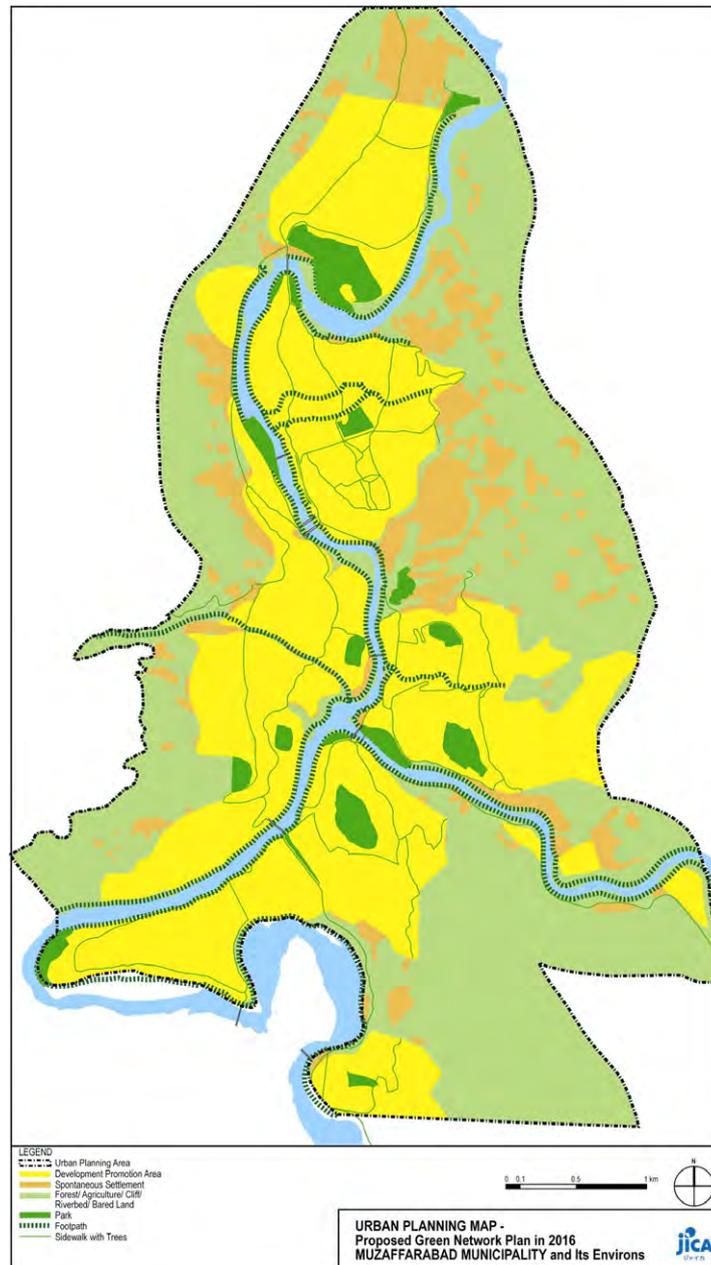
The potential sites for industrial development are Chela Bandi in the north and Ambore in the south.

### **(3) Park and Open Space Development**

Old City was a densely populated and congested urban area without sufficient road network and open space. This situation caused heavy damages and large number of casualties in the earthquake disaster. Parks and open space network is one of the most important factors in rehabilitation and reconstruction processes to establish safe urban structure against natural disasters. Key recommendations for park and open space development are as follows:

- In order to reconstruct the city with a safe and secure urban structure, a park and open space network should be established in the urban areas.
- New proposal will connect parks, sports facilities, schools, hospitals and other public facilities. It will be used for recreational purpose in ordinary time and also used for evacuation and rescue routes in case of emergency. The total proposed parks and green space in the city is about 69.2 ha in 2016, which is more than double of the area in 2005. The areas are shown in Figure 5.2.2
- The Old University campus located at the center of Old City should be transformed into a new urban park. It should be developed as a park dedicated to the victims of the Earthquake. Also, it is a symbol of city's reconstruction from the earthquake disaster. The New University campus located at the south of Chela Bandi will be used for the city's open space with greenery and natural landscape, which will contribute to a resource of tourist attraction.
- College Road running through the center of Old City is recommended to be widened to 25 m with 4 m width of pedestrian each side. Along with the central park at the old University campus, College Road will be developed as a symbol of city's reconstruction from the earthquake disaster.
- The natural landscape of the Neelum and Jhelum rivers is a significant resource for tourism attraction. Footpath along the rivers will be one of the scenic attractions for visitors. New riverside parks are proposed at several locations and the area near the confluence of the Neelum and Jhelum rivers is proposed to be a scenic attraction with the development of hotels, restaurants and park.

- The existing Jalalabad Garden and Sathra Park in Jalalabad shall be improved and become natural parks in the city. During the recovery period for the next 2-3 years, it is recommended that these parks will be used for temporary housing sites. Existing grave yards would be maintained at the previous locations. New grave yards should be planned in the outskirts of the city instead of scattered grave yards all over the city.



Source: JICA Study Team

**Figure 5.2.2 Park and Green Space Network**

#### **(4) Major Public Facilities Development**

Many public facilities were heavily damaged in the city; some government offices, education and welfare service facilities were collapsed. The damages of these public facilities cause delay of recovery and disruptions of people's life. Key recommendations for major public facilities development are as follows:

- The higher education function including old and new University campus will be transferred to and integrated at new location (Chatter Kalas), about 20 kilometer south from the city. The former campuses will be used for urban open spaces, which will function as recreational spaces in ordinary time as well as evacuation and rescue spaces in emergency.
- Medical facilities should be recovered at the previous location, the CMH area, in Old City. New medical facility, such as community hospital / polyclinic, should be developed in the west side of the Neelum and Jhelum Rivers to serve the people in the areas of Gojra and Naluchi. In addition, it is estimated that 7 new basic health units (BHU) need to be developed by 2016 to serve the increased population of the city.<sup>15</sup>
- Government administrative functions should be decentralized into three strategic locations: Muzaffarabad municipal administration in Old City; Muzaffarabad district administration<sup>16</sup> in Jalalabad; and AJK state government administration in Chattar Domel.
- Regarding basic education facility, it is estimated that 9 new two section primary schools and 3 four section secondary schools need to be developed by 2016 to serve the increased population in the city<sup>17</sup>. In addition, a new boy's college should be developed in the west side of the Neelum River to serve the people in the areas of Gojra and Naluchi.

#### **5.2.4. Road Network Plan**

A proposed road network in Muzaffarabad city is illustrated in Figure 5.2.3. Road functions are classified into the following four levels: primary, secondary, tertiary and access roads. A

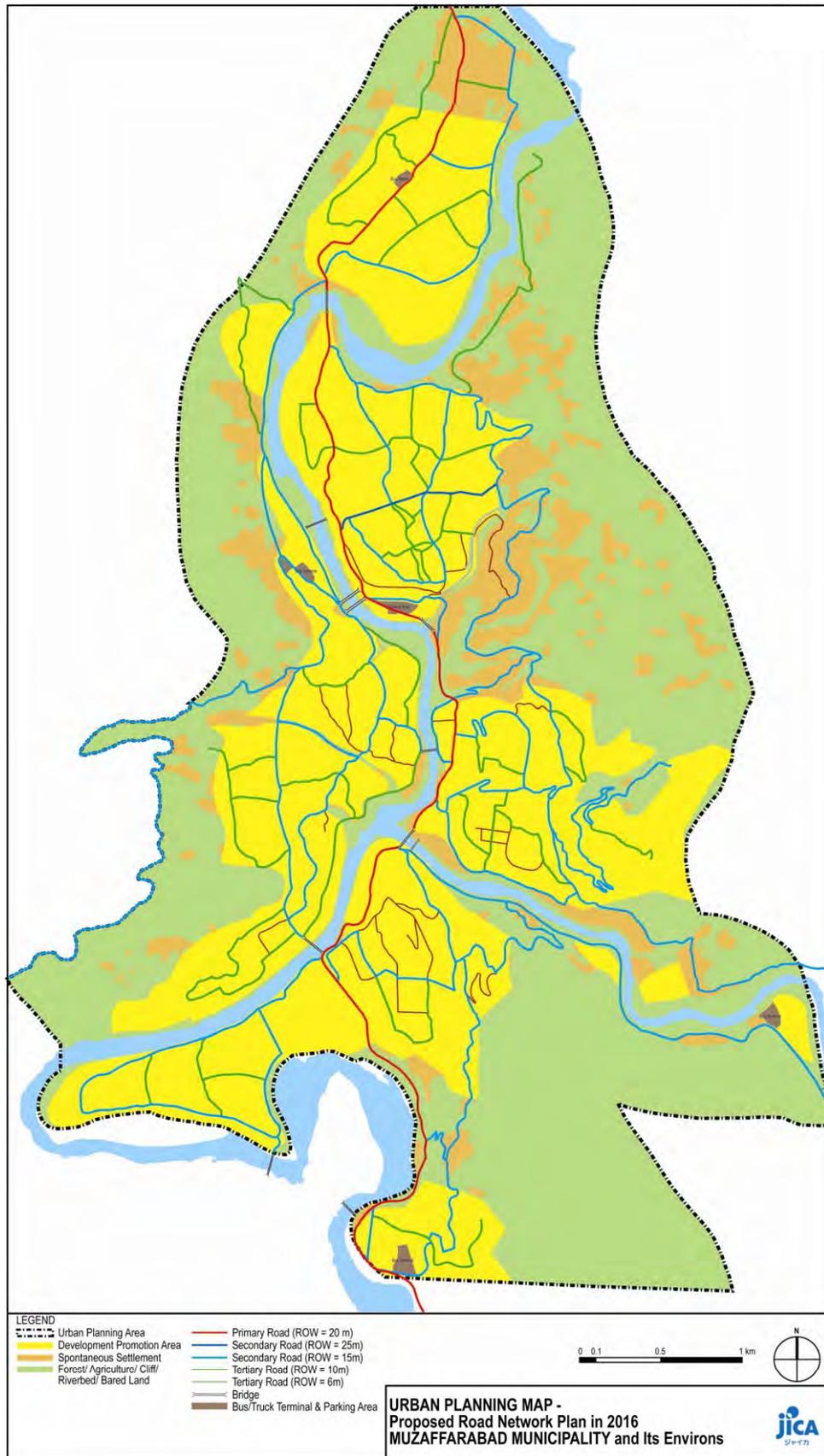
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<sup>15</sup> The future requirement of health facilities is based on the planning standard of National Reference Manual on Planning and Infrastructure Standards, prepared by Government of Pakistan, Ministry of Housing and Works in 1986.

<sup>16</sup> The relocation of district headquarter is not decided yet by ERR and AJK government. In this urban planning, district headquarter will remain in Jalalabad.

<sup>17</sup> The future requirement of education facilities is based on the planning standard of National Reference Manual on Planning and Infrastructure Standards, prepared by Government of Pakistan, Ministry of Housing and Works in 1986.

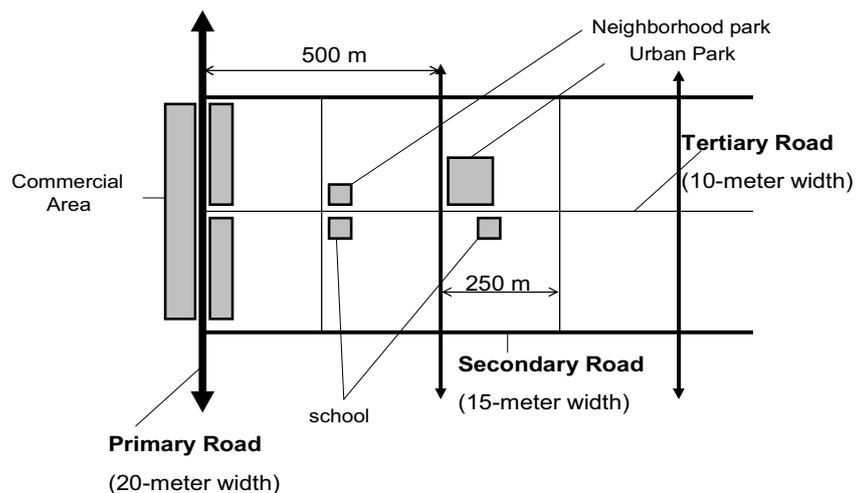
standard road network pattern with its functions is shown in Figure 5.2.4. Key recommendations for road development are described as follows:



Source: JICA Study Team

**Figure 5.2.3 Proposed Road Network in 2016**

- Primary roads are the most important road in the city serving with a standard width of 20 m. It is proposed that the existing north-south axis from Kohala Road to Neelum Road throughout the city be reconstructed as a primary road.
- The secondary road provides access to major geographical districts in the city serving with widths of 15 m in the urban promotion zone and 10 m in the preservation zone. A bypass road from Chattar to Chela Bandi (West Bank Bypass Road) with a new bridge crossing the Jhelum River is recommended to be developed as a secondary road. It will encourage urban development in Naluchi and Gojra in the west bank of the Neelum and Jhelum rivers.
- A bypass road from Jhelum Valley Road in the east to Chela Bandi in the north should be reconstructed to reduce through traffic in the city. It will function as a secondary road and encourage urban development in the eastern part of Jalalabad and future urbanization of the areas near airport.
- The tertiary roads provide major distribution of traffic in each geographical district is serving at 10 m wide. Tertiary roads will be developed every 200-300 meters in the urban promotion zone.
- The access road provides access to each plot or individual property. It would be having widths of 6 m in standard and 4 m minimum in case of difficulty of land acquisition.

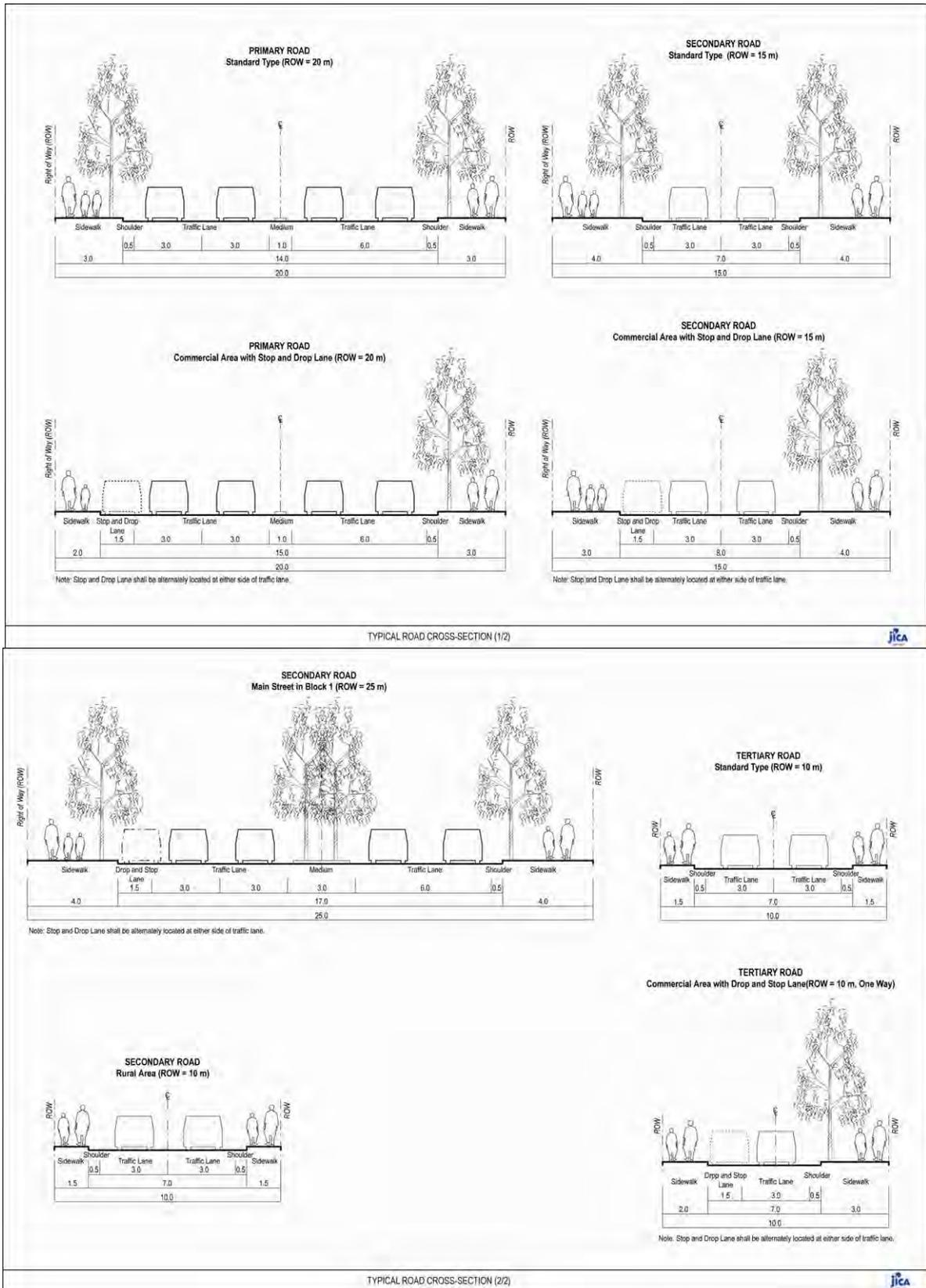


Source: JICA Study Team

**Figure 5.2.4 A Standard of Road Hierarchy in Urban Area**

- New inter-city bus terminals would be developed in the outskirts of the city, providing transport services to other cities and regions in AJK and Pakistan. The new inter-city bus terminals will contribute to reducing traffic congestion in the city, particularly in Old City. Intra-city bus services to access to each geographical district will be provided by the network connecting these bus terminals.
- Reconstruction of road network in Old City is particularly important in terms of recovery of the city. It is recommended that Bank Road, which is proposed as a primary road, should be replaced to the south to solve the traffic congestions. Existing Fort Road, College Road, Eidgah Road, Madina Market Road and Khawaja Bazar Road should be widened and serve as secondary road.

Figure 5.2.5 illustrates standard cross-sections of proposed primary, secondary and tertiary roads, but actual design of each road should be taken with considerations of surrounding topographic conditions and land use.



Source: JICA Study Team

Figure 5.2.5 Standard Cross Sections of Proposed Urban Roads

## 5.2.5. Infrastructure

Key recommendations for infrastructure, including water supply, sewerage, drainage and solid waste management, are as follows:

### (1) Water Supply

- The existing water distribution network should be extended to cover the whole municipal area and the proposed satellite town near the airport.
- The capacity of the Makri Water Treatment Plant should be expanded to meet the water demand of 11.68 million gallons/day in 2016 as shown in Table 5.2.2. The land for the future expansion is available at the existing Makri WTP site.
- The main water supply facilities and distribution tanks should be improved to one of earthquake resistance structures and the transmission and trunk distribution lines are recommended to install earthquake-resistant pipelines.
- To reduce the leakage of the pipelines, the distribution system based on block or grid system is recommended. The pipe registration system should be developed to replace the old pipes properly.
- Distribution facilities of storage tanks and pipelines should be designed to meet the maximum daily and hourly factors in accordance with the National Reference Manual on Planning and Infrastructure Standards.

