



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

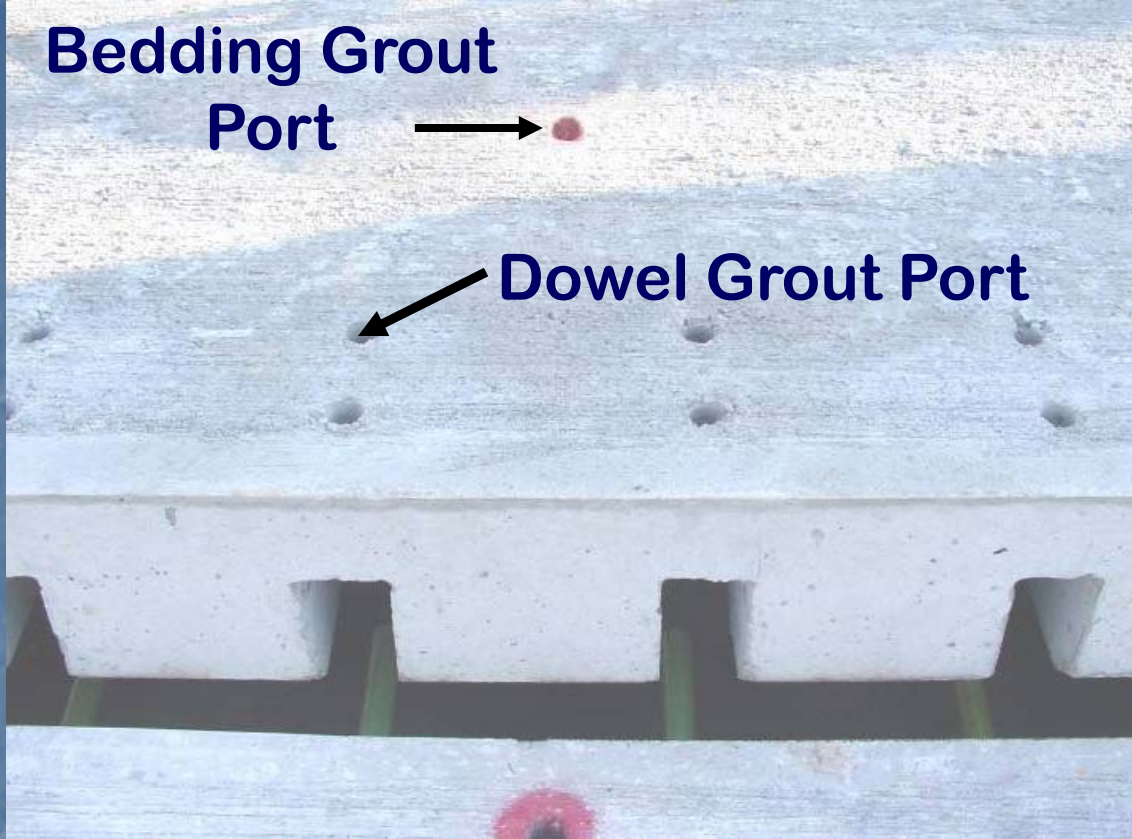
Thickness as Required

Length and Width as
Required



**Bedding Grout
Port** →

← **Dowel Grout Port**



Transverse Dowel Connection

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





Bedding Grout

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



Grout Flow Test Chamber



Pumping Bedding Grout

Two Types of Slabs (and Subgrade Surfaces)

- Single Plane



- Warped Plane



Examples of Intermittent Installations



I-90 - Albany, NY

(2004)

378 Slabs in 47 Nights

(48,000 SF \pm)

In Half the Time Required
for (Rapid Set) Cast-in-
Place



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)



← This

(3,000 SF Per Eight Hour Shift)

(Within ± 3 mm)

In 2001 and 2002

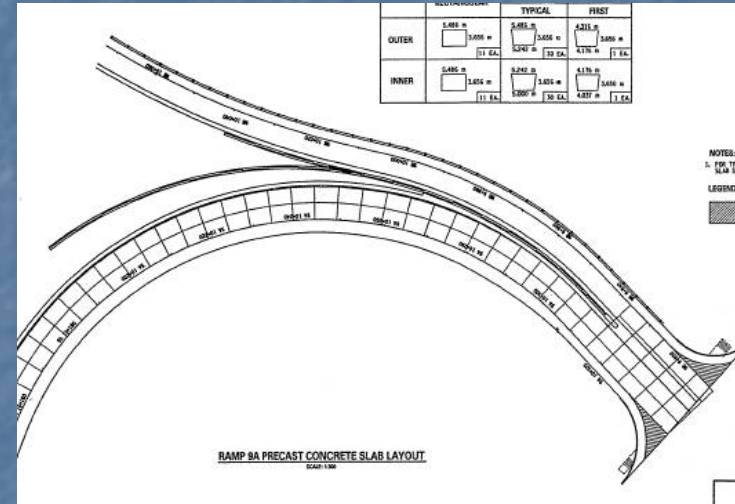
While Maintaining

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 recompactd
- **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



