CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

RJSeal™ Application
Baotou-HuShi Expressway,
Inner Mongolia,
Peoples Republic of China

May 2005

TS^2 Consulting Inc.
Lamma, Hong Kong

CROWN CAPITAL ENTERPRISE LIMITED

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RJSeal™ Application
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Application of RJSeal^{T}
Baotou-HuShi Expressway, Inner Mongolia
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1.0 INTRODUCTION

Crown Capital Enterprise Limited of Hong Kong entered into an arrangement in September 2004 with the ShuangChen Highway Maintenance Department, which is responsible for the maintenance of the Baotou-HuShi Expressway in proximity to the city of HuShi. This arrangement calls for the analysis of the performance of RJSeal^{TM}, a sealer/rejuvenator for asphalt pavement on Baotou-HuShi Expressway; near the city of HuShi, some 160 km's west of Hohhot, the Capital City of Inner Mongolia.

Inner Mongolia is situated in the upper northeastern portion of China bordering Outer Mongolia. The capital city of Inner Mongolia is Hohhot with a population of approximately 2.1 million. The population is composed of forty-nine nationalities which include the Mongolian, Han, Hui, Manchu, Korean, Daur, Ewenki, and Oroqen peoples.

Inner Mongolia has a climate that is typical of an intermediate-temperate zone. The weather is characterized by the scantiness of rainfall as well as drastic changes of temperature. The temperature varies greatly between day and night. July is the hottest month of summer and the temperature varies between 15 Celsius and 27 Celsius. The coldest month is January in the winter where the weather ranges from -10 Celsius to -32 Celsius. See figure 1.0 for a map showing the location of Inner Mongolia, and Hohhot.

The predominant feature of the topography is the extensive grasslands, as well as outwash and moraines from the last glacial period. The asphalt concrete in the area is manufactured from locally sourced aggregate materials, which are comprised of crushed and screened sandstone and diorites hauled in from quarries elsewhere in Inner Mongolia, as well as washed gravels from the various rivers. The bitumen binder is probably sourced from refineries located outside China.

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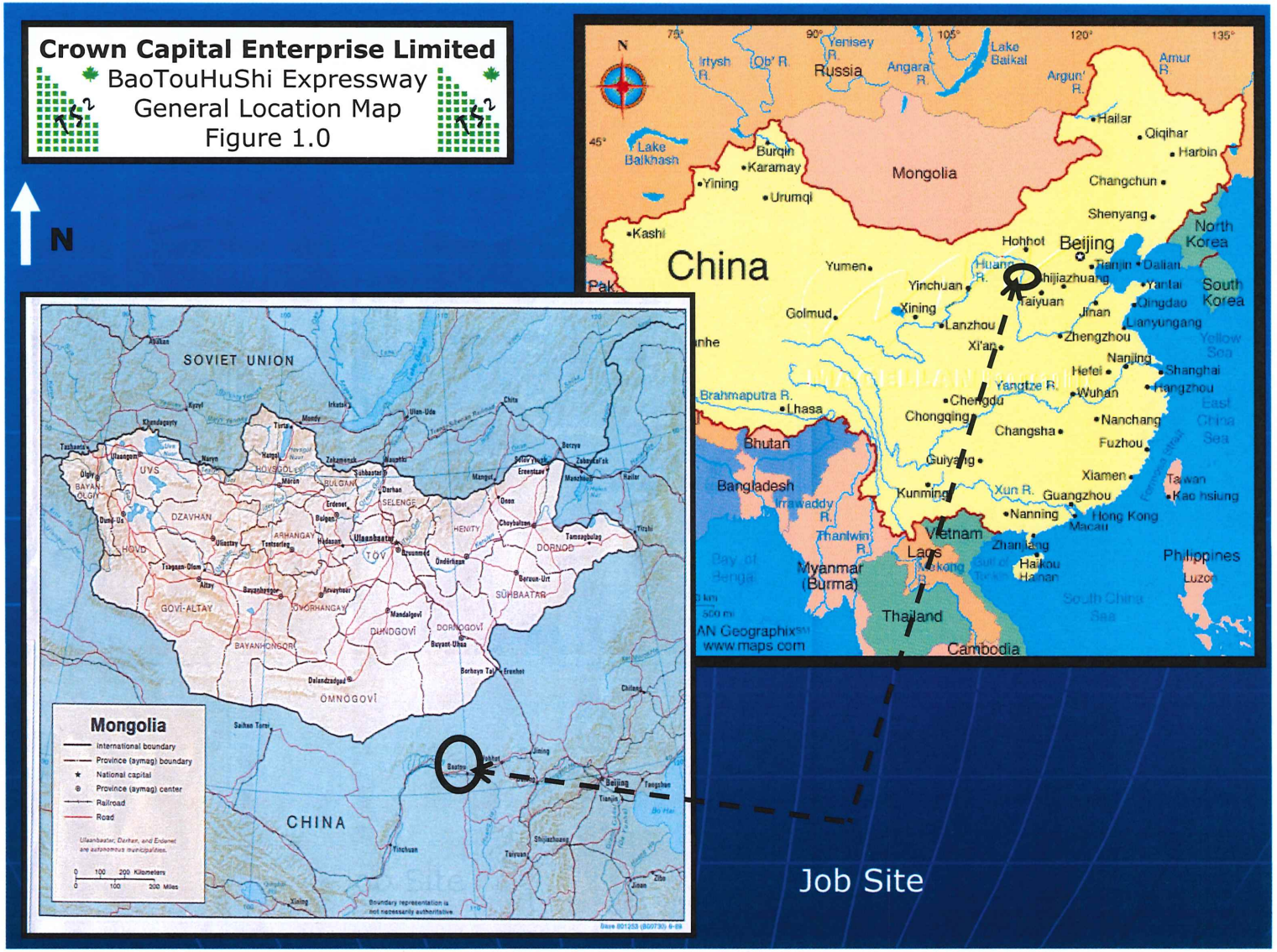
BaoTouHuShi Expressway
General Location Map
Figure 1.0



