

## PRECAST CONCRETE PAVEMENT SLAB SYSTEMS (Tollway)

### DESCRIPTION

This specification covers material and fabrication requirements for precast concrete pavement slab systems. The precast concrete pavement slab system must be the Tollway's generic system or an alternate system approved by the Tollway.

### SYSTEM APPROVAL

An alternate precast pavement slab system designer must submit the following information to the Tollway for review. After the Tollway reviews the submitted information, the system designer will be required to perform a trial installation as detailed herein.

- A. Fabricator Standard Drawings. Section 504 of the Standard Specifications shall apply. Include the following details:
- Transverse joint support type, locations, spacing, and the mechanism used to transfer loads across transverse joints after slabs are placed.
  - Longitudinal joint tie type, locations, spacing and the mechanism used to tie adjacent slabs together.
  - Lifting insert type, location, positioning, and capping or backfill method.
  - Grout port type, location, positioning, and capping or backfill method.
  - Exterior forms during fabrication shall be steel. Side forms shall have form plates of sufficient thickness, shall be sufficiently braced, and shall be anchored, so as to withstand the forces due to vibratory placement of the concrete and to maintain correct alignment. The ends or sides of adjacent sections of form, which are butt joined, shall match smoothly and tightly and shall result in proper alignment. The side forms shall be cross tied above the finished surface of the member at sufficiently close spacing to maintain true cross sectional dimensions.
  - Maximum dimensional tolerances are  $\pm 1/4$ " depth and  $\pm 1/2$ " length and/or width. It is intended that the dimensions of all members shall be well within these tolerances and that the maximum values shall be permitted to be approached or equaled only occasionally.
  - Reinforcement bars shall be rigidly fastened together by wire ties, and extra tie bars shall be furnished as may be necessary for maintaining satisfactory rigidity during handling and placing. Spot welding will be permitted where approved by the Engineer. Sufficient thermoplastic or wire chairs shall be furnished for supporting the reinforcement at the proper distance from horizontal surfaces. Wire chairs may also be used as spacers to hold reinforcement at the proper distance from vertical surfaces. The concrete cover over all reinforcements shall be within plus or minus  $1/4$  inch of the specified cover. All metal chairs and miscellaneous metal left in the concrete shall be hot dip galvanized to at least  $1/2$  inches from concrete surfaces.
  - Miscellaneous accessories to be cast into the concrete or for forming holes or recesses shall be carefully located and rigidly held in place by bolts, clamps, or other effective means.
- B. Installation Instructions. Twenty-one (21) days prior to constructing and erecting precast concrete slabs, the Contractor shall submit detailed installation working drawings to the Engineer for approval in accordance with Article 105.04 of the Tollway Supplemental Specifications, except as may be otherwise specified herein. Erection drawings shall be prepared and signed by a Structural Engineer licensed in the State of Illinois. It is specifically understood that the approval of the Engineer shall not be considered as relieving the

Contractor of either responsibility for the safety method and equipment, or responsibility from carrying out the work in full accordance with the Plans and Specifications. Provide installation instructions, including any special equipment and materials to address the following:

1. Removal and Subbase Preparation. Specific procedures for sawcutting and removal if needed and instructions for any recommended subbase preparation.
2. Slab Installation. Instructions, methods, and equipment for lifting, moving, protecting, lowering, and adjusting the slabs into position.
3. Bed and Level Slabs. Instructions to ensure slabs are fully supported by underlying layers at the correct line, grade, and cross slope while meeting contract smoothness requirements. Slabs may be either:

- Placed on a precisely graded bedding layer and grouted in-place to fill any small, isolated voids between the slabs and bedding layer (grade-supported).
- Placed at final position on flowable fill material, or placed or held near final position and jacked into place (grout-supported).
- Placed by other methods approved by the Tollway Materials Manager.

For grade-supported slabs, include all pertinent bedding and leveling instructions, including:

- Bedding material composition and gradation.
- Bedding grout mix design and anticipated strength gain. Bedding grouts must develop a minimum compressive strength of 575 psi in 12 hours.
- Method used to place the bedding material and grout beneath the slab.
- Method used to ensure complete bedding when placed.

For grout-supported slabs, include all pertinent bedding and leveling instructions, including:

- Material properties, composition, mix design, and anticipated strength gain of any slab-jacking or flowable fill material.
- Method used to place the flowable fill before slab installation or place the slab-jacking material beneath the slab after installation.
- Method used to ensure complete slab contact with jacking material when placed.

4. Backfilling Pavement Hardware. Instructions to completely encase load transfer tie devices, longitudinal joint ties, lifting inserts, and grout ports. Include all pertinent information, including:

- Material properties, composition, mix design, and anticipated strength gain of any backfill material that is not named in Backfill Material for Pavement Hardware, or, revised instructions for those materials if the manufacturer's instructions are not followed.
- Method used to place backfill material.
- Method used to ensure complete hardware encasement.

5. Joint Sealing. Instructions, methods, and equipment for filling all joints with hot poured sealant.

Subsequent to system approval, any change to approved installation instructions must be submitted to, and approved by, the Tollway. The Tollway reserves the right to require additional trial installations if the changes are deemed significant.

- C. Trial Installation. Perform a trial installation at a location agreeable to the Tollway. Ensure Tollway personnel are present. Place 4 (minimum) 12 foot x 12 foot slabs simulating 2 lanes of

traffic. Provide a drill rig, with operator, capable of retrieving 4-inch mm diameter cores through any portion of the slab, and a technician capable of fabricating test specimens in accordance with AASHTO T106. As a minimum, the following will be evaluated:

1. Bedding Grout Properties and Completeness of Placement. Fabricate 24 cubes meeting AASHTO T106.
2. Leveling Material Properties and Completeness of Placement. Fabricate 24 cubes meeting AASHTO T106.
3. Backfill Material Properties and Completeness of Placement. If a material identified in this specification as Backfill Material for Pavement Hardware (under Material Requirements) is used in accordance with the manufacturer's written instructions, no further material testing is required. If a different material is used (or if a material is not used in accordance with the manufacturer's instructions), fabricate a sufficient amount of test specimens to determine the properties identified in Section C of the Backfill Material Requirements for either mortar or polymer materials as required by the manufacturer, when tested in accordance with AASHTO T106 or the referenced ASTM Standard.
4. Dimensions and Tolerances. Slabs must conform to the Fabricator Standard Drawings and be capable of being placed in an essentially true plane.
5. Instruction Completeness. Manufacturer's instructions must accurately reflect the processes used in the trial installation.
6. Load Transfer Efficiency (LTE). The Tollway reserves the right to conduct falling weight deflectometer testing to determine LTE at the joints. Poor LTE ( $\leq 70\%$ ) is cause for rejection.

#### **MATERIAL REQUIREMENTS**

Section 504 of the Standard Specifications shall apply, except as noted herein.

- A. Concrete. The concrete shall be a Class PC according to Section 1020, and shall have a minimum compressive strength of 4500 psi at 28 days.
- B. Reinforcement. Article 1006.10 shall apply. Reinforcement shall be epoxy coated. Provide 2-inch (minimum) concrete cover between the mat and the slab bottom. Fabricate mats using a size and spacing of steel (in both directions) that results in a steel area to cross-sectional area ratio of 0.002 (minimum). Maximum bar spacing is 18 inches.

The manufacturer may provide additional reinforcement based on jobsite loading conditions. (A typical example is when slabs must be loaded before a bedding grout is placed.)

- C. Backfill Material for Pavement Hardware. If the precast slab system requires a backfill material around pavement hardware or tie device, use DBR Retrofit Mortar, HD-50, Five Star Highway Patch or a two component urethane polymer system as recommended by the manufacturer, or an alternate material submitted as an approved equal. If the brands or material types named above are mixed in accordance with their manufacturer's written instruction, no further testing is required. If an alternate material is proposed for use, the material must meet the Backfill Material Requirements listed below when tested in accordance with AASHTO T106 or the referenced ASTM Standard.

BACKFILL MATERIAL REQUIREMENTS FOR MORTARS		
Property	Minimum	Maximum
Compressive Strength, Opening to Traffic	2500 psi	-
Compressive Strength, 28 Day	4000 psi	-
Expansion	-	0.40 %
Contraction	-	0.05 %
Freeze - Thaw Loss (25 cycles at 10% NaCl)	-	1.0 %
Bond Strength (to dry PCC)	300 psi	-
Initial Set Time	15 minutes	-
Chloride Content	-	0.05 %
Sulfate Content	-	5.0 %

BACKFILL MATERIAL REQUIREMENTS FOR URETHANE POLYMERS		
Cured Property	Minimum	Maximum
Compressive Strength, (ASTM C-39)	3,282 psi	-
Hardness, Durometer D, (ASTM D-2240)	70	-
Specific Gravity, (ASTM D-792)	1.07	-
Tensile Strength, (ASTM D-412)	4,300 psi	-
Elongation at Break, (ASTM D-412)	-	10%
Tear Strength, (ASTM D-624)	275	-
Bond Strength to PCC	350 psi	500 psi

D. Flowable Fill Leveling Material. The flowable fill mix placed only on tangent sections before slab installation to level the precast pavement slabs shall consist of Portland cement, fly ash, coarse and / or fine aggregates, water, air entraining admixture (optional), and any other admixture needed to control the initial and final set times of the mixture. The contractor shall submit the proposed mix design for flowable fill to the Engineer for Tollway approval prior to placement. Trial batches shall be required on any mix design that has not been previously approved. The flowable fill produced shall be in accordance with the following:

1. Portland cement shall be Type 1 cement in accordance with Section 1001 of the Standard Specifications.
2. Fly Ash shall be in accordance with Section 1010 of the Standard Specifications.
3. Fine aggregate shall be in accordance with Section 1003 of the Standard Specifications.
4. Coarse aggregate, if used, shall be in accordance with Section 1004 of the Standard Specifications with a maximum aggregate size of 12.5 mm.
5. If an air entrainment admixture is used, the air content of the flowable fill shall not exceed 35% of the flowable fill volume.
6. The compressive strength of the flowable fill mixture shall not be less than 50 psi at 3 days, nor less than 75 psi or greater than 150 psi at 28 days.

7. The final set time for each mix design shall be determined through trial batch sampling and test procedure ASTM C 403 performed on a trial batch specimen. Recorded final set times shall be no more than 1 1/2 hours after the batch time.

E. High Density Polyurethane Leveling/Support Material. For precast slabs supported and leveled by high-density foam placed after the slab installation, the high-density foam shall be expanding polyurethane foam having a water insoluble diluent and shall be in accordance with the following:

Density .....	6.0 min.
Tensile Strength (psi) ASTM D 1623 .....	100 min.
Elongation .....	5.1
Compressive Strength (psi) ASTM D 1621 (At Yield) .....	100 min.
Volume Change (% of original) .....	0

The manufacturer shall provide documentation that the lot(s) of foam meet the specified properties. Manufacturer's certification shall list lot number(s) and documentation of compliance with the specification.

F. Joint Sealer. Hot poured joint sealer shall be in accordance with Article 1050.02 of the Standard Specifications. Any proposed sealant product shall be approved in writing by the Engineer prior to the delivery to the work site.

**DRAWINGS**

Section 504 of the Standard Specifications shall apply, except as noted herein. Provide job-specific Fabricator Working Drawing(s), from the system designer, for each contract. Use these drawings, in conjunction with approved Fabricator Standard Drawing(s), to manufacture the pavement slabs. Copies of approved working drawings will be returned to the system designer. If the manufacturer is not the system designer, include the manufacturer's name, address, and telephone number on the drawings.

**FABRICATION**

Section 504 of the Standard Specifications shall apply, except as noted herein. Precast slabs can be produced by any Illinois DOT Certified Precast Concrete Producer.

**TEXTURE**

Either an astro turf drag finish or a combination of the turf drag finish followed by a tined finish in accordance with Article 420.09(e)(1) of the Standard Specifications shall be applied to the top surface of the slab as required in the slab design schedule on the contract documents.

**CURING**

When membrane curing compound is the selected curing method and the slabs are exposed to sunlight while curing, use a white pigmented membrane curing compound from the Illinois Department of Transportation Approved List instead of a clear compound with fugitive dye.

**SAMPLING AND TESTING**

The Illinois Department of Transportation's Manual for Fabrication of Precast Prestressed Concrete Products as referenced in Section 504 of the Standard Specifications shall apply.

**FINAL PRODUCTION INSPECTION**

The Illinois Department of Transportation's Manual for Fabrication of Precast Prestressed Concrete Products as referenced in Section 504 of the Standard Specifications shall apply.

**HANDLING, STORING AND TRANSPORTING**

Section 504 of the Standard Specifications shall apply.

**BASIS of ACCEPTANCE**

Section 504 of the Standard Specifications shall apply in addition to the following:

- The system must be approved by the Tollway based on compliance with the Special Provision for Precast Concrete Pavement Slab Systems.
- Written approval from the system designer to use the approved system if the manufacturer is not the system designer.

## **DOWEL BAR RETROFIT (Tollway)**

**Effective: March 30, 2009**

**Revised: April 19, 2011**

### **DESCRIPTION**

This work shall consist of furnishing and installing epoxy coated round steel dowels into existing concrete pavement across transverse joints and/or cracks, in accordance with this Specification, at locations shown in the Plans and/or as directed by the Engineer. This work shall include sawing channels into the pavement, cleaning the channels, placing dowel into the channels, filling the channels and transverse joints with adhesive, sawing and sealing the retrofitted joints, cleanup and other related work.

