ANNEX 10 – TRANSPORT SECTOR

A. Introduction

1. Roads provide the major means of transport to the affected areas and their reconstruction will be critical to the recovery and reconstruction effort. No damage has been reported to the offices of various roads agencies. The Civil Aviation Authority (CAA) reported minor damages to terminal buildings of the airports at Muzaffarabad and Rawalakot, but CAA is not covered in the assessment.

2. The road network in AJK includes 9,430 km of primary, secondary and local roads of which 4,020 km are paved, 420 km are fair-weather and 4,990 are local or unpaved roads. The Public Works Department (PWD) is responsible for the 4,440 km of paved and fair-weather roads and the Local Government and Rural Development Department (LGRDD) manages local roads. The road network in the three affected districts is 5,305 km of which 2,545 km is managed by PWD and 2,760 km is the responsibility of LGRD.

3. In NWFP, the road network consists of 9,100 km of provincial highways, secondary roads and rural roads. About 5,000 km of these roads are paved. The Frontier Highway Authority (FHA) is responsible for 2,100 km of provincial highways that connect all districts and provide links to the neighboring provinces. The remaining 7,000 km roads are managed by the local governments in the 24 districts. In the five affected districts, the road network is 6,658 km, of which 549 km of provincial highways are under FHA and the rest are with the districts. Three national highways serve as the primary corridor to the affected districts in NWFP. Managed by the National Highway Authority (NHA), the total length of these highways is 270 km.

4. The concerned provincial and local government agencies in both AJK and NWFP prepared preliminary estimates of the damage caused to the road infrastructure, while NHA prepared estimates of damage to national highways. The transport team consulted these agencies to understand the methodology employed for data collection and assessment of the damage and cost estimates. Field observations included visits to the affected areas in AJK and NWFP. The team met with officials of the responsible government agencies, other stakeholders, and earthquake affected persons who have been relocated to tented villages. To validate the damage assessment provided by the government agencies, a combination of rapid field assessments, stakeholder interviews, and desk reviews were conducted in all affected Districts.

B. Damage Overview and Recovery Needs

5. Due to the mountainous terrain in AJK and northern areas of NWFP, access to population centers is by roads carved along mountainsides. The earthquake damage to these roads was primarily caused by landslides. Five types of damages was observed: (i) major landslides causing loss of an entire section of the mountain slope and the road traversing through it; (ii) minor landslides depositing a large amount of debris on the road while the mountainside is unstable; (iii) flow of debris including large boulders on the road; (iv) severe cracking in the road due to embankment failure and upheaval of earth; and (v) unstable mountainside slopes that may lead to potential landslides. Lack of maintenance and extreme weather conditions will accelerate the deterioration of the damaged roads. Overall damage is estimated at Rs. 20.165 billion (US$339.5 million).

6. Bridges were also affected by the earthquake, but the damage was not extensive. Of particular mention is the Balakot Bridge where severe damage was observed in the reinforced concrete

superstructure and the abutments. Some other smaller concrete bridges, culverts, and suspension bridges on rural roads were also damaged.

7. In the three affected districts of AJK, it is estimated that about 2,366 km roads were damaged. Of this 203 km are major roads, 761 km are other paved roads, and 182 km are unpaved roads for a total of 1,146 km representing 45% of the total PWD-managed roads. The Neelam Valley road and, to a lesser extent, the Jehlum Valley road were severely damaged. Both roads are the primary transport arteries in AJK. Another 1,220 km of local unpaved roads developed with community participation and managed by LGRD are damaged. This represents 44% of the total LGRD roads in the affected districts. The assessed damage in AJK is estimated as Rs. 9,190 million.

Table 1: Summary of Road Damage in AJK

Agency		**PWD**			**LGRD**	**Total**
Type of Road		**Major**	**High**	**Low**	**Low**	
Muzaffarabad	Total Length (km)	156	748	323	978	2,205
	Damaged Length (km)	83	396	171	587	1,237
	Damage Costs (PRs Million)	668	2,522	484	956	4,630
Poonch	Total Length (km)	167	523	12	983	1,685
	Damaged Length (km)	65	204	5	393	667
	Damage Costs (PRs Million)	423	1,224	11	590	2,247
Bagh	Total Length (km)	154	446	16	799	1,415
	Damaged Length (km)	55	161	6	240	461
	Damage Costs (PRs Million)	638	1,172	23	479	2,312
Total	Total Length (km)	477	1,717	351	2,760	5,305
	Damaged Length (km)	203	761	182	1,220	2,366
	Damage Costs (PRs Million)	1,729	4,918	517	2,026	9,190

PWD: Public Works Department, LGRD: Local Government & Rural Development Department.

Major: Main highways, High: Paved roads, Low: Earthen/shingled roads.

8. In NWFP, about 2,063 km roads were damaged representing 31% of the total road network in the five affected districts. Of this, 652 km are provincial highways that are managed by FHA, 1016 km are other paved provincial roads managed by the districts, 367 km are unpaved districts roads, and 27 km urban roads that are managed by municipal agencies. Estimates of the assessed damage in NWFP are to the tune of Rs. 7,494 million.

9. The three national highways damaged by the earthquake include Mansehra – Pattan (N35), Mansehra – Naran (N15), and Kohala – Muzaffarabad (N75). The damaged length is about 194 km representing 72% of the total length. Estimates of assessed damage to the national highways[1] are Rs. 3,481.

[1] The World Bank is financing reconstruction of the national highways through additional financing to its ongoing Highway Rehabilitation Project.

Table 2: Summary of Road Damage in NWFP

Agency		FHA		W&S/DC		MC		Total
Type of Road		Provincial Highways	Secondary Roads	Access Roads		Urban Roads		
		High	High	High	Low	High	Low	
Abbottabad	Total Length (km)	58	230	560	949	123	21	1,940
	Damaged Length (km)	5	29	255	0	15	3	306
	Damage Costs (Rs. mill.)	43	186	511	0	76	5	821
Battagram	Total Length (km)	103	108	88	54	0	0	354
	Damaged Length (km)	43	99	88	54	0	0	284
	Damage Costs (Rs. mill.)	366	645	260	68	0	0	1,338
Kohistan	Total Length (km)	27	127	161	317	0	0	632
	Damaged Length (km)	6	40	142	208	0	0	396
	Damage Costs (.Rs. mill.)	51	261	419	260	0	0	991
Mansehra	Total Length (km)	253	347	333	2,229	29	21	3,212
	Damaged Length (km)	31	298	333	0	5	4	671
	Damage Costs (Rs. mill.)	264	1,943	638	0	27	8	2,878
Shangla	Total Length (km)	107	93	213	105	0	0	519
	Damaged Length (km)	44	58	198	105	0	0	405
	Damage Costs (Rs. mill.)	374	376	584	131	0	0	1,465
Total	Total Length (km)	549	905	1,356	3,549	152	42	6,658
	Damaged Length (km)	129	523	1,016	367	21	6	2,063
	Damage Costs (Rs. mill.)	**1,097**	**3,411**	**2,412**	**459**	**103**	**13**	**7,494**

FHA: Frontier Highway Authority, W&S: Workd and Services Department, DC: District Council, MC: Municipal Committee.

High: Paved roads, Low: Earthen/shingle roads.

Table 3: Summary of Damage to National Highways

	N35: Mansehra - Pattan	N15: Mansehra – Naran	N75: Kohala – Muzaffarabad	Total
Total Length (km)	141	93	40	274
Damaged Length (km)	80	98	16	194
Damage Costs (Rs. mill.)	1,080	2,191	210	3,481

C. Reconstruction and Recovery Strategy

Approach

10. Short term recovery efforts are classified into actions that are immediately required, and those needed in the short term. In view of the oncoming winter and snowfall in the region that will worsen the condition of the blocked roads, the priority should be to clear landslide debris from the roads and provide access to remote areas. This effort has been largely confined to the national highways and some major provincial roads. The responsible government agencies at the Provincial and District levels should mobilize their own equipment and that available from the private sector contractors for clearing debris.

11. Restoration of access on roads where bridges are damaged or the roads have been swept away due to landslide requires immediate actions. Bailey bridges and other similar support structures are needed to provide temporary access.

12. Stabilization of road embankments to ensure that the snow will not cause further damage is equally important. The work involves restoration of retaining walls and drainage structures to ensure that damaged sections withstand the winter.

13. There is need for a comprehensive survey of the damaged roads. Under short term measures, the responsible government agencies should mobilize staff supplemented by consultants, if needed, to undertake this task. Satellite imaging can also be used for remote and inaccessible areas. The road condition data collected will enable the Government to plan and prioritize the reconstruction works. The criteria used for prioritization may include primary road corridors opening access to affected Districts, roads that provide access to a large section of population, and bridges. The reconstruction contracts should include provision that the contractor to give priority to local communities in engagement of skilled/unskilled laborers. While planning and design can be done in the short term, construction will be part of the medium to long-term effort.

14. For local unpaved roads there are considerable opportunities to employ local communities to reconstruct the damaged sections using appropriate labor-based methods. This will also supplement local contractors' capacity. On other rural roads or road embankment works, cash-for-work or food-for-work type approaches can be adopted. Hence, as part of short term efforts, it is important that local and rural roads are identified early on and communities or individuals employed to work on reconstruction or even clearance of landslide debris, and the process for their engagement is initiated.

Critical Issues

15. Implementation will be the key to the reconstruction and recovery effort. Careful planning and realistic scheduling will assist in monitoring progress and ensuring achievement of objectives within the specified timeframes.

16. Ensuring transparency of procurement processes will be critical to achieve the recovery objectives. Hence established procurement procedures should be closely followed. However, there is also a need to simplify procedures and review timeframes of various steps of the procurement process to ensure that procurement does not become a bottleneck.

17. Capacities of the government agencies responsible for recovery and reconstruction need to be reviewed. In some cases, inadequate capacity of these agencies will be exacerbated due to demand for initiating major reconstruction works in short time frames. For the national highways, NHA has the staff resources and experience to undertake reconstruction works. In AJK, the capacity of PWD is limited and has been severely constrained after the earthquake. It may be possible that for major roads NHA can supplement PWD's capacity. LGRD capacity may also need to be augmented. In NWFP, FHA is fully capable to manage reconstruction of the provincial highways. However, the districts' capacity will need to be significantly improved.

18. Timely implementation is directly dependent on capacity of ***domestic consultants*** to undertake engineering design and ***local contractors*** to complete construction within the contract period. Past experience has shown significant delays in implementation, particularly in civil works. It may be important to undertake a focused capacity building effort for the contracting industry. Use of international consultants and contractors may also be considered.

19. Reconstruction activities will place heavy demands on availability of key construction materials, particularly bricks, cement, steel (reinforcing bars and rolled sections), bitumen, etc. The Government will need to carefully monitor prices and take timely and appropriate policy actions to ensure price stability. Large increases in prices will not only adversely impact availability, but will also delay the reconstruction process and constrain available financial resources. Consideration could be given to import, on a limited basis, materials where capacity for local production is limited.

20. To ensure that the road infrastructure restoration/reconstruction effort meets specified quality requirements, a third party technical quality audit could be part of the infrastructure reconstruction program. The audit firm will be responsible for checking quality of all type of reconstruction works ranging from unpaved local roads to the national highways. Likewise, there is a need to review the design standards for roads and bridges to ensure that seismic provisions are adequately reflected, appropriate technology is utilized, and that safety provisions are included in the reconstructed roads.

Short term Recovery (up to 18 months)

21. Immediate actions are as follows:

- Removal of landslide debris and opening the roads to traffic.
- Restoration of roads and bridges.
- Stabilization of road embankment to withstand the oncoming snow.
- Comprehensive condition surveys of all damaged roads to plan and prioritize the reconstruction and recovery works.
- Initiate reconstruction of unpaved local roads using labor-based appropriate technology methods employing communities and individuals to create livelihood opportunities.

Short term activities include:

- Planning and engineering design.
- Bidding of the priority damaged paved roads.
- Mobilization for construction.

A total of Rs. 5,125 million (US$86 million) will be needed for this phase. Details are given in the table below.

Medium to Long term Recovery (18 months to 5 years)

22. In the medium to long term timeframe, the recovery efforts will include continuation of bidding for the remaining damaged paved roads, supervision and monitoring of the ongoing reconstruction works, and stabilization of the roadside slopes damaged by landslides and potential landslide areas. The estimated cost of this phase is Rs. 19,574 million (US$330 million). Details are given in Table 4 below.

Table 4: Summary of Recovery Costs
(in million)

	Short-term		Medium to Long-term		Total	
	Rs.	**US$**	**Rs.**	**US$**	**Rs.**	**US$**
AJK	2,194	37	9,181	155	11,375	192
NWFP	1,529	26	7,707	130	9,236	155
National Highways	1,402	24	2,686	45	4,088	69
Total	**5,125**	**86**	**19,574**	**330**	**24,699**	**416**

D. Environmental and Social Aspects

23. Since the recovery works involve reconstruction of existing roads, the environmental impacts will be limited. The most environment-sensitive activity will be disposal of landslide materials. Careful planning will be needed for reuse of the material for reconstruction and proper disposal.

24. Resettlement will be minimal and will be confined to road damage where the original road cannot be reconstructed and requires partial realignment.