CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

Application of RJSeal™
HaiYang, HeBei, JianShe, YouYi, BeiHuan & XiGang Streets, QinHuangDao, Hebei, Peoples Republic of China

May/June 2006

TS^2 Consulting Inc.
Lamma, Hong Kong

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May/June 2006

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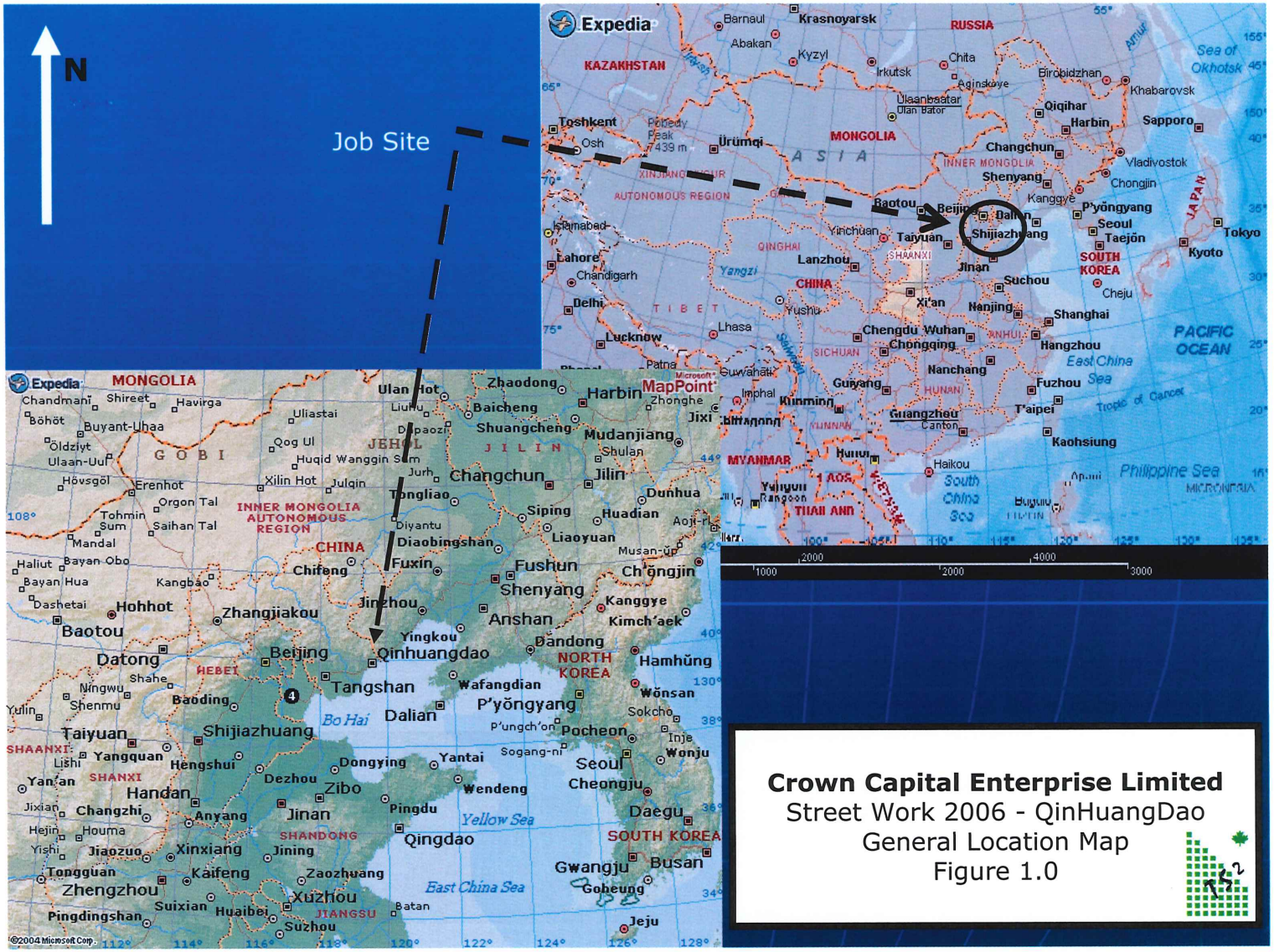
1.0 INTRODUCTION

