1. Country and Sector Background

Anhui Province, with about 65 million people, is one of the most populous and densest provinces of China. Its density—of about 460 persons per km$^2$—is more than three times the national average. The province is crossed by the Yangtze River and Huai River, and is adjacent to six provinces. Compared to its more successful neighbors to the east and north—Zhejiang, Jiangsu, and Shandong—Anhui has lagged markedly behind in socio-economic development, with a GDP per capita around one third the average level of those three provinces and two years in reduced life expectancy (73 vis-à-vis 75 years). Compared to those to the west and south—Hubei, Henan, and Jiangxi—Anhui has more similar—though slightly lower—socio-economic indicators. Within Anhui, there is great regional disparity, with most of the wealth concentrated in industrial regions close to the Yangtze River.$^1$

Anhui’s geographic location—right to the west of Shanghai and Hangzhou metropolitan areas—makes the province a natural crossing area for the interchange of industrial products and technology between the more developed coastal provinces and those less prosperous to the center and west. In line with the Central Government’s initiative of “Rise of Central China” which is

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$^1$ Agricultural activities in Anhui vary according to the climate zones that the province crosses. North of the Huai He river wheat and sweet potatoes are grown, while south of that river it is rice and wheat instead. Natural resources of Anhui also include iron in Ma’an Shan, coal in Huainan, and copper in Tongling. There are industries related to these natural resources (e.g., steel industry at Ma’an Shan). One of the famous Anhui-based corporations is the automobile company Chery which is based in Wuhu.
part of the Eleventh Five-Year Program (EFYP), defined as crucial for a coordinated and harmonized development between eastern, central and western areas, the Anhui Government has elaborated its own strategy of “Development to the East”, with an aim at expediting the incorporation of the various regions of Anhui to the comparatively more affluent regions of the Yangtze Delta, including those poorer areas (in the north and south of Anhui). Transport is one of the priorities in that development strategy.

Although the existing highway network of Anhui Province (of about 71,000 km) represents a sizable network in terms of kilometers per inhabitant, the average service level is limited due to the relatively low technical standards. Compared to the six surrounding provinces, the density of the network (km per population) is above the average, while the percentage of paved roads (as a proxy for the quality of the infrastructure) is the lowest. This results in likely shortcomings of the existing highway network in meeting future transport demand. Other major issues of current highway network include: (a) connections on the east-forward corridors consisting of lower-class type of roads; (b) poor quality of pavement and weak resistance against disaster, and (c) unbalanced distribution of network across the regions in Anhui Province. The Government of Anhui has then advanced a program for upgrading and reconstructing existing national and provincial trunk highway network—the so-called “515 Engineering Program”—to enhance the level of service and traffic capacity, while minimizing the needs for land acquisition. This program—which is part of the national EFYP—involves several concurrent actions that build upon the progress made in the last few years, with highway and waterway investments for about US$13 billion, as follows:

- Expansion of the expressway network to the Yangtze Delta and to regional central cities in the Province, reaching a total length of 3,500 km (from about 1,500 km completed at the end of 2005), realizing the goals of (a) three-hour travel from east to west and six-hour from north to south in the Province; (b) round trip on the same day from provincial-governed cities to Hefei; and (c) expressways accessible to 90% counties (cities) and one-hour trip to nearby expressway for all counties.
- Enhanced connections of this expressway network to the national and provincial trunk highway network, constituting a mutually supporting layout, which could provide a more effective infrastructure for the economic development of the province. The “515 Engineering Program” includes the rehabilitation and improvement of about 5,700 km of national and provincial trunk highways, with about US$1.25 billion allocated to improving road geometries, structural strength, and pavement roughness. This program seeks to enhance the level of service of the existing road infrastructure under the direct responsibility of the provincial communications department while reducing the encroachment into scarce land resources.

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3 During “the tenth five-year plan” period, Anhui Province increased investment and accelerated construction to realize rapid growth of transport infrastructure scale, substantially forming a comprehensive transport system framed by trunk railways, expressways, main navigation waterways and important airports.
• A rural roads program to support the expansion of the network towards ensuring village access to the provincial network by 2010.4
• Improvements to inland waterways to achieve 5,600 km of total mileage in inland navigation and 280 million-ton capacity of harbors.

