

PA 1353 / CR. 001

Professional Services Contract PA 1353



# Auckland Harbour Bridge

Resource Consents for Discharge of  
Abrasive Blast Products

Annual Report

July 1998



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*Professional Services Contract PA 1353*



# Auckland Harbour Bridge

## Resource Consents for Discharge of Abrasive Blast Products

### Annual Report

July 1998

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# TABLE OF CONTENTS

**1 INTRODUCTION .....1**

**2 DISCHARGE TO LAND AND WATER .....2**

2.1 LOCATION AND EXTENT OF BLASTING.....2

2.2 ABRASIVE BLASTING PRODUCTS AND LIKELY CONTAMINANTS .....3

2.3 RECOVERY AND DISPOSAL OF ABRASIVE BLAST DEBRIS .....5

2.4 CORROSION INHIBITORS.....5

2.5 MEASURES UNDERTAKEN TO AVOID, REMEDY OR MITIGATE ANY ADVERSE ENVIRONMENTAL EFFECTS .....6

**3 DISCHARGE TO AIR.....8**

3.1 EXISTING PAINT SYSTEM .....8

3.2 ALTERNATIVE PAINTING SYSTEMS .....8

3.3 ALTERNATIVE PAINT REMOVAL TECHNIQUES .....9

3.4 PUBLIC SURVEY RESULTS.....10

**APPENDIX A**

ABRASIVE BLASTING DATA

**APPENDIX B**

NOTICE TO ENGINEER 140  
SURVEY RESULTS



## 1 INTRODUCTION

The following report has been prepared for the Auckland Regional Council in accordance with the special conditions of consent as set out in the Resource Consents for the Auckland Harbour Bridge (AHB). This is the fourth Annual Report and covers the period 28 June 1997 to 26 June 1998.

The Resource Consents have been granted to Transit New Zealand for the discharge of abrasive blasting products from abrasive blasting of the Auckland Harbour Bridge under the following Discharge Permits:

- Discharge Permit No. 938557 for discharge to air
- Discharge Permit No. 938508 for discharge to water
- Discharge Permit No. 938862 for discharge to ground

All conditions of these discharge permits are being complied with. In accordance with the special conditions of consent the following details are discussed:

- The location and extent of blasting
- The estimated quantity of abrasive blasting products generated and likely contaminants contained within the removed paint and abrasive.
- Confirmation of the quantity of abrasive blasting products recovered and disposed of.
- The quantity and type of corrosion inhibitors used during wet blasting.
- Details of the measures undertaken to avoid, remedy or mitigate any adverse environmental effects.
- Investigations into new paint technologies and other developments which will reduce the need for dry abrasive blasting.
- Investigations into alternative paint removal techniques.
- Results of a public survey taken to assess the effectiveness of the permit conditions.

## 2 DISCHARGE TO LAND AND WATER

### 2.1 Location and Extent of Blasting

Over the past twelve months the bulk of the abrasive blasting, high pressure water blasting and maintenance painting work on the AHB was carried out on the original truss bridge. The areas painted include below walkways steel work on Span 1 Panel Point 14/15, Span 3 Panel Points 11/12 to 14/15, Span 4 Panel Points 2/3 to 3/4. The above walkways steel work included Span 3 Panel Point 11/12, Span 4 Panel Points 0/1 to 3/4. These packages accounted for 44% of all abrasive blasting carried out over the past year. The total quantity of blasting media used over the past twelve months was 42,287kg.

The above walkways maintenance work includes all steelwork on the original bridge structure above the level of the maintenance walkways that runs the length of the structure. This includes all chords, posts, diagonals, laterals, road stringers, cross girders and services pipework. The below walkways maintenance work includes all steel work on the original bridge below the level of the access walkway, safety railings, monorails and fixed maintenance platforms and supports. The total scheduled painting area above and below walkways on the original truss bridge was 4,000m<sup>2</sup>.

Three separate areas of the Overarch of the original bridge have been worked on in the last year. Abrasive blasting of the Overarch cross bracing, above the four central lanes of the bridge commenced in April 1997. The painting of these members was completed in August 1997. The total area painted was 90 m<sup>2</sup>. The west face of the west arch chord was painted during January 1998. The total area painted was 272 m<sup>2</sup>. As part of this work crevice corrosion repairs were carried out on the chord. For these repairs a system of ultra high pressure water blasting (40,000psi) was trailed, this system was found to be satisfactory for removing the corrosion products from the crevices and hence a reduced volume of blasting media was required. The crevice corrosion repairs were carried out from November 1997 to January 1998. The final area of work on the Overarch was the hot metal spraying of the top chord on the west arch. This work was carried out in May to June 1998. The total area coated was 255m<sup>2</sup>. Once again ultra high pressure water blasting was used to remove the existing paint. It was however also necessary to blast the surface to remove the remaining zinc and provide to necessary profile for hot zinc spraying. Work on the overarch accounted for 19% of the blasting media used over the past year.

Abrasive blasting was carried on the northern anchorage bridge access area TN0 to TN1. This work was carried out from February 1998 to May 1998. The work involved the painting of all steelwork below deck level and included the road stringers, cross girder, earthquake bracing, trestle leg and bridge access stairs. This work accounted for 14% of the blasting media used over the past year. The total area painted was 250m<sup>2</sup>.

The north west inner and outer and the south west outer maintenance gantries, for the west extension have been upgraded as part of the extension of the current maintenance



contract. This work was carried out intermittently from December 1997 to May 1998. The work involved the painting of all steelwork on the gantries. The south west inner gantry has been included in this work but was not commenced prior to the end of June 1998. The approximate steel area of each gantry is 50m<sup>2</sup>. The blast media used in the surface preparation of the three gantries completed accounted for 8% of the media used over the past year.

Other areas where blasting was carried out include:

- Completion of extension trestle legs Pier 2 east and west which were commenced prior to June 1997. Total area painted 290m<sup>2</sup>.
- Spot painting has commenced on the west extension where coating failures have occurred. This work has been added to the current contract to be completed under the extension of the maintenance contract.
- Spot blasting was also carried out on in various locations on the AHB for remedial work to defective paint and crevice corrosion.

This work accounts for the remaining 15% of blasting media used.

Prior to the 1997/98 Christmas period a three year contract was let for the remainder of the resurfacing work on the extensions of the AHB. The RFT specified all blasting activities shall comply with the existing consent conditions, be fully captive, where full captive blasting is not practicable open blasting shall be no more than 5% of the total area, open blasting areas must be screened and spent media to be removed on completion of blasting, captive shot blasting must have a minimum 90% recovery rate. Media specifications included that the media must be free of soluble matter and chlorides. The maximum free silica content must not exceed 1%. The accepted tender advised that 3 Nelco CPX-16-65DC units would be used for the captive shot deck blasting. These units were fitted with shot blasting media cleaning machinery and free dust collectors. Any dropped shot would be cleaned up immediately. The construction report submitted on completion of the works showed that blasting was completed on 28 December 1997. A magnetic truck swept up the left over shot and minimum of 95% was recovered. Open blasting using Garnet abrasive was used over a total area of 5m<sup>2</sup>, this was for the blasting of five manhole covers. All spent abrasive was cleaned up immediately on completion of the blasting. Exact quantities of shot and garnet used are not available.

## 2.2 Abrasive Blasting Products and Likely Contaminants

### Quantity of Abrasive Blasting Products Generated

Details of abrasive blasting carried out on the Auckland Harbour Bridge between 27 June 1997 and 26 June 1998. Have been tabulated and included in Appendix A. For each day the location of the blasting on the bridge, the work hours, wind speed, amount of abrasive used and controls have been recorded. On some days the Contractors quality



assurance records did not give work hours or wind direction during blasting. The Contractor has been instructed to insure that all abrasive blasting data is fully recorded in the future.

Table 1 below gives the approximate amount of blasting abrasive used in each part of the AHB over the past year. The period of blasting and the prevailing wind direction is also given.

**Table 1: Summary of Abrasive Blasting Data**

Location of Blasting	Period	Approximate Amount of Abrasive Used (kg)	Prevailing Wind Direction
<b>Original Truss Bridge</b>			
Span 1 PP 14/15 Below	July 97 – Nov 97	1,325	SW
Span 3 PP 11/12 Below	Aug 97 – Nov 97	4,675	NE/SW
Span 3 PP 12/13 Below	Oct 97 – Nov 97	2,250	SW
Span 3 PP 13/14 Below	Dec 97	1,825	SW
Span 3 PP 14/15 Below	Oct 97 – Nov 97	2,237	NE/SW
Span 4 PP 2/3 Below	Feb 98 – Mar 98	2,800	NE
Span 4 PP 3/4 Below	Mar 98 – Apr 98	1,825	SW
Span 3 PP 11/12 Above	Sept 97	475	SW
Span 4 PP 0/1 to 3/4 Above	Jan 98 – Feb 98	2,225	NE
<b>Overarch</b>			
East Overarch Laterals	July 97 – Aug 97	1,200	SW
West Overarch West Face	Dec 97	25	NE/SW
West Overarch Crevice Corrosion	Nov 97-Jan 98	2,725	SW
West Overarch Top Face	May 98 – June 98	4,675	SW
<b>North Anchorage</b>			
TN0 - TN1	Feb 98 – May 98	6,300	SW
<b>Maintenance Gantries</b>			
NW Inner & Outer, SW Outer	Dec 97 – May 98	3,375	SW
<b>Miscellaneous</b>			
Pier 2 Brackets East & West	July 97 – Aug 97	500	NE
West Extension Spot Painting	June 98	2,400	SW
Misc. Remedial Work	June 97 – June 98	3,550	-



### Likely Contaminants in Removed Paints and Abrasives

Both basalt and garnet abrasive blasting media have been used on the AHB over the last twelve months. The basalt abrasive has been of two grades, Fine Blast and Min Blast. Both these products are supplied by Mintech NZ Ltd and are manufactured at their Waitakere plant. The garnet has been supplied by Industrial Minerals Ltd.

As mentioned in our previous reports the basalt and garnet abrasive media do not contain any known toxic contaminants or free silica in excess of 1% and the concentrations of soluble materials are so low that they can be considered inert. The chemical and mineralogical composition of both the basalt and garnet abrasive have been given in previous reports.

The paint removed from the AHB structure over the past twelve months has been the original five coat system. The original AHB paint system consisted of three coats zinc chromate primer and two coats of micaceous iron oxide. Particles of the original zinc spray bridge coating system have also been removed by abrasive blasting and be present in the blasting discharge.

The blasting technique and type of coatings removed from the AHB structure over the past twelve months are the same as those used when the resource consents for the AHB were issued in 1994. The composition of the abrasive blasting products and the concentration of contaminants will therefore be essentially the same as at that time. See Works Consultancy Services Central Laboratories Report No. 93/24730 for the results of the analysis of the abrasive blasting products.

### **2.3 Recovery and Disposal of Abrasive Blast Debris**

Although quantities of shot and garnet used are not known from the resurfacing on the extensions, it is known some 99% of the shot was recovered, recycled and ultimately disposed of off site in accordance with the Disposal Plan.

Blasting carried out from TN0-TN1 (north anchorage) and the gantry refurbishment (north anchorage and south anchorage) deposited quantities of media on surrounding sealed areas. The Contract was requested to collect and dispose of all blasting deposits in these areas on completion of the works. The collected abrasive blasting products were disposed of in accordance with our Disposal Plan, i.e. in the Northern Disposal Systems Special Waste Landfill at Greenmount.

### **2.4 Corrosion Inhibitors**

The AHB Maintenance Contractor has confirmed that corrosion inhibitors were used on the AHB in the past twelve months. The temporary corrosion inhibitor was used in one package of work on the south end of the northern viaduct (TN0-TN1). Sodium Nitrite was used in this area and applied at the specified rate of 0.32% by mass. See Notice to Engineer No. 140, dated 9 July 1998 in Appendix B.

## 2.5 Measures Undertaken to Avoid, Remedy or Mitigate any Adverse Environmental Effects

We have continued to as far as practicable avoid, remedy and mitigate adverse effects on the environment from the abrasive blasting on the AHB. Methods used include:

- Using the more expensive garnet abrasive for blasting where possible. Using garnet has reduced the amount of abrasive dust generated when blasting. Garnet is more efficient due to its hardness and angular profile and therefore a lesser quantity is required to prepare the steel surfaces as compared to basalt abrasive.
- High pressure water blasting has continued to be used over the past twelve months to remove as much of the loose paint, scale and corrosion products from surfaces as possible before abrasive blasting. Water blasting removes paint flakes rather than generating the dust associated with abrasive blasting. Following water blasting a light sweep blast is required to obtain a suitable surface profile for anchorage of the paint film.
- Ultra High Pressure (40,000psi) water blasting was recently trialed on the west overarch crevice corrosion work. It was found that the ultra high pressure water blasting removed all scale, corrosion products and left a suitable profile for filling of the crevices. This technique was also used on the west overarch top chord to remove the existing paint system and work extremely well. A light sweep blast was also required to obtain a suitable surface profile for anchorage of the paint film.
- Signage was displayed advising the public of abrasive blasting and coating operations on the AHB.
- Surrounding businesses and residents were forwarded blasting and painting programmes at regular intervals over the past twelve months. (see appendix B for a copy of a letter distributed to residents)
- Screens were used where practicable to reduce the spread of debris.
- Investigation into alternative blasting abrasives continued over the past twelve months. Crushed glass is one product that was trialed as an alternative abrasive. This product is more environmentally friendly as the product is environmentally stable and non toxic as well as producing less dust than envirogrit which is currently used. It was found that this product did not produce the same profile as the current abrasives, but the profile was within the lower acceptable limit.
- Investigation and trialing of alternative paint systems that comply with health and safety legislation in terms of VOC and toxicity levels.
- Long life paint systems are also being identified and trialed. If these are successful then the amount of cumulative discharge over future years will be reduced.



- The current blasting philosophy is based on spot blasting followed by a light sweep blast. This philosophy together with high pressure water blasting where possible, minimises the volume of material that is generated.
- Regular wash down of steel work maximises coating life by removing salt deposits which are detrimental to coating life. By maximising coating life we reduce the frequency of repainting and therefore quantities of material discharged to the environment. It is expected that this practice will continue no matter what coatings are employed in the future.

### 3 DISCHARGE TO AIR

#### 3.1 Existing Paint System

As described in previous reports the paint system currently being applied to the AHB is an alkyd system consisting of four coats; two primers of high build zinc phosphate overcoated by two micaceous iron oxide top coats. This system is applied over the original paint system.

The original AHB paint system consisted of three coats of zinc chromate primer and two coats of micaceous iron oxide. A large proportion of this paint system has been removed and replaced or repainted over by the new zinc chromate free system. The general philosophy that has been adopted for bridge maintenance painting system minimises paint removal by leaving sound paint intact and spot blasting where breakdown occurs. These areas are spot primed and covered by a single coat top coat. This minimises the quantity of paint being reapplied and will minimise future discharge quantities.

The current three year maintenance painting contract (MA 1357) was scheduled to finish on 31 August 1997 but has been extended to 31 August 1998. By this time approximately 60,000m<sup>2</sup> of maintenance painting will have been completed.

#### 3.2 Alternative Painting Systems

##### Paint Trials

Some 30 different paint systems are currently included in the paint trials. Of these 24 systems are the original trial systems and in June 1997 six additional system were added and include Polysiloxanes developed by Resene Ameron and Moisture Cured Urethanes developed by Wasser. Both these systems were discussed in the previous report. All paint systems in the trials were recently assessed and the performance of each system rated against its performance, application characteristics and VOC content. At this stage it appears that for large flat areas such as the extension boxes that the inorganic zinc silicates are the best performing and on the original truss bridge the zinc phosphates are the best performing.

##### Zinc Metal Spray

The bridge structure was coated with zinc metal spray at the time of construction (with the exception of Span 7 and the interior surfaces of the extensions, pier brackets and diagonals which were painted with a lead based primer). The Zinc coating provides a high level of protection to the steel substrates due to its sacrificial action.

Over the last few years we have been trialing zinc spray on the AHB. Several types of metal spray systems exist to choose from. The most common sprays used world wide are zinc, zinc/aluminium and aluminium/magnesium with the aluminium alloy sprays offering superior protection. Although zinc spray is more expensive to apply than conventional wet coatings the expected life to first maintenance is in the order of 20 – 25



years. The overall amount of abrasive blasting required over time for zinc metal spray may therefore be less than for conventional coatings.

In December 1994, a zinc metal spray trial was carried out on the top chord in span 3. Application of the zinc spray was relatively simple although costs were high. Over February and March 1997 three West Overarch Apexes were successfully treated with 85/15 zinc /aluminium metal spray and sealed. The underside of the Pier 1 East Extension Bracket were also treated with zinc/aluminium spray in May 1997. In May/June 1998 the West Overarch Top Face was treated with a zinc spray, sealed and top coated with a single coat of AHB 4.

### 3.3 Alternative Paint Removal Techniques

#### High Pressure Water Blasting

As mentioned in previous reports, high pressure water blasting has been found to be very effective for the removal of brittle, high build films. Abrasive blasting is still required to provide a surface profile for application of coatings, but the quantity of blasting abrasive required is reduced compared with removal of coatings by abrasive blasting alone.

The standard procedure for surfacing preparation on the AHB now starts with a wash down of entire area to be treated, followed by abrasive blasting of defective area. The area is then water blasted and sweep blasted before proceeding with maintenance painting

High pressure water blasting has proved to be an efficient and cost effective method of paint removal. With high enough pressures this method can remove large quantities of coating in a relatively short period of time. Other advantages are:

- There is no airborne debris from discharge to air. Coatings are removed in flakes rather than as a fine dust and therefore do not affect the respiratory system of persons in the vicinity of the blasting operation.
- No abrasive blast media is deposited in areas where these may present a hazard.

#### Ultra High Pressure Water Blasting

Ultra high pressure water blasting is carried out at 40,000psi. This system has been trialed over the past twelve months for both crevice corrosion repair and removal of the existing coating system. Results from the trial for removing existing coating systems have been similar to those mentioned above for high pressure water blasting. Crevice corrosion repair using this technique have all but eliminated the need for abrasive blasting. The pressure is sufficient that all corrosion products are removed from the crevice and little to no hand preparation is necessary. A sweep blast may still be required on the surfaces surrounding the crevice prior to coating.



### Alternative Blasting Abrasive

Crushed basalt continued to be used for the majority of abrasive blasting activities on the AHB over the past year. However, alternative blasting abrasives have been investigated and trialed over the past two years.

Garnet abrasive was successfully used for the West Extension resurfacing project (1996/97) and for abrasive blasting of the AHB superstructure. The garnet abrasive is considerably harder than the basalt abrasive and does not breakdown upon impact to the same extent (leading to less dust). The hardness of the garnet also meant that the used garnet from the resurfacing project was able to be recycled and reused on the AHB superstructure. In addition, the hardness and angularity of the garnet abrasive gives it an increased rate of coating removal in comparison to the softer less angular basalt. The initial cost of the garnet is still greater than for basalt, but this cost has been offset to a point by recycling.

An alternative basalt blasting abrasive has also been trialed. The abrasive was sourced from Whangerei and it was hoped that it could be used as a low dust blasting abrasive without the costs associated with the garnet. Trials proved the abrasive to be unsuitable for general use on the bridge as it breaks up on impact with the target surface creating excess dust.

Captive steel shot blasting was used on the West Extension Resurfacing project (1997/98). This was used for the majority of the surface preparation work. Only very small quantities of the shot were not captured and these were cleaned up easily with a magnetic sweeper. Garnet was used in the areas where it was not possible to use the shot system. The resurfacing contractor is intending to use this methodology for the remaining resurfacing work.

During May/June 1998 crushed glass was trialed as an alternative blasting abrasive. It was found from these trials that the glass like the garnet produced less dust than the basalt. However the profile achieved was not as good as that from the basalt. This was not seen as a problem by the Contractor as the profile achieved meet the specified standards.

### 3.4 Public Survey Results

As required by Special Condition 9 of the Air Discharge Permit, survey questionnaires have been sent to residents and businesses adjacent to the AHB. The surveys asked for comments on:

- The effectiveness of the screens.
- The availability of information about the Contractor's programme.

- The adequacy of the sweeping of the surrounding sealed areas.
- The sufficiency of signage warning of possible hazards.
- Other relevant comments.

The survey questionnaire and the six replies received are included in Appendix B. The majority of respondents appear to be happy with the measures currently in place. However several complaints were received regarding the noise from the TN6 bearing. Remedial work on this bearing have since been completed and the noise much reduced.. The Contractor says that screening has been used on the AHB but that wind has sometimes made the use of screens in some locations difficult or not fully effective. The Contractor has attempted to place signage in locations that will expose the signs to the greatest number of the public as possible. On some occasions they may not be directly visible to every local resident and business surrounding the AHB. The Contractor also reports that the material in Princess Street is fine road dust that would only be further dispersed by sweeping. As has been done in the past, the Contractor will arrange for cleaning of any vehicle or building, soiled by abrasive blasting products or paint from the AHB when requested by the owner.



# Appendix A

## Abrasive Blasting Data







TRANSIT NEW ZEALAND  
AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive				Controls
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.		
28-Jul-97	O/A	Laterals	11:30	-	0.5	-	SW	75		75	0	-
29-Jul-97	1,O/A	14/15, Lat	12:00	15:00	0.5	0.5	NE	50	125	175	0	-
30-Jul-97	No Abrasive Blasting, Alternative Work											
31-Jul-97	No Abrasive Blasting, Painting Only											
01-Aug-97	No Abrasive Blasting, Painting Only											
02-Aug-97	Weekend											
03-Aug-97	Weekend											
04-Aug-97	O/A	Laterals	11:30	15:20	5	-	SW	75		75	0	-
05-Aug-97	No Abrasive Blasting, Painting Only											
06-Aug-97	1, 7	11/12, 3/4	09:45	15:30	1.5	3.5	NE	150	150	300	0	-
07-Aug-97	No Abrasive Blasting, Painting Only											
08-Aug-97	No Abrasive Blasting, Painting Only											
09-Aug-97	Weekend											
10-Aug-97	Weekend											
11-Aug-97	No Abrasive Blasting, Alternative Work											
12-Aug-97	No Abrasive Blasting, Painting Only											
13-Aug-97	3	11/12	-	-	5	-	SW	275		275	0	-
14-Aug-97	P2,3	11/12	-	15:15	-	4.5	SW	175	225	400	0	-
15-Aug-97	No Abrasive Blasting, Alternative Work											
16-Aug-97	Weekend											
17-Aug-97	Weekend											
18-Aug-97	No Abrasive Blasting, Pier 2 Strengthening											
19-Aug-97	No Abrasive Blasting, Pier 2 Strengthening											
20-Aug-97	No Abrasive Blasting, Pier 2 Strengthening											
21-Aug-97	No Abrasive Blasting, Pier 2 Strengthening											
22-Aug-97	P2	Trestle	08:00	15:00	1.5	3	SW	125		125	0	-
23-Aug-97	Weekend											
24-Aug-97	Weekend											
25-Aug-97	3	11/12	-	-	-	1.5	NE	275		275	0	-
26-Aug-97	3	11/12	-	-	-	2.5	NE	200		200	0	-



TRANSIT NEW ZEALAND  
 AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
 ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive				Controls	
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.			
27-Aug-97	No Abrasive Blasting, Painting Only												
28-Aug-97	O/A	chord	08:10	-	5	-	SW	125			125	0	-
29-Aug-97	3,O/A,5	11/12,ch,1-3	10:00	15:30	2.5	2.8	SW	150	125	150	425	0	-
30-Aug-97	Weekend												
31-Aug-97	Weekend												
01-Sep-97	O/A,3,5	ch,11/12,3-6	08:00	15:25	1.5	3.5	SW	150	75	75	300	0	-
02-Sep-97	3	11/12	-	-	3.5	-	SW	425			425	0	-
03-Sep-97	O/A,Misc	Laterals	11:00	15:15	3.5	3	SW	125	50		175	0	-
04-Sep-97	3	11/12	11:05	15:25	0.5	0.5	NE	200			200	0	-
05-Sep-97	3	11/12	-	14:30	-	0.5	NE	150			150	0	-
06-Sep-97	Weekend												
07-Sep-97	Weekend												
08-Sep-97	3	11/12	-	-	-	2.8	NE	150			150	0	-
09-Sep-97	3	11/12	-	-	-	2.8	NE	150			150	0	-
10-Sep-97	3	14/15,11/12	08:00	-	3.5	-	NE	300	200		500	0	-
11-Sep-97	3	14/15,11/12	10:40	15:00	0.5	0.5	NE	225	100		325	0	-
12-Sep-97	3	11/12,14/15	-	-	3.2	-	NE	150	100		250	0	-
13-Sep-97	Weekend												
14-Sep-97	Weekend												
15-Sep-97	3	11/12	-	15:00	-	3.2	SW	225			225	0	-
16-Sep-97	O/A	Laterals	-	15:00	-	2.2	SE	150			150	0	-
17-Sep-97	3	14/15	09:00	15:00	0.1	0.1	NW	12			12	0	-
18-Sep-97	No Abrasive Blasting, Painting Only												
19-Sep-97	3	11/12	09:00	15:00	0	1.6	SW	450			450	0	-
20-Sep-97	Weekend												
21-Sep-97	Weekend												
22-Sep-97	3	11/12,14/15	-	-	0.83	1.67	W	400	100		500	0	-
23-Sep-97	No Abrasive Blasting, Alternative Work												
24-Sep-97	No Abrasive Blasting, Alternative Work												
25-Sep-97	No Abrasive Blasting, Alternative Work												







TRANSIT NEW ZEALAND  
 AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
 ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive			Controls		
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.			
26-Oct-97	Weekend												
27-Oct-97	Public Holiday												
28-Oct-97	No Abrasive Blasting, Painting Only												
29-Oct-97	1	14/15	09:05	15:00	2.5	3.5	SW	100			100	0	-
30-Oct-97	Misc	-	-	-	-	-	-	450			450	0	-
31-Oct-97	3,Misc	12/13,14/15	08:00	15:00	0	0	-	600	150	150	900	0	-
01-Nov-97	Weekend												
02-Nov-97	Weekend												
03-Nov-97	1,3,Misc	14/15,12/13	08:00	15:00	2.5	3.5	SW	125	325	150	600	0	-
04-Nov-97	No Abrasive Blasting, Painting Only												
05-Nov-97	3,O/A	14/15,12/13	08:00	14:30	5	5	SW	450	350	25	825	0	-
06-Nov-97	3,O/A	11/12, C/C	08:30	14:30	1.9	3.3	NE	450	75		525	0	-
07-Nov-97	No Abrasive Blasting, Alternative Work												
08-Nov-97	Weekend												
09-Nov-97	Weekend												
10-Nov-97	No Abrasive Blasting, Painting Only												
11-Nov-97	3	14/15,11/12	-	-	2.3	3.5	SW	175	300		475	0	-
12-Nov-97	3,1	13/12,14/15	08:00	-	2	-	NW	200	150		350	0	-
13-Nov-97	No Abrasive Blasting, Painting Only												
14-Nov-97	No Abrasive Blasting, Washdown												
15-Nov-97	Weekend												
16-Nov-97	Weekend												
17-Nov-97	3	14/15,12/13	09:25	15:00	1.5	1.5	SW	75	175		250	0	-
18-Nov-97	O/A	C/C	12:00	-	3	-	SW	150			150	0	-
19-Nov-97	3	12/13	08:00	15:10	2.5	3.5	SW	275			275	0	-
20-Nov-97	O/A	C/C	12:15	-	4.5	-	SW	50			50	0	-
21-Nov-97	Misc	-	08:00	16:00	-	-	-	250			250	0	-
22-Nov-97	Weekend												
23-Nov-97	Weekend												
24-Nov-97	O/A,Misc	C/C	11:30	14:20	2.5	3	SW	100	125		225	0	-



TRANSIT NEW ZEALAND  
 AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
 ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive			Controls		
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.			
25-Nov-97	O/A,Misc	C/C	08:00	14:50	3.5	3.5	SW	75	100	175	0	-	
26-Nov-97	Misc	-	08:00	14:55	3.5	4	SW	125		125	0	-	
27-Nov-97	No Abrasive Blasting, Painting Only												
28-Nov-97	Gantry	NW Inner	10:00	15:10	2	3.5	SW	125		125	0	-	
29-Nov-97	Weekend												
30-Nov-97	Weekend												
01-Dec-97	No Abrasive Blasting, Washdown												
02-Dec-97	No Abrasive Blasting, Washdown												
03-Dec-97	Gantry	NW Inner	-	-	4.5	-	SW	225		225	0	-	
04-Dec-97	O/A,Gant.	C/C,NW In.	09:00	15:45	2.5	2.5	SW	225	100	325	0	-	
05-Dec-97	Gantry	NW Inner	08:00	15:00	2.5	2.5	SW	200		200	0	-	
06-Dec-97	Weekend												
07-Dec-97	Weekend												
08-Dec-97	Gantry,Misc	NW Inner	-	-	0.5	2	SW	100	50	150	0	-	
09-Dec-97	O/A	C/C	11:40	-	0.5	-	SW	100		100	0	-	
10-Dec-97	O/A,3	C/C,13/14	11:30	-	0.5	-	SW	150	225	375	0	-	
11-Dec-97	O/A	C/C	11:30	-	0.5	-	SW	125		125	0	-	
12-Dec-97	3	13/14	-	-	0.5	-	SW	225		225	0	-	
13-Dec-97	Weekend												
14-Dec-97	Weekend												
15-Dec-97	3,O/A	13/14,C/C	08:00	15:00	3.5	4.5	NE	225	125	350	0	-	
16-Dec-97	3	14/15	-	-	3.5	-	NE	275		275	0	-	
17-Dec-97	3,O/A	13/14,C/C	11:30	14:00	0.5	0.5	NE	150	100	250	0	-	
18-Dec-97	3,O/A	13/14,C/C	08:00	14:50	0.5	1	SW	275	100	375	0	-	
19-Dec-97	3	14/15	08:00	15:00	0	2.2	NW	225		225	0	-	
20-Dec-97	Weekend												
21-Dec-97	Weekend												
22-Dec-97	3,O/A,Gant	13/14,C/C,NW	07:45	14:30	0.5	0.5	NE	225	100	325	650	0	-
23-Dec-97	No Abrasive Blasting												
24-Dec-97	No Abrasive Blasting												











TRANSIT NEW ZEALAND  
 AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
 ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive			Controls	
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.		
23-Feb-98	1	TN0-1	09:30	-	2.5	-	NW	175		175	0	-
24-Feb-98	No Abrasive Blasting, Washdown											
25-Feb-98	1	TN0-1	08:00	14:00	-	-	-	275		275	0	-
26-Feb-98	4	2/3	08:30	15:00	1.5	1.5	SW	175		175	0	-
27-Feb-98	4	2/3	08:00	15:00	1.5	1.5	SW	225		225	0	-
28-Feb-98	Weekend											
01-Mar-98	Weekend											
02-Mar-98	1,4	TN0-1,2/3	08:00	15:30	1.5	2.5	SW	350	100	450	0	-
03-Mar-98	1,4	TN0-1,2/3	08:00	15:00	1.5	1.5	SW	125	325	450	0	-
04-Mar-98	1,4	TN0-1,2/3	09:00	15:15	0.5	0.5	NE	175	25	200	0	-
05-Mar-98	No Abrasive Blasting											
06-Mar-98	No Abrasive Blasting, Painting Only											
07-Mar-98	Weekend											
08-Mar-98	Weekend											
09-Mar-98	No Abrasive Blasting, Painting Only											
10-Mar-98	No Abrasive Blasting, Painting Only											
11-Mar-98	No Abrasive Blasting, Painting Only											
12-Mar-98	No Abrasive Blasting, Painting Only											
13-Mar-98	No Abrasive Blasting, Washdown											
14-Mar-98	Weekend											
15-Mar-98	Weekend											
16-Mar-98	4	2/3	08:00	15:30	0.5	1.5	SW	150		150	0	Screens
17-Mar-98	1,4	TN0-1,2/3	07:45	14:50	1.5	1.5	SW	150	350	500	0	-
18-Mar-98	1,4	TN0-1,2/3	07:45	14:40	1.5	3	NE	75	125	200	0	-
19-Mar-98	4	2/3	07:45	14:55	3.5	5	SW	175		175	0	-
20-Mar-98	No Abrasive Blasting, Painting Only											
21-Mar-98	Weekend											
22-Mar-98	Weekend											
23-Mar-98	No Abrasive Blasting, Painting Only											
24-Mar-98	No Abrasive Blasting, Painting Only											



TRANSIT NEW ZEALAND  
 AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
 ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive			Controls	
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.		
25-Mar-98	No Abrasive Blasting, Painting Only											
26-Mar-98	No Abrasive Blasting, Painting Only											
27-Mar-98	4	3-Apr	-	-	0.5	-	S	175		175	0	-
28-Mar-98	Weekend											
29-Mar-98	Weekend											
30-Mar-98	1,4	TN0-1,3/4	08:00	15:00	0.5	1.5	NE	175	350	525	0	Screens
31-Mar-98	1,4	TN0-1,3/4	07:45	15:00	-	-	-	300	425	725	0	Screens
01-Apr-98	1,4	TN0-1,3/4	07:45	14:50	0.5	1.5	NE	275	300	575	0	Screens
02-Apr-98	No Abrasive Blasting, Washdown											
03-Apr-98	1,4	TN0-1,3/4	07:45	15:00	1.5	5	SW	225	325	550	0	Screens
04-Apr-98	Weekend											
05-Apr-98	Weekend											
06-Apr-98	1,4	TN0-1,3/4	07:45	15:00	1.5	3	SW	175	325	500	0	-
07-Apr-98	1,4	TN0-1,3/4	07:45	15:15	0.5	1.5	SW/SE	125	275	400	0	-
08-Apr-98	1,4	TN0-1,3/4	07:45	15:00	0.5	0.5	NE	125	175	300	0	-
09-Apr-98	No Abrasive Blasting, Washdown											
10-Apr-98	Public Holiday											
11-Apr-98	Weekend											
12-Apr-98	Weekend											
13-Apr-98	Public Holiday											
14-Apr-98	1	TN0-1	12:30	14:00	0.5	0.5	NW	175		175	0	-
15-Apr-98	No Abrasive Blasting, Painting Only											
16-Apr-98	1	TN0-1	07:50	14:50	0.5	4.5	SW	175		175	0	Screens
17-Apr-98	1,P4-6	TN0-1	07:45	-	0.5	0.5	SW	150	75	225	0	Screens
18-Apr-98	Weekend											
19-Apr-98	Weekend											
20-Apr-98	1,Gantry	TN0-1,SW	07:45	15:15	0.5	0.5	SW	100	175	275	0	-
21-Apr-98	1,Gantry	TN0-1,SW	07:45	15:20	0.5	0.5	SW	100	275	375	0	Screens
22-Apr-98	1,Gantry	TN0-1,SW	07:45	15:20	2.5	5	SW	150	300	450	0	Screens
23-Apr-98	No Abrasive Blasting, Alternative Work											







TRANSIT NEW ZEALAND  
 AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
 ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive			Controls	
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.		
24-May-98	Weekend											
25-May-98	O/A	West Top	07:45	14:40	1.5	3	NW	350		350	0	-
26-May-98	O/A	West Top	10:15	-	5	5	SW	350		350	0	-
27-May-98	O/A	West Top	10:40	15:15	5	5	SW	525		525	0	-
28-May-98	O/A	West Top	08:40	15:00	0	0.5	SW	375		375	0	-
29-May-98	No Abrasive Blasting, Alternative Work											
30-May-98	Weekend											
31-May-98	Weekend											
01-Jun-98	Public Holiday											
02-Jun-98	No Abrasive Blasting, Alternative Work											
03-Jun-98	No Abrasive Blasting, Painting Only											
04-Jun-98	No Abrasive Blasting, Painting Only											
05-Jun-98	No Abrasive Blasting, Painting Only											
06-Jun-98	Weekend											
07-Jun-98	Weekend											
08-Jun-98	No Abrasive Blasting, Painting Only											
09-Jun-98	No Abrasive Blasting, Painting Only											
10-Jun-98	West Ext	-	-	-	-	-	-	250		250	0	-
11-Jun-98	No Abrasive Blasting, Painting Only											
12-Jun-98	No Abrasive Blasting, Painting Only											
13-Jun-98	Weekend											
14-Jun-98	Weekend											
15-Jun-98	No Abrasive Blasting, Painting Only											
16-Jun-98	West Ext	-	08:15	15:00	1	1	SW	125		125	0	-
17-Jun-98	No Abrasive Blasting, Alternative Work											
18-Jun-98	No Abrasive Blasting, Alternative Work											
19-Jun-98	West Ext	-	-	-	1.5	2.5	SW	275		275	0	-
20-Jun-98	Weekend											
21-Jun-98	Weekend											
22-Jun-98	West Ext	-	-	-	1	-	SW	175		175	0	-



TRANSIT NEW ZEALAND  
 AUCKLAND HARBOUR BRIDGE MAINTENANCE - MA 1357

RESOURCE CONSENTS FOR ABRASIVE BLAST PRODUCTS  
 ANNUAL REPORT - JULY 1998

ABRASIVE BLASTING DATA

DATE	Span	Panel P.	Work Hours		Wind Speed (m/s)			Abrasive			Controls	
			From	To	0830 hrs	1400 hrs	Dir	Used	Tot.	Recov.		
23-Jun-98	West Ext	-	-	-	1.5	-	SW	475		475	0	Screens
24-Jun-98	West Ext	-	-	-	-	-	-	275		275	0	Screens
25-Jun-98	West Ext	-	-	-	2.5	-	NE	400		400	0	Screens
26-Jun-98	West Ext	-	-	-	0	-	NE	225		225	0	Screens
Av. Wind Speed					1.60	2.07		Total Quantity Used		45087	0	





## **Appendix B**

### **Notice to Engineer 140 Survey Results**



**NOTICE TO ENGINEER**

Consecutive No 140

Client: Transit NZ.

Consultant: Opus International Consultants

Contract: Auckland Harbour Bridge - Maintenance Contract

Resource Consent Data

Your Reference NTC 292

In accordance with the conditions of the Resource Consent, please find attached the following information:

1. Copies of Daily Environment Reports dated from 5<sup>th</sup> to 6<sup>th</sup> July 1998. Our coatings inspector informs me that you already have the daily sheets prior to 25<sup>th</sup> August 1997.
2. Temporary corrosion inhibitor has been used on one package of work at the South end of the North Viaduct (TNO-1).

In accordance with our Contract Documents, and more particularly Specification CES 305 appendix II, Sodium Nitrite was used in this area, applied at the specified rate of 0.32% by mass.

3. Copy of the latest notification to local residents dated March 1998.
4. Copies of completed summaries from local residents.
5. As you are aware, two alternate blasting methods have been trialed on the bridge structure in the last 12 months.
  - Ultra high pressure water blasting is particularly effective on thick coatings, producing no dust with a water discharge volume of 4litres/min.
  - Crushed glass appears from trials to have similar characteristics to the Basalt blasting media but with less dust. Production rates are also similar to basalt. Full product data sheets have been supplied as part of NTE 133 of 21<sup>st</sup> April 1998.

Issued by hand / post / fax

*G Osbaldiston*

9 7 98

G Osbaldiston. Project Manager



7<sup>th</sup> July 1998

**SERCO**

**RESOURCE CONSENT - SURVEY**

Dear Neighbour,

You will no doubt be aware that over the last few months, we have been undertaking maintenance painting work on the Auckland Harbour Bridge. This work has been carried out in accordance with the Resource Consent granted by the Auckland Regional Council.

In order that we can monitor our work methods and if necessary modify work practices, plant and / or materials we would appreciate your comments regarding any inconvenience that may have been caused by our operation.

1	Were the screen effective in reducing the drift of blasting media?	✓
2	Was sufficient information available to inform you of our painting programme?	✓
3	Were the streets and surrounding areas swept adequately after blasting?	✓
4	Was there sufficient signage in place to warn of possible hazards?	✓
5	Any other comments?	

NAME: s9(2)(a)

SIGNATURE: s9(2)(a)

DATE: 8/7/98



7<sup>th</sup> July 1998

**SERCO**

**RESOURCE CONSENT - SURVEY**

Dear Neighbour,

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In order that we can monitor our work methods and if necessary modify work practices, plant and / or materials we would appreciate your comments regarding any inconvenience that may have been caused by our operation.

1	Were the screen effective in reducing the drift of blasting media?	Yes.
2	Was sufficient information available to inform you of our painting programme?	Yes.
3	Were the streets and surrounding areas swept adequately after blasting?	Yes.
4	Was there sufficient signage in place to warn of possible hazards?	Yes
5	Any other comments?	TN6. making clunking Bad at moment noise

NAME: <sup>s9(2)(a)</sup> \_\_\_\_\_  
SIGNATURE: \_\_\_\_\_  
DATE: 8.7.98.



7<sup>th</sup> July 1998

**SERCO**

**RESOURCE CONSENT - SURVEY**

Dear Neighbour,

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In order that we can monitor our work methods and if necessary modify work practices, plant and / or materials we would appreciate your comments regarding any inconvenience that may have been caused by our operation.

1	Were the screen effective in reducing the drift of blasting media?	YES
2	Was sufficient information available to inform you of our painting programme?	?
3	Were the streets and surrounding areas swept adequately after blasting?	?
4	Was there sufficient signage in place to warn of possible hazards?	No.
5	Any other comments?	Sand in gutters overflows when raining (old)

NAME: \_\_\_\_\_  
SIGNATURE: \_\_\_\_\_  
DATE: 8/7/98



7<sup>th</sup> July 1998

**SERCO**

**RESOURCE CONSENT - SURVEY**

Dear Neighbour,

You will no doubt be aware that over the last few months, we have been undertaking maintenance painting work on the Auckland Harbour Bridge. This work has been carried out in accordance with the Resource Consent granted by the Auckland Regional Council.

In order that we can monitor our work methods and if necessary modify work practices, plant and / or materials we would appreciate your comments regarding any inconvenience that may have been caused by our operation.

1	Were the screen effective in reducing the drift of blasting media?	Yes - I saw it and appreciated it.
2	Was sufficient information available to inform you of our painting programme?	Yes.
3	Were the streets and surrounding areas swept adequately after blasting?	Yes.
4	Was there sufficient signage in place to warn of possible hazards?	Didn't see any signs
5	Any other comments?	Painting ok but spray from resealing affected road in water. (RESEALING ROAD)

NAME: s9(2)(a)  
SIGNATURE: \_\_\_\_\_  
DATE: 8/7/98



7<sup>th</sup> July 1998

**SERCO**

**RESOURCE CONSENT - SURVEY**

Dear Neighbour,

You will no doubt be aware that over the last few months, we have been undertaking maintenance painting work on the Auckland Harbour Bridge. This work has been carried out in accordance with the Resource Consent granted by the Auckland Regional Council.

In order that we can monitor our work methods and if necessary modify work practices, plant and / or materials we would appreciate your comments regarding any inconvenience that may have been caused by our operation.

1	Were the screens effective in reducing the drift of blasting media?	SMALL AMOUNT, GOOD.
2	Was sufficient information available to inform you of our painting programme?	YES.
3	Were the streets and surrounding areas swept adequately after blasting?	YES.
4	Was there sufficient signage in place to warn of possible hazards?	YES.
5	Any other comments?	KEEP IT UP.

NAME: \_\_\_\_\_  
SIGNATURE: \_\_\_\_\_  
DATE: 8 / 7 / 98



7<sup>th</sup> July 1998

**SERCO**

**RESOURCE CONSENT - SURVEY**

Dear Neighbour,

You will no doubt be aware that over the last few months, we have been undertaking maintenance painting work on the Auckland Harbour Bridge. This work has been carried out in accordance with the Resource Consent granted by the Auckland Regional Council.

In order that we can monitor our work methods and if necessary modify work practices, plant and / or materials we would appreciate your comments regarding any inconvenience that may have been caused by our operation.

1	Were the screen effective in reducing the drift of blasting media?	YES.
2	Was sufficient information available to inform you of our painting programme?	YES.
3	Were the streets and surrounding areas swept adequately after blasting?	YES.
4	Was there sufficient signage in place to warn of possible hazards?	YES.
5	Any other comments?	EXPANSION JOINTS T.N.G. (Noise 24)

NAME: s9(2)(a)

SIGNATURE: \_\_\_\_\_

DATE: 7-7-97





INTERNATIONAL  
CONSULTANTS