Crown Capital Enterprise Limited of Hong Kong initially entered into a contract with the QinHuangDao City Construction Investment Inc. (QICIC) of the City of QinHuangDao, Hebei Province, China in October 2003. The arrangement led to the analysis of the performance of RJSeal™, a sealer/rejuvenator for one-year old asphalt pavement on Hong Qing Lu. This was a precursor to further work in 2004, on newly-paved streets, primarily in proximity to the newly constructed Olympic Stadium. In 2005 the work was extended to include newly-paved streets in proximity to the North (primary) Train Station. Then in 2006, the work extended to newly paved streets in the city centre.

Hebei Province is situated to the north of the Yellow River (HuangHe) at its confluence with the Sea of Bohai. Henan, Shanxi, Shandong and Liaoning Provinces as well as Inner Mongolia border Hebei Province. Hebei has seen a major growth in the highway system, in recent years, due to a government drive to build national highways linking Beijing and TianJin with major cities in the adjoining provinces and the massive increase in the world export trade. QinHuangDao lies some 250 kilometres east of Beijing and some 100 kms northeast of TianJin. The capital city of Hebei Province is Shijiazhuang with a population of approximately 3 million. See figure 1.0 for a map showing the location of QinHuangDao and Hebei Province. The majority of the area lies at 10 to 20 metres in elevation, on the extensive coastal plain that borders the Sea of Bohai. The regions' latitude (39 degrees north), means that there are four seasons, with temperatures ranging from 45 Celsius in the long, hot summer to minus 15 Celsius in the short winter. Their is no rainy season per-se, just thunderstorms and these occur primarily in June thru August, but can extend into September.

In the immediate QinHuangDao area, there are hills, with exposures of weakly cemented fine-grained sandstone. The asphalt in the area is manufactured from imported materials, which is comprised of crushed and screened sandstone and diorites hauled in from quarries elsewhere in Hebei Province, as well as washed gravels from the various rivers. The bitumen binder for the asphalt is sourced from various locations. Since Hebei Province borders the Sea of Bohai, the possibility of bitumen being sourced from offshore is a distinct possibility so refineries in Singapore and the like should not be forgotten.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Job Site
Expedia
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RUSSIA
KAZAKHSTAN
MONGOLIA
CHINA
NORTH KOREA
SOUTH KOREA
JAPAN
MYANMAR
Sea of Okhotsk
PACIFIC OCEAN
East China Sea
Yellow Sea
South China Sea
Philippine Sea
Bo Hai
Crown Capital Enterprise Limited
Street Work 2006 - QinHuangDao
General Location Map
Figure 1.0

2.0 CO-OPERATIVE PROGRAM

The intent of the arrangement with the City of QinHaungDao is to demonstrate RJSeal™ and subsequently allow analysis of the performance of RJSeal™ on a variety of asphalt surfaces. A demonstration was undertaken on Hong Qi Lu, in the central core of the city of Qinhuangdao, on October 15 and 16, 2003. Subsequent to the demonstration on Hong Qi Lu, interest was generated in treating a newly laid asphalt pavement with significant water penetration problems on Ying Bin Lu. This led to the an agreement to apply RJSeal™ to the entire portion of this street, which stretched some 2.3 kilometres northwards from JianShe Road through Gang Cheng Road and Yan Shan Road, terminating at a park. Ultimately this has resulted in additional newly paved streets being treated with RJSeal™ throughout the balance of 2004 and then again in 2005 and now in 2006. This report pertains to the application of RJSeal™ on portions of HaiYang, HeBei, JianShe, YouYi, BeiHuan & XiGang Streets in proximity to the city centre and the North Train Station in May and June 2006.

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 that 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 sixty (60) locations in China and over sixty five(65) commercial-scale applications have taken place at various locations, including Beijing, Shijiazhuang and Tangshan in Hebei Province as well as Shanghai, ShenYang, ChangChun, Harbin and Kunming.

