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Taxiway Zulu

Project Overview
Taxiway Zulu – What we originally planned

- New Taxiway Development including:
  - TWY Victor extension
  - TWY Echo realignment
  - TWY Zulu construction
- Largest airfield expansion since the Airport was opened in 1970
- 400,000m$^3$ excavation
- 300,000m$^2$ new taxiway pavement - 15 x the playing area of the MCG
- Approximately 1,000 new lights
**Taxiway Zulu - Project Overview**

- WHO declares worldwide pandemic
- April - asked to speed up and make advantage of aircraft movements
- End of April - realising funding is becoming an issue, still assumed that Zulu was the big deal, and we would always be funded.
- May - discussions about stopping project
- June to August - lobbying within APAM to Complete TWY Victor.
- September - approval to complete Victor

**Taxiway Zulu – Man hours during delivery**

- WHO declares worldwide pandemic
- April - asked to speed up and make advantage of aircraft movements
- End of April - realising funding is becoming an issue, still assumed that Zulu was the big deal, and we would always be funded.
- May – discussions about stopping project
- June to August – lobbying within APAM to Complete TWY Victor.
- September – approval to complete Victor
Taxiway Zulu – What we have achieved so far

- Largest airfield expansion Project since the Airport was opened in 1970
- New TWY Victor completed.
- New security access.
- 285,000 m$^3$ excavation PFAS material
- 110,000 m$^2$ new taxiway pavement (70,000 A/C and 40,000 concrete) - 6 x the playing area of the MCG
- Circa 700 new lights
- Commenced TWY Papa
TWY Victor – Expedient Pavement Construction
Taxiway Victor Expedient Pavement

Pavement Tie-ins:
• Victor – North & South of RWY 09/27
• Alpha – South of RWY 09/27
• Victor – North & South of TWY Echo

Access Windows:
• Contract requirement – 8 hour nightshift
• Operational opportunity – 32 hour continuous closure
• COVID-19 opportunity – 5 day continuous closure
Expedient – 8 Hour Nightshift Methodology

- Nightworks represented the original critical path.
- Re-grading of full works area to reduced level.
- 650mm Airfield Concrete placed in sections with crack inducers
- Working from shoulder out, asphalt once concrete in place.
Expedient – 32 Hour Continuous Closure Methodology

Operational Opportunity
- 32 Hour Closures of Runway 09/27.
- 22:00 Monday Evening to 06:00 Wednesday Morning.
- 118 night shifts (5 week program reduction).
- Revised pavement design.

Methodology Change
- Service relocation & protection
- Subsoil installation
- Excavate total pavement depth of 975mm
- Subgrade preparation
- Place and compact 3 layers of CMCR at 250mm each
- Ramp with FBB/emulsion to graded strip level.
Historic Passenger Growth (1971-2021)
Expedient – 5 Day Closure Methodology

- COVID-19 caused significant drop in air travel.
- Provided opportunity to close RWY 09/27 with minimal impact to Operations (Mon-Fri).
- Project able to perform 32 hour scope during day shift.
- Program unchanged due to access / productivity benefits during day.
- Higher quality pavement, reduction in future maintenance requirements.
Expedient – Runway Shoulder Tie In

Risk based approach to reducing pavement thickness.

- Original design based on historic information.
- Required full reconstruction of southern RWY shoulder.
- Change in level for future surface is between 0-70mm.
- Test pits prove greater pavement depth.
- Asphalt inlay to adjust levels.
- Solution easily implemented and provides cost saving.
Expedient – Key Learnings

Program
• 32 hour closure proved to be viable.
• Longer closures (due to COVID) allowed complete removal of night works.

Quality
• Remove the high risk of reflective cracking.
• Subgrade rectification able to be undertaken.
• No compromise to design life.
• Reduce long-term maintenance.
• Higher quality finished surface can be achieved.
• Allows conduit installation in pavement for AGL.
• Normal design for drainage including subsoils.

Safety & Resourcing
• Reduces operational risks associated with multiple hand overs.
• Improves health & safety of workers and personnel.
• Retain ability to restore runways to services quickly in the event of an emergency.
• Reduction in WSO requirement.

Cost
• Savings due to overtime allowances & duplication of services.
TWY Echo Reconstruction

• Taxiway Echo was reconstructed in 2011.
• Design based on condition in 2014 (Good)
• 2017-2020 – 8 patch repairs required.
• Pavement investigations undertaken:
  o Identified that basecourse had failed.
  o Modelling indicated state of failure.
TWY Echo Reconstruction

• 50mm Overlay to tie in levels not suitable
• 4 Options considered to reconstruct pavement
• Minimum intervention of 375mm to replace failed pavement layer.
• Program duration of 1 - 12 weeks proposed.
• Solution of 560mm intervention selected.
• 12 week continuous closure, including the expedient pavement fillets.
Taxiway Echo Fillets

Temporary Works

- Staging requirement always had Echo opening prior to area to the east being reconstructed.
- Temporary ramping requirement detailed.
- Responsibility for temporary ramping assigned to Contractor and not fully designed by Lead Designer.
- More complex than initially envisaged.
Taxiway Zulu Project – Project Overview

Buildability & Value Engineering
CAT II/III Hold Position

State 1
- Taxi Victor CL on.
- Charlie & Victor (north) stopbar on.
- Aircraft held at Victor (north) stopbar.

State 2
- Stopbars dropped when ATC advise able to access Rwy.
- Taxi Victor CL remains on.
- Taxi Victor turn Charlie CL and directional lead onto Rwy 16/34 turned on.
- Aircraft moves onto Rwy for departure.

State 3
- After MBD @ Charlie triggered, or 90 seconds has elapsed. 30 second timer for Charlie Stop Bar started.
- Victor (north) stopbar turned back on and TWY Victor turn Charlie CL extinguished.
- Taxi Victor CL and directional lead both remain on.
- Aircraft continues to move onto Rwy.
- Following aircraft to be held at Victor (north) stopbar.

State 4
- After 120 seconds.
- Charlie stopbar turned back on and directional lead extinguished.
- Taxi Victor CL remains on.
- Following aircraft still held at Victor (north) stopbar.
Subsoils

Some Issues with Subsoils

- Not modelled during design development.
- Not included in clash detection.
- Typical details only – assuming that subsoil will fall with pavement.
- Invert levels not provided with Tender Drawing.
- Routinely need to be redesigned – resulting in variation.
Blast Pavement

To Pave or not to Pave?

- Providing surface resistant to blast.
- Minimum 3m must be sealed (if used by jet aircraft)
- Historically constructed to varying dimensions.
- Paving full shoulder extended out to 30m from £.
- New MOS 139 shoulder defined as 22m from £.

<table>
<thead>
<tr>
<th>Taxiway Code</th>
<th>Taxiway Width (m)</th>
<th>Shoulder width at each side of the taxiway (m)</th>
<th>Total width of taxiway and shoulders (m)</th>
<th>Total width of taxiway and shoulders (m)</th>
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<td>30</td>
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</tbody>
</table>

<sup>a</sup> Includes the pavement shoulder width

<sup>b</sup> Includes the blast protection pavement width
Pit Bearing Capacity – RWY/TWY Strip

Class G or Class D?

- Standards for pit strength vary.
- Other buried structures not referenced in standards.
- Do structures represent a safety risk in an excursion event?
- Risk based approach to value engineering.
  - Class G pits are required in any pavement area.
  - Relocate pits outside graded portion of strip.
  - Use Class D pits outside graded strip.
Questions?