### **MATERIALS**

- (a) Dowels. The dowel bars shall consist of a smooth, round, epoxy and bond breaker coated 14-inch long, 1.5-inch diameter steel dowels meeting the requirements of Article 1006.06(b).
- (b) Bond Breaker. Acceptable bond-breaker compounds include white pigmented curing compound, concrete form oil, or other approved bond breaker materials.
- (c) Expansion Caps. Use tight-fitting, commercial quality end caps made of a non-metallic, non-organic material that allows for ½ inch of movement at each end of the dowel bar.
- (d) Dowel Bar Support Chairs. Use chair devices for supporting the dowel bars that conform to the epoxy-coated steel requirements of ASTM A 884. Dowel bar chairs are used to firmly hold the dowels centered in the slots during backfill operations. The dowel bar chairs must hold the bar a minimum of ½ inch above the bottom of the slot while the backfill material is placed and consolidated.
- (e) Caulking Filler. Caulking filler used for sealing the existing transverse or crack at the bottom and sides of the slot shall be concrete sealant that is compatible with the patch material being used.
- (f) Non-Shrink Concrete Backfill Material. The backfill material shall be:
  - (1) Five Star Highway Patch, as manufactured by Five Star Products, Inc., Fairfield, Connecticut;
  - (2) Highway DB Retrofit Mortar, as manufactured by Dayton Superior, Miamisburg, Ohio; or
  - (3) A Tollway approved equivalent tested as Rapid Set Concrete Patching materials per AASHTO National Transportation Product Evaluation Program (NTPEP) which conforms to ASTM C 928.

The material shall :

- (1) Provide a compressive strength of 4,000 psi in 24 hours (opening to traffic after 3,000 psi) per ASTM C 39;
- (2) Exhibit expansion of less than 0.10 percent per ASTM C 531; and
- (3) have a calculated durability factor of 90.0 percent minimum at the end of 300 freeze-thaw cycles per ASTM C 666.

The Contractor shall submit the proposed concrete backfill material to the Engineer 14 days prior to any placement operations. For any backfill material that is extended with aggregate, the maximum aggregate size shall be no more than 3/8 inch.

- (g) Curing Compound. Use a Type I, II, or III curing compound to cure the approved concrete backfill material that conforms to Article 1022.01 of the Standard Specifications.
- (h) Joint / Crack Sealer. Hot poured joint / crack sealer used at retrofitted joints shall be in accordance with Article 1050.02 of the Standard Specifications. Any proposed sealant product shall be approved in writing by the Engineer prior to the delivery to the work site. The backer rod if needed shall consist of a material capable of withstanding the application temperatures of hot poured sealant to 400° F. The backer rod shall be extruded from a cross-linked, closed cell polyolefin and shall be available in a variety of diameters to readily meet the requirements of any particular application.

## **EQUIPMENT**

- (a) A template shall be used to locate the sawcuts on any nonskewed crack or joint in order to align the sawcuts consistently. Either single diamond bladed saws or diamond bladed gang saws shall be used to make the saw cuts to allow for dowel bar placements within the specified tolerances.
- (b) Chipping hammers shall be hand held and have a maximum weight of 30 lbs. prior to any handle modification where applicable to minimize damage to the concrete pavement that remains.
- (c) The compressor for air blasting shall have a minimum capacity of 120 cu. ft. per minute. The compressed air shall be free from oil and other contaminants.
- (d) Consolidation equipment used to consolidate the concrete repair material in the dowel bar slats shall be internal vibrators with a maximum diameter of 1 inch and shall have a resilient covering that will not damage the epoxy coated reinforcement during use.
- (e) Equipment for mixing and pumping any backfill materials for retrofitting the dowel bars shall be in accordance with the material manufacturer's instructions and specifications.
- (f) Routing or sawing equipment for crack sealant, where required, shall be power driven and be capable of cutting the cracks to the required dimensions without excessive spalling of the adjacent surface. Equipment for heating and placing hot poured sealant material shall be an oil jacketed, double boiler type, heating kettle or other thermostatically controlled equipment of a type approved by the Engineer, capable of heating the material to 400° F (205° C) and pumping the material into the prepared crack or joint.

## **SUBMITTALS**

Submit samples to the Engineer for approval prior to the installation of the following items:

- a. Dowel bars
- b. Dowel bar chairs
- c. Dowel bar end caps
- d. Backfill material
- e. Aggregate for extension of backfill material



Submit the material samples, except for the backfill and aggregate, at least 10 days prior to use. Submit backfill material and aggregate used for extension 30 days prior to use.

## **DRAWINGS**

The proposed location of the dowel bars is shown in the Plans. Before any fabrication is started, the Contractor shall prepare and submit shop drawings and/or catalog cuts to the Engineer for approval, in accordance with the provisions of Article 105.04 of the Tollway Supplemental Specifications. The shop drawings shall give full detailed dimensions and sizes of the channels to be sawed and the dowel bar retrofit.

## **CONSTRUCTION METHODS**

Install dowel bars in the existing portland cement concrete pavement as shown on the Plans and in the Specifications.

- (a) **Concrete Removal.** Create slots to a depth and length that allows the center of the dowel to be placed at mid-depth in the pavement slab and parallel to the pavement surface. Slots can be created with a gang saw, or by making two saw cuts and removing the concrete between the sawcuts with a 30-lb maximum jackhammer or handtools. Slots are to be parallel to each other and to the centerline of the roadway with a maximum tolerance of  $\frac{1}{4}$  inches per 12 inches of dowel bar length to allow for the dowel bar to be placed parallel to the centerline of the roadway. For non-skewed cracks and joints, the saw cut locations shall be pre-marked using a template. Skewed joints or cracks may require slots longer than the length specified in the plans to allow for equal length of the dowel bar to be placed across the transverse joint or crack. Remove water and residue immediately after sawing. If the concrete removal operations cause damage to the pavement that is to remain, discontinue concrete removal operations and only resume after taking corrective measures. Repair or replace pavement damaged during concrete removal operations at no additional expense to the Tollway. The bottom of the slot must be flat and level. Dispose of any concrete removal debris.
- (b) **Slot Cleaning and Preparation.** Sandblast all exposed surfaces in the dowel bar slot to remove saw slurry and debris such that clean aggregate is exposed. After sandblasting, clean the slot by blowing with moisture-free, oil-free compressed air having a minimum capacity of 120 cu. ft. per minute to remove any dust, residue or debris left in the slot.
- (c) **Sealing Joints and Cracks in Slot before Backfilling.** Seal the existing transverse contraction joint and/or all cracks at the bottom and the sides of the dowel bar slot with an approved caulking or silicone filler to prevent any of the backfill material from entering these areas. The caulking filler should not be placed any farther than  $\frac{1}{2}$  inch outside either side of the joint. Excessive sealant around the slot does not allow the concrete patching material to bond to the sides of the slot. Prior to slot sealing, ensure that surfaces receiving the caulking filler are clean and free of moisture. Do not extend the caulking filler beyond  $\frac{3}{8}$  inches of each side of the existing joint or crack.
- (d) **Placing Dowel Assembly in Slot.** Prevent contamination of the cleaned slot before or while placing dowel assemblies to limit the potential of bonding loss with the backfill material. Place the dowel bars to within 0.5 inches of the midpoint of the slab. Ensure that the bar is parallel to the traffic lane centerline and the top of the roadway surface within a tolerance of

¼ inch per 12 inches of dowel bar length. Center dowels at the nonskewed transverse joints such that at least 6 inches of the dowel extends into each adjacent panel. For dowel bars at any skewed joint and at all cracks, the dowel shall be centered over the joint or crack in each slot. Cease and adjust operations if the chairs do not hold dowel bars securely in place during placement of the backfill material.

Place a foam core insert at the middle of the dowel bar and to the surface of the pavement. Place insert so it covers the existing transverse joint or crack and is capable of remaining in a vertical position, tight to all edges during backfill placement operations. Re-establish the joint or crack above the foam core insert within 4 hours of backfill placement by sawing after the backfill material has hardened sufficiently.

- (e) **Mixing and Placing Backfill Material.** Mix backfill material in accordance with the manufacturer's instructions and the specifications. Refer to manufacturer's information on handling, mixing, and placing backfill material.

Fill each dowel bar slot with backfill material after placement of the caulking filler, the coated dowel bar, expansion caps, support chairs, and the foam core insert. Ensure that the foam core inserts remain upright, extends to the surface of existing pavement, and is over the existing joint or crack during the backfill process. Vibrate the backfill material with a small hand held vibrator capable of thoroughly consolidating the backfill material into the slot around the dowel bars and support chairs.

Slightly overfill the slot and finish the surface of the filled slot level with to no more than ¼" above the existing concrete. Any slots insufficiently filled below existing pavement surfaces shall be redone at the contractor's expense. Cure the backfill material in accordance with the manufacturer's recommendations. Apply curing compound per the manufacturer's recommendation.

- (f) **Sawing Cracks after Backfilling.** After installation of dowel bars and backfill material is completed for retrofitting mid-slab cracks, where the foam insert is not observed present on the finished surface of the patch the patched channels shall be saw cut by the Contractor between existing crack openings within 24 hours of placement to a nominal 1.5 inch depth to reduce surface stress and spalling at the surface of the backfilled slot. Such sawcutting will be at no additional cost to the Tollway.

#### **METHOD OF MEASUREMENT**

This work will be measured for payment in units of each dowel bar assembly installed.

#### **BASIS OF PAYMENT**

This work will be paid at the contract unit price per each for DOWEL BAR RETROFIT.

## **PRECAST REPLACEMENT OF CONCRETE PAVEMENT SLABS (Tollway)**

**Effective: March 30, 2009**

**Revised: September 8, 2011**

**DESCRIPTION.** This work shall consist of the removal of existing concrete pavement, restoration of the subbase material, the installation of precast concrete pavement slabs in accordance with the contract documents, and the sealing of joints at locations designated by the Engineer, or as shown in the Plans, or described in the Special Provisions. The precast slab system shall be the Tollway's generic system or an alternate system approved by the Tollway based on compliance with the Tollway special provision for Precast Concrete Pavement Slab Systems.

**MATERIALS.** The materials must meet the requirements of the Tollway special provision for Precast Concrete Pavement Slab Systems and the requirements of the designer of the approved system.

### **CONSTRUCTION REQUIREMENTS.**

1. General. For replacements using the Tollway's generic precast system, the pavement areas to be repaired will be initially delineated by the Engineer on shoulder pavement using spray paint furnished by the Contractor and noted to qualify for either a 12'-6" or 13'-6" standard slab repair or require a custom slab repair. Standard slab placement shall only be allowed where the length of the patch is no longer than 6'-0", the width between existing longitudinal joints is measured at a right angle to the joints to be either between 11'-6" and 12'-6" or between 12'-6" and 13'-6", and if on-site saw cutting of the slabs is possible to be performed. At all locations initially marked to possibly receive a standard precast slab, the widths between existing longitudinal joints shall be measured by the Contractor under maintenance of traffic provided by the Contractor. The Contractor's width measurements shall be used to determine the need for any on-site sawcuts of the longitudinal edges of standard slabs to fit the opening and to align the saw cut edge(s) with any existing longitudinal joints. The longitudinal edges of any standard slab shall not be sawed cut more than 6 inches off the original edge. No new longitudinal joint shall, of a cut standard slab, be allowed inside of the existing longitudinal joint by more than ¼ inch. If the tolerances for Tollway standard slabs can not be met, then a custom slab shall be required at the location. The locations designated to receive a custom precast slab shall be fully surveyed by the Contractor under maintenance of traffic provided by the Contractor to determine the specific dimensions and diagonals required by the system manufacturer to fabricate the precast slab. The dimension requirements for fabrication of all custom slabs shall be summarized in a table that complies with the example table shown on the Tollway's Standard Drawing A18 and submitted to the Engineer for review and approval before any fabrication work proceeds.

For replacements using any Tollway approved alternate (non-generic) precast system, the pavement areas to be repaired will be initially delineated by the Engineer on shoulder pavement using spray paint furnished by the Contractor. It shall be the Contractor's responsibility to survey all slab locations and mark saw cut locations that comply with the alternate system requirements for alignment. The locations designated to receive an alternate system slab shall be fully surveyed by the Contractor to determine the specific dimensions and diagonals required by the system manufacturer to fabricate the precast slab.

For replacements using any precast system, the slab lengths of any designated repair area shall comply with the menu for precast concrete slabs as identified on the design detail drawings unless concrete deterioration that occurred since the initial design survey was performed requires a modified length to the repair area. Any areas of pavement removed and replaced outside the final limits established by the Engineer shall be done entirely at the Contractor's expense. After removal of the concrete pavement and any aggregate subbase in a repair area, the Engineer shall determine the suitability of the existing subbase material and the steps necessary to restore the subbase in accordance with the Tollway special provision for "Aggregate For Base Course Restoration, Special".

2. **Quality Control Plan.** The Contractor's Quality Control Plan (QCP) shall include a detailed back up plan for temporary filling of any removed repair location where the precast slab cannot be set before the time for peak hour traffic arrives. Any placement and removal of temporary fill material to allow for the pavement to be opened to traffic during peak hours shall be at the Contractor's expense. The backfill material shall be cement or asphalt treated material approved by the Engineer that will support traffic for 24 hours or more until the precast pavement is able to be placed.
3. **Meetings.** Convene a pre-placement meeting within 14 calendar days of the planned start of slab installation with the Engineer, manufacturer, supplier, system designer of an alternate precast slab system, and any relevant subcontractors to review and coordinate all aspects of pavement removal, placement and inspection including equipment and personnel requirements to install slabs to the line and grade depicted in the contract documents  $\pm \frac{1}{4}$  inch.
4. **Technical Assistance for Alternate Precast Systems.** Several processes in this specification are performed in accordance with the system designer's instructions. The system designer must supply on-site technical assistance at the beginning of the installation until the Engineer determines the assistance is no longer required. Provide approved system designer instructions to the Engineer at least 30 calendar days before starting work associated with slab installation.
5. **Weather Limitations.** Article 420.07 of the Standard Specifications shall apply.
6. **Pavement Removal.** Removal of existing pavement shall be in accordance with Section 440 of the Standard Specifications except as modified herein.

The outer limits of the repair area will be sawcut full depth and shall not extend (overcut) by more than 10 inches into the adjacent concrete that is to remain in place. Overcuts shall be filled with a product acceptable to the Tollway Materials Engineer. The outer limits for repair shall be marked out by the Contractor and approved by the Engineer prior to any sawcutting. Removal of concrete within the perimeter sawcuts shall be by the lift-out method, and any concrete removed between sawcuts for dowel bar retrofits shall be removed using the jackhammer and hand tool equipment specified in the Tollway special provision for Dowel Bar Retrofit.