**Table 5.2.2 Estimated Average Daily Water Demand in 2016**

Item	Quantity	Unit
Population* <sup>1</sup>	176,751	person
Daily Domestic Water Demand per Capita* <sup>3</sup>	50	gallon/capita /day
Daily Water Demand for Commercial & Industrial Use* <sup>2</sup> (% of Domestic Demand)	10	%
Daily Water Demand for Public Use* <sup>2</sup> (% of Domestic Demand)	5	%
Sub-Total	10.16	million gallon/day
Unaccounted for Water* <sup>2</sup>	15	%
Total	11.68	million gallon/day

Source: \*1 – Estimated by JICA Study Team

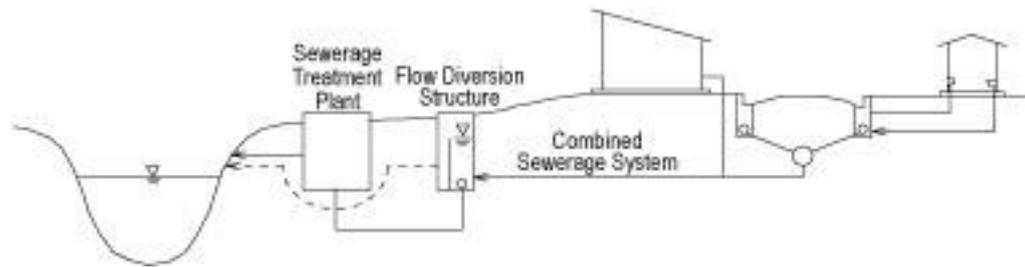
\*2 – Pre-Feasibility Study for Greater Water Supply Scheme Muzaffarabad Phase II, 2002

\*3 – National Reference Manual on Planning and Infrastructure Standards

### (2) Sewerage

- The installation of septic tanks in each building will need a relatively long period and on-site treatment system will face the obstacles posed by narrow roads in the densely populated areas. Therefore, the central sewerage treatment system should

be developed connected to the existing sewerage pipelines by interceptor. This system is illustrated in the figure below.



Source: JICA Study Team

**Figure 5.2.6 Combined Sewerage Collection System**

- Taking topographic conditions into account, the service area of the central sewerage treatment system is recommended to be divided into two service areas: (1) Chela Bandi, Old City, Jalalabad and Gojra; and (2) Chattar, Ambore and Naluchi. Central treatment plants should be developed in each service area.

### (3) Drainage

- Drainage system should be recovered to the pre-earthquake conditions. Particularly, the streams blocked by landslides need to be renovated.
- New construction in the flood-prone areas along the Neelum and Jhelum rivers should be restricted. The lands in the flood-prone areas should be used for parks or green areas.

### (4) Solid Waste Management

- Some improvements of solid waste management system will be needed for the next 10 years. The existing landfill site can be used for the next five years, but a new landfill site will be needed after 2011. Required capacity of the new landfill site is estimated at 869,000 m<sup>3</sup> based on the population projection in the period from 2011 to 2016.

## **5.3. Rehabilitation and Reconstruction Measures: Urban Functions, Buildings and Communities**

### **5.3.1. Introduction**

The Kashmir earthquake disrupted people's normal lifestyles. It destroyed property, forced people out of their homes, closed businesses, suspended commuting services, and took many lives away. This earthquake changed the communities' landscape in one fell swoop with building collapse, infrastructure destruction and changes in the geographic condition. This disaster also disrupted community solidarity—a condition that may bring about slower recovery from the disaster.

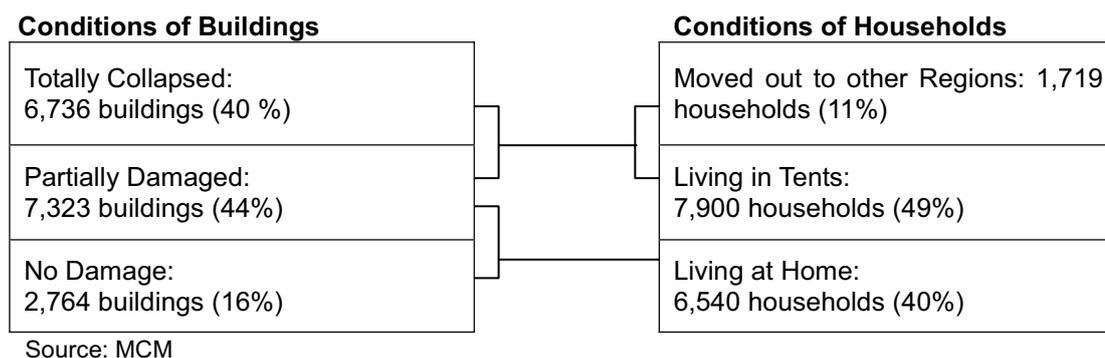
In this study, two basic principles were applied in rehabilitation and reconstruction plan: (i) bringing people's normal life back at the soonest possible time, and (ii) recovering urban functions to support people's life. These two principles are mutually related to each other. People's normal life cannot be recovered without recovering the urban functions and infrastructure. Conventional reconstruction measures, however, primarily focused on the physical recovery of urban functions and paid little attention to recovery of people's life and livelihood.

The approach will be further supported by the concept of sustainability, which will give a framework for a holistic approach to disaster recovery necessary to bring life back to normal for the people in the affected areas as well as the urban functions and community solidarity.

### **5.3.2. Damage and Loss in Muzaffarabad City**

#### **(1) Affected buildings and people**

Municipal Corporation Muzaffarabad (MCM) has conducted a damage survey of the Kashmir earthquake and released the results in May 2006, which included the number of affected households and damaged buildings in the municipality. According to this survey, of a total 16,823 buildings in the municipality, approximately 40% (6,736) collapsed completely, 44% (7,323) were partially damaged, and 16% (2,764) were reported to have no damage. Of affected households totaling 16,159, around 11% (1,719) moved out to other regions, while 49% (7,900) are living in tents. Around 40% (6,540) of the households continue to live in their houses. Figure 5.3.1 summarizes the results of survey.



**Figure 5.3.1 Conditions of Buildings and Households Affected by the Earthquake**

## (2) Disrupted livelihoods

At present, many people are still forced to live in temporary tents. Some of them live in makeshift tents set up in their own properties, and some are living in tent camps organized by the government or international donors. Recently, the living conditions of these tent dwellers have become worse because of the severe weather conditions—extremely cold during winter and acutely hot during summer season, and heavy rains. Utilities, such as water supply, electricity and toilet, are not prepared in the tents. They are hoping to go back to their residences and recover their normal life as soon as possible.

Although the mounds of debris have been partially removed from the affected sites by the efforts of government, international donor agencies and local communities, most are still left at the various sites. Furthermore, many people who lost their lives beneath the rubble are still trapped inside. Such situation makes it difficult for the people to get back to their normal life.

Facilities that support social welfare systems – clinics, hospitals, schools, community halls, and mosques – sustained significant damage and still cannot be used fully. This situation is affecting the smooth delivery of welfare services and is thus disrupting the established welfare system. Again, this has made it very difficult for people to carry on with their normal lifestyles. To make matters worse, markets, where basic necessities for living are sold, have also been damaged contributing to the difficulties of day-to-day living.

Though schools started operating again almost immediately after the earthquake, many children have been forced to attend classes in school buildings that are half collapsed or in tents that are set up in the school grounds.

## (3) Dispersed community

Together with the buildings, facilities, and equipment damages, community ties have also been disrupted. There used to be a strong bond among relatives and close neighbors in Muzaffarabad prior to the disaster, yet the disaster brought death of the community

members. In some occasions, people had to move out from their original residences in order to survive the next day. Furthermore, social activities that have helped sustain community solidarity are not being implemented at the moment since many facilities are no longer suitable for use and additionally, people are missing,

Local administration is also an important factor to restore the communities. However, the administrations in the current situation, however, are unable to define clear roles and mandates to support the local initiatives to reconstruct. If worked out properly, this could contribute to faster recovery. Community organizations, referred to as the CBOs, are also having complications in reactivating their functions because many communities have faced loss of key members. This loss of community members, disruption of organizational functions, as well as destruction of places to nurture community ties resulting from the earthquake, if not carefully addressed, may result into the further disintegration of the community.

#### **(4) Losing economic opportunities**

Many people were making their living through small, family-owned businesses including convenience stores, jewelry shops, and shops selling fresh and dairy products. The earthquake damaged family-owned buildings, as well as some equipment used for their business operation. Further, key members of the family operating the various businesses faced life loss or injuries, which made it difficult for families to continue doing business. People in family-owned businesses lost their income opportunities.

Private sector industries in Muzaffarabad are known for soap making, furniture making, wood carving and Kashmiri handicrafts. There are also a number of textiles centers that produce bed sheets, pillow covers and cushion covers. These industries have also been affected tremendously by the earthquake, often forcing them to stop operation. Their factories or plants are damaged, equipment are broken, and workers are gone. Some have either lost their lives, have been injured, are unable to commute, or have pursued other life priorities other than working at this point. To add to this, many work places, including offices, factories, and plants, are still closed and have not yet restarted operations, thus minimizing income-generating opportunities further for the people in Muzaffarabad.

### **5.3.3. Rehabilitation and Reconstruction Measures**

This section discusses two types of rehabilitation and reconstruction measures proposed: (i) building rehabilitation measures, and (ii) housing reconstruction measures. Building rehabilitation measures will focus on restoration of damaged buildings. Housing reconstruction measures will discuss several schemes to provide temporary shelters as well as houses for long-term use.

### **(1) Building Rehabilitation Measures**

In rehabilitation and recovery, there are two options in restoration of damaged buildings: (i) to restore damaged buildings with repair or retrofitting, or (ii) to demolish damaged buildings to eliminate the risk of further loss and casualties. As to which option to take can be decided upon based on the technical evaluation of each building and its ground conditions. It is therefore necessary to conduct a technical survey to evaluate all damaged buildings as soon as possible in order to have a basis of decision on whether to repair or demolish damaged buildings.

The technical survey has not yet been completed by MCM. The damaged buildings are still left unused due to the risk of collapse, and living in fear of this happening, the people have opted to live in tents or temporary shelters. Further, public facilities, including hospitals, schools, and welfare services are still in a state of disrepair. Delay in rehabilitation activities continues to drag because all of the damaged buildings have not yet been diagnosed for their safety. A technical inspection of damaged buildings is the first step in the process of rehabilitation and reconstruction of Muzaffarabad.

After diagnosing for building safety, then the decision can be made whether to repair or to demolish. If the building was evaluated as safe for continued occupancy, effective retrofitting or repairing measures would be necessary, which need compliance with earthquake-resistant design code, and this is currently being prepared by the Pakistani government. In the case of retrofitting or repairing, the government should provide financial and technical support, such as special loans, information on repairing methods and construction materials. On the other hand, if the building was evaluated unsafe for continued occupancy, it would need to be demolished. In this case, earthquake-resistant design code should be strictly applied when new buildings will be constructed.

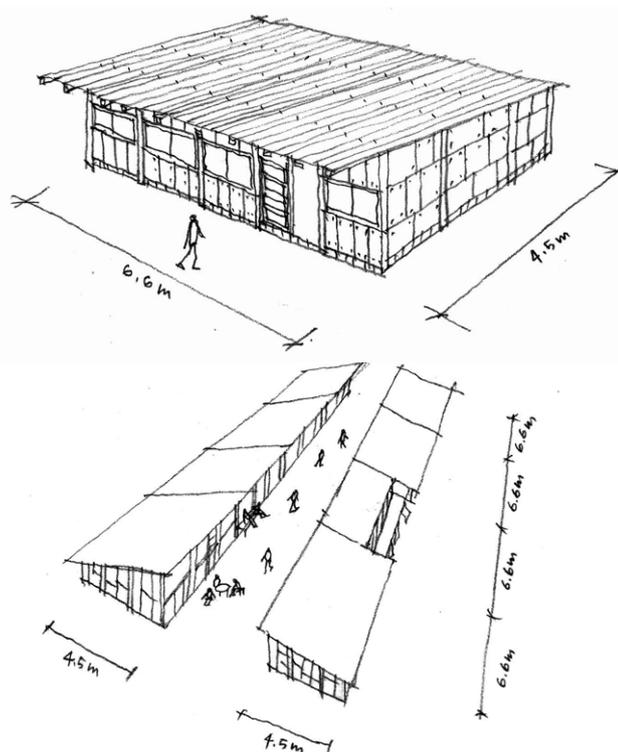
### **(2) Housing Reconstruction Measures**

Provision of housing or temporary shelter is another important measure in recovery and reconstruction of people's lives. The earthquake brought about a complex situation, and as consequence, each family has different demands and needs. Some who lost their houses and live in tents need temporary shelters to live, and others whose houses had been damaged but can be repaired are willing to go back to their original houses as soon as possible. Taking into account these facts, several housing reconstruction schemes are proposed. They are: (i) temporary shelters, (ii) affordable housing, (iii) minimum-house, and (iv) financial aids. These schemes are described below.

**a. Temporary Shelters**

Nearly 8,000 families are still living in tents in and around the city, according to the information by MCM. Thus, the provision of temporary shelters is one of the urgent tasks to improve living conditions for the people who are now forced to stay in tents. Temporary shelter aims to provide better living conditions than that in tents. Many people are suffering deplorable living conditions in tents. It is, therefore, recommended that temporary shelter should provide basic infrastructure. Thus people can recover their normal lives more smoothly.

Temporary shelter can be constructed at low cost by using local materials, such as wooden pieces, galvanized iron, and adobe bricks. Local contractors and architects can provide inputs on how best to proceed with the construction. The temporary shelters to be built are not formal houses but they will be used for a limited time for recovery of people’s life. In theory, after 2-3 years of use, the temporary shelters will be demolished and the land will revert to its original land use. Figure 5.3.2 illustrates an image of temporary shelter in Muzaffarabad.



Source: JICA Study Team

**Figure 5.3.2 Image of Temporary Shelters**

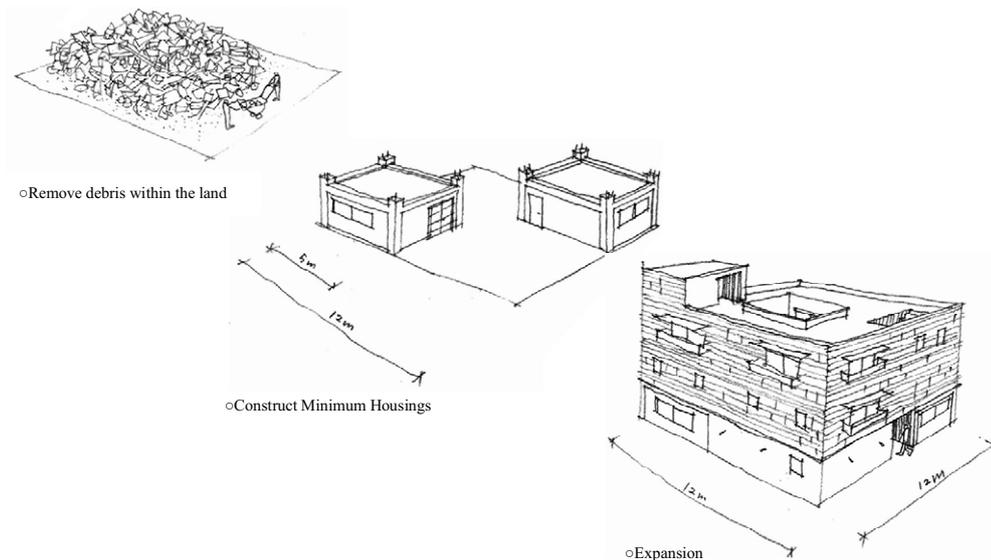
**b. Affordable Housing Scheme**

Affordable housing is another scheme to provide shelter for people, and it will be developed mainly by public sector. Affordable housing can be developed in either public land or private

land. In the case of public land, the government is an owner and developer of affordable housing and rents it out to people. In the case of private land, development mechanisms are more complicated. The government will be a developer but not an owner. The land owner may have priority to use the affordable housing. In either case, some financial support by the government is essential for development of affordable housing. Because of limited land availability in the city, affordable housing will be developed in the outskirts of the urban areas.

### **c. Minimum-housing Scheme**

Minimum-housing is a scheme to develop minimum function of residence in early stage of reconstruction. It will be able to extend to a bigger house by the resident's own effort, when it will be needed. The minimum-housing scheme can be applied to private properties in which buildings were completely collapsed and needed new construction. This scheme makes possible the reconstruction of houses without relocation.



Source: JICA Study Team

**Figure 5.3.3 Minimum-Housing Scheme**

### **d. Financial Aids for Housing Reconstruction**

Financial aids for housing reconstruction are particularly important to provide to people who lost their houses and properties and aimed to start a new life in new areas. The temporary shelter, affordable housing and minimum-house cannot be successful without proper financial aids by the government. Such subsidy will make it possible for people to get their life back to normal situation in the early stage of reconstruction.

### **5.3.4. Transitional Urban Reconstruction Scheme**

#### **(1) Mechanisms of Transitional Urban Reconstruction**

Transitional urban reconstruction is a holistic approach aiming at reconstruction of housing, community, and people's normal life together. It will recover urban functions with minimum relocation of people. For this purpose, consensus-building among residents is an essential part in the implementation. If community made an agreement, private-owned lands will be used for construction site of temporary shelters for a limited time. This approach will benefit people by putting back their livelihoods in their original neighborhoods, so that the recovery will be smoothly implemented.

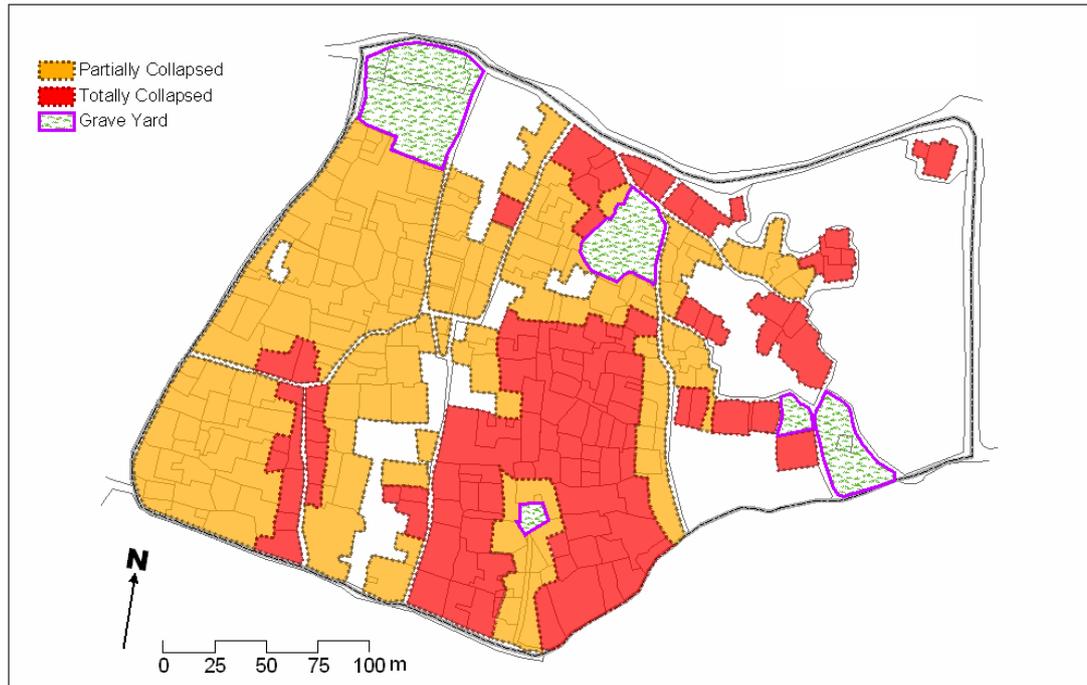
The transitional urban reconstruction scheme can be applied to the areas with heavily damaged and high-density urban area. In putting this approach into practice, it is important that the following are implemented:

- Effectively use available resources, namely facilities, infrastructures and community
- In case individual lands are available, promote construction of minimal-housing
- Construct temporary shelters in heavily damaged areas after debris is removed

Figure 5.3.4, Figure 5.3.5 and Figure 5.3.6 illustrate the concept of transitional urban reconstruction and its processes are shown as follows:

### **First step - Building Assessment**

Initial work is the building damage assessment by professionals. This work will assess each damaged building to identify whether it can be recovered with repairing or be demolished due to unsafe condition. Figure 5.3.4 shows a sample of comprehensive damage assessment map, which includes totally collapsed area, partially collapsed area with damaged buildings, and other open space. This map is useful for making a consensus among residents regarding reconstruction and future layout of urban functions.