4.0 TEST PROGRAM

Since Hebei Province is located in a semi-tropical climate (Latitude: 39 North) at a low altitude (10 to 20 metres), it's a demanding setting for asphalt, given the year round warm climate (extremes of 45 Celsius in summer and minus 5 Celsius in the winter) and intense exposure to ultraviolet radiation, all which contribute to the oxidation and breakdown of the asphalt binder.

Hebei has the second greatest concentration of highways in China (after ShangDong), with some 10,000 kms of National and Provincial highway. QinHuangDao is responsible for approximately 100 kms of streets in QinHuangDao and other neighbouring communities

The city of QinHuangDao has an extensive network of roads and the relatively short life of the asphalt surface, accordingly it is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, the QinHuangDao Civic Construction Department has agreed to try RJSeal™ on portions of HaiYang, HeBei, JianShe, YouYi, BeiHuan & XiGang Streets, that were newly repaved, in the city centre, near the northern train station of QinHuangDao. See Figure 4.0, showing the location of these streets with respect to QinHuangDao and Hebei

On May 2, work commenced on XiGang Street and RJSeal™ was applied The portion of the street where RJSeal was applied is graphically shown in figure 4.1, which follows.

Subsequent inspection, showed that the trial application rate of 4.0 m^2/kilogram was a adequate at this location. The portion of XiGang Street that had RJSeal™ applied was at the following geographic location:

Table 4.1 Geographic Location		**XiGang Street**	
System		**Northing**	**Easting**
West End of RJSeal™ Application	Geographic (deg, min)	39^0 57.712'	119^0 35.192'
	Universal Transverse Mercator Grid (metres) 50S	4426745	0720922
East End of RJSeal™ Application	Geographic (deg, min)	39^0 56.480'	119^0 35.362
	Universal Transverse Mercator Grid (metres) 50S	4424472	0721230

The portion of XiGang Street that was treated with RJSeal™, commenced at BeiHuan Street and ran south from the intersection

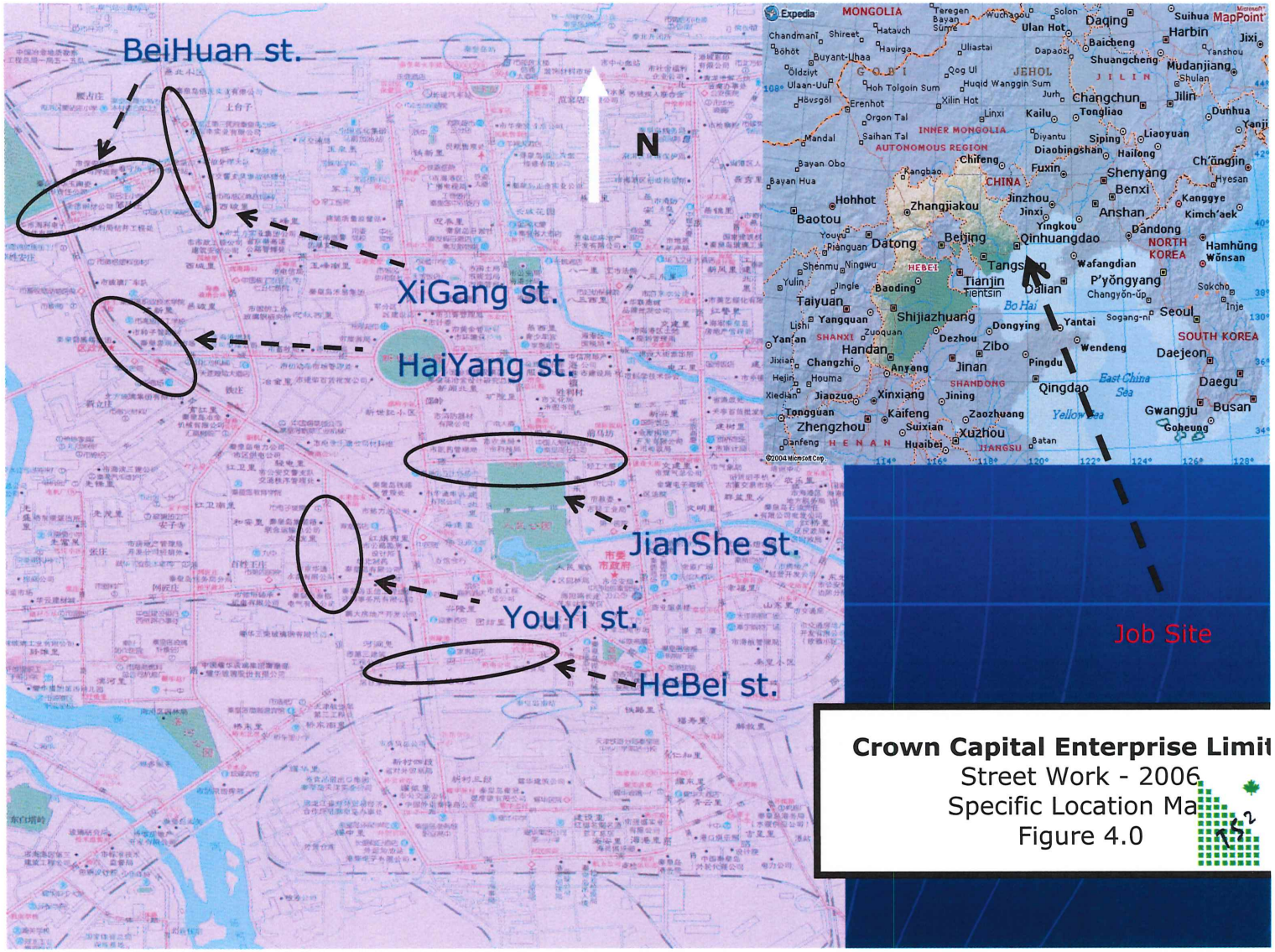
BeiHuan st.
XiGang st.
HaiYang st.
JianShe st.
YouYi st.
HeBei st.
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Figure 4.0