Equipment and methods used for removing old pavement shall be such as to prevent cracking, shattering or spalling of the pavement remaining in place. Should the remaining pavement be damaged by this operation the Contractor shall immediately change equipment and/or methods to prevent damage to any more pavement. Care shall be

exercised in the removal of the pavement to prevent damage to load transfer devices, tie bars, or adjacent concrete surfaces or edges in portions of the pavement that are to remain in place. Adjacent pavement or bars damaged as a result of the removal process shall be replaced at the Contractor's expense to the satisfaction of the Engineer.

7. Disposal of Excavated Materials. Materials resulting from the removal of concrete pavement and materials removed for base course restoration, as required, shall be disposed of by the Contractor at his expense, in accordance with the applicable portions of Article 202.03 of the Standard Specifications.
8. Subbase Course. The subbase shall be prepared to the requirements of Tollway special provision "Subgrade Aggregate, 12-inch" for new construction and add-on lanes. For pavement repair over dense graded capping aggregates, any areas of a dense graded subbase that are below the required elevation of the finished subbase, due to the Contractor's operations in breaking or removing old pavement, shall be built up to meet the level of the surrounding subbase to the satisfaction of the Engineer in accordance with the contract documents at the Contractor's expense. For repairs over porous granular subbase or if the Engineer determines that the existing granular subbase is unsuitable for the intended purpose, the Contractor shall remove the unsuitable material in the pavement removal areas to the depth specified by the Engineer and no less than 2 inches and replace the material removed with an equal thickness of new material placed and compacted in accordance with the requirements of the Tollway special provision for "Aggregate For Base Course Restoration, Special". Follow the system designer's instruction for any final subbase preparation prior to slab installation. Do not disturb the prepared surface before installation.
9. Slab Installation. Install the slabs in accordance with the approved system instructions. Set grade-supported slabs to achieve maximum contact with the prepared subbase.
10. Joints for an Alternate Precast System. Submit a proposed joint layout with the Fabricator Working Drawings, in accordance with the Tollway special provision for "Precast Concrete Pavement Slab Systems." Align joints both transversely and longitudinally between abutting precast slabs, i.e., do not stagger joints, except where approved on the joint layout. When tying precast slabs to existing concrete pavement, such as an add-on lane, joint alignment is not required. However, do not drill and anchor longitudinal joint ties within 24 inches of a transverse joint in the existing pavement.
11. Joint Widths. Install slabs such that the joint widths on the remaining concrete surfaces are less than ½ inch, regardless of joint orientation. These dimensions apply to joints between adjacent precast slabs or joints between precast slabs and existing pavement.
12. Bed and Level Slabs. Bed and level slabs in accordance with the system instructions such that the vertical differential across any corner is ¼ inch or less.
13. Backfill Pavement Hardware. Backfill around pavement hardware in accordance with the approved system instructions.
14. Smoothness (Pavement's Remaining Concrete Surface). Where profile grinding of a precast repair is required by design, the Tollway special provision for Profile Diamond Grinding of Concrete Pavements shall apply for pavement smoothness.

15. Corrective Action for Smoothness. Immediately after the slab has been set and leveled, survey the vertical elevation across all corners to verify that the vertical difference between adjacent slabs across any corner does not exceed  $\frac{1}{4}$  inch. If the difference exceeds  $\frac{1}{4}$  inch, then the slab shall be removed and reset or the surface shall receive a corrective diamond grind at the contractor's expense after any required bedding grout or leveling material has been placed.

Upon completion of any corrective work, the surface of the patch shall be resurveyed. Corrective work shall be at no additional cost to the Tollway.

16. Opening to Traffic shall be per the approved system requirements

**METHOD OF MEASUREMENT.** This work will be measured for payment in square feet of area of slab delivered and placed, and accepted in accordance with the Contract.

Reinforcement and other such items incidental and necessary to provide complete assemblies, as shown on the Plans, will not be measured separately for payment.

**BASIS OF PAYMENT.** This work will be paid for at the contract unit price per square foot for STANDARD PRECAST CONCRETE PAVEMENT SLABS of length specified, and CUSTOM PRECAST CONCRETE PAVEMENT SLABS.

The work for any required profile grinding of precast slabs will be paid at the contract unit price per square yard for PROFILE DIAMOND GRINDING OF CONCRETE PAVEMENT.

The work for any necessary restoration to the existing subbase will be paid at the contract unit price per ton for AGGREGATE FOR BASE COURSE RESTORATION, SPECIAL.

## FABRICATION GENERAL NOTES

### MATERIALS:

1. EPOXY COATED DOWEL BARS USED SHALL COMPLY WITH ASTM A 615 GRADE 60.
2. ALL EMBEDDED LIFTING HARDWARE USED SHALL BE GALVANIZED.
  - A. FOR LIFTING INSERTS, INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION INCLUDING MINIMUM EDGE DISTANCE AND SPACING REQUIREMENTS. UNLESS THE CONTRACTOR AND FABRICATOR WILL BE USING A LIFTING BEAM OR ROLLING SHEAVE TO ENSURE THAT EACH OF THE FOUR INSERTS WILL SHARE THE LOAD EQUALLY, TWO OF THE FOUR INSERTS MUST BE CAPABLE OF CARRYING THE TOTAL LOAD WITH A 4:1 SAFETY FACTOR WHILE ADJUSTING FOR THE ANGLE OF THE CABLES AND THE STRENGTH OF THE CONCRETE OVER TIME. THE INSERT SHOULD BE RECESSED A MINIMUM OF 1/2" UNLESS THE SLAB IS TO BE OVERLAID IMMEDIATELY AFTER PLACEMENT. THE INSERT SHALL LEAVE A MAXIMUM 1/4" DIAMETER THREADED HOLE TO BE GROUTED AFTER SLAB INSTALLATION. IF THE INSERT IS INSTALLED WITH A FULL SLAB PENETRATION, THE LIFTING INSERT CAN BE USED AS A BEDDING GROUT PORT AT THE CONTRACTOR'S DISCRETION.
  - B. FOR LIFTING PLATES, INSTALLATION MUST BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND HAVE A STANDARD 5:1 SAFETY FACTOR FOR LIFTING HARDWARE. UNLESS A LIFTING BEAM IS USED TO SPACE THE FOUR PICK POINTS DIRECTLY ABOVE THE INSERTS, THE LIFTING HARDWARE MUST BE RATED FOR USE WITH CABLES AT AN ANGLE AND TWO OF THE FOUR DEVICES MUST BE CAPABLE OF LIFTING THE FULL LOAD AS WITH THE INSERTS REFERENCED IN THE PREVIOUS NOTE.
3. REINFORCEMENT USED SHALL BE EPOXY COATED, IN ACCORDANCE WITH ASTM A706 GRADE 60 AND IN COMPLIANCE WITH ARTICLE 1006.10 OF THE STANDARD SPECIFICATIONS.
4. CONCRETE COVER OVER REINFORCEMENT TO BE MAINTAINED USING WIRE OR THERMOPLASTIC CHAIRS OR SPACERS OR AN APPROVED EQUIVALENT.
5. CONCRETE USED SHALL MEET THE FOLLOWING REQUIREMENTS:
  - A. CONCRETE USED SHALL BE CLASS PC (f'c = 4,500 PSI @ 28 DAYS) IN ACCORDANCE WITH SECTION 1020 OF THE STANDARD SPECIFICATIONS.
  - B. MINIMUM STRIPPING STRENGTH OF CONCRETE SHALL BE 3,000 PSI.
  - C. CONCRETE MIX DESIGN TO BE SUBMITTED AND APPROVED PRIOR TO FABRICATION.
  - D. CURING OF CONCRETE SLABS TO BE IN ACCORDANCE WITH THE SPECIFIED METHODS OF SECTION 1020 OF THE STANDARD SPECIFICATIONS. THE CURING PROCEDURE TO BE USED SHALL BE SUBMITTED AND APPROVED PRIOR TO FABRICATION.

### SLAB DESIGN:

6. FOR STANDARD SLABS:
  - A. USE SLAB DIMENSIONS SHOWN ON THE TOLLWAY STANDARD DRAWINGS FOR DESIGN SLAB THICKNESS, WIDTH, AND LENGTH. ACTUAL WIDTH TO BE MODIFIED WITH ON-SITE SAW CUTS TO FIT THE OPENING.
  - B. USE ONE LAYER OF REINFORCEMENT WITH A MINIMUM STEEL AREA RATIO OF 0.2%.
  - C. SIZE ANY PREFORMED SLOTS THAT ARE DESIGNED FOR CONSECUTIVE STANDARD SLABS CONSISTENT WITH THE THICKNESS OF THE SLAB SUCH THAT THE BOTTOM OF THE OPENING IS AT LEAST 2 1/2" (± 1/4") WIDE AND AT LEAST 1/2" OF GROUT COVER IS PROVIDED UNDER THE DOWEL.
  - D. FOR STANDARD SLABS WITH WIDE OPEN SLOTS AND/OR EMBEDDED DOWEL BARS, IT SHALL BE THE CONTRACTOR'S OPTION TO EITHER PRE-INSTALL/EMBED THE DOWEL BARS INTO THE SLABS AT THE PRECAST PLANT AND PARTIALLY RETROFIT THE EMBEDDED DOWELS INTO ADJACENT PAVEMENT SLABS IN THE FIELD, OR TO FULLY RETROFIT THE DOWEL BARS INTO BOTH THE INSTALLED PRECAST SLAB AND ANY ADJACENT SLAB IN THE FIELD DURING PLACEMENT IN ACCORDANCE WITH CONTRACT SPECIFICATIONS AND THE GENERAL NOTES FOR INSTALLATION. THE LOCATIONS AND SPACING OF THE DOWEL BARS IN THE STANDARD SLABS SHALL BE SHOWN ON THE TOLLWAY STANDARD DRAWINGS AND WITHIN THE SPECIFIED TOLERANCES FOR ALIGNMENT. FOR DOWEL BAR RETROFITTING WITH STANDARD SLAB INSTALLATION, A STANDARD TEMPLATE SHALL BE USED TO LOCATE THE CUTS AND POSITION THE DOWEL SLOTS CONSISTENTLY.
  - E. FOR STANDARD ISOLATED SLABS WITH NARROW ELONGATED PREFORMED DOWEL SLOTS, THE CENTERPOINT BETWEEN THE WHEEL PATH SLOTS SHALL BE MARKED.
7. FOR CUSTOM SLABS:
  - A. USE SLAB DIMENSIONS SHOWN ON THE TOLLWAY STANDARD DRAWINGS FOR DESIGN SLAB THICKNESS, LENGTHS AND WIDTHS OF EACH CUSTOM SLAB SHALL BE ACCURATE DIMENSIONS BASED ON FIELD SURVEY DATA COLLECTED BY THE CONTRACTOR TO

DEVELOP WORKING DRAWINGS FOR THE SLAB. MINIMUM AND MAXIMUM DIMENSIONS FOR LENGTHS AND WIDTHS ARE NOTED ON THE STANDARD DRAWINGS.

- B. ANY CUSTOM SLABS > 6 FT. IN LENGTH THAT WILL BE OPENED TO TRAFFIC BEFORE ANY HARDWARE AND UNDERSLAB GROUTING OR FILLING OCCURS SHALL REQUIRE TWO (2) LAYERS OF STEEL REINFORCEMENT AS NOTED ON SHEET 5.
  - C. FOR ANY CUSTOM SLAB FABRICATED TO REPLACE EXISTING WARPED PAVEMENT AT AN ISOLATED LOCATION, THE CUSTOM SLAB SHALL BE FABRICATED ON A SINGLE PLANE. THE SLAB THICKNESS OR BEDDING MATERIAL SHALL BE ADJUSTED TO ALLOW FOR THE ELEVATION OF ALL FOUR (4) CORNERS OF THE CUSTOM SLAB TO BE FLUSH OR HIGHER THAN THE EXISTING OR ADJOINING PAVEMENT WHEN INSTALLED. THE SURFACE OF ALL CUSTOM SLABS REPLACING WARPED PAVEMENT SHALL RECEIVE A COMPLETE PROFILE DIAMOND GRIND AFTER INSTALLATION AND GROUTING TO PROVIDE A SMOOTH SURFACE AND LEAVE ALL EDGES FLUSH WITH THE ADJOINING PAVEMENTS. THE PROFILE GRINDING OPERATION FOR CUSTOM SLABS REPLACING ANY WARPED PAVEMENTS, ON CURVED RAMPS OR SUPERELEVATED MAINLINE SECTIONS, SHALL BE IN ACCORDANCE WITH CONTRACT SPECIAL PROVISIONS FOR PROFILE DIAMOND GRINDING AND PAID FOR SEPARATELY. FOR CONSECUTIVELY PLACED CUSTOM SLABS FABRICATED TO REPLACE EXISTING WARPED PAVEMENT, FULL SURVEYS FOR X, Y, AND Z DIMENSIONS SHALL BE TAKEN BY THE CONTRACTOR BEFORE FABRICATION IN ORDER TO MATCH EXISTING GRADES AT ALL CORNERS DURING INSTALLATION.
  - D. FOR ALL CUSTOM SLABS WITH WIDE OPEN SLOTS, THE DOWEL BARS SHALL BE FULLY RETROFITTED INTO ADJACENT PAVEMENT SLABS DURING FIELD INSTALLATION OF THE PRECAST SLAB IN ACCORDANCE WITH CONTRACT SPECIFICATIONS AND GENERAL NOTES FOR INSTALLATION.
  - E. FOR ALL CUSTOM SLABS WITH NARROW ELONGATED PREFORMED DOWEL SLOTS, THE DOWEL BARS SHALL BE SLID INTO PREDRILLED HOLES IN THE ADJACENT PAVEMENT SLABS DURING FIELD INSTALLATION OF THE PRECAST SLAB IN ACCORDANCE WITH CONTRACT SPECIFICATIONS AND GENERAL NOTES FOR INSTALLATION.
8. ALL FABRICATED SLABS:
- A. THE MAXIMUM ALLOWABLE JOINT WIDTH CAN NOT BE LESS THAN THE TOTAL OF THE ALLOWABLE SLAB FABRICATION TOLERANCES.
  - B. BEDDING GROUT PORT HOLES SHALL BE LOCATED ON TRANSVERSE LINES ACROSS THE SLAB THAT ARE PARALLEL WITH EXISTING TRANSVERSE JOINTS. EACH PORT HOLE SHALL BE EVENLY DISTRIBUTED ON EACH LINE. THE DISTANCE BETWEEN BEDDING GROUT PORT HOLES SHALL NOT EXCEED 4'-0", WITH THE PORT HOLES AT THE END OF THE TRANSVERSE LINES TO BE NO LESS THAN 1'-8" AND NO MORE THAN 3'-0" OFF A LONGITUDINAL JOINT. THE TRANSVERSE LINES FOR PORT HOLES SHALL BE NO MORE THAN 4'-0" APART, AND NO LESS THAN 1'-8" AND NO MORE THAN 2'-6" OFF OF A TRANSVERSE JOINT.
  - C. RECESS LIFTING DEVICES 1" MINIMUM BELOW THE SURFACE OF THE SLAB TO ALLOW FOR A MINIMUM GROUT COVER OF 1" ON SLABS THAT WILL NOT BE OVERLAID.