2.0 CO-OPERATIVE PROGRAM

The intent of the arrangement with ShuangChen Highway Maintenance Department, which is responsible for the Baotou-HuShi highway, is to demonstrate RJSeal™ at a location selected by the Maintenance Division. The Application will subsequently allow analysis of the performance of RJSeal™ on a variety of asphalt surfaces. An application was undertaken on the inside, eastbound (overtaking or passing) lane of the Baotou-HuShi Expressway, 20 km's west of the city of HuShi. The work was undertaken on May 14, 2005. The portion of the highway that was treated is composed of asphalt pavement, nominally 12 centimetres thick, which overlays a silty sand.

The age of the asphalt pavement is circa 2002. Keen interest was expressed in having the life of the asphalt pavement extended on this highway. The asphalt pavement has a number of lateral cracks. Smaller cracks also exist and the road maintenance department wished to prevent water percolating through these cracks in the asphalt pavement, thus softening the sub-grade.

3.0 RJSeal™

RJSeal™ is a proprietary product that is supplied by Crown Capital Enterprise Limited of Wanchai, Hong Kong. RJSeal™ has been proven in numerous applications in North and South America and recently in China to rejuvenate asphalt pavement at various stages of its life and economically extend the life of the pavement. RJSeal™ is a three component, asphalt sealer rejuvenator that is comprised of Coal Tar, Coal Tar Oils and Petroleum Solvents.

3.1 PRIOR EXPERIENCE

Refer to Appendix A for a copy of the brochure which outlines the experience with RJSeal™ at various locations in North America and South America as well as China. Further information is available from Crown Capital Enterprise Limited. RJSeal™ has been used at numerous airports in North and South America, as well as highways in Alberta, Canada; Cearo State, Brazil and other locations in the U.S.A. Since 2000, RJSeal™ has been demonstrated successfully at over forty five (45) locations in China and forty (40) commercial-scale applications have taken place at various locations, including Shanghai, DaQing, Kunming and QinHuangDao.