In parallel to that investment program, highway maintenance in the Province requires to be strengthened, with enhanced methodologies and tools for the programming of preventive and periodic maintenance activities and improvements to the implementation of those activities. In Anhui, road condition is ranked using four levels of rating system, i.e., excellent, good, bad and very bad, and each level is determined on the basis of five attributes or road asset components.5 Based on such a ranking system and measurements that are often carried out visually, statistics would show that about 80% of the road network in Anhui is in good or excellent condition. This assessment however appears optimistic and has to be adjusted to take into account the particularities of each factor and the higher importance of the pavement condition as key element when measuring overall road condition; also the fact that Anhui Provincial Communications Department’s (APCD) current plan is to improve/rehabilitate about 5,700 km of national/provincial roads seems to suggest that more than half of the national/provincial network is in less than fair condition. Based on the above considerations, an estimate of the condition of the national and provincial network would indicate that only up to 46% are in good and fair conditions. Enhanced measurement and a cutting-edge management system—which would improve from the older version of the Chinese Pavement Management System (CPMS) with limited analytical capabilities—would allow better assessment of road conditions and optimal programming of maintenance activities.

In addition, currently, maintenance activities are carried out through the so-called maintenance stations composed of APCD own-administration (force-account) labor. This mechanism appears to have room for improvement, particularly through the establishment of incentive-based contractual relationships. The APCD is aware of the importance of maintenance and seeks to establish improved road management and maintenance approaches, alongside those currently being implemented for the control of overloading, more efficient toll collection mechanisms, and a wide-ranging road safety program. The proposed project seeks to contribute to these efforts.

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4 As part of that strategy, the Provincial Government also intends to speed up investments for enhancing the condition of rural roads. The construction program of “bitumen (cement) road accessible to every village” has been started in 2006. By 2010, it is expected to form a rural road network which connects with national and provincial trunk highways, complies with rural socio-economic development, and meets living and production demands of rural populations. Investment on rural roads is expected to reach US$2.25 billion, through support to the (re)construction and improvement of about 60,000 km of rural roads and realizing the goal of 80% of administrative villages having access to a paved road.

5 The five attributes are: (a) pavement condition; (b) roadbed and sub-grade condition; (c) bridge and culvert condition; (d) safety facilities along the road; and (e) landscaping. Each of these attributes is assigned a weighting factor in the overall assessment.
2. Objectives

The project aims to increase the effective use of the road infrastructure in the Anhui Province to support its social and economic development, as evidenced by the increase in the flows of passenger and freight traffic along key corridors across the province at lower costs and with improved safety. The objective would be achieved through priority interventions to improve the condition of the roads across the province, pilot more efficient initiatives for road maintenance, and enhancements to the programming and management capacity of APCD, towards optimizing the use of resources for the upkeep of road assets.

The assessment of the achievement of the project development objective will be carried out through the measurement of the following outcome indicators: reduction in average freight rates along a representative sample of key provincial and national road corridors, and reduction in travel times on the rehabilitated or improved roads. The results of the project will also be measured by another set of intermediate outcome indicators such as (a) increased traffic volumes on the corridors to be upgraded or rehabilitated; (b) reduction in accident rates; (c) percentage of APCD budget allocated to maintenance and rehabilitation; (d) application of alternative mechanisms for road maintenance and recycling approaches for road rehabilitation; (e) progress in the implementation of enhanced programming tools for the allocation of resources for the preservation of road assets; and (f) APCD’s enhanced knowledge and application of road management approaches through specialized training and study tours. The proposed set of results indicators is included in Annex 3.

The interventions being considered under the project are in line with the Bank’s FY06-10 Country Partnership Strategy (CPS) with China particularly under the second pillar where the upgrading of transport infrastructure, while improving network management and traffic safety, is singled out as an element for poverty reduction, inequality, and social exclusion. Enhancing the linkages of the inland provinces to the dynamic coast is seen as a critical step to widen the benefits of accessibility to the larger population and, particularly, to its poorer segments. Ultimately, those interventions should help improve the productivity in Anhui Province, enhance its competitiveness, and increase the inter- and intra-provincial trade, which will consequentially foster the development of Anhui and the provinces to the west.

In this respect, the project seeks to contribute to the higher goals of (a) improving living conditions across the province—particularly in the areas where poverty rates are higher—by enhancing the transport accessibility to economic opportunities and social services, and (b) stimulating higher economic growth in the Anhui Province by reducing transport costs within the province and between Anhui and, particularly, the neighboring provinces of Jiangsu and Zhejiang, to the east of Anhui.