### FABRICATION:

9. PREPARE WORKING DRAWINGS THAT SHALL INCLUDE THE FOLLOWING INFORMATION:
  - A. SLAB LAYOUT DRAWING FOR TYPICAL STANDARD SLABS AND FOR EACH CUSTOM SLAB TO BE FABRICATED, WITH ACCURATE DIMENSIONS CITED.
  - B. REINFORCEMENT SIZES, SPACING, NUMBER OF MATS, AND METHOD OF MAINTAINING CONCRETE COVER.
  - C. SIZES AND LOCATIONS FOR EMBEDDED DOWELS, OF DOWEL BARS TO BE RETROFITTED AFTER PLACEMENT OF THE SLAB, AND OF PREFORMED SLOTS AT THE FEMALE END OF STANDARD SLABS FOR CONSECUTIVE PLACEMENT.
  - D. SIZE AND LOCATION OF GROUT PORTS, LIFTING ANCHORS, AND GROUT SEAL GASKETS.
  - E. COMPRESSIVE STRENGTH AND AIR CONTENT OF CONCRETE.
  - F. CONCRETE CURING METHOD TO BE USED.
  - G. MARKING LEGEND FOR EACH SLAB TO INDICATE PRECAST MANUFACTURER, AND DATE OF PRODUCTION; AND FOR EACH CUSTOM SLAB TO INCLUDE CONTRACT NUMBER AND MARK NUMBER OF THE SLAB.
  - H. WEIGHT OF EACH SLAB.
  - I. THE SIZE AND LOCATION OF ANY EMBEDDED HARDWARE (TREADLE FRAMES, CONDUITS, ETC.) REQUIRED FOR CUSTOM PLAZA SLABS.
10. PERFORM A PRE-POUR INSPECTION OF THE FORMS TO CONFIRM THAT THEY ARE ASSEMBLED IN ACCORDANCE WITH THE FOLLOWING TOLERANCES:
 

LENGTH AND WIDTH	± 1/8"
DIAGONALS	± 1/16"
DOWEL VARIANCE FROM LEVEL, SQUARENESS TO EDGE OF SLAB, AND LOCATION.	± 1/8"

EDGE SQUARENESS - 1/8" IN 10" (IN RELATION TO TOP AND BOTTOM SURFACES).

11. INCLUDE A 1 INCH CHAMFER ALONG ALL BOTTOM EDGES OF SLABS, AND A STONED EDGE TO ALL TOP EDGES OF THE SLAB.
12. THE EXPOSED SURFACES OF ALL PREFORMED SLOTS FOR DOWEL BARS SHALL BE SANDBLASTED.
13. ACCURATELY SCREED TOP OF SLAB TO MEET SURFACE AND THICKNESS TOLERANCES.
14. APPLY EITHER AN ASTRO TURF DRAG FINISH TO TOP OF SLAB IN ACCORDANCE WITH ARTICLE 420.09(a)(2) OF THE STANDARD SPECIFICATIONS, OR A TINED FINISH IN ACCORDANCE WITH ARTICLE 420.09(a)(1) OF THE STANDARD SPECIFICATIONS AS INDICATED IN THE SLAB DESIGN SCHEDULE ON CONTRACT DRAWINGS.

SHEET 1 OF 19

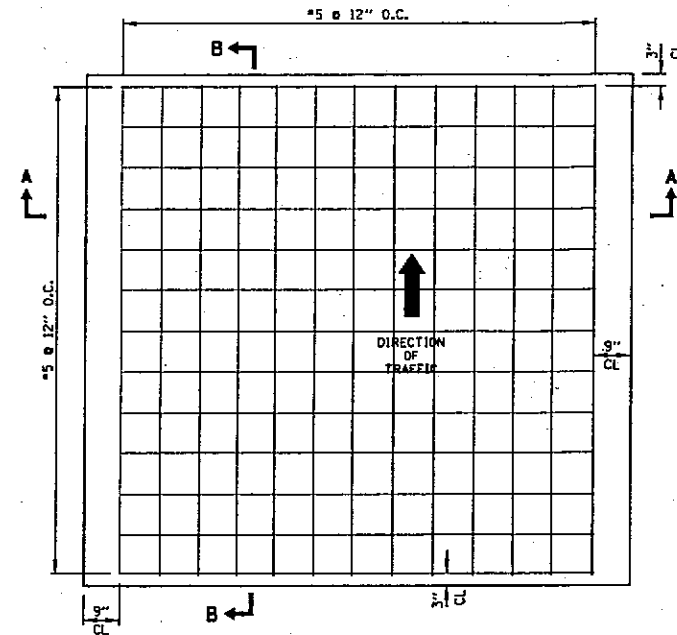


DATE	REVISIONS
9-08-2011	UPDATED NOTES AND DETAILS

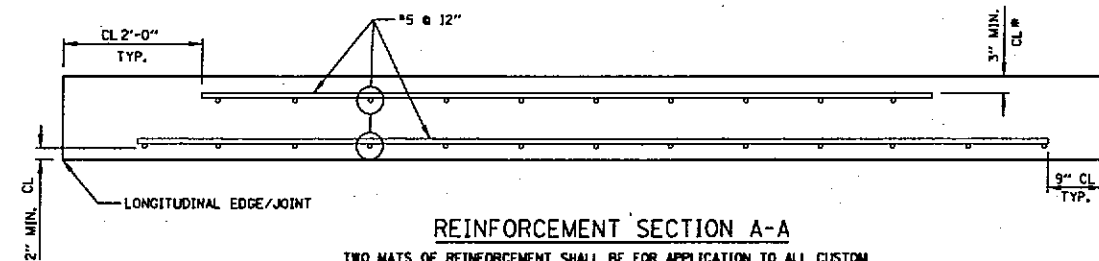
PRECAST PAVEMENT SLABS

STANDARD A18-01

APPROVED: DATE: 5-1-2009

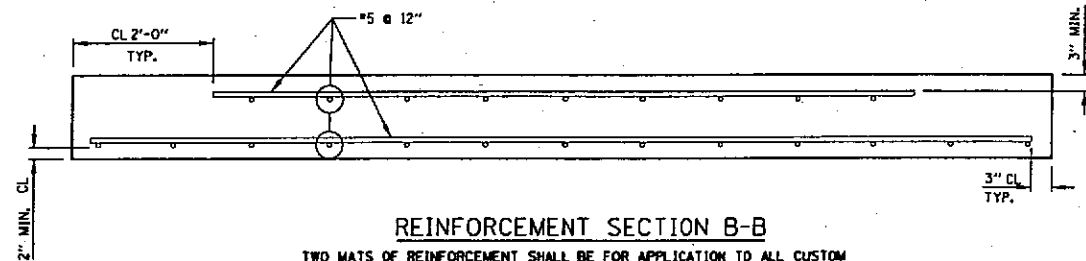


TYPICAL REINFORCEMENT DETAIL FOR STANDARD SLABS



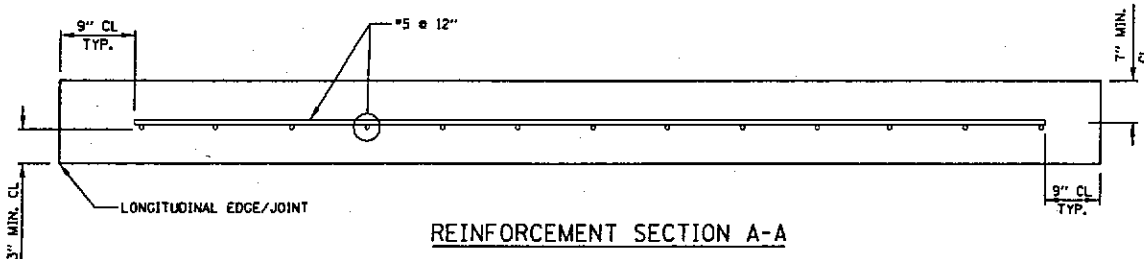
REINFORCEMENT SECTION A-A

TWO MATS OF REINFORCEMENT SHALL BE FOR APPLICATION TO ALL CUSTOM SLABS GREATER THAN 6 FT. LONGITUDINAL LENGTH TO BE OPENED TO TRAFFIC BEFORE GROUTING IS COMPLETED  
 ALL BARS ARE TRIM TO FIT #5 BAR  
 SAW CUTS OFF LONGITUDINAL EDGES SHALL BE NO MORE THAN 6" OFF THE EDGES



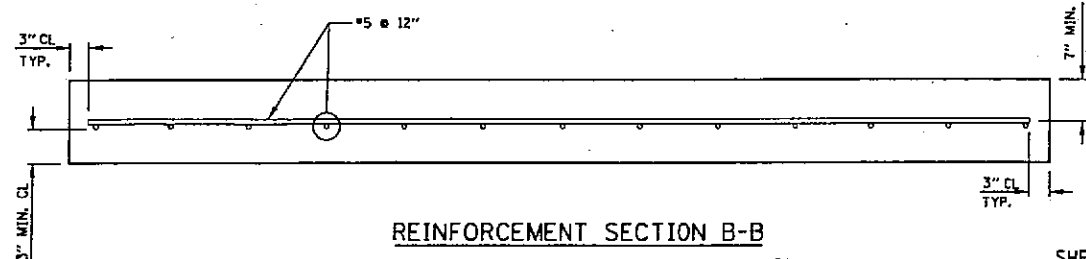
REINFORCEMENT SECTION B-B

TWO MATS OF REINFORCEMENT SHALL BE FOR APPLICATION TO ALL CUSTOM SLABS GREATER THAN 6 FT. LONGITUDINAL LENGTH TO BE OPENED TO TRAFFIC BEFORE GROUTING IS COMPLETED  
 ALL BARS ARE TRIM TO FIT #5 BAR



REINFORCEMENT SECTION A-A

ONE MAT OF REINFORCEMENT SHALL BE FOR APPLICATION TO ALL STANDARD SLABS AND FOR ANY CUSTOM SLABS GREATER THAN 6 FT. LONGITUDINAL LENGTH TO BE OPENED TO TRAFFIC ONLY AFTER GROUTING IS COMPLETED.  
 ALL BARS ARE TRIM TO FIT #5 BAR  
 SAW CUTS OFF LONGITUDINAL EDGES SHALL BE NO MORE THAN 6" OFF THE EDGES



REINFORCEMENT SECTION B-B

ONE MAT OF REINFORCEMENT SHALL BE FOR APPLICATION TO ALL STANDARD SLABS AND FOR ANY CUSTOM SLABS GREATER THAN 6 FT. LONGITUDINAL LENGTH TO BE OPENED TO TRAFFIC ONLY AFTER GROUTING IS COMPLETED.  
 ALL BARS ARE TRIM TO FIT #5 BAR

SHEET 2 OF 19

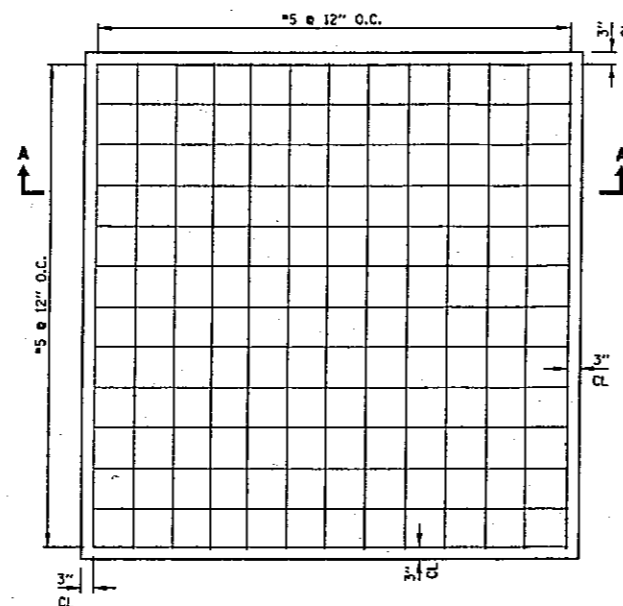


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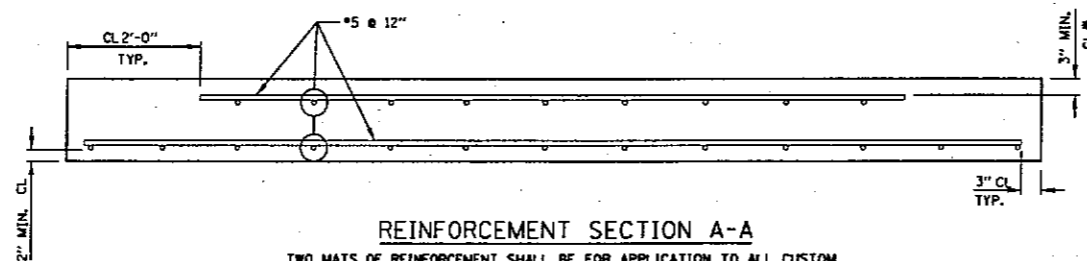
PRECAST PAVEMENT SLABS  
 STANDARD A18-01

