Super-Slab® Installation
Highways for Life Show Case
I-280 Project

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The Super-Slab™ System

A Slab-on-Grade System

Super-Slab® is a patented system
The System Consists of:

- **Precision Precast Slabs**
  - Correct in Three Dimensions – to ± 4 mm

- **Techniques for Precision Grading**
  - Correct in three dimensions - to ± 3 mm

- **Interlocking Dowels and Tie Bars**
  - Accessible From Top of the Slab

- **A Bedding Grout Distribution System to Insure Complete Support**
  - Accessible From Top of the Slab
Super-Slab™

The Product

Features:
- High Performance Concrete
- Embedded Dowels
- Embedded Tie Bars
- Matching Inverted Dovetail Slots
- Thickness as Required
- Length and Width as Required
Transverse Dowel Connection

- Slots on the bottom Protects Grout From De-Icing Chemicals
- Mechanical Resistance to Dowel Pop-out
Pumping Bedding Grout

- To fill any voids
- Flow rate = 17 - 20 seconds
- 2 MPa in 12 hrs.

Bedding Grout
Two Types of Slabs (and Subgrade Surfaces)

- Single Plane
- Warped Plane
Examples of Intermittent Installations
In Half the Time Required for (Rapid Set) Cast-in-Place

I-90 - Albany, NY
(2004)
378 Slabs in 47 Nights
(48,000 SF +)
Minneapolis, MN
Design, Bid, Build
One Day Installation
3 – D Hand Grading (Above)
Crane Occupying Un-grouted Slabs
(Above Right)
Marine Parkway Toll Plaza
Brooklyn, NY
“Snow Flakes”
Examples of Continuous Installations
Continuous Replacement
(single plane)

While Maintaining
This

(3,000 SF Per Eight Hour Shift)
(Within ± 3 mm)

In 2001 and 2002

While Maintaining
This

(135,000 Vehicles per Day)
Continuous Replacement
(warped 3-dimensional plane)

3 – D Supergrading (Above)

9A Ramp
Tarrytown, NY

All slabs warped
• All slabs trapezoidal (pie shaped)
• Traffic continuously maintained
Continuous Replacement

(warped 3 - dimensional plane)

Completed in 18 Nights
158 Slabs – 28,500 SF
Step by Step
Installation Details
For
Intermittent Repair
Step 1
Saw Cutting Existing Pavement
Marking Out for Cutting

Use Separate Template for Each Size Slab
Score to Preserve Mark

Full Depth Cuts
Cuts Must Be Accurate
Use Proper Width Blade
Step 2
Removal of Existing Pavement
Methods of Removal

- Slab Crab” Method of Removal (continuous installations)
  - Fastest method
  - It does disturb the subgrade
    - Sub-grade can be repaired and recompacted

- Lift Out Method (intermittent installations)
  - Slower, requiring crane
  - Advantage, it does not disturb subgrade

- Must not damage existing pavement to remain
Lift-out Method of Removal

Wedge Type Lift Anchors

Sometimes in More Than One Piece
Sometimes Shoulder Breaks
Step 3
Precision Grading
(Super-grading)
Super-Grading

(The process of grading fully-compacted bedding material to a surface accuracy of ± 3 mm)

- Provides grade control for slabs
  - Set slabs only once
- Provides “nearly complete” subgrade support without grout
  - Slabs can be opened to traffic right away
  - Minimizes volume of bedding grout required
Supergrading with the H.O.G.

- Set Rails Accurately (Surveyor Preferred)
  - Vertically parallel = single plane
  - Two different grades = warped plane
- Set (calibrate) screed at correct height
  - Check slab thickness first
  - Set theoretical bottom of screed
- Use finely graded bedding material (stone dust)
Installing Bedding Material

Don’t Put in More Than You Need

Bagged Stone Dust

Spread Only as Needed
Super Grading
With H.O.G.

Three Steps
(12 minutes)

First Pass (high)

Compaction

Last Pass (done)
Small – Scale Grading Equipment

Now a Choice of Precision Grading Equipment

Hand Operated Grader (H.O.G.)

Auger H.O.G.

Mini-H.O.G.

Shutter Screed
Step 4

Installing Dowels and Tie Bars
Drilling for Dowels

Mark Out (accurately) to Fit Inverted Dovetail Slots

Use Appropriate Drill
(12 minutes for 16 holes)
Installing Dowels (and Tie Bars)

Follow Directions (and specifications)

Use Two-Cartridge Pneumatic Gun
Step 5
Placing Slabs
Prior to Placing Slabs

- Make a final grade check around edges
- Wet bedding material (if necessary)
  - (requires water truck)
- Apply bond breaker to edges previously set
  - (requires spray can of form oil)
Check Edges with a Drop Gage

Check Middle with a Straight Edge

To make sure slabs will fit)
Apply Bond Breaker

Spray (form oil)
Placing Slabs

- Use proper size crane
  - Do not place outrigger on slab corners!
- Rig properly
  - So all four corners hit at once
- Set long – and pull in to marks
  - Do not use bars or wedges
  - Do not allow slabs to touch
- Check for match
  - Correct if necessary before setting next slab
Improper Rigging
(Takes forever to set)

Proper Rigging
(all four corners hits grade at once)
Place Outriggers Off Slabs If Possible
(If not, do not place outrigger near corner)

One Man in Each Corner
(Nothing Touches)
Checking for Match

If Not -

Pick Up & Re-Grade
Step 7

Grouting
Dowel Grouting

- Dowel Grout is “hot grout”
  - Reaches 2500 psi in two hours
- Keep mixture below 70 degrees
  - Use Ice Water to Control Temp.
- Use Proper Nozzle
- Keep Dowel Grout Moving
  - Do not let it sit in hoses
- Wash Out Grout Pump Frequently
Grout Rig

- Truck (grout material & water)
- Trailer (grout mixer/pump)
- Short hose & nozzle
- Pails (for water measuring)
- Barrels (for waste)

Measure Water Accurately
Grout Pumps

Chem-Grout (batch) Pump

Volumetric Mixer Pump

Contractor-Designed Joint Dam (Montreal Project)
"Chase" the Grout

Immediate Clean Up
Bedding Grout

- Mixture of Cement, Water & Admixture
  - Flow rate of 17 - 20 seconds
  - Must flow into thin voids
- Reaches 2 MPa ± in 12 hours
- Use Proper Nozzle
- Keep Holes filled
Bedding Grout

Flow Rate
17 – 22 Seconds

Proof
(keep ports full)
How About Smoothness?

- Small differences between slabs are to be expected
  - There are tolerances allowed (by necessity) in the slabs
  - There are tolerances allowed in the grading
- Super-Slab® specifies finished surfaces ± 3 mm
  - In many cases this is acceptable
- For best International Roughness Index - grind
  - Grinding is a known and accepted practice
Keys to Job Site Success
(Still More to Learn)

- Good Training
- Working Together
- Real Partnering
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