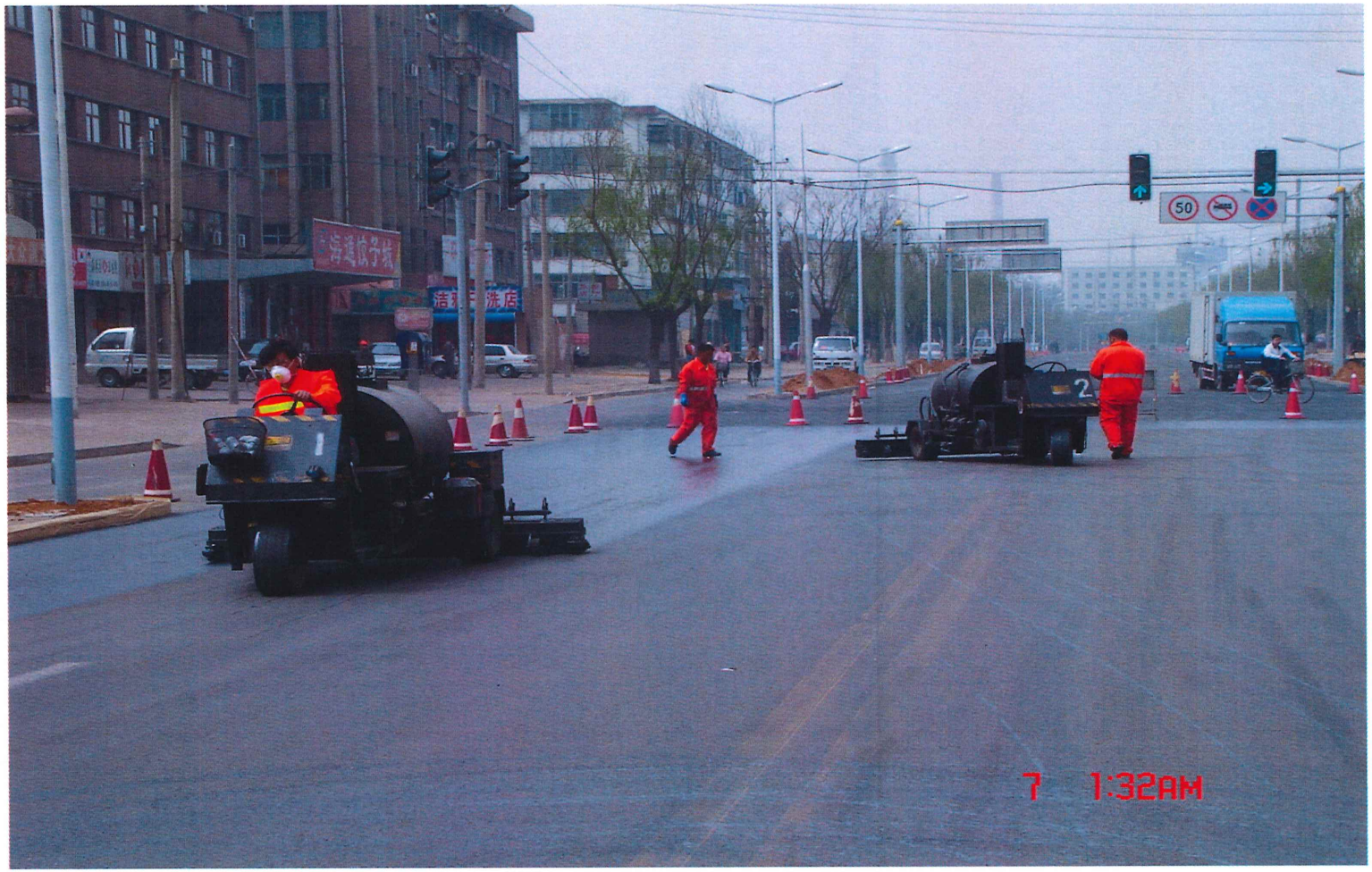


Figure 4.1 Test Strip on Street

Work commenced on the Application section at 6:00 am on May 2, and the work continued throughout the month of May and into June. There is a slight camber to the streets, which causes water to run off toward the shoulder, rather than puddle on the road. The asphalt surface on HaiYang, HeBei, JianShe, YouYi, BeiHuan & XiGang Streets, was reputedly less than one month old (2006 vintage). 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 no aging and oxidation of the bitumen. There were cold joints between the parallel mats which were susceptible to water penetration. The entire portion of the treated street was composed of asphalt pavement that was purportedly 15 centimetres thick and underlain by a gravel base, which was on a compacted silty-clay, sub-grade.

Details of the application are summarized in the table that follows:

Table 4.2		**Details on RJSeal™ Application on HaiYang, HeBei, JianShe, YouYi, BeiHuan & XiGang Streets**								
Street	Work Day	Work Time (hrs)	Total Area m^2	RJSeal™ Applied			Application Rate			
				US gals	Litres	Kgs	USGal /yd^2	Litres /m^2	m^2 /Litre	m^2/Kg
Dao Xi Gang	2-May	11.0	12,925	749	2,830	3,000	0.048	0.23	4.57	4.31
	4-May	11.0	7,470	399	1,509	1,600	0.045	0.21	4.95	4.67
	Totals	22.0	20,395	1,148	4,340	4,600	0.047	0.23	4.70	4.43
Bei Huan	5-May	12.0	15,576	998	3,774	4,000	0.054	0.26	4.13	3.89
	6-May	10.5	3,785	275	1,038	1,100	0.061	0.29	3.65	3.44
	31-May	12.0	16,806	1,098	4,151	4,400	0.055	0.26	4.05	3.82
	Totals	34.5	36,166	2,371	8,962	9,500	0.055	0.26	4.04	3.81
You Yi	7-May	12.5	15,657	923	3,491	3,700	0.049	0.24	4.49	4.23
	8-May	11.0	12,926	774	2,925	3,100	0.050	0.24	4.42	4.17
	Totals	23.5	28,583	1,697	6,415	6,800	0.050	0.24	4.46	4.20
Jian She	16-May	11.0	26,200	1,522	5,755	6,100	0.049	0.23	4.55	4.30
	17-May	11.0	24,003	1,373	5,189	5,500	0.048	0.23	4.63	4.36
	18-May	11.0	21,728	1,348	5,094	5,400	0.052	0.25	4.27	4.02
	20-May	5.0	1,010	50	189	200	0.041	0.20	5.35	5.05
	25-May	4.0	977	75	283	300	0.064	0.31	3.45	3.26
	Totals	42.0	73,917	4,368	16,509	17,500	0.049	0.24	4.48	4.22
HeBei	22-May	6.0	34,252	2,196	8,302	8,800	0.054	0.26	4.13	3.89
	23-May	11.0	31,067	1,847	6,981	7,400	0.050	0.24	4.45	4.20
	24-May	11.0	46,106	2,945	11,132	11,800	0.053	0.26	4.14	3.91
	Totals	28.0	111,425	6,988	26,415	28,000	0.052	0.25	4.22	3.98
Hai Yang	8-Jun	14.0	38,532	2,446	9,245	9,800	0.053	0.25	4.17	3.93
	Totals	164.0	309,019	19,018	71,887	76,200	0.051	0.25	4.30	4.06