APPROVED *Paul Horvath* DATE 10-1-2009  
 CHIEF ENGINEER



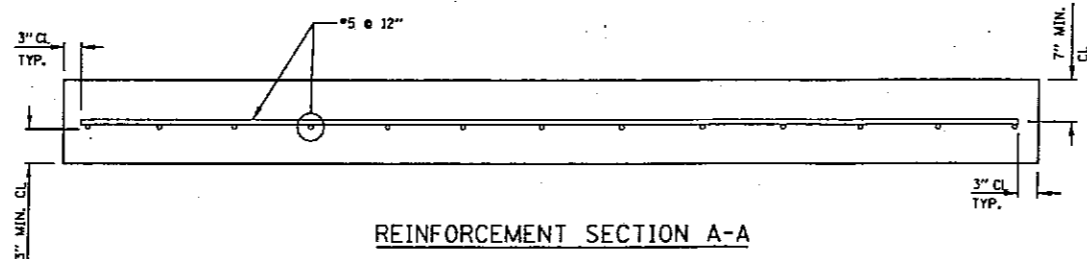


TYPICAL REINFORCEMENT DETAIL FOR CUSTOM SLABS



REINFORCEMENT SECTION A-A

TWO MATS OF REINFORCEMENT SHALL BE FOR APPLICATION TO ALL CUSTOM SLABS GREATER THAN 6 FT. LONGITUDINAL LENGTH TO BE OPENED TO TRAFFIC BEFORE GROUTING IS COMPLETED  
ALL BARS ARE TRIM TO FIT #5 BAR



REINFORCEMENT SECTION A-A

ONE MAT OF REINFORCEMENT SHALL BE FOR APPLICATION TO ALL STANDARD SLABS AND FOR ANY CUSTOM SLABS GREATER THAN 6 FT. LONGITUDINAL LENGTH TO BE OPENED TO TRAFFIC ONLY AFTER GROUTING IS COMPLETED.  
ALL BARS ARE TRIM TO FIT #5 BAR

NOTE:

FOR ALL CUSTOM SLABS OF TRAPEZOID SHAPES, REINFORCEMENT SHALL BE LAID OUT IN A PERPENDICULAR GRID PATTERN, NOT SKEWED.

\* MIN. CLEARANCE FOR TOP REINFORCEMENT SHALL BE ADJUSTED FOR PLAZA SLAB TO FIT TREADLE FRAMES OR INSERTED HARDWARE.

SHEET 3 OF 19

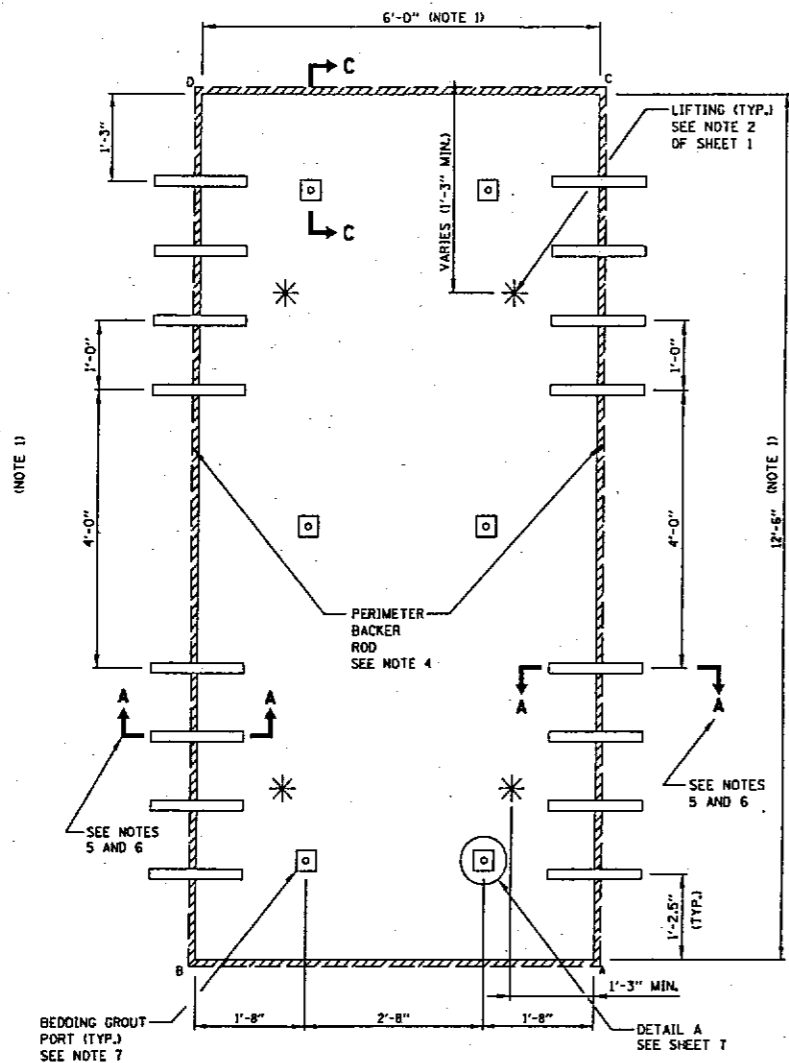


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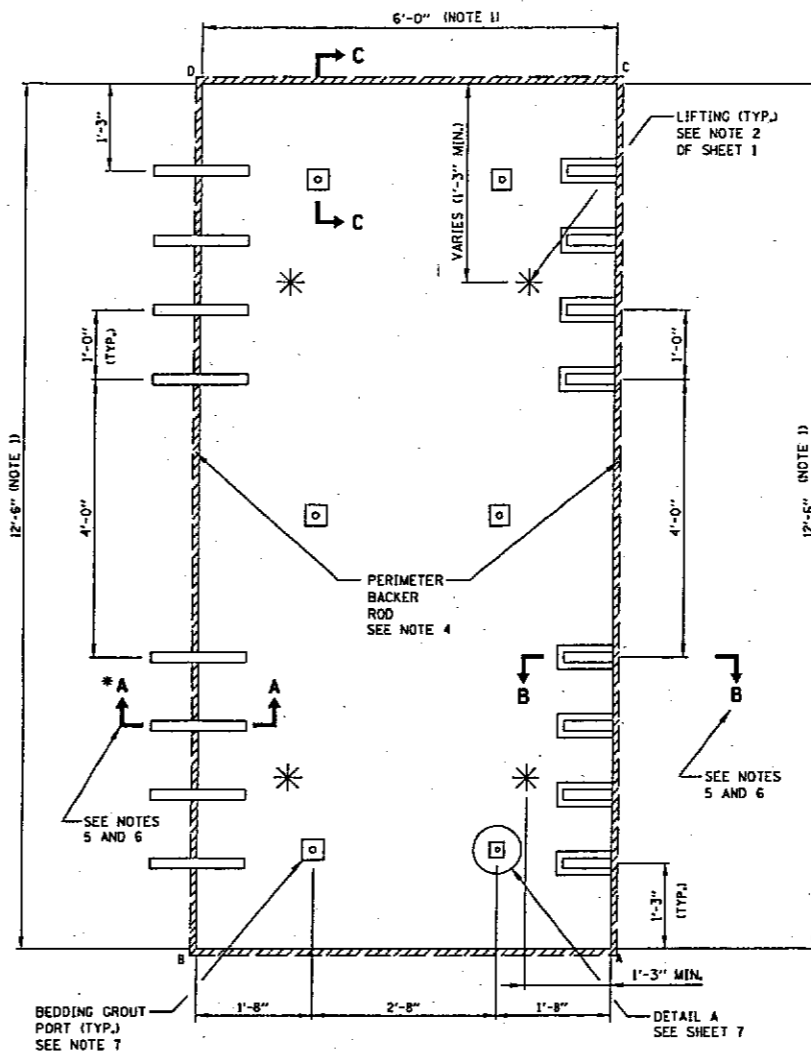
PRECAST PAVEMENT SLABS

STANDARD A18-01

APPROVED *Paul Kovacs* CHIEF ENGINEER DATE 5-1-2009



STANDARD 12'-6" WIDE PANEL LAYOUT FOR ISOLATED PLACEMENT  
WITH EMBEDDED DOWELS FOR PRECAST WIDE MOUTH  
SLOTS IN ADJACENT PAVEMENT



STANDARD 12'-6" WIDE PANEL LAYOUT FOR CONSECUTIVE PLACEMENT

\* FOR INTERNAL CONSECUTIVE SLABS, PREFORMED SLOTS IN ACCORDANCE WITH SECTION B-B OF SHEET 4 MAY BE USED IN-PLACE OF EMBEDDED DOWELS OR OF FIELD RETROFITTED DOWEL BARS WITH SAWCUT SLOTS. ALL PREFORMED SLOTS MUST BE FILLED BEFORE BEING OPENED TO TRAFFIC.

NOTES:

1. THE WIDTH AND LENGTH OF PRODUCED SLABS SHALL BE THE INDICATED DIMENSIONS  $\pm 1/8"$ .
2. FOR MIDDLE LANE SLAB OPENINGS/PATCHES LESS THAN 12'-6" IN WIDTH AND GREATER THAN 11'-6" IN WIDTH, THE STANDARD PERCAST SLAB CAN BE SAW CUT ON-SITE TO FIT THE OPENING AND TO MAINTAIN ALIGNMENT WITH EXISTING LONGITUDINAL JOINTS. OTHERWISE, THE SLAB PATCH LOCATION MUST BE PRESURVEYED BY THE CONTRACTOR AND THE SLAB FABRICATED AS A CUSTOM SLAB.
3. SLAB THICKNESS SHALL BE  $11\frac{1}{2}" \pm 1/8"$ .
4. A FOAM BACKER ROD SHALL BE PLACED AROUND THE OUTSIDE PERIMETER OF THE SLAB AT THE BOTTOM OF THE JOINTS AFTER THE SLAB HAS BEEN SET AND BEFORE BEDDING GROUT OR POLYURETHANE LEVELING FILL IS APPLIED. THE BACKER ROD SHALL NOT BE REQUIRED WHEN ANY SLAB IS LEVELED WITH FLOWABLE FILL.
5. SEE SHEET 7 FOR SECTION DETAILS.
6. IT SHALL BE THE CONTRACTOR'S OPTION TO REPLACE ANY EMBEDDED DOWEL BARS OR PREFORMED SLOTS AS SHOWN ON THESE DRAWINGS WITH FULLY RETROFITTED DOWEL BARS FIELD INSTALLED IN ACCORDANCE WITH "DETAIL C" OF SHEET 13. THE CONTRACTOR SHALL USE AN APPROVED TEMPLATE TO LOCATE THE SAW CUTS REQUIRED FOR PROPER SPACING AND RETROFITTING OF THE DOWEL BARS IN ACCORDANCE WITH THESE DRAWINGS. DIAMOND BLADED GANG SAWS SHALL BE USED TO MAKE SAW CUTS PERPENDICULAR TO THE TRANSVERSE (NON-SKEWED) JOINT LINE TO ALLOW FOR DOWEL BAR PLACEMENTS WITHIN THE SPECIFIED TOLERANCES.
7. SEE NOTE 8 ON SHEET 1 FOR LOCATING UNDERSEALING GROUT PORTS.

