

# Roller Compacted Concrete CN Intermodal Project



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# What is Roller Compacted Concrete?

RCC is a stiff, zero-slump concrete mixture that is mixed, placed, and roller compacted with the equipment similar to that used for asphalt pavement construction



# RCC Material

- Type 10 Portland Cement
- Fly Ash
- Crushed Aggregate
- Water



# RCC Core





# Background on RCC

- First RCC Pavement in Canada was built in 1976 at a log sorting yard on Vancouver Island
- During the 1980's, the US Army Corps of Engineers began studying the use of RCC for pavement at military facilities
- From this point interest in RCC as a heavy duty pavement expanded beyond the logging & mining industries



# Applications of RCC

- Haul Roads
- Container Yards
- Industrial Pavements
- Composting Pads
- Intersection Treatments
- Airport Aprons
- Feed Lots
- Pond Liners
- Tank Storage Yards
- Fueling Stations
- Logging Roads
- Truck Stops
- Road Base
- Grain Terminals



# SG Involvement with RCC

- Started in 1988 with 2 Projects
- Quantities-to-Date:
  - Over 50 Projects
  - Supplied & Placed – 475,000 Tonnes
  - Supplied – 250,000 Tonnes



# CN Intermodal – Project Scope

- Land Acquisition for the 145 Ha. Terminal
- Site Grading – 1,400,000 m<sup>3</sup> of Excavation
- Site Drainage Systems
- Site Storage & Road Infrastructure
- Track Construction
- Site Office
- Equipment Garage





# Original Ground





**Grading Complete**



# CN Intermodal – SG Project Scope

- 50,000 m<sup>2</sup> – common excavation
- 285,000 m<sup>2</sup> – subgrade preparation
  - 47,000 m<sup>2</sup> – stabilized with 30 kg/m<sup>2</sup> of Cement
- 65,000 tonnes – granular base
- 92,500 tonnes – granular sub-ballast
- 94,000 m<sup>2</sup> – 400mm thick RCC
- 6,000 tonnes – asphalt pavement





# Design Considerations

- RCC Pavement Design Vehicle
  - Fantuzzi RS 70 Rail Stacker
  - Total Weight with Container – 348,700 lbs
  - Total Weight on Drive Axle – 270,600 lbs
  - Total Weight on Steer Axle – 78,100 lbs
- Initial Capacity – 150,000 Units
- Future Capacity – 225,000 Units





# Fantuzzi RS 70 Rail Stacker



# Pavement / Mix Design

## Specified Pavement Design:

- 200mm Subgrade Preparation
- 250mm / 20mm Crushed Aggregate
- 400mm Roller Compacted Concrete

## Specified Mix Design:

- Compressive Strength 30 Mpa @ 28 Days
- Flexural Strength 4.0 MPa @ 90 Days



# Job Mix Formula

- 11 % Type 10 Portland Cement
- 85 % Aggregate (83.5% Dry Aggregate)
- 4 % Water (6% optimum moisture)
  
- Compressive Strength 46 MPa @ 28 Days
- Flexural Strength 4.8 MPa @ 28 Days



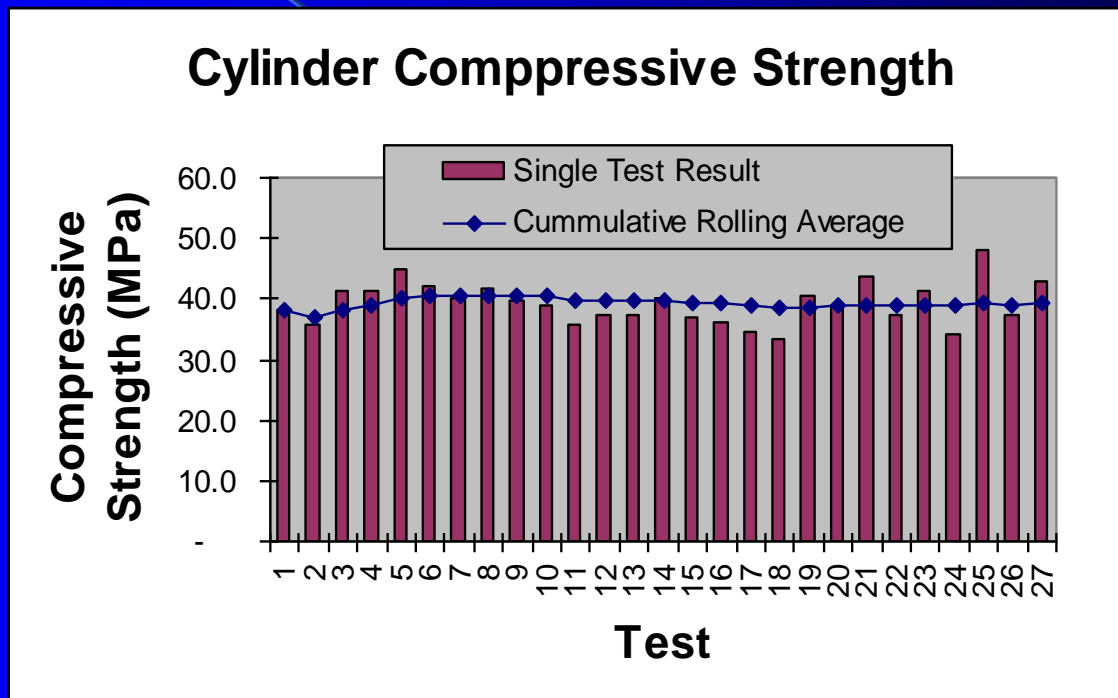
# Test Strip

- 28 Day Strength Results
  - Cylinders – 47 MPa
  - Cores
    - Surface Mat – 26 MPa
    - Base Mat – 35 MPa
- In-place Beams
  - Surface Mat – 3.7 MPa
  - Base Mat – 3.8 MPa



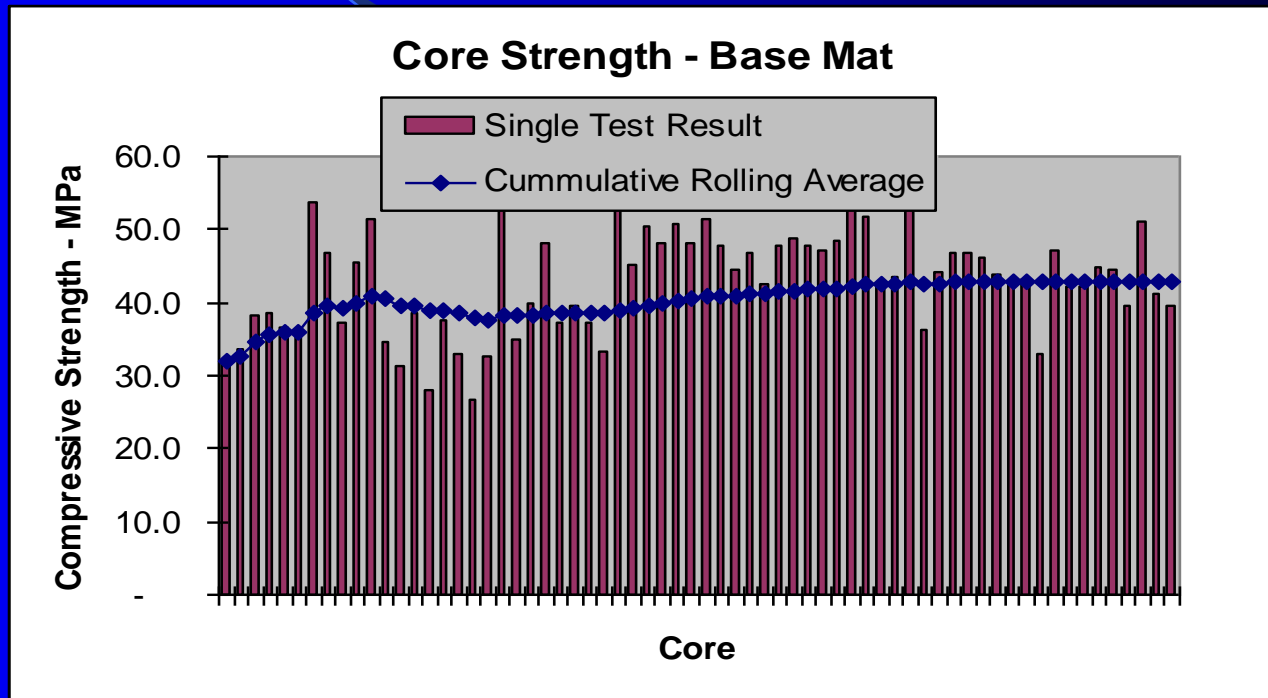
# Cylinder Results

- Average 28 Day Strength – 39.2 MPa
- Maximum 28 Day Strength – 44.9 Mpa
- Minimum 28 Day Strength – 33.3 MPa



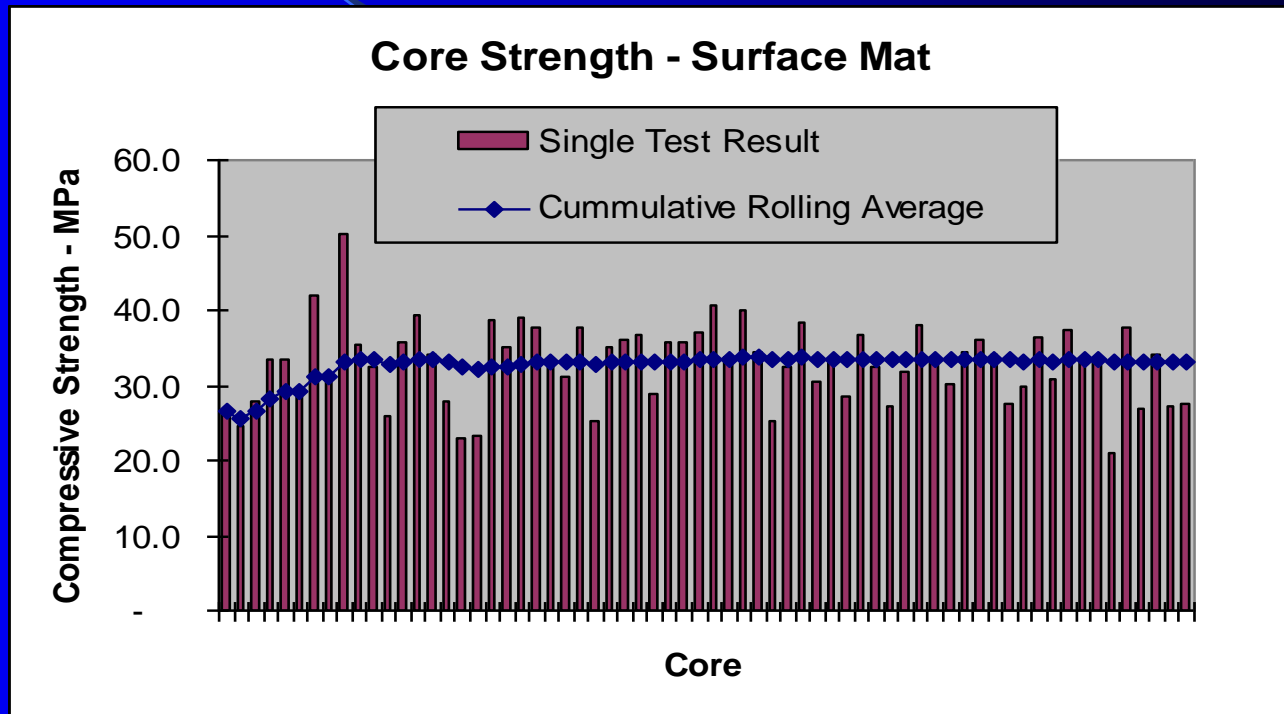
# Base Mat Core Results

- Average Core Result – 42.8 MPa
- Maximum Core Result – 53.3 Mpa
- Minimum Core Result – 26.8 MPa



# Surface Mat Core Results

- Average Core Result – 33.0 MPa
- Maximum Core Result – 50.3 Mpa
- Minimum Core Result – 21.1 MPa



# Project Milestones

- Project was put-out to tender on February 2, 2001
- Tender Closed on February 14, 2001
- Project was Awarded on February 21, 2001
- All Work to be complete by August 31, 2001
- Sub-ballast to be complete by May 25, 2001
- RCC to be complete by July 15, 2001





# Site after Sub-ballast Construction





# Cement Stabilized SGP – Spread Cement



8 7:45 AM



# Cement Stabilized SGP – Wet Mix Set-up





# Granular Base Operations



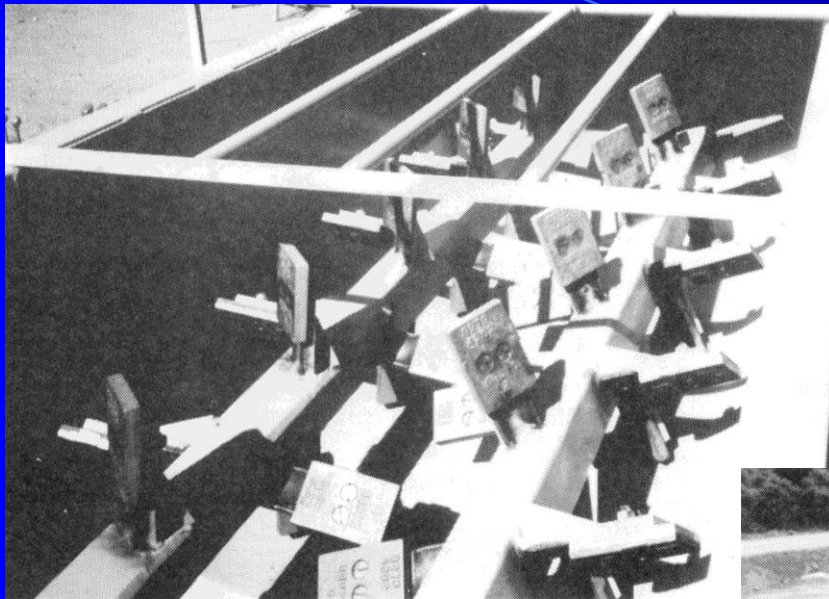


# Mobile RCC Plant





# Twin Shaft Pugmill





# Loading Trucks





# Plant in Operation





# Paving & Gravel Operations





# Tandem Paving





# Tandem Paving





# Lift Scarification



13 2:46 PM



# ABG Titan 511 Paver





# Scarified Base Mat





# Paving Along the Tracks





# SS-1 Application



13 2:24PM



# Tack Coat Cure





# Final Day of Paving





**Open for Business**





Full Operation