4.0 TEST PROGRAM

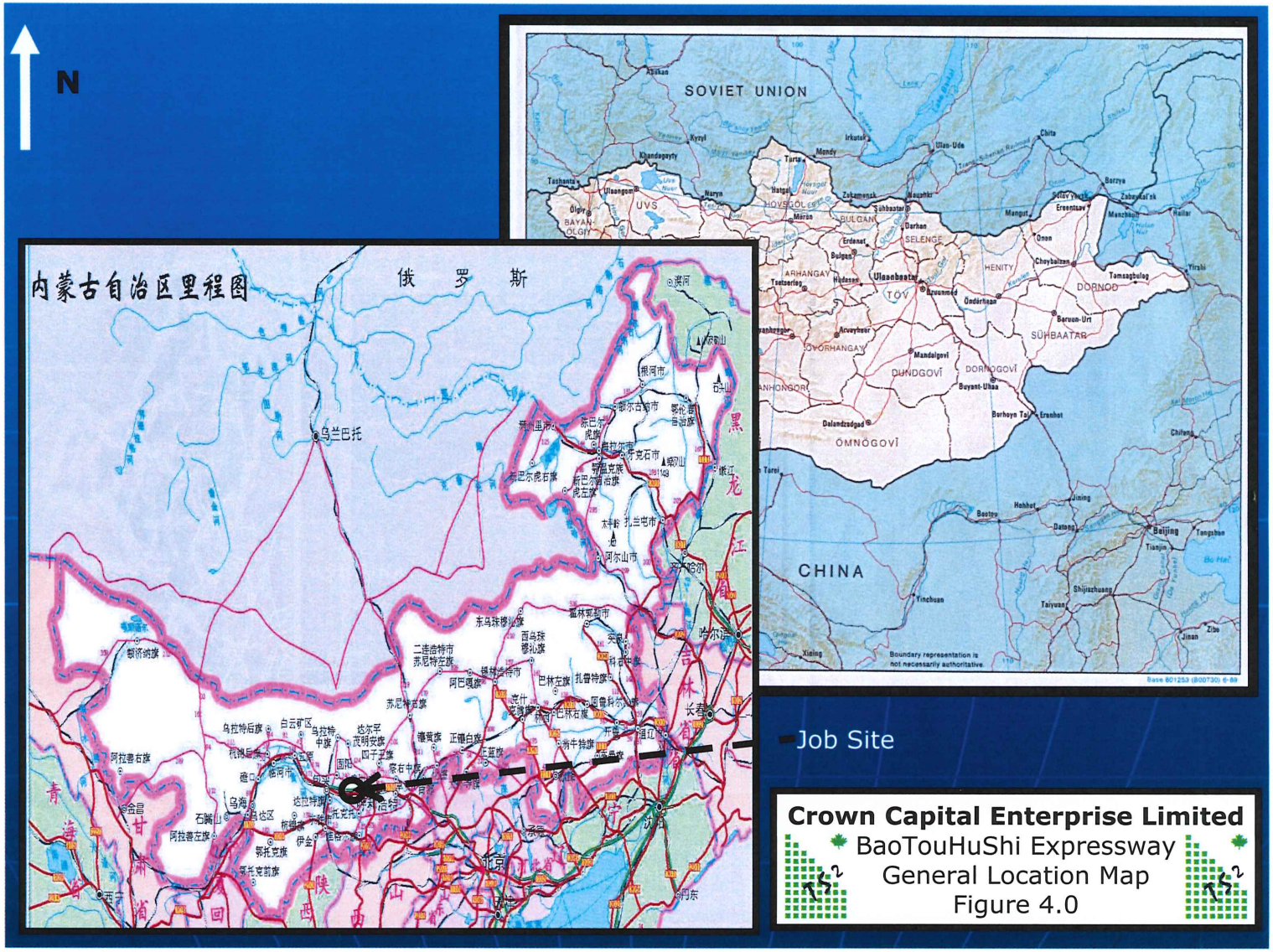
Since Inner Mongolia is located in a northern climate (Latitude: 43 to 53 North) at a high altitude (1500 to 2000 metres), it's a demanding setting for asphalt, given the climate (extremes of 45 Celsius in summer and minus 25 Celsius in the winter) and intense exposure to ultraviolet radiation, all which contribute to the oxidation and breakdown of the asphalt binder.

Inner Mongolia has a significant concentration of highways, with some 10,000 kms of National and Provincial Highway. The ShuangChen Highway Maintenance Department is responsible for the maintenance of the Baotou-HuShi Highway.