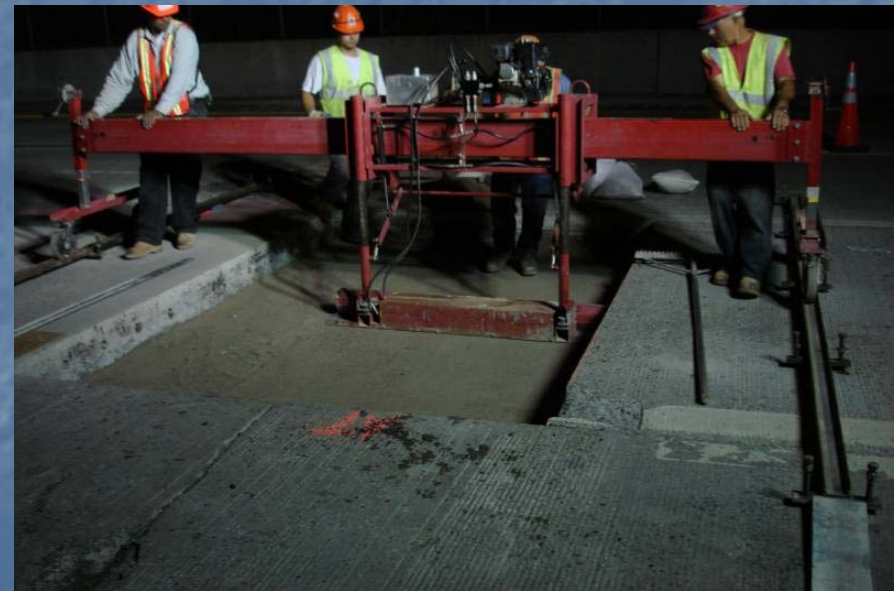
First Pass (high)

Super Grading With H.O.G.

Three Steps
(12 minutes)



