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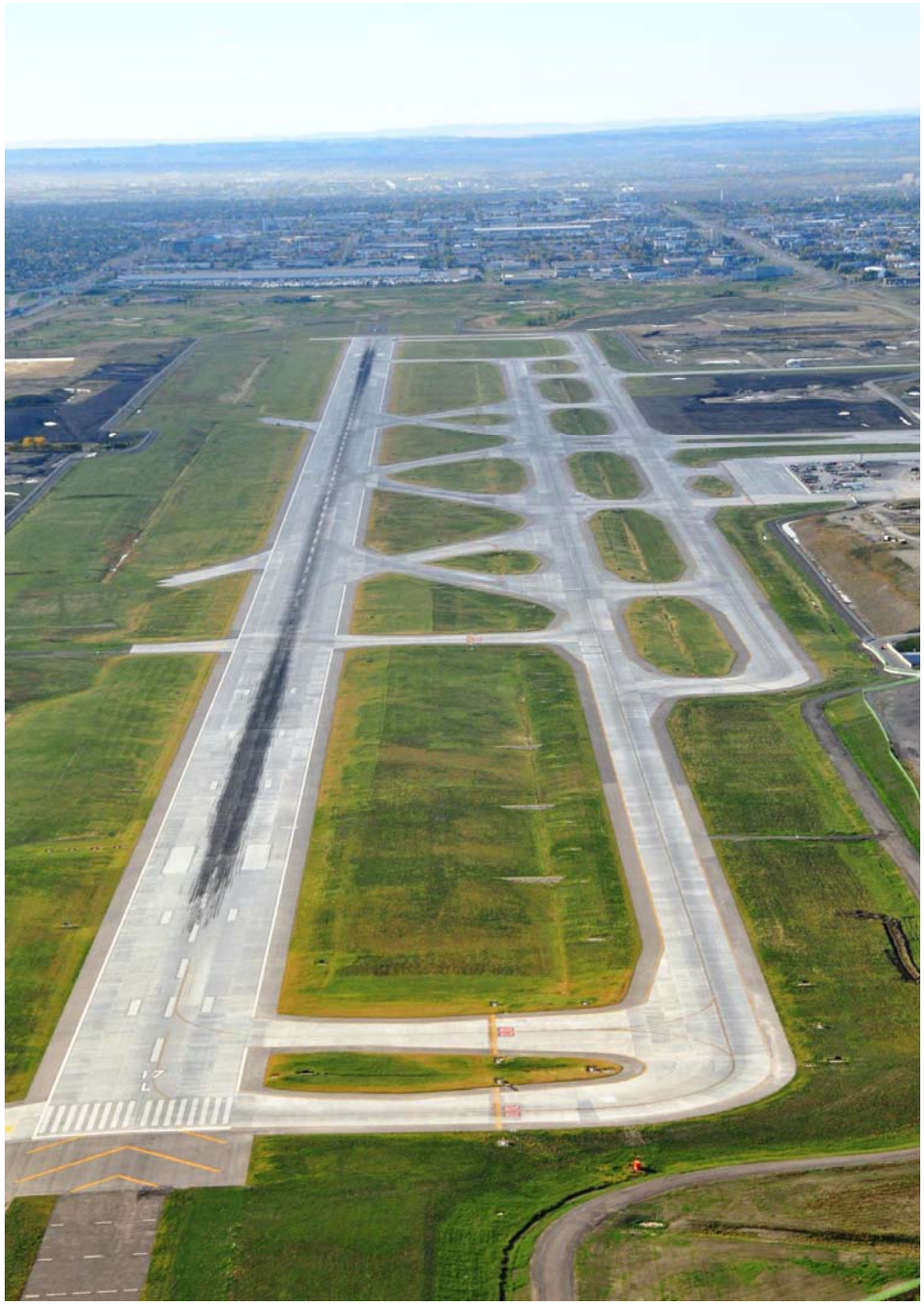
Construction

Concrete Pavement The Contractor's Perspective

Canadian Airfield Pavement Technical Group



Concrete And Paving Technology

Paving Technology – Eddy Marin: Vice President

Concrete Technology – Vincent Gangaram: QC Manager

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CONCRETE TECHNOLOGY

- **Materials**
  - Specified vs. Locally available
  - Mix Materials

- **Mix Production - Quality**
  - Quality Control Monitoring
  - Mix Consistency
  - Mix Design and Production Control Tools
  - QC Testing and Personnel

Mix Materials

- **Finding the right materials!**
  - **Contract Review**
  - **Bid Enquiries**
  - **Specified vs. Locally Available**

- **Aggregates**
  - **Quality Adjustment: Quarry vs. Pit Run**
  - **Suppliers Lack of Data**
    - Alkali-Silica Reactivity
    - D-Cracking

Mix Materials

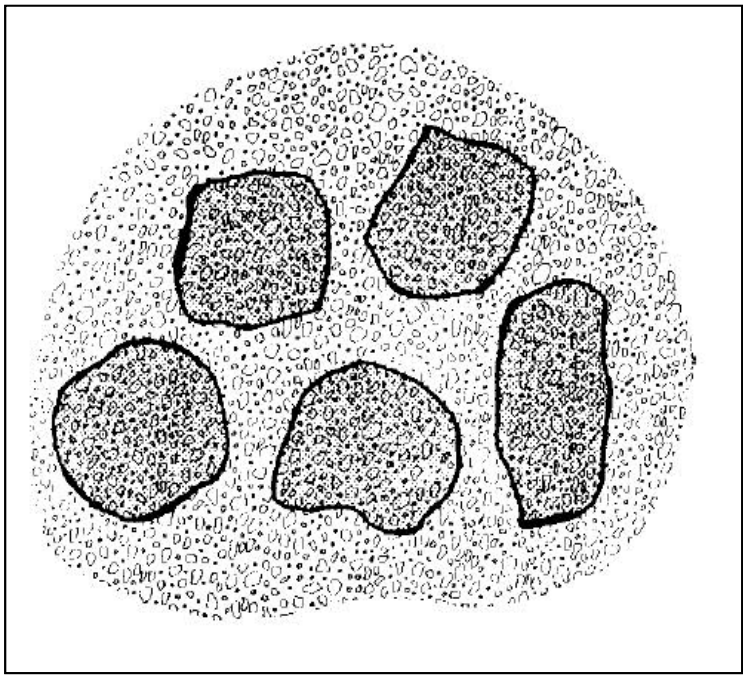
- **Cementitious – "Geographical & Geological Regions"**
  - Portland – GU (Alkali Variations)
  - Slag - Ontario
  - Fly Ash – Western Canada

- **Admixtures**
  - Air Entrainment
    - Higher Dosages - Ash
  - Water Reducer
    - Check Effectiveness: Water Demand Reduction
    - Compatibility

Mix Development

Gap Graded Mix

1. Requires more paste/mortar to fill voids
2. Increased mix cost
3. Poor Mix Quality
4. Durability Issues



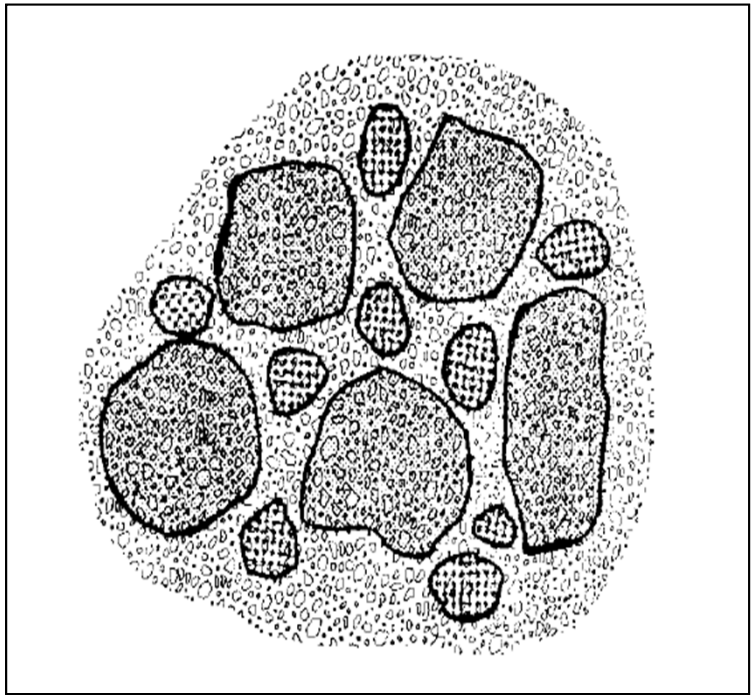
Mix Development

Well Graded Mix

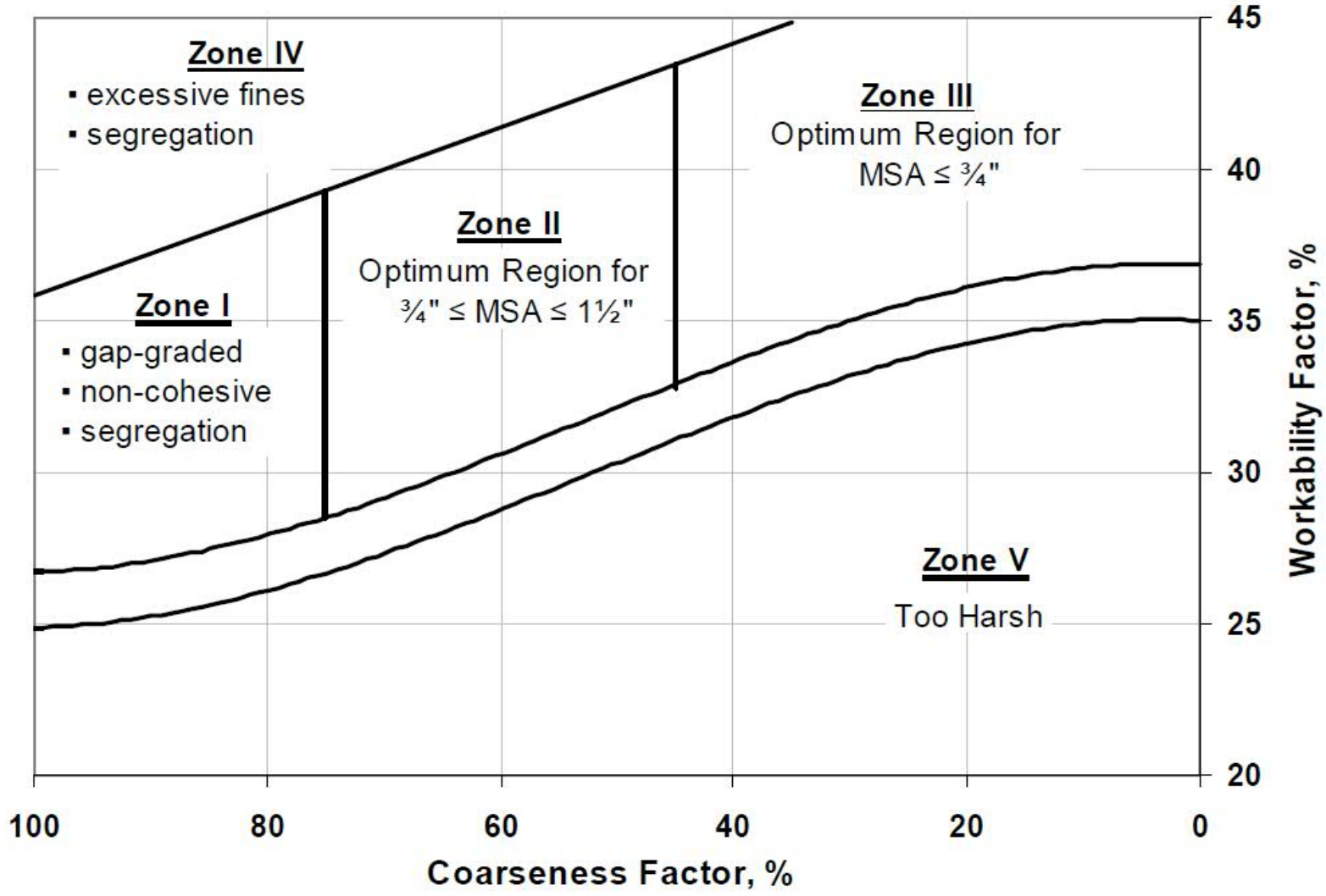
- Increased Durability
- Maintains Mix Consistency

Facilitates Better

- Placement
- Consolidation
- Finishing



Mix Tools - Shilstone Method



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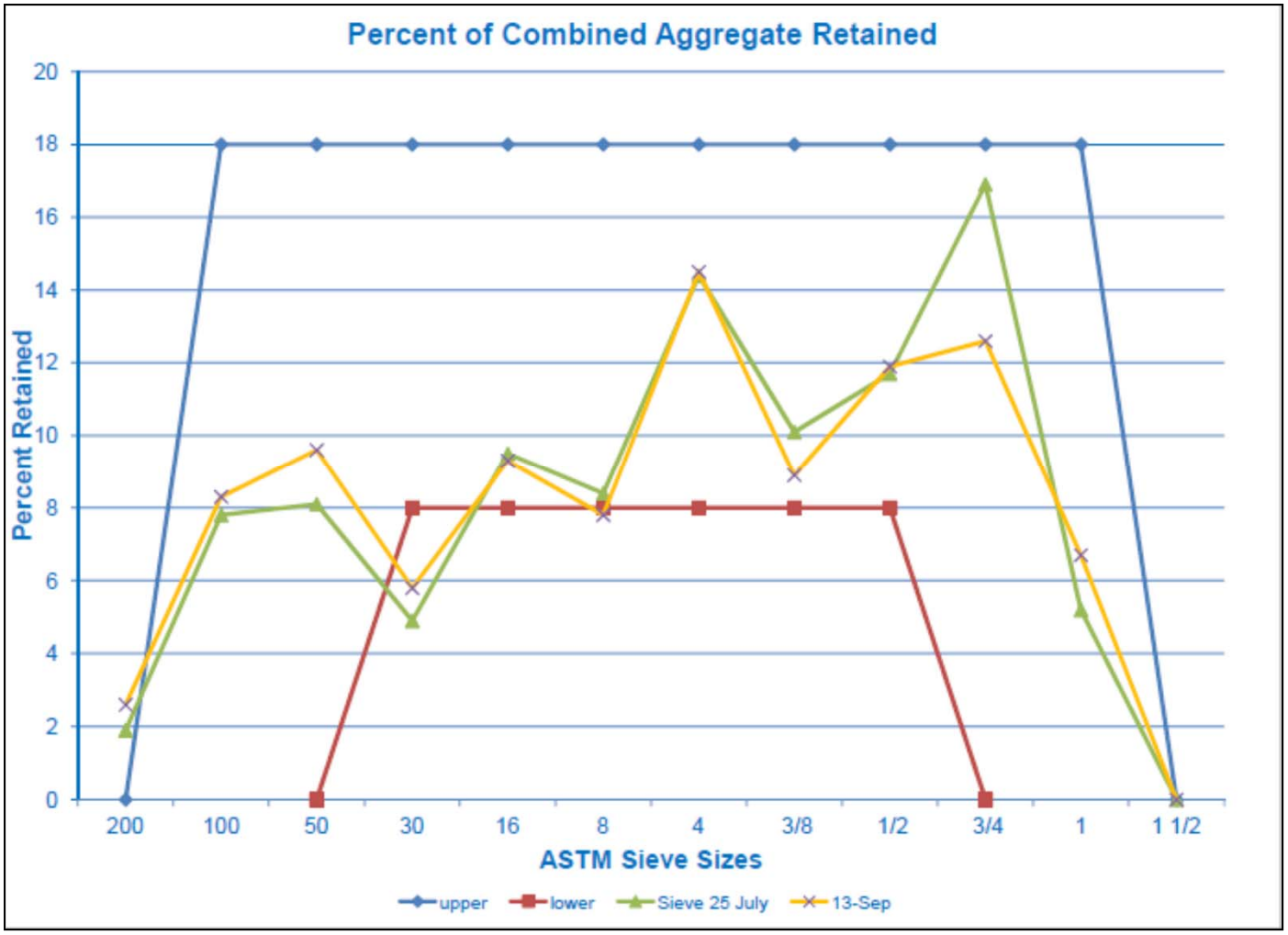
Mix Tool - Percent Retained



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Mix Tool - 0.45 Power Plot

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High Daily Volume Projects:

- Importance on On-Site Monitoring
- Quality Control Personnel
- QC Lab Onsite

1. Moisture Content
2. Gradations (Delivery)

These are critical for Mix Consistency during Production

Paving Technology

Eddy Marin

Vice President,

Dufferin Construction Company

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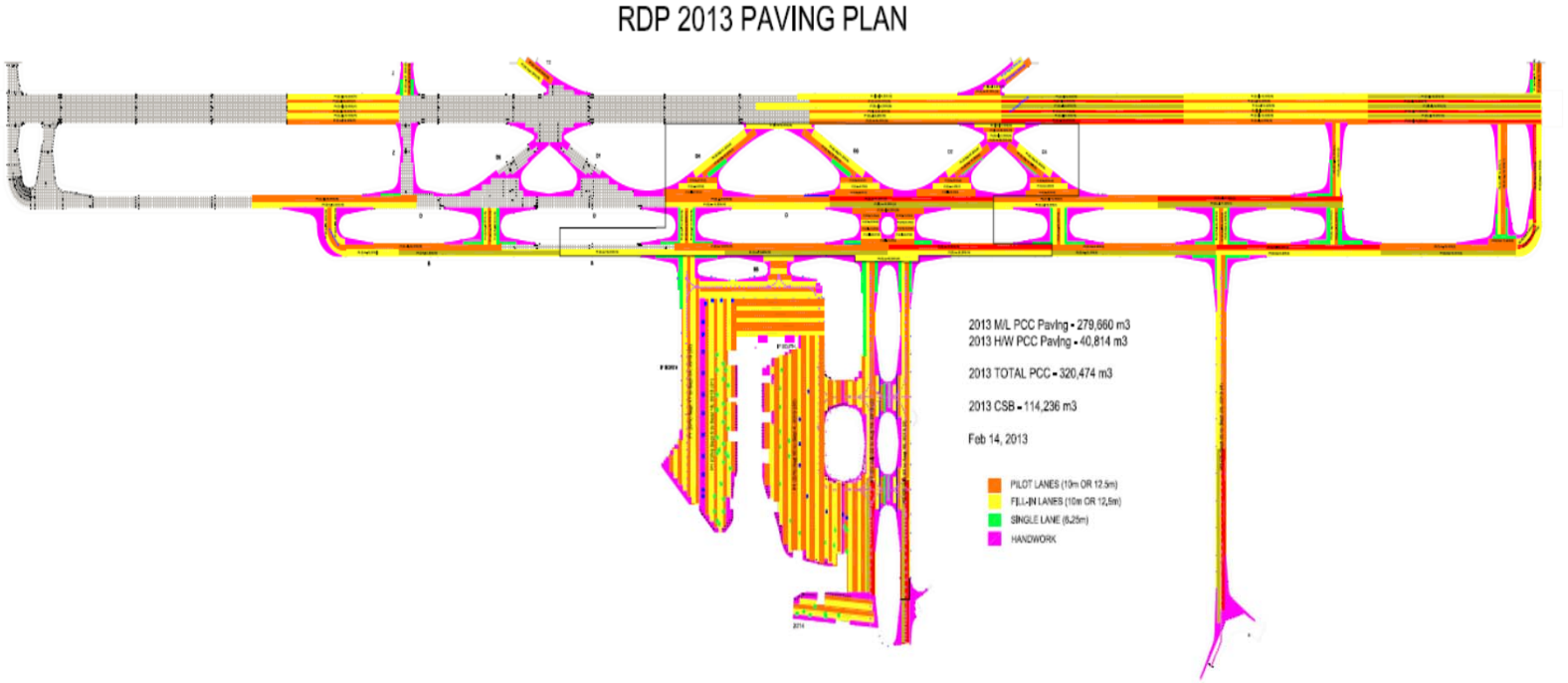
Concrete Paving Technology – A Contractor's Perspective

- **Concrete Production**
  - Plants
- **Paving**
  - Equipment
- **Concrete Placement**
  - Dowel Bar Inserter (DBI)
  - Baskets
  - Surface Finishing
  - Curing
  - Saw Cutting

Project Complexity & Volume

- Read Contract Documents
- Establish A Concrete Paving Plan
- Highlighting Machine Work – Pilot Lanes, Fill-in Lanes, Hand Work
- Plant Location & Various Haul Roads
- Constructability



Plant Selection

- Erie Strayer: Central Mix Wet Batch Plant – Dual Drum
- Matching Plant and Paver Productions

Capacity = 400 m^3/hr.

- Year: 2011
- Max Height: 30 m
- Site Area: 16000 m^2
- Batch Size: 9 m^3
- Cycle Time: 107 Sec
- Delivery: Dump Trucks

Plant Selection
Multiple Paving Operations & Volume

- Erie Strayer: Central Mix Wet Batch Plant – Single Drum
- CSB and Handwork

Capacity = 200 m^3/hr.

- Year: 2012
- Max Height: 12 m
- Site Area: 8200 m^2
- Batch Size: 9 m^3
- Cycle Time: 110 Sec
- Delivery: Dump Trucks

Plant Selection
Single Paving Operation

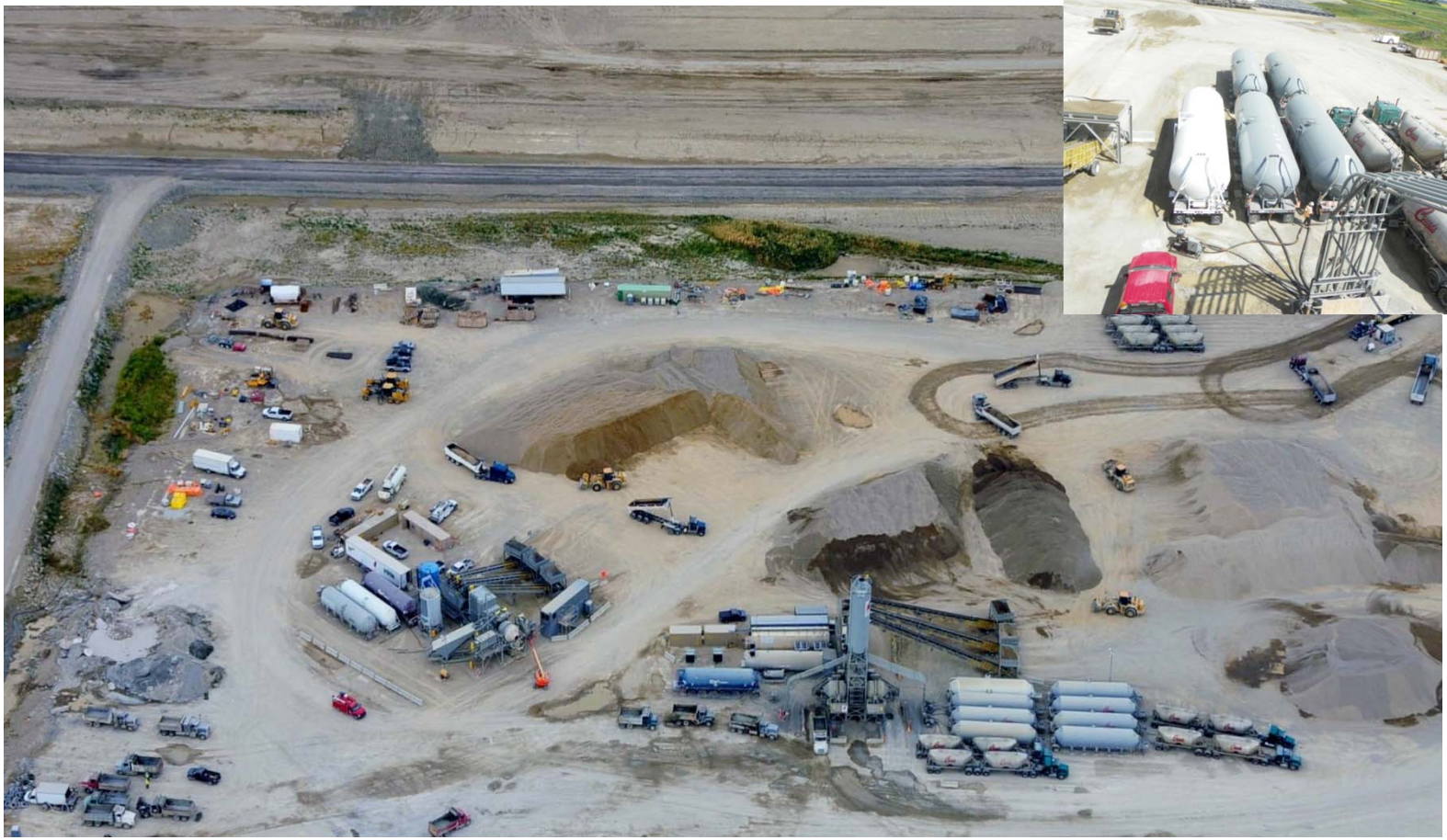
- Rexcon Wet Batch Plant

Capacity = 225m^3/hr.

- Year: 1995 – Model S
- Max Height: 15 m
- Site Area: 8050m^2
- Batch Size: 8.5m^3
- Cycle Time: 75 sec
- Delivery: Dump Trucks

PLANTS - Adequate Storage

- Horizontal Storage Silos
- Min 4 to 7 Days Storage Capacity - Cementitious (GU + Fly Ash)
- Accommodate Daily Production – (Sand + Stone)



PCC Equipment Selection

Guntert Zimmerman – PS1200 Placer + S1500 Paver

Gomaco – RTP 500

CSB - Equipment Selection

Gomaco RTP 500 Placer and ABG Paver

Paving 9 m Width

Concrete Placement - Dowel Bars

- Dowel Bar Inserter
- Dowel Cart
  - Cost Savings
  - Reduced Labor
  - Increased Production
  - Smoother Operation
  - Reduced Site Congestion
  - Precise Dowel Placement
  - Minimized Displacement

Concrete Placement – Dowel Bars & Baskets

- **Dowel Baskets**
  - Costs
  - Labor Intensive
  - Production Impacts
  - Site Congestion
  - Displacement
  - 20 Km of LTDs
  - 160 K of Dowels

Concrete Placement – Fixed Form & Hand Finishing

- Small Equipment & Tools

1. **Bidwell 6500**
2. Roller Screeds
3. 3m Straight Edge
4. Hand Floats – Bull float
5. Hand Trowels – Darby
6. **Irregular Shapes (0.6m to 12.5m)**

Concrete Placement - Texturing

- **Surface Texturing**
  - Fork Tinning
  - Burlap Drag
  - Stiff Bristle Broom - Surface Texture Depth not less than 1 mm
    - Friction for Aircraft

Importance of Curing

- Curing - immediately after finishing operations without damaging the fresh concrete
- Ensure uniform application & distribution of compound

White Pigmented Curing Compound

Saw Cutting and Curing

- **Saw Cutting is a very critical operation**
- **Saw cutting Window - always balancing the “too soon or too late” dilemma**
  - Timely saw cutting controls cracking & facilitates slab movement
  - Done as soon as possible without raveling the surface
  - Saw Cutting is done to 1/3 depth of slab

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Thank You !
&
Questions

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