In view of this extensive network of roads and the relatively short life of the asphalt surface, The Highway Maintenance Department is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, they agreed to try RJSeal™ on Baotou-HuShi Expressway, immediately west of the city of Hohhot. See Figure 4.0, showing the location of this Highway with respect to BaoTaou and HuShi

On May 14, 2005 a test strip on the eastbound overtaking (inside) lane of the Baotou-HuShi Expressway, (a four lane, divided highway) was treated with RJSeal™. The location selected for an application of RJSeal™ was at the following geographic location:

Table 4.1	Geographic Location of Test Strip on Baotou-HuShi Highway		
Test Strip	System i.e. Geographic or Universal Transverse Mercator (UTM)	Northing	Easting
East End	Geographic (deg, min)		
	UTM Grid (52T) (metres)		
West End	Geographic (deg, min)		
	UTM Grid (52T) (metres)		


N
内蒙古自治区里程图
俄 罗 斯
SOVIET UNION
CHINA
Job Site
Crown Capital Enterprise Limited
BaoTouHuShi Expressway
General Location Map
Figure 4.0

Particulars of the test strips are shown in the table that follows:

Table 4.2				Particulars of the Test Strip on Baotou-HuShi Expressway							
Work Time	Strip Width (m)	Strip Length (m)	Total Area (m^2)	Total Area ft^2 approx	RJSeal™ Applied			Application Rate			
					US gals	Litres	Kgs	US Gal /yd^2	litres /m^2	m^2 /Litre	m^2 /Kg
14:30 – 16:00	3.6	387	1,393.2	14,990.8	76.3	288.5	300	0.046	0.21	4.83	4.64

Subsequent inspection of the test strips, showed that the application rate of 4.64 m^2/kg was adequate for the asphalt pavement at this location

The 387 metre long application section on the Baotou-HuShi Expressway is comprised entirely of asphalt pavement. See figure 4.0 for the location of the test strip with respect to the city of HuShi. The test strip location is graphically shown in figure 4.1, which follows.

Figure 4.1 Test Strip on BaoTou - HuShi Highway.

There is a slight camber to the road, which causes water to run off toward the shoulder, rather than puddle on the road. No significant oil spills were observed, just the occasional drop of transmission oil, crankcase oil or hydraulic fluid. The asphalt pavement surface was not appreciably worn with no rutting due to traffic wear. There was aging and oxidation of the bitumen, which extended to a depth of several millimetres. There were lateral cracks,. The entire portion of the treated asphalt pavement section overlies a compacted silty-clay, sub-grade

RJSeal™ was applied, using a Desco D200 Sprayer. See Appendix B for technical information on this unit. This unit can uniformly apply the RJSealTM in the application.

Ambient temperatures at the time of the application on May 14 were in the 22 degree Celsius range, with humidity in the 70% range. Photos showing the test application of RJSeal™ follow in figures 4.2, 4.3 and 4.4. on the following pages.

A site visit on May 15, 2005 was made to check to entire test section and evaluate the penetration of the RJSealTM. A difference
was readily perceived between the RJSeal™ treated sections and the adjoining untreated lanes. A screwdriver was used to dig several small holes in the asphalt pavement, to determine the penetration of the RJSeal™. At these locations the rejuvenated surface was evident, by the black resilient surface layer, which was now approximately 1 centimetre thick. Below that depth, the grey, oxidized layer of asphalt was evident. This is pictorially shown in Figure 4.4 that follows.

Figure 4.2 Typical Application Procedure.

Figure 4.3 Finished Surface.

4.1 RJSeal™ Testing

To date the comparison of the asphalt treated with RJSeal™ has been compared on a subjective basis over a very short period on Baotou-HuShi Highway.

Additional testing equipment will be brought to the site for comparison on a more disciplined, objective basis in the future, and to this end, the following tests will be undertaken.

- Hydroplaning Potential
- Water Penetration
- Macrotexture (Depth of Texture)

At a later date, cores will be acquired from the asphalt pavement for laboratory testing and the following properties of the asphalt pavement will be determined:

- Viscosity
- Ductility
- Penetration
- Softening Point

4.2 Hydroplaning Potential

An "Outflow Meter" manufactured in the U.S.A. by Humble Equipment Company of Ruston, Louisiana and sold under the trademark "Outflow Meter" (see figure 4.5) will be used to measure the asphalt pavement's capability to dissipate water, as concern has been expressed about hydroplaning on the RJSeal™ treated surface, versus the untreated surface. The procedure is documented in the ASTM Standard E2380-05. The Outflow Meter gives readings in seconds for the dissipation of a known quantity of water. It is suggested that any readings between 3 and 10 seconds are satisfactory results for an asphalt surface, if hydroplaning is to be minimized.

Figure 4.5 Outflow Meter

4.3 Water Penetration

Water Penetration Tests (China Testing Standard T 0730-2000) will be undertaken at several locations on the Baotou-HuShi Expressway on both treated and segment treated with RJSeal™. During the inspection on May 1, 2005, water was poured on the RJSeal™ treated segment and no water penetrated the asphalt pavement, whereas on the adjoining untreated segment water penetrated the pavement at the micro-cracks that laterally cross the highway

See Figure 4.6 that follows for a pictorial presentation of the Water Penetration Meter.

4.4 Macrotexture (Depth of Texture)

The sand patch test (ASTM Standard E965-96 OR China Standard T 0961-95) will be used to ascertain the Pavement Macrotexture (Depth of Structure). Comparison will be undertaken at several locations on the untreated section in close proximity to the Water Penetration Meter tests.

See Figure 4.7 which follows, showing the sand patch testing procedure.

4.5 Ductility/Viscosity/Penetration Testing

This aspect of the testing is beyond the capabilities Crown Capital Enterprise Limited personnel and external assistance has been sought from outside experts in the field of Asphalt Testing. To this end, the ShuangChen Highway maintenance Department has retained an independent testing company to conduct tests on the treated section. This will be reported separately.

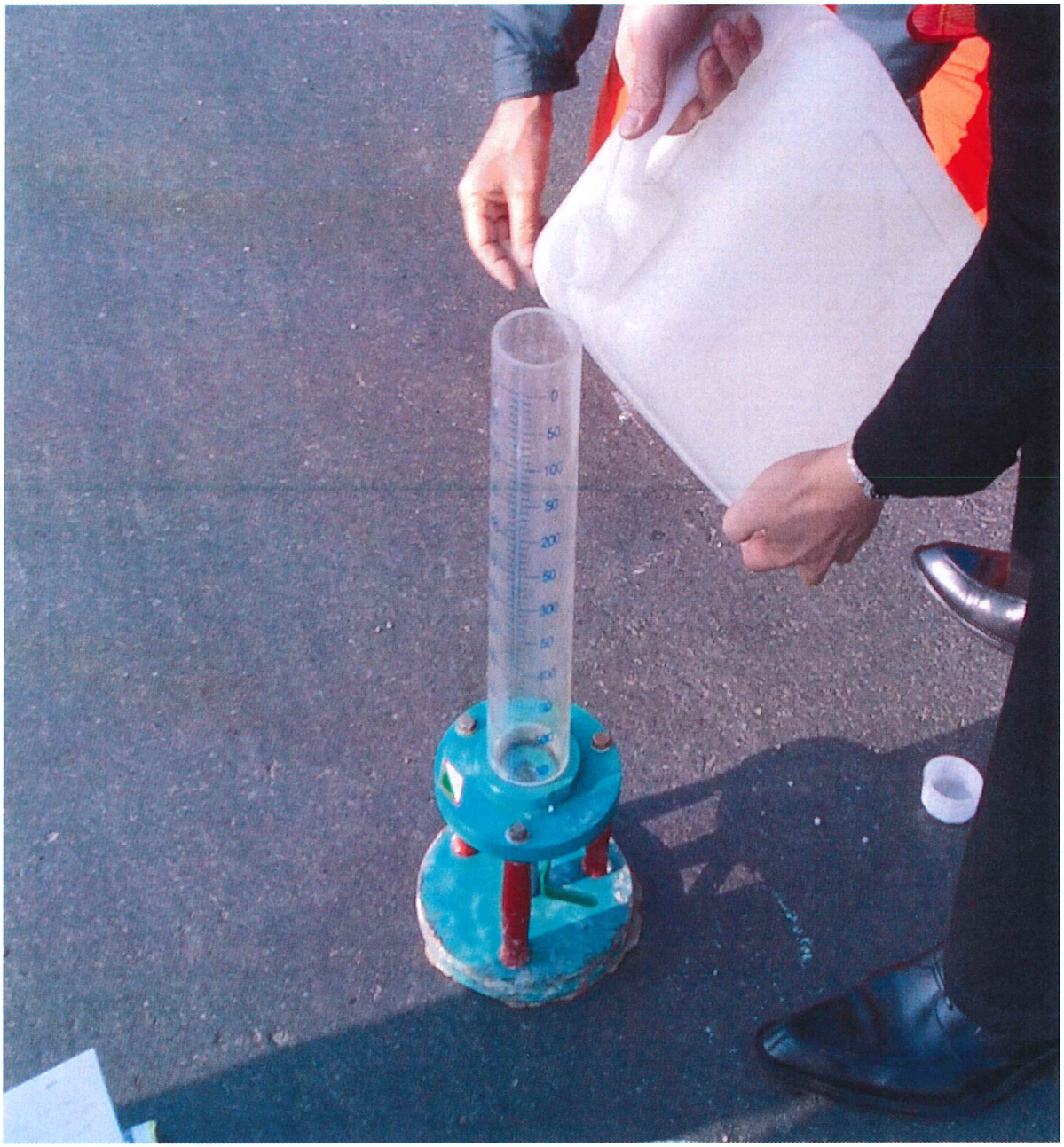