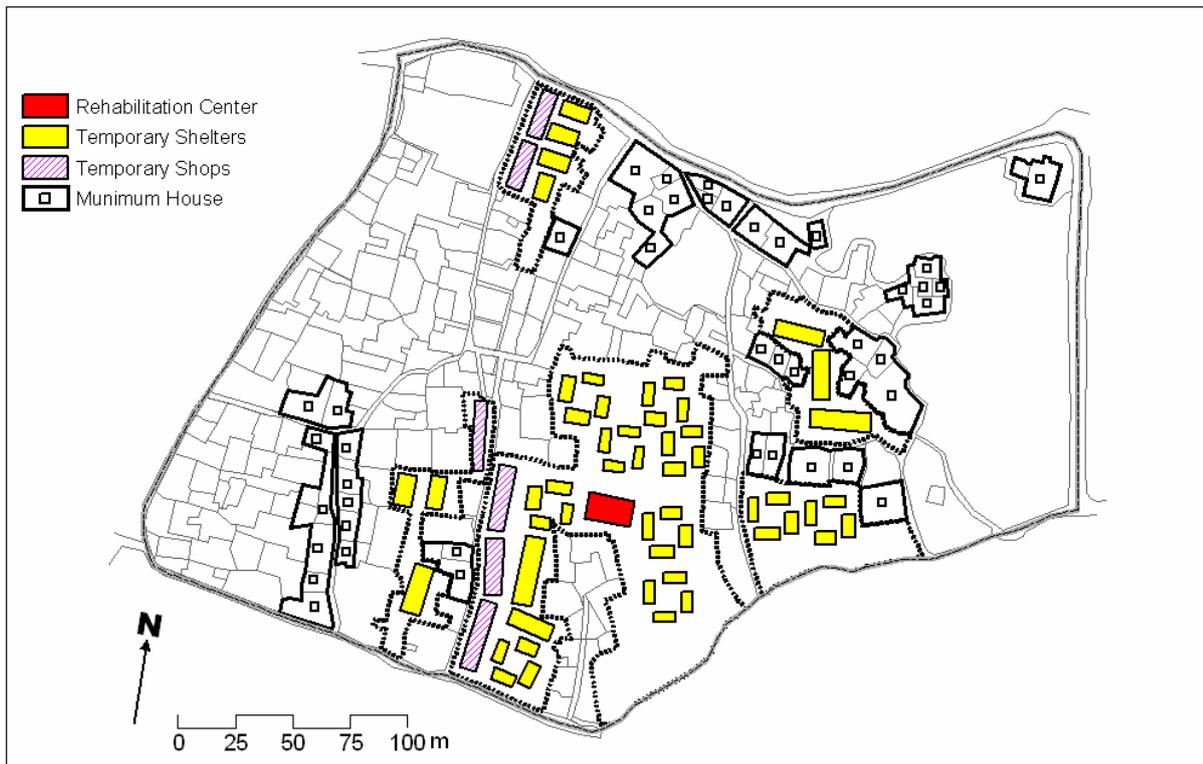


Source: JICA Study Team

**Figure 5.3.4 Damage Assessment of Each Building**

**Second step – Rehabilitation of damaged buildings and provision of temporary shelters and minimum-housing**

In this stage, damaged buildings, if they are deemed safe for continued occupancy, will be repaired following the building code on earthquake-resistant design. Temporary shelters will be constructed to accommodate people who lost their houses. Minimum-housing will also be constructed in individual plots by financial and technical support of the government. An image of layout plan, including temporary shelters and minimum-housing, is illustrated in Figure 5.3.5.

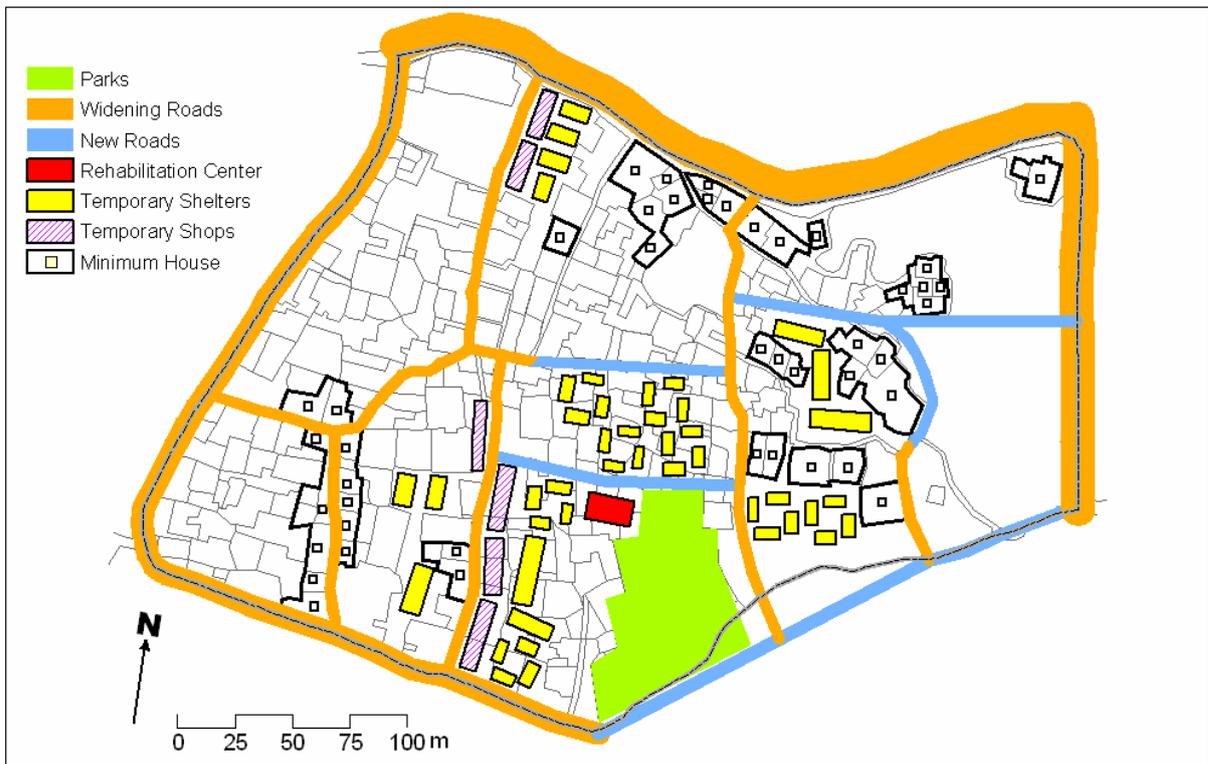


Source: JICA Study Team

**Figure 5.3.5 Transitional Layout Plan: Provision of Temporary Shelters and Minimum-housing**

### **Third step – Remodeling of Urban Structure**

After immediate rehabilitation period in the second step, some temporary shelters will be removed and transferred to original use. In this stage, widening of roads will be implemented and new roads, if necessary, will be constructed. For example, as shown in Figure 5.3.6, some temporary shelters will be transformed to roads or park space to improve the overall urban structure.

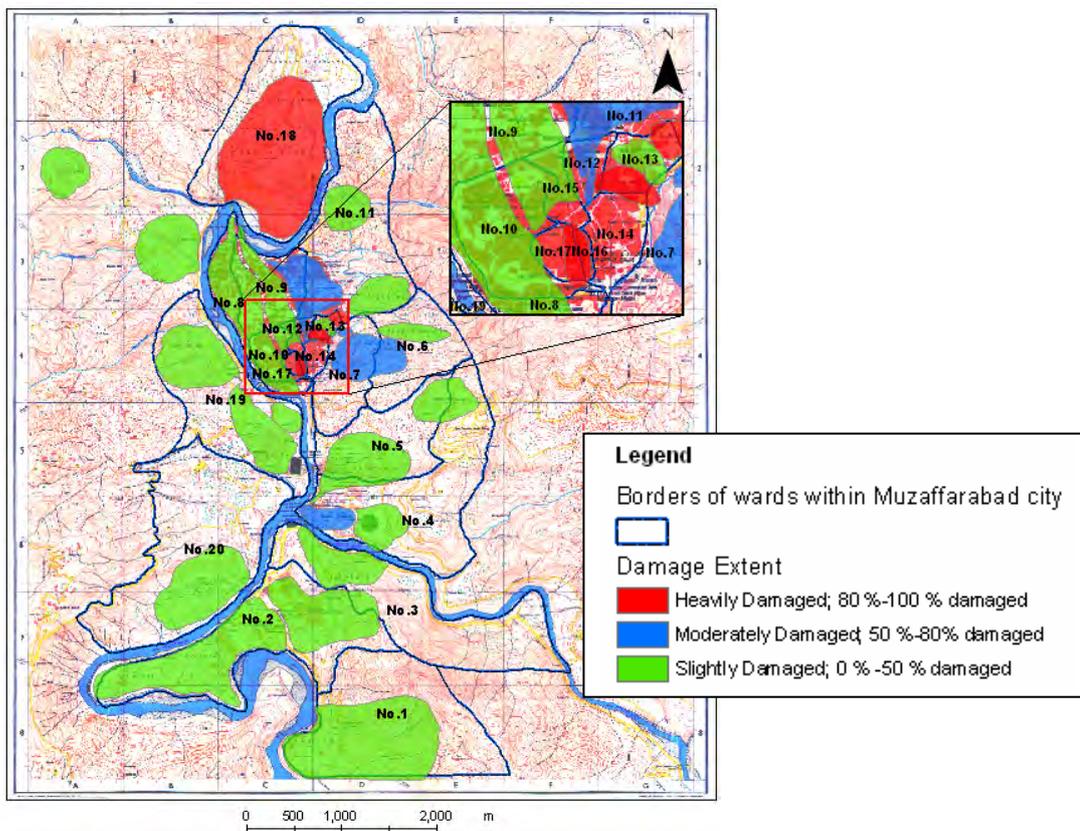


**Figure 5.3.6 Layout Plan After Removal of Temporary Shelters**

**(2) Priority Area**

As shown in the previous section, building damage is the primary indicator to prioritize reconstruction areas, particularly by applying the transitional reconstruction scheme. If most of the buildings and infrastructure are completely collapsed, new development measures should be taken in these areas. If the damage is not so significant and infrastructure can be available, reconstruction should focus on rehabilitation of damaged buildings and recovery of livelihood.

The potential areas to apply the transitional urban reconstruction scheme were selected based on the results of building damage survey conducted by the Study team in March 2006. The survey identified locations of heavily damaged areas in the municipality. Figure 5.3.7 shows distribution of heavily damaged areas with classification of three levels: Rank A, shown in red color, has heavily damaged building ratio with more than 80% of total buildings, rank B, shown in orange color, has heavily damaged building ratio with 50% to 80%, and rank C, shown in yellow color, has heavily damaged building ratio with less than 50%. The areas with damaged building ratio over 50% are located in Old City, Chela Bandi and Tariqabad. Old City, particularly in the southern area from College Road, is one of the priority areas to apply the transitional urban reconstruction scheme.



Source: JICA Study Team

**Figure 5.3.7 Ratio of Heavily Damaged Buildings per Ward**

### **(3) Land Availability**

One of the critical issues in applying the transitional reconstruction scheme is land availability for construction of temporary shelters. There are two types of potential lands for construction of temporary shelters: (i) public owned vacant lands, and (ii) private owned vacant lands. Public owned vacant lands are parks or plots which public facilities occupied before the earthquake and they totally collapsed. Private owned vacant lands are lands which individual houses occupied and were collapsed by the earthquake.

If public lands are available, government should take the initiative to provide temporary shelters in its property. The temporary shelters will primarily accommodate the people who lived nearby in the same neighborhood. Thus, these people would probably know each other and this can help in their recovery. In this case, temporary shelters will be removed and the land's original function is restored. If public lands are not available, private owned lands will be used for construction of temporary shelters. In this case, consensus-building among landowners, people and government is essential in implementation of the transitional reconstruction scheme. Community leaders or CBOs should play a leading role.

## **5.4. Social and Livelihood Restoration**

### **5.4.1. Basic Scheme of Community Restoration Process**

Four actions needed to include in the plan for community restoration processes: i) restore livelihood, ii) involve communities in reconstruction process, iii) mobilize CBOs to make residents the central actors, and iv) locate small sources of funds to support communities to trigger economic independence. These activities are discussed in detail below.

#### **(1) Restore Livelihood**

Current conditions of the communities suggest that residents are surviving daily but are anxious without a safe place to live, income to support their daily lives, and social activities, such as attending schools or going to work, to fulfill their lives. Thus, community restoration needs to put top priority to secure their livelihoods. To provide secure livelihood, people need to be located in their original neighborhood, have opportunities to generate income, and have access to social activities, including education.

Allocating residents in or nearby their original neighborhood is one of the core plans, because it will drastically increase opportunities to enhance existing social capital and bonds. By providing opportunities for residents to generate income, they can support recovery with their own business or in other cases, providing jobs are required.

#### **(2) Involve Community Residents in Reconstruction Process**

Involving communities in reconstruction process is another important aspect. The Study Team carried out a debris removal pilot project, targeting Ward 13, which led to successful debris removal of the neighborhood with positive responses from the residents. Some reasons why this project was welcomed by the residents of Ward 13 are: i) the project generated temporary income to the resident, and ii) it got the residents' own neighborhood cleaned and proved they could do it by themselves.

This success provides the important message that involving communities in the reconstruction process and providing a small amount of income, especially for the areas where they reside, is very important. Such behavior is important to be continued for the longer term as well; by so doing, it will make their neighborhood a better place to live by their own efforts.

#### **(3) Mobilize CBOs making Residents as Central Actors**

As CBOs are found to be one of the essential and useful organizations that represent Muzaffarabad communities, retrieving and enhancing their function is listed as a top priority; if none exists, organizations that have similar functions are recommended to utilize to make

it easier for residents to participate in the decision making process and activities that are related to reconstruction.

Making residents as central actors in reconstruction process is also essential for effective and rapid reconstruction. As the JICA pilot project demonstrates, sense of ownership is also essential in the reconstruction process. Furthermore, by having residents participate in programs of a group, community bonds and networks have opportunities to strengthen.

**(4) Locate Small Sources of Funds to Trigger Economic Independence of Communities**

Social survey by the Study Team found that some residents expressed need for soft loans to restart businesses and other entrepreneurial activities. Conditions of the neighborhood after the earthquake also suggest that residents are suffering extreme hardships to survive in their everyday lives, due to the loss of household members and lack of facilities to run their businesses. One of the attitudes found, among many others, is the keen interest of residents to restore their houses and places for business by their own effort. Consequently, under the notion of “self-help”, it is useful to provide small funds to trigger economic independence, and recover the normal life of communities in general. Community members could find ways to generate income, if they receive some funds to initiate their activities. As an option, community members need to borrow money from private institutions, commercial banks, yet often, borrowing money from such institutions make them face further difficulties in paying it back with commercial interest and it would force them into debt. The same applies to the residents who need to borrow a certain amount of money from informal lenders.

**5.4.2. Community Restoration Strategies**

Understanding the impact of earthquake to the communities has provided information for key components that need to be included in community restoration. The next step is to develop strategies that support improvement of current conditions. Strategies for community restoration mainly include three approaches: i) three levels of assistance, ii) enhance, develop, and utilize CBOs, and iii) allowing community members to participate in the reconstruction plan.

**(1) Approaches to Restore Communities**

Restoration and reconstruction procedures are proposed to take action at three levels: self-help, mutual-help, and public assistance. These levels target individuals and families, community members, and governments, respectively. Responsible actors at three levels as well as systems need to interact to produce the most effective and rapid reconstruction. However, the most important actor among the three levels is the communities that consist of

individuals and families. The other actors need to function in supportive way to preserve and enhance community bonds.

## **(2) Enhance, develop, and utilize Community Based Organizations (CBO)**

Since there is no official organization that is uniformly distributed throughout Muzaffarabad, and only some wards have a CBO within their administration since many were disrupted by the earthquake impact, CBOs needs to be either enhanced in their existing form or developed a new one within individual wards based on the notion of utilizing the existing resources.

Members of the CBOs can be any residents who have the motivation to participate and make their neighborhoods a better place to live in. However, it is also important to select some representatives of the CBOs, who will have the responsibilities to organize the community as well and negotiate with the government. Elections are recommended procedure to take, when selecting the representatives, because such procedure will select trust-worthy people, and also make the selected people be responsible for organizing the group.

Size and population of wards vary, and thus, it is recommended to have several CBOs, recommended to develop by *mohallah*. In case the population within the *mohallah* is still too large, more CBOs can be developed, based on the areas of blocks or streets.

CBOs will be the main organization to contribute to restoring communities, and their roles will include: coordination among residents, coordination and collaboration with the government agencies, and supporting decisions of the members in the communities.

To strengthen and develop CBOs throughout the wards, MCM or the district governments are proposed to lead, by encouraging and showing models to the communities.

## **(3) Skills Training for Income Restoration**

Many households lost income source like shops, and there are also many women left widows by the earthquake. On the other hand, skilled or semi-skilled labors are needed for infrastructure construction – requiring skills such as masonry, carpentry, plumbing, electrical works etc, that are mostly needed during reconstruction work. However, women including widows do not have enough skills to have new income sources, also, most of the men including boys have not been trained for construction work. Therefore, it is important that new skills are imparted to semi-skilled, unskilled individuals as well as to asset poor families especially women.

To support them, skills training centers are recommended for men, women, and youth on viable vocational training such as computer technology, carpentry, masonry, plumbing, electrical works, bag making, and embroidery.

**(4) Sustain Transparency of CBO's Finance and Activity to the Public**

CBOs will also be in charge of managing and distributing funds. Their role is critical, especially for residents because it will directly give monetary support to residents' life. In the case of the pilot project for the debris removal, a targeted CBO opened its bank account to pool the funds that were provided by the Japanese government, to keep transparency of the money flow and to allow access from all representatives, if needed. A large portion of the money provided became compensation to the residents for debris removal activities, and the effort of making flow of funds transparent to the public showed great potential in excluding corruption.

In a similar way, even for any other activities that will be planned and implemented in different wards in long-term reconstruction process, CBOs need to maintain transparency for their credibility and accountability. These are the key components that need to be secured to sustain trust among residents and also to the government.

