

**CROWN CAPITAL ENTERPRISE
LIMITED**

WANCHAI, HONG KONG

**Demonstration of Rejuvaseal™
Guang-Quin Expressway, Guangzhou,
GuangDong Province,
Peoples Republic of China**

December 2001



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

TS² CONSULTING INC.



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

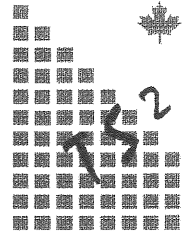
Hong Kong (Office)

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

中国云南昆明市人民中路丰国大厦2607室



December 20th, 2001

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

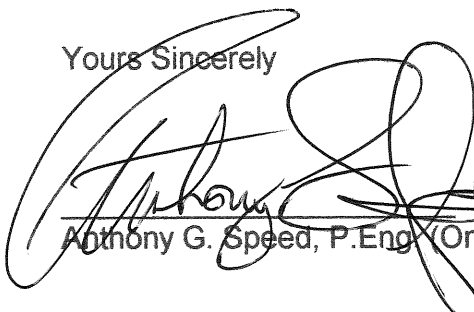
Attn: Charence Chiang
General Manager

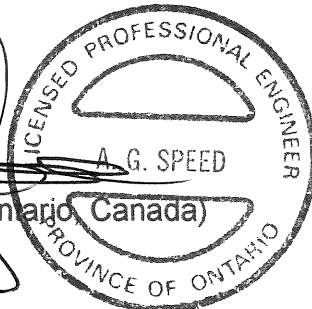
Dear Charence

Re: Demonstration of RejuvaSealTM on Guang-Quin Expressway, Guangdong

This is the final report on the demonstration of RejuvaSealTM on the Guang-Quin Expressway. A strip, 145.6 metres in length was completed in the outside, south bound lane of this four-lane divided expressway, in two phases. An initial 71.6 metres was completed on December 8th, 2001 and some 74.0 metres was completed during the second phase on December 14, 2001. I will submit a supplementary letter report on the follow up inspection that will be conducted in early 2002.

Yours Sincerely


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



Crown Capital Enterprise Limited.
RejuvaSeal Demo
Guang-Quin Expressway

Demo Dates 8-Dec-01 14-Dec-01
Prepared by A.G. Speed
Updated by A.G. Speed
Updated 20-Dec-01

Assumptions

Panels 1	21.6	Metres
Panel Width	3.64	Metres
Panel Area	78.6	Sq Metres
Panels 2 & 3	20.0	Metres
Panel Width	3.64	Metres
Panel Area	72.8	Sq Metres
Panel 4	10.0	Metres
Panel Width	3.64	Metres
Panel Area	36.4	Sq Metres
Panel 5-8	18.5	Metres
Panel Width	3.64	Metres
Panel Area	67.3	Sq Metres

Conversion Factors

US Gallon=	3.78	Litres
Sq Metre=	10.76	Sq Feet
Sq Metre=	1.20	Sq Yds

	<u>8-Dec-01</u>	<u>14-Dec-01</u>
<u>Crew Consist</u>	<u>No</u>	<u>No</u>
Labourers	8	5
Truck Dr.	1	1
Supervisor	1	1
Total	10	7

Work Schedule	Work Time (hrs)	No. of Panels	Test Length (m)	Total Area m ²	Total Area yd ²	RejuvaSeal Applied		Application Rate			Work Crew	
8-Dec-01						US gals	litres	USGal /yd ²	Litres /m ²	m ² /Litre	m ² /man hr	yd ² /man hr
am/pm												
10:10-10:30	0.33	1	21.6	78.6	94	7.4	27.8	0.078	0.35	2.83	23.6	28.2
10:30-11:10	0.67	2	40.0	145.6	174	10.0	37.8	0.057	0.26	3.85	21.8	26.1
11:10-11:25	0.25	1	10.0	36.4	44	2.5	9.5	0.057	0.26	3.85	14.6	17.4
Sub-Total (Dec 8)	1.25	4	71.6	260.6	312	19.9	75.0	0.064	0.29	3.47	20.8	24.9
13:45-15:30 (Dec 14)	1.75	4	74.0	269.4	322.0	20.0	75.6	0.062	0.28	3.56	22.0	26.3
Total (Dec 8 & 14)	3.00	8	145.6	530.0	633.5	39.9	150.6	0.063	0.28	3.52	21.4	25.6

Work Schedule	Work Time (hrs)	No. of Panels	Test Length (m)	Total Area m ²	Total Area yd ²	RejuvaSeal Applied		Application Rate			7 Man Crew	
14-Dec-01						US gals	litres	USGal /yd ²	Litres /m ²	m ² /Litre	m ² /man hr	yd ² /man hr
am/pm												
13:45-15:30	1.75	4.0	74.0	269.4	322	20.0	75.6	0.062	0.28	3.56	22.0	26.3
Totals	1.75	4.0	74.0	269.4	322	20.0	75.6	0.062	0.28	3.56	22.0	26.3

Test Patches by Danny Mui on Dec 2, 2001

Test Patch Number	Patch Width (m)	Patch Length (m)	Total Area m ²	RejuvaSeal Applied (litres)	Application Rate	
					litres /m ²	m ² /litre
One	1	1.13	1.13	0.25	0.22	4.5
Two	1	0.88	0.88	0.25	0.28	3.5

Outflow Meter Readings by Ekman Tang - Dec 14, 2001

<u>Untreated</u>	<u>Reading</u>	<u>Location</u>	<u>Offset from Sideline</u>
No. 1	3 sec	1 metre north of REjuvaSeal Demo Section	3 metres
No. 2	5 sec	1 metre north of REjuvaSeal Demo Section	2 metres
<u>Treated</u>			
No. 1	2 sec	1 metre south of north boundary of REjuvaSeal Demo Section	3 metres
No. 2	5 sec	1 metre south of north boundary of REjuvaSeal Demo Section	2 metres

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal Guang-Quin Expressway, Guangzhou, Guangdong Province, Peoples Republic of China

December 2001

TABLE OF CONTENTS

Section	Description	Page
1.0	Introduction	1
2.0	Co-operative Program	3
3.0	RejuvaSeal™	4
3.1	Prior Experience	4
4.0	Test Program	5
4.1	RejuvaSeal™ Testing	13
4.2	Water Dissipation	13
4.3	Fuel Resistance Testing	15
4.4	Elasticity/Ductility Testing	15
5.0	Project Completion Schedule	16

FIGURES

No.	Description	Page
1.0	General Location Map	2
4.0	Specific Location Map	6
4.1	Test Patches At Demonstration Site	7
4.2	Typical Application Procedure for RejuvaSeal™	10
4.3	Finished RejuvaSeal™ Surface	11
4.4	Cracks that were filled with crack sealant	12
4.5	Humble Equipment Co. "Outflow Meter"	14
5.0	Project Completion Schedule	17

TABLES

No.	Description	Page
4.1	Geographic Location of Test Patch	5
4.2	Details on Test Patch on Guang-Quin Expressway, Guangzhou	5
4.3	Geographic Location of Demo Site	8
4.4	Details on RejuvaSeal™ Demonstration Section on Guang-Quin Expressway, Guangzhou	9
4.5	Outflow Meter readings at Demo Site	13

CROWN CAPITAL ENTERPRISE LIMITED

**Demonstration of RejuvaSeal
Guang-Quin Expressway, Guangzhou, Guangdong Province
Peoples Republic of China**

September 2001

APPENDICES

No.	Description
A	Rejuvaseal™ – Technical Seminar, Guangzhou, China, 14 December, 2001
B	Rejuvaseal™ Descriptive Literature
C	Nitoflor Hardtop Aggregate Specification sheet



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

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal™

**Guang-Quin Expressway, Guangzhou, Guangdong Province
Peoples Republic of China**

December 2001

1.0 INTRODUCTION

Crown Capital Enterprise Limited of Hong Kong entered into an arrangement with the City of Guangzhou, in Guangdong Province, China in November 2001. This arrangement calls for the analysis of the performance of RejuvaSeal™, a sealer/rejuvenator for asphalt pavement on highways within the jurisdiction of the city.

The City of Guangzhou is located in Guangdong Province, which is bordered by Fujian, Jiangxi, Hunan, and Guangxi Provinces. Guangzhou has a lengthy history and extensive archival records exist, which document the growth of the City. Guangzhou is the capital city of Guangdong province and is a major service center for the area and in recent years has seen a major growth in population, along with significant construction due to the transfer of manufacturing from Hong Kong to Guangzhou and special economic development zone like the neighbouring cities of Shenzhen and Zhuhai. Guangzhou lies in the Pearl River Delta and hosts a port accessible to sea going vessels of Panamax Size and has a major container terminal for the export trade. The present population of Guangzhou and its suburbs and surrounding area is estimated at approximately 8 million. See figure 1.0 for a map showing the location of Guangzhou in Guangdong Province. The majority of the area lies at 100 to 150 metres in elevation, although mountains to the north and east hold some peaks that exceed 1,000 metres. The regions' latitude (23 degrees north), mean that there are four seasons, with temperatures ranging from 45 Celsius in the long, hot summer to 5 Celsius in the short winter. The rainy season is primarily May thru August, but can extend into September.

In the immediate Guangzhou area, a sequence of sedimentary rocks predominates, although some metamorphic rocks also occur. Due to the rock cuts along the highways, numerous rock outcrop exposures are available. The asphalt in the area is manufactured from local materials, which is comprised of crushed and screened sandstone, diorite, phyllite and granite, as well as washed gravels from the various rivers. The bitumen binder for the asphalt is sourced from various locations. Since Guangzhou is a seagoing port on the Pearl River, which is navigable by oceangoing vessels, the possibility of bitumen being sourced from offshore is a distinct possibility so refineries in Singapore and the like should not be forgotten.

2.0 CO-OPERATIVE PROGRAM

The intent of the arrangement with the City of Guangzhou is to demonstrate RejuvaSeal™ at different locations selected by the Guangdong Longda Highway Maintenance Department, which will subsequently allow analysis of the performance of Rejuvaseal™ on a variety of asphalt surfaces. A demonstration was undertaken on the Guang-Quin Expressway, some 45 kilometres north of the city on December 8, 2001, a 4 lane divided highway, with north bound and southbound lanes separated by a median. The demonstration strip was on the outside (slow) lane on the south bound of the expressway. The expressway has been showing signs of advanced deterioration and portions have been planed and repaved with a new overlay in recent times. The portion of the expressway that was treated was paved in 1998. No details are known about the subgrade, but inspection of the shoulders show a sandy-silty material. Knowing construction techniques in highways in China in general, minimal gravel would be used for an immediate coarse base, beneath the asphalt pavement. At the demonstration site, the surface of the asphalt in the wheel paths quite rough and there was a significant amount of exposed aggregate and the bitumen was quite oxidized. Some lateral and lineal cracks existed, but were typically in the 2 to 3 mm width range.

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 Guangzhou on December 14, 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 Guangdong Province is located in a tropical climate (Latitude: 23 degrees North) at a low altitude (100 to 150 metres), it's a demanding setting for asphalt, given the year round warm climate (extremes of 46 Celsius in summer and 5 Celsius in the winter) and intense exposure to ultraviolet radiation, all which contribute to the oxidation and breakdown of the asphalt binder.

The City of Guangzhou is responsible for 7,000 kilometres of highway, (distances as of year-end 2000). The highway network is forecast to expand to 9,000 kilometres by the end of year 2005.

In view of this extensive network of roads and the relatively short life of the asphalt surface, Guangzhou is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, Guangzhou has agreed to try RejuvaSeal™ on the Guang-Quin Expressway. 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 Expressway with respect to Guangzhou.

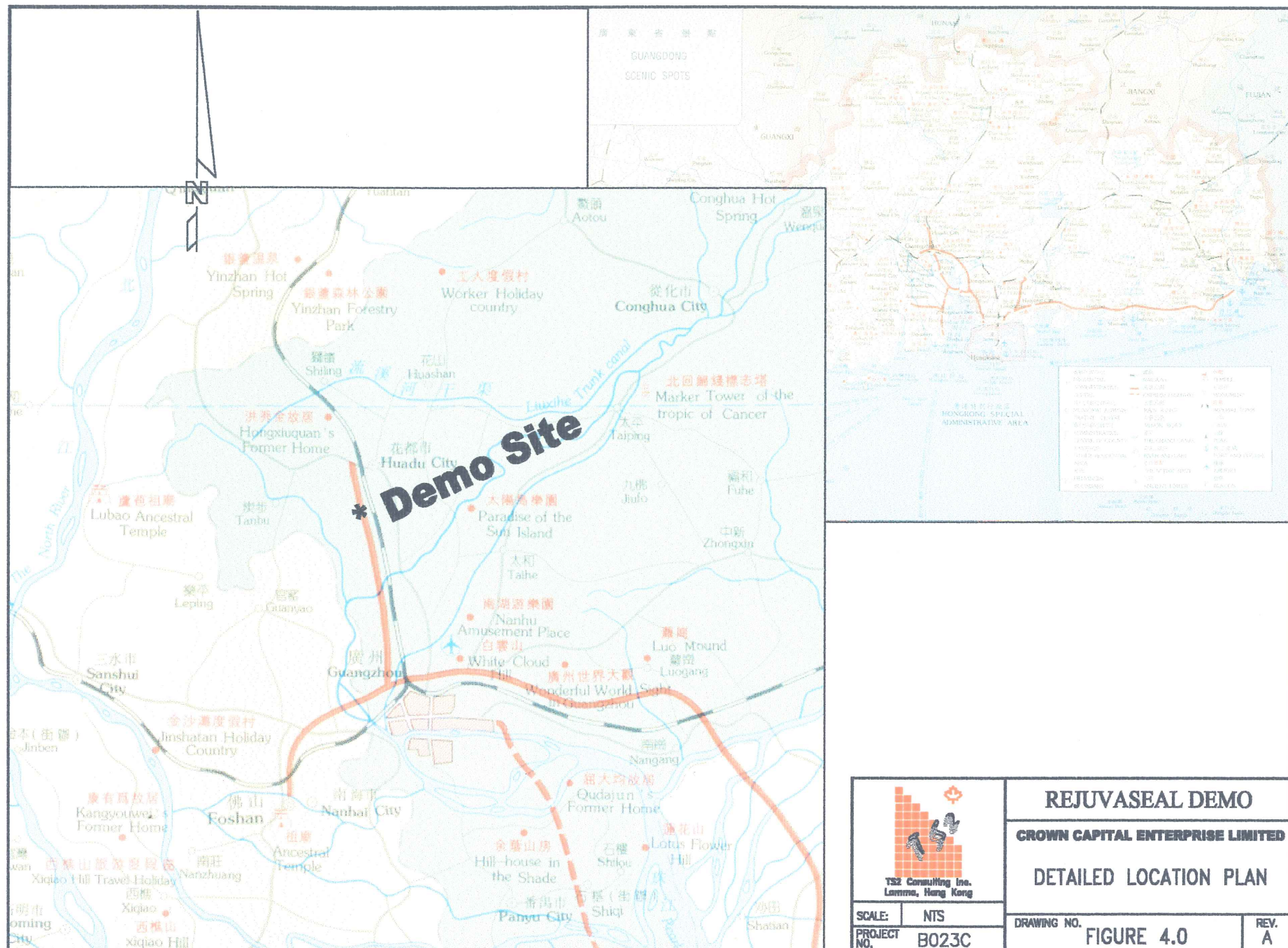
On December 1, two test patches on the shoulder of the Guang-Quin Expressway, some 1 kilometre south of the tollgate at the northern end of the Expressway, were treated with RejuvaSeal™. The test patches were at the following geographic location:

Table 4.1	Geographic Location of Test Patch Site	
System	Northing	Easting
Geographic (deg, min)	23 ⁰ 32.219'	113 ⁰ 06.525'
Universal Transverse Mercator Grid (49Q) (metres)	2604557	0715278

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

Table 4.2		Particulars of the test patches				
Test Patch Number	Patch Width (m)	Patch Length (m)	Total Area m ²	RejuvaSeal™ Applied (litres)	Application Rate	
					litres /m ²	m ² /litre
One	1.00	1.13	1.13	0.25	0.22	4.5
Two	1.00	0.88	0.88	0.25	0.28	3.5

The demonstration section on the Guang-Quin Expressway is located just 20 metres south of the test patches. See figure 4.0, which follows, for a location of the general locale.



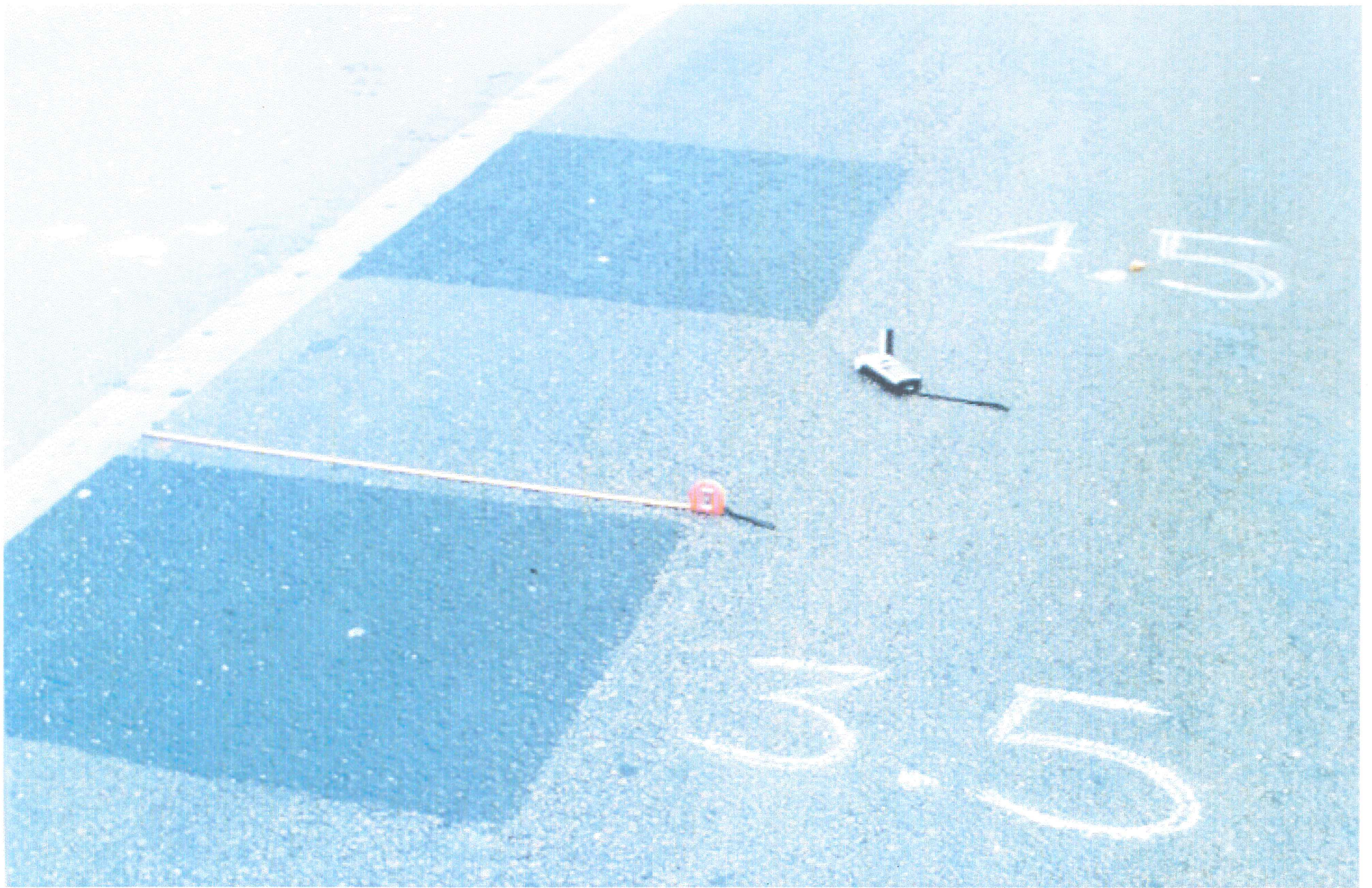
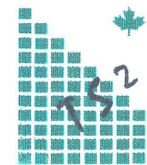


Figure 4.1: Test Patches at Demo Site



The demonstration section, on the Guang-Quin Expressway was selected by the Guangdong Longda Superhighway Maintenance Co. Ltd., who is responsible for the maintenance. The section chosen for the demonstration is geographically located as follows:

Table 4.3	Location of Demo Site	
System	Northing	Easting
Geographic (deg, min)	23 ⁰ 32.204'	113 ⁰ 06.507'
Universal Transverse Mercator Grid (metres) 49Q	2604531	0715248

Work commenced on the demonstration section at 10:10 pm on December 8, on a cool, windy morning, where the temperature was approximately 20 degrees Celsius. The skies were overcast throughout the day with some late afternoon showers. A test strip, 71.6 metres long, on the curb lane of the service road the south bound (west side) of Guang-Quin Expressway was treated. The test section is located on a downhill section with a gradient of - 0.5% for the most part. 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 2 years old (1999 vintage). No significant oil spills were observed, just the occasional drop of transmission oil, crankcase oil or hydraulic fluid. The surface was not appreciably worn, with no noticeable rutting due to traffic wear. There were some minor lateral and longitudinal cracks, usually in the 2 to 3 mm width, in the initial portion of the demonstration strip. In the initial 3 metres of the demonstration strip, two concentric depressions, adjacent to the shoulder were evidence of some settlement in the subgrade. The oxidation of the bitumen extended to a depth of several millimetres. The initial 20 metres were located on a significant fill, whereas the balance was in a cut. The fill section has settled and some structural damage has occurred due to settlement of the fill. A portion of the expressway some 40 metres north of the test section had been planed and a 40 mm overlay placed earlier in the year. The entire portion of the treated highway was on a compacted silty-clay, sub-grade

On December 8, an initial segment (panel) was marked off, with a 21.6 metre length. The width of this curbside lane is 3.64 metres between the painted lane dividing line and the outside lane marker line. A five U.S. gallon (17.9 litres) pail of RejuvaSeal™ was assigned to the initial panel. The RejuvaSeal™ was applied using paint rollers and paint roller pans, to ensure uniformity in the application. This initial panel was barely covered with the assigned 5 US gallon pail, so the latter panels were subsequently shortened to 20 metres. The balance of the panels were coated with RejuvaSeal™ using paint rollers and paint roller pans, to ensure uniformity in the application. The last panel was abbreviated at 10 metres and the left over RejuvaSeal™ was used to touch up portions of the initial panel and apply a second coat to longitudinal and lateral cracks. On Dec 14, four additional panels (5 thru 8) were marked off in 18.4 metre length for a supplemental demonstration of RejuvaSeal. Details of the application are summarized in the table that follows:

Table 4.4				Details on RejuvaSeal™ Demonstration Section on Guang-Quin Expressway						
Work Schedule	Work Time	No. of Panels	Test Length	Total Area	Total Area	RejuvaSeal™ Applied		Application Rate		
	(hrs)		(m)	m ²	yd ²	US gals	litres	US Gal /yd ²	Litres /m ²	m ² /Litre
Dec 8, 2001										
10:10-10:30	0.33	1	21.6	78.6	94	7.4	27.8	0.078	0.35	2.83
10:30-11:10	0.67	2	40.0	145.6	174	10.0	37.8	0.057	0.26	3.85
11:10-11:25	0.25	1	10.0	36.4	44	2.5	9.5	0.057	0.26	3.85
Sub-Total	1.25	5	71.6	260.6	312	19.9	75.0	0.064	0.29	3.47
Dec 14, 2001	1.75	4	74.0	269.4	322	20.0	75.6	0.062	0.28	3.56
Total	3.00	8	145.6	530.0	633.5	39.9	150.6	0.063	0.28	3.52

Ambient temperatures at the time of the Dec 8 application were in the 22 degree Celsius range, with humidity in the 50% range. The application ceased at 11:25 am and the lane remained closed until 6:00 am on December 8, when it was re-opened for traffic. Photos showing the test application of RejuvaSeal™ follow in figures 4.2, and 4.3 on the following pages.

The site was visited on December 14 around 2:30 pm following the addition of a 74 metre strip for another demonstration for Highway maintenance personnel from Guangzhou and a difference was readily perceived between the Dec 8, RejuvaSeal™ treated section and the adjoining untreated portion. A screwdriver was used to dig two small holes in the asphalt pavement, to a depth of 3 centimetres, some 50 metres south of the start point (north end) of the demonstration (test) section, to determine the penetration of the RejuvaSeal™. This was a week after the application of RejuvaSeal™ and at these two locations the newly rejuvenated surface was evident, by the black resilient surface layer, which was now approximately 2 millimetre thick. Below that depth, the grey, oxidized layer of asphalt was evident

At the time of the visit on December 14, several cracks that were encountered in the Dec 8 test strip were filled with crack sealant. See figure 4.4 for a photographic record of the cracks that were filled with crack sealant. These cracks were in the range of 4 to 6 mm in width.



Figure 4.2: Typical Application Procedure for RejuvaSeal TM





Figure 4.3: Finished RejuvaSeal™ Surface





Figure 4.4: Cracks filled with crack sealant



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 the Guang-Quin. 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.

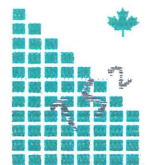
Readings were taken with this aforesaid Outflow Meter when the site was revisited on December 14 at 13:25 pm at four locations on the portion of the highway selected for the test, in proximity to the test patches and on the Dec 8 RejuvaSeal treated portions, The results are shown in the table that follows:

Table 4.5		Outflow Meter Readings		
Test	Location relative to shoulder marker line	Location relative to start of demo sect'n	Untreated (secs)	RejuvSeal™ treated (secs)
One	3 metres east	1 metre north	3	n/a
Two	2 metres east	1 metre north	5	n/a
Three	3 metres east	1 metre south	n/a	2
Four	2 metres east	1 metre south	n/a	5

* These readings are acceptable from a skid resistance viewpoint.



Figure 4.5: Humble Equipment Co. "Outflow Meter".



4.3 Fuel Resistance Comparison

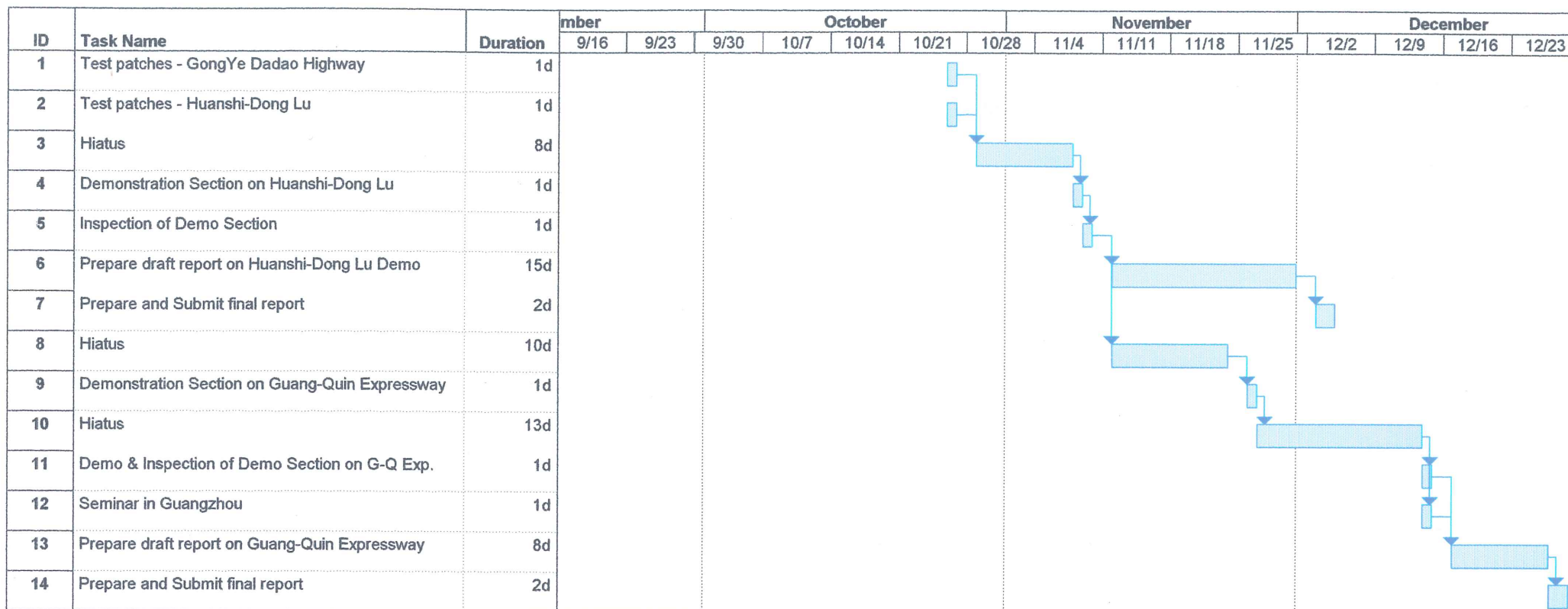
Fuel Resistance Comparison was undertaken on several sections of the untreated and RejuvaSeal™ treated sections in close proximity to the Outflow meter tests. This comparison consisted of pouring about a cupful of diesel fuel onto the road surface and then later checking the penetration of the fuel. 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. In the instance of the RejuvaSeal™ treated section, the diesel fuel pooled on the surface whereas fuel was absorbed in the untreated sections.

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, Dr John Emery in Toronto, Canada has been contacted for advise on independent testing.

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.



Project: ChengDusched
Date: Mar 8

Task



Summary



Rolled Up Progress

Progress



Rolled Up Task



Milestone



Rolled Up Milestone



CROWN CAPITAL ENTERPRISE LIMITED

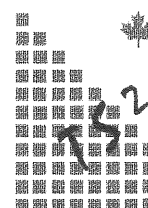
WANCHAI, HONG KONG

**Demonstration of Rejuvaseal™
Guang-Quin Expressway, Guangzhou,
GuangDong Province,
Peoples Republic of China**

December 2001

APPENDICES

No.	Description
A	Rejuvaseal™ – Technical Seminar, Guangzhou, GuangDong Province, China, 14 December, 2001
B	Rejuvaseal™ Descriptive Literature
C	Nitoflor Hardtop Aggregate Specification sheet



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

**CROWN CAPITAL ENTERPRISE
LIMITED**

WANCHAI, HONG KONG

**Demonstration of Rejuvaseal™
Guang-Quin Expressway, Guangzhou,
GuangDong Province,
Peoples Republic of China**

December 2001

Appendix A

**RejuvaSeal™ – Technical Seminar,
Guangzhou, GuangDong Province,
Peoples Republic of China,
December 14, 2001**



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



中怡企业发展有限公司
Crown Capital Enterprise Limited

美国 [沥再生] 技术交流会
RejuvaSeal™ - Technical Seminar

中国广东省广州市
Guangzhou, Guangdong, China

二零零一年十二月十四日

14 December 2001

Registration and Reception

Introduction

Welcoming Speech

RejuvaSeal™ – An Introduction

Road Demonstration Projects

Question and Answer Session

Lunch

**CROWN CAPITAL ENTERPRISE
LIMITED**

WANCHAI, HONG KONG

**Demonstration of Rejuvaseal™
Guang-Quin Expressway, Guangzhou,
GuangDong Province,
Peoples Republic of China**

December 2001

Appendix B

Rejuvaseal™ Descriptive Literature



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



CROWN CAPITAL ENTERPRISE LIMITED
中 怡 企 業 發 展 有 限 公 司

RejuvaSeal™ 沥再生

Asphalt Pavement Rejuvenator
沥青路面再生密封剂

B5, CENTRE POINT, 181 – 185 GLOUCESTER ROAD, WANCHAI, HONG KONG
香港灣仔告士打道 181 - 185 號中怡大廈 B5 室

TEL. 電話: + 852 - 2142 3500

FAX 傳真: + 852 - 2390 5465

E-mail 電郵: crowncap@crowncapital.com.hk

May 2001

沥再生 RejuvaSeal™

页

I. 概述

1

II. 产品资料

A. 新一代的沥青路面再生密封剂

2

B. 产品规范

3-5

C. 部份施用现场名单

6-7

III. 技术数据事项

A. 独立实验室之测试结果

8

B. 芯样测试步骤

9-10

IV. 应用须知

A. 安全事项

11

B. 施工前测试之要求

12

V. 质量保证

VI. 美国联邦航空局之第 44 号工程法令

附件 I. 一些使用沥再生的现场照片

附件 II. 沥再生 RejuvaSeal™ - 沥青再生密封剂时代来临 - 摘自
(2001 年国际机场科技)

附件 III. 加拿大国防部的执行测试概论 - 1999 年 9 月 24 日至 10 月
10 日之沥青路面之处理

**CROWN CAPITAL ENTERPRISE
LIMITED**

WANCHAI, HONG KONG

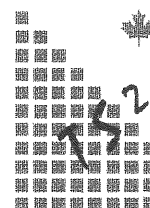
**Demonstration of Rejuvaseal™
Guang-Quin Expressway, Guangzhou,
GuangDong Province,
Peoples Republic of China**

December 2001

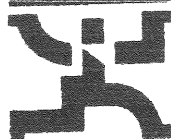
Appendix C

Nitoflor Hardtop Aggregate

Specification Sheet



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



Nitoflor Hardtop Aggregate

Monolithic surface hardening compound

Uses

Nitoflor Hardtop Aggregate provides a highly abrasion resistant surface to concrete floors by the **dry shake** method which ensures the hard wearing surface bonds monolithically to the base concrete. It is ideally suited for all industrial areas subject to heavy traffic, e.g. loading bays, trucking lanes, car parks, workshops, machine shops, ramps and spillways.

Advantages

- Provides hard, abrasion resistant floors
- Provides high impact resistance
- Forms a monolithic bond with base concrete
- Good non-slip properties
- Easy and economical to apply

Description

Nitoflor Hardtop Aggregate is a quality controlled, hardwearing aggregate selected for its physical properties of abrasion and wear resistance as well as shape and grading.

Nitoflor Hardtop Aggregate dry mixed with Portland Cement cures monolithically to provide a dense floor surface.

Technical support

Fosroc offers comprehensive technical support, including help at the design stage, application advice and on the site problem solving. Specifiers and contractors are encouraged to contact our trained staff for answers to their questions.

Properties

Nitoflor Hardtop Aggregate has been tested to ASTM.D4060 - Taber Abrader and BS 6431 - Part 20 (Wet Abrasive Method), alongside concrete mortar control panels. The test results show that Nitoflor Hardtop Aggregate improves the abrasion resistance of plain concrete by over 200%.

Compressive Strength (BS.6319.Pt.1.) At water contents equivalent to those obtained in practical applications, the typical 28 day strength of Nitoflor Hardtop Aggregate cubes exceeds 60 Mpa:

Mohs Hardness	>6
Specific Gravity	3.1
Corrosive Elements	None
Sieve Analysis # 8 (2.5mm)	>98% passing
#30 (0.5mm)	< 5% passing

The right chemistry for construction

Specification clauses

All base slab concrete areas so designated shall be applied with monolithic hard wearing, abrasion resistant floor hardener tested to BS 6431-Part 20 (Wet Abrasive Method), such as Nitoflor Hardtop Aggregate manufactured by Fosroc Ltd.

Application instructions

Base Concrete

The base concrete should have a minimum cement content of 300kg/m³. The concrete mix should be designed to minimise segregation and bleeding. Free water:cement ratios of less than 0.55 are required. The concrete should have a slump of between 75 and 100mm.

The base concrete should be laid and compacted in accordance with good concrete practice. Accurate finished profile and minimum laitence build up should be ensured. Particular attention should be paid to bay edges and corners to ensure full compaction.

Vacuum dewatering is not recommended when w/c ratios of less than 0.55 have been used.

Mixing

The following proportions should be dry-mixed together:

- 100kg Nitoflor Hardtop Aggregate
- 50kg Cement

Care should be taken to ensure that the two components are thoroughly mixed together. Mechanical mixing is preferred.

Application

It is recommended that the floor be marked off into bays of known area. Sufficient material should then be laid out to meet the required spread rates.

Application of Hardtop Aggregate can begin when the base concrete has stiffened to the point when light foot traffic leaves an imprint of about 3mm. Any bleed water should have evaporated now.

Hardtop Aggregate mix is applied in two application stages.

- (a) The first application is made using 1/2 to 2/3 of the material required for the eventual end use. Hardtop Aggregate mix is evenly broadcast onto the concrete surface. When the material becomes uniformly dark by the absorption of moisture from the concrete this first application can be floated. Wooden floats, or, on large areas a power float may be used. It is important, however, that the surface is not over-worked.



The right chemistry for construction

- (b) Immediately after floating, the remaining Hardtop Aggregate mix is thrown evenly over the surface. Again moisture is absorbed and the surface can be floated in the same way as before.

Final finishing of the floor using the blades of a power float can be carried out when the floor has stiffened sufficiently so that damage will not be caused.

Limitations

1. Timing of Application

Timing of the application of the Hardtop Aggregate mix is important. Too early and excess water will be absorbed and the resultant floor surface will be of lower strength and subject to dusting. Also the dense aggregate of Hardtop Aggregate mix could sink and be lost from the surface. Too late and insufficient moisture will be available to completely hydrate the Hardtop Aggregate mix. Cracking and pitting of the surface are likely to result.

2. Bay Edges

Where bay edges are likely to suffer particularly heavy impact or wear these can be given additional protection. Immediately after the base concrete is levelled, sprinkle Hardtop Aggregate mix on a strip 100-150mm wide along the bay edges. Steel trowel into the surface.

Areas where saw-cut transverse control joints are located can also be pretreated in this manner.

3. Curing

Tests have shown that proper curing of concrete floors treated with products such as Hardtop Aggregate mix is essential to ensure the physical properties of the floor.

The most efficient method of curing is to use Fosroc Concure curing membranes which conform to ASTM and DOT specifications. However, in indoor applications where curing conditions are less arduous and breakdown of the membrane slower, alternative approved methods of curing such as polythene sheeting are acceptable.

4. Surface Treatments

Because of the high density, low porosity surface finish of floors treated with Hardtop Aggregate mix, subsequent surface finishes are not recommended.

Estimating

Pack sizes

Nitoflor Hardtop Aggregate	50 kg bags
----------------------------	------------

Coverage

Dry-mixed Nitoflor Hardtop Aggregate is applied at different rates per m² to provide floor surfaces suitable for different types of industrial use.

Application rate (Mixed)	Intended traffic use
2.5 kg/m ²	Light vehicular
3.5 kg/m ²	Heavy vehicular & storage
5.0 kg/m ²	Aisleways & industrial
7.5 kg/m ²	Severe impact & abrasion

Storage

There is no minimum shelf life for Hardtop Aggregate. Bags should be stored in dry conditions.

Precautions

Health & safety

Portland cement is alkaline when in contact with water. Avoid prolonged contact with the skin. Any eye contamination should be washed immediately with plenty of clean water and medical advice sought.

For additional information please consult your local Fosroc office for a copy of the products health and safety datasheet.

Hardtop Aggregate is non-flammable.

Additional information

Fosroc offers a comprehensive range of products for all types of specialist floor applications. This range provides solutions to satisfy the most critical conditions to ensure the safe working environment required from industrial and heavily trafficked floors.

Nitoflor is the trademark of Fosroc International Limited.



Important note

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard terms and conditions of sale, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification or information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation or information given by it.

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal Guang-Quin Expressway, Guangzhou, Guangdong Province, Peoples Republic of China

December 2001

TABLE OF CONTENTS

Section	Description	Page
1.0	Introduction	1
2.0	Co-operative Program	3
3.0	RejuvaSeal™	4
3.1	Prior Experience	4
4.0	Test Program	5
4.1	RejuvaSeal™ Testing	13
4.2	Water Dissipation	13
4.3	Fuel Resistance Testing	15
4.4	Elasticity/Ductility Testing	15
5.0	Project Completion Schedule	16
6.0	Statement of qualifications	18

FIGURES

No.	Description	Page
1.0	General Location Map	2
4.0	Specific Location Map	6
4.1	Test Patches At Demonstration Site	7
4.2	Typical Application Procedure for RejuvaSeal™	10
4.3	Finished RejuvaSeal™ Surface	11
4.4	Cracks that were filled with crack sealant	12
4.5	Humble Equipment Co. "Outflow Meter"	14
5.0	Project Completion Schedule	17

TABLES

No.	Description	Page
4.1	Geographic Location of Test Patch	5
4.2	Details on Test Patch on Guang-Quin Expressway, Guangzhou	5
4.3	Geographic Location of Demo Site	8
4.4	Details on RejuvaSeal™ Demonstration Section on Guang-Quin Expressway, Guangzhou	9
4.5	Outflow Meter readings at Demo Site	13

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 of Ontario, and New Brunswick, Canada
- IV. THAT my 30 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 my visit on December 8, 2001 to Guangzhou, Guangdong Province, China to observe the RejuvaSeal™ demonstration and again on December 14, 2001 to visit the demonstration section, described in this report

Dated at Hong Kong, this 20TH day of December, 2001


Anthony G. Speed, P.Eng. (Ontario and New Brunswick, Canada)



TS² CONSULTING INC.



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

Hong Kong (Office)

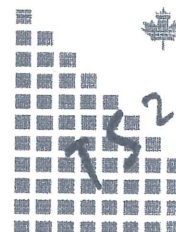
2/F 81 Po Wah Yuen,
Lamma Island,
Hong Kong
Phone (85-2)-2142-3500
Fax: (85-2)-2390-5465
Cellular: (85-2)-9157-6693
Email: speed_cny@yahoo.co.uk

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

中国云南昆明市人民中路丰源大厦2607室

March 10th, 2002



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

Attn: Charence Chiang
General Manager

Dear Charence

Re: Follow-Up Inspections of RejuvaSealTM Demo on Guang-Quin Expressway.

I visited the 145.6 metre long, RejuvaSealTM demonstration strip on March 2nd on the Guang-Quin Expressway, some 45 kilometres north of Guangzhou. This test strip was applied in two segments on Dec 8th and December 14th, respectively. The time lapse between the application of the RejuvaSealTM and the follow-up visit was approximately 3 months. In addition to visual inspection, I took photographs of the supplemental points of interest, namely the cracks that were filled with crack filler and also the pothole that was filled with pothole filler.

See the appended photos with notations for the crack and pothole documentation. From the visual inspection, despite the dust and fine sand from haulage vehicles and general traffic the RejuvaSealTM treated section is wearing quite well and it looks very good. The use of a wire brush, showed that the RejuvaSealTM has now reacted with the oxidized bitumen and the excavation of a small hole, shows that the rejuvenated surface now extends beyond a depth of 20 millimetres.

The comparison of the treated section in the outside lane with the untreated surface in the inside lane, is quite obvious in terms of colour and also the very open texture of the untreated section, which is now starting to ravel. The one

lateral crack that was treated with crack filler has now lost most of the immediate surface material, but water poured on the crack showed it was still impervious to water. However, another attempt should be made to apply crack filler, as part of the ongoing maintenance program.

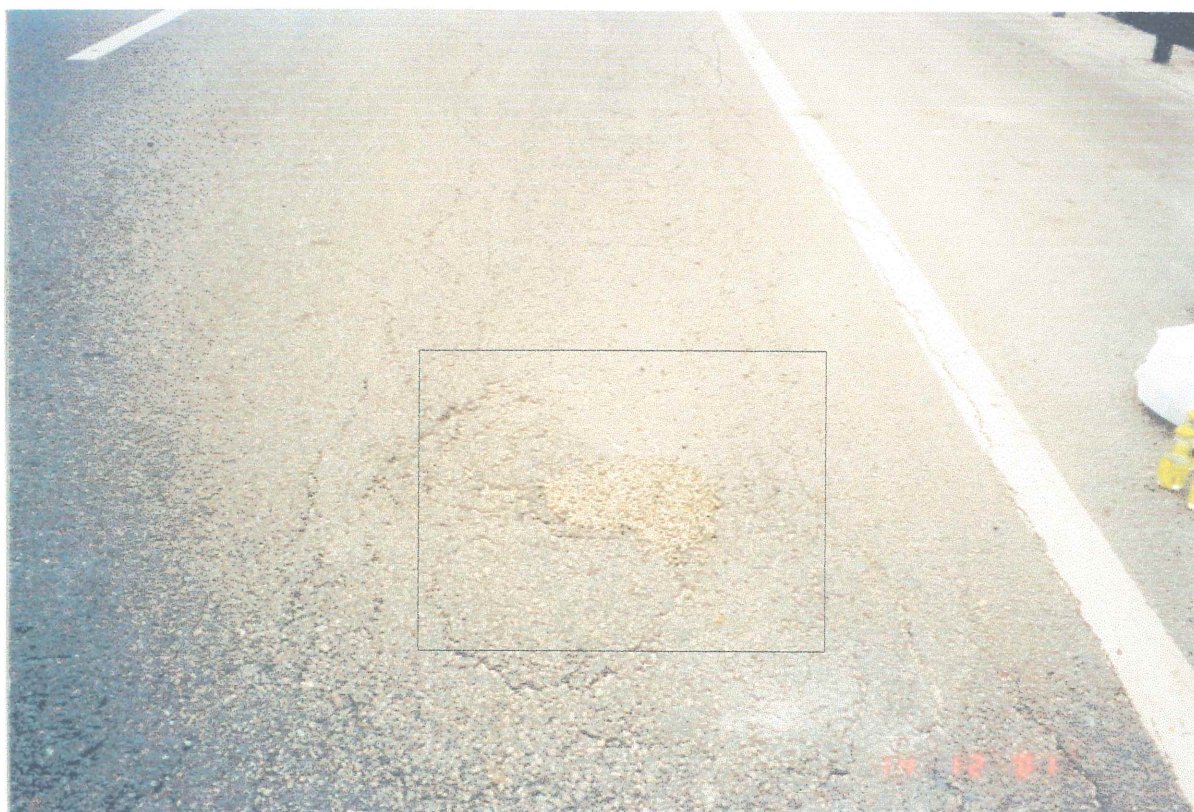
The pothole that was filled with the JEGEL pothole filler was still intact, although the surrounding area has suffered further structural damage, due to the fill for the highway continuing to settle across the gully the highway traverses at this point. In fact additional asphalt pavement has been added to fill in the ruts that lead up to the pothole.

It would be interesting to re-visit the demonstration section during the rainy season, to see the road surface of both the treated and untreated sections after a heavy rain and observe how both surfaces compare in terms of water penetration and water dissipation

Yours Sincerely



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



Pothole filled with JEGEL Pothole Filler
Top Photo: December 14, 2001,
Bottom Photo: March 2, 2002





Crack filled with crack sealant
Top: December 14, 2001, Bottom March 2, 2002