Figure 4.6 Water Penetration Test

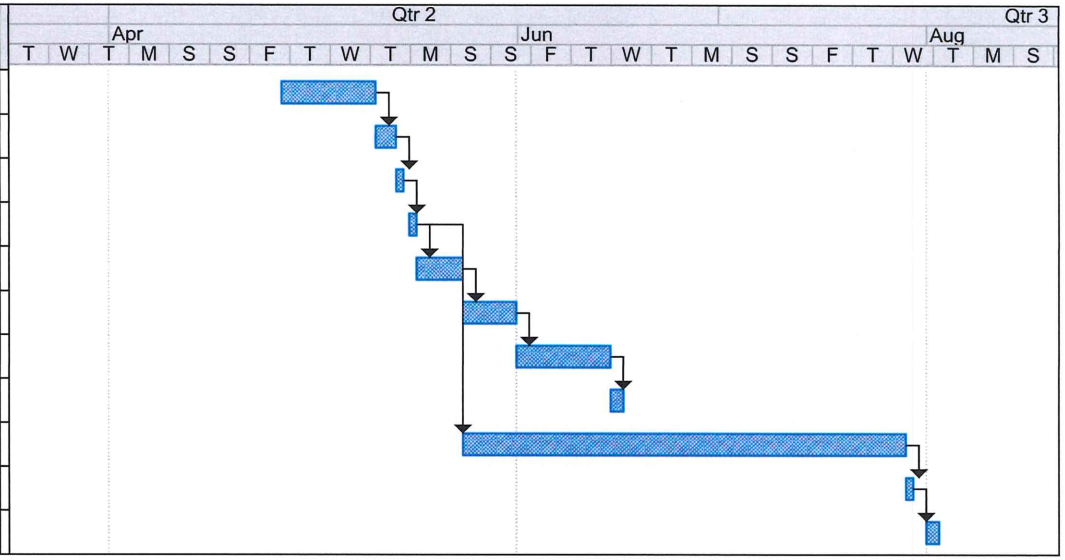
Figure 4.7 Sand Patch Test

5.0 Test Completion Schedule

The technicians from the testing laboratory, retained by the ShuangChen Highway Maintenance Department will be dispatched to undertake further testing on the trial section in the near future. The projected completion of this testing is scheduled as shown in the following chart.

LiveProject - Project Schedule

ID	Task Name	Duration	Start	Finish	Predecessors	Successor
1	Negotiate Contract	10 days	27/4/2005	10/5/2005		2
2	Mobilize Crew	3 days	11/5/2005	13/5/2005	1	3
3	RJSeal Demo	1 day?	14/5/2005	14/5/2005	2	4
4	Demobilize	1 day?	16/5/2005	16/5/2005	3	9, 5
5	Hiatus	5 days	17/5/2005	23/5/2005	4	6
6	Report Preparatio	6 days	24/5/2005	31/5/2005	5	7
7	Hiatus	10 days	1/6/2005	14/6/2005	6	8
8	Report Completion	2 days	15/6/2005	16/6/2005	7	
9	Hiatus	48 days	24/5/2005	28/7/2005	4	10
10	Inspection	1 day	29/7/2005	29/7/2005	9	11
11	Testing	2 days	1/8/2005	2/8/2005	10	



Normal task: % complete: Milestone:

Split task: Summary task: External task:

Critical task: Rolled up Summary task: Deadline:

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Appendix A

RJSeal™ Descriptive Literature

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Appendix B

Desco D200 Sprayer

Technical Data

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