

**CROWN CAPITAL ENTERPRISE  
LIMITED**

**WANCHAI, HONG KONG**

**Demonstration of RJSeal™  
ShiDa Road, Hangzhou, ZheJiang,  
Peoples Republic of China**

**December 2005**



**TS² Consulting Inc.  
Lamma, Hong Kong**

# TS<sup>2</sup> CONSULTING INC. <

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

**China** (Office)  
4<sup>th</sup> Floor, Bldg No. 042,  
Shang Xian Lu  
San Liao, Wang Jiang  
HuiZhou, Guangdong,  
Peoples Republic of China,  
516003.  
Phone: (86-752)-281-3573  
Mobile: (86)-1362-949-8994  
Email: [speed\\_cny@yahoo.co.uk](mailto:speed_cny@yahoo.co.uk)

**Canada** (Liaison Office)  
1016 Cannock Road, S.W.  
Calgary, Alberta,  
Canada, T2W 1M5  
Phone (403)-238-1809  
Fax: (403)-281-3043  
Cellular: (403)-630-7846  
Email: [speed\\_cny@yahoo.co.uk](mailto:speed_cny@yahoo.co.uk)



广东省惠州市望江上坊上先路42号4楼

January 16, 2006

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

Attn: Charence Chiang  
General Manager

Dear Charence

Re: Inspection of RJSeal Demo Section – ShiDa Highway – Hangzhou, Zhejiang

An inspection of the RJSeal Demo Section on the ShiDa Highway on the northside of Hangzhou, Zhejiang Province was undertaken on January 11, 2006, in conjunction with Mr. Jiang, the local agent from Hangzhou and also Paul Li from your office. The demonstration section is on the exit ramp from the ShiDa Highway onto the HuHan Expressway, nominally at the following location:

<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>
Start off Test Strip	30 deg 20.947 min	120 deg 16.113 min
End of Test Strip	30 deg 20.727 min	120 deg 16.170 min

This exit ramp has earned the nickname of "Devils Corner" by the road maintenance company (Hangzhou Shida Highway Co. Ltd.). It is approximately 2 kilometres north of the toll booths on this highway and originally had two lanes throughout the extent of the exit ramp (it now has two lanes that merge into one lane). The demonstration section covers the entire exit ramp. In the past, a small sign indicated that the speed limit was 40 kph on the curve, but motorists ignored this and the end result was numerous vehicles traveling at high speed (>100 kph), losing control on the corner (sharp right hand curve) and crashing into the outside guard-rail and impact with other vehicles or upset and further impact with the guard-rails.

This location has had a significant number of accidents and the intent of the RJSeal/slag demonstration was to show that the skid resistance of the road surface could be improved. Whilst a significant amount of slag was spread by hand at the time of the RJSeal application on December 6 and 7, 2006, a rubber tired roller was not available and consequently most of the copper slag that was spread was consequently swept aside by the vehicles once traffic was re-instated on the demonstration section.

Following the RJSeal application on December 6 & 7, further accidents have occurred and at the inspection on January 11, new guardrail was evident on the outside of the curve and even some portions of the inside of the curve. An attempt by the road maintenance company to increase the skid resistance was the application of a milling machine to roughen the surface. Furthermore a larger sign to indicate that the speed limit is 40 kph has been installed and flashing lights have been affixed to both the inner and outer guard-rails, however it would appear that the drivers continue to ignore the posted speed limit and the fact that the curve is now well defined (flashing lights, chevron marked signs, etc). 'Rumble patches' at the beginning of the entry onto the ramp are insignificant and should be replaced by more functional full-width exaggerated rumble strips. However this aspect is beyond the responsibility of Crown Capital.

During the inspection on January 11, 2006, some five (5) tonnes of copper slag was delivered at 9:30 am to the jobsite and some two (2) tonnes was spread by hand by hand, on the inside lane of this curve and then rolled, with an eleven (11) tonne, rubber tired roller. The road surface temperature was around 0 Celsius and the slag was in fact frozen. Consequently the slag was not able to be squashed into the frozen road surface and the original thesis that the road surface would be warmed up by the sun and allow the slag to be embedded in the road, was thwarted when the highway police arrived at 10:00 am and told the workers to sweep the slag off the road and then re-open the lane. I did some test work at the commencement of the RJSeal demonstration section on the outside (slow) lane and conducted a sand patch test to measure the macrotexture and outflow meter test to determine the hydroplaning potential of the road surface.

The sand patch test that I conducted, corroborated that the surface is smooth, with the patch being nominally 355 mm in diameter (Depth of Texture is 0.25 mm) and the outflow meter gave readings of 17 seconds and 19 seconds respectively for the two tests. (see appended photo showing test). Test results at the time of the RJSeal application on December 10/11 were quite different, with 'Depth of Texture' in the range of 0.30 to 0.42 mm following the RJSeal Application.

A meeting after lunch was held with Ms. She Jia Ying, the Deputy Director of the Hangzhou Shida Highway Co. Ltd and the entire problem discussed quite frankly. I'll leave Paul Li to give you the gist of the discussions at the meeting with Ms. She. However it would appear that a combination of factors led to troubles at this location:

1. Temperature of road surface was low (6 Celsius to 14 Celsius) at the time of the RJSeal application
2. RJSeal did not have enough opportunity to soften the bitumen due to low temperature.
3. A rubber tired roller to follow-up the copper slag application was not available (the owner declined to supply the roller)
4. Slag spread by hand was not embedded in the road surface, but swept aside by passing vehicles
5. Curve is notorious for accidents due to drivers continuing to exit at high speed, despite posting of lower speed limit

I would assume that Mr. Jiang the local agent will continue to lobby the Hangzhou Shida Highway Co. Ltd. to use RJSeal in the future, but my general impression is that the notoriety from a multiple fatality accident on the RJSeal Demonstration Section on the Shang San Highway in late 2003 (early 2004 ??) and the poor choice for an RJSeal demonstration (Devils's Curve) on the ShiDa Highway, mean that officials will be reluctant to endorse the use of RJSeal in the future.

Photo's of the inspection on January 11 are appended, as well as two powerpoint figures showing the location of the RJSeal job.

Sincerely



---

Ir Anthony G. Speed, MHKIE  
P. Eng. (Ontario & New Brunswick, Canada)

c/c: Paul Li

Attachments

1. ShiDa Road. Figure No. 1
2. ShiDa Road. Figure No. 2
3. Photograph – Sand Patch Test – January 11, 2006
4. Photograph – Outflow meter Test – January 11, 2006



Crown Capital Enterprise Limited.

RUS Seal Demo  
ShiDa Road, Hangzhou  
2005-12-6 / 7  
Prepared by: XiQuan  
4-Jan-06  
Updated: A.G. Speed

Job	No	Origin
Disco Op	1	Beijing Crew
Disco Helper	1	Beijing Crew
Truck Driver	1	Beijing Crew
Labourers	6	Local Crew
Supervisor	1	Local Crew
Total	10	

Note: One Disco on this job

Conversion Factors
US Gallon= 3.78
Sq Metre= 10.76
Sq Metre= 1.20
One Litre= 1.06
One Bbl= 200

Slag (Kgs)
625
625

RUS Seal
358
357

Assumptions
Area (sq m) 1,884.52
Width (m) 4.4
Length (m) 428.3
Day 6-Dec-05
7-Dec-05

Summary
two thru four
two thru four

Street Name
ShiDa Road
ShiDa Road

Weather Conditions
6-Dec-05 Celsius etc
7-Dec-05 Celsius etc
10 12
5 6
14 15
6 6
40% 40%
Weather sunny
Drying time 5

Weather Conditions
Air Temperature Max
Air Temperature Min
Road Surface Temp - Max
Road Surface Temp - Min
Relative Humidity
Weather sunny
Drying time 5

Work Schedule		Work Time	Work Time (hours)	Test Length metres	Total Area m <sup>2</sup>	Total Area yds <sup>2</sup>	RejuvaSeal Applied			Application Rate			Slag Application	
		am/pm					US gals	litres	kilograms	USGal/yd <sup>2</sup>	Litres/m <sup>3</sup>	m <sup>2</sup> /Litre	m <sup>2</sup> /Kg	Kgs
		am/pm												Kgs/sq m
6-Dec-05		8:30 - 12:00	3.50	428	1 885	2 253	89	338	358	0.04	0.18	5.58	5.26	625
7-Dec-05		8:30 - 12:00	3.50	428	1 885	2 253	89	337	357	0.04	0.18	5.60	5.28	625
Totals			7.00	857	3 769	4 505	178	675	715	0.04	0.18	5.59	5.27	1 250
														0.33

Notes:  
One Disco on this job  
One Asphalt Paver and 6 times years old  
This application job used crack padded impregnant is 20kg  
Start off Test Strip 30 deg 20.347 min 120 deg 16.113 min  
End of Test Strip 30 deg 20.227 min 120 deg 16.170 min

First Day Testing result:

Sand Patch Test													
Location	Test Date	Lane	Wheel Path	Sample No.	Diameter of Sand Patch				Texture depth		Direction of Traffic		
					D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	Average (mm)	(mm)			
K000+10	6-Dec-05	Middle Lane	left wheel path	1	310	350	340	310	327.50	0.3	Eastbound		
	6-Dec-05	Middle Lane	right wheel path	1	250	270	260	260	260.00	0.47	Eastbound		
	6-Dec-05	Middle Lane	left wheel path	1	270	270	260	280	270.00	0.44	Eastbound		
	6-Dec-05	Middle Lane	right wheel path	1	250	260	250	260	255.00	0.49	Eastbound		
(After RJ Seal & Slag)													
K000+10	6-Dec-05	Middle Lane	left wheel path	1	310	300	310	300	305	0.34	Eastbound		
	6-Dec-05	Middle Lane	right wheel path	1	260	270	280	280	272.5	0.43	Eastbound		
	6-Dec-05	Middle Lane	left wheel path	1	280	280	280	270	277.5	0.41	Eastbound		
	6-Dec-05	Middle Lane	right wheel path	1	270	250	250	260	257.5	0.48	Eastbound		
Water Penetration													
Location	Test Date	Lane	Wheel Path	min/min	Direction of Traffic		British Pendulum		(Before RJ Seal)		Wheel Path	BPN	Direction of Traffic
							Location	Test Date	Lane				
K000+10	6-Dec-05	Middle Lane	left wheel path	0	Eastbound		K000+10	6-Dec-05	Middle Lane	left wheel path	38	Eastbound	
	6-Dec-05	Middle Lane	right wheel path	0	Eastbound		K000+10	6-Dec-05	Middle Lane	right wheel path	38	Eastbound	
	6-Dec-05	Middle Lane	left wheel path	0	Eastbound		K000+120	6-Dec-05	Middle Lane	left wheel path	37	Eastbound	
	6-Dec-05	Middle Lane	right wheel path	0	Eastbound		K000+120	6-Dec-05	Middle Lane	right wheel path	36	Eastbound	
(After RJ Seal)													
K000+10	6-Dec-05	Middle Lane	left wheel path	0	Eastbound		K000+10	6-Dec-05	Middle Lane	left wheel path	39	Eastbound	
	6-Dec-05	Middle Lane	right wheel path	0	Eastbound		K000+10	6-Dec-05	Middle Lane	right wheel path	40	Eastbound	
	6-Dec-05	Middle Lane	left wheel path	0	Eastbound		K000+120	6-Dec-05	Middle Lane	left wheel path	39	Eastbound	
	6-Dec-05	Middle Lane	right wheel path	0	Eastbound		K000+120	6-Dec-05	Middle Lane	right wheel path	39	Eastbound	

British Pendulum Test	Location	Test Date	Lane	Wheel Path	min/min	Direction of Traffic
	K000+10	6-Dec-05	Middle Lane	left wheel path	38	Eastbound
	K000+10	6-Dec-05	Middle Lane	right wheel path	38	Eastbound
	K000+120	6-Dec-05	Middle Lane	left wheel path	37	Eastbound
	K000+120	6-Dec-05	Middle Lane	right wheel path	36	Eastbound

British Pendulum Test	Location	Test Date	Lane	Wheel Path	min/min	Direction of Traffic
	K000+10	6-Dec-05	Middle Lane	left wheel path	39	Eastbound
	K000+10	6-Dec-05	Middle Lane	right wheel path	40	Eastbound
	K000+120	6-Dec-05	Middle Lane	left wheel path	39	Eastbound
	K000+120	6-Dec-05	Middle Lane	right wheel path	39	Eastbound

10 Man Crew	m <sup>2</sup> /man hr	yd <sup>2</sup> /man hr
	53.8	64.4
	53.8	64.4
	53.8	64.4

# CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RJSeal™  
ShiDa Road, Hangzhou, ZheJiang,  
Peoples Republic of China

December 2005

## TABLE OF CONTENTS

Section	Description	Page
1.0	Introduction	1
2.0	Co-operative Program	3
3.0	RJSeal™	4
3.1	Prior Experience	4
4.0	Test Program	5
4.1	RJSeal™ Testing	12
4.2	Water Dissipation	12
4.3	Water Penetration	14
4.4	MacroTexture Depth Comparison	14
4.5	Skid Resistance	17
4.6	Ductility/Penetration/Viscosity Testing	17
5.0	Project Completion Schedule	19
6.0	Statement of Qualifications	21

## FIGURES

No.	Description	Page
1.0	General Location Map	3
4.0	Specific Location Map	6
4.1	Test Strip At Demonstration Site	7
4.2	Typical Application Procedure	9
4.3	Slag Application – Km 0+010	10
4.4	Finished Surface – Km 0+010	11
4.5	Humble Equipment Co. Outflow Meter	13
4.6	Water Penetration Meter	15
4.7	Sand Patch Test	16
4.8	British Pendulum Test	18
5.0	Project Completion Schedule	20

## TABLES

No.	Description	Page
4.1	Geographic Location of Test Strip	5
4.2	Geographic Location of Demonstration Section – Km 0+010	5
4.3	Particulars of Demonstration Section – Km 0+010	8
4.4	Outflow Meter Test results	12
4.5	Water Penetration Test results	14
4.6	Sand Patch Test results	14
4.7	British Pendulum Test results	17

# CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RJSeal™  
ShiDa Road, Hangzhou, ZheJiang,  
Peoples Republic of China

December 2005

## APPENDICES

No.	Description
A	RJSeal™ – Descriptive Literature
B	Desco D200 Sprayer Technical Specifications
C	Kunming Copper Slag – Technical Specifications



TS² Consulting Inc.  
Lamma, Hong Kong

# **CROWN CAPITAL ENTERPRISE LIMITED**

**Demonstration of RJSeal™  
ShiDa Road, Hangzhou, Zhejiang  
Peoples Republic of China**

**December 2005**

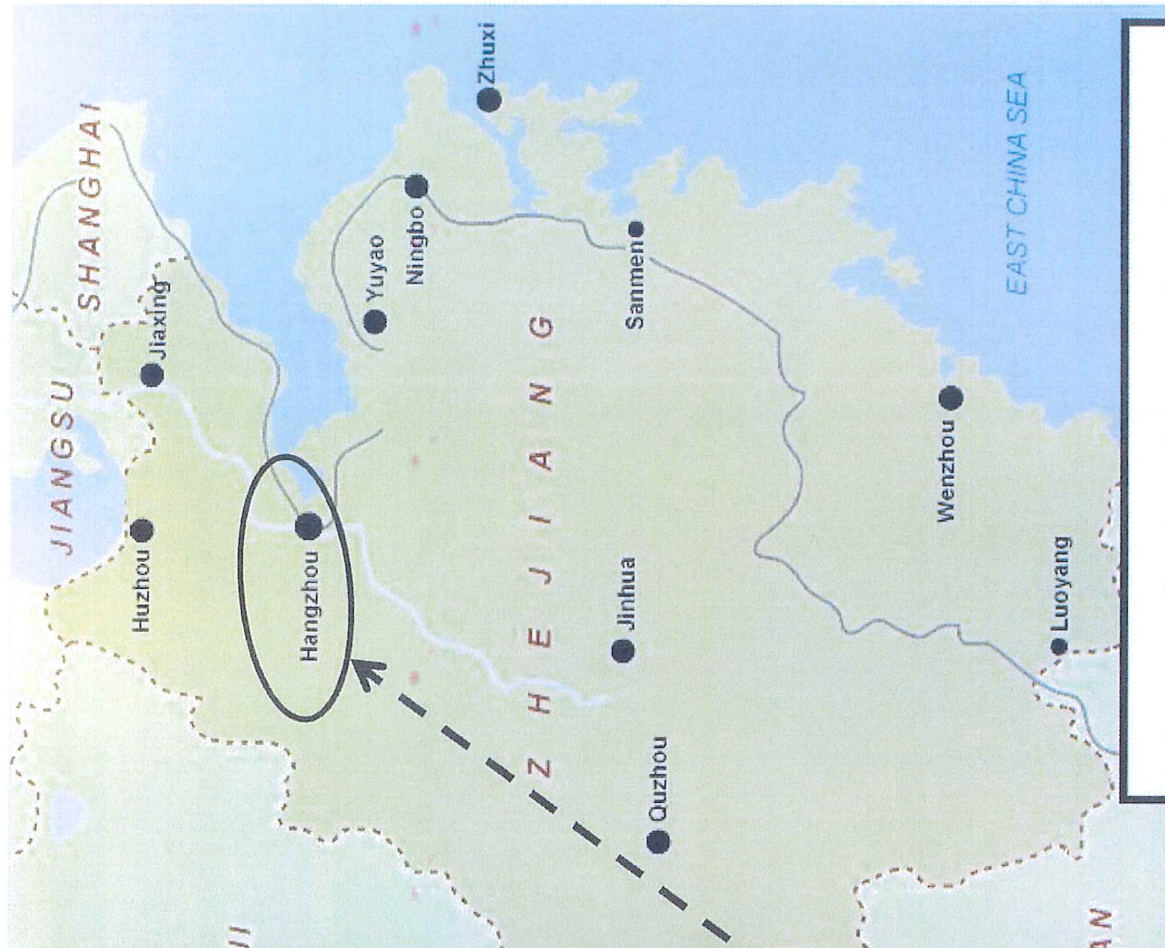
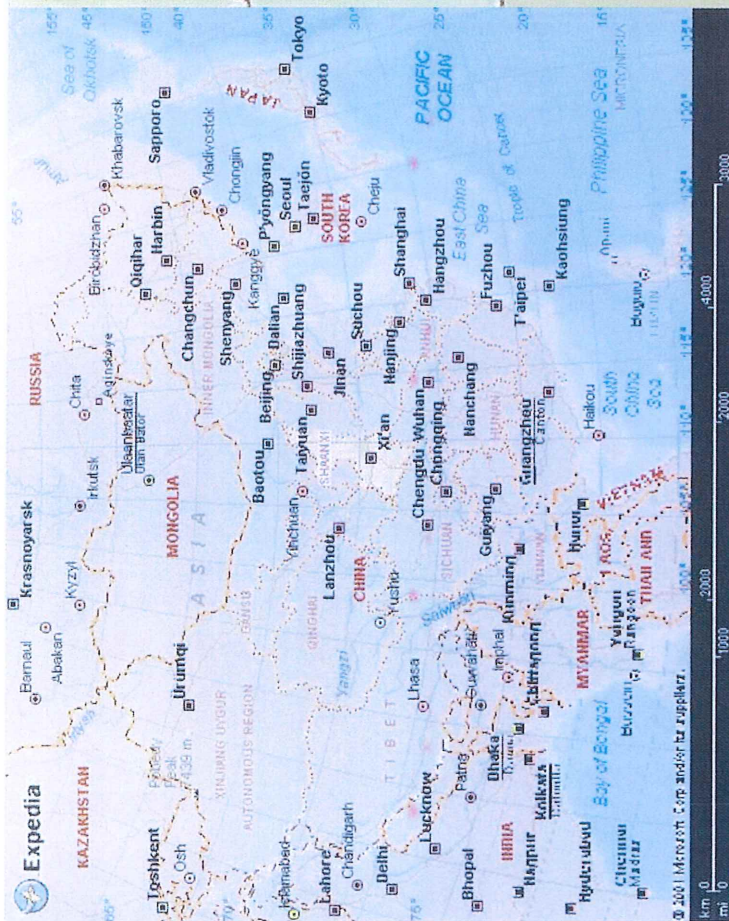
## **1.0 INTRODUCTION**

Crown Capital Enterprise Limited of Hong Kong entered into an arrangement with the Hangzhou ShiDa Highway Co. Ltd. in Zhejiang Province, China in December 2005. This arrangement calls for the analysis of the performance of RJSeal™, a sealer/rejuvenator for asphalt pavement on highways within the Hangzhou ShiDa Highway Co. Ltd. administrative district.

Zhejiang Province is situated immediately south of the municipality of Shanghai, which straddles the Yangtze (Chiang Jiang) River at its mouth that enters the East China Sea. Zhejiang has a lengthy history related to the sea, with fishing villages and ports along the coastline that have supported trade with foreign countries since recorded time. Zhejiang province is bordered by Anhui, JiangXi and Fujian Provinces as well as Shanghai Municipality. The province is generally quite mountainous and the principal city is Hangzhou, which has a population of approximately 3 million and is also the capital city. Hangzhou was already a city of note in the Song Dynasty and Marco Polo languished there and wrote of the beauty of the West Lake and the surrounding area. Hangzhou lies some 200 kilometres south of Shanghai. See figure 1.0 for a map showing the location of Hangzhou and Zhejiang Province. The majority of the area lies at 60 to 70 metres in elevation. The regions' latitude (30 degrees north), mean that there are four seasons, with temperatures ranging from 45 Celsius in the long, hot summer to minus 2 Celsius in the short winter. There is a rainy season per-se, that occurs primarily in May thru August, but can extend into September and throughout the winter there are numerous showers and thunderstorms

In the immediate Hangzhou area, a significant consolidated sedimentary sequence predominates. Due to mountain building a significant number of hills and small mountains prevail, that have been gradually eroded and afford excellent opportunities to see the bedrock. The asphalt in the area is manufactured from local materials, which is comprised of crushed and screened sandstone hauled in from local quarries, as well as washed gravels from the various rivers. The bitumen binder for the asphalt is sourced from various locations. Since Zhejiang Province borders the East China Sea, the possibility of bitumen being sourced from offshore is a distinct possibility so refineries in Singapore and the like should not be forgotten.



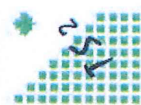


# Crown Capital Enterprise Limited

ShiDa Rd - Hangzhou

General Location Map

Figure 1.0



## **2.0 CO-OPERATIVE PROGRAM**

The intent of the arrangement with Hangzhou ShiDa Highway Co. Ltd. in Zhejiang Province is to demonstrate RJSeal™ at different locations selected by the RaoChen City Expressway Company. The demonstration will subsequently allow analysis of the performance of RJSeal™ on a variety of asphalt surfaces. A demonstration was undertaken on the ShiDa Road, near the city of Hangzhou, on December 6 and 7, 2005.

The portion of ShinDa Road at Kilometre marker 0+010 that was treated, was of mid-2001 vintage and was at grade. Knowing construction techniques in highways in China, the portion on grade would have minimal gravel in the immediate coarse base, beneath the asphalt pavement. The surface of the asphalt was quite smooth with some lateral and longitudinal cracks and concern had been expressed about water percolating through the asphalt pavement and 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 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 prepared by Crown Capital Enterprise Limited. This outlines the experience with RJSeal™ at various locations in China, 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 fifty (50) locations in China and over sixty (60) commercial-scale applications have taken place at several locations in Zhejiang Province and elsewhere, including Shanghai and Kunming.



#### 4.0 TEST PROGRAM

Since Zhejiang Province is located in a semi-tropical climate (Latitude: 30 degrees North) at a low altitude (50 to 70 metres), it's a demanding setting for asphalt, given the year round warm climate (extremes of 45 Celsius in summer and minus 2 Celsius in the winter) and intense exposure to ultraviolet radiation, all which contribute to the oxidation and breakdown of the asphalt binder.

Zhejiang has the significant concentration of highways in China with some 4,000 kms of national and provincial highway. Hangzhou ShiDa Highway Co. Ltd. is responsible for over 150 kilometres of Provincial Highway, within its jurisdiction (distances as of year-end 2003).

In view of this network of roads and the relatively short life of the asphalt surface Hangzhou ShiDa Highway Co. Ltd. is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, Hangzhou ShiDa Highway Co. Ltd. has agreed to try RJSeal™ on the ShiDa Road. See Figure 4.0, showing the location of this highway with respect to Hangzhou and Zhejiang

On December 6, a test strip at kilometre marker 0+010, on the Eastbound ramp from this street onto the HuHan, divided highway was treated with RJSeal™. This test strip was at the following geographic location:

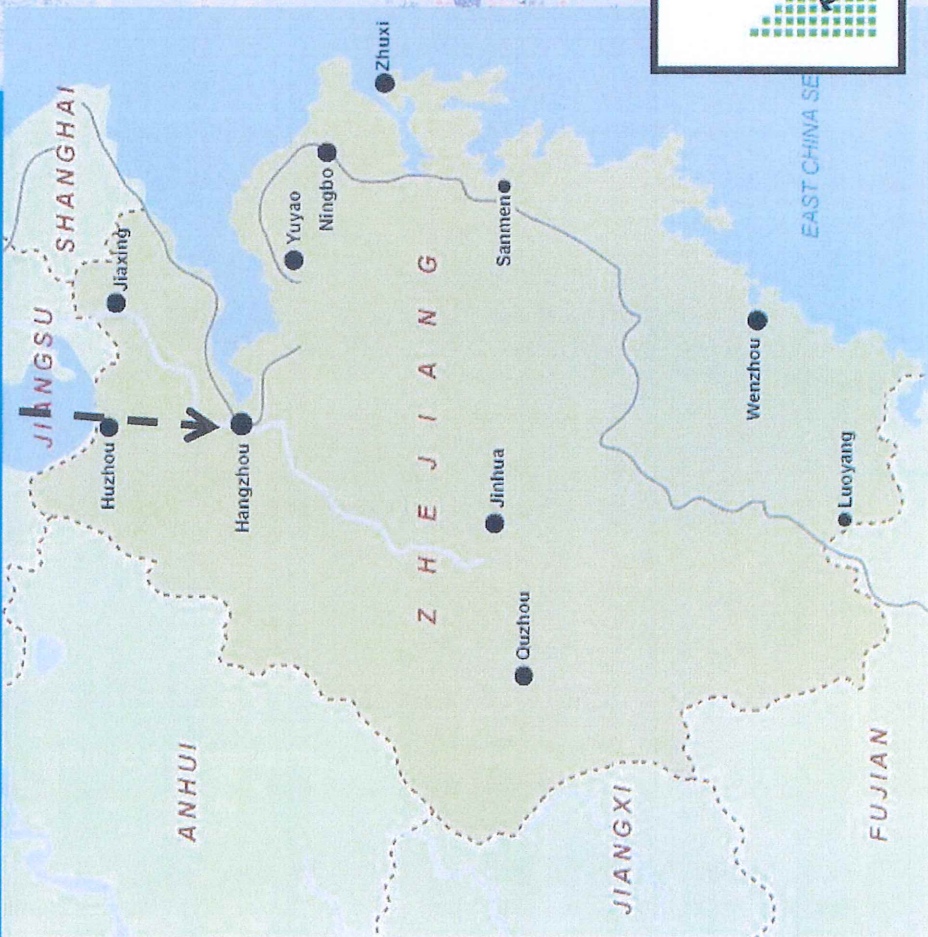
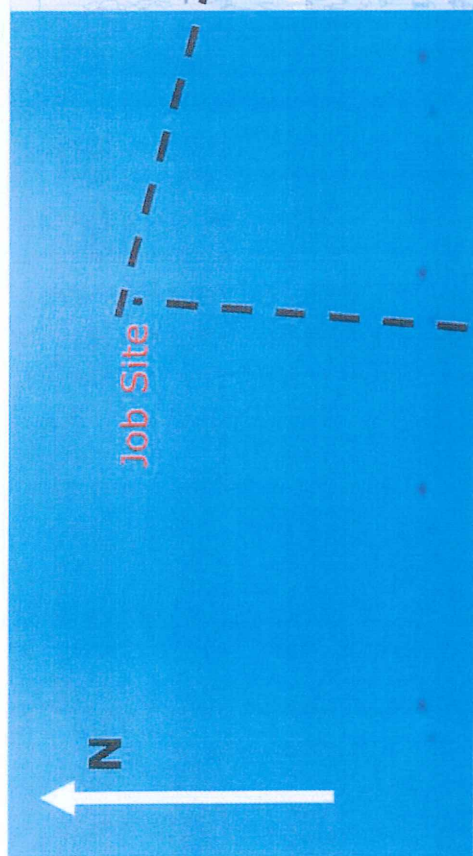
<b>Table 4.1 Kilometre 0+000 - Test Strip</b>		<b>Geographic Location of Test Patch Site</b>	
<b>Loc'n</b>	<b>System</b>	<b>Northing</b>	<b>Easting</b>
South End	Geographic (deg, min)	30 <sup>0</sup> 20.947'	120 <sup>0</sup> 16.113'
	Universal Transverse Mercator Grid (51R) (metres)	3360647	0237436

This test patch showed that an application rate of 5.0 m<sup>2</sup>/kg would be appropriate for the road surface at this location. See figure 4.1, which follows, for a depiction of the general locale for the test strip.

The Test Strip undertaken on December 6 & 7, 2005 was 428 metres long and was located on the Eastbound exit ramp of the ShiDa Road onto the HuHan Expressway at the location shown in Table 4.2 which follows:

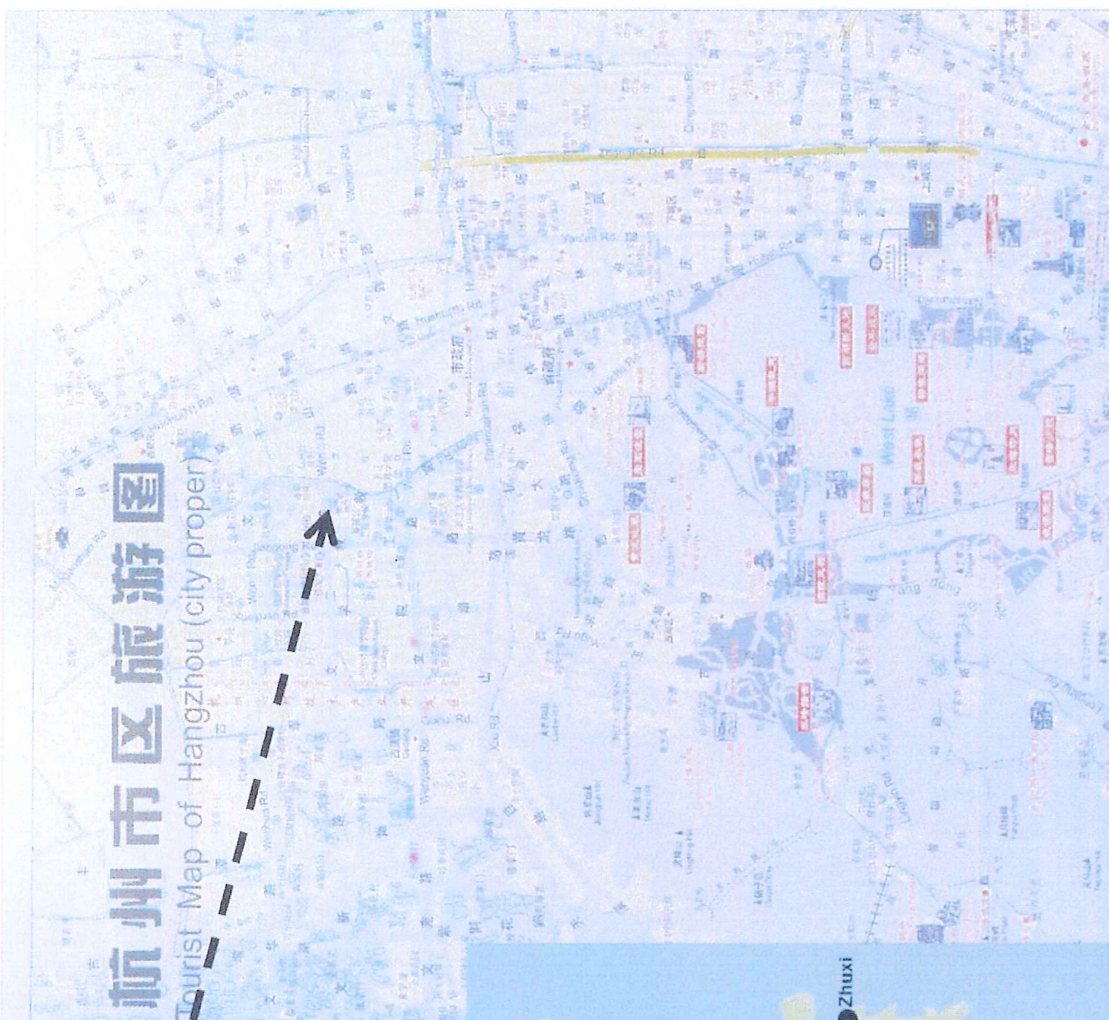
<b>Table 4.2 Kilometre 0+010 – Demonstration ShinDa Street</b>		<b>Geographic Location of Test Strip Site</b>	
<b>Loc'n</b>	<b>System</b>	<b>Northing</b>	<b>Easting</b>
North End	Geographic (deg, min)	30 <sup>0</sup> 20.947'	120 <sup>0</sup> 16.113'
	Universal Transverse Mercator Grid (51R) (metres)	3360647	0237436
South End	Geographic (deg, min)	30 <sup>0</sup> 20.727'	120 <sup>0</sup> 16.170'
	Universal Transverse Mercator Grid (51R) (metres)	3360239	0237516





## 杭州市区旅游图

Tourist Map of Hangzhou (city proper)



**Crown Capital Enterprise Limited**

ShiDa Rd RJSeal Demo Site

Specific Location Map

Figure 4.0





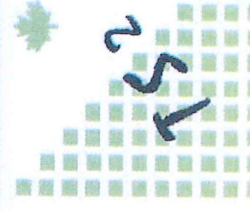


Figure 4.1 Test Strip at Application Site

Work commenced on the demonstration section at 8:30 am on December 6, on an overcast morning with an early-morning temperature of 5 Celsius that subsequently warmed up to 10 Celsius by noon. The road section selected for the demonstration was on the two lane eastbound exit ramp onto the HuHan, four lane divided highway. The ramp had a slight camber that also ensured that water would not 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 some aging and oxidation of the bitumen, which extended to a depth of several millimetres. The entire portion had an asphalt underlay that was purportedly 25 centimetres thick and underlain by a gravel base, which was on a compacted silty-clay, sub-grade. No particulars were known about the asphalt pavement on the elevated portion in terms of thickness. The asphalt pavement on the section treated was reputedly 3 years old.

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

<b>Table 4.3</b>				<b>Details of RJSeal™ Demonstration Section on ShiDa Road</b>							
Schedule	Work Time	Work Time (hrs)	Test Length (m)	Total Area m <sup>2</sup>	RJSeal™ Applied			Application Rate			
					US gals	litres	Kilo grams	US Gal /yd <sup>2</sup>	Litres /m <sup>2</sup>	m <sup>2</sup> /Litre	m <sup>2</sup> /Kg
Dec 6	08:30-12:00	3.50	428	1,885	89	338	358	0.04	0.18	5.58	5.26
Dec 7	08:30-12:00	3.50	428	1,885	89	337	357	0.04	0.18	5.60	5.28
Totals		7.00		26,479	3,769	178	675	715	0.04	0.18	5.59

Photos showing the application of RJSeal™ follow in figures 4.2, 4.3 and 4.4 on the following pages. Copper slag was applied to improve the skid resistance, see figure 4.3 showing the application of the copper slag.

The site was visited on December 8, 2004 around 10:00 am and a difference was readily perceived between the RJSeal™ treated sections and the untreated lane, just north of the test section.





Figure 4.2 Typical Application Procedure

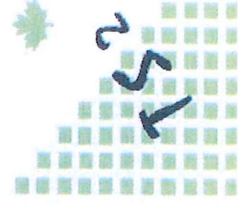






Figure 4.3 Copper Slag Application

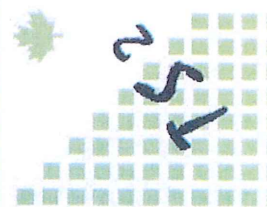
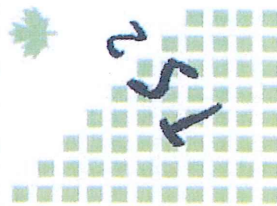






Figure 4.4 Finished Surface



#### 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 at the test site on ShiDa Road. Testing equipment that 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 Susceptibility
- Water Penetration
- Macrotexture Depth
- Skid Resistance
- Ductility/Penetration/Viscosity 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" was 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 pavement surface, if hydroplaning is to be minimized.

Test Results from the Outflow Meter Testing are contained in the table that follows:

Table 4.4		Test Results from the Outflow Meter			
Location	Traffic Direction	Lane	Wheel Path	Before RJSeal™	After RJSeal™
				seconds	seconds
k000+10	Eastbound	Driving Lane	right	120	23
k000+120	Eastbound	Driving Lane	left	13	11
k000+10	Eastbound	Overtaking	right	14	11
k000+120	Eastbound	Overtaking	left	16	12

See figure 4.5 for a photo of the Outflow Meter in use at the demonstration site.



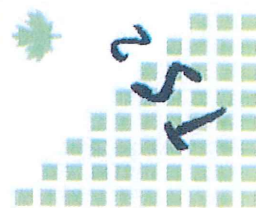
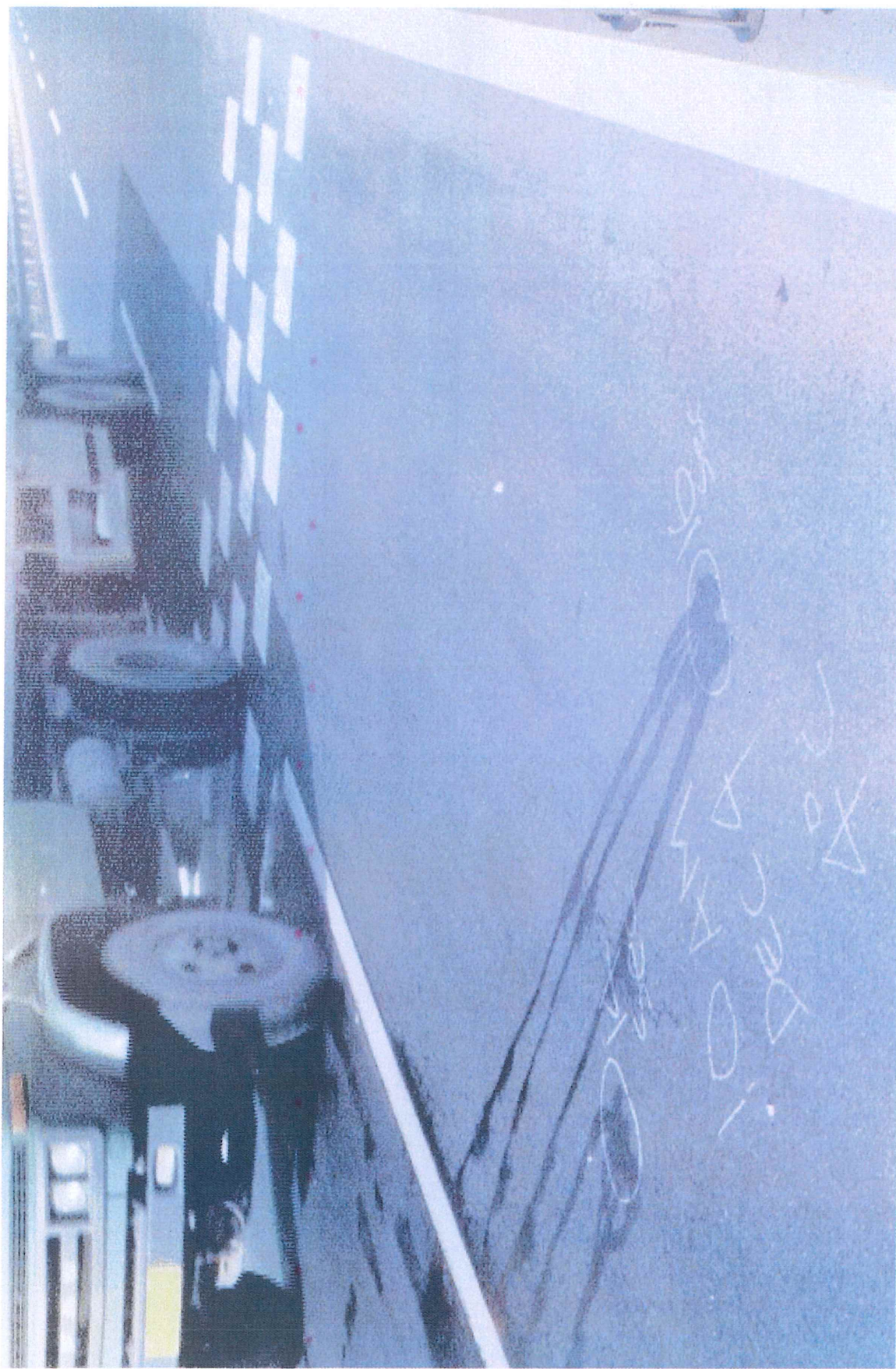


Figure 4.5 Outflow Meter Test



### 4.3 Water Penetration

Water penetration into the asphalt pavement is minimized by the application of RJSeal™. Water Penetration meter tests (China Testing Standard T 0730-2000) were undertaken on a section of the RJSeal™ treated section in close proximity to the Outflow meter test.

Test Results from the Water Penetration Testing are contained in the table that follows:

<b>Table 4.5</b>		<b>Test Results from the Water Penetration Meter</b>			
Location	Traffic Direction	Lane	Wheel Path	Before RJSeal™	After RJSeal™
				ml/min	ml/min
k000+10	Eastbound	Driving Lane	left	0	0
k000+10	Eastbound	Driving Lane	right	0	0
K000+120	Eastbound	Driving Lane	left	0	0
K000+120	Eastbound	Driving Lane	right	0	0
k000+10	Eastbound	Overtaking	left	0	0
k000+10	Eastbound	Overtaking	right	0	0
K000+120	Eastbound	Overtaking	left	0	0
K000+120	Eastbound	Overtaking	right	0	0

See figure 4.6 for a photo of the Water Penetration Meter in use at the demonstration site.

### 4.4 Macrotexture Depth Comparison

The sand patch test (ASTM Standard E965-96 OR China Standard T 0961-95) was undertaken on several sections of the untreated and RJSeal™ treated sections in close proximity to the Outflow meter tests.

Test Results from the Sand Patch Testing are contained in the table that follows:

<b>Table 4.6</b>		<b>Test Results from the Sand Patch Tests</b>			
Location	Traffic Direction	Lane	Wheel Path	Depth of Texture	
				Before RJSeal™	After RJSeal™
				mm	mm
k000+10	Eastbound	Driving Lane	left	0.30	0.34
k000+10	Eastbound	Driving Lane	right	0.47	0.43
K000+120	Eastbound	Driving Lane	left	0.44	0.41
K000+120	Eastbound	Driving Lane	right	0.49	0.48
k000+10	Eastbound	Overtaking	left	0.48	0.45
k000+10	Eastbound	Overtaking	right	0.47	0.42
K000+120	Eastbound	Overtaking	left	0.5	0.45
K000+120	Eastbound	Overtaking	right	0.39	0.36

See figure 4.7 for a photo of the Sand Patch testing at the demonstration site.

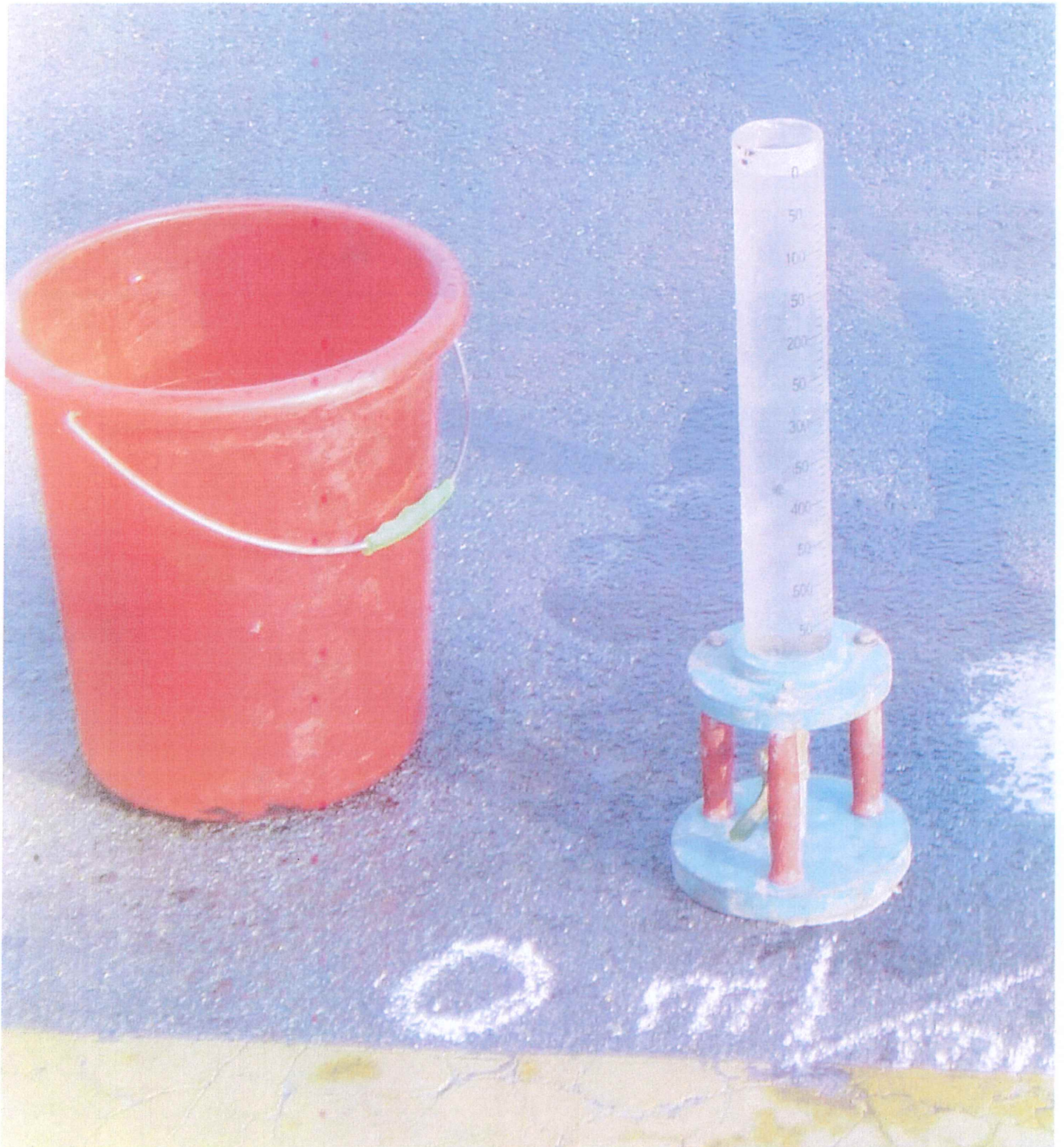


Figure 4.6 Water Penetration Test







Figure 4.7 Sand Patch Test

#### **4.5 British Pendulum Testing**

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:

<b>Table 4.7</b>		<b>Test Results from the Sand Patch Tests</b>			
Location	Traffic Direction	Lane	Wheel Path	British Pendulum #	
				Before RJSeal™	After RJSeal™
k000+10	Eastbound	Driving Lane	left	38	39
k000+10	Eastbound	Driving Lane	right	38	40
K000+120	Eastbound	Driving Lane	left	37	39
K000+120	Eastbound	Driving Lane	right	36	38
k000+10	Eastbound	Overtaking	left	39	40
k000+10	Eastbound	Overtaking	right	37	39
K000+120	Eastbound	Overtaking	left	39	41
K000+120	Eastbound	Overtaking	right	36	39

The test results from the British Pendulum are not directly correlatable with the sand patch test, or the Outflow Meter. 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 4.8 for a photo of the British Pendulum testing at the demonstration site

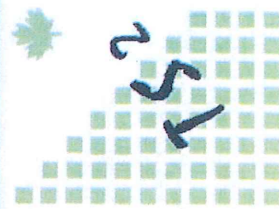
#### **4.6 Ductility/Penetration/Viscosity Testing**

This aspect of the testing requires specialized laboratory equipment and is beyond the capabilities of both Crown Capital Enterprise Limited and RJSeal™ personnel and as such, external assistance has been sought from outside experts in the field of Asphalt Testing. To this end, an independent laboratory has been contacted to undertake asphalt pavement testing.





Figure 4.8 British Pendulum

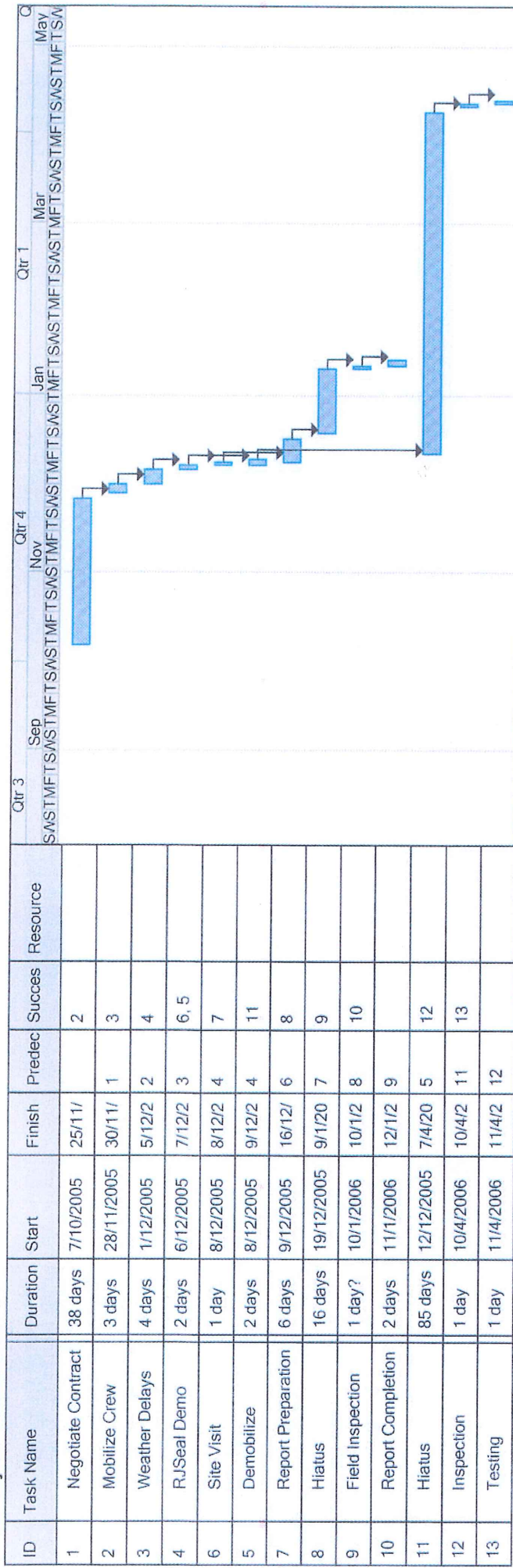


## **5.0 Test Completion Schedule**

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



# LiveProject - ShiDa Road



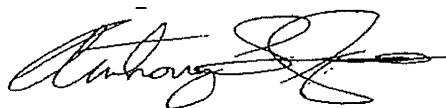
## 6.0 Qualifications

### STATEMENT OF QUALIFICATIONS

I, Anthony G. Speed of Hong Kong in the Special Administrative Region of China, DO HEREBY CERTIFY.

- I. THAT I am a Consulting Engineer, with offices at 2/F, 81 Po Wah Yuen, Lamma Island, Hong Kong
- II. THAT I am a 1968 graduate of the University of Saskatchewan, Canada with a Bachelor of Science Degree in Mining Engineering.
- III. THAT I am currently registered and in good standing as a Professional Engineer with the Association of Professional Engineers (PEO) of Ontario and the Association of Professional Engineers and Geologists of New Brunswick (APEGNB), Canada. I am a corporate member of the Hong Kong Institute of Engineers - Civil Engineering Division.
- IV. THAT my 37 years of continuous experience in mining, major civil engineering works (earth moving, highway and mining construction) has exposed me to a broad knowledge of mining and heavy civil engineering construction and allowed considerable familiarization with road construction and asphalt pavement.
- V. THAT this report is based on a visit on December 1 thru 4 to Hangzhou in Zhejiang Province to view the ShiDa Road as described in this report and data as provided by Xu Quan, secretary in the Beijing office of Crown Capital Enterprise Limited, as well as corroboration of the facts by Paul Li, project manager for Crown Capital Enterprise Limited on this particular RJSeal<sup>TM</sup> application.

Dated at Hong Kong, this \_\_\_\_\_ day of December, 2005



Ir Anthony G. Speed, MHKIE (Hong Kong), P.Eng. (PEO, APEGNB, Canada)



# **CROWN CAPITAL ENTERPRISE LIMITED**

## **WANCHAI, HONG KONG**

**Demonstration of RJSeal™  
ShiDa Road,  
Hangzhou, ZheJiang,  
Peoples Republic of China**

**December 2005**

### **APPENDICES**

<b>No.</b>	<b>Description</b>
A	RJSeal™ – Descriptive Literature
B	Desco D200 Technical Specifications
C	Kunming Copper Slag – Technical Specifications



**TS² Consulting Inc.  
Lamma, Hong Kong**

**CROWN CAPITAL ENTERPRISE  
LIMITED**

**WANCHAI, HONG KONG**

**Demonstration of RJSeal™  
ShiDa Road,  
Hangzhou, ZheJiang,  
Peoples Republic of China**

**December 2005**

**Appendix A**

**RJSeal™ – Descriptive Literature**



**TS² Consulting Inc.  
Lamma, Hong Kong**

**CROWN CAPITAL ENTERPRISE  
LIMITED**

**WANCHAI, HONG KONG**

**Demonstration of RJSeal™  
ShiDa Road,  
Hangzhou, ZheJiang,  
Peoples Republic of China**

**December 2005**

**Appendix B**

**Desco D200 Sprayer  
Technical Specifications**



**TS<sup>2</sup> Consulting Inc.  
Lamma, Hong Kong**

**CROWN CAPITAL ENTERPRISE  
LIMITED**

**WANCHAI, HONG KONG**

**Demonstration of RJSeal™  
ShiDa Road,  
Hangzhou, ZheJiang,  
Peoples Republic of China**

**December 2005**

**Appendix C**

**Kunming Copper Slag  
Technical Specifications**



**TS² Consulting Inc.  
Lamma, Hong Kong**