3. Rationale for Bank Involvement

The Government of China has requested the World Bank to support the implementation of the rehabilitation and improvement of provincial/national trunk highways within Anhui Province and attain the full benefits of an efficient transport network by fostering its integration of villages
and towns within the Province and of those networks with its neighboring provinces. The Anhui Provincial Government has further expressed its desire to secure a World Bank loan to complement APCD’s own resources in support of the “515 Engineering Program.” As a result of the previous two highway operations in Anhui Province, APCD wishes to continue with the value added cooperation through the Bank’s support in financing projects that require broad strategic approaches and benefit from the exchange of international experiences and institutional strengthening mechanisms. The Bank is technically and financially in a good position to contribute to the incorporation of up-to-date approaches and tools for strengthening APCD’s capacity in managing the national and provincial road networks in Anhui.

4. Description

Building upon the investments and activities accomplished under the previous two World Bank projects in the province and in the context of strengthening the current overall framework for the management and upkeep of road assets in the Anhui Province, the project will include the following components.6

Component A. Road Rehabilitation
[estimated cost US$217.61 million – 46.5% of the total project cost – of which US$95.81 million will be financed by the Bank Loan]

This component will support the provincial rehabilitation and maintenance program from 2007-2010 under the EFYP. The Bank contribution will help finance eligible investments under the rehabilitation component of the program. A list of 18 segments to be rehabilitated, for about 890 km, has been evaluated and found acceptable in the context of the province-wide program of the road network rehabilitation. Activities under this component consist of improving pavement conditions of the roads by resurfacing, specific structural strengthening, and limited adjustments to the alignment when required to improve safety. This component includes the pertinent supervision activities of the rehabilitation works to be undertaken by local supervision firms.

In the event that any resettlement might be required under this component, a resettlement action framework has been prepared. Similarly, simplified environmental impact assessments and standardized environmental specifications have been prepared for their application in the rehabilitation works (as part of the environmental documentation for the project).

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6 The project costs for each component include physical and price contingencies and the percentages are calculated from a total project cost of US$460 million. A front-end-fee of 0.25% has been included temporarily in the calculations although currently the World Bank Board of Directors has waived the fee during the current fiscal year (FY07) and until further decisions are made on this matter. Since the project is an FY08 project, conservatively, the front-end-fee prevalent in FY06 has been included, and it will be adjusted or eliminated as necessary at the time of negotiations.
Component B. Road Improvement
[estimated cost US$244.43 million – 52.2% of the total project cost – of which US$102.34 million will be financed by the Bank Loan]

Improvement or upgrading of about 320 km of key provincial and national roads located on the central-eastern and southeastern areas of the Province. These improvements or upgrades would include in some cases the duplication of existing roads following the same alignment with specific bypasses in built-up areas (in order to minimize resettlement actions) or with short segments of new alignments if necessary to avoid difficult topographical conditions. In two cases (roads S311 and S322), this component will include the construction of a limited number of kilometers to increase the transport capacity of the existing corridor or complete missing segments. In addition, for road S322, this component includes the relevant complementary elements to make the road an eco-friendly road. The supervision of the works under this component will be undertaken by local supervision firms and financed with local funds.

This component is the only one that will require resettlement. It will also include the implementation of the relevant environmental management plans. The cost of the actions to take into account the safeguards requirements are included in the estimated cost reported above.

Component C. Pilot on Road Maintenance by Contract
[estimated cost US$1.87 million – 0.4% of the total project cost – of which US$0.80 million will be financed by the Bank Loan]

Under this component, APCD will implement maintenance by contract approach in at least two highway segments of the provincial highway network for a cumulative number of 120 kilometers by the end of the project. The maintenance activities will be limited to routine or periodic interventions within the existing road pavement width. The final design of this component will be supported by a technical assistance, as further described below, that will help APCD with additional knowledge and analytical elements for exploring the alternative maintenance mechanisms as well as for the preparation and implementation of the selected contractual schemes. The supervision will be carried out by local firms supported by the previously mentioned technical assistance.

Component D. Institutional Strengthening Program
[estimated cost US$4.09 million – 0.9% of the total project cost – of which US$1.05 million will be financed by the Bank Loan]

This component includes the provision of improved tools for road management (technical, environmental, and economic) and a training program, as follows:

- a study on technological options for the recycling of pavement materials when a pavement needs to be rehabilitated;
- the technical assistance for the pilot on maintenance by contract to provide the knowledge and analytical elements for exploring alternative mechanisms for contracting of maintenance activities as well as for the preparation, implementation, supervision, and assessment of the preferred contractual scheme under the pilot;
- the preparation of standardized environmental specifications;
• support to APCD’s Anhui Highway Administration Bureau (AHAB) in implementing the new enhanced version of the CPMS, to be financed with local funds;
• the analysis of socio-economic impacts of key roads to be improved under the project, towards establishing an enhanced knowledge base of the impacts of road investments on the livelihoods of the population living within the area of influence of the roads targeted for improvement, through the incorporation of specific surveys and data collection at the time of undertaking the resettlement completion reporting effort; and
• a training program building upon those activities previously carried out under the Second Anhui Highway Project, for staff not only of APCD but also of city and county highway bureaus, and focusing on: (a) overseas training in road management (in conjunction with the activity in support to AHAB in implementing the new CPMS); (b) overseas training on improved technologies for the use of recycled pavement materials (in conjunction with the study on technological options for the recycling of these materials); (c) road safety, (d) project management, (e) environmental supervision of road construction, (f) environmental design of scenic/ecological routes, (g) right-of-way management, (h) highway planning and design, (i) highway information systems management; and (j) training to communities along the S322 road to be upgraded under the project on road safety and on starting up or developing productive activities to help them realize the benefits of improved accessibility across the corridor.

5. Financing

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<td><strong>Total</strong></td>
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6. Implementation

**Partnership arrangements**

Though project preparation has been carried out with the leadership of the APCD (and the technical support of its AHAB), it has also been coordinated with a broader spectrum of agencies involved in the road sector in Anhui, including the Anhui Provincial Finance Department, and the Provincial Development and Reform Commission. This coordination will be maintained during project implementation through the exchange of views with these other provincial agencies in the context of the supervision of project implementation.

**Institutional and implementation arrangements**

The APCD (through the AHAB), with the support of the Project Executing Office (PEO) that is currently supporting the implementation of the ongoing Second Anhui Highway Project, will carry out the execution of the project. The proposed project will be the third World Bank financed transport project in the Anhui Province and under the responsibility of the APCD.

The PEO was established in 1997 within the APCD under the first Anhui Highway Project (1999-2005) and has been satisfactorily conducting day-to-day management of the
previous two Bank financed projects in Anhui. As a government organization, PEO has been authorized to implement the project. The APCD has agreed to retain the PEO over the implementation period of the proposed new project, with staff composition and skills acceptable to the Bank. APCD will remain ultimately responsible for the monitoring of the execution of the project and ultimately responsible for its satisfactory implementation.

Sub-Project Construction Management Offices (Sub-PCMOs) will be set up in each city where project investments are expected to take place, for management and supervision of the project civil works (both rehabilitation and improvement). These sub-PCMOs will be specially set up for management of the World Bank project but will draw from staff of the cities’ highway bureaus. These bureaus are affiliated to the AHAB (though staffing issues need to be agreed upon with the city public authorities). They will be in charge of construction management, and APCD (through AHAB) will monitor their activities to ensure compliance with World Bank fiduciary and safeguards requirements and those included in the legal agreements. The specific duties of each sub-PCMO will depend on the characteristics of the road section within their jurisdiction and, where needed, they will count with the support of the relevant specialists. They will report directly to the AHAB and the central PEO.

The APCD, through the PEO, and with support from the Project Construction Management Office of AHAB, will be responsible for the procurement of the civil works under the project. The maintenance pilot and technical assistance components of the project will be directly under the responsibility of the PEO. A project management manual has been prepared and adopted by April 30, 2007, clarifying the responsibilities and reporting requirements among the PEO, PCMO, and Sub-PCMOs, in respect of the procurement and supervision activities of the physical components of the project.

7. Sustainability

The proposed project represents the first of the recent highway projects in China without a major tolled expressway as part of its components. The less-complex physical characteristics of the investments reduce the engineering risks and provide a higher probability of ensuring high quality construction standards and completion of schedule. Supervision efforts will also be less onerous—hence the use of domestic consultants to perform this activity.

The long-term sustainability of the road assets, however, will depend on the design of a comprehensive maintenance strategy and program as well as the effective and timely implementation of the programmed maintenance activities. Support is provided under the project to improve both the collection of data to measure the condition of road assets and the mechanisms used to incorporate the data into the revamped APCD management systems—through the implementation of a new (enhanced) CPMS. The goal of these improvements is the enhancement of the knowledge base in order to improve the maintenance planning decisions. Similarly the pilot on maintenance by contract seeks to instill more efficient maintenance practices towards an enhanced sustainability of the road investments.

