CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

Demonstration of Rejuvaseal™
Huanshi Dong Lu, Guangzhou,
GuangDong Province,
Peoples Republic of China

November 2001

TS^2 Consulting Inc.
Lamma, Hong Kong

TS² CONSULTING INC.

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November 20th. 2001

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 Huanshi Dong Lu, Guangzhou.

This is the final report on the demonstration of RejuvaSeal™ on the Huanshi Dong Lu. A strip, 200 metres in length was completed in the outside, east bound lane of this two-lane service road on November 8th, 2001. I will submit a supplementary letter report on the follow up inspection that will be conducted in early 2002.

Yours Sincerely

LICENSED PROFESSIONAL ENGINEER
A. G. SPEED
PROVINCE OF ONTARIO

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

Crown Capital Enterprise Limited.
RejuvaSeal Demo
HuanShi Dong Lu - GuangZhou

Demo Date	8-Nov-01
Prepared by	A.G. Speed
Updated by	A.G. Speed
Updated	28-Nov-01

Assumptions

Panels 1-5 Le	40.0	Metres
Panel Width	2.7	Metres
Panel Area	109.6	Sq Metres

Conversion Factors

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

Crew Consist	No
Labourers	14
Loader Op	1
Supervisor	1
Total	16

Work Schedule am/pm	Work Time (hrs)	No. of Panels	Test Length (m)	Total Area m^2	Total Area yd^2	RejuvaSeal Applied US gals	RejuvaSeal Applied litres	Application Rate USGal /yd^2	Application Rate Litres /m^2	Application Rate m^2 /Litre	16 Man Crew m^2 /man hr	16 Man Crew yd^2 /man hr
23:00-01:00	2.00	5	200	548	655	35	132	**0.053**	**0.24**	**4.14**	17.1	20.5
Totals	2.00	5	200	548	655	35	132	**0.053**	**0.24**	**4.14**	17.1	20.5

Test Patch Number	Patch Width (m)	Patch Length (m)	Total Area m^2	RejuvaSeal Applied (litres)	Application Rate litres /m^2	Application Rate m^2 /litre
One	1	1.37	1.37	0.25	**0.18**	**5.5**
Two	1	1.13	1.13	0.25	**0.22**	**4.5**
Three	1	0.88	0.88	0.25	**0.28**	**3.5**

FlowMeter Readings	Time (sec)	Location
Treated	**26**	2.4 m from curb & 30 m from West End of Treated Section
Treated	**4**	1.0 m from curb & 30 m from West End of Treated Section
Treated	**9**	1.3 m from curb & 30 m from West End of Treated Section
Un-treated	**12**	2.6 m from curb & 81 m from West End of Treated Section
Un-treated	**14**	2.0 m from curb & 81 m from West End of Treated Section
Treated	**4**	2.3 m from curb & 79 m from West End of Treated Section

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal
Huanshi Dong Lu, Guangzhou, GuangDong Province,
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Huanshi Dong Lu, Guangzhou, GuangDong Province
Peoples Republic of China

September 2001

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B	Rejuvaseal™ Descriptive Literature
C	Nitoflor Hardtop Aggregate Specification sheet

TS² Consulting Inc.
Lamma, Hong Kong

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal™
Huanshi Dong Lu, Guangzhou, GuangDong Province
Peoples Republic of China

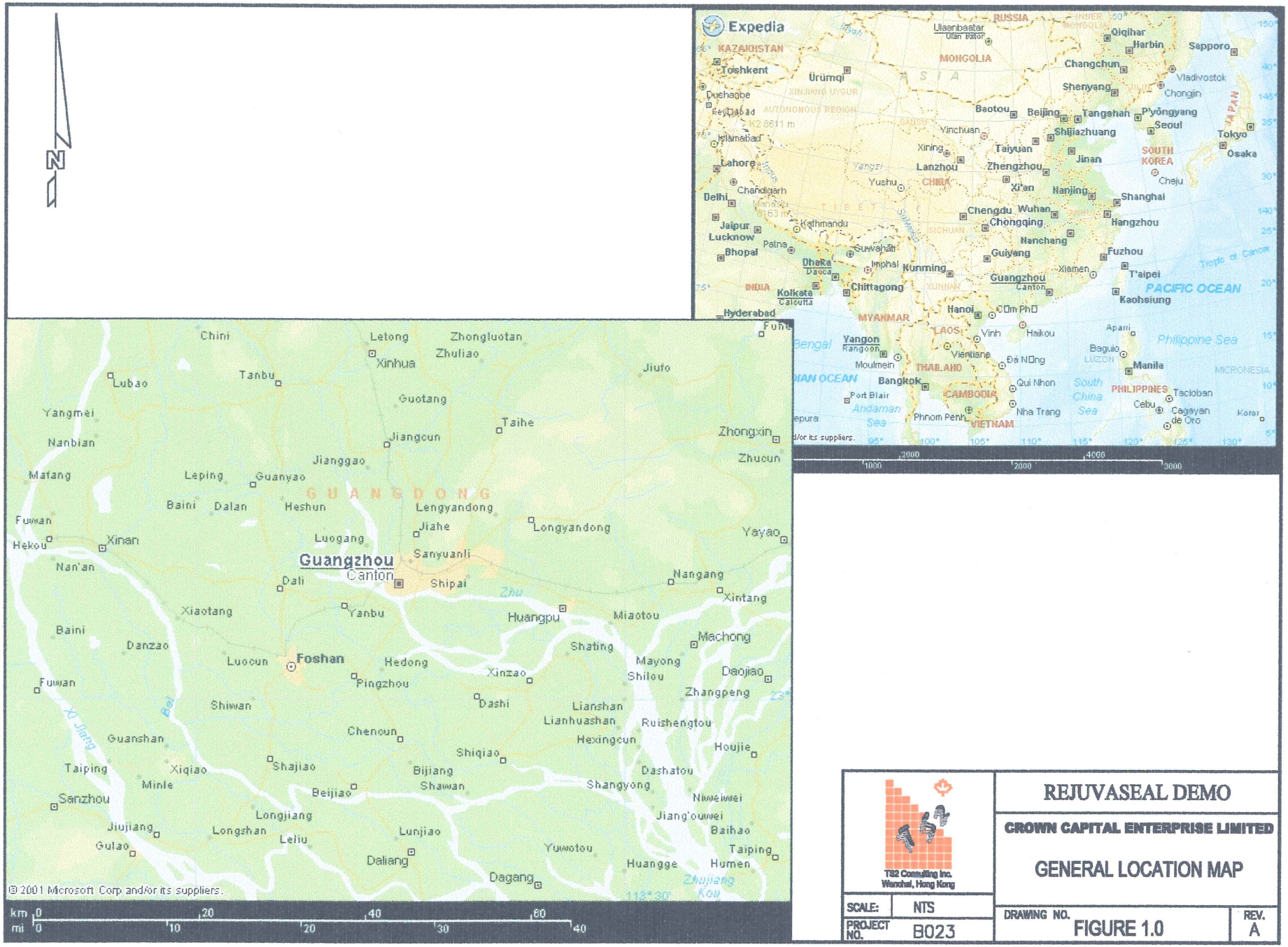
November 2001

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 roads 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, phylites 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.



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Wanchai, Hong Kong

REJUVASEAL DEMO

CROWN CAPITAL ENTERPRISE LIMITED

GENERAL LOCATION MAP

SCALE:	NTS	DRAWING NO. FIGURE 1.0	REV. A
PROJECT NO.	B023		

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 Urban Services Department, which will subsequently allow analysis of the performance of Rejuvaseal™ on a variety of asphalt surfaces. A demonstration was undertaken within the city on November 8, 2001 on Huanshi Dong Lu, a 6 lane street with a wide service road on either side, separated by a median. The demonstration strip was on the service road on the south side of the street. The service road is essentially two lanes wide and the portion, adjacent to the median had been planed and a 25 mm overlay of new asphalt applied, age unknown. The portion of the street that was treated, was adjacent to the curb, which was paved in 1996. No details are known about the subgrade, but inspection of the excavations for utilities in adjacent cul-de-sacs 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 is quite polished. Inspection of the original asphalt in the curbside lane generally showed that 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 to150 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 25,000 kilometres of highway, (distances as of year-end 2000). The highway network is forecast to expand to 30,000 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 Huanshi Dong Lu. 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 Guangzhou.

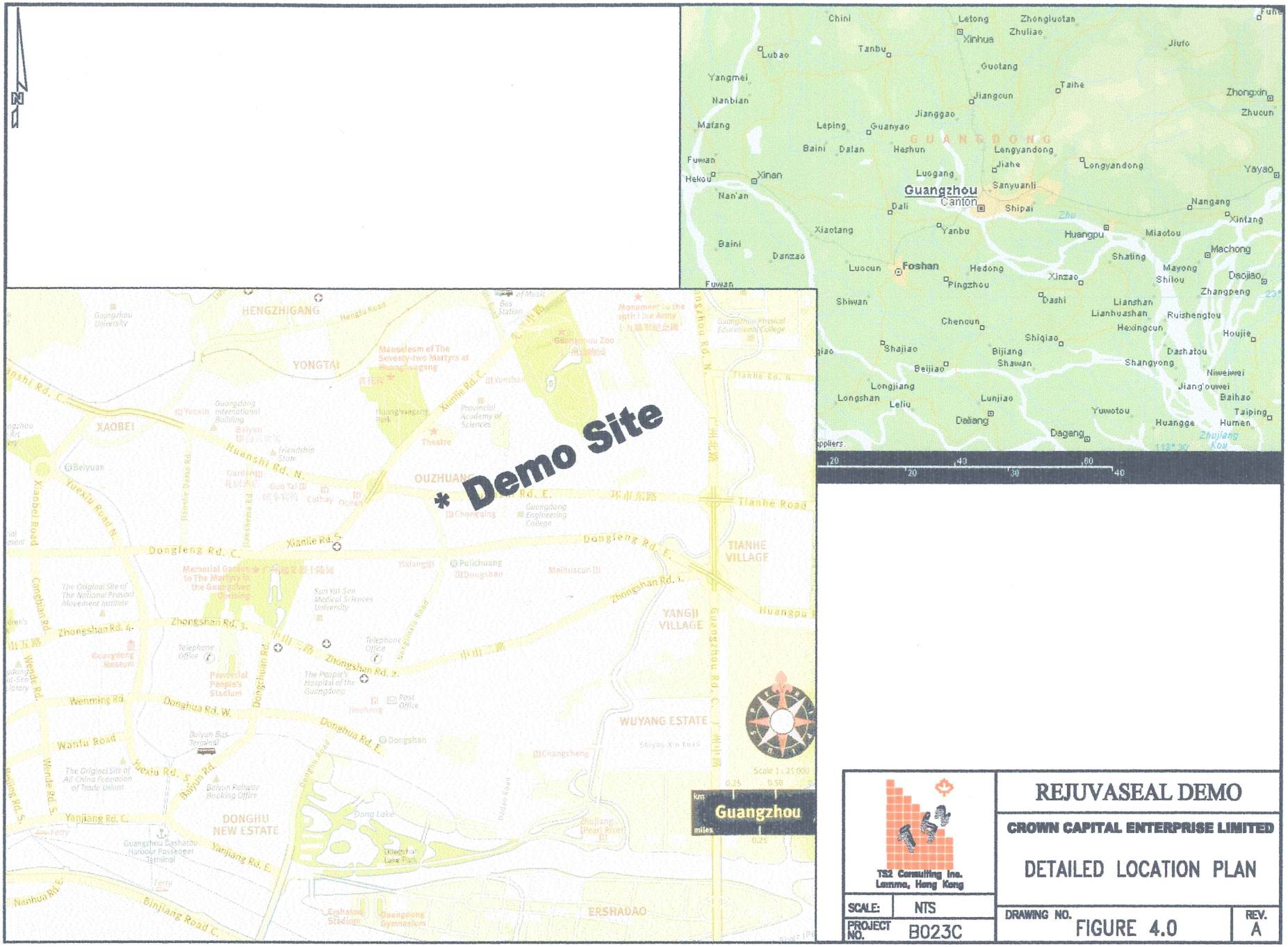
On October 29, three test patches on the shoulder of the Huanshi-Dong Lu, some 100 metres east of the junction with NongLin Xia Lu, were treated with RejuvaSeal™. The test patches were at the following geographic location:

Table 4.1	**Geographic Location of Test Patch Site**	
System	**Northing**	**Easting**
Geographic (deg, min)	23^0 08.232'	113^0 17.526'
Universal Transverse Mercator Grid (49Q) (metres)	2560562	0734705

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	RejuvaSealTM Applied (litres)	Application Rate	
					litres /m^2	m^2 /litre
One	1.00	1.37	1.37	0.25	**0.18**	**5.5**
Two	1.00	1.13	1.13	0.25	**0.22**	**4.5**
Three	1.00	0.88	0.88	0.25	**0.28**	**3.5**

The demonstration section on the Huanshi Dong Lu is located just east of the junction with NongLin Xia Lu. See figure 4.0, which follows, for a location of the general locale.



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Lamma, Hong Kong

REJUVASEAL DEMO

CROWN CAPITAL ENTERPRISE LIMITED

DETAILED LOCATION PLAN

SCALE:	NTS	DRAWING NO.	REV.
PROJECT NO.	B023C	FIGURE 4.0	A

Figure 4.1: Test Patches at Demo Site

The demonstration section, on the Huanshi Dong Lu was selected by the Guangzhou Urban Services Department, who are responsible for road and highway 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 08.232'	113^0 17.526'
Universal Transverse Mercator Grid (49Q)(metres)	2560562	0734705

Work commenced on the demonstration section at 11:00 pm on November 8, on a cool evening, where the overnight temperature reached 14 Celsius. This was followed by a sunny day. A test strip, 200 metres long, on the curb lane of the service road the east bound (south side) of Huanshi Dong Lu was treated. The test section is located on a slightly curving 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 6 years old (1996 vintage). No significant oil spills were observed, just the occasional drop of transmission oil, crankcase oil or hydraulic fluid. However a garbage pick up zone, that stretched from 80 metres through to 140 metres east of the start of the demonstration strip, was skipped as grease and water had stained the street. The service lane is used by bicycles and buses, as well as vehicles seeking access to local business and side streets. 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. The oxidation of the bitumen extended to a depth of several millimetres. The adjacent lane (adjacent to the main street), on this two lane service road was re-paved with an overlay sometime during the past summer so was no more than 6 or 7 months old. The entire portion of the treated street was on a compacted silty-clay, sub-grade

On November 8, five segments (panels) were marked off, in 40 metre lengths. The width of this curbside lane is 2.74 metres between the painted lane dividing line and the curb (outside lane) marker line. A five U.S. gallon (17.9 litres) pail of RejuvaSeal™ was assigned to the initial 31 metres of each panel. The RejuvaSeal™ was applied to each of the panels, using paint rollers and paint roller pans, to ensure uniformity in the application. The balance of the 40-metre segment (from the 31 metre mark onwards) was completed with RejuvaSeal™ from a second pail, communally shared with other segments.

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

Table 4.4				Details on RejuvaSeal™ Demonstration Section on Huanshi Dong Lu						
Work Schedule	Work Time (hrs)	No. of Panels	Test Length (m)	Total Area m^2	Total Area yd^2	RejuvaSeal™ Applied		Application Rate		
						US gals	litres	US Gal /yd2	Litres /m2	m2 /Litre
23:00-01:00	2.00	5	200	548	655	35	132	0.053	0.24	4.14

In view of concern expressed. that the RejuvaSeal™ treated road gave the appearance of a slippery surface, Nitoflor Hardtop Aggregate (a topping mix), was applied to two segments of the road surface immediately following the application of RejuvaSeal™. The application rate was approximately 0.25 kgs/sq metre (0.5 lbs/sq yard). This was applied to portions of the most easterly panel (#5) and the middle segments (panel #3). Nitoflor is a product sold by Fosroc and was purchased in Hong Kong. Further information on this Nitoflor product is contained in the Fosroc information sheet for this product in Appendix C. The approximate size consist for Nitoflor Hardtop Aggregate is stated as follows: >98% passing #8 mesh (2.5 mm) and <5% passing #30 mesh (0.5mm).

Ambient temperatures at the time of the application were in the 14 degree Celsius range, with humidity in the 65% range. The application ceased at 1:00 am and the lane remained closed until 6:00 am on November 9, when it was re-opened for traffic. Photos showing the test application of RejuvaSeal™ follow in figures 4.2, and 4.3 and on the following pages.

The site was visited on November 9 around 4:30 pm and a difference was readily perceived between the 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 east of the start point (west end) of the demonstration (test) section, to determine the penetration of the RejuvaSeal™. This was half a day 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 1 millimetre thick. Below that depth, the grey, oxidized layer of asphalt was evident. The surface was dry. See figure 4.4 for details on the holes dug to examine the RujuvaSeal™ penetration.

Nitoflor Hardtop Aggregate that was applied to two segments of the finished RejuvaSeal™ demonstration strip had generally stayed in-place and vehicular traffic had not 'scrubbed' a significant amount from the surface.

Figure 4.2: Typical Application Procedure for RejuvaSeal TM

Figure 4.3: Finished RejuvaSeal ™ Surface

Figure 4.4: Test hole to show depth of penetration of RejuvaSeal ™

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 Huanshi Dong Lu. 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 three locations on the portion of the street selected for the test, in proximity to the test patches. Further readings were taken on the treated road surface, when the site was revisited on November 9 at 4.45 pm. The results are shown in the table that follows:

Table 4.5		**Outflow Meter Readings**		
Test	Location relative to the curb	Location relative to start of demo sect'n	Before RejuvaSeal™ (secs)	After RejuvSeal™ (secs)
One	2.6 m north	81 m east	**12***	n/a
Two	2.0 m north	81 m east	**14***	n/a
Three	2.3 m north	79 m east	n/a	4
Four	2.3 m north	30 m east	n/a	**26***
Five	1.0 m north	30 m east	n/a	4
Six	1.3 m north	30 m east	n/a	9

*** These readings are unacceptable from a skid resistance viewpoint.**

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

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.

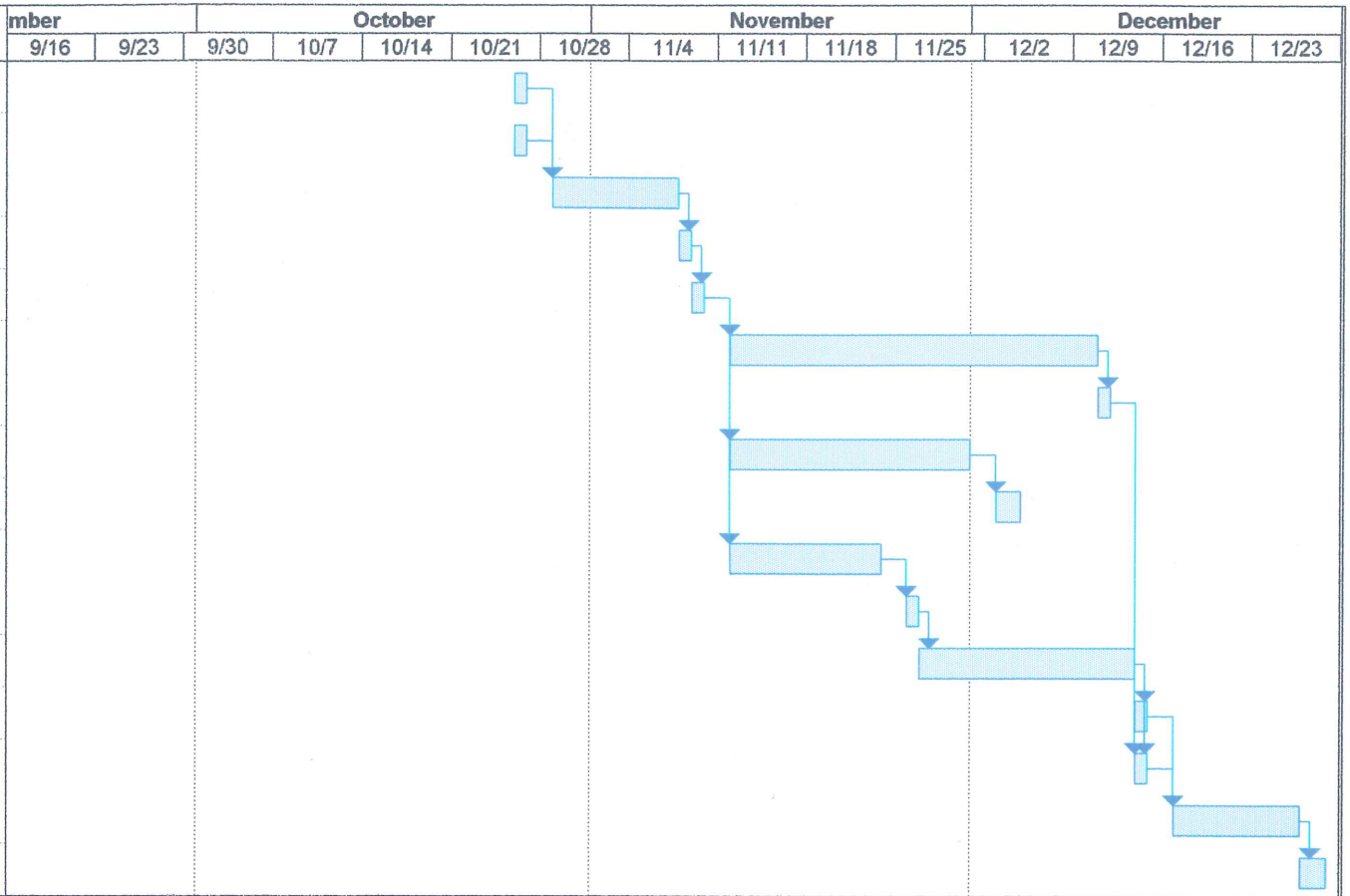
4.4 Elasticity/Ductility Testing

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, 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.

ID	Task Name	Duration
1	Test patches - GongYe Dadao Highway	1d
2	Test patches - Huanshi-Dong Lu	1d
3	Hiatus	8d
4	Demonstration Section on Huanshi-Dong Lu	1d
5	Inspection of Demo Section	1d
6	Sample Acquisition & Testing by Guangzhou Eng	21d
7	Report preparation by Guangzhou Engineering Co.	1d
8	Prepare draft report on Huanshi-Dong Lu Demo	15d
9	Prepare and Submit final report	2d
10	Hiatus	10d
11	Demonstration Section on Guang-Quin Expressway	1d
12	Hiatus	13d
13	Demo & Inspection of Demo Section	1d
14	Seminar in Guangzhou	1d
15	Prepare draft report on Guangzhou Dadao Highway	8d
16	Prepare and Submit final report	2d



Project: ChengDusched
Date: Mar 8

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

Demonstration of Rejuvaseal™ Huanshi Dong Lu, Guangzhou, GuangDong Province, Peoples Republic of China

November 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

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WANCHAI, HONG KONG

Demonstration of Rejuvaseal™ Huanshi Dong Lu, Guangzhou, GuangDong Province, Peoples Republic of China

November 2001

Appendix A

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

TS^2 Consulting Inc.
Lamma, Hong Kong

中怡

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™
Huanshi Dong Lu, Guangzhou,
GuangDong Province,
Peoples Republic of China

November 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
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May 2001

沥再生 RejuvaSeal™

CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

Demonstration of Rejuvaseal™ Huanshi Dong Lu, Guangzhou, GuangDong Province, Peoples Republic of China

November 2001

Appendix C

Nitoflor Hardtop Aggregate

Specification Sheet

TS^2 Consulting Inc.
Lamma, Hong Kong

Nitoflor Hardtop Aggregate

FOSROC

The right chemistry for construction

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

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.

(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. Crazing 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/m²	Light vehicular
3.5 kg/m²	Heavy vehicular & storage
5.0 kg/m²	Aisleways & industrial
7.5 kg/m²	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.

FOSROC

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal
Huanshi Dong Lu, Guangzhou, GuangDong Province,
Peoples Republic of China

November 2001

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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 November 4-8, 2001 to Guangzhou, GuangDong Province, China to view the test section, described in this report

Dated at Hong Kong, this 20th day of November, 2001

LICENSED PROFESSIONAL ENGINEER
A. G. SPEED
PROVINCE OF ONTARIO

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