CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

Demonstration of RJSeal™
BadaLing Highway, Beijing Municipality
Peoples Republic of China

May 2004

TS^2 Consulting Inc.
Lamma, Hong Kong

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RJSeal
Shung-PingGu Highway, Beijing Municipality
Peoples Republic of China

May 2004

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1.0 INTRODUCTION

Crown Capital Enterprise Limited of Hong Kong entered into an agreement with a unit of the Beijing Municipality's Highway Management Department in May 2004. The agreement calls for the analysis of the performance of RJSeal™, a sealer/rejuvenator for asphalt pavement on highways within the jurisdiction of the highway management groups area.

Beijing Municipality, surrounds the City of Beijing and is bordered by Hebei, Shandong and Liaoning Provinces. The town of HuiLongGuang is located in the northern sector of the Municipality. See figure 1.0 for a map showing the location of HuiLongGuang in Beijing Municipality. HuiLongGuang and the majority of the area lies in the foothills adjacent to the Mountains near BadaLing and averages 50 metres in elevation. The regions' latitude (40 degrees north), mean that there are four distinct seasons, with temperatures ranging from 35 Celsius in the long, hot humid summer to –10 Celsius in the short, but frigid winter.

The asphalt in the area is manufactured from local materials, which is comprised of crushed and screened sandstone, granites, gneisses and limestone. In the immediate area, the rocks are from a sedimentary series that has been lithified and sandstone predominates. The bitumen binder for the asphalt is sourced from various locations, with DaQing in HeilongJiang Province one of the principal sources and refineries in Tianjin, also being a possibility but most likely offshore sources such as Singapore are the most probable.


Shijingshan
Military Museum
军事博物馆
Scientific and Technical Exchange Centre
Fuxing Lu
复興路
Ministry of Traffic & Communications
Beijing Railway Bureau
Muxidi 木樨地
Fuxingmen Waidajie
复興門外大街
Yanjing 燕京饭店
Fuxing Hospital
复兴医院
China Machine & Equipment Import-Export Corp.
All-China Federation of Trade Unions
Togheju 同和居分号
Fuwai Store
February the Seventh Theatre 二七剧场
Nanlishilu Toutiao 南礼士路头条
Nuclear Energy Industry Corp.
Nanlishilu Auditorium
Urban Planning Administration
State Bureau of Oceanography
Fuxingmen 复兴门
Nanlishi Lu 南礼士路
Broadcasting Building
Zhenwumiao Lu 2 Tiao 真武庙路二条
Zhenwumiao Lu 4 Tiao~真武庙路四条
Baiyunguan Taoist Temple 白云观
中国人民公安大学
Chinese People's Public Security University
Guang'anmenbeibinhe Lu 广安门北滨河路
Feixia 飞霞饭店
Lianhuachi Donglu 莲花池东路
Xunwumen Xidajie
Electrothermal Factory
Tianning Temple 天宁寺
Xinrong 欣荣饭店
Nubabao Hutong
Binhe Park
Guang'anmen Hospital
XUANWU 宣武
Yili Foodstuffs Corp.
Guang'anmen Waidajie 广安门外大街
Guang'anmen Neidajie 广安门内大街
Louwailou 楼外露饭庄
Tianwai Tianning Hotel
GUANGWAI 广外
Machine Tools Factory
Xuanwu Stadium 宣武体育场
Scale 1 : 15 000
0.20 0.40 0.60 0.80
km
Central Beijing 北京市
miles
0.20 0.40
PERIPLUS
E
F
G
1
2
3

2.0 CO-OPERATIVE PROGRAM

The intent of the Agreement is to demonstrate RJSeal™ at different locations selected by the Highways Maintenance Group, which will subsequently allow analysis of the performance of RJSeal™ on a variety of asphalt surfaces. A demonstration was undertaken at 11 Km north of Beijing on May 9, near the town of QingHe, on the primary highway that leads from Beijing to BadaLing, some 60 km north-west. The section of highway was paved in 2001. No details are known about the subgrade, but inspection of the shoulders in the fill sections of the highway, show a sandy-silty material. Knowing construction techniques in highways in China in general, minimal gravel would be used in the immediate coarse base, beneath the asphalt pavement.

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 to rejuvenate asphalt pavement at various stages of it's 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. 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 North Dakota and Texas, as well as other locations in the U.S.A. Since 2000, RJSeal™ has been demonstrated successfully at over thirty seven (37) locations in China and fifteen (15) commercial-scale applications have taken place at various locations, including Shanghai, DaQing, Kunming and QinHuangDao.

4.0 TEST PROGRAM

Since Beijing Municipality is located in a semi-tropical climate (Latitude: 40 North) at a low altitude (50 metres), it's a demanding setting for asphalt, given the year round warm climate (extremes of 40 Celsius in summer and –15 Celsius in the winter) and intense exposure to ultraviolet radiation, all which contribute to the oxidation and breakdown of the asphalt binder.

The Municipal Highway Management Department is responsible in the immediate area for a growing system of primary and secondary roads.

In view of their growing network of roads, and the short life of the asphalt surface the Beijing Municipality's Highway Management Department is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, they have greed to try RJSeal™ on a section of highway. The 213 metre long test section is located on the BadaLing Highway, 11 km north of Beijing at the following geographic location:

Table 4.1		**Geographic Location of Demo Site**	
Loc'n	**System**	**Northing**	**Easting**
North End of Strip	Geographic (deg, min)	40^0 04.924 '	116^0 18.047'
	Universal Transverse Mercator (metres) (Zone 50T)	4437115	0440387
South End of Strip	Geographic (deg, min)	40^0 04.808 '	116^0 18.145'
	Universal Transverse Mercator (metres) (Zone 50T)	4436901	0440523

See figure 4.0 which follows, for a graphic presentation of the location.

A strip, 213 metres long on the outside lane on the southbound side of the six lane, divided portion of this highway was treated. The test section is located on a straight section with no significant grade. There is a slight camber to the road which causes water to run off, rather than puddle on the road. The asphalt surface on the section treated, was reputedly six years old (1998 vintage). No significant oil spills were observed, just the occasional drop of transmission oil, crankcase oil or hydraulic fluid. The highway surface was not noticeably worn, although there were some lateral and lineal cracks, with no noticeable rutting due to traffic wear. There was appreciable aging and oxidation of the bitumen, which extended to a depth of two to three mm. The entire 213 metres of the treated highway section was on fill

On May 9, between 11:00 am and 4:30 pm, RJSeal™ was applied in a uniform manner using a Desco D200 Sprayer. See Appendix B for a copy of the brochure with the technical specification for this unit. The width of the lane is 3.75 metres between the painted highway centerline and the outside marker line. 200 Kgs of RJSeal™ was applied. Following the application of the RJSeal, Copper slag was applied to the road surface to improve the skid

resistance, through improvement of the macrotexture. Details of the application are summarized in table 4.2 which follows.

Table 4.2					Details of RJSeal™ Application on Badaling Highway						
Schedule	Work Time (hrs)	Test Length (m)	Total Area m^2	Total Area yd^2 approx	RJSeal™ Applied			Application Rate			
					US gals	Litres	Kgs	US gals/ sq. yd.	Litres /m2	m^2 /Litre	m^2 /Kg
11:00–16.30	5.50	213	799	54	420		200	0.049	0.22	4.53	4.53
Totals	5.50	213	799	50	111	420	200	0.049	0.22	4.53	4.53

The test strip application was completed by 4:30 pm and the lane remained closed until 7:00 pm on May 9, when it was re-opened for traffic. Photos showing the test application of RJSeal™ follow in figures 4.1 and 4.2. on the following pages. The site was visited on June 26 around 4:30 pm and a difference was readily perceived between the RJSeal™ treated section and the adjoining untreated portion

Figure 4.1 Typical Application Procedure.

Figure 4.2 Finished Job.

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. Testing equipment will again be brought to the site for comparison on a more disciplined, objective basis in the future.

- Hydroplaning Potential
- Water Penetration
- Macrotexture Depth
- Viscosity/Ductility Testing

. 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 4.3) will be used to measure the asphalt pavement's macrotexture, as concern has been expressed about hydroplaning on the RJSeal™ treated surface, versus the untreated surface. The procedure is documented in the ASTM working paper, WK-364. 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 pavement surface, if hydroplaning is to be minimized.

4.3 Water Penetration

Water Penetration Tests (China Testing Standard T 0730-2000) will be undertaken at several locations on the RJSeal™ treated section and the untreated portion of the road, in close proximity to the Outflow Meter.

4.4 Macrotexture Depth

The sand patch test (ASTM Standard E965-96 OR China Standard T 0961-95) will be used to ascertain the Pavement Macrotexture Depth. Comparison was undertaken at several locations on both the untreated and RJSeal™ treated sections in close proximity to the Outflow meter tests.

4.5 Viscosity/Ductility Testing

This aspect of the testing is beyond the capabilities of the field equipment available to both Crown Capital Enterprise Limited and RJSeal™ personnel

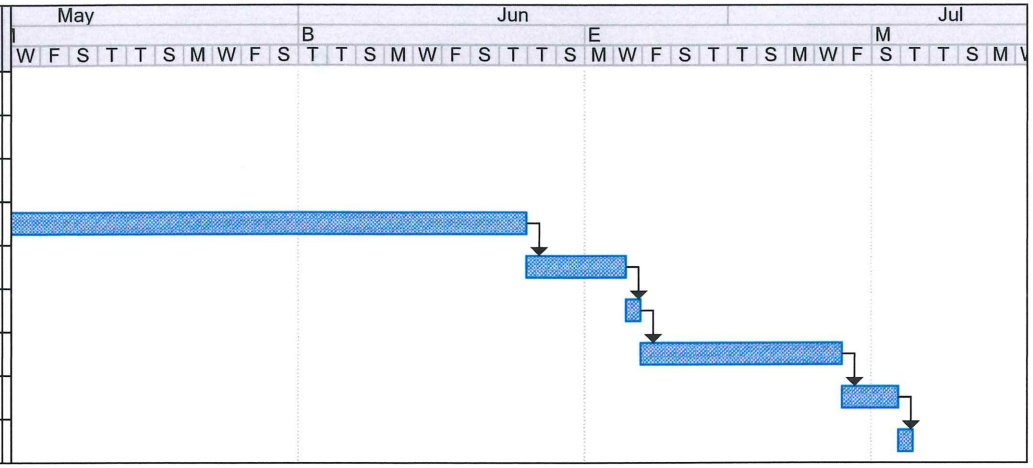
Figure 4.3
Humble Equipment Co. Outflow Meter

5.0 Test Completion Schedule

The team of technicians from the Hong Kong office 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 - BadaLing Highway

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
1	Preliminary site inspec	1 day?	26/4/2004	26/4/2004		2
2	Negotiations	9 days	27/4/2004	7/5/2004	1	3
3	RJSeal Application	1 day?	9/5/2004	9/5/2004	2	4
4	Hiatus	28 days	10/5/2004	16/6/2004	3	5
5	Report Compilation	5 days	17/6/2004	23/6/2004	4	6
6	Site Inspection & Testi	1 day?	24/6/2004	24/6/2004	5	7
7	Hiatus	10 days	25/6/2004	8/7/2004	6	8
8	Report Finalization	2 days	9/7/2004	12/7/2004	7	9
9	Report Submittal	1 day?	13/7/2004	13/7/2004	8	



Normal task:
% complete:
Milestone:
Split task:
Summary task:
External task:
Critical task:
Rolled up Summary task:
Deadline:

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July 14, 2004

Crown Capital Enterprise Limited
B5, Centre Point Building
181 – 185 Gloucestor Road,
Wanchai, Hong Kong.

Attn: Charence Chiang
General Manager

Dear Charence

Re: Demonstration of RJSeal™ on BadaLing Highway, Beijing.

This is the final report on the demonstration of RJSeal™ on the BadaLing Highway, some 11 kilometres north of Beijing, sandwiched between the Second Ring Road and the Third Ring Road. This demonstration was undertaken on May 9, 2004 and encompassed a 213 metre long portion of the southbound slow lane. A very smooth asphalt surface was encountered on this highway and Copper Slag from Kunming was also applied to the entire 213 metres of this demonstration strip on an experimental basis, at an application rate of approximately 2.1 kgs/square metre. The hot weather and the subsequent traffic on the road, embedded most of the slag in the rejuvenated surface. Several major cracks were encountered and these were treated by Crown Capital, with SAMIfilla EC, a cold pour crack sealer. The initial results of the RJSeal™ application appear quite satisfactory.

Yours Sincerely

_____

Anthony G. Speed, P.Eng. (Ontario, Canada)

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APPENDICES

No.	Description
A	RJSeal™ – Technical Literature
B	Desco D200 sprayer – Technical Specifications

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Appendix A

RJSeal™ – Technical Specifications

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Appendix B

Desco D200 Sprayer
Technical Specifications

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