

DIAL Runway 21-03



Runway 21-03

- 1900m long, 46m wide, Code 4C runway
- Asphalt surfacing
- Last overlaid in 2001
- Southern 200m extension constructed 1993
no overlay since
- Maintenance cost accelerating by Dec 2011
annual inspection
- Cracksealing and mill and fills

Investigations

- Visual (annual December inspections)
 - Annual survey reveals cracking extending past recent patches
 - Marked increase in crack sealing
 - Asphalt joints opening up
 - Turning nodes in poor condition
 - Drainage at node 03 not effective
- Topo Survey (August 2012)
 - What shape have we got? <0.2% to 3.5% crossfall



Investigations

- Subsurface (Sept 2012)
 - FWD. Subgrade modulus appeared unrealistically high
 - Benkelmen Beam: 187 deflection points from 2005
 - GPR. Confirmed range of pavement materials
- Asphalt
 - 22 Cores (Sept 2012)
 - 17 Additional cores (January 2013)
 - Friction testing close to maintenance level
 - Defining repairs required before overlay
 - Water in asphalt? -Asphalt permeability



Design Constraints

- CAA 139-06 Governing document
 - 5% max end gradients
 - 25mm max edge drop
 - 1.5% 'ideal' crossfall
 - 30km Longitudinal radius, 1% slope, , limits on slope change
- Concrete slot drain and cable duct
- Extension has minimal crossfall but no edge drop
- Estimate of debonding extent
- BUDGET \$\$

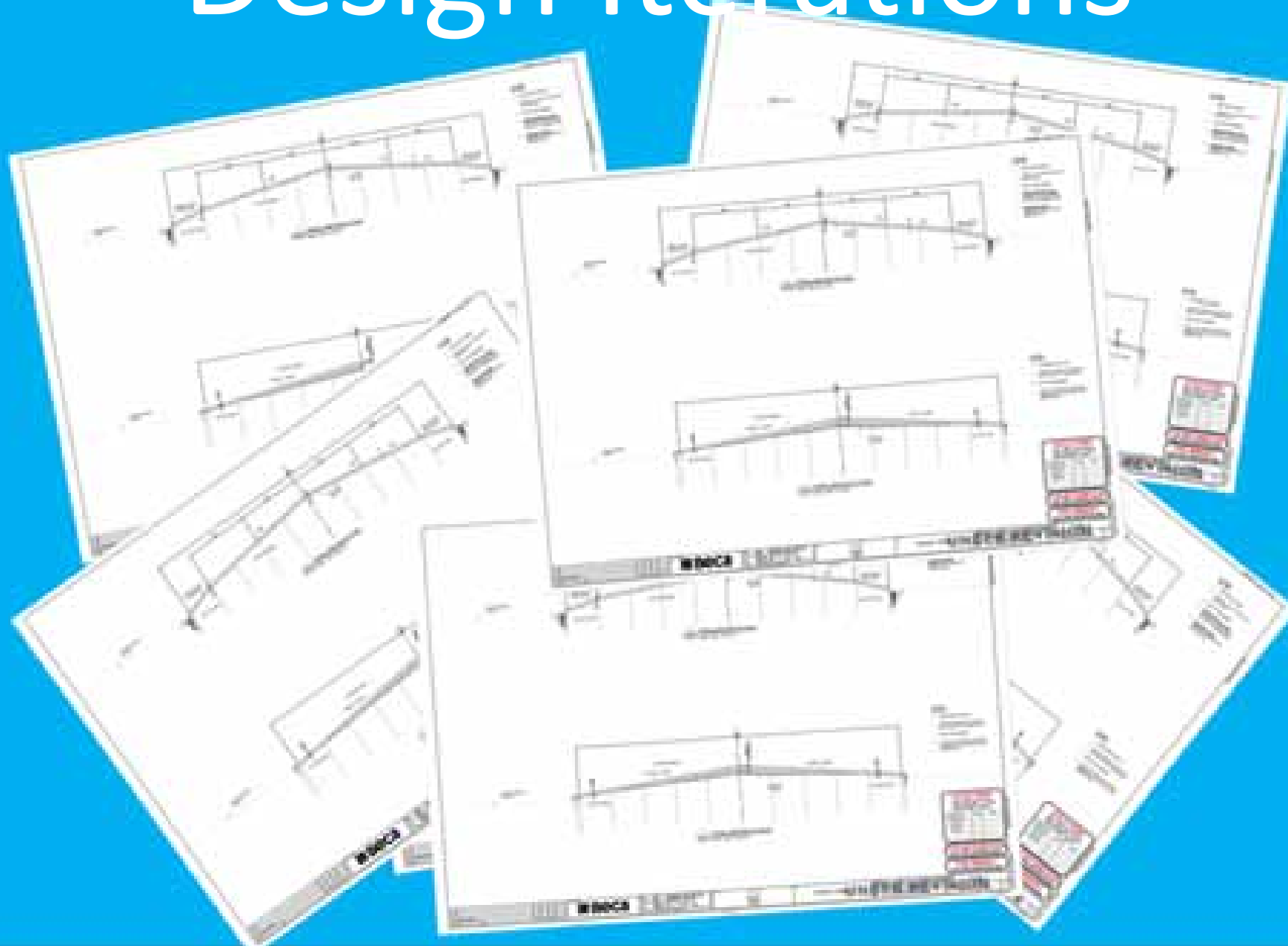




Planning

- Needed very early
- Stakeholder Identification – 25 of them!
- Contractor Procurement
- Risks
- Normal aircraft schedule must be keep. 6:50am - 9pm
- Rerouting night postal flights
- Communications with stakeholders and project team
- PCG with sub teams (safety, design, stakeholders)

Design Iterations



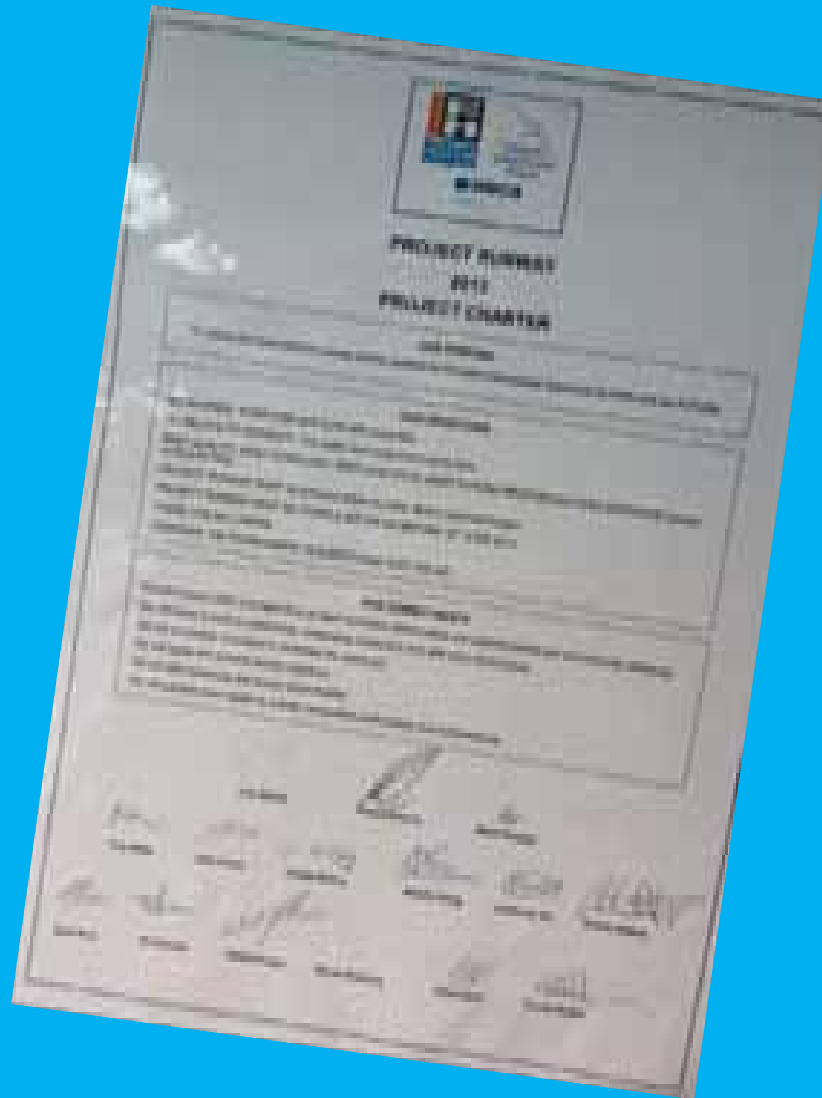
Slide 11

RR2

The first full overlay option was above budget.
THE PROJECT TEAM then looked at 7 more options.
Found 1 that would fit the budget

Richard Roberts, 1/10/2013

Procurement



The Charter

RR3

2001 THE LAST OVERLAY

I CANT REMEMBER ANYTHING ABOUT IT AS I HAD JUST STARTED

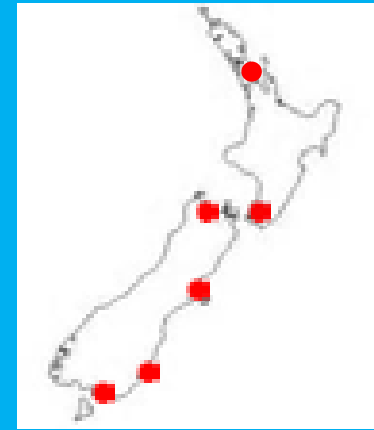
I WANTED TO REMEBER THIS ONE AND HOPRFULLY GET EVERYONE ELSE TO REMEBER IT TOO.

Richard Roberts, 1/10/2013

PROJECT RUNWAY 2013

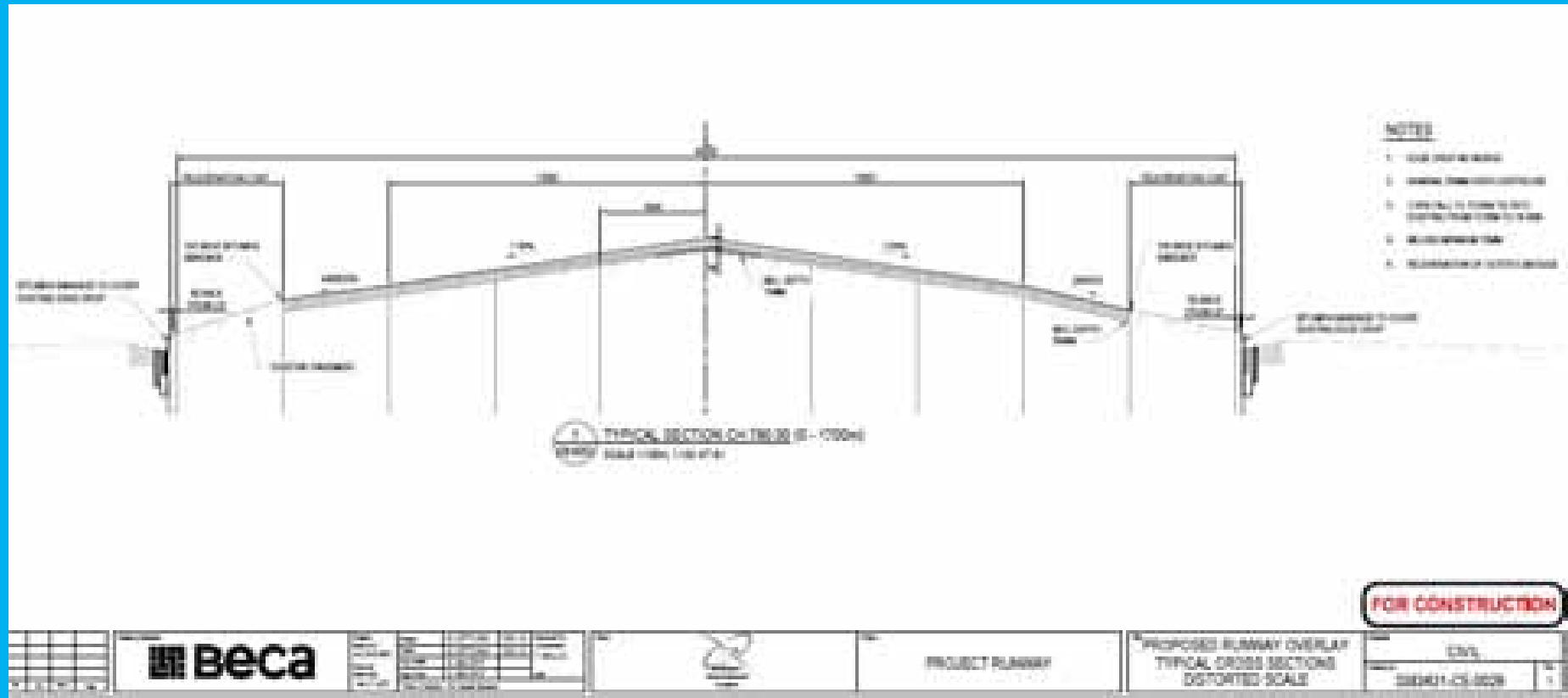


Fulton Hogan

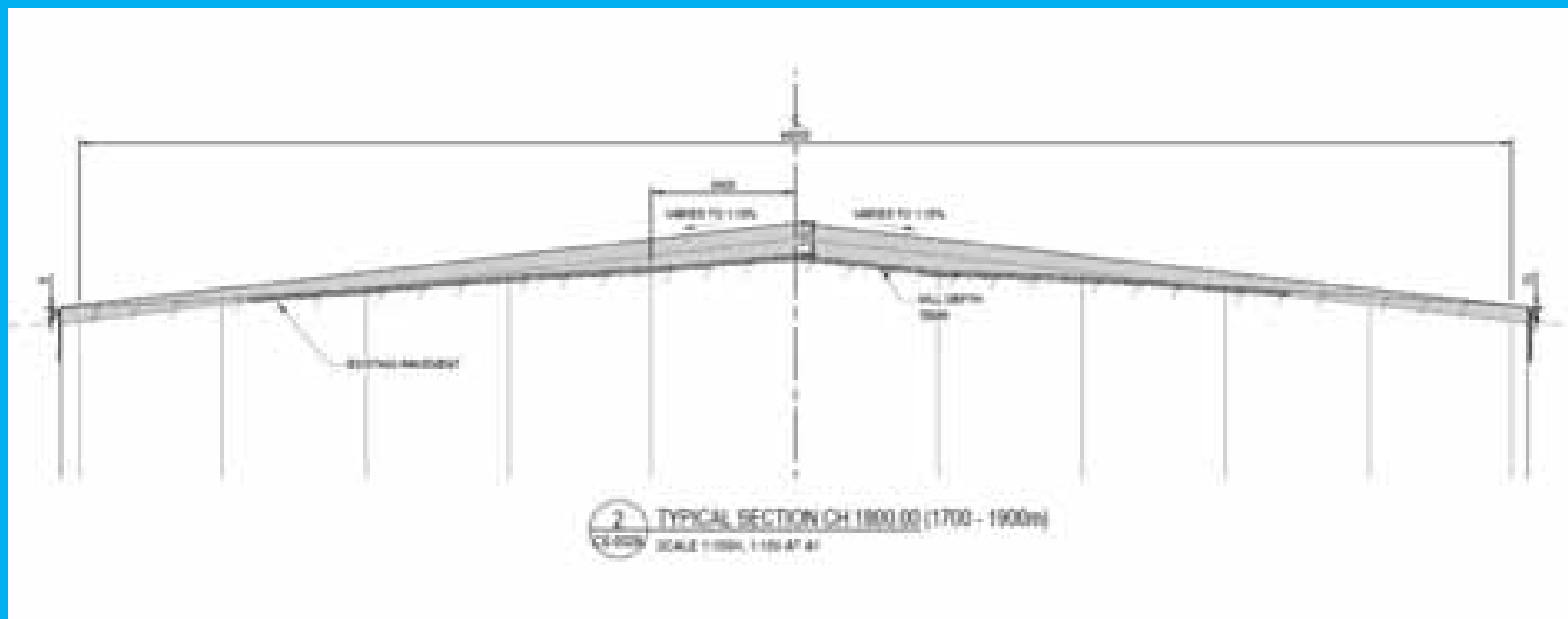




Selected Design - Main Runway



Selected Design - Extension



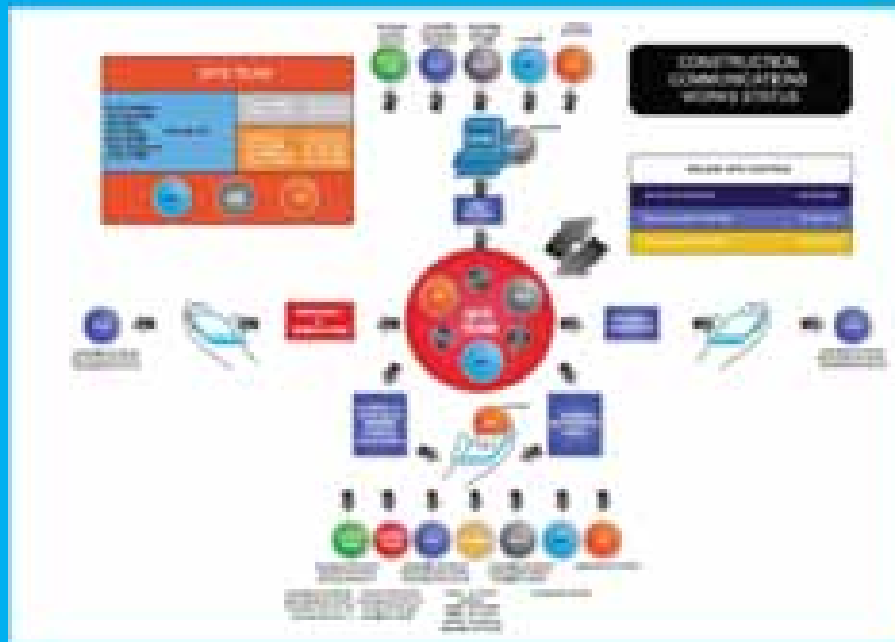
Slide 16

RR6

The first full overlay option was above budget.
THE PROJECT TEAM then looked at 7 more options.
Found 1 that would fit the budget

Richard Roberts, 1/10/2013

Communication



Communications

Most critical component of Physical Works

- Text Groups, Facebook, e-mail, telephone
- Protocols for cancellation either before or during works. Default position was work proceeds.
- Runway evacuation trial for emergency flight.
- Serious harm response
- Night diary and previous nights results
- Day team job list
- Runway clear to use

RISK AND HAZARD ASSESSMENT									
Project: DIAL - 2012/2013 Runway Overlay									
No.	Code	Risk	Severity						Risk Level Priority
			1 (Extreme)	2 (High)	3 (Medium)	4 (Low)	5 (Very Low)	6 (Negligible)	
10		Setting							
11	01	Activation of warning lights before setting	1	1	1	1	1	1	0.1
12									
13		Operational Risk							
14	01	Increased weather (including fog) when taxi areas still illuminated - works illuminated. (Start from taxi)	1	1	1	1	1	1	0.1
15	01	Increased weather (including fog) after works commence. Poor visibility and quality of work adversely affected. Potential delay to aircraft operations.	1	1	1	1	1	1	0.1
16	02/01	Non-visibility caused by Contractor's personnel or equipment - reduced with adequate control.	1	1	1	1	1	1	0.1
17	01	Insufficient time left to complete work before scheduled lights	1	1	1	1	1	1	0.1
18	01	Runway lights not being activated at the end of the light - taking taxi or more lights out at a time	1	1	1	1	1	1	0.1
19	01	Increased aircraft arrival earlier than scheduled time - works incomplete at time of aircraft arrival. aircraft cannot taxi or taxi to stand	1	1	1	1	1	1	0.1
20									
21	02/01	Increased aircraft arrivals during the works - works incomplete at time of aircraft arrival. aircraft cannot taxi.	1	1	1	1	1	1	0.1
22									
23	02/01	Low level of activity or disturbance - delay to the commencement of works due to probability conditions used to O&M works may not be completed before specified end of work period. works may be disturbance of airport at a later date.	1	1	1	1	1	1	0.1
24	01/01	Full or low barrier - damage to aircraft. incident used to O&M, potential accident involving and significant works completed.	1	1	1	1	1	1	0.1
25	01/01	Damage to light cable during edge work resulting in edge lights going down. aircraft being safely compromised being to aircraft operations.	1	1	1	1	1	1	0.1
26	01/01	Contact between ground support equipment, light aircraft and construction aircraft and construction works or personnel.	1	1	1	1	1	1	0.1
27									
28	01	Increased impact of construction, increased ground edge resulting from - signal light level failure or lighting of damage to aircraft within pavement edge damaged by an taxi.	1	1	1	1	1	1	0.1
29	01	Issues to increase performance in time for scheduled operations - out of aircraft timing of crossing line or misalignment.	1	1	1	1	1	1	0.1
30	02/01	Flashing completed from aircraft incidents - low or degraded from through edge. flight to priority for all other flights.	1	1	1	1	1	1	0.1
31	01	Flashing completed from incidents due to high operations level and lighting or runway and available ground. flight to priority for all other flights.	1	1	1	1	1	1	0.1
32	01	Runway lights not activated. NOTAM issued but lights not shown.	1	1	1	1	1	1	0.1
33	01	Work carried out that will be at the end of work period or period.	1	1	1	1	1	1	0.1

PROJECT RUNWAY 2013

SAFETY

WE DEVELOPED THE “FILTHY FIVE”

Moving Plant Fatigue Kills Manual Handling
Asphalt Plant Hot Bitumen

Team Buy-in



The Real Charter



The
REAL
Charter

COMMUNICATION
RELATIONSHIP
TRUST

Quality

Mix design

- Design selected based on friction and stability. 'Column 3'
- High PSV chip and fines imported from Oamaru
- Extensive materials testing before landed
- Lab trials. Gyrotory (BFT and VMA) and Marshall (stability, bitumen content, air voids)
- Wheeltracking for rut resistance
- Mobile plant production trials
- On ground compaction trials
- Mix proven

Quality

Nightly sampling

- Lab on site to process each night's production and core samples
- Results available next day to act quickly on any defects

Production testing

- 3 sets of Marshall blocks 1/150t for first 3 nights then 1/300t thereafter
- Bitumen content, stability, grading, air voids, BFT and VMA

Field testing

- Core samples for air voids, RD and thickness
- British pendulum and sand circles each night
- Joint temperature



Preparation over

Let's get started!

The Programme

- 4 nights of mill and fill starting 13 Feb 2013.
- 1 night of AC Pre-levelling at the extension
- 16 days of runway overlay starting 19 Feb. Cores taken after each night and results reported following day
- Achieved programme with 1 day weather delay
- 11,000 tonnes of AC laid
- 6 days a week work

PROJECT RUNWAY 2013





The Process

- Start on far side, Mill goes first. Up to 120m/night including milling out temporary ramps
- Debonding chased out and swept
- When mill reaches centreline membrane applied
- Asphalt applied to deeper milled areas
- Asphalt laid in 4.6m wide runs in echelon (including ramps) and rolled
- At centreline, decision to continue
- Pavement marking
- Emu parade























Jantre's & Scotts
Bebonding Ltd

















Rejuvenation coat edge treatment



DIAL - Runway Overlay - Site Diary

Consultant	Richard Roberts	DIAL	Jim Parsons	Fulton Hogan
	Steve Simpson	DIAL	Wesley Pickering	Fulton Hogan
	John McCall	DIAL	Scott Payne	Fulton Hogan
	Richard Robinson	Beca	Grant Sims	Fulton Hogan
	Jarvis Van Zyl	Beca	Richard Fulton	Fulton Hogan
	Tony Halls	Beca	John Marsh	Beca
Date	18/02 February 2011		By	Ernest Moore
Weather	Fine, No wind			
Previous night's weather	Station	Dated(2011)	Amount(ton)	
	Dunedin Aers (app)	200 30209 0000	0	
	Dunedin Aers (app)	200 30209 0600	0	
	Dunedin Aers (app)	200 30209 0800	0	
	Dunedin Aers (app)	200 30209 1100	0	
	Dunedin Aers (app)	200 30209 1400	0	
	Dunedin Aers (app)	200 30209 1700	0	
	Dunedin Aers (app)	200 30209 2000	0	
	Dunedin Aers (app)	200 30209 2300	0	
	Dunedin Aers (app)	200 30209 0000	0	
	Renewed from http://www.dunedin.govt.nz/development/cabin_gfx_page			
Ground Conditions	Dry	Stable	Wind	Variable
Start Time	Last scheduled flight arrived/after 21:00. Cleared to access runway 21:37		Finish Time	Feeling finished 24:40
Night scope of work	<ul style="list-style-type: none"> MM, apply membrane seal and pave/subgrade from L22line to 202m Complete guttering the 107 number and ends of threshold marks (app) followed by 5m test night. 5m mark contrastive. Turning heads not marked 			
Work Completed	<ul style="list-style-type: none"> Work achieved 			
Quality assurance	<p>Results from L22 4 test night (figure in brackets give justification limits)</p> <p>Production results</p> <ul style="list-style-type: none"> Sample 100 Complying except BPT 2.4µm(2-10), VMA 11.1%(-1.4), stiffness 4.02kN/m²(4-5) Sample 105 Complying except binder content 5.2% (2-10), Flow 2.25mm(2.5-3.5), VMA 13.0% (-1.4), stiffness 4.28kN/m² Sample 102 Complying except air voids 1.3% (1-3), stiffness 4.02kN/m² Sample 103 Complying except air voids 1.3%, VMA 13.0% (-1.4), stiffness 4.22kN/m² 			

	<p>Core results:</p> <p>4 cores taken. Air voids range from 1.9 to 4.2% (2-6.5) for 3 cores taken in the mat, 1 core on the joint was 3.2% (2-7.5). Relative compaction ranged from 96.7% to 101% (96-101) for the mat and was 100.2% on the joint (min 96). Core thickness however ranged from 35-43 (min 50mm). Positions of cores are required to determine if cores are on <u>prelevelling</u> or on overlay.</p> <p>No texture faults received from Lot 6</p>								
Issues Experienced									
Technical	<ul style="list-style-type: none"> Some <u>debanding</u> found on the milled surface on the first 4.5m width on the far side and near side where milling depth was deepest (50mm). Solution again was to remove loose edges back to well bound material with a pade. Membranes set either side of the <u>prelevelled</u> area. He elected to mill the <u>prelevelled</u> surface to achieve a better bond. Last night some movement of overlay was experienced under rollers resulting in change to roller pattern and longer rolling period to achieve compaction. Membranes set on milled existing surface and tack coat only on <u>scabbled prelevelled</u> surface. The edge light extension R032 on the turning node was removed last night, a plywood cover installed and paved over. This light is in the 2.5% ramp off the edge of the overlay which will be removed when the AC into the turning node is completed. The cover has deflected under aircraft <u>operational</u> traffic. The cover was removed and the light refitted. 								
Programme	<p>Programmed start date was Tuesday 13th Feb. Finish date 31st March. A total of 39 working nights. No allowance for wet weather. One day delay 12/13 Feb due to production mix outside spec.</p> <ul style="list-style-type: none"> 2.5 <u>hrs</u> weather delay 15/16 Feb 21:00 – 23:30 								
Site safety & noise	None.								
Photo Register	<p>Refer <u>Teamwork</u> file.</p> <p>http://fileadmin.international.bea.net/sites/DialRunwayOverlay/Nightly%20Operations/Forms/AllItems.aspx?fileofid=646275&file%20ofid=DialRunwayOverlay%20Nightly%20Operations%20%2027%20Feb%2014%202013&View={D3C549-47-46-5D-461B-A6-24-C163DC0FA959}</p>								
Forecast works	<table border="0"> <tr> <td>31-29 Feb</td> <td>130m long by 14m wide overlay on runway commences</td> </tr> <tr> <td>22-23 Feb</td> <td>Continue overlay at 120m/night</td> </tr> <tr> <td>23-29 Feb</td> <td>Continue overlay at 120m/night</td> </tr> <tr> <td>23-23 Feb</td> <td>Rest day</td> </tr> </table>	31-29 Feb	130m long by 14m wide overlay on runway commences	22-23 Feb	Continue overlay at 120m/night	23-29 Feb	Continue overlay at 120m/night	23-23 Feb	Rest day
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23-29 Feb	Continue overlay at 120m/night								
23-23 Feb	Rest day								

weather and flight delays allowed by the contract	Unit	Rate	Quantity	Cost
Accumulative total for weather delays	Day	£000000	0	
Accumulative total for flight delays	Day	£000000	0	

Forecast Variations		Unit	Rate	Quantity	Cost
2.4	Increased Milling on patches	m ²	To be agreed		
	• 13/14 Feb – 20mm on 200m ²			200	
	• 14/15 Feb – 20mm on 200m ²			200	
	• 15/16 Feb – 10mm on 30m ²			30	
	• 17/18 Feb – 10mm on 140m ²			140	
	• 17/18 Feb – 20mm on 100m ²			200	
AC Prelevelling over item 2.3	AC Prelevelling over item 2.3	tonne			
	• 13/14 Feb – The total area that was pre levelled was approx. 100m ² (1.8 tonne of AC)				
	• 13/14 Feb – 0.5 tonne of AC at lot 10. Subject to the Ag/built levels and delivery docks.				
	• 15/16 Feb – The total area that was pre levelled was approx. 150m ² (1.7 tonne of AC)				
	• 15/16 Feb – 1.0 tonne of AC at lot 10. Subject to the Ag/built levels and delivery docks.				
	• 16/17 Feb – The total area that was pre levelled was approx. 155m ² (1.7 tonne of AC)				
	• 16/17 Feb – 2.0 tonne of AC at lot 12. Subject to the Ag/built levels and delivery docks.				
	• 17/18 Feb – The total area that was pre levelled was approx. 600m ²				
2.5	Increase in AC from increased milling	tonne	£00000		
	• 13/14 Feb – 20mm on 200m ²			11.9	£00000
	• 14/15 Feb – 20mm on 200m ²			13.8	£00000
	• 15/16 Feb – 10mm on 30m ²			0.85	£00000
				Total	£00000



PROJECT RUNWAY 2013

7 Months Planning

53 Staff

450 Loads of Chip

53 Items of Plant

72,834m² of pavement

740 tonnes of Bitumen

First runway to be echelon
paved in NZ

60 tonne of Chip

750 tonne of
asphalt per per shift

21 Nights Work

11,216 tonne of
asphalt

10,324 Man Hours

387 Eggs, 257 sausages

& 3 Tomatoes



The Wrap

- Within budget
- Only 1 night lost due to weather
- Consistently achieved asphalt quality. No rework
- No safety LTI
- No incidents to travelling public
- No stakeholder concerns

No-one knew the overlay was even happening

5,000m³ of millings