Ambient temperatures throughout the entire 34 days of the RJSeal™ application were in the 20 degrees Celsius range at the commencement of work in the early morning on May 2 and the maximum was 29 degree Celsius by mid-afternoon, with humidity in the 55% to 75% range. The entire work area was treated with copper slag at an application rate of 0.22 kgs/square metre, immediately after the application of RJSeal™. Photos showing the application of RJSeal™ follow in figures 4.2, 4.3 and 4.3 on the following pages.

Figure 4.2 Typical Application Procedure.

Figure 4.3 Copper Slag Application

Figure 4.4 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 HaiYang, HeBei, JianShe, YouYi, BeiHuan & XiGang Streets in QinHuangDao. Testing equipment was brought to the site for comparison on a more disciplined, objective basis included the following tests.

- Skid Resistance
- 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 Skid Resistance

A British Pendulum (ASTM Standard E303-93 OR China Standard T 0964-95) was employed to determine the skid resistance of the road surface prior to the application of RJSeal™ and also after the application.

Test Results from the British Pendulum Testing are contained in the table that follows:

Table 4.3			Results from the British Pendulum Tests				
						British Pendulum #	
Street	Loc'n	Date	Lane	Wheel Path	Traffic Direct'n	Before RJSeal™	After RJSeal™
XiGang	K122+365	2-May	Slow	right	Southbound	55	n/a
BeiHuan	K50+126	5-May	Fast	right	Northbound	54	n/a
YouYi	K60+110	7-May	Fast	right	Northbound	46	n/a
JianShe	K256+210	9-May	Middle	left	Southbound	40	n/a
JianShe	K254+400	16-May	Slow	right	Northbound	56	n/a
JianShe	K212+000	18-May	Fast	right	Northbound	50	n/a
HeBei	K10+220	24-May	Middle	left	Northbound	50	n/a
JianShe	K211+800	25-May	Slow	right	Southbound	54	n/a
HaiYang	K16+255	8-Jun	Middle	right	Northbound	50	n/a

The test results from the British Pendulum are not directly correlatible with the sand patch test. A BPN of 42 is indicative of an acceptable road surface from a skid resistance point of view. Whereas a BPN of 26 infers that the road surface is unacceptable.

See figure 4.5 for a photo of the British Pendulum testing at the demonstration site

Figure 4.5 British Pendulum

4.3 Water Penetration

Water Penetration Tests (China Testing Standard T 0730-2000) were undertaken at several locations on the untreated portion of the street, in close proximity to the test strip and later on the RJSeal™ treated section, in close proximity to the British Pendulum tests.

Table 4.4			Results from the Water Penetration Tests				
						Water Inflow ml/min	
Street	Loc'n	Date	Lane	Wheel Path	Traffic Direct'n	Before RJSeal™	After RJSeal™
XiGang	K122+365	2-May	Slow	right	Southbound	5	n/a
BeiHuan	K50+126	5-May	Fast	right	Northbound	0	n/a
YouYi	K60+110	7-May	Fast	right	Northbound	5	n/a
JianShe	K256+210	9-May	Middle	left	Southbound	10	n/a
JianShe	K254+400	16-May	Slow	right	Northbound	25	n/a
JianShe	K212+000	18-May	Fast	right	Northbound	0	n/a
HeBei	K10+220	24-May	Middle	left	Northbound	10	n/a
JianShe	K211+800	25-May	Slow	right	Southbound	10	n/a

