3D Stringless Paving: Designer/Contractor Perspectives

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Introduction

• Stringless technology/machine auto grade control from the design engineer’s perspective

• Review of recent runway rehabilitation at Myrtle Beach International Airport using this technology

• Lessons learned

• Look ahead
MYR Project Overview

- Single runway airport
  - (9,500 feet x 150 feet)
- 12 taxiway connectors
- Former USAF base
- Multiple pavement sections (asphalt and PCC); runway extended twice since original construction
- PCC ends structurally deficient for A320 and A321
- Non-standard longitudinal and transverse gradients
MYR Project Overview

- P-401 Asphalt Overlay
- Variable depth milling
- Two variable depth leveling courses
- Uniform 2-inch surface course
MYR Project Overview

• Tourism major component of the local economy
• Off-season and off-peak construction
  – September, 2014 to March, 2015
• Night work only
  – Weeknights: 10:45 PM – 6:45 AM
  – Weekends: 11:45 PM – 5:30 AM
  – Runway open to traffic during the day
• P-401-4.1 Weather Limitations
  – Surface temperature of underlying course (45 degrees F)
  – Wilmington, NC terminal stopped shipping PG 76-22 binder for the surface course (too stiff to pipe in cold temps)
MYR Project Overview

- This job demanded speed and efficiency
- Automated machine control paving was key!

(...else we may still be paving...)
Design Considerations

• Five surfaces
  – Existing Surface
  – Milled Surface
  – 1st Lift Surface
  – 2nd Lift Surface
  – Finished Surface

• What’s the best way to present the information to the contractor?
  – Contractors want the digital design files
  – Release disclaimer
Design Considerations

- Contractor imported our design elevations from MS Excel into their Carlson Takeoff Suite software.
- We were able to compare each surface before construction started.
- Makes it easier on contractor and ensures correct transfer of data.
Design Considerations

As-built final surface compared very well to design surface; no payment adjustments.
Lessons Learned

• Night construction = terrible project photos
• Temporary pavement markings
  – Saved time each night by outlining using Polaris Brutus with spray can mounted to machine control equipment
Lessons Learned

- **Expand the survey area**
  - Automatic grade control equipment doesn’t like being near the edges of the survey data
  - Contractor recommended 300-400 feet of additional survey beyond the limits of construction

- **AutoCAD drawings – presentation vs. functionality**
  - Annotated/blocked/hatched features in AutoCAD do not show up on machine control equipment in the field
  - Redraw symbols (to scale) using polylines
Going Forward

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the Engineer for an interpretation and decision, and such decision shall be final.

AE firms: is our product transitioning away from paper plans to the digital design model? Where do project digital files (*.xml, etc.) fit into the discrepancy chain?
Going Forward

• How does your QA/QC reviewer ‘check’ a digital file?

• Where to focus design efforts in plan production?
  – Paper
  – Digital
  – How will that work with FAA specs like P-152 (cross sections)?

• When do we distribute the digital files?
  – After contract award
  – During bidding?
Going Forward

• Automatic grade control equipment is here to stay
  – As design engineers, we need to learn how to handle this technology advance practically, professionally, legally and within our E&O guidelines