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

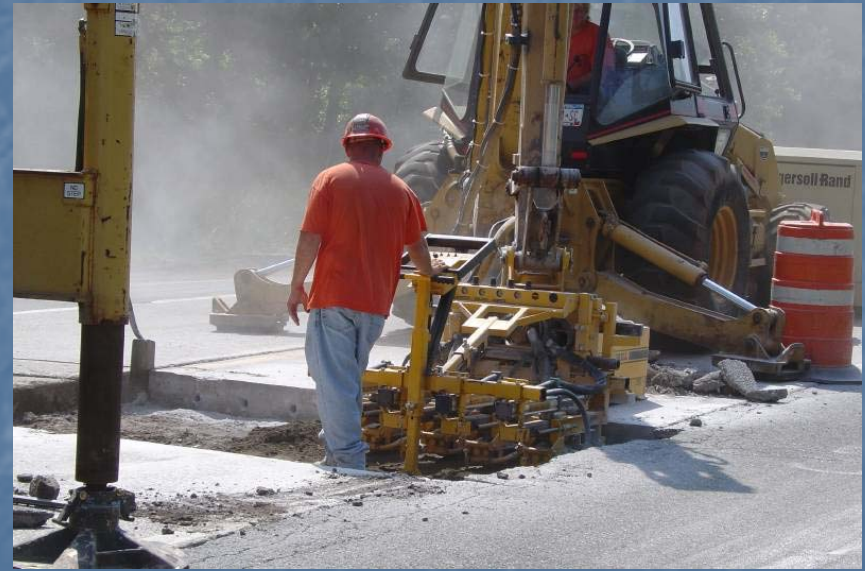
Installing Dowels

and

Tie Bars

Drilling for Dowels

Mark Out (accurately)
to Fit Inverted Dovetail Slots

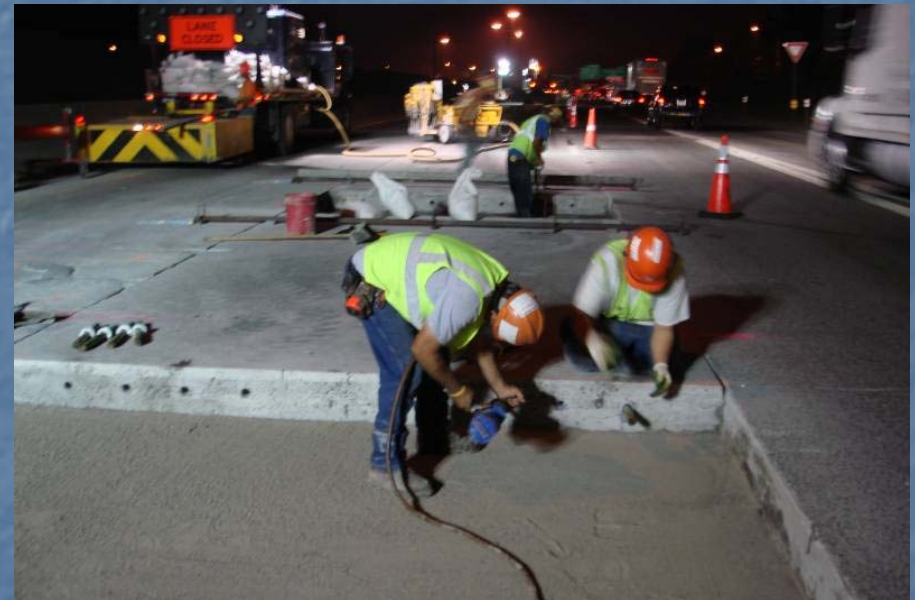


Use Appropriate Drill
(12 minutes for 16 holes)

Installing Dowels (and Tie Bars)



Follow Directions (and specifications)



Use Two-Cartridge Pneumatic Gun

Step 5

Placing Slabs

Prior to Placing Slabs

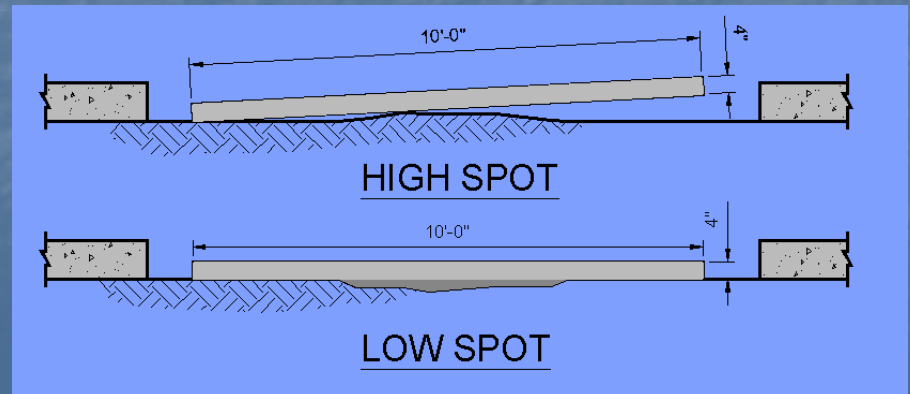
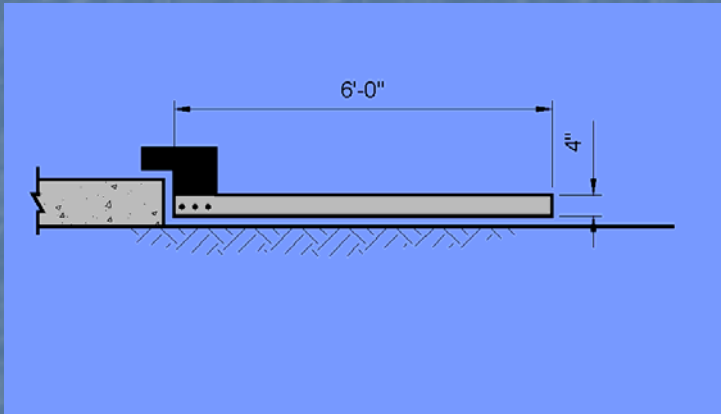
- Make a final grade check around edges
- Wet bedding material (if necessary)
 - (requires water truck)
- Apply bond breaker to edges previously set
 - (requires spray can of form oil)



Check Edges with a Drop Gage

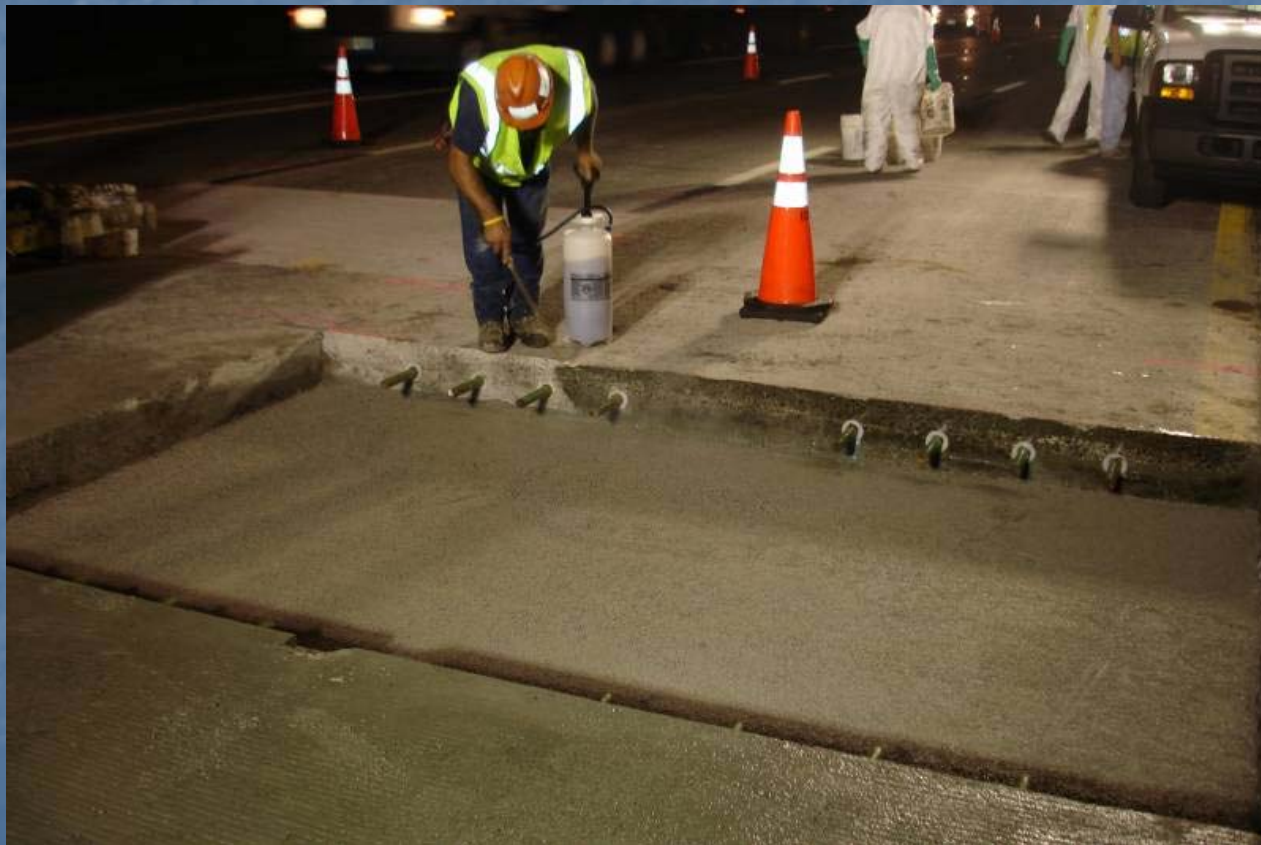
Check Middle with a Straight Edge

To make sure slabs will fit)



Apply Bond Breaker

Spray (form oil)

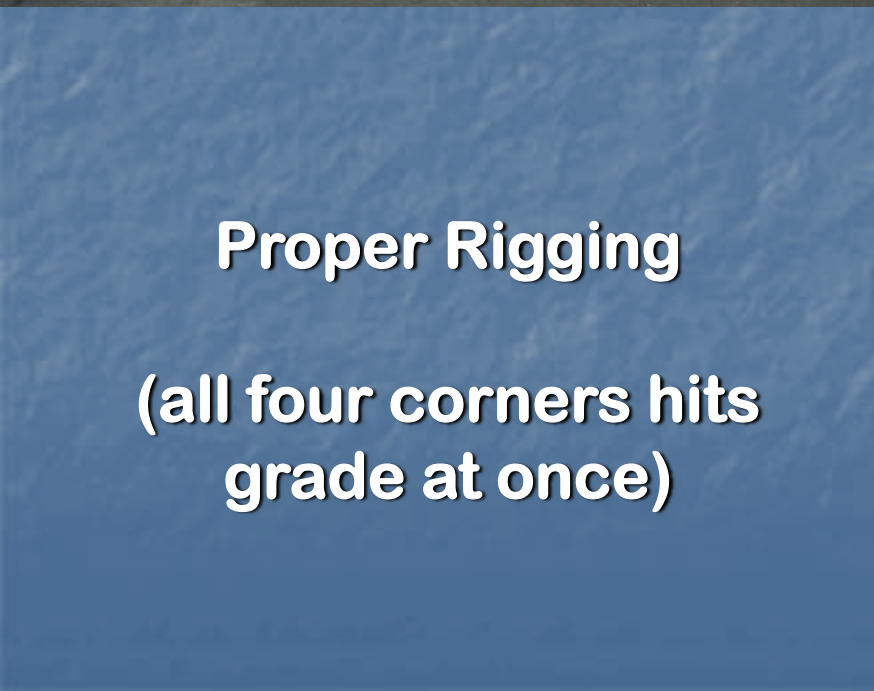


Placing Slabs

- 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 \pm in 12 hours
- Use Proper Nozzle
- Keep Holes filled



Bedding Grout

Flow Rate

17 – 22 Seconds



Proof

(keep ports full)

JUL 10 2002

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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