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) was used to ascertain the Pavement Macrotexture Depth. Comparison was undertaken at several locations on both the untreated and RJSeal™ treated sections. The results of the testing are documented in the table that follows:

Table 4.5			Results from the Sand Patch Tests				
						Depth of Structure (mm)	
Street	Loc'n	Date	Lane	Wheel Path	Traffic Direct'n	Before RJSeal™	After RJSeal™
XiGang	K122+365	2-May	Slow	right	Southbound	0.47	n/a
BeiHuan	K50+126	5-May	Fast	right	Northbound	0.54	n/a
YouYi	K60+110	7-May	Fast	right	Northbound	0.60	n/a
JianShe	K256+210	9-May	Middle	left	Southbound	0.46	n/a
JianShe	K254+400	16-May	Slow	right	Northbound	0.71	n/a
JianShe	K212+000	18-May	Fast	right	Northbound	0.82	n/a
HeBei	K10+220	24-May	Middle	left	Northbound	0.42	n/a
JianShe	K211+800	25-May	Slow	right	Southbound	0.45	n/a
XiGang	K122+365	2-May	Slow	right	Southbound	0.36	n/a

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

Figure 4.6 Water Penetration Test

Figure 4.7 Sand Patch Test

4.5 Ductility/Viscosity/Penetration Testing

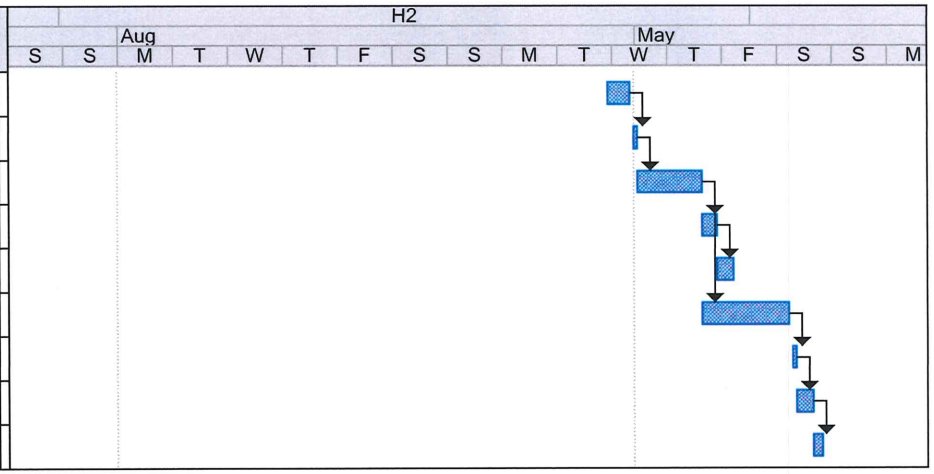
This aspect of the testing is beyond the capabilities Crown Capital Enterprise Limited personnel and external assistance has been sought from outside experts in the field of Asphalt Testing. To this end, the QinHuangDao's Civic Construction Department will retain an independent testing company to conduct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

5.0 Test Completion Schedule

Technicians from the independent testing agency will be dispatched to undertake further testing on the trial sections in the near future. The projected completion of this testing is scheduled as shown in the following chart.

LiveProject - QinHuangDao Schedule

ID	Task Name	Duration	Start	Finish	Predecessor	Successors
1	Negotiate Contract for Application	10 days	17/4/2006	28/4/2006		2
2	Mobilization	2 days	1/5/2006	2/5/2006	1	3
3	Application	24 days	3/5/2006	5/6/2006	2	6, 4
4	Hiatus	6 days	6/6/2006	13/6/2006	3	5
5	Report Preparation	7 days	14/6/2006	22/6/2006	4	
6	Hiatus	34 days	6/6/2006	21/7/2006	3	7
7	Field Testing & Core Sample Acquisi	2 days	24/7/2006	25/7/2006	6	8
8	Core Sample Testing	6 days	26/7/2006	2/8/2006	7	9
9	Report Preparation & Submission	3 days	3/8/2006	7/8/2006	8	



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

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