SHEET 4 OF 19



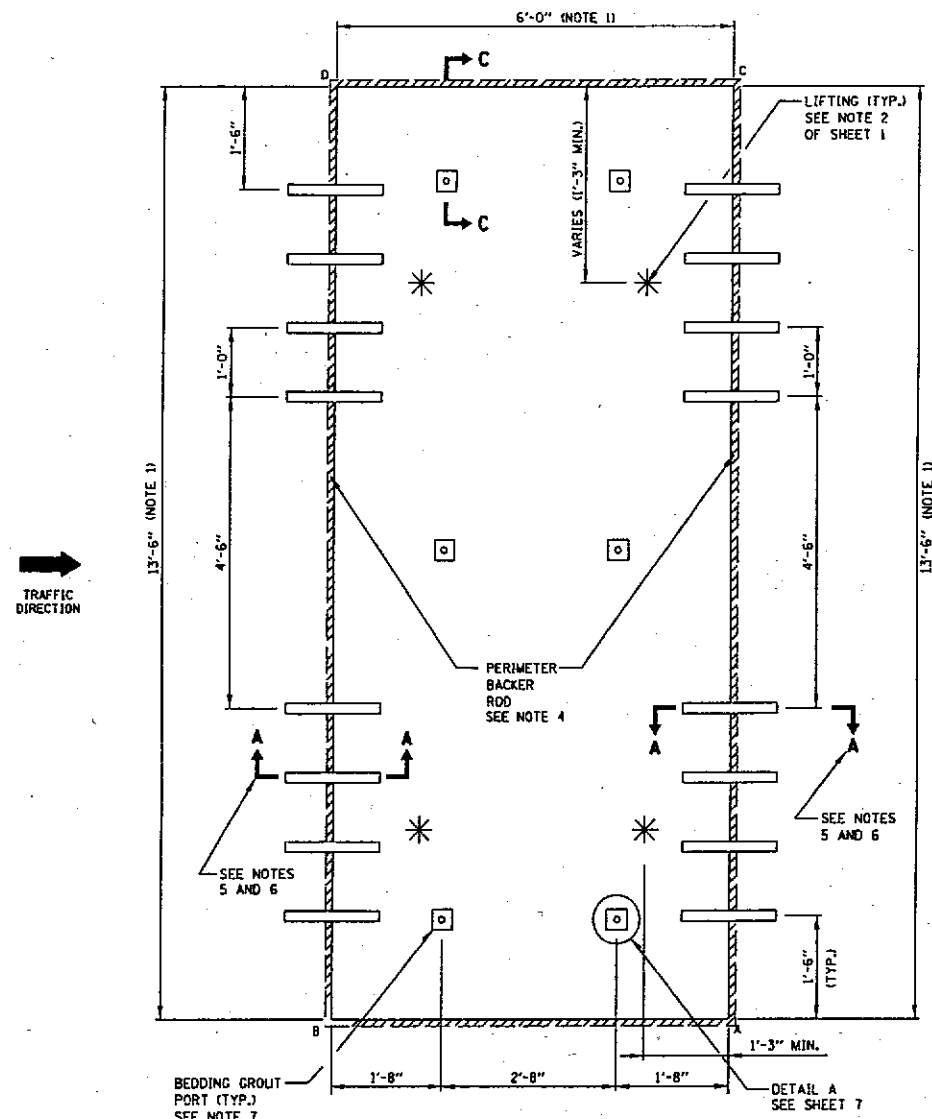
PRECAST PAVEMENT SLABS

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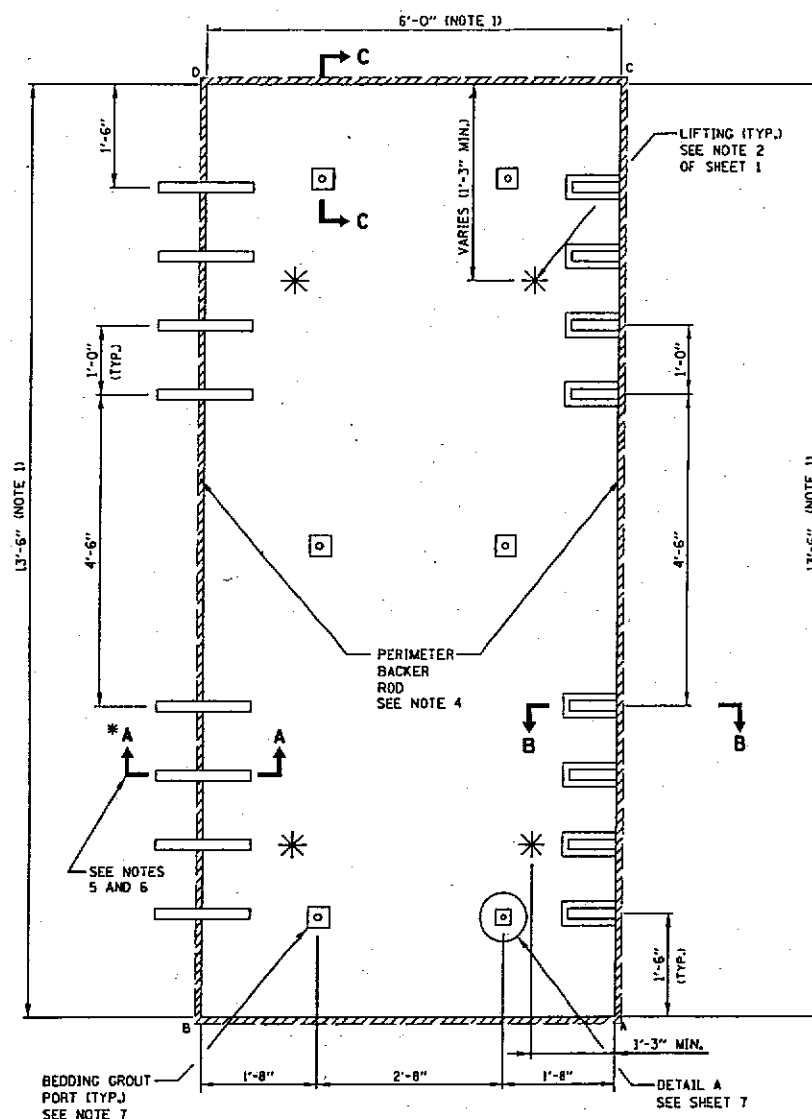
DATE	REVISIONS

Paul Kovacs

APPROVED: DATE: 5-1-2009



STANDARD 13'-6" WIDE PANEL LAYOUT FOR ISOLATED PLACEMENT WITH EMBEDDED DOWELS FOR PRECUT WIDE MOUTH SLOTS IN ADJACENT PAVEMENT.



STANDARD 13'-6" WIDE PANEL LAYOUT FOR CONSECUTIVE PLACEMENT

\* FOR INTERNAL CONSECUTIVE SLABS, PREFORMED SLOTS IN ACCORDANCE WITH SECTION B-B OF SHEET 4 MAY BE USED IN-PLACE OF EMBEDDED DOWELS OR OF FIELD RETROFITTED DOWEL BARS WITH SAWCUT SLOTS. ALL PREFORMED SLOTS MUST BE FILLED BEFORE BEING OPENED TO TRAFFIC.

**NOTES:**

1. THE WIDTH AND LENGTH OF PRODUCED SLABS SHALL BE THE INDICATED DIMENSIONS  $\pm \frac{1}{8}$ ".
2. FOR MIDDLE LANE SLAB OPENINGS/PATCHES LESS THAN 13'-6" IN WIDTH AND GREATER THAN 12'-6" IN WIDTH, THE STANDARD PERCAST SLAB CAN BE SAW CUT ON-SITE TO FIT THE OPENING AND TO MAINTAIN ALIGNMENT WITH EXISTING LONGITUDINAL JOINTS. OTHERWISE, THE SLAB PATCH LOCATION MUST BE PRESURVEYED BY THE CONTRACTOR AND THE SLAB FABRICATED AS A CUSTOM SLAB.
3. SLAB THICKNESS SHALL BE  $11\frac{1}{2}$ "  $\pm \frac{1}{8}$ ".
4. A FOAM BACKER ROD SHALL BE PLACED AROUND THE OUTSIDE PERIMETER OF THE SLAB AT THE BOTTOM OF THE JOINTS AFTER THE SLAB HAS BEEN SET AND BEFORE BEDDING GROUT OR POLYURETHANE LEVELING FILL IS APPLIED. THE BACKER ROD SHALL NOT BE REQUIRED WHEN ANY SLAB IS LEVELLED WITH FLOWABLE FILL.
5. SEE SHEET 7 FOR SECTION DETAILS.
6. IT SHALL BE THE CONTRACTOR'S OPTION TO REPLACE ANY EMBEDDED DOWEL BARS OR PREFORMED SLOTS AS SHOWN ON THESE DRAWINGS WITH FULLY RETROFITTED DOWEL BARS FIELD INSTALLED IN ACCORDANCE WITH "DETAIL C" OF SHEET 13. THE CONTRACTOR SHALL USE AN APPROVED TEMPLATE TO LOCATE THE SAW CUTS REQUIRED FOR PROPER SPACING AND RETROFITTING OF THE DOWEL BARS IN ACCORDANCE WITH THESE DRAWINGS. DIAMOND BLADED GANG SAWS SHALL BE USED TO MAKE SAW CUTS PERPENDICULAR TO THE TRANSVERSE (NONSKewed) JOINT LINE TO ALLOW FOR DOWEL BAR PLACEMENTS WITHIN THE SPECIFIED TOLERANCES.
7. SEE NOTE 8 ON SHEET 1 FOR LOCATING UNDERSEALING GROUT PORTS.

SHEET 5 OF 19

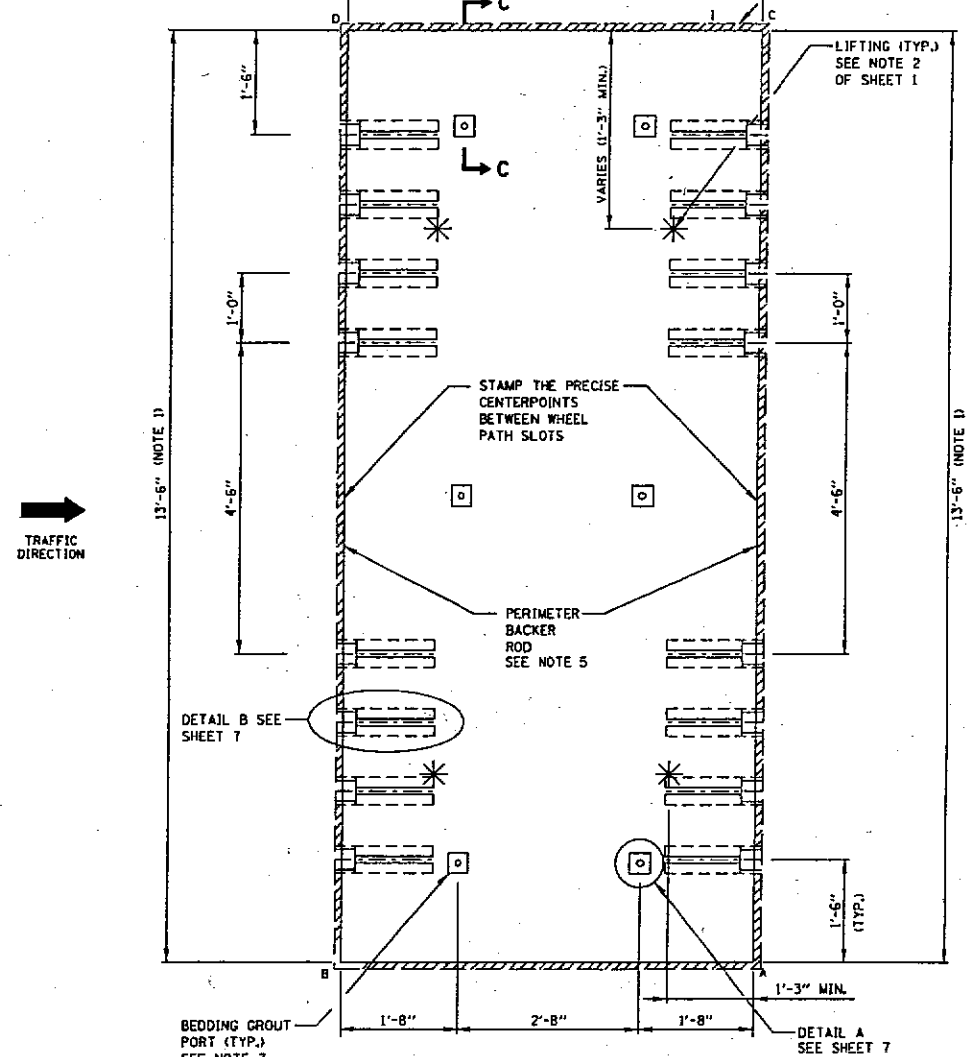
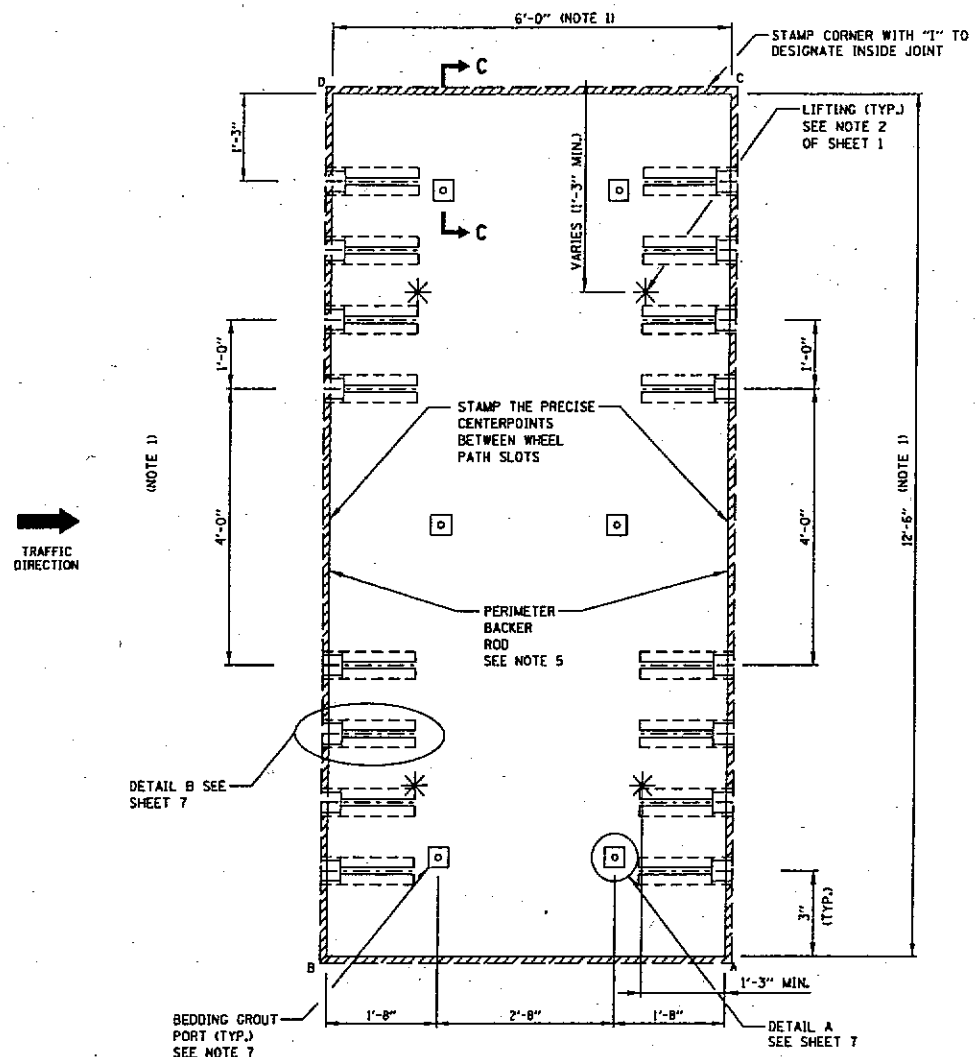
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**Illinois Tollway**  
Open Roads for a Brighter Future

PRECAST PAVEMENT SLABS

STANDARD A18-01

APPROVED: *Paul Kovacs* DATE: 5-1-2009  
CHIEF ENGINEER



STANDARD 12'-6" WIDE PANEL LAYOUT FOR ISOLATED PLACEMENT WITH NARROW MOUTH PREFORMED DOWEL SLOTS TO ALIGN WITH PREDRILLED HOLES IN ADJACENT PAVEMENT.