**(5) Financial Support to Restore Livelihood**

To support neighborhood residents in getting their life back to normal, a small portion of financial support is recommended to be given to community members for them to initiate their efforts, in addition to the jobs that may be created by the CBOs. Often, the affected people include a large proportion of the poor as seen in Muzaffarabad; such residents struggle to survive everyday after a disastrous incident. Since there are no opportunities for the residents to generate income from the pre-disaster businesses immediately after the incident – especially because most of the businesses found in Muzaffarabad were small-households and informal ones – it is too difficult for them to retain a system which generates income by themselves. However, if some support is given for those who are willing to get their life back to normal, especially to the one an activity that is linked to income, it is believed that residents will make the effort to improve their lives.

One of the recommended financial support systems in this vein, are “soft loans” with low or no interest, targeting people who are hoping to restore their residences or businesses. The interest rates as well as procedures should be decided based on the conditions of the borrowers, whether government employer, business owner, or female household head. In making decisions on such rates, CBOs are also responsible for coordinating with the borrowers, as well as providing after care for those who need support.

In coordination with government and CBOs, information on job opportunities is also recommended to be distributed to the residents.

### **5.4.3. Toward Disaster Resilient Communities**

#### **(1) Self-help and Mutual-help Nourish Stronger Bonds**

An example of a debris removal pilot project in Ward 13 showed that there is potential to develop networks, norms, and social trust, which are directly linked to nourishing social capital by sharing mutual benefit through cooperation.

In fact, there is a movement in Muzaffarabad by donor agencies, represented by the debris removal activity, which is solely providing support for removing debris without any involvement of the community members. Such assistance is easy and speedy if funds are provided; yet it will not contribute to the residents in developing any sense of ownership and motivation in participating in the recovery process.

Since recovery is not a short term process, community bonds are critical to achieve livable and satisfactory neighborhoods at the end. In this context, community members are strongly recommended to participate in all activities related to their neighborhood recovery through CBOs.

#### **(2) Toward Disaster Resilient Communities**

Nurtured social capital through CBOs in different wards will be a neighborhood asset. Not only will this capital accelerate the speed of recovery, but it will also provide many opportunities to improve their livelihoods in the future. Different characteristics of the areas, in terms of social and physical conditions, can be retained for the area's betterment, using CBOs and developed social capital, by implementing their own action programs. Such action programs may include activities related to disaster mitigation activities, such as enlightenment and education, disaster drills, as well as income generation. The neighborhoods will also be able to provide mutual support in eliminating possible disaster impacts or sharing the risk for the future catastrophes with strong community bonds.

## **5.5. Plan for Reduction of Natural Hazard and Risk**

### **5.5.1. Reduction of Earthquake Hazard**

#### **(1) Management System**

This section considers the basis for establishing the rehabilitation plan. It is clear that the structures may be destroyed if they are rehabilitated by a similar method as previously used, because previous structures were destroyed by the earthquake. The ideal standard can not be obtained so easily. However, it is necessary to initiate rehabilitation activity to address structural weaknesses. This section will focus on realistic solutions and credible targets of disaster mitigation.

The issue is that the government organization should control building construction process. In case of Muzaffarabad, the responsible organization is Muzaffarabad Development Authority. Regulation of building permission and inspection system defines the content of compulsion. In general, regulation of building permission and inspection system is divided into the structure mechanics and the planning editions. The structure mechanics edition has direct effect of physical earthquake-resistance of the buildings.

In Japan the building standards law and the enforcement orders, which are properly announced officially, provide the matter which should be observed. They are the laws with compulsion power by which the whole country of Japan is covered and the jurisdictions of the Ministry of Land Infrastructure and Transport

However, in Pakistan the law of building permission and inspection is not the jurisdictions of national government. Building permission and inspection is usually enacted as regulation of local government. This regulation of local government does not exist in AJK. Therefore, it is indispensable to enact regulation of local government with the compulsion power in the AJK government.

The building must be designed according to this regulation of local government, and it is necessary to perform an engineering check by public body at each stage of construction and starting use. When the building does not meet regulations, the legal compulsion power should have and be obstructed. It is necessary to execute the legal compulsion according to the obvious statement system substantively.

#### **(2) Earthquake Resistant Design Code**

##### **a. Contents of code**

A structural regulation is called Earthquake Resistant Design Code, and this affects directly earthquake-resistance of the buildings. It is necessary to provide for the following three matters in this regulation.

- Design requirement of building frame
- Construction technique of building
- Decision thing concerning parts other than building frame (i.e. urban planning affairs, fire protection, safety matter, daylighting, water supply, water discharge and environmental hygiene etc.)

This paragraph describes the content of the design requirement of building frame while it has a definite influence in the damage scale at the earthquake.

#### **b. Revised Building Code**

As for building code, Ministry of housing & works Environment & Urban Affairs Division publishes "Building Code of Pakistan" as a guideline. This guideline is now on the way of the revision work, the method of the design for earthquake-resistance provided by "1997 UNIFORM BUILDING CODE"(UBC 1997 hereinafter) published by "International Conference of Building Officials" is provisionally applied.

In UBC 1997, design base shear is provided as a design earthquake. On the other hand, NESPAK made a draft of guideline "Criteria for Seismic Resistant Design of Building in Pakistan (June 2006)" (CSDBP 2006 hereinafter). In CSDBP 2006 spectral acceleration coefficient is recommended as a design earthquake. Map that shows the distribution of peak ground acceleration coefficient (PGA) is offered in this draft. As for the design earthquake which this peak ground acceleration coefficient shows, probability of exceedance corresponds to 10% in 50 years. 2.5 times this value corresponds to the peak value of the response spectrum, and it is called "elastic seismic load" in that draft.

The model is assumed to be elastic in the frame analysis. However the structure excited by this scale of earthquake reaches into the elasto-plastic domain, actual response of the structure will be different from the response obtained by elastic assumption. The response spectrum is decreased by reduction factor  $R$  to consider the effect of ductility and redundancy.

As for the obtained stress, safety is checked by allowable stress design or ultimate stress design. Factor applied to load combination is different depending the way of checking (i.e. allowable stress design or ultimate stress design). Safety is checked according to calculation method which American Concrete Institute (ACI hereinafter) provides. Above is an outline of the design calculation in Pakistan. As mentioned above, "Design Earthquake" and "Strength Design Method" must be provided in the earthquake resistant design code.

Following is considered regarding the earthquake resistant design code applied to Muzaffarabad city. PGA value around the Muzaffarabad city is proposed 0.36g-0.43g in peak ground acceleration map which CSDBP 2006 proposes. When these values are multiplied by 2.5, the peak value of the response spectrum will be obtained and that becomes about 1.0g. If *equivalent lateral load method* is applied and the maximum  $R$  value for RC frame structure 7.0 is applied, the base shear coefficient becomes 0.15-0.22.<sup>18</sup>

It is thought that earthquake-resistant capacity of many existing buildings in Muzaffarabad does not come up to 0.1 as the value of base shear coefficient. It is difficult to obligate all of building in this region to satisfy the requirement, which the combination of CSDBP 2006 and ACI proposes. It is possible to apply the base shear coefficient of 0.15-0.22 for important buildings but it is not feasible to obligate small-scale individual possession building to satisfy same requirement of base shear coefficient.

Generally earthquake resistant design code defines acceptable limit of the damage caused by earthquake implicitly or explicitly and an example is seen in Table 5.5.1.

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<sup>18</sup> It is mentioned that the peak value of the response spectrum for Muzaffarabad region recommended by CSDBP 2006 will be about 1.0g. This setting is similar to the standard base shear coefficient for “Ultimate Lateral Strength Method” provided by the building standards law and the enforcement order 82-4 in Japan. However, the system of “Ultimate Lateral Strength Method” of Japan is different from the system of CSDBP 2006 and ACI. In “Ultimate Lateral Strength Method” non-linear frame analysis is applied and *Structure characteristic coefficient*  $D_s$  is defined in order to give careful consideration to the effect of ductility and redundancy. Consequently, the calculation by the Japanese system brings severer judgment than the calculation by the combination of CSDBP 2006 and ACI.

**Table 5.5.1 Earthquake Performance Level” in VISION 2000**

Damage Range & Damage Index	Performance level	Thresholds
10 Negligible 9	Fully Operational	No damage, continuous service. Continuous service, facility operates and functions after earthquake. Negligible structural and non-structural damage.
8 Light 7	Operational	Most operations and functions can resume immediately. Repair is required to restore some non-essential services. Damage is light. Structure is safe for occupancy immediately after earthquake. Essential operations are protected, non-essential operations are disrupted.
6 Moderate 5	Life Safe	Damage is moderate. Selected building systems, features or contents may be protected from damage. Life safety is generally protected. Structure is damaged but remains stable. Protected from falling debris.
4 Severe 3	Near Collapse	Structural collapse prevented. Non-structural elements may fall. Structural damage is severe but collapse is prevented. Non-structural elements fall.
2 Complete 1	Collapse	Portions of primary structural system collapse. Complete structural collapse.

Source: Performance Based Seismic Engineering of Buildings (SEAOC 2000)

It is almost pertinent that *Performance level* for important buildings is set as *Operational* or more but it can not be avoided that *Performance level* for a small-scale individual possession building is set as *Life Safe*. Otherwise the earthquake resistant design code will not be observed. As a concrete way *Importance factor I* must be set in the value less than 1.0. Otherwise another table of *Structural Behaviour Factor R* must be prepared for the buildings of lower *Performance level*.

**c. Check method**

An analytical calculation method is needed to check whether the building is designed following Earthquake Resistant Design Code or not. At least a mathematical analysis using frame model is indispensable. Stress generated in the main part of the structural members should be calculated. However, computer software is necessary to carry out this method. Most of designers use computer software made in US (for example “SAP” and “ETABS”, etc.) because their countries do not develop their own computer software. One of the problems in using these computer software programs is language. It is almost impossible to accurately operate for the average engineer whose mother tongue is not English. When software is used without accurate knowledge of technical terms in structural mechanics, wrong input can not be avoided. This is a form of willful negligence.

Previously, it was described that structural analysis of the frame was indispensable. It is known that the deformation of structural members of the major buildings exceed the domain

of analysis with linear force-deformation. Realistically speaking, it is necessary to cover the behavior of the non-linear domain by the equivalent linear analysis (where elastic assumption can not be applied in its strict meaning).

It is presumed that the revision standard of Pakistan will follow UBC 1997 or IBC 2000 of the United States. Over strength factor  $R$  is set in UBC to cover the behavior of the non-linear domain. This idea is realistic, but it can cause essential mistakes when it is copied without enough examination.

Let us consider the application of conventional construction method when structural analysis is not feasible. "Wooden" and "Masonry structures" are designed without calculating either intensity of stress or the displacement of the structural member by a structural analysis in the strict meaning. The large majority of houses, masonry structures, and the reinforced masonry structures correspond to this building type. A considerable number of the buildings are built by this construction method even if they are public buildings (the government office, the hospital, and the school). The general public usually think that even these kinds of buildings can resist against earthquake effects the same as the buildings built by modern structural methods. This is a problem which should be emphasized together with "Earthquake performance level" previously described.

#### **d. Structure detail**

In Pakistan, many buildings can be found with careless construction. In many cases, installation of reinforcement bar and concrete placing method are inappropriate. Those buildings can not resist against earthquake even though the design is appropriate. The minimum rule, which the architect-engineer should comply with, should be clearly shown in the code.

### **(3) Building Code Enforcement Mechanism**

Building code enforcement must be performed linking with Building permission. The outline of building permission and inspection system is shown as follows.

- When the design of the building is completed, the builder submits the drawing and the structural calculation book to district surveyor.
- Only when district surveyor checks the drawing and the structural calculation book, and the earthquake-resistance is secured, the construction start is permitted.
- District surveyor goes to the construction site at important term of construction and conducts in-process check.
- The improvement recommendation is performed when there is a problem in the quality of the used material or problem in the craftsmanship.

- District surveyor goes to the construction site when the building is completed and the completion inspection is done.  
Only when finish is corresponding to an initial state in the completion inspection, the use of the building is permitted.

### **5.5.2. Reduction of Slope Hazards and Risks**

#### **(1) Current Hazards and Risks for Muzaffarabad City**

The disastrous earthquake on October 8, 2005 affected a number of buildings in/around Muzaffarabad city and induced considerable death toll and injuries. Moreover, the 2005 Kashmir earthquake has caused a lot of slope failures and new landslides, and has activated existing landslides, which are located in Muzaffarabad city and its vicinities.

In this line, the JICA Study Team had made quick hazard assessment for Muzaffarabad city. Through this hazard assessment, various kinds of natural hazards, especially landslides and debris/mud flow (potential), have been identified in Muzaffarabad city and its adjacent areas.

It is concluded that Muzaffarabad city has high potential of natural hazard currently.

#### **(2) Debris Flows as Possible Natural Hazards in the Near Future**

The JICA Study found out that the slope failures and landslides have been inducing much of talus deposits derived from materials forming slopes in mountain streams, and the Study have warned Muzaffarabad city and the AJK State Government of the high potential of debris/mud flows to affect existing urbanized areas within the city in a Monsoon season. Actually, a debris flow occurred in a residential site located in Chela Bandi killed at least 12 people and more on July 24, 2006. Then other debris (or mud) flows affected several residential sites within Muzaffarabad city in the Monsoon season, 2006. Similar debris flow hazards are also considered in future.

It is considered that debris flows are identified as the most harmful natural hazards for people's lives and property currently, and in the near future. The countermeasure actions for debris flows have to be taken as soon as possible by Muzaffarabad city and the AJK State Government.

#### **(3) Other Slope Hazards/Risks Harmful for Muzaffarabad City**

Landslides and slope failures are also harmful natural hazards as well as debris flows mentioned above, which are considered to occur in Muzaffarabad city. However, it seems to be not easy to stop and control active landslides in/around Muzaffarabad city immediately because their sizes are relatively large and it takes a lot of times and costs needed for effective countermeasure work. In addition, mechanisms of the landslides have not been understood sufficiently needed for countermeasure work.

Currently, the most possible measures immediately for (relative large-scale) the landslides and slope failures are: to monitor landslide activities, and to prohibit use of landslide prone areas for not activating landslides any more. To monitor the landslide activity is very important to understand mechanisms of landslides and let people know urgent evacuation.

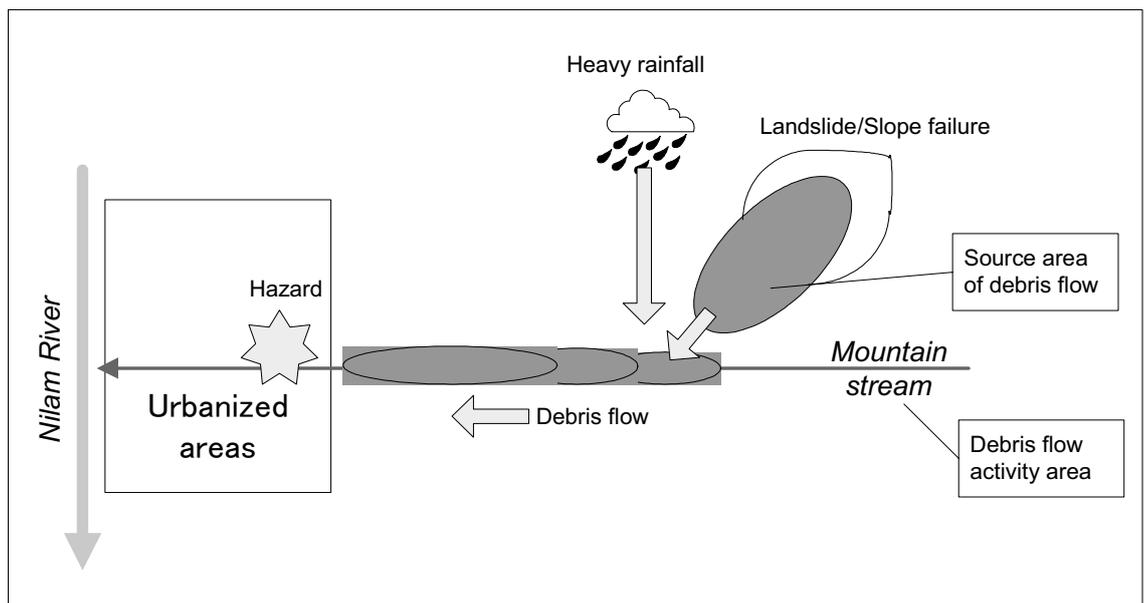
#### (4) Possible Measures for Reduction of Slope Hazards and Risks

##### a. Necessity of Disaster Management for Muzaffarabad City

Without countermeasures against slope hazards mentioned above, it is difficult to realize better /quick recovery and future development of Muzaffarabad city. Therefore the disaster management to reduce the risks there is inevitable for the city.

Of the possible natural hazards, debris flow hazards are the most urgent issues to be considered for Muzaffarabad city. Of course, countermeasures for active landslides and slope failures are important so that slopes do not supply 'source' materials of debris flows any more.

A schematic mechanism of a debris flow hazard to affect the urbanized area in Muzaffarabad city is shown in Figure 5.5.1.



Source: JICA Study Team

**Figure 5.5.1 Schematic Diagram of a Debris Flow Hazard in Muzaffarabad City**

##### b. Urgent Measures

The following measures have to be taken within six months, as urgent measures especially for water-induced natural hazards (debris flows). These measures are not permanent solutions for Muzaffarabad city, but solutions to reduce likely casualties in debris flow hazards as possible as it can.

- Disaster education and training for governments’ officers and residents
- Detailed study on mechanisms of slope disasters, and preparation of the risk map for Muzaffarabad city
- Establishment of effective evacuation system for residents
- Debris flow/landslide monitoring

**c. Additional Measures**

Toward ‘safe’ city, additional measures listed below should be taken against debris flows to affect the urbanized area, following urgent measures above.

- Design and construction of simple/low-cost facilities to reduce debris flow impacts on urbanized area in Muzaffarabad city
- Prohibition of use/development of landslide area (and debris flows’ source areas)
- Permanent countermeasure work for landslides, when the measures above do not function sufficiently.

Table 5.5.2 summarizes a basic policy on slope hazard risk reduction for Muzaffarabad city.

**Table 5.5.2 Basic Policy of Water-induced Disaster Risk Reduction in Muzaffarabad City**

Target Area	Urgent phase (within six months)	Following phase (after six months)
‘Source’ area (landslide/slope failure areas)	Prohibition of land use and development of areas	Necessary permanent countermeasure work
‘Activity area’ (mountain streams)	Simple or low cost facilities for reducing debris flow impacts; gabions, etc.	Necessary permanent countermeasure work, e.g., Sabo-dams.
‘Affected area’ (urbanized area)	‘Soft’ measures; education, training, study, monitoring	‘Hard’ measures; improvement of city drainage system, river protection work, etc.

Source: JICA Study Team

## **6. PROJECT IMPLEMENTATION PLAN**

### **6.1. Project Implementation Strategies**

#### **6.1.1. Introduction**

In order to enhance the rehabilitation and reconstruction process, the JICA Study Team has formulated several implementation strategies for Muzaffarabad. The rehabilitation and reconstruction strategies can be categorized into five groups: rehabilitation and reconstruction of urban areas, reconstruction of housing and buildings, back to normal life for citizens, restoration of economic activities and reduction of potential natural hazard. The restoration of economic activities is not included in this study, yet restoration of economic activities will have great long-term impacts on rehabilitation and reconstruction of the Muzaffarabad area.

The Study Team examines the measures to achieve the vision and objectives and selected four implementation strategies as shown below.

- 1) Rehabilitation and reconstruction of urban areas
- 2) Provision of appropriate shelter and housing
- 3) Recovery of citizen's life to the normal situations
- 4) Reduction of natural hazard risk

The Study Team emphasizes the involvement of community-based organizations (CBO) in the whole rehabilitation and reconstruction process because they will act as coordinator and mediator of dispute resolutions within the community and pave the way towards the effective and efficient implementation of projects. The government should work together with community organizations. The Study Team has proved that CBO is one of the candidates of the implementation body to carry out a debris removal project.

#### **6.1.2. Rehabilitation and Reconstruction of Urban Areas**

Urban reconstruction patterns will be determined based on the building and housing damage assessment results. As pointed out in 4.2 of the report, the building damage can be classified into four categories: "most damaged area" of more than 80% heavily damaged, "moderately damaged area" of 50% to 80% heavily damaged, "slightly damaged area" of less than 50% heavily damaged and "no damage area". Based on the damage ratio of the buildings, urban rehabilitation and reconstruction process will be determined.

There are three patterns of rehabilitation and reconstruction of urban areas: whole urban remodeling, partial remodeling and self-rehabilitation and reconstruction. Based on the development policy shown in this study, reconstruction and rehabilitation of urban areas should proceed accordingly.

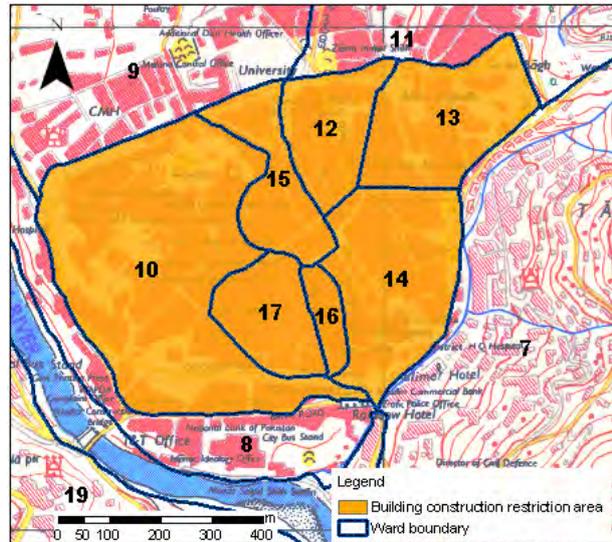
**Table 6.1.1 Rehabilitation and Reconstruction Pattern**

Damage	Urban block	Rehabilitation and reconstruction	Project Choice
None and slightly damaged area	Self-rehabilitation and reconstruction	Start permanent construction	<ul style="list-style-type: none"> <li>• Permanent building construction</li> </ul>
Moderately and most damaged area	Partial remodeling	Widening of the existing road Start permanent construction	<ul style="list-style-type: none"> <li>• Detailed urban planning</li> <li>• Relocation of affected people</li> <li>• Temporary house construction</li> <li>• Permanent building construction</li> </ul>
	Whole remodeling	Construct a more planned urban area <ul style="list-style-type: none"> <li>• Road pattern</li> <li>• Urban block</li> <li>• Public facility</li> <li>• Parks</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed urban planning</li> <li>• Formulation of transitional urban area</li> <li>• Temporary house construction</li> <li>• Permanent house construction</li> </ul>

Source: JICA Study Team

**(1) Urban Rehabilitation and Reconstruction Direction**

The results of the building damage assessment done by the Study Team show that Wards 10, 13, 14, 16 and 17 belong to the “most damaged area” category. Their damage ratios may be lower than that defined for this category, but the surrounding wards also come under the whole urban remodeling pattern. In order to achieve the intended vision, this study puts Wards 10, 12, 13, 14, 15, 16 and 17 under the category needing urban remodeling and detailed urban planning will be required. Therefore, those wards would be declared as the permanent building construction restriction area until the government and residents accepted a detailed plan. The plan should include the formulation of commercial complex within the remodeling area.



Source: JICA Study Team

**Figure 6.1.1 Location of Building Construction Restricted Area**

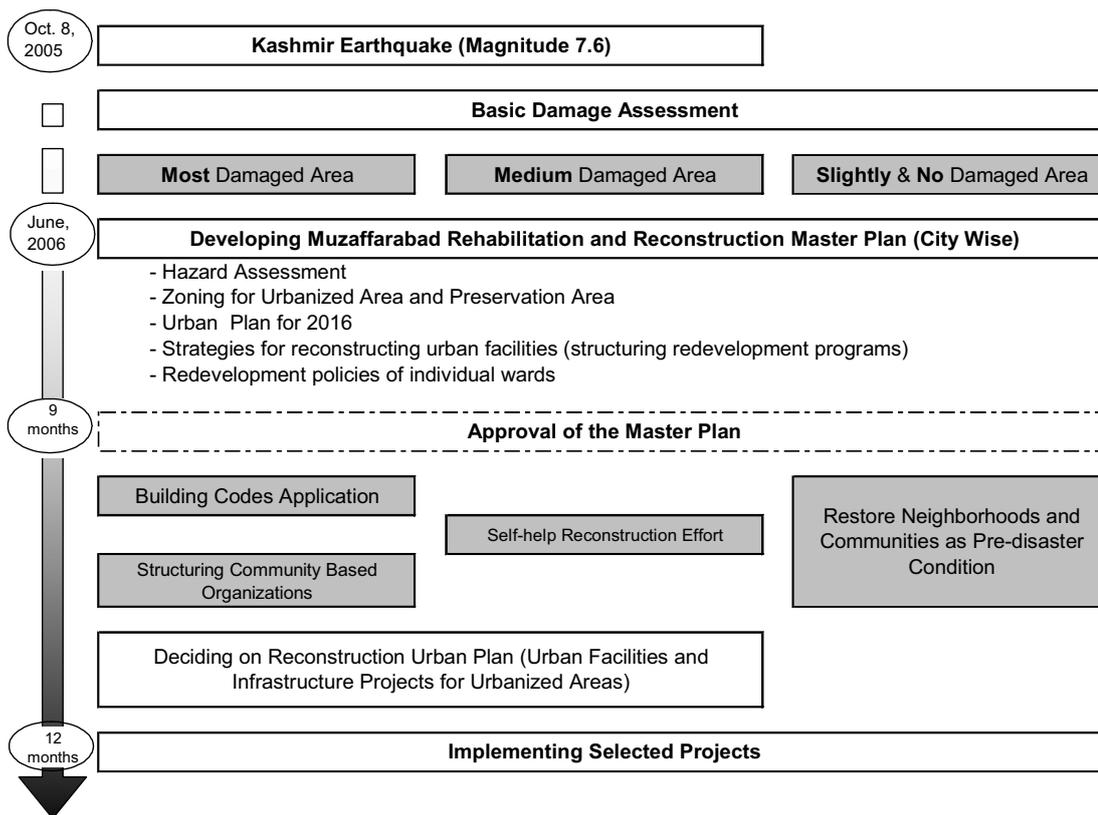
Wards 5, 6, 7, 8, 9, 11 and 18 belong to the category “moderately damaged area” and will therefore require partial remodeling. The government should formulate a detailed urban rehabilitation and reconstruction plan in those wards, which include areas with most to moderate damage. Special attention should be given to road widening and the areas in the upper bracket of this category.

Other wards, 1, 2, 3, 4, 19 and 20, would construct permanent urban areas, if there is no road widening plan. In those wards, urban block change will not be recommended.

## (2) Reconstruction Process

The rehabilitation and reconstruction of urban areas should be implemented based on the policy and guideline set forth in this study and the type of rehabilitation and reconstruction pattern should be determined (refer to Table 6.1.1). In order to implement the urban rehabilitation and reconstruction smoothly, the Study Team proposed to involve community organizations in the whole process, especially in whole remodeling of the urban area, which should start with formulating a transitional urban area before building a permanent urban structure.

The reconstruction process of Muzaffarabad is briefly depicted in Figure 6.1.2.



Source: JICA Study Team

**Figure 6.1.2 Urban Reconstruction Process of Muzaffarabad City**

**a. Basic Damage Assessment**

As for the process, first, institutions and organizations involved in recovery implemented a basic damage assessment of the entire city after the earthquake, aiming to identify the areas that fall under the four levels of damage, i.e. most damaged area, moderately damaged area, slightly damaged area and areas with no damage.

**b. Developing Muzaffarabad Rehabilitation and Reconstruction Master Plan**

By June 2006, the city of Muzaffarabad together with the Study Team had come up with a rehabilitation and reconstruction master plan, which is the major output of this study. In developing the master plan, hazard assessment, zoning for urbanized areas and preservation areas are first implemented to develop an urban plan for 2016. Further, strategies for reconstructing urban facilities and redevelopment policies of individual wards are developed.

**c. Application of Development Model**

As shown in Table 6.1.1, there are three development patterns of urban rehabilitation and reconstruction. The government should decide the development pattern by ward.

**d. Approval of the Master Plan**

The governments, which will start implementing the projects and activities included, will soon approve this master plan. Concomitantly, rules and regulations will have to be

adopted to begin the work of reconstructing a well planned Muzaffarabad with reinforced or earthquake resistance structures based on the damage assessment; the most damaged area will especially need to focus on strictly applying the standards set forth in building codes for new building constructions, and structuring community-based organizations, moderately damaged areas will put emphasis on self-help reconstruction efforts, and areas with slight and no damage will put focus on restoring neighborhoods and communities back to pre-disaster condition. These efforts will have to be sustained throughout the recovery process and further maintain resiliency to natural disasters that would occur in Muzaffarabad city.

#### e. Implementing Selected Projects

After jumpstarting the approved master plan, facilities and other infrastructure projects will also be selected and then be implemented one by one.

### (3) Rehabilitation and reconstruction policy framework

In order to understand the whole rehabilitation and reconstruction of the urban area, a detailed policy framework is crafted as shown in Table 6.1.2.

**Table 6.1.2 Urban Rehabilitation and Reconstruction Policy**

Title	Description	Remarks
Building damage distribution survey	Area-wise building damage distribution map is formulated based on survey results.	Study team has already carried out such survey.
Building damage survey	Each building damage survey will be carried out to determine degree of damage and level of compensation. The building can be divided into safe, needs retrofitting or repair, and unsafe.	AJK government is carrying out this survey.
Determination of urban reconstruction and rehabilitation plan	JICA Study is for this purpose.	By the end of August 2006 the JICA Study Team will submit the draft report.
Designation of building construction restriction area	JICA Study Team proposed that Wards 10, 12, 13, 14, 15, 16 and 17 would comprise the construction restriction area.	Those wards are located in old city and the south side of College road.
Determination of transitional urban area for rehabilitation and reconstruction	JICA Study proposes Ward 10, 12, 13, 14, 15, 16 and 17 will be such area.	Building damage is more than 80%.
Formulation of detailed urban rehabilitation and reconstruction plan	Following the JICA Study, the AJK government will carry out detailed urban plans. The plan includes urban area development schemes.	TOR is under preparation.
Implementation of rehabilitation and reconstruction projects	JICA Study Team included the project list in the Study.	Each implementation body should prepare a detailed plan.

Source: JICA Study Team

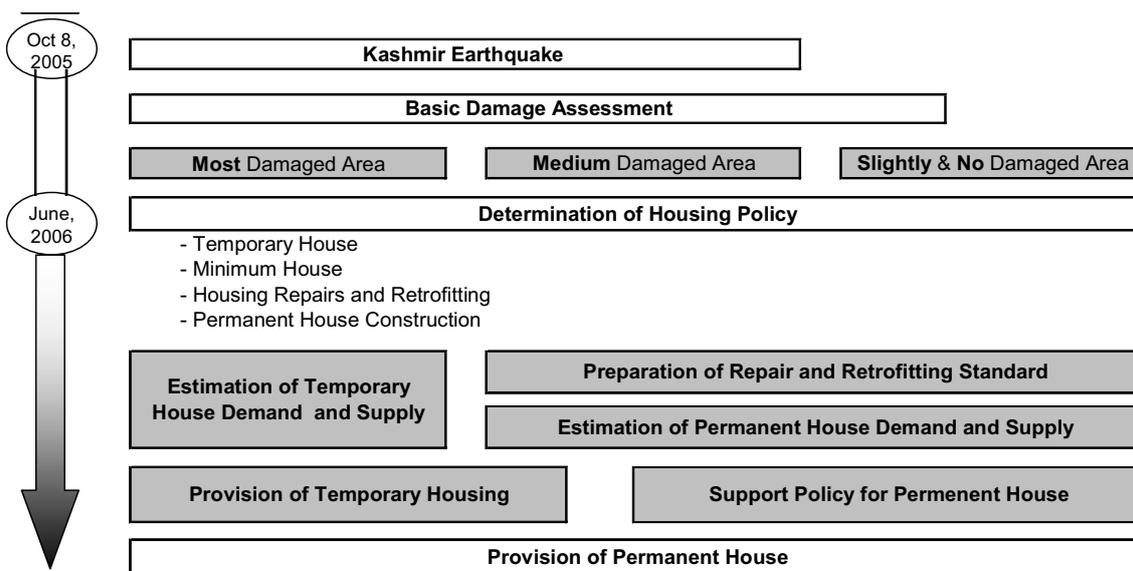
### 6.1.3. Provision of appropriate shelter and housing

The most important issue in rehabilitation and reconstruction after the earthquake area is shelter and housing because many buildings have been destroyed and damaged by the earthquake. The people have no appropriate place to live and are huddled in tents and damaged houses temporarily. The first priority should be given to provide appropriate shelter and housing. The Study Team proposes a two-step approach to solve shelter and housing problems: the first step is to move out from tents and damaged houses to temporary shelters, and the next step is from temporary shelters to permanent houses. This approach is the most effective and efficient method to solve the shelter and housing problems.

#### (1) Housing reconstruction process

Housing reconstruction will include provision of temporary shelter, technical support to self-reconstruction of housing and other government support. Housing construction should incorporate with urban reconstruction process.

The reconstruction process of housing is shown in Figure 6.1.3.



Source: JICA Study Team

Figure 6.1.3 Housing Reconstruction Process

#### a. Building damage survey results

As shown by the results of the building damage survey in previous section, the buildings can be categorized into safe, require retrofitting or repair, and unsafe. The results of the survey can be used for baseline data for housing sector policy formulation.

#### b. Determination of housing policy

The most urgent needs of the victims are the housing reconstruction. The government should address the housing policy, which includes temporary housing, building retrofitting

and repair guidelines, permanent housing rehabilitation and reconstruction guidelines and financial support mechanism. There are three major items in rehabilitation and reconstruction of housing: temporary housing, repair and retrofitting guideline and permanent housing construction.

Firstly, temporary shelter issues should address the following questions: understanding of temporary housing and its importance, type of temporary housing, place of the temporary housing, selection criteria for applicants and selection process determination. In order to evacuate from tents and damaged houses, temporary housing and shelter should be provided by the government support. The government should estimate the required number of temporary houses and shelters and determine the location for such houses. Public land is the first candidate for temporary housing and shelter.

In order to implement rehabilitation and reconstruction, some residents should relocate from their original place of residence. The people living in highly hazardous areas, such as landslide areas, should evacuate entirely. The implementation of the plan may require relocation of the people because of expansion of roads and remodeling of urban areas. Those people require a place to live in temporarily for two to three years.

The idea of putting up temporary housing has been often criticized because of such reasons as double investment, deterioration of urban environment and high cost. But these criticisms usually come from the government side, yet, from the victims' point of view, there are strong demands for an appropriate place to live in. In case of Japan, provision of temporary housing is a responsibility of the government in light of provision of minimum living conditions to the citizens. The decision to go for or against temporary housing, however, still rests with the Pakistani government. In any case, the preparation of housing policy is a matter of urgency.

Secondly, the existing building should be used as much as possible by doing repairs and applying retrofitting methods. However, in order to do this, there should already be in place standard retrofitting and repair methods, and self-help construction methods also can be applied by following guidelines issued by the government.

Fourthly, based on the damage of the building assessment, part of moderately and slightly damaged areas will construct permanent buildings and houses directly. The government support includes both financial and technical. The government should provide officially approved building construction manuals and methods.

## (2) Housing Rehabilitation and Reconstruction Policy Framework

The issue of housing sector is the degree of government involvement in temporary housing and permanent housing reconstruction. Once the government accepted the idea of temporary shelters, there are several policy alternatives to achieve the goal. The housing rehabilitation and reconstruction policy is shown in Figure 6.1.3 below.

**Table 6.1.3 Housing Policy Process y**

Title	Description	Remarks
Determination of housing damage	Same as building damage survey in pervious section.	Same as previous section.
Preparation of housing reconstruction plan	The government should prepare housing reconstruction plan in the damaged area.	AJK government or MDA may have a share of responsibility.
Determination of housing policy	The government should decide a housing rehabilitation and reconstruction policy	Includes temporary housing and permanent housing.
Estimation of temporary housing demand and supply	Based on the damage assessment survey, the total number of temporary houses will be estimated. It includes relocation and dislocation of the people.	The issue of temporary housing is not clear. The Study Team proposes having temporary housing for a few years until permanent construction.
Estimation of permanent housing demand and supply	Based on damage assessment survey, the total number of damaged houses should be estimated.	Based on damage survey results, it can be calculated
Implementation of repairs and retrofitting of the buildings	Based on the damage assessment survey, the category of the buildings for retrofitting should implement repair and retrofitting.	It should be the responsibility of each individual.
Provision of temporary housing	Temporary housing should be provided to the designated area. The government will select the families who will move in to the temporary housing.	Temporary houses should be located in public land and safe place.
Permanent housing provision plan	The policy selection of permanent housing reconstruction should be selected. The policy choice includes provision of financial support, direct assistance, provision of materials, etc.	The government should give the priority for housing construction.
Implementation of housing construction	Construction of housing should start soon.	-

Source: JICA Study Team

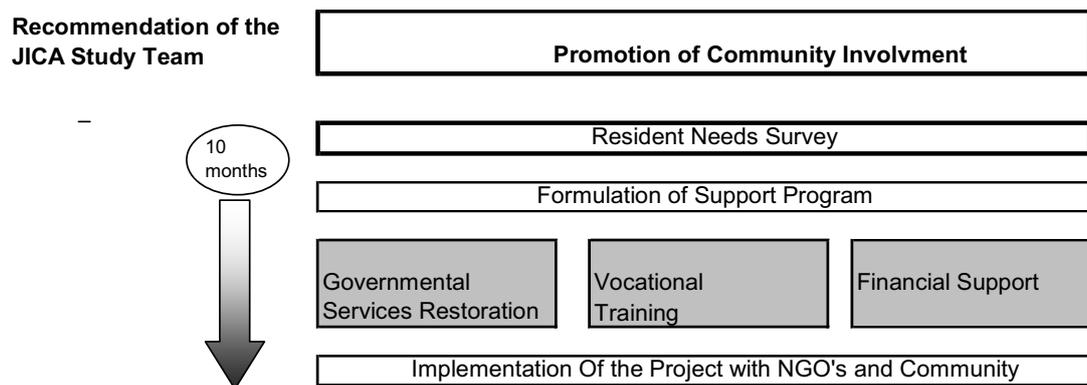
#### 6.1.4. Recovery of citizen's life to the normal situations

Since the earthquake struck, the people have been struggling to cope with the many disturbances in their life: in their living environment, the insufficient supply of government services, losing economic opportunities and the dispersed community solidarities. In order to address these issues, the physical measures, construction of a transitional urban area and permanent house, have already been mentioned in previous section. In this section, the focus is more on non-physical measures for rehabilitation issues.

##### (1) Recovery of citizen's life process

The recovery of one's life (in this case, the earthquake victims') back to normal situation can be categorized into four aspects: appropriate place to live, income generation opportunity, receive government services, and financial support from the government.

The recovery of the citizen's life can be formulated based on the needs assessment of the citizens. The process is shown in the figure below:



Source: JICA Study Team

**Figure 6.1.4 Recovery Process of Citizen's Normal Life**

##### a. Residents needs survey

The residents' needs could change the rehabilitation and reconstruction process going on. Eight months after the earthquake, requests from the residents continually vary. The government should identify needs and requirements from the residents appropriately.

##### b. Formulation of support programs for the residents

Based on the residents' needs survey, the government should formulate support programs for the residents. The support program will include many aspects of getting the people's life back to normal.

##### c. Restoration of government functions

The government's level of services is insufficient because many governmental buildings have been damaged and not functioning well. The government services affected include

health care, welfare, schools for children etc. The government function should be established in early stage in order to implement rehabilitation and reconstruction projects without delay.

**d. Provision of training**

Based on the number of people hired living in Ward 13, it seems that many would like to have vocational training to improve their economic situations. The type of vocational training may be determined by the request from the residents.

**(2) Getting back to normal life Policy Framework**

The involvement of the community in the rehabilitation and reconstruction process is one of the major recommendations of the Study. In order to implement rehabilitation and reconstruction programs, the involvement of community organizations is indispensable. The JICA Study Team has proved the CBO is a reliable organization for such purpose based on the experience of debris removal project in Ward 13. The detailed policy framework is shown in Figure 6.1.4 below.

**Table 6.1.4 Recovery of Life Policy Framework**

Title	Description	Remarks
Residents needs survey project	Residents’ needs should carry out needs assessment survey to the victims.	See previous section
Formulation of support programs to residents	Based on the residents’ needs assessment survey, the government should formulate programs for the residents, e.g., skills development.	The programs should cover the whole aspects of the support.
Plan for government service restoration	The government should provide services to the residents. It is important for the residents to receive such services.	The government function should recover to normal situation.
Provide technical and vocational training for the residents	In order to provide better employment opportunities, the government should provide training to the residents. The government should provide technical and vocational training for residents.	The Japanese NGO, JADE, provides training programs for women. It can be implemented in cooperation with the NGO.
Financial support program	The government should select financial support programs for housing retrofitting and reconstruction and promotion of economic activities.	The financial support program should be formulated.
Establishment of cooperation mechanism to NGOs	The restoration of livelihood can be worked closely with NGOs.	-

Source: JICA Study Team

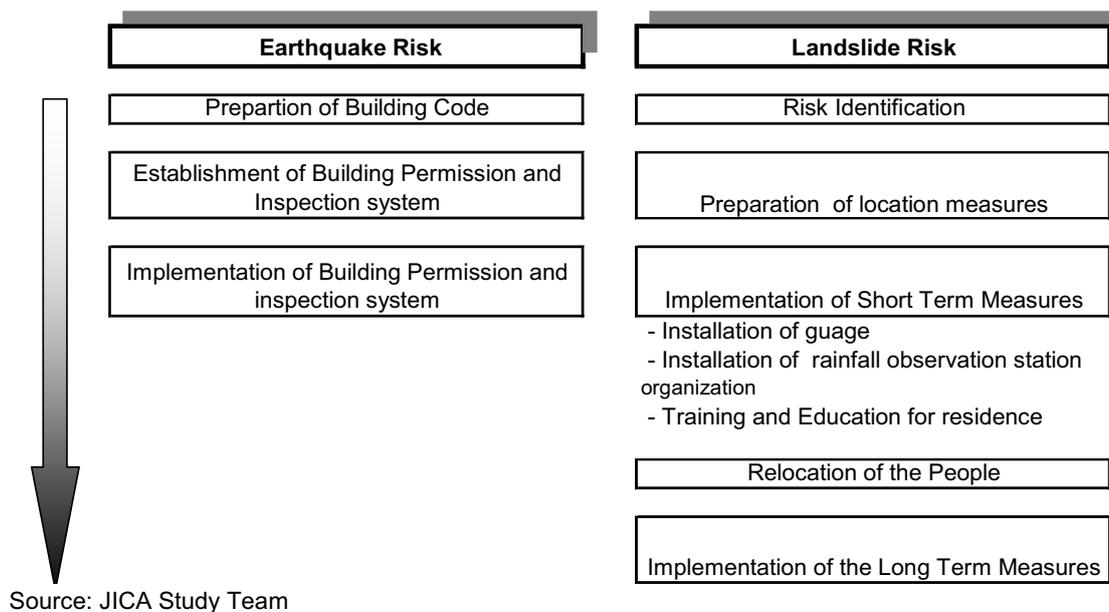
### 6.1.5. Reduction of natural hazard risk, especially earthquake and landslide

The risk of a natural hazard like landslide is still high in the study area. As the Study Team pointed out in March 2006, many landslides and debris flows have happened in the study area during this monsoon period. It is pointed out that the risk of landslide and debris flow will continue for the next ten years, at the least. The Study Team provides technical assistance for monitoring and warning system in Muzaffarabad. The primary target is technology transfer to Muzaffarabad governmental officials.

#### (1) Reduce natural hazard risk process

Two types of natural hazard risk are identified in the study area: earthquake and landslide. As for earthquake hazard, the countermeasure is construct building in accordance with the building code, that is under preparation by the Pakistani government. At the same time, building inspection and construction process should be established in Muzaffarabad.

The process is shown in the figure below:



**Figure 6.1.5 Reduction Process of Natural Hazard Risk**

#### a. Earthquake risk

In order to mitigate earthquake risk, the buildings should be constructed to withstand earthquakes. The first step in constructing an earthquake resistant structure is to prepare a building code that takes into account earthquake hazard. The building permission and inspection system should be established at the same time in the MDA. The buildings should be constructed properly in accordance with the defined earthquake risk.

**b. Landslide risk**

The recent incident of landslide and debris flow, which happened in Muzaffarabad, is evidence of the high risk involved. In order to mitigate landslide risk, the government should understand the risks and measures of the area. Relocation of people from the areas of high risk is a matter of urgency.

**(2) Policy Framework for natural hazard**

The policy framework for the reduction of the natural hazard is summarized as follows:

**Table 6.1.5 Reduction of Natural Hazard Policy**

Title	Description	Remarks
Preparation of building code, including earthquake design code	The government, through NEPAK, is preparing the earthquake design code in Pakistan by NEPAK. The code only regulates earthquake design and should cover the whole aspects of building construction.	The government has already taken action.
Establishment of building permission and inspection system	The system covers building code enforcement mechanism and building construction permission. Each process should identify the responsible organization for approval and confirmation.	The establishment of the system is a long and important process.
Identification of landslide risk in Muzaffarabad	Muzaffarabad is in immediate risk of landslide. Recent landslide and debris flow in this area are witness of the dangers.	The Study Team carried out landslide risk analysis in the study area.
Preparation of countermeasures for landslide	The countermeasures should include structural measures and non-structural measures and also short term and long term.	The Study Team prepared short-term and long-term measures.
Implementation of short-term measures	Many of short-term programs are non-structural measures; installation of gauge, rainfall observation station, establishment of disaster management unit in government, education and enlightenment for residents and preparation for evacuation place and route.	The Study Team carried out part of the short-term measures.
Relocation of residents in hazardous areas	The government should relocate the persons who live in danger areas, such as areas in the path of potential debris flow and landslide.	The Study Team has identified such people.
Implementation of short-term physical measures	Physical measures should implement in short-term. The government can do it by involving the local residents.	The local people should participate in the project.
Study for permanent measures	Several portions should be compared for permanent measures. It should include financial viability of the programs.	Study should clarify the cost of the project.
Implementation of long-term measures	The long-term measures are costly. The financial viability of the project should be studied carefully.	-

Source: JICA Study Team

### **6.1.6. Development of Muzaffarabad**

#### **a. Economic Development**

Economic activities include rehabilitation and reconstruction of commercial and industrial activities in the Muzaffarabad area. The government should provide assistance to the small and medium size industries for early operation of and restoration of shops and industry. In the case of Kobe in Japan, despite physical rehabilitation and reconstruction efforts by the people, the economic activities are still lower than that of before the earthquake. Many industries were relocated from Kobe to other urban areas and they did not come back to Kobe. Sluggish economic activities have long-term negative effects to the area.

#### **b. Tourist Development**

Muzaffarabad has already established the position of tourist base before the earthquake because of good scenery and natural resources. Muzaffarabad should develop the tourism sector by facilitating the development of modern attractive areas, easy access to tourism spots, provision of tourist facilities such as hotels, vehicles and shops. The Study aims at providing better urban infrastructure and facility, which will enhance tourism development.

### **6.2. Implementation Period**

The project should be implemented in three phases: rehabilitation period, initial reconstruction period and full-scale reconstruction period. Past experience in Japan shows that the intermediate phase takes considerable time, and it is expected to be three years in this study. The whole project implementation period is 11 years from year 2006. However, it may take longer if reconstruction works are delayed. The following shows the target and explanation of each phase:

**Table 6.2.1 Phased Development Scheme**

	Phase 1 Short Term (Rehabilitation Period)	Phase 2 Intermediate Term (Initial Reconstruction Period)	Phase 3 Long Term (Full-scale Reconstruction Period)
Duration	About 2 - 3 years	About 3 years	After the end of intermediate term to 2016
Target	Mainly urgent evacuation areas and refugees, and areas for temporary facility development.	The study area and residents in the area.	The study area and its surrounding area and the residents in the area.
Situation	After the earthquake, many buildings have been damaged or collapsed and many people have no place to live. Those who have no place to live have to evacuate to tents or public spaces.	From evacuation place, people move to temporary urban area to build temporary houses. The people start thinking about reconstruction of their future area and neighborhood.	Reconstruction of urban area and neighborhood starts full-scale.
Most Damaged and Moderately Damaged Area	<ul style="list-style-type: none"> <li>• Preparation of temporary life in temporary facilities</li> <li>• Preparation for starting tentative commercial and business activities at temporary facilities</li> <li>• Completion of temporary facilities development</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of moving to temporary facilities</li> <li>• Starting temporary life and commercial and business activities at temporary facilities</li> <li>• Preparation of ordinary activities at permanent facilities</li> <li>• Completion of permanent facility development</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of moving to permanent facilities</li> <li>• Starting of normal commercial and business activities</li> <li>• Urban development</li> </ul>

Source: JICA Study Team

Rehabilitation and reconstruction works should start soon after approval of the master plan. Rural areas have started reconstruction from this year, while the urban area takes time to start because of the problem of hazard analysis.

### **(1) Short Term (Rehabilitation Phase)**

In short-term, the target is to withdraw from evacuation situation and formulate a temporary urban area. In order to formulate temporary urban areas, it is recommended in this study to formulate resident organizations. The preparation work for the coming transition periods such as design of rehabilitation and reconstruction work has started. Permanent building construction will start, but at very limited part of slightly damaged areas.

### **(2) Intermediate Term (Initial Reconstruction Period)**

Main target of this phase is transition from temporary urban area to permanent urban area.

Damaged houses and buildings in the slightly damaged and moderately damaged area will start reconstruction. Many governmental buildings and infrastructure will start rehabilitation and reconstruction. Priority projects start in this period. Design work for the second priority project begins in this period as well.

**(3) Long Term (Full-scale Reconstruction Period)**

Full-scale reconstruction work begins in this period. Residents will start moving to permanent urban areas. Still many reconstruction works will not be finalized, but many parts of the city are under construction to achieve the target.

**6.3. Implementation Organization**

**(1) Basic Structure**

The implementation organization for the projects will be governmental organizations, NGOs, international donor organizations and community level organizations. The private sector, business and commercial community, and professional organizations, should be involved in the project implementation. However, the individuals who are not included in the long list will do the projects. In order to implement these projects, coordination mechanisms should be established within the AJK government.

**(2) Reconstruction Process and Responsibilities of the Institutions**

**a. Responsibilities of the Organizations in the Reconstruction Process**

With the notion of three assistantships in disaster management – self-help, mutual-help, and public assistance – individuals, communities, and governments are the main actors respectively, and have varied roles to play in the recovery scheme explained as Figure 6.1.2.

**Governments**

Governments, including newly structured organizations that are mainly responsible for coordination in recovery process as well as different level of governments will be responsible for developing, approving, implementing, and monitoring the master plan. Basic role of governments however varies; national governments have larger weights on diplomatic and financial coordination, regional governments are responsible for coordinating national and local, and local governments will play a practical role in the implementation of projects and activities included in the master plan. In line with reconstruction process of Muzaffarabad city, the master plan will need to be approved by the government of Pakistan, and depending on size of projects and activities individual governments will be responsible for implementation.

**Communities**

Communities are responsible for the activities that are planned in their neighborhoods. Debris removal supported by the Study Team was one good example of community activity. Such activities are recommended to develop within the neighborhood, and then continue within the area so that it will contribute to nurture the community bonds. This bond is anticipated to accelerate the recovery process. Area-wise, mutual-help aims to improve areas that are not owned by individuals, but located within the neighborhoods such as roads,

parks, and open spaces. In developing the mutual-help structure, communities are responsible for selecting members of the CBO, and after establishment, this organization will be the core for the communities. CBOs are responsible for keeping developing activities and motivations. As discussed earlier, CBOs are also in charge of managing and distributing funds by a transparent way, together with the activities that will be on going in the area.

### **Individuals**

Individuals are responsible for activities that can be controlled by them. Their fundamental role is to rehabilitate and reconstruct their buildings in a safe way, with guides provided by MCM or AJK after permission. Individuals are also responsible for putting effort in securing their own livelihood back close to normal, and thus, need to seek jobs or other opportunities that will benefit them continuously. Lastly, members of Muzaffarabad communities are accountable to actively participate in meetings to express their interests and possible contribution for the community to the CBOs.

### **(3) Implementation of the rehabilitation and reconstruction plan**

The implementation of the Study will take 10 years from 2006. The AJK government decided the main implementation body of rehabilitation and reconstruction is MDA. In order to monitoring and evaluation of rehabilitation and reconstruction process of the plan, it is recommended that the AJK government should establish “a rehabilitation and reconstruction system” within the government. The plan should be review and revise time to time to cope with rehabilitation and reconstruction progress.

## **6.4. Long List**

The long list prepared in this study includes all projects aiming to achieve the goal and objectives of the rehabilitation and reconstruction master plan. The projects and programs are identified to fill the gap between existing situations and future rehabilitation and reconstruction of Muzaffarabad city. Some of the items that could not be formulated projects will be mentioned in recommendations. The projects will be compiled by sector and show the implementation organization and time schedule. However, it can be changed when implementation organization modifies the time and scope of the project.

The long list prepared in this study should be shared with donor community for early preparation of the project implementation. Before implementing these projects, an environmental impact study should be carried out and countermeasures should be taken for negative environmental impacts.

The project long list is shown in the Appendices.

## 6.5. Urgent Project

The urgent project is defined as the project that will be implemented within this year and directly related to people's life and basic human needs. It includes the project that, in emergency response period, should be implemented. It should be pointed out that urgent project is formulated observation of the existing situations.

### (1) Provision of temporary shelter project

#### a. Background

This project intends to distribute temporary houses to the earthquake victims who live in tents and damaged houses. It is already passed 10 months after the earthquake but people are still living in tents. In this situation, victims will still be staying in tents in this winter. The victims desperately need to move out from these tents to temporary houses.

#### b. Project component

##### **Estimation of the temporary houses needed**

The survey done by the MCM in May 2006 showed that at least 10,000 households require temporary housing. The person who will evacuate from original place because of risk are residents and affected people of road widening etc, and is a candidate for the distribution of temporary shelter. The household will be a candidate of the provision of temporary shelter.

##### **Estimation of supply of temporary house**

The government should identify costs and financial resources.

##### **Selection of temporary house placement site**

The person who owned land builds the temporary house within the owned land. The other person will build in the public space. The government should select the candidate place for temporary houses.

##### **Applicants selection**

The government selects applicants among the persons who want the temporary house.

#### c. Time of implementation

The project has started and temporary house construction will start soon.

**(2) Debris flow countermeasures project**

**a. Background**

The Study team pointed out the potential hazard risk of landslide and debris flow in March 2006. Recent events of landslide and debris flow in Muzaffarabad have proved that the land related hazard potential is imminent in the city. It is pointed out that those kinds of hazard will continue at least ten years until recovery of stability of land. The Study Team proposed to have countermeasures based on the recent observations and situations in Muzaffarabad.

**b. Project components**

**Study on debris and mud flow risk map for Muzaffarabad city**

The study should identify the areas at risk of debris flow and mud flow and prepare a hazard map of them.

**Relocation of people living in areas of high risk**

The people living in areas of high risk should relocate from original place.

**Disaster education for officers and residents**

One of the targets of the project is capacity building of government officials who are working in the field of disaster management. Their knowledge of debris flows and mudslides is very limited; therefore, appropriate action cannot be taken. The other target is the people living in this area. Based on the results of previous study, information about the potential risk of debris flow and slides should be disseminated to the residents in the area.

**Monitoring of debris flow**

The Study Team has established a monitoring and warning system and a disaster management unit in the MCM. Those efforts will continue in the coming years.

**c. Time of Implementation**

The project will start from now and will continue for the next ten years.

## 6.6. Action Plan

Action Plan is selected from among the long list of projects so programs can be formulated that are composed by the project. Three criteria are set forth to evaluate projects: urgency, maturity and contribution of rehabilitation and reconstruction process. Moreover, several meetings and discussions were held with the AJK government officials to reflect their needs and requirements.

Action plans in this study are selected priority projects or activities for effective implementation of recovery and reconstruction of the city from the earthquake disaster. For the selection of action plans, three criteria are applied: “urgency,” “maturity or importance” and “effectiveness” in the process of recovery of urban functions and the citizen’s life back to normal condition. In addition, action plans contribute to reduction of the risk of recurrent natural disaster. As the results, the following nine combined projects were selected as priority programs as summarized in Table 6.6.1

Action plans will contribute four strategies, which are set forth by the Study. Each of strategy will contribute directly to achieve study vision and objectives.

The selected projects are shown below:

**Table 6.6.1 List of Action Plans**

Rehabilitation and Reconstruction Strategies	Code	Name
A. Provision of shelter and housing	A-1	Preparation of micro town planning and its implementation
	A-2	Development of transitional housing schemes and Its Implementation
	A-3	Development of financial assistance scheme for housing reconstruction
B. Recovery of urban function	B-1	Construction of the west bank by-pass road
	B-2	Development of satellite town
	B-3	Development of central park with the function of disaster management
	B-4	Recovery of Infrastructure and basic urban service facilities
C. Recovery of citizen's life	C-1	Reconstruction of shopping complex
	C-2	Reconstruction of government facilities
	C-3	Development of skill training center for a casualty of the earthquake
D. Reduction of recurrent natural hazard risk	D-1	Establishment of land use and building control measures
	D-2	Establishment of building Permission and Inspection System
	D-3	Construction of Debris and Mud Flow Risk Reduction Facilities

Note: The project code number does not mean the priority.