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7 There are 17 cities (and prefectures) in Anhui Province. The project activities are located in 12 of those cities.
Road maintenance budgets in Anhui are planned for an average 8% annual increase during the next five year plan. However, an analysis carried during project preparation has shown that the budget growth needs to be higher if maintenance and rehabilitation requirements based on the actual road network condition are to be met towards improving the overall condition and serviceability of the network. In fact, during 2006, the first year of the EFYP, has seen a substantial increased to the amounts allocated to maintenance and rehabilitation, from 45% to 57% of AHAB resources, with an increase of about 34% in the amount allocated per kilometer of (national and provincial) highway. On the basis of a preliminary analysis of network needs, the increase in the percentage of AHAB resources would need to be upped slightly more (by another 4% points) and sustained to ensure a steady good condition of the road network. In this respect, a loan covenant requiring annual reviews of APCD’s road maintenance budget and plan has been agreed upon. The goal of the review will be to assess the appropriateness of the allocation of resources between network development and preservation.

Nonetheless, the fundamental problem lies not so much on the overall funding (as shown by the fiscal capacity assessment in Annex 8 which concluded with a sound rating for the province), but rather on the need for a more rational and scientific approach to road network management and maintenance. Hence the project focus is on providing APCD with the proper tools to better assess the linkages between actual network condition and budget allocation requirements. Another loan covenant relates to the timetable of actions for the installation of the enhanced CPMS and the gradual improved analysis and forecast of road preservation needs (further supporting the assessment of the budget allocation to be reviewed annually as explained in the previous paragraph).

The types of roads to be improved or rehabilitated under the proposed project, with only a few tolled (and with tolls set at low levels given that they are at or below Class II), must be framed in a different dynamic in terms of the ultimate financial or fiscal sustainability of the investments compared to expressway investments with a secure (at least partially) stream of toll income. The analysis of the overall fiscal framework at the provincial level (Annex 8) and the implications for the road sector exhibit a robust overall financial framework within the foreseeable future. This provides a positive outlook for the sustainability of the investments granted, as indicated in the previous paragraph, key strengthening actions are implemented in APCD’s road management approaches and systems.

8. Lessons Learned from Past Operations in the Country/Sector

The proposed project departs from previous Bank highway projects in China with its exclusive focus on the rehabilitation and maintenance of the existing road network. Its design builds on lessons learned from similar projects in other countries as well as from the implementation of the previous two transport projects in Anhui Province. The resulting lessons assimilated for project design are summarized below:

- **Refocusing the sector agenda.** During project identification and preparation the dialogue has emphasized the exchange of views on road asset management issues, seeking to refocus the provincial strategies from one with a large prominence on road construction to one that stresses management of roads assets and the serviceability of the network.
• **Gradual approach to shift in sector focus.** Changes in the overall sector approach need to be built gradually as capacity and financing conditions constrain what can realistically be achieved in the short term in terms of addressing maintenance and rehabilitation needs. Attention must then be given to key cost effective and appropriate solutions and to pilot initiatives that can create the demonstration effects that will encourage building upon those initiatives towards more encompassing shifts in sector approaches.

• **The definition and design of the institutional strengthening subcomponents** build upon the studies and subsequent actions carried forward under previous World Bank projects (see box below). By focusing on those critical activities that complement previous actions and in addition have a potential to create a demonstration effect and further enhance key capacities of the APCD in managing highway assets (and in providing technical leadership to county and local highway entities), the scope of these subcomponents seeks also to ensure a strong ownership and commitment of APCD in carrying out the studies on time and with the expected application of their results. Given the progress in streamlining road safety investments and (currently) addressing truck overloading, the new project refocuses on strengthening other road management skills, with an emphasis on maintenance programming, technologies, and contractual mechanisms.

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**Institutional strengthening activities in previous World Bank projects**

The project has been built on the previous efforts by the Bank and other international lending institutes to strengthen Anhui’s capacities in design, planning, highway operation, road management, and road safety. Particularly, under the ongoing World Bank Second Anhui Highway Project, the Bank supported the APCD in:

(a) appropriate measures and policies to mitigate the overloading problem; (b) carrying out road safety interventions (safety audits and black spot improvements); and (c) technical assistance on highway maintenance, organization and management systems. During the preparation and implementation of this project, exchange of views and experiences took place on topics such as highway design standards improvement, construction quality, and road safety.

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• **Treatment of project contingencies.** The first Anhui project was finished with about 15% of the loan funds un-disbursed, hence loan allocations for contingencies require a different treatment than other used funds to avoid provincial entities to pay commitment fees on large amounts of funds that remain largely unused until greater certainty is reached in the estimation of the final costs of the various components of the project.

9. **Safeguard Policies (including public consultation)**

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10. List of Factual Technical Documents

- Feasibility Study for the Anhui Highway Rehabilitation and Improvement Project, June 2006.

11. Contact point

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* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas