Draft Memorandum

To:	Neil Cochrane (CIAL)	**Date:**	12 June 2012
From:	John Marsh, Tamas Andrell (Beca)	**Our Ref:**	3231836
Copy:	Alex Sundakov, John Cairns, Richard Holyoake		
Subject:	CIAL Airfield Pavement Maintenance Pricing Study		

1 Introduction

Christchurch International Airport Ltd. (CIAL) commissioned Beca on 05 June 2012 to provide high level airfield pavement maintenance advice assistance to support current pricing reviews.

This draft memorandum summarizes our initial advice for review and further discussion with CIAL.

2 General Background

Airfield pavements are subject to the following common types of load related and environmental damage:

- Cracking at joints due to general ageing and exposure to the environment;
- Stone loss and general pavement surface deterioration due to general ageing and exposure to the environment;
- Load-induced fatigue cracking and block cracking;
- Load induced surface shape loss and rutting;
- Shunting, surface scuffing, delamination due to horizontal forces exerted by braking/ accelerating/ turning aircraft;
- Bitumen stripping or aggregate deterioration due to moisture in the pavement;
- Loss of surface texture due to rubber deposits and abrasion.

Airfield pavement maintenance is required to keep the pavements in serviceable condition. The proportion of costs of maintenance that are attributed to aircraft loading, and which are attributed to environmental factors (age) are situational – i.e. it depends on the age of the pavement, the type of the pavement and the loadings on the pavement.

3 Pavement Area Usage by Aircraft Type

The airfield pavements of Christchurch International Airport are currently used by both turboprop and jet aircraft. To assist CIAL with developing their pricing model a hypothetical high-level layout plan sketch has been prepared to identify those areas of the existing airfield pavement which could be required if the airport were used by commercial turboprop aircraft only.

The layout plan sketch SK-01 in Appendix A indicates these areas.

This layout plan has been prepared based on the following assumptions:

- Runway 02-20 maintained for turboprop operations in 1,300m length and 30m width (Code 3C runway) from Taxiway A3 to Runway 11-29 (Chainage 800m to 2100m).

- Runway 11-29 maintained in full 1741m length and 30m width (Code 3C runway) as there are no intermediate exit or entry taxiways that would allow the use of a reduced runway length without backtracking operations.
- Taxiways A, A3, A4 and A11 maintained in their current full length but in a width of 18m and without shoulders compared to their existing width of 23m plus shoulders.
- Taxiway A5 maintained in its current full length but in 18m width as opposed to 23m.
- Taxiways E/E1 and F/F1 maintained in their current full length but in 18m width as opposed to 23m.
- Taxiways E12 to E14 and A12 to A14 maintained in their current length and width.

(Actual areas of the respective pavements suggested for turbo prop and existing mixed usage can be provided as required. An approximate measurement from SK-01 of pavements for turboprop usage is 280,000m^2)

The following areas have been excluded as they have been deemed to be required for jet aircraft operations or non-commercial turboprop (Antarctic C-130 Hercules Aircraft) operations only:

- Runway 02-20 from Taxiway A2 to Taxiway A3 (Chainage 0m to 800m);
- Runway 02-20 from Runway 11-29 to Taxiway A7 (Chainage 2100m to 3288m);
- Taxiway A2;
- Taxiway A6;
- Taxiway A7;
- Taxiway A from Taxiway A11 to Taxiway A2;
- Taxiway A from Runway 11-29 to Taxiway A7;
- Taxiway A15 (provides access to jet stands only);
- International aircraft stands and apron areas (Stands 25 to 35);
- Antarctic Apron (Stands Z1 to Z8) and Remote Code E Stand (Stands R1 to R3).

4 CIAL Airfield Maintenance Plan Options

Two versions of the CIAL 20-year airfield pavement maintenance programme have been developed on the basis of the pavement area usage assumptions described in Section 3 above.

Option 1 of the maintenance plan is the existing model assuming that operations continue with the current mixed jet and turboprop aircraft fleet over the total extent of the current airfield pavement areas.

Option 2 is a reduced version of the maintenance plan assuming that only the pavement areas identified in Section 3 for turboprop aircraft use would be maintained.

In addition to the reduced areas, the following assumptions have been made in the Option 2 maintenance plan to reflect the reduced maintenance requirements resulting from the exclusion of jet aircraft from the traffic fleet mix and the resulting reduced structural loading.

- The overlay thickness of the runways reduced from 75mm/ 100mm to 50mm.
- The overlay thickness of the taxiways reduced from 60mm/ 75mm/ 100mm to 50mm.
- The patching allowance has been reduced to 50% of Option 1.
- The grooving of the main runway is not required for turboprop operations so has been deleted.

- The time between subsequent maintenance overlays increased by three years on average on the runways (from 11 years to 14 years on Runway 02-20 and from 12 to 15 years on Runway 11-29).
- The time between subsequent maintenance overlays have been increased by four years in average on the taxiways, from 15/16 years to 19/20 years, with an interim surface treatment remaining at approximately 10 to 12 years.

The maintenance plan options are included in Appendix B.

(Please note the Option 2 maintenance alternative for turboprops has been prepared reasonably quickly, and if this information is being used in detail for the upcoming pricing reviews we would recommend a further review of the maintenance elements)

10-year and 20-year total and annual average maintenance costs are summarized for the whole of airfield pavements and for the runways only in Tables 4-1 and 4-2, respectively:

Table 4-1: CIAL Maintenance Cost Estimate for Runways, Taxiways, and Aprons

	10 Year Total	20 Year Total	10 Year Average per Annum	20 Year Average per Annum
	2012/2013 to 2021/2022	2012/2013 to 2031/2032	2012/2013 to 2021/2022	2012/2013 to 2031/2032
Option 1 - Jet and Turboprop Aircraft	$53,040,000	$110,751,000	$5,304,000	$5,537,550
Option 2 - Turboprop Aircraft Only	$10,620,000	$31,286,000	$1,062,000	$1,564,300

Table 4-2: CIAL Maintenance Cost Estimate for Runways 02-20 and 11-29

	10 Year Total	20 Year Total	10 Year Average per Annum	20 Year Average per Annum
	2012/2013 to 2021/2022	2012/2013 to 2031/2032	2012/2013 to 2021/2022	2012/2013 to 2031/2032
Option 1 - Jet and Turboprop Aircraft	$23,650,000	$44,600,000	$2,365,000	$2,230,000
Option 2 - Turboprop Aircraft Only	$2,450,000	$7,500,000	$245,000	$375,000

It is noted that the planned maintenance activities and resulting maintenance costs are subject to the current condition of the pavements both for Options 1 and 2 and therefore somewhat biased by the past and current usage by a mixed jet and turboprop aircraft fleet. If maintenance costs were calculated for the case of “all new” airfield pavements, then the difference between the Option 1 and 2 cost figures may be somewhat larger.

It is also noted the Option 2 annual average maintenance cost figures are reasonably similar to the annual average costs in the nominal regional airport pavement maintenance plan under Section 5 below. The differences are due to the differences between a general “nominal” regional airport and

Christchurch International Airport as a specific example – for example the overall pavement area, pavement construction, climatic conditions, etc.

5 Comparison with Nominal Regional Airport Pavement Maintenance Costs

Appendix C includes two examples of hypothetical 10 year pavement maintenance programmes for nominal NZ regional airports which cater for turboprop aircraft only. These airports would typically have a sealed Code 3C runway, often additional unsealed runways, and a taxiway stub connecting the runway to an apron parking area and terminal building.

These facilities are less extensive than those existing at CIAL, and would cater for significantly fewer aircraft movements. However the comparison is provided for information.

The average proposed pavement maintenance expenditure per year varies from approximately $500,000 to a bit over $1,000,000 per year. This compares to the approximate figures of $1,000,000 to $1,500,000 per year in Table 4-1 above for CIAL.

We have reviewed a range of maintenance plans for airfields in Australia as well, and found a similar range of annual maintenance spend to the NZ examples for those bases with turboprop usage only.

6 Summary

We look forward to discussing this initial information pack further with CIAL, and refining areas to assist further with your current pricing reviews.

We have noted above that the planned maintenance activities and resulting maintenance costs are subject to the current condition of the pavements and the extent of the facilities provided at the airport, and are also somewhat biased by the past and current usage by a mixed jet and turboprop aircraft fleet.

The extent of pavements at CIAL that may be used by a turboprop only scenario as summarised in Section 3 above and the CIAL turboprop only maintenance plan “Option 2” summarised in Section 4 above are likely to be the most relevant sources of information for your review, however a comparison to other nominal airport maintenance costs is also provided and discussed in Section 5.

Appendices

Appendix A – CIAL Airfield Pavement Areas Used by Turboprop Aircraft

Appendix B – CIAL 20-year Airfield Pavement Maintenance Plan (Options 1 and 2)

Appendix C – Hypothetical 10-year Airfield Pavement Maintenance Plan of a Regional Airport

Appendix A

TABLE OF COORDINATES

BENCHMARK	NORTHING	EASTING	ELEVATION
BM1	811238.17	384414.21	32.139
BM2	811402.19	384551.61	31.485
BM3	811635.84	384747.34	30.536
BM4	811889.49	384943.07	30.744
BM5	812103.14	385138.81	31.528
BM6	812336.77	385334.52	30.216
BM7	810934.42	384159.75	33.062
BM8	810700.77	383964.02	34.423
BM9	810467.13	383768.30	35.510
BM10	810233.48	383572.57	36.645
BM11	not shown		
BM12	811042.42	384647.87	31.080
BM13	810846.71	384881.50	29.634
BM14	810741.73	385006.81	28.885
BM15	811531.76	384063.75	33.097
BM16	811727.49	383830.10	34.094
BM17	811857.14	383675.33	34.682
OLD BLOCK VI	812128.38	385159.95	31.374
OBPL	812789.72	385697.21	28.072

RUNWAY 02/20 RUNNING DISTANCES

RD0	812845.51	385522.74
RD500	812462.23	385201.65
RD1000	812078.94	384880.57
RD1500	811695.66	384559.49
RD2500	810929.10	383917.32
RE3000	810545.81	383596.24
RD3288	810324.31	383410.68

RUNWAY 11/29 RUNNING DISTANCES

RD0	810653.48	384935.54
RD500	810974.56	384552.26
RD1000	811295.64	384168.97
RD1500	811816.72	383785.69
RD1741	811770.79	383601.77

NOTES

HORIZONTAL COORDINATES ARE IN TERMS OF
NZ GEODETIC DATUM 2000, Mt PLEASANT 2000 PROJECTION
FALSE ORIGIN: 800000 mN, 400000 mE
ORIGIN OF SURVEY: OLD BLOCKVI SO 15271
(GEODETIC CODE BH3G)
812128.38mN, 385159.95mE (FROM LINZ DATABASE)

VERTICAL ELEVATIONS ARE IN TERMS OF MEAN SEA LEVEL
LYTTELTON DATUM 1937. ORIGIN OF LEVELS
BM5 SO11018, RL 31.528M (FROM SO 11018)

BENCH MARKS

ACCURACY: HORIZONTAL +/-20mm
VERTICAL +/-2mm

THE BENCH MARKS ARE SCREWS IN LEAD PLUGS
SET IN CONCRETE BLOCKS

RUNNING DISTANCES

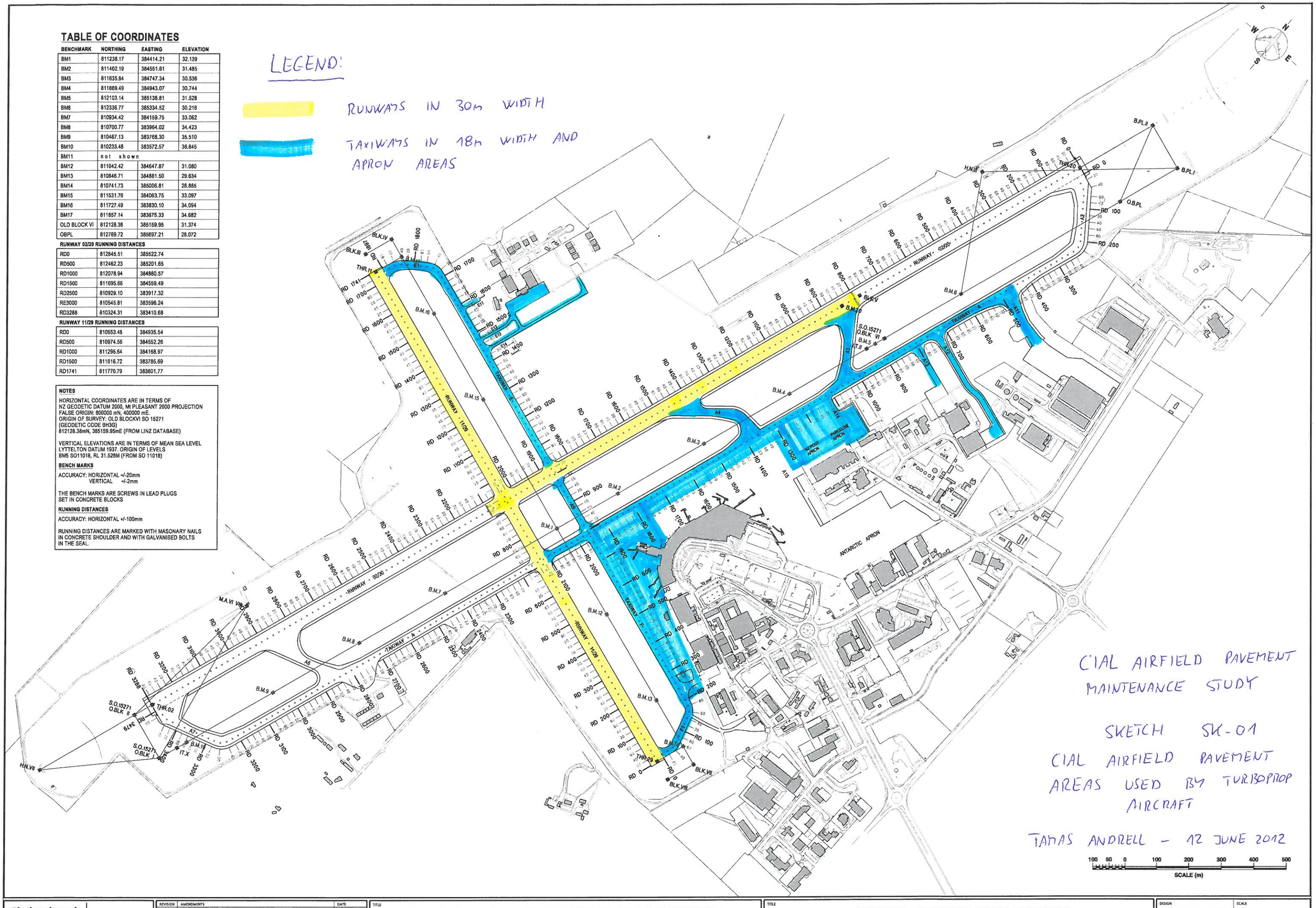
ACCURACY: HORIZONTAL +/-100mm

RUNNING DISTANCES ARE MARKED WITH MASONARY NAILS
IN CONCRETE SHOULDER AND WITH GALVANISED BOLTS
IN THE SEAL.

LEGEND:

RUNWAYS IN 30m WIDTH

TAXIWAYS IN 18m WIDTH AND APRON AREAS



CIAL AIRFIELD PAVEMENT MAINTENANCE STUDY

SKETCH SK-01
CIAL AIRFIELD PAVEMENT AREAS USED BY TURBOPROP AIRCRAFT

TAMAS ANDRELL – 12 JUNE 2012

Christchurch International airport Limited Airport Maintenance Sevices 818 Wairakei Road Ph: (03) 353 7080 Fax: (03) 353 7090	CHRISTCHURCH INTERNATIONAL AIRPORT LIMITED	AIRFIELD RUNWAY AND TAXIWAY RUNNING DISTANCE AND SURVEY DATA	DESIGN DRAWN T. LESTER DATE 20 MAR 2002 DWG No. ABMSTRRD SCALE 1 : 5000 @ A1 SHEET 1 of 1 REV F AB

REVISION	AMENDMENTS	DATE
C	CONNELL WAGNER CONTROL SURVEY DATA ADDED	23.6.05
D	GENERAL REVISION	04.9.07
E	GENERAL REVISION	15.12.08
F	GENERAL REVISION	23.9.09

30/09/2009 1:38:34 p.m.

Appendix B

PROPEL Infrastructure Services — Beca Airports

20 YEAR AIRFIELD PAVEMENT MAINTENANCE PLAN - OPTION 1, JET AND TURBOPROP AIRCRAFT - JUNE 2012

REVIEW DATE: June 2012

Pavement Section		Original Construction	Asphalt Overlay	Sprayed Treatment	Reconstruction Major Patching	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	Year 1 2012/2013	Year 2 2013/2014	Year 3 2014/2015	Year 4 2015/2016	Year 5 2016/2017	Year 6 2017/2018	Year 7 2018/2019	Year 8 2019/2020	Year 9 2020/2021	Year 10 2021/2022	Year 11 2022/2023	Year 12 2023/2024	Year 13 2024/2025	Year 14 2025/2026	Year 15 2026/2027	Year 16 2027/2028	Year 17 2028/2029	Year 18 2029/2030	Year 19 2030/2031	Year 20 2031/2032	10 Year Total 2012/2013 to 2021/2022	20 Year Total 2012/2013 to 2031/2032	10 Year Average 2012/2013 to 2021/2022	20 Year Average 2012/2013 to 2031/2032
Main Runway	**A2 - A3**	1984	93,98	-	08 (central 15m)		Patching $36,000	Mill&Fill/Repairs $1,820,000	Misc/M&F $10,000	Mill&Fill/Repairs $100,000		Misc $130,000		Patching $100,000			Overlay $5,620,000											Overlay $5,620,000							$5,720,000	$11,340,000	$572,000	$567,000
	A3 - A4	1950/1951	64,77,80,93 03	-	-					Mill&Fill	Grass/Covers $10,000	Mill&Fil $1,500,000	Lipseal $110,000			Patching $100,000			Overlay $2,430,000												Overlay $2,430,000			$2,640,000	$5,070,000	$264,000	$253,500
	A4 - Subsidiary Runway	1950/1951	64,77,80,93 04	-	-	Shoulder ramp $67,925					Grass/Covers $10,000	Mill&Fil $700,000	Mill&Fill $620,000	Lipseal $100,000			Patching $100,000			Overlay $3,140,000											Overlay $3,140,000		$3,960,000	$7,100,000	$396,000	$355,000
	Subsidiary Runway - A6	1950/1951	64,77,80,92 04 (Part), 05	-	-		Patching $35,000	Patching $150,000			Grass/Covers $10,000	Patching $50,000	Mill&Fill $620,000	Mill&Fill $1,020,000	Lipseal $70,000			Patching $100,000			Overlay $3,540,000											Overlay $3,540,000	$5,350,000	$8,890,000	$535,000	$444,500
	A6 - A7	1963	77,91,07	-	06 (Fillet)	Fillet $47,609	Overlay $1,300,000						Patching $30,000	Patching $30,000				Overlay $1,800,000												Overlay $1,800,000			$1,860,000	$3,660,000	$186,000	$183,000
Subsidiary Runway	**Taxiway E1 - Main Runway**	1951	72,97, 11	-	-		Catchpits $70,000	Patching $50,000	Misc $10,000	Patching	Overlay $3,845,000												Overlay $3,640,000										$0	$3,640,000	$0	$182,000
	Main Runway - Taxiway A	1951	72,91,02	-	91 (Part)		Catchpits $35,000							Overlay $780,000	▼										Overlay $780,000								$780,000	$1,560,000	$78,000	$78,000
	Taxiway A - Taxiway F1	1951	72,95, 10	-	05		Catchpits $70,000	Patching $50,000	Patching $20,000	Overlay $3,340,000												Overlay $3,340,000											$3,340,000	$3,340,000	$334,000	$167,000
Taxiway A	**A2 - A11**	1984	10	96,01	-				Patching $25,000	Overlay $1,030,000										Pavecoat $80,000					Overlay $1,030,000									$80,000	$1,110,000	$8,000	$55,500
	A11 - A3	1977	83, 06	96,01	-	Overlay $1,239,551										Pavecoat $120,000						Overlay $1,960,000									Pavecoat $120,000		$2,080,000	$2,200,000	$208,000	$110,000
	A3 - A4	1951/1952	68, 06 99 (Part)	95	84	Overlay $686,521						Pavecoat $10,000				Pavecoat $70,000						Overlay $920,000									Pavecoat $70,000		$990,000	$1,060,000	$99,000	$53,000
	A4 - Subsidiary Runway	1967	96, 07 99 (Part)	01 (Part) 09 (Part)	-		Overlay $3,100,000		Overlay $190,000			Pavecoat $15,000							Overlay $5,770,000										Pavecoat $480,000			$5,770,000	$6,250,000	$577,000	$312,500
	Subsidiary Runway - A6	1958	74,94,09 99 (Repairs)	01 (Part) 06 (centre)	-	Pavecoat $176,306			Overlay $2,425,000										Pavecoat $200,000					Overlay 2,730,000								$200,000	$2,930,000	$20,000	$146,500
	A6 - A7	1973	94, 08	01 (Part) 06 (centre)	-	Pavecoat $107,702	Patching $40,000	Overlay * $1,560,000										Pavecoat $110,000					Overlay $1,560,000								Pavecoat $110,000	$110,000	$1,780,000	$11,000	$89,000
Taxiways	**A2**	1984	10	96,01	-			Bandaging $10,000	Patching $10,000	Overlay $1,430,000										Pavecoat $85,000					Overlay $1,430,000								$85,000	$1,515,000	$8,500	$75,750
	A3	1951/1952	68, 04, 10	95,01	84		Patching $20,000	Patching $10,000	Patching $10,000	Overlay $710,000										Pavecoat $80,000					Overlay $710,000								$80,000	$790,000	$8,000	$39,500
	A4	1951/1952	68 99 (Part), 02	94,98	77									Pavecoat $90,000				Overlay $890,000										Pavecoat $120,000					$980,000	$1,100,000	$98,000	$55,000
	A5	1951/1952	Patching	99	88									Overlay $330,000										Pavecoat $35,000					Overlay $330,000				$330,000	$695,000	$33,000	$34,750
	A6	1958	74,96, 08	-	-		Patching $20,000	Overlay $1,050,000											Pavecoat $80,000					Overlay $1,050,000									$80,000	$1,130,000	$8,000	$56,500
	A7	1973	94, 08	01 (Part) 06 (centre)	-	Pavecoat $92,948		Overlay $1,220,000											Pavecoat $80,000					Overlay $1,220,000									$80,000	$1,300,000	$8,000	$65,000
	A11	1977	84, 06	96	-	Overlay $240,476												Pavecoat $100,000					Overlay $950,000									$100,000	$1,050,000	$10,000	$52,500
	A12	1996	-	11	-						Pavecoat $110,000				Overlay $380,000										Pavecoat $110,000					Overlay $380,000		$380,000	$870,000	$38,000	$43,500
	A13	1985	06	97	-	Overlay $61,499												Pavecoat $30,000					Overlay $150,000									$30,000	$180,000	$3,000	$9,000
	A14 (Includes Parceline Apron)	1996	-	06	-	Pavecoat $93,763							→	Overlay $650,000										Pavecoat $100,000					Overlay $650,000			$650,000	$1,400,000	$65,000	$70,000
	A15	1981	99 (Part), 05	93	11 (Part)							Mill&Fill/Repairs $150,000				Pavecoat $210,000					Overlay $2,290,000										Pavecoat $210,000		$2,500,000	$2,710,000	$250,000	$135,500
	E (Includes E1)	1951/1952	-	98	86		Fillet $120,000		Patching $10,000				Overlay $1,780,000											Pavecoat $130,000					Overlay $1,780,000			$1,780,000	$3,690,000	$178,000	$184,500
	E12	1996	-	-	-								→	Overlay $40,000											Pavecoat $10,000					Overlay $90,000		$40,000	$140,000	$4,000	$7,000
	E13	1998	-	-	-								→	Overlay $40,000											Pavecoat $5,000					Overlay $40,000		$40,000	$85,000	$4,000	$4,250
	E14	1999	-	-	-								→	Overlay $110,000											Pavecoat $11,000					Overlay $110,000		$110,000	$231,000	$11,000	$11,550
	F (Includes F1)	1951/1952	67, 95/98 (Part) 09/11 (Part)	92	-			Patching $20,000	Overlay + $1,200,000		Overlay + $1,080,000										Pavecoat $210,000					Overlay $2,180,000							$210,000	$2,390,000	$21,000	$119,500
Aprons	**Passenger Aprons Domestic**	Various	Various Parts 89,96,90,96,98	01 (Part)	79 (Part) 96 (Part)		Patching + $100,000	Patching + $50,000	Patching + $50,000	Patching + $50,000	Patching in ITP $520,000	Patching $50,000											Overlay/Inlay $1,100,000	Overlay/Inlay $2,300,000	Overlay/Inlay $1,000,000								$0	$4,400,000	$0	$220,000
	Passenger Aprons Domestic - Part of ITP Works	Various	Various Parts 89,96,90,96,98	01 (Part)	79 (Part) 96 (Part)						Overlay in ITP $520,000	Overlay in ITP $800,000	Overlay in ITP $450,000																			$0	$0	$0	$0
	Passenger Aprons International Gates 25 to 30	Various	Various Parts 89,96,90,96,98	01 (Part)	79 (Part) 96 (Part)		Misc $20,000	ICBP Gate 27 $525,000	Patching $25,000		ICBP Gate 28 $520,000	ICBP Gate 26 $800,000	Rehab-24 $450,000	Rehab-29 $710,000	Rehab-30 $680,000								Overlay 25 $420,000	Overlay 26 $440,000	Overlay 27/28 $710,000	Overlay 29 $500,000	Overlay 30 $500,000						$1,840,000	$4,410,000	$184,000	$220,500
	Passenger Aprons International Gates 31 to 35	Various	Various Parts 89,96,90,96,98				Patching Gate 34	Patching $40,000	ICBP Gate 34/35 $370,000	Patching $50,000	Mill & Fill 34 35 $410,000					$ Rehab-31 $500,000	$ Rehab-32 $500,000	$ Rehab-33 $500,000				Overlay 34/35 $500,000						Overlay 31 $500,000	Overlay 32 $500,000	Overlay 33 $500,000			$2,000,000	$3,500,000	$200,000	$175,000
	Deep Freeze Apron	1961,70	-	Part in 95,99 01	-				Patching $10,000					→	Overlay $4,290,000										Pavecoat $270,000					Overlay $4,290,000		$4,290,000	$8,850,000	$429,000	$442,500
	Remote Code E Stand	2010								New Pavement $2,700,000										Pavecoat $250,000					Overlay $1,800,000							$250,000	$2,050,000	$25,000	$102,500
	New Zealand Post Apron (excl. Parceline Apron)	1959 Ext 2006	97	-	-	New Pavement $1,785,876				Repairs $5,000			→	Overlay $1,540,000										Pavecoat $180,000					Overlay $1,540,000		$1,540,000	$3,260,000	$154,000	$163,000
	Fire Crash Rescue Apron	1982	99	94	-		Repairs $240,000		Patching $10,000				Patching $25,000		Overlay $350,000										Pavecoat $40,000					Overlay $350,000		$375,000	$765,000	$37,500	$38,250
	Run Up Bay (Air Ambulance Apron)	?	-	02	-									Pavecoat $35,000				Overlay $400,000										Pavecoat $40,000				$435,000	$475,000	$43,500	$23,750
	Aero Club Apron	1996	-	-	-									Overlay $230,000										Pavecoat $30,000					Overlay $230,000			$230,000	$490,000	$23,000	$24,500
	Runway 02-20 Shoulders											$15,000	$25,000	$30,000	$40,000																	$95,000	$95,000	$9,500	$4,750
					Maintenance Treatments	$2,814,299	$5,206,000	$6,555,000	$4,375,000	$9,415,000	$5,995,000	$3,420,000	$3,660,000	$5,835,000	$5,810,000	$1,000,000	$6,220,000	$3,930,000	$8,560,000	$3,635,000	$6,040,000	$6,720,000	$7,820,000	$8,215,000	$7,126,000	$3,460,000	$500,000	$6,280,000	$7,310,000	$8,190,000	$3,540,000	$3,650,000	$51,410,000	$107,501,000	$5,141,000	$5,375,050
					Patching Allowance	$50,000	$100,000	$100,000	$100,000	$100,000	$120,000	$100,000	$100,000	$75,000	$125,000	$75,000	$125,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$1,000,000	$2,000,000	$100,000	$100,000
					Crack Banding Allowance		$50,000	$50,000	$50,000	$50,000	$80,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$630,000	$1,250,000	$63,000	$62,500
					Maintenance Budget Totals	**$2,864,299**	**$5,356,000**	**$6,705,000**	**$4,525,000**	**$9,565,000**	**$6,195,000**	**$3,600,000**	**$3,820,000**	**$5,960,000**	**$6,015,000**	**$1,135,000**	**$6,395,000**	**$4,110,000**	**$8,720,000**	**$3,785,000**	**$6,220,000**	**$6,880,000**	**$7,970,000**	**$8,395,000**	**$7,286,000**	**$3,610,000**	**$680,000**	**$6,440,000**	**$7,460,000**	**$8,370,000**	**$3,700,000**	**$3,800,000**	**$53,040,000**	**$110,751,000**	**$5,304,000**	**$5,537,550**

Asphalt Overlay
Sprayed Treatment (SEST, Sand Seal, Chip Seal, Pavecoat etc)
Reconstruction/Major Patching
Capital works
Miscellaneous
Cost of RESAs, sealing of grass runway and runway extensions excluded

Note: All budget costs subject to further review
Main airfield pavement inspection undertaken between 15-17 November 2011.
\+ Assumes Integrated Terminal Project (ITP) proceeds and work is completed in 2012.
$ Overlay - budget provision only

Notes:
i - 2012-2013 budget estimate based on FH pricing and design and construction observation costs estimates
ii - Year 2-4 costs based on FH 2011 rates plus contingency, survey and design allowance
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Note: All budget costs subject to further review

PROPEL Infrastructure Services

Beca Airports

20 YEAR AIRFIELD PAVEMENT MAINTENANCE PLAN - OPTION 2, TURBOPROP AIRCRAFT ONLY - JUNE 2012

REVIEW DATE: June 2012

Pavement Section		Original Construction	Asphalt Overlay	Sprayed Treatment	Reconstruction Major Patching	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	Year 1 2012/2013	Year 2 2013/2014	Year 3 2014/2015	Year 4 2015/2016	Year 5 2016/2017	Year 6 2017/2018	Year 7 2018/2019	Year 8 2019/2020	Year 9 2020/2021	Year 10 2021/2022	Year 11 2022/2023	Year 12 2023/2024	Year 13 2024/2025	Year 14 2025/2026	Year 15 2026/2027	Year 16 2027/2028	Year 17 2028/2029	Year 18 2029/2030	Year 19 2030/2031	Year 20 2031/2032	10 Year Total 2012/2013 to 2021/2022	20 Year Total 2012/2013 to 2031/2032	10 Year Average 2012/2013 to 2021/2022	20 Year Average 2012/2013 to 2031/2032
Main Runway	A2 - A3	1984	93,98	-	08 (central 15m)		Patching $36,000	Mill&Fill/Repairs $1,820,000	Misc/M&F $10,000	Mill&Fill/Repairs $100,000		Misc $130,000																					$0	$0	$0	$0
	A3 - A4	1950/1951	64,77,80,93 03	-	-					Mill&Fill	Grass/Covers $10,000	Mill&Fill $1,500,000				Patching $40,000						Overlay $1,230,000											$1,270,000	$1,270,000	$127,000	$63,500
	A4 - Subsidiary Runway	1950/1951	64,77,80,93 04	-	-	Shoulder ramp $67,925					Grass/Covers $10,000	Mill&Fill $700,000	Mill&Fill $620,000				Patching $40,000						Overlay $1,590,000										$660,000	$2,250,000	$66,000	$112,500
	Subsidiary Runway - A6	1950/1951	64,77,80,92 04 (Part), 05	-	-		Patching $35,000	Patching $150,000			Grass/Covers $10,000	Patching $50,000																					$0	$0	$0	$0
	A6 - A7	1963	77,91,07	-	06 (Fillet)	Fillet $47,609	Overlay $1,300,000																										$0	$0	$0	$0
Subsidiary Runway	Taxiway E1 - Main Runway	1951	72,97, 11	-	-		Catchpits $70,000	Patching $50,000	Misc $10,000	Patching	Overlay $3,845,000														Overlay $1,600,000								$0	$1,600,000	$0	$80,000
	Main Runway - Taxiway A	1951	72,91,02	-	91 (Part)		Catchpits $35,000							Overlay $520,000	▼														Overlay $440,000				$520,000	$960,000	$52,000	$48,000
	Taxiway A - Taxiway F1	1951	72,95, 10	-	05		Catchpits $70,000	Patching $50,000	Patching $20,000	Overlay $3,340,000														Overlay $1,420,000									$0	$1,420,000	$0	$71,000
Taxiway A	A2 - A11	1984	10	96,01	-				Patching $25,000	Overlay $1,030,000																							$0	$0	$0	$0
	A11 - A3	1977	83, 06	96,01	-	Overlay $1,239,551										Pavecoat $100,000										Overlay $760,000							$100,000	$860,000	$10,000	$43,000
	A3 - A4	1951/1952	68, 06 99 (Part)	95	84	Overlay $686,521						Pavecoat $10,000				Pavecoat $60,000										Overlay $450,000							$60,000	$510,000	$6,000	$25,500
	A4 - Subsidiary Runway	1967	96, 07 99 (Part)	01 (Part) 09 (Part)	-		Overlay $3,100,000		Overlay $190,000			Pavecoat $15,000						Overlay $2,270,000															$0	$2,270,000	$0	$113,500
	Subsidiary Runway - A6	1958	74,94,09 99 (Repairs)	01 (Part) 06 (centre)	-	Pavecoat $176,306			Overlay $2,425,000																								$0	$0	$0	$0
	A6 - A7	1973	94, 08	01 (Part) 06 (centre)	-	Pavecoat $107,702	Patching $40,000	Overlay * $1,560,000																									$0	$0	$0	$0
Taxiways	A2	1984	10	96,01	-			Bandaging $10,000	Patching $10,000	Overlay $1,430,000																							$0	$0	$0	$0
	A3	1951/1952	68, 04, 10	95,01	84		Patching $20,000	Patching $10,000	Patching $10,000	Overlay $710,000										Pavecoat $70,000									Overlay $390,000			$70,000	$460,000	$7,000	$23,000
	A4	1951/1952	68 99 (Part), 02	94,98	77									Pavecoat $80,000								Overlay $490,000									Pavecoat $90,000	$570,000	$660,000	$57,000	$33,000
	A5	1951/1952	Patching	99	88													Overlay $260,000									Pavecoat $30,000					$260,000	$290,000	$26,000	$14,500
	A6	1958	74,96, 08	-	-		Patching $20,000	Overlay $1,050,000																								$0	$0	$0	$0
	A7	1973	94, 08	01 (Part) 06 (centre)	-	Pavecoat $92,948		Overlay $1,220,000																								$0	$0	$0	$0
	A11	1977	84, 06	96	-	Overlay $240,476												Pavecoat $80,000								Overlay $750,000						$80,000	$830,000	$8,000	$41,500
	A12	1996	-	11	-						Pavecoat $110,000								Overlay $380,000										Pavecoat $110,000			$380,000	$490,000	$38,000	$24,500
	A13	1985	06	97	-	Overlay $61,499												Pavecoat $30,000								Overlay $150,000						$30,000	$180,000	$3,000	$9,000
	A14 (Includes Parceline Apron)	1996	-	06	-	Pavecoat $93,763							→	Overlay $650,000										Pavecoat $100,000									$650,000	$750,000	$65,000	$37,500
	A15	1981	99 (Part), 05	93	11 (Part)							Mill&Fill/Repairs $150,000																				$0	$0	$0	$0
	E (Includes E1)	1951/1952	-	98	86		Fillet $120,000		Patching $10,000				Overlay $1,140,000											Pavecoat $110,000									$1,140,000	$1,250,000	$114,000	$62,500
	E12	1996	-	-	-								→	Overlay $40,000											Pavecoat $10,000					Overlay $90,000		$40,000	$140,000	$4,000	$7,000
	E13	1998	-	-	-								→	Overlay $40,000											Pavecoat $5,000					Overlay $40,000		$40,000	$85,000	$4,000	$4,250
	E14	1999	-	-	-								→	Overlay $110,000											Pavecoat $11,000					Overlay $110,000		$110,000	$231,000	$11,000	$11,550
	F (Includes F1)	1951/1952	67, 95/98 (Part) 09/11 (Part)	92	-			Patching $20,000	Overlay + $1,200,000		Overlay + $1,080,000										Pavecoat $170,000									Overlay $1,710,000		$170,000	$1,880,000	$17,000	$94,000
Aprons	Passenger Aprons Domestic	Various	Various Parts 89,96,90,96,98	01 (Part)	79 (Part) 96 (Part)		Patching + $100,000	Patching + $50,000	Patching + $50,000	Patching + $50,000	Patching in ITP $520,000	Patching $50,000											Overlay/Inlay $1,100,000	Overlay/Inlay $2,300,000	Overlay/Inlay $1,000,000								$0	$4,400,000	$0	$220,000
	Passenger Aprons Domestic - Part of ITP Works	Various	Various Parts 89,96,90,96,98	01 (Part)	79 (Part) 96 (Part)						Overlay in ITP	Overlay in ITP	Overlay in ITP																				$0	$0	$0	$0
	Passenger Aprons International Gates 25 to 30	Various	Various Parts 89,96,90,96,98	01 (Part)	79 (Part) 96 (Part)		Misc $20,000	ICBP Gate 27 $525,000	Patching $25,000		ICBP Gate 28 $520,000	ICBP Gate 26 $800,000																					$0	$0	$0	$0
	Passenger Aprons International Gates 31 to 35	Various	Various Parts 89,96,90,96,98				Patching Gate 34	Patching $40,000	ICBP Gate 34/35 $370,000	Patching $50,000	Mill & Fill 34 35 $410,000																					$0	$0	$0	$0
	Deep Freeze Apron	1961,70	-	Part in 95,99 01	-				Patching $10,000					→																			$0	$0	$0	$0
	Remote Code E Stand	2010								New Pavement $2,700,000																							$0	$0	$0	$0
	New Zealand Post Apron (excl. Parceline Apron)	1959 Ext 2006	97	-	-	New Pavement $1,785,876				Repairs $5,000			→	Overlay $1,540,000										Pavecoat $180,000					Overlay $1,540,000			$1,540,000	$3,260,000	$154,000	$163,000
	Fire Crash Rescue Apron	1982	99	94	-		Repairs $240,000		Patching $10,000				Patching $25,000		Overlay $350,000										Pavecoat $40,000					Overlay $350,000		$375,000	$765,000	$37,500	$38,250
	Run Up Bay (Air Ambulance Apron)	?	-	02	-									Pavecoat $35,000				Overlay $400,000									Pavecoat $40,000					$435,000	$475,000	$43,500	$23,750
	Aero Club Apron	1996	-	-	-									Overlay $230,000										Pavecoat $30,000					Overlay $230,000			$230,000	$490,000	$23,000	$24,500
	Runway 02-20 Shoulders																															$0	$0	$0	$0
					Maintenance Treatments	$2,814,299	$5,206,000	$6,555,000	$4,375,000	$9,415,000	$5,995,000	$3,405,000	$1,785,000	$3,245,000	$350,000	$200,000	$40,000	$770,000	$380,000	$70,000	$170,000	$1,720,000	$4,960,000	$2,720,000	$2,486,000	$2,810,000	$900,000	$70,000	$2,710,000	$2,300,000	$0	$90,000	$8,730,000	$27,776,000	$873,000	$1,388,800
					Patching Allowance	$50,000	$100,000	$100,000	$100,000	$100,000	$120,000	$100,000	$100,000	$75,000	$125,000	$75,000	$125,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$1,000,000	$2,000,000	$100,000	$100,000
					Crack Banding Allowance		$50,000	$50,000	$50,000	$50,000	$80,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$80,000	$60,000	$50,000	$630,000	$1,250,000	$63,000	$62,500
					Maintenance Budget Totals	$2,864,299	$5,356,000	$6,705,000	$4,525,000	$9,565,000	$6,195,000	$3,585,000	$1,945,000	$3,370,000	$555,000	$335,000	$215,000	$950,000	$540,000	$220,000	$350,000	$1,880,000	$5,110,000	$2,900,000	$2,646,000	$2,960,000	$1,080,000	$230,000	$2,860,000	$2,480,000	$160,000	$240,000	$10,360,000	$31,026,000	$1,036,000	$1,551,300

Asphalt Overlay
Sprayed Treatment (SEST, Sand Seal, Chip Seal, Pavecoat etc)
Reconstruction/Major Patching
Capital works
Miscellaneous

Cost of RESAs, sealing of grass runway and runway extensions excluded

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Main airfield pavement inspection undertaken between 15-17 November 2011.

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Appendix C

Nominal New Zealand Regional Airport (Turbo Prop) Spend

Surface Rehabilitation
Surface Treatment

Airport 1 - Higher Traffic

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Runway	187	2708	3376	176	50	190	100	165	130	1070
Taxiway	23	35	38	473	8	40	10	30	20	20
Apron	217	296	821	196	201	196	196	271	196	196
Total ($000's)	**$ 427**	**$ 3,039**	**$ 4,235**	**$ 845**	**$ 259**	**$ 426**	**$ 306**	**$ 466**	**$ 346**	**$ 1,286**

Average $ 1,163,500 per year

Airport 2 - Lower Traffic

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Runway	74	3766	12	7	22	105	42	77	80	532
Taxiway	4.5	200	11	11	650	5	5	11	10	11
Apron	10.5	9.5	14	7	7	12	12	9	10	9
Total ($000's)	**$ 89**	**$ 3,976**	**$ 37**	**$ 25**	**$ 679**	**$ 122**	**$ 59**	**$ 97**	**$ 100**	**$ 552**

Average $ 573,550 per year