Source: JICA Study Team

**Table 6.6.2 Action Plan No. 1 (A-1)**

Project Title	Preparation of Micro Town Planning and Its Implementation
Background and Objectives	<p>The master plan study on rehabilitation and reconstruction in Muzaffarabad city provided a guideline and policy framework for recovery of the city and social life from the earthquake disaster. It also aimed to rebuild the city with strong urban structure to avoid recurrent natural disaster. For these purposes, the master plan proposed future land use plan as a policy framework. In order to move from policy to reality, detailed micro town planning should be prepared with a scale of 1 to 2,000 at each sub-district level. Without the micro town planning, actual rehabilitation and reconstruction cannot be realized.</p> <p>The micro town planning is an implementation plan to realize the concepts proposed in the master plan. It will cover the areas of urban promotion zones in effective and smooth implementation of recovery work. The micro town planning needs topographic survey, building damage survey, residents' opinion survey, detailed land use zoning plan, road alignment, building control measures, and rehabilitation and reconstruction program.</p>
Project Components	<p>[ST-1] Baseline Opinion Survey for the Residents  [UD-1] Preparation of Micro Town Planning for the sub-district of Old City  [UD-2] Preparation of Micro Town Planning for the sub-district of Chela Bandi.  [UD-3] Preparation of Micro Town Planning for the sub-districts of Jalalabad.  [UD-4] Preparation of Micro Town Planning for the sub-districts of Chatter and Ambore.  [UD-5] Preparation of Micro Town Planning for the sub-districts of Gojra and Naruchi.  [UD-7] Institutional Capacity Building in Urban Planning Sector</p>
Planning and Implementation Period	<p>The baseline opinion survey [ST-1] will be implemented for the residents in the city to understand their opinions regarding relocation, rehabilitation and reconstruction of their houses. The micro town planning should be prepared in the most damaged three sub-districts, Old City [UD-1], Chela Bandi [UD-2] and Jalalabad [UD-3]. The preparation of the micro town planning will take 3-6 months. Other sub-districts, Chatter &amp; Ambore [UD-4] and Gojra &amp; Naluchi [UD-5], will be prepared after 2009. Institutional Capacity Building in Urban Planning Sector [UD-7] will be conducted through the formulation of the micro town planning</p>
Implementation Agency	MCM, CDO, DAM
Implementation Issues	It should be prepared by local initiative and public participation in the planning process is a key in successful implementation of recovery work.
Project Effect	<p>Beneficiary: The residents in Muzaffarabad city. The preparation of micro town planning is an opportunity to strengthen planning and institutional capacity of AJK government.</p> <p>Economic and financial viability: not applicable</p> <p>Environmental impact: Natural and environmental study should be carried out during the design stage. It is recommended that relocation of residents from original wad to other place should be minimized, in order to avoid creating another negative social impact on the victims.</p>

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.3 Action Plan No. 2 (A-2)**

Project Title	Development of Transitional Housing Schemes and its Implementation
Background and Objectives	Transitional housing is a holistic and process-oriented approach aiming at effective reconstruction of urban area, including housing as well as restoration of community and social life. This scheme will provide temporary shelters and/or minimum housing for the people who lost their houses. The temporary shelter can be located in either public or private land and will be used for limited period, the next 3-5 years until permanent reconstruction work will be started. The minimum housing is a scheme to rebuild houses by the residents own efforts with a support from the government. These schemes will encourage public participation and consensus building in recovery and reconstruction of urban area.
Project Components	[UD-7] Formulation of Transitional Urban Area in Urban Remodeling Area  [UD-8] Construction of temporary housing and/or minimum housing in selected urban remodeling area
Planning and Implementation Period	6 months for the development of plans and consensus building among the stakeholders including residents, land owners and the government. 12 months for the construction.
Implementation Agency	AJK Government, MCM, CBOs
Implementation Issues	Local initiative and government support are the keys for successful implementation of the schemes. The government should determine the housing policy, which includes temporary shelter and permanent house construction. The implementation of the project will be community organization and local government. Involvement of the residents is a key.
Project Effect	Beneficiary: The residents who lost their houses by the earthquake  Economic and financial viability: not applicable  Environmental and social impact: Natural and environmental study should be carried out during the design stage. It is recommended that relocation of residents from original wad to other place should be minimized, in order to avoid creating another negative social impact on the victims.

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.4 Action Plan No.3 (A-3)**

Project Title	Development of Financial Assistance Scheme for Housing Reconstruction
Background and Objectives	A significant number of people in Muzaffarabad city had heavy damages in their houses and even completely lost their properties by the earthquake. Reconstruction of their houses is the most urgent and important task to recover the city and people's life from the disaster. Many people who have been forced to live in temporary tents since the earthquake are eager to return and start reconstruction of their houses as soon as possible. The idea of insurance and housing loan has not been common in AJK, and it should be developed with a support of GoP and international donor agencies.
Project Components	[UD-10] Housing Loan/Subsidy for Repair and Retrofitting of Damaged Building [UD-11] Housing of Loan/Subsidy for New Construction [UD-12] Housing Loan/Subsidy for Earthquake-resistance housing Construction [UD-13] Development of Housing insurance Scheme
Planning and Implementation Period	The development of housing loan and insurance schemes needs a support of public and private sectors. Public-private partnership will be essential to elaborate the schemes and it will take 3-5 years.
Implementation Agency	SERRA, ERRRA, AJK Government, Private Sector, International Donors
Project Effect	Beneficiary: The residents in Muzaffarabad city, especially the people who lost their houses.. Economic and financial viability: not applicable Environmental and social impact: Natural and environmental study should be carried out during the design stage. It is recommended that relocation of residents from original wad to other place should be minimized, in order to avoid creating another negative social impact on the victims.

Note: [ ] shows long list reference number.  
Source: JICA Study Team

**Table 6.6.5 Action Plan No.4 (B-1)**

Project Title	Construction of the West Bank Bypass Road Project
Back ground and Objectives	Major existing road in Muzaffarabad city is Neelum Valley road, which is congested during daytime and reaches the capacity of the road. It is expected to increase traffic volume when the rehabilitation and reconstruction work start in full scale. The project intends to provide additional capacity of through traffic, especially north and south and south and west directions. The project expects to enhance rehabilitation and reconstruction activities in the damaged area not only inside city but also outside of the city.
Project Component	Total length of bypass road: 5.0 km [T-101] Detailed design for Naluchi bridge [T-102] Construction of Naluchi bridge: L = 210 m [LS-6] Countermeasure for landslide section at Panjgran Area: L = 300 m [T-7] Preliminary design and detailed design for West Bank bypass road [T-8] Construction of West Bank bypass road
Construction period	18 months from the start of construction.
Implementation Agency	AJK Government, PWD
Implementation Issues	In widening section, several houses are relocated because of the expansion of the road. In new road section, several houses should be relocated. The social assessment will take time to get approval from the government.
Project Effect	Beneficiary: Beneficiary includes residents in Muzaffarabad as well as people living in the northern part of the study area. Economic and financial viability: Needs future study In order to evaluate economic and financial viability, the estimation should include the impact of enhancement of rehabilitation and reconstruction activities in Neelum Valley and Northern part of the AJK. Environmental consideration: Most of the road alignment uses existing road. Only 700 m section needs relocation of residents (about 50 houses) and a small-scale primary school, yet further detailed study is required.

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.6 Action Plan No. 5 (B-2)**

Project Title	Development of Satellite Town
Background and Objectives	<p>The master plan study identified that Muzaffarabad city does not have enough space for future urbanization within its administrative boundary. Thus, the development of new satellite town outside the municipality is one of the most important and urgent projects in the rehabilitation and reconstruction process. The potential site for new satellite town is the area near airport, about 3-5 km from Jalalabad. The area has more than 300 ha of agricultural or grass land with moderate slope and it is rather secure from potential natural hazard. The development of new satellite town will extend urban area to the east along the Jhelum River and encourage multi-core urban structure.</p> <p>The satellite town planning and development should include the following tasks: i) site selection study, ii) geographical and topographical survey, iii) hazard assessment, iv) preparation of layout plan, v) detailed design of infrastructure including water supply, electricity, sewage and drainage, solid waste management and roads, vi) land acquisition, vii) development phasing plan, viii) financial and investment plan, x) temporary shelter and relocation plan.</p>
Project Component	<p>The stage development scheme should be appraised for the development of the satellite town. 1<sup>st</sup> phase will be developed 100 ha of the land and next stage will be 100 ha. In design stage, required infrastructure should develop in the 1<sup>st</sup> stage. It should be noted that the construction of satellite town includes the provision of necessary infrastructure.</p> <p>[ST-2] Preliminary and detailed design of New Satellite Urban Zone (Airport Area)</p> <p>[ST-3] Construction of Satellite Town near Airport Area (Phase 1)</p> <p>[ST-4] Construction of Satellite Town near Airport Area (Phase 2)</p> <p>[T-25] Detailed design of Airport Road: L = 5.0 km</p> <p>[T-26] Construction of Airport Road: L = 5.0 km</p> <p>[T-107] Preliminary Design and detailed design of Maira Kalan Bridge: L = 100 m (for bridge)</p> <p>[T108] Construction of Maira Kalan Bridge: L = 100 m (for bridge)</p>
Construction Period	18 months
Implementation Agency	MDAs
Implementation issues	<p>The development area should be clearly marked by the government. Involvement of private sector is key to success. Stage construction scheme should be developed.</p>
Project Effect	<p>Beneficiary: The people in Muzaffarabad city.</p> <p>Economic and financial viability: Needs future study</p> <p>Environmental impact: Natural and social environmental study should be carried out during the design stage.</p>

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.7 Action Plan No. 6 (B-3)**

Project Title	Development of Central Park with the functions of disaster management
Background and Objectives	The proposed Central Park is a general park on city level, which is located in the central area of the old city in Muzaffarabad. The size is 3.1 ha. The old city area is a high-density area, and Central Park can be an evacuation space for the people in old city area. Therefore, it is proposed that Central Park should be established as a park which has functions against disaster. This park will function as a stronghold against disaster on city level at disaster time. In usual time, it will function not only as recreational space but also as a stronghold for education and training on disaster prevention.
Project Component	[PO-5] Basic Design and Detail Design of Central Park - Whole park and Open Space - Buildings in the park - Main Building for administration, headquarters, exhibition and education on disaster, toilets with tank for emergency, warehouse etc. [PO-6] Construction of Central Park - Open space with facilities such as pond, benches, lights - Buildings in the park (ditto)
Construction Period	24 months
Implementation Agency	MDA and AJK government
Implementation Issue	The facilitation of disaster function into the park development will be the first time in Pakistan.
Project Effect	Beneficiary: The people in Muzaffarabad city. Economic and financial viability: Needs future study Environmental impact: Natural and social environmental study should be carried out during the design stage.

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.8 Action Plan No. 7 (B-4)**

Project Title	Recovery of Infrastructure and Basic Urban Service Facilities
Background and Objectives	The earthquake caused heavy damage of basic urban service facilities, including road network, electricity, drainage, sewerage telephone, piped water supply. Although temporary reconstructions of these facilities were made during the emergency rehabilitation period, some facilities are not recovered and not made in full operation. Detailed damage survey should be conducted and reconstruction program should be formulated to recover the services. In addition, some facilities need expansion of the capacity to meet the demand of increased population in the future.
Project Components	[W-1] Rehabilitation of Distribution Tank and Transmission Pipe [W-2] Field Survey of Damaged Distribution Pipeline [W-3] Rehabilitation of Damaged Distribution Pipeline [W-4] Rehabilitation of Damaged Distribution Tank [S-104] Field Survey of Existing Sewerage Pipeline [S-105] Rehabilitation of Damaged Sewerage Pipeline [S-304] Rehabilitation of Existing Landfill Site [S-305] Master Plan Study for Solid Waste Management [E-401] Study for Electricity Supply System [E-402] Rehabilitation of Electricity Supply Facilities [G-501] Implementation of a Study for Natural Gas Supply System [G-502] Rehabilitation of Natural Gas Pipeline system
Planning and Implementation Period	The field surveys to identify damage will be needed at least 6-12 months in each component and the period of rehabilitation works will be varied depending on the level of damage. Presumably, a full-scale of recovery of basic urban service will take 3-5 years.
Implementation Agency	PWD, MCM, AJKED, AJK
Implementation Issues	The earthquake damages basic infrastructure and victims have spent inconvenient time. The government should take initiative to facilitate and construct the basic infrastructure. Design and construction of basic infrastructure in early stage.
Project Effect	Beneficiary: The people living in the entire region. Economic and financial viability: Needs future study Environmental impact: Natural and social environmental study should be carried out during the design stage.

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.9 Action Plan No. 8 (C-1)**

Project Title	Reconstruction of Shopping Complex
Background and Objectives	<p>Reconstruction of markets and shopping complex is one of the urgent tasks to restore normal life for the residents. Major commercial function was concentrated in Old City, especially along Neelum, Madina Market, Main Bazar and Khawaja Bazar Roads. These commercial areas received a heavy damage by the earthquake.</p> <p>Core commercial function should be recovered in Old City, but the previous linear-type of commercial facilities along the streets caused heavy traffic congestion due to narrow streets and lack of parking space. A new shopping complex should be a cluster-type rather than linear-type, seeking safe activities for shoppers and smooth traffic in major roads. The widening road and provision of parking space are essential in the new shopping complex.</p>
Project Components	<p>[T-43] Street expansion and its implementation</p> <p>[T-44] Planning and design of parking space in old city</p> <p>[PB-11] Rehabilitation of market</p> <p>[PB-12] Design of new shopping complex</p> <p>[PB-13] Construction of new shopping complex</p>
Planning and Implementation Period	The demarcation of widening streets [T-43] and the planning and design of parking space [T-44] should be provided through the formulation of micro town planning [A-1] and these activities will need at least three months. Design of new shopping complex will be implemented in 2008 and the construction will start from 2009.
Implementation Agency	AJK Government, Private sector
Implementation Issues	The government should prepare the plan for the shopping complex. During design period, the government should explain the resident and community organization for the implementation of the plan.
Project Effect	<p>Beneficiary: The residents in Muzaffarabad city to restore their normal life.</p> <p>Economic and financial viability: Needs future study</p> <p>Environmental impact: Natural and social environmental study should be carried out during the design stage.</p>

Note: [ ] shows long list reference number.  
Source: JICA Study Team

**Table 6.6.10 Action Plan No. 9 (C-2)**

Project Title	Reconstruction of government facilities
Background and Objectives	A significant amount of public facilities was damaged by the earthquake. The immediate focus in reconstruction is to recover the social life in the city. These facilities include schools, hospitals, community centers and government administration buildings. Their reconstructions should incorporate improvement of building standard to reduce their risk of future collapse or damage in the event of a subsequent disaster.
Project Components	[PB-1] Preparation of Inventory of Damages in Medical Service Facilities [PB-2] Rehabilitation and reconstruction of Medical Service Facilities [PB-3] Preparation of Inventory of Damages in Public Schools [PB-4] Rehabilitation and reconstruction of Public Schools [PB-15] Preparation of Inventory of Damages in Government Administration Facilities [PB-16] Rehabilitation and reconstruction of Government Administration facilities
Planning and Implementation Period	The rehabilitation and reconstruction of all components will take 5-10 years. Because of limitation of the fund, reconstruction schedule of the facilities will be needed with a balance of cost and demand.
Implementation Agency	MOH, MOE, AJK Government
Implementation issues	The government should take leading role in whole process of reconstruction. Priority should be given to the type of the building. Stage construction is needed. The financing the governmental building is key to success.
Project Effect	Beneficiary: The residents in Muzaffarabad city to restore their normal life. Economic and financial viability: Needs future study Environmental impact: Natural and social environmental study should be carried out during the design stage.

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.11 Action Plan No. 10 (C-3)**

Project Title	Establishment of Skills Training Center for a Causality of the earthquake
Background and Objectives	<p>It is proposed that, the project should be implemented by the CBO at the district level with the assistance of the PWD, MCM, Social Welfare department and Labor and Manpower Department.</p> <ul style="list-style-type: none"> <li>• Livelihood restoration for women and men through viable skills training in marketable trades will enable them to contribute in the reconstruction process and earn income.</li> <li>• Capacity building of men, women and youth will enhance the chances of project success in achieving pro-poor and gender-focused outcomes, and create sustainable capacity beyond the project cycle.</li> </ul>
Project Component	<p>There are two major components of the program</p> <ol style="list-style-type: none"> <li>1. Construction of skill training center:</li> <li>2. Preparation and implementation of the Training Program</li> </ol> <p>The program is composed of following activities</p> <ol style="list-style-type: none"> <li>1. Formation of CBOs</li> <li>2. CBO capacity building</li> <li>3. Formulation of Design for skills enhancement Programs</li> <li>4. Identification and hiring of training instructors [from the community]</li> <li>5. Preparation of training materials</li> <li>6. Market survey</li> <li>7. Purchase of tools and equipment</li> <li>8. Socio economic impact: Socio-economic study will be carried out at the planning and completion stage.</li> </ol> <p>[CR-3] Design of skills training center  [CR-4] Construction of the buildings of following centers:  - Computer Training Center  - Vocational Training Center for Women  - Technical Training Center for Boys  [CR-5] Preparation of Training Program</p>
Establishment Period	24 months
Implementation Agency	PWD and AJK Government Social Welfare Department, Labor and manpower Department CBO
Implementation Issues	<p>The program should be formulated by the governments, community and NGOs.</p> <p>The program should be matched with future labor demand.</p>
Project Effect	<p>Beneficiary: The people in the Muzaffarabad city.</p> <p>Economic and financial survey: Needs future study</p> <p>Socio economic impact: Socio-economic study should be carried out at the planning and completion stage.</p>

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.12 Action Plan No. 11 (D-1)**

Project Title	Establishment of Land Use and Building Control Measures
Background and Objectives	<p>Site conditions appear to have influenced the level and type of damages. Many buildings without earthquake resistance structure were totally corrupt and narrow streets in urban area caused difficulty of evacuation. Landslides occurred on steep slopes and the edge of the urban area. Many settlements in Chela Bandi, Old City and Jalalabad received significant impact from the earthquake.</p> <p>Based on hazard assessment, the master plan study proposed urban promotion zone and preservation zone as a guideline of the city's future development. Even in the urban promotion zone, the areas with potential fault lines need special land use and building control measures to reduce potential disaster risk.</p>
Project Components	[BH-8] Establishment of Land Use and Building Control Measures.
Planning and Implementation period	18 months including implementation of detailed building damage survey and land use surveys in the designated areas and formulation of land use and building control measures.
Implementation Agency	MCM, DAM
Implementation Issues	The government should establish land use control plan as well as building control measures. The enforcement of the those measures is a key to success. The government should established control measures together with plans.
Project Effect	<p>Beneficiary: The residents of Muzaffarabad city and the local government.</p> <p>Economic and financial viability: not applicable</p> <p>Socio economic impact: not applicable</p>

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.13 Action Plan No. 12 (D-2)**

Project Title	Establishment of Building Permission and Inspection System Project
Background and Objectives	The most effective manner to have earthquake-resistant buildings is to construct them in accordance with a building code enforced by the government. The government should establish a building code and, at the same time, establish the building code enforcement mechanism for design and construction. During the whole process of the building inspection, the government should confirm the appropriateness of the building design and construction. The standard design drawing should be prepared by the government to provide assistance to the building designers.
Project Component	[BH-2] Legislation of building code [BH-5] Establishment of building permission and inspection system [BH-3] Training of building engineers and building administration [BH-6] Preparation of standard drawing and technical manuals for earthquake-resistant buildings.
Establishment Period	36 months from the start of the project.
Implementation Agency	MDA and AJK Government
Implementation Issues	Strengthening the capacity of MDA is key to success. Building permission issues involve variety of issues, such as level of designer, standard drawing, level of skilled worker at site, etc.
Project Effect	Beneficiary: The people in Muzaffarabad city. Economic and financial viability: not applicable Environmental impact: Not applicable. The project is composed of capacity building and training.

Note: [ ] shows long list reference number.

Source: JICA Study Team

**Table 6.6.14 Action Plan No. 13 (D-3)**

Project Title	Construction of Debris and Mud Flow Risk Reduction Facilities Project
Background and Objectives	<p>In March 2006, the JICA Study Team pointed out the potential hazard of the landslide and debris flow in the study area. As a pilot project, the Study Team has installed the rainfall observation station and gauge for landslides at the potential hazard area. At the same time, the Study Team carried out education and evacuation drills at the target area to inform the residents about the hazard, and the evacuation sites and routes in case the need arises.</p> <p>The recent events observed in Muzaffarabad shows that the landslide and mudflow are quite active in the area. In order to be prepared cope with for this situation, the Study Team proposed to have the study target debris and mud flow because this problem is more imminent than other potential hazard in the next ten years, at the least.</p>
Project Component	<p>The government should provide information to the residents risk area and how to cope with the risks. The individual person should understand the how to act when the rain come to strong. The government system may not be work properly and individual should act based on own decision. Training and drill will indispensable for the community. The community should do the emergency countermeasures.</p> <p>[LS-1] Preparation of Study on debris and mud flow risk map for Muzaffarabad</p> <p>[LS-9] Monitoring and debris and mud flow risks hazards and establishing emergency evacuation system</p> <p>[LS-7] Disaster education for officials and residents</p> <p>[LS-10] Design of countermeasures for debris and mud flow for risk reduction</p> <p>[LS-11] Construction of debris and mud flow facilities for risk reduction</p>
Establishment Period	5 years from the start of the project
Implementation Agency	PWD and AJK Government
Implementation Issues	<p>The observation of mudflow is essential for future action.</p> <p>The project should implement in short time to prevent secondary disaster.</p>
Project Effect	<p>Beneficiary: The people in Muzaffarabad city.</p> <p>Economic and financial viability: Needs future study</p> <p>Environmental impact: Natural and social environmental study should be carried out during the design stage.</p>

Note: [ ] shows long list reference number.

Source: JICA Study Team



## **7. PUTTING LIFE BACK IN ORDER**

The quake that lasted for a very short time tipped people's lives into desperation. Many families lost part of their members, houses, money, and other assets; all of which are making people so difficult to put back lives into normal. Assets also include social capitals that are explained by neighborhood ties, social norms, and resource personnel in Muzaffarabad.

The process of recovery is long and difficult, and Muzaffarabad will also face similar situation to others. There are many lessons learned from the world-wide experiences that can be shared. In putting life back to normal in Muzaffarabad in least disorder, these lessons need to be comprehended fully.

### **7.1. Focal Issues in Rehabilitation Process**

Experiences in other earthquakes in urban areas have brought about four critical issues that primarily need to put effort for smooth recovery. These include: i) restoring livelihood of the affected people, ii) recovering places to live, iii) providing opportunity to generate incomes, and iv) preparing plans of regional reconstruction.

Restoring livelihood of the affected people aims at maintaining people's live as close to the pre-disaster period at minimum level. In this rationale, the affected area needs to consider about services related to health and health care system, welfare, education, and information in an integrated way. By so doing, residents of the affected area will have minimum securities on their livelihood.

Second, recovering places to live is critical for the affected. This process, however, is difficult to provide solely by the government and thus need positive participation of the affected residents through neighborhoods. Developing systems that support incentives of residents and providing special assistance for the residents in desperate condition, is the major role of government.

Third, creating jobs and providing such opportunities to the affected are essential in supporting the livelihood through the recovery process. Residents in Muzaffarabad, especially has large population of self-employed, and thus suffering to generate income. Without any opportunities in earning incomes, they cannot put their effort to self-help or mutual-help activities. Further, by being unable to restart their business without places and resources, their life will be a depressed, and be unable to cut the chain of deflation spiral. Government is responsible to provide, at least at minimum level, income or opportunities that trigger residents to stand up for recovery.

Last, as prepared in the master plan of this study, addressing a road map for regional reconstruction is important so that the living environment of the area will be close to the one of pre-disaster period. The plan in this Study thus addresses: the vision of recovery, policies on land use, policies on allocating urban facilities, and reconstruction of the urban areas – including transition urban areas.

## **7.2. Pros and Cons of Past Recovery Procedures from Earthquake**

Past experiences of recovery from earthquake disasters in urban areas addressed several problems that need to be highlighted. In some cases, government urged for rapid recovery which as a result led to large un-satisfaction of the residents. For example, temporary shelters provided by the government in Kobe earthquake did not pay too much attention at quality of life, and thus affected many evacuated psychologically, causing loneliness, feel of separation, and even deaths of the elderly. Moreover, top down procedures in the recovery process, such as an attempt to enforce newly crafted city redevelopment plan, was hardly accepted by the residents and further caused distrust and conflicts between the government and residents. Moreover, careless allocation of funds to the neighborhoods as well as provision of infrastructure by top-down approach increased gaps of recoveries between the affected areas.

On the other hand, other experiences show drastic improvement of the affected areas in comparison to the pre-disaster period. In cases where areas have improved, participation of residents were significant, with supportive assistantships of the public. For example, in an experience of Tottori Prefecture of October 2000, government quickly provided funds to the affected, for them to rehabilitate their residences. This provision withheld many residents to stay at their original neighborhoods that were ready to emigrate, and at the end succeeded in restoring and enhancing the neighborhoods' bonds. Providing incentives to the affected residents as well as promoting residents to participate in reconstruction activities of own areas were the ultimate factors for this success.

Although the reconstruction processes of the past experiences are very limited, examples suggest that participatory process of the affected residents is key components for proper recovery. Without paying attention to such social capitals, communities could be segmented and will face difficulties in participating to the decision making process or recovery activities, which will negatively function for an area's recovery at the end. Such notion is also important for the recovery process in Muzaffarabad.

### **7.3. Recommendations for Muzaffarabad**

This Study mainly discuss on regional reconstruction plans as for recovery and rehabilitation, which includes structure plan of the city – consisting urban function, road networks, urban infrastructures, open spaces, and restoration of buildings – of Muzaffarabad. Further, in the process of recovery, using method of transition urban area is recommended which is expected to nourish community and neighborhood bonds. Moreover, three concepts on i) restoring livelihood of the affected population, ii) providing opportunity to generate income, and iii) recovering places to live, are generally consulted. Proposed activities, such example as debris removal project, include all of these notions and involve residents in the recovery activities, and also give incentives by providing some incomes to them.

One of the most important and responsible role of government is to develop a system that will propel reconstruction activities at all levels, with emphasis at community level. If the government succeeds in providing incentives to the community members to participate in reconstruction activities, sustainability in recovery is easier to keep. If such structure is developed and the government is capable of continuously providing programs and actions to take for the neighborhoods, the road map of rehabilitation plan can be drawn in a step by step procedure.

On the other hand, the government needs to put effort in improving their capacities as well. Studies on responses to this earthquake incident clarified that the government could not respond in a sufficient manner. In line with this, government needs to begin putting effort in enhancing their emergency response capacities. The effort includes: developing emergency response plans of the government at all levels – local, Ward, and Provincial – including response structure, information dissemination, mutual assistantships, etc. It is Essential factor is to define and clarify the role and responsibilities of all governments by timeline. Additionally, these governments are responsible to hold periodical disaster drills so that there capacities in responding emergency will increase.

Lastly, governments are responsible for providing information on their activities as well as possible assistantships that are given to the residents. It also needs to be equally accessible by the residents for keeping reconstruction as uniform as possible. Such effort is expected to develop trust between the government and the affected in the community which will lead to smooth coordination. This will significantly increase the reconstruction process.



# ***APPENDICES***

# PROJECT LONG LIST

## Table A-1 Project Long List (1/5)

### Sector : Urban and Housing Reconstruction

No.	Action Plan	Project Name	Type of Project	Implementation Body	Implementation Schedule													
					Phase 1			Phase 2			Phase 3							
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016			
UD-1	A-1	Detailed Urban Plan for Block A	Study	CDO and DAM	■													
UD-2	A-1	Detailed Urban Plan for Block B	Study	CDO and DAM	■													
UD-3	A-1	Detailed Urban Plan for Block C	Study	CDO and DAM	■													
UD-4	A-1	Detailed Urban Plan for Block D	Study	CDO and DAM				■										
UD-5	A-1	Detailed Urban Plan for Block E	Study	CDO and DAM				■										
UD-6		Revision of Master Plan	Study	CDO and DAM					■	■							■	■
UD-7	A-1	Institutional Capacity Building in Urban Planning Sector	Capacity Building	CDO and DAM	■			■									■	■
UD-8	A-2	Formulation of Transitional urban Area in Urban remodeling Area	Study	MDA	■	■												
UD-9	A-2	Construction of temporary housing and/or minimum housing in selected urban remodeling area	Construction	MDA	■	■	■	■	■	■								
UD-10	A-3	Housing Loan/ Subsidiary for Repair and Retrofitting	Program	PWD	■	■	■	■	■	■								
UD-11	A-3	Housing Loan/ Subsidiary for Reconstruction of Housings	Program	PWD	■	■	■	■	■	■	■	■	■	■	■	■	■	■
UD-12	A-3	Housing Loan/ Subsidiary for Earthquake-resistant Housing Construction	Program	PWD	■	■	■	■	■	■	■	■	■	■	■	■	■	■
UD-13	A-3	Introduce housing Insurance Scheme	Program	PWD				■	■	■	■	■	■	■	■	■	■	■

### Sector: Transportation

No.	Action Plan	Project Name	Type of Project	Implementation Body	Implementation Schedule													
					Phase 1			Phase 2			Phase 3							
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016			
T-1		Detailed Design for Neelum Valley Road (North Boundary - Domel Bridge)	Design	CDO and PWD	■													
T-2		Construction for Neelum Valley Road (North Boundary - Domel Bridge)	Construction	PWD	■	■	■	■	■	■								
T-3		Detailed Design for Kohala - Muzaffarabad Road (Domel Bridge - South Boundary)	Design	CDO and PWD		■												
T-4		Construction for Neelum Valley Road (Domel Bridge - South Boundary)	Construction	PWD			■	■	■	■								
T-5		Detailed Design for Tariq Abad By-Pass Road	Design	CDO and PWD	■													
T-6		Construction for Tariq Abad By-Pass Road	Construction	DAM	■	■	■	■	■	■								
T-7	B-1	Detailed Design for West Bank By-Pass Road	Design	CDO and PWD	■													
T-8	B-1	Construction for West Bank By-Pass Road	Construction	PWD		■	■	■	■	■								
T-9		Detailed Design for Chela Bandi Bridge - Alama Iqbal Bridge Road	Design	CDO and PWD		■												
T-10		Construction for Chela Bandi Bridge - Alama Iqbal Bridge Road	Construction	PWD			■	■	■	■								
T-11		Detailed Design for Secondary & Tertiary Road in and around Medina Market	Design	DAM	■													
T-12		Construction for Secondary & Tertiary Road in and around Medina Market	Construction	DAM	■	■	■	■	■	■								
T-13		Detailed Design for College Road	Design	DAM		■												
T-14		Construction for College Road	Construction	DAM			■	■	■	■								
T-15		Detailed Design for Secondary & Tertiary Road in and around Upper & Lower Plate	Design	DAM		■												
T-16		Construction for Secondary & Tertiary Road in and around Upper & Lower Plate	Construction	DAM			■	■	■	■								
T-17		Detailed Design for New Katchery Road	Design	DAM	■													
T-18		Construction for New Katchery Road	Construction	DAM			■	■	■	■								
T-19		Detailed Design for Upper Adda Makri Road	Design	DAM				■										
T-20		Construction for Upper Adda Makri Road	Construction	DAM				■	■	■								
T-21		Detailed Design for Secretariat Road	Design	DAM				■										
T-22		Construction for Secretariat Road	Construction	DAM				■	■	■								

Note: The number in the left side column does not mean the priority.

Source: JICA Study Team

**Table A-2 Project Long List (2/5)**

No.	Action Plan	Project Name	Type of Project	Implementation Body	Implementation Schedule																	
					Phase 1			Phase 2			Phase 3											
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016							
T-23		Detailed Design for Secondary & Tertiary Road in Old Secretariat	Design	DAM																		
T-24		Construction for Secondary & Tertiary Road in Old Secretariat	Construction	DAM																		
T-25	<b>B-2</b>	Detailed Design for Airport Road	Design	CDO and PWD																		
T-26	<b>B-2</b>	Construction for Airport Road	Construction	PWD																		
T-27		Detailed Design for Maira Tanoulian Road	Design	CDO and PWD																		
T-28		Construction for Maira Tanoulian Road	Construction	DAM and PWD																		
T-29		Detailed Design for Secondary & Tertiary Road in Chela Bandi	Design	DAM																		
T-30		Construction for Secondary & Tertiary Road in Chela Bandi	Construction	CDO and PWD																		
T-31		Detailed Design for Alama Iqbal Bridge - Police Line Road	Design	CDO and PWD																		
T-32		Construction for Alama Iqbal Bridge - Police Line Road	Construction	PWD																		
T-33		Detailed Design for Secondary & Tertiary Road in Naluchi and Gojra	Design	DAM																		
T-34		Construction for Secondary & Tertiary Road in Naluchi and Gojra	Construction	DAM and PWD																		
T-35		Detailed Design for Secondary & Tertiary Road in and around Chattar	Design	CDO and PWD																		
T-36		Construction for Secondary & Tertiary Road in and around Chattar	Construction	PWD																		
T-37		Detailed Design for Secondary & Tertiary Road in and around Ambore	Design	CDO and PWD																		
T-38		Construction for Secondary & Tertiary Road in and around Ambore	Construction	PWD																		
T-39		Detailed Design for Jhelum Valley Road	Design	CDO and PWD																		
T-40		Construction for Jhelum Valley Road	Construction	PWD																		
T-41		Detailed Design for Muzaffarabad - Balakot Road	Design	CDO and PWD																		
T-42		Construction for Muzaffarabad - Balakot Road	Construction	PWD																		
T-43	<b>C-1</b>	Street expansion plans and its implementation	Design and Construction	CDO and PWD																		
T-44	<b>C-1</b>	Planning and design of parking space in old town	Study	CDO																		
T-101	<b>B-1</b>	Detailed Design for Naluchi Bridge	Design	CDO and PWD																		
T-102	<b>B-1</b>	Construction for Naluchi Bridge (steel)	Construction	PWD																		
T-103		Detailed Design for Jalalabad Bridge	Design	CDO and PWD																		
T-104		Construction for Jalalabad Bridge	Construction	PWD																		
T-105		Detailed Design for Makri Bridge	Design	CDO and PWD																		
T-106		Construction for Makri Bridge	Construction	PWD																		
T-107	<b>B-2</b>	Detailed Design for Maira Kalan Bridge (Near the AirPort) include Access Road	Design	CDO and PWD																		
T-108	<b>B-2</b>	Construction for Maira Kalan Bridge (Near the Airport) include Access Road	Construction	PWD																		
T-201		Construction of Bus Terminal at Chela Bandi	Construction	PWD																		
T-202		Construction of Bus Terminal at Ambore	Construction	PWD																		
T-203		Construction of Bus Terminal along Jehlum Valley Road	Construction	PWD																		
T-204		Construction of Parking Area at Old City	Construction	DAM																		
T-301		Development of city Bus System (Inner City Bus System)	Construction	PWD																		

Note: The number in the left side column does not mean the priority.

Source: JICA Study Team





Table A-5 Project Long List (5/5)

No.	Action Plan	Project Name	Type of Project	Implementation Body	Implementation Schedule												
					Phase 1			Phase 2			Phase 3						
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
PB-8		Relocation of AJK University to Chatter Klas	Construction	MOE													
PB-9		Residential Development at Chatter Klas	Design	MOE													
PB-10		Residential Development at Chatter Klas	Construction	MOE													
PB-11	C-1	Rehabilitation of Market	Construction	DAM													
PB-12	C-1	Development of Shopping Complex	Design	CDO and DAM													
PB-13	C-1	Development of Shopping Complex	Construction	DAM													
PB-14		Rehabilitation of Slaughter House	Construction	DAN													
PB-15	C-2	Preparation of Inventory on the Damage of Government Administration Facilities	Study	CDO													
PB-16	C-2	Rehabilitation and reconstruction of Government Administration facilities	Construction	DAM													

**Sector : Code and Regulation Building**

No.	Action Plan	Project Name	Type of Project	Implementation Body	Implementation Schedule												
					Phase 1			Phase 2			Phase 3						
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
BH-1		Building Damage Survey Training of Evaluation and Implementation of Damage Survey	Capacity Building	PWD and MCM													
BH-2	D-2	Legislation of Building code and Building Laws	Capacity Building	PWD and MCM													
BH-3	D-2	Training of Building Engineers and Building Administration Office	Capacity Building	PWD and DAM													
BH-4		Training of Skilled Workers for Construction	Capacity Building	PWD and DAM													
BH-5	D-2	Establishment of Building Permission and Inspection System	Capacity Building	PWD and DAM													
BH-6	D-2	Standard Drawings and Technical Manual for Earthquake-resistant Building	Capacity Building	PWD and DAM													
BH-7		Standard Drawings and Technical Manual for Rehabilitation of Damaged Building	Capacity Building	PWD and DAM													
BH-8	D-1	Establishment of Land Use Control Measures	Institutional Building	PWD and DAM													

**Sector : Landslides**

No.	Action Plan	Project Name	Type of Project	Implementation Body	Implementation Schedule												
					Phase 1			Phase 2			Phase 3						
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
LS-1	D-3	Study on Emergency Measures for Land Slide Protection at High Hazardous Areas (18 locations)	Study	PWD													
LS-2		Establishment of Monitoring and Warning System at Sunbal Nalla River	Construction	PWD													
LS-3		Establishment of Monitoring and Warning System at Manal Paian Nalla River	Construction	PWD													
LS-4		Capacity Building for Monitoring and warning System	Capacity Building	MCM													
LS-5	D-3	Study on Permanent Measures for Land Slide Protection	Study	PWD													
LS-6	B-1	Countermeasures for Landslide Sector at Pangran Area	Construction	MDA													
LS-7	D-3	Disaster Education for officres and Resident	Capacity Building	MCM													
LS-8		Study and Preparation of debris/mud flow risk map for Muzaffarabad	Study	GSP													
LS-9	D-3	Monitoring of debris/mud flow Hazards and Establishing emergency Evacuation System	Capacity Building	MCM and GSP													
LS-10	D-3	Design of Counter measures for Debris/mud Flow Risk Reduction	Study	MDA													
LS-11	D-3	Construction of Debris/mud flow Risk Reduction Facilities	Construction	MDA													

**Sector: Others**

No.	Action Plan	Project Name	Type of Project	Implementation Body	Implementation Schedule												
					Phase 1			Phase 2			Phase 3						
					2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
OT-1		Training of Doctor and Medical Experts	Capacity Building	MOH													
OT-2		Teacher Training for Disaster Mangment Education at school Level	Capacity Building	MOE													
OT-3		Preparation of Educational Material for Disaster Management	Study	MOE													

Note: The number in the left side column does not mean the priority.

Source: JICA Study Team