STANDARD 13'-6" WIDE PANEL LAYOUT FOR ISOLATED PLACEMENT WITH NARROW MOUTH PREFORMED DOWEL SLOTS TO ALIGN WITH PREDRILLED HOLES IN ADJACENT PAVEMENT.

NOTES:

1. THE WIDTH AND LENGTH OF PRODUCED SLABS SHALL BE THE INDICATED DIMENSIONS  $\pm \frac{1}{8}$ ".
2. FOR MIDDLE LANE SLAB OPENINGS/PATCHES LESS THAN 12'-6" IN WIDTH AND GREATER THAN 11'-6" IN WIDTH, THE 12'-6" WIDE STANDARD PERCAST SLAB CAN BE SAW CUT ON-SITE TO FIT THE OPENING AND TO MAINTAIN ALIGNMENT WITH EXISTING LONGITUDINAL JOINTS. OTHERWISE, THE SLAB PATCH LOCATION MUST BE PRESURVEYED BY THE CONTRACTOR AND THE SLAB FABRICATED AS A CUSTOM SLAB.
3. FOR MIDDLE LANE SLAB OPENINGS/PATCHES LESS THAN 13'-6" IN WIDTH AND GREATER THAN 12'-6" IN WIDTH, THE 13'-6" WIDE STANDARD PERCAST SLAB CAN BE SAW CUT ON-SITE TO FIT THE OPENING AND TO MAINTAIN ALIGNMENT WITH EXISTING LONGITUDINAL JOINTS. OTHERWISE, THE SLAB PATCH LOCATION MUST BE PRESURVEYED BY THE CONTRACTOR AND THE SLAB FABRICATED AS A CUSTOM SLAB.
4. SLAB THICKNESS SHALL BE  $11\frac{1}{2}$ "  $\pm \frac{1}{8}$ ".
5. A FOAM BACKER ROD SHALL BE PLACED AROUND THE OUTSIDE PERIMETER OF THE SLAB AT THE BOTTOM OF THE JOINTS AFTER THE SLAB HAS BEEN SET AND BEFORE BEDDING GROUT OR POLYURETHANE LEVELING FILL IS APPLIED. THE BACKER ROD SHALL NOT BE REQUIRED WHEN ANY SLAB IS LEVELED WITH FLOWABLE FILL.
6. SEE SHEET 7 FOR SECTION DETAILS.
7. SEE NOTE 8 ON SHEET 1 FOR LOCATING UNDERSEALING GROUT PORTS.

SHEET 6 OF 19

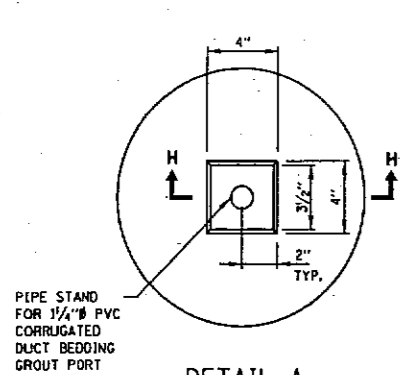


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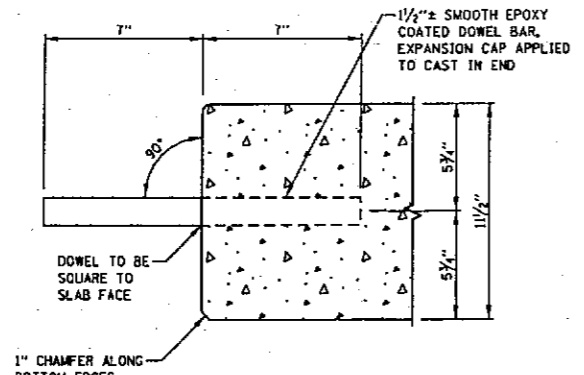
PRECAST PAVEMENT SLABS

STANDARD A18-01

APPROVED: *Paul Kovacs* DATE: 5-1-2009.  
CHIEF ENGINEER

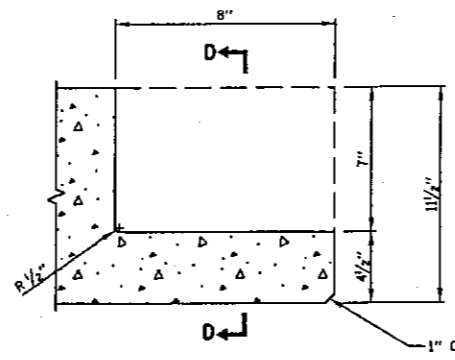


**DETAIL A**  
GROUT PIPE STAND



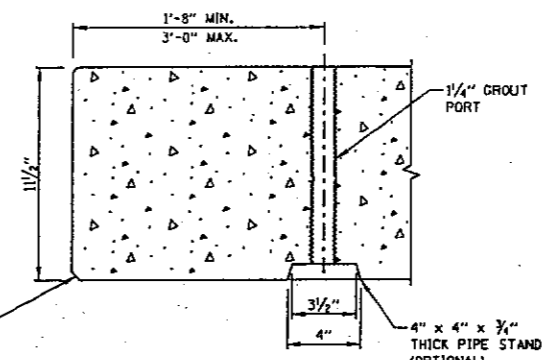
**SECTION A-A**

TRANSVERSE JOINT-DOWEL BAR EMBEDDED INTO STANDARD PRECAST PAVEMENT SLAB FOR BOTH ISOLATED AND CONSECUTIVE PLACEMENT-TYP



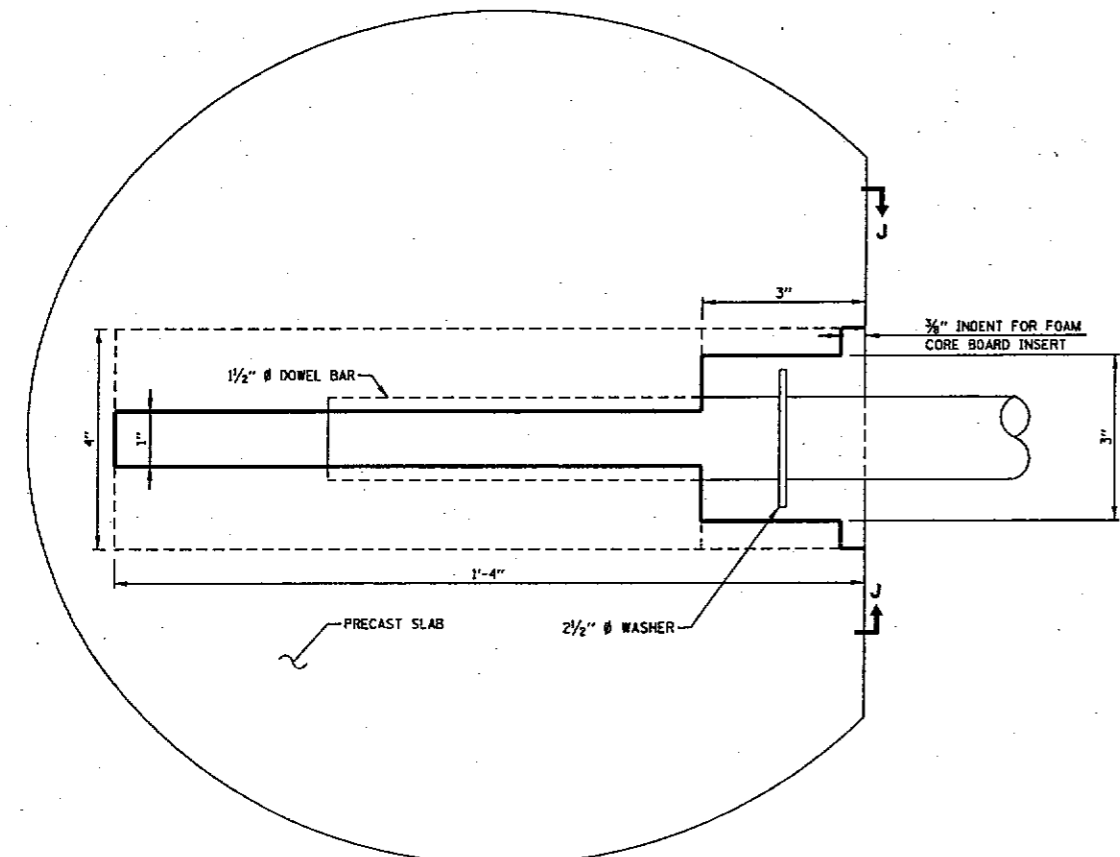
**SECTION B-B**

TRANSVERSE WIDE MOUTH OPEN SLOT DETAIL FOR CONSECUTIVE STANDARD SLABS



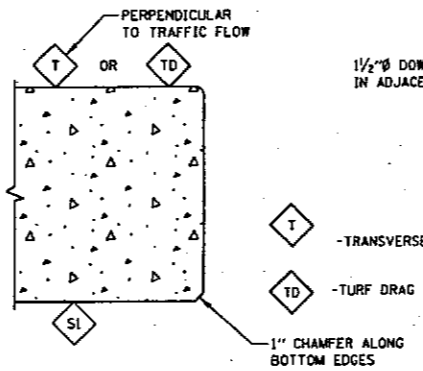
**SECTION C-C**

GROUT CHANNEL & PORT LOCATION

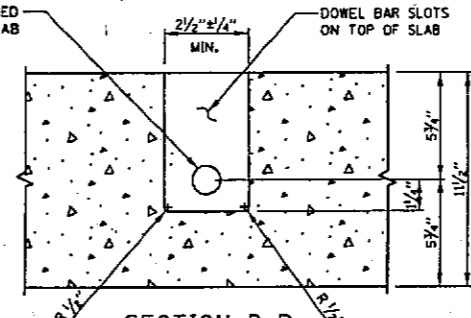


**DETAIL B**

TRANSVERSE NARROW MOUTH SLOT DETAIL FOR ISOLATED SLABS

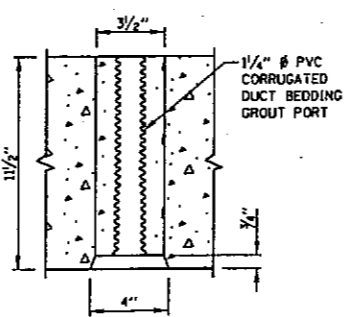


**FINISH SCHEDULE**



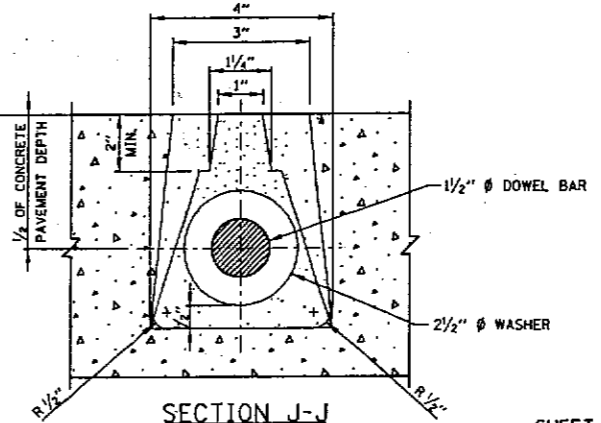
**SECTION D-D**

DOWEL BAR SECTION FOR WIDE MOUTH OPEN SLOTS



**SECTION H-H**

PIPE STAND ELEVATION



**SECTION J-J**

3" TAPER TO 4"x16" LONG DOWEL SLOT

SHEET 7 OF 19



DATE	REVISIONS

PRECAST PAVEMENT SLABS  
STANDARD A18-01

APPROVED: *Paul Kovacs* DATE: 5-1-2009.  
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**FABRICATION DETAILS**

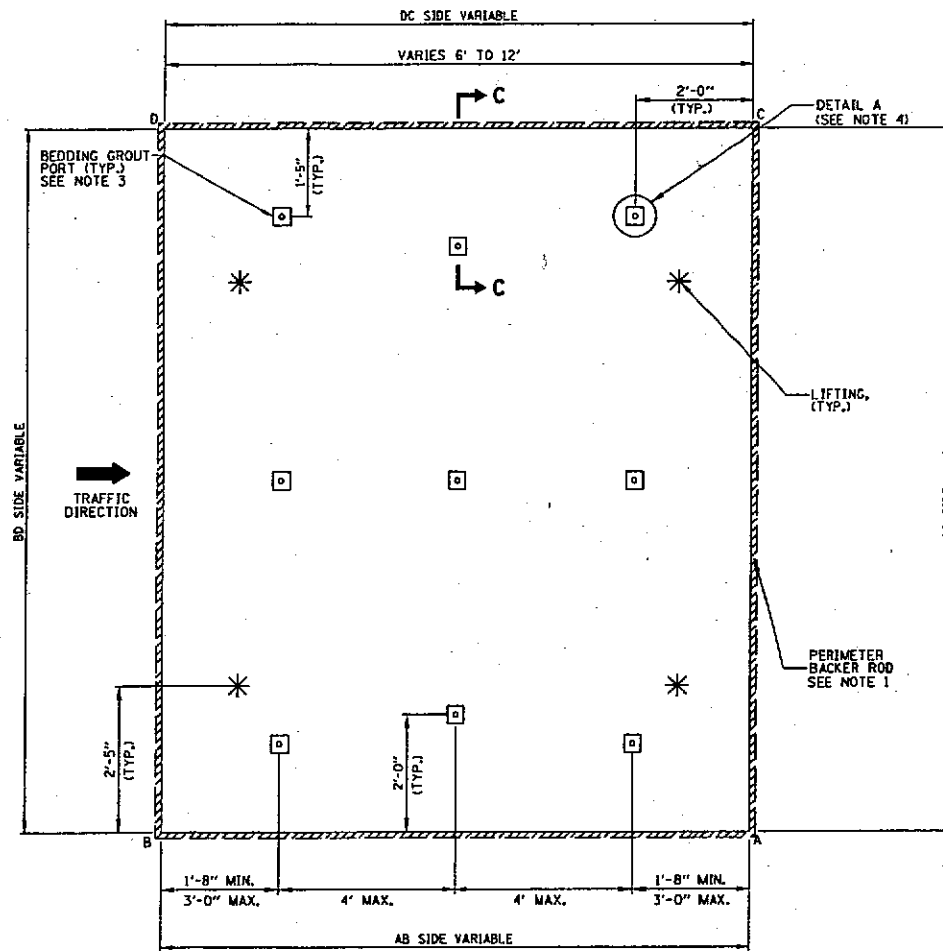
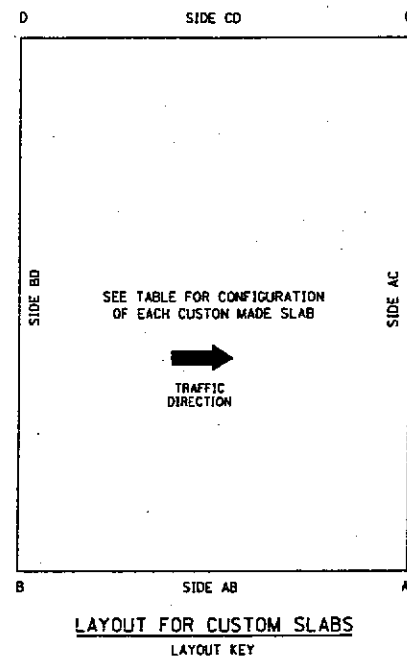
FOR NON STANDARD SLABS, UPON COMPLETION BY THE CONTRACTOR A SLAB LAYOUT WILL BE ADDED WITH SLAB DIMENSIONS TO INCLUDE BUT NOT BE LIMITED TO THE TABLE SHOWN BELOW.

EXAMPLE	CORRIDOR	STATION NUMBER	MAINLINE LANE NO.	RAMP ID.	RAMP LANE NO.	PLAZA LANE NO.	PLAZA LANE NO.	MARK NO.	LANE TYPE	VARIABLES (FT.)				AB <sup>#</sup> SIDE	BD <sup>#</sup> SIDE	CD <sup>#</sup> SIDE	AC <sup>#</sup> SIDE	AREA (SQ. FT.)	VOLUME (CU. FT.)	WEIGHT (TONS)	DIAGONALS (FT.)	
										AB (FT.)	AC (FT.)	BD (FT.)	CD (FT.)								AD	BC

MAINLINE LANE NO.: LANE NO. 1 IS ADJACENT TO MEDIAN SHOULDER.  
 RAMP LANE NO.: LANE NO. 1 IS ADJACENT TO THE BUILDING  
 PLAZA LANE NO.: LANE NO. 1 IS ADJACENT TO THE BUILDING  
 MARK NO.: EACH PANEL SHALL BE INDIVIDUALLY MARKED FOR CORRECT PLACEMENT.  
 LANE TYPE: "OUT" IN THIS COLUMN INDICATES OUTSIDE LANE.  
 "MID" IN THIS COLUMN INDICATES MIDDLE LANE.  
 "IN" IN THIS COLUMN INDICATES INSIDE LANE.  
 "PLAZA" IN THIS COLUMN INDICATES PLAZA LANE.

**LEGEND**

DB= DOWEL BAR EMBEDDED  
 DS= DOWEL SLOT  
 ST= SLOT OR HOLE FOR STITCHED TIE BAR  
 RD= FIELD RETROFITTED DOWEL BARS



**LAYOUT DETAIL FOR CUSTOM SLABS 6'-12' IN LENGTH (VARIED WIDTH\*\*)**

\*\* FOR TRAPEZOID SLABS MINIMUM WIDTH IS 2 FT. WITH MAXIMUM WIDTH OF 16 FT.

**NOTES:**

1. A FOAM BACKER ROD SHALL BE PLACED AROUND THE OUTSIDE PERIMETER OF THE SLAB AT THE BOTTOM OF THE JOINTS AFTER THE SLAB HAS BEEN SET AND BEFORE BEDDING GROUT OR POLYURETHANE LEVELING FILL IS APPLIED. THE BACKER ROD SHALL NOT BE REQUIRED WHEN ANY SLAB IS LEVELED WITH A FLOWABLE FILL.
2. EITHER SINGLE DIAMOND BLADED SAWS OR DIAMOND BLADED GANG SAWS SHALL BE USED TO MAKE THE SAW CUTS PERPENDICULAR TO THE TRANSVERSE (NONSKEWED) JOINT LINE TO ALLOW FOR DOWEL BAR PLACEMENTS WITHIN THE SPECIFIED TOLERANCES.
3. SEE NOTE 8 ON SHEET 1 FOR LOCATING BEDDING GROUT PORTS.
4. SEE SHEET 7 FOR SECTION DETAILS.

SHEET 8 OF 19



DATE	REVISIONS

PRECAST PAVEMENT SLABS  
 STANDARD A18-01

APPROVED: *Paul Kovacs*  
 CHIEF ENGINEER DATE: 5-1-2009

INSTALLATION GENERAL NOTES

ALIGNMENT:

1. WHEN THE TRANSVERSE JOINTS OF ANY PRECAST SLAB CAN NOT BE ALIGNED WITH TRANSVERSE JOINTS IN ADJACENT LANES, A MINIMUM 2'-0" OFFSET BETWEEN JOINTS SHALL BE PROVIDED.
2. THE LONGITUDINAL JOINT OF ANY ISOLATED OR CONSECUTIVE STANDARD PRECAST SLAB MUST BE ALIGNED TO BE PARALLEL WITH EXISTING LONGITUDINAL JOINTS. THE WIDTH OF ANY OF THE STANDARD PRECAST SLABS SHALL BE SAW CUT ON-SITE TO BE ALIGNED WITH THE EXISTING LONGITUDINAL JOINTS IN ADJACENT LANES OF EXISTING CONCRETE PAVEMENTS. THE WIDTH OF THE PRECAST SLAB SHALL BE NO MORE THAN 1/2 INCH LESS THAN THE WIDTH OF THE EXISTING SLAB BEING REPLACED. IF A STANDARD SLAB DOES NOT COMPLY WITH TOLERANCES FOR MAXIMUM AND MINIMUM WIDTHS FOR A DESIGNATED LOCATION, THEN A CUSTOM SLAB SHALL BE REQUIRED TO BE PRODUCED AND PLACED.
3. THE TRANSVERSE JOINT OF ANY PRECAST SLAB SHALL BE NO LESS THAN 4'-0" DISTANCE FROM AN EXISTING TRANSVERSE JOINT THAT REMAINS, OR NO LESS THAN 2'-0" DISTANCE PAST ANY EXISTING TRANSVERSE JOINT THAT IS REMOVED AND REPLACED WITH A PRECAST SLAB.
4. PRIOR TO THE PLACEMENT OF AN ISOLATED STANDARD PRECAST SLAB IN A MIDDLE LANE, THE WIDTH BETWEEN EXISTING LONGITUDINAL CONCRETE PAVEMENT JOINTS SHALL BE MEASURED BY THE CONTRACTOR UNDER MAINTENANCE OF TRAFFIC PROVIDED BY THE CONTRACTOR. ONLY APPROXIMATE WIDTHS SHALL BE MEASURED BY AND PROVIDED BY THE DESIGNER FOR BIDDING PURPOSES. THE CONTRACTOR'S WIDTH MEASUREMENTS SHALL BE USED TO DETERMINE THE NEED FOR ANY ON-SITE SAWCUTS OF THE LONGITUDINAL EDGES TO FIT THE OPENING AND TO ALIGN THE SAW CUT EDGES WITH ANY EXISTING LONGITUDINAL JOINTS. THE LONGITUDINAL EDGES OF ANY STANDARD SLAB SHALL NOT BE SAW CUT MORE THAN 6 INCHES OFF THE ORIGINAL EDGE. NO NEW LONGITUDINAL JOINT SHALL BE ALLOWED INSIDE THE EXISTING JOINT BY MORE THAN 1/4 INCH. IF THESE TOLERANCES CAN NOT BE MET, THEN A CUSTOM SLAB SHALL BE REQUIRED. FOR ISOLATED STANDARD SLABS PLACED IN THE OUTSIDE OR INSIDE LANES, THE NEW CONCRETE LONGITUDINAL JOINT SHALL MATCH THE EXISTING JOINT. THE STANDARD PRECAST SLAB MAY EXTEND INTO THE EXISTING BITUMINOUS SHOULDERS NO MORE THAN 6 INCHES TO ALLOW FOR PROPER ALIGNMENT OF THE CONCRETE JOINTS. THE ONLY ALTERNATIVE TO ON-SITE SAW CUTTING OF ISOLATED STANDARD SIZES PRE-FABRICATED SLABS IS TO DESIGN AND FABRICATE EACH SLAB, TAKING WIDTH MEASUREMENTS AT THE BEGINNING OF A PROJECT AND THEN FABRICATING THE SLAB TO FIT THE SPECIFIC OPENING DIMENSIONS.
5. FOR STANDARD SLAB PLACEMENTS, A TEMPLATE SUPPLIED BY THE PRECAST FABRICATOR SHALL BE USED TO LOCATE THE PERIMETER SAW CUTS FOR THE SLAB. THE TEMPLATE MAY BE USED TO MARK LONGITUDINAL EDGE SAW CUT LOCATIONS ON A PRECAST SLAB TO FIT THE SAME PATCH OPENING THAT THE TEMPLATE WAS USED FOR TO LOCATE A PERIMETER SAW CUT. IF THE SLAB DOWEL BAR IS RETROFITTED OR FABRICATED FOR INSERTED DOWELS, THE TEMPLATE MAY ALSO BE USED FOR THE EMBEDDED /SLOTTED DOWEL BAR LOCATIONS TO BE RETROFITTED OR INSERTED INTO EXISTING PAVEMENT.

LOAD TRANSFER:

6. ACROSS STANDARD SLABS
  - A. THE EMBEDDED DOWEL BARS OF ISOLATED STANDARD PRECAST SLABS SHALL BE RETROFITTED INTO EXISTING CONCRETE PAVEMENT IN ACCORDANCE WITH DETAIL D (SEE SHEET 14).
  - B. THE EMBEDDED DOWEL BARS OF CONSECUTIVE STANDARD SLABS SHALL BE:
    - i) RETROFITTED INTO THE EXISTING CONCRETE PAVEMENT AT THE LOCATION OF THE FIRST SLAB PLACEMENT IN ACCORDANCE WITH DETAIL D (SEE SHEET 14).
    - ii) RETROFITTED INTO THE PREFORMED SLOTS OF ADJACENT PRECAST SLABS IN ACCORDANCE WITH DETAIL E (SEE SHEET 15).
    - iii) EITHER FULLY RETROFITTED INTO THE PREFORMED SLOT OF THE LAST INSTALLED CONSECUTIVE PRECAST SLAB AND THE ADJACENT CONCRETE PAVEMENT IN ACCORDANCE WITH DETAIL F (SEE SHEET 16), OR PARTIALLY RETROFIT AN EMBEDDED DOWEL BAR OF A STANDARD ISOLATED SLAB INTO ADJACENT PAVEMENT AS THE LAST INSTALLED CONSECUTIVE PRECAST SLAB IN ACCORDANCE WITH DETAIL D (SEE SHEET 14).
  - C. FOR PRECAST STANDARD SLABS WITH NO EMBEDDED DOWEL BARS AND WITH NO NARROW MOUTH PREFORMED SLOTS FOR DOWEL INSERTIONS, THE DOWEL BARS SHALL BE FULLY RETROFITTED ACROSS ALL TRANSVERSE JOINTS IN THE FIELD IN ACCORDANCE WITH DETAIL C (SEE SHEET 13). THE LOCATIONS AND SPACING OF ALL FIELD RETROFITTED DOWEL BARS SHALL COMPLY WITH THE SPECIFIED TOLERANCES AS SHOWN ON SHEETS 4 AND 5.
  - D. FOR PRECAST STANDARD SLABS WITH LONG AND NARROW MOUTH PREFORMED SLOTS AS SHOWN ON SHEET 6, THE LOCATIONS FOR PREDRILLED HOLES FOR DOWEL BAR INSERTIONS SHALL BE ALIGNED WITH THE PREFORMED SLOTS IN THE SPECIFIC PANEL BEING PLACED. ONLY GANG DRILLS WILL BE USED TO DRILL THE HOLES. THE HOLES SHALL BE PARALLEL TO THE GRADE AND CENTERLINE OF THE PAVEMENT WITH A TOLERANCE OF 1/4 INCH IN 12 INCHES. THE DRILLING OPERATION SHALL NOT CRACK OR SPALL THE PAVEMENT. BEFORE SLAB PLACEMENT, THE DOWEL BARS SHALL BE PLACED WITHIN THE ELONGATED SLOTS AND THE PREDRILLED HOLES THOROUGHLY CLEANED OF DRILLING DEBRIS. AFTER SLAB PLACEMENT, THE DOWEL BARS WILL BE SLID INTO THE PREDRILLED HOLES AND EPOXIED IN ACCORDANCE WITH ARTICLE 442.06(g)(2) OF THE STANDARD SPECIFICATIONS WITH RETENTION DISKS OR WASHERS PLACED AGAINST THE FACE OF THE SLAB. SEE DETAIL G OF SHEET 17. IMMEDIATELY PRIOR TO FILLING THE PREFORMED SLOT WITH BACKFILL GROUT, THE EXPOSED ENDS OF THE DOWEL BARS SHALL BE CLEANED AND LIGHTLY OILED IN SUCH A MANNER AS TO NOT CONTAMINATE THE SURFACE OF ANY CLEANED SLOT AND THE FOAM CORE BOARD SHALL BE INSERTED AT THE FACE OF THE ADJACENT SLAB.

7. ACROSS CUSTOM MADE SLABS
  - A. THE DOWEL BARS OF CUSTOM DESIGNED PRECAST SLABS PLACED CONSECUTIVELY, PLACED ON WARPED GRADES, OR PLACED ON RAMPS SHALL BE FULLY RETROFITTED ACROSS THE JOINT IN THE FIELD IN ACCORDANCE WITH DETAIL C (SEE SHEET 13). FOR ALL SUCH CUSTOM SLABS, THE DOWELS BETWEEN ANY EXISTING CONCRETE PAVEMENT AND ANY ADJACENT PRECAST SