CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

Demonstration of Rejuvaseal™
ShengLi Beijie, Shijiazhuang, Hebei, Peoples Republic of China

September 2002

TS^2 Consulting Inc.
Lamma, Hong Kong

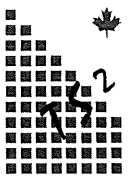
CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal
ShengLi Beijie, Shijiazhuang, Hebei,
Peoples Republic of China

September 2002

APPENDICES

No.	Description
A	Rejuvaseal™ – Technical Seminar, Ping-Gu (Beijing) China, August 2001
B	Rejuvaseal Descriptive Literature



TS² Consulting Inc.
Lamma, Hong Kong

TS² CONSULTING INC.

(British Virgin Islands Incorporated) website: http://ts2.stormloader.com

Hong Kong (Office)
2/F 81 Po Wah Yuen,
Lamma Island,
Hong Kong
Phone (85-2)-2142-3500
Fax: (85-2)-2390-5465
Cellular: (85-2)-9157-6693
Email: speed_cny@yahoo.co.uk

China (Liaison Office)
Room 2607, Feng Yuan Bldg,
RenMing Zhong Lu,
Kunming, Yunnan,
Peoples Republic of China,
Phone: (86-871)-537-7086
Mobile:(86)-1362-949-8994
Email: speed_cny@yahoo.co.uk

November 28th, 2002

中国云南昆明市人民中路丰园大厦2607室

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 RejuvaSeal™ on ShengLi Beijie, Shijiazhuang.

This is the final report on the demonstration of RejuvaSeal™ on ShengLi Beijie in Shijiazhuang. This demonstration was undertaken during an extended period from September 16 thru September 18 and encompassed a combined 606 metre section of this four lane road. The principal interest of the municipality was improvement of the asphalt pavement's resistance to water penetration, as the two year old, 25 mm thick asphalt overlay was quite pervious. The asphalt pavement overlay is two years old and was placed on a asphalt base with cracks and reflective cracks occur in the new overlay. Inspection of the road on September 19, upon completion, showed that RejuvaSeal™ had penetrated the asphalt pavement to a depth of at least 2 mm in the initial portions treated on September 16 and the immediate surface was now pliable.

Yours Sincerely

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

Crown Capital Enterprise Limited.
RejuvaSeal Demo
Hebei - Shijiazhuang - Highway G107

Demo Date	17-Sep-02
Prepared by	A.G. Speed
Updated by	A.G. Speed
Updated	17-Oct-02
Temperature	25 Celsius
Humidity	75% percent

Assumptions

Panel No1 Length	64.5	Metres		
Panel Width	7.20	Metres		
Panel Area	464.4	Sq Metres		
Panels No 2 Leng	90.0	Panels No 2A	231.0	
Panel Width	3.60	Panel Width	7.20	
Panel Area	324.0	Panel Area	1663.2	
Panels No3 Leng	220.0	Metres		
Panel Width	3.60	Metres		
Panel Area	792.0	Sq Metres		

Conversion Factors

US Gallon=	3.78	Litres
Sq Metre=	10.76	Sq Feet
Sq Metre=	1.20	Sq Yds
RejuvaSeal	1.10	S.G.

Crew Consist	No
Labourers	24
Equipment Op	2
Supervisor	2
Total	28

Work Schedule

Date	am/pm	Work Time (hrs)	No. of Panels	Test Length (m)	Total Area m^2	Total Area yd^2	RejuvaSeal Applied			Application Rate				24 Man Crew	
							US gals	litres	kilograms	USGal /yd^2	Litres /m^2	m^2 /Litre	m^2 /Kg	m^2 /man hr	yd^2 /man hr
16-Sep-02	20:00 - 23:00	3.00	1	64.5	464	555	25	95	104	**0.045**	**0.20**	**4.91**	**4.47**	5.5	6.6
17-Sep-02	12:30 - 18:00	5.50	1	321.0	1,987	2,375	63	236	260	**0.026**	**0.12**	**8.41**	**7.65**	12.9	15.4
18-Sep-02	8:00 - 10:30	2.50	1	220.0	792	947	50	189	208	**0.053**	**0.24**	**4.19**	**3.81**	11.3	13.5
	Totals	11.00	3	606	3,244	3,877	138	520	572	**0.035**	**0.16**	**6.24**	**5.67**	10.5	12.6

Test Patches
ShengLie BeiJie
Shijiazhuang,
Hebei

Test Patch Date
17-Sep-02

Test Patch Number	Patch Width (m)	Patch Length (m)	Total Area m^2	Total Area ft^2 approx	RejuvaSeal Applied			Application Rate				
					US gals	litres	kilograms	USGal /ft^2	USGal /yd^2	Litres /m^2	m^2 /Litre	m^2 /Kg
One	1.00	1.00	1.00	11	0.05	0.20	0.22	**0.005**	**0.044**	**0.20**	**5.00**	**4.55**

FlowMeter Readings

	Time (sec)	Location	Location
17-Sep-02	**Time**	**Location**	**Location**
Untreated	**22**	**South End of Test Strip**	**0.5m of Shoulder (N.E. bound lane)**
Untreated	**>100**	**South End of Test Strip**	**3.0 m of Shoulder(N.E. bound lane)**
Untreated	**16**	**South End of Test Strip**	**4.2m of Shoulder (N.E. bound lane)**
17-Sep-02			
Treated	**47**	**South End of Test Strip**	**0.5m of Shoulder (N.E. bound lane)**
Treated	**72**	**South End of Test Strip**	**3.0m of Shoulder (N.E. bound lane)**

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal™
ShengLi BeiJie, Shijiazhuang, Hebei
Peoples Republic of China

September 2002

1.0 INTRODUCTION

Crown Capital Enterprise Limited of Hong Kong entered into an arrangement with the Highway Administration Department of Hebei Province, China in May 2002. This arrangement calls for the analysis of the performance of RejuvaSeal™, a sealer/rejuvenator for asphalt pavement on highways within Hebei Province.

Hebei Province is situated to the north of the Yellow River (HuangHe) at it's confluence with the Sea of Bohai. Hebei is bordered by Henan, Shanxi, Shandong and Liaoning Provinces as well as Mongolia. Furthermore, Beijing and TianJin and their independently administered Municipalities are hosted by 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. Shijiazhuang, lies some 165 kms southwest of TianJin and some 200 kilometres south of Beijing. Shijiazhuang is the capital city of Hebei Province with a population of approximately 3 million. See figure 1.0 for a map showing the location of Shijiazhuang and Hebei Province. The majority of the area lies at 10 to 20 metres in elevation, on the extensive plain that borders the Sea of Bohai. The regions' latitude (38 degrees north), mean that there are four seasons, with temperatures ranging from 45 Celsius in the long, hot summer to minus 5 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 Shijiazhuang area, a significant unconsolidated sedimentary sequence predominates and this is due to the site adjoining the delta of the Yellow River. The silt from the flooding that has occurred over several millennium and now obscures all outcrops. Drainage channels feeding into the Yellow River also afford no opportunities to see the bedrock. 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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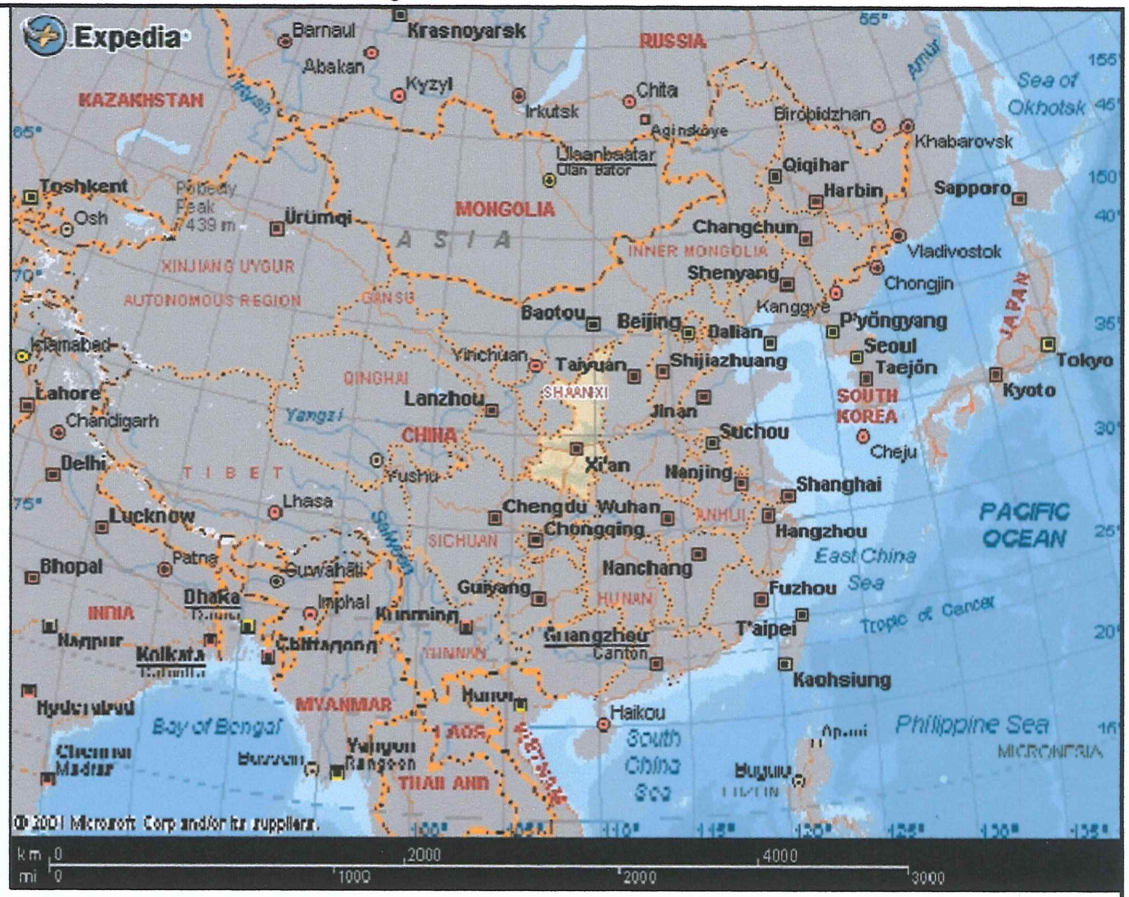

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DRAWN BY	Bb	02/08/20	PROJECT NO. B023G	

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Lamma, Hong Kong

REJUVASEAL DEMO

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HEBEI PROVINCE

GENERAL LOCATION MAP

DRAWING NO. FIGURE 1.0

REV. A

2.0 CO-OPERATIVE PROGRAM

The intent of the arrangement with Hebei Province is to demonstrate RejuvaSeal™ at different locations selected by the Highways Administration Bureau. The demonstration will subsequently allow analysis of the performance of Rejuvaseal™ on a variety of asphalt surfaces. A demonstration was undertaken on ShengLi BeiJie (Highway G107), in the northern sector of the city of Shijiazhuang, on September 16 thru 18, 2002. The portion of the street that was treated was composed of a 25mm asphalt pavement overlay of mid-2000 vintage. No details are known about the subgrade although it is presumed that an asphalt pavement underlay of indeterminate age exists. Knowing construction techniques in highways in China in general, minimal gravel would be used for an immediate coarse base, beneath the asphalt pavement. The surface of the asphalt was quite rough and concern had been expressed about rain and also street washing water percolating through the porous texture of the asphalt pavement and softening the sub-grade.

3.0 REJUVASEAL™

RejuvaSeal™ is a proprietary product that is supplied by Crown Capital Enterprise Limited of Wanchai, Hong Kong. Rejuvaseal™ has been proven in numerous applications in North and South America to rejuvenate asphalt pavement at various stages of its life and economically extend the life of the pavement. Rejuvaseal™ 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 provided to participants at a seminar held in Ping-Gu (Beijing Municipality) in August 2001. This outlines the experience with Rejuvaseal™ at various locations in North America and South America. Further information is available from Crown Capital Enterprise Limited. Rejuvaseal™ 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.

4.0 TEST PROGRAM

Since Hebei Province is located in a semi-tropical climate (Latitude: 38 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 Shandong), with some 10,000 kms of National and Provincial highway. The City of Shijiazhuang is responsible for 1000 kilometres of National Highway, and 800 kilometres of Provincial Highway, within it's jurisdiction (distances as of year-end 2000) and approximately 100 kms of streets in Shijiazhuang and other neighbouring communities

In view of this extensive network of roads and the relatively short life of the asphalt surface, Hebei is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, Hebei has agreed to try RejuvaSeal™ on the ShengLi BeiJie, in the northwest sector of the city of Shijiazhuang. The arrangement led to a committee being struck to suggest appropriate locations for the testing of RejuvaSeal™. See Figure 4.0, showing the location of this street with respect to Shijiazhuang and Hebei

On September 17, one test patch in the eastbound slow lane of the ShengLi BeiJie (four-lane street with paved shoulders, was treated with RejuvaSeal™. The test patch was at the following geographic location:

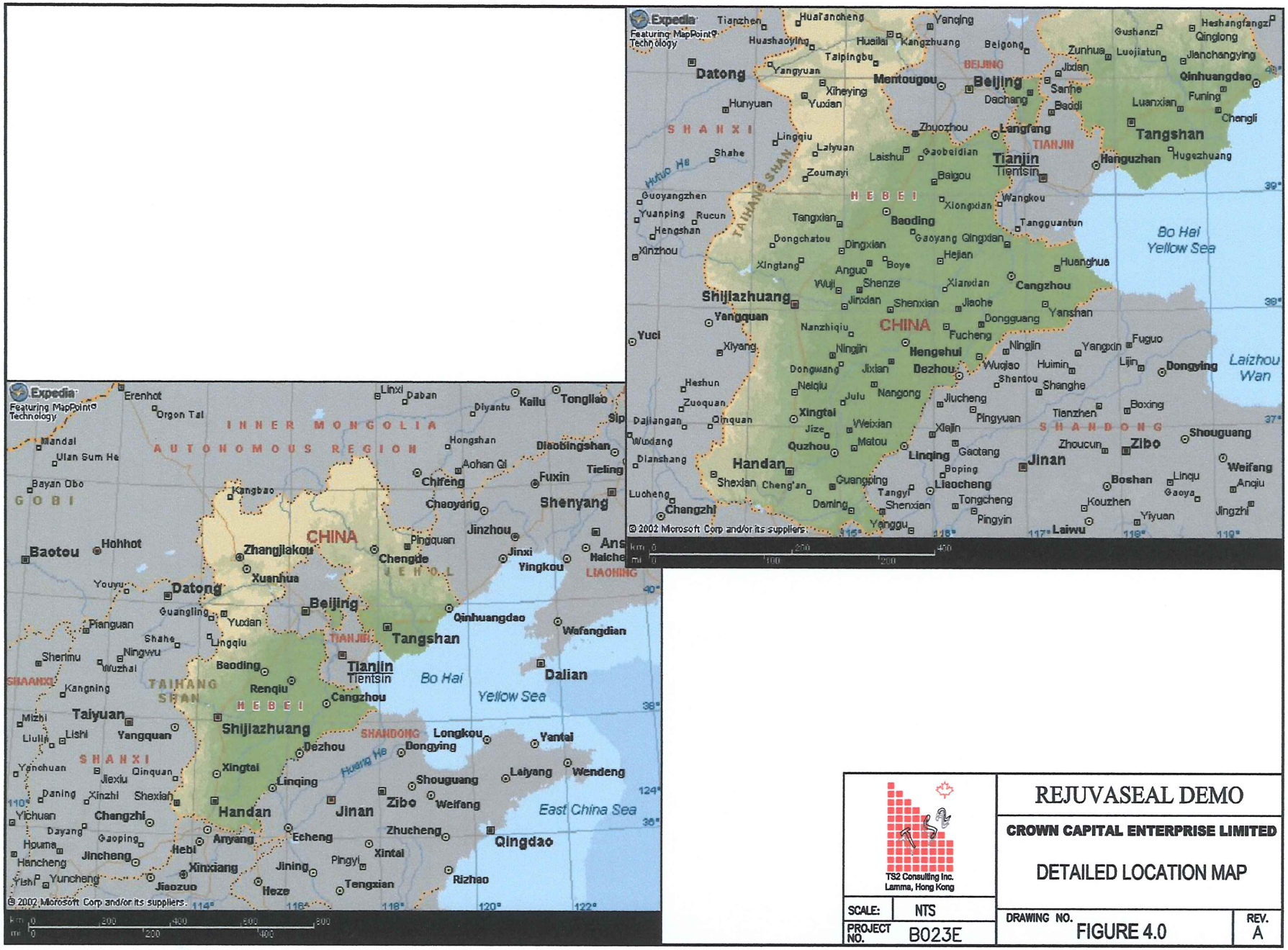
Table 4.1	**Geographic Location of Test Patch Site**	
System	**Northing**	**Easting**
Geographic (deg, min)	38^0 30.862'	116^0 52.302'
Universal Transverse Mercator Grid (50S) (metres)	4262910	0488814

See Figure No 4.1 for a photo showing the test patches as implemented. Particulars of the test patch are as follows:

Table 4.2				**Particulars of the test patch**						
Test Patch Number	**Patch Width (m)**	**Patch Length (m)**	**Total Area m^2**	**Total Area ft^2 approx**	**RejuvaSeal™ Applied**		**Application Rate**			
					Litres	**Kgs**	**US Gal /yd^2**	**Litres /m^2**	**m^2/Litre**	**m^2/Kg**
One	1.00	1.00	1.00	11	0.20	0.22	0.044	0.20	5.00	4.55

Subsequent inspection of the test patch on September 16, showed that the application rate of 4.55 m^2/kilogram was appropriate for the asphalt pavement at this location and could be used as a guide for other locations with similar physical characteristics.

Two demonstration sections were undertaken on ShengLi BeiJie, immediately north of HePing Dong Lu in the northern sector of the City of Shijiazhuang. The initial demonstration section was on both northbound lanes of this four-lane street and covered 385.5 metres. The second demonstration section was on the curb lane of the opposing southbound side and covered 220 metres. The asphalt pavement consists of a 25mm overlay on top of an older pavement of indeterminate age. See figure 4.0, which follows, for a location of the general locale. The location of the test patch with respect to the demonstration portion of the street is graphically shown in figure 4.1, which follows.



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REJUVASEAL DEMO

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DETAILED LOCATION MAP

SCALE:	NTS
PROJECT NO.	B023E

DRAWING NO. FIGURE 4.0

REV. A

Figure 4.1
Test Patch at Demonstration Site.

the demonstration section, on ShengLi BeiJie was selected by the Hebei Highway Administration Department and is geographically located as follows:

Table 4.3	Location of Demo Site	
System	**Northing**	**Easting**
Geographic (deg, min)	38^0 30.862'	116^0 52.302'
Universal Transverse Mercator Grid (metres) 50S	4262910	0488814

This is at the same location as the test patch. Refer to Figure 4.0 for the location. Work commenced on the demonstration section at 8:00 pm on September 16, following a sunny day, where the mid-day temperature reached 27 Celsius. An initial section, 64.5 metres long, on both northbound lanes of this four-lane street were treated. This initial section is located on a straight section. There is a slight camber to the road, which causes water to run off toward the shoulder, rather than puddle on the road. The asphalt surface on the section treated was reputedly a 2 years old overlay of 25 mm thickness. 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 some aging and oxidation of the bitumen, which extended to a depth of several millimetres. The entire portion of the treated street had an asphalt underlay that was purportedly 15 centimetres thick and underlain by a gravel base, which was on a compacted silty-clay, sub-grade. RejuvaSeal^{TM} was applied using paint rollers to ensure uniformity in the application. Overnight temperatures were in the 16 degree Celsius Range. This initial section reportedly took in excess of 10 hours to dry.

A second section, which was a continuation of the first section, was undertaken on September 17 and covered some 321 metres (231 metres north of the initial section and some 90 metres south of the initial section). Work commenced around 12:30 pm and continued until 6:00pm. The same specifics, as to asphalt pavement for the initial section are applicable. However this time the application rate was reduced considerably from 4.47 m^2/kg to 7.65 m^2/kg. RejuvaSeal^{TM} was applied using paint rollers to ensure uniformity in the application. Mid-afternoon temperatures were in the 25 degree Celsius Range. This second section dried in approximately 4 hours.

A third section, in the opposite southbound curb lane, was undertaken on September 18 and covered some 220 metres. Work commenced around 8:00 am and continued until 10:30am. The same specifics, as to asphalt pavement are also applicable. However this time the application rate was increased to 3.81 m2/kg, as drying time in the instance of the second section on September 17, was quite acceptable and it was believed that problems with the initial section (September 16) were related to high humidity and lower temperature (16 degrees Celsius, versus 25 degrees Celsius) PLUS the fact, that all the work was undertaken at night. RejuvaSeal^{TM} was applied using paint rollers to ensure uniformity in the application. Late-morning

temperatures were in the 25 degree Celsius Range. The drying time was approximately 6 hours.

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

Table 4.4				**Details of RejuvaSeal™ Demonstration Sections on ShengLi BeiJie**							
Date Sept	Work Schedule am/pm	Work Time (hrs)	Test Length (m)	Total Area m^2	RejuvaSeal Applied			Application Rate			
					US gals	litres	Kilo grams	USGal /yd^2	Litres /m^2	m^2 /Litre	m^2/Kg
16	20:00-23:00	3.00	65.5	464	25	95	104	**0.045**	**0.20**	**4.91**	**4.47**
17	12:30-18:00	5.50	321.0	1,987	63	236	260	**0.026**	**0.12**	**8.41**	**7.65**
18	08:00-10:30	2.50	220.0	792	50	189	208	**0.053**	**0.24**	**4.19**	**3.81**
	Totals	11.00	606.0	3,244	138	520	572	**0.035**	**0.16**	**6.24**	**5.67**

Photos showing the test application of RejuvaSeal™ follow in figures 4.2, 4.3 and 4.4. on the following pages.

The site was visited on September 19 around 9:15 am and a difference was readily perceived between the RejuvaSeal™ treated sections and the adjoining untreated lanes. A screwdriver was used to dig two small holes in the asphalt pavement, to a depth of 3 centimetres, some 100 metres south of the extreme north end of the demonstration section, to determine the penetration of the RejuvaSeal™. This was one day after the application of RejuvaSeal™ and at this location, the newly rejuvenated surface was evident, by the black resilient surface layer, which was now approximately 1 millimetre thick. Below that depth, the grey, oxidized layer of asphalt was evident.

Figure 4.2
Typical Application Procedure.

Figure 4.3 Finished Surface
Two Northbound Lane Segment

Figure 4.4 Finished Surface.
Southbound, Curb Lane Segment

4.1 RejuvaSeal™ Testing

To date the comparison of the asphalt treated with Rejuvaseal™ has been compared on a subjective basis over a very short period at the test site on ShengLi BeiJie. Testing equipment brought to the site for comparison on a more disciplined, objective basis solely consisted of an Outflow meter manufactured by Humble Equipment Co. of Reston, Louisiana, U.S.A. This was to establish the Water Dissipation (Hydroplaning Comparison).

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.

- Fuel Resistance Comparison
- Elasticity/Ductility Testing

4.2 Water Dissipation

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) was used to measure the asphalt pavement's capability to dissipate water, as concern has been expressed about hydroplaning on the RejuvaSeal™ treated surface, versus the untreated surface. 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. Initially readings were taken with this aforesaid Outflow Meter at four locations on the portion of the street selected for the test, in proximity to the test patches. These initial readings were taken at 8:00 am on September 17. The results are shown in the table that follows:

Table 4.5		**Outflow Meter Readings**		
Test Date	Location relative to north bound curb	Location relative to north bound lane segment	Before RejuvaSeal™ (secs)	After RejuvaSeal™ (secs)
Sept 17	0.5 m from curb	south end of strip	**22**	n/a
Sept 17	3.5 m from curb	south end of strip	**>100**	n/a
Sept 17	4.2 m from curb	south end of strip	**16**	n/a
Sept 17	0.5 m from curb	south end of strip	n/a	**47**
Sept 17	3.0 m from curb	south end of strip	n/a	**72**

Figure 4.5
Humble Equipment Co. Outflow Meter

TS2

4.3 Fuel Resistance Comparison

Fuel Resistance Comparison will be undertaken on several sections of the untreated and RejuvaSeal™ treated sections in close proximity to the Outflow meter tests in the near future. This comparison will consist of pouring about a cupful of diesel fuel onto the road surface and then later checking the penetration of the fuel. If the fuel readily penetrated the asphalt pavement surface, then resistance to this form of chemical attack was presumed to be lower than if the fuel pooled on the surface of the asphalt pavement and slowly evaporated.

4.4 Elasticity/Ductility Testing

This aspect of the testing is beyond the capabilities of the field equipment available to both Crown Capital Enterprise Limited and RejuvaSeal™ personnel and as such, external assistance has been sought from outside experts in the field of Asphalt Testing. To this end, the City of Shijiazhuang has contacted an independent laboratory for advise on asphalt pavement testing.

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.

Figure 5.0 Project Completion Schedule

CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

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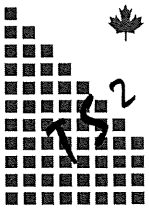

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Appendix A

Rejuvaseal[tm] – Technical Seminar,
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WANCHAI, HONG KONG

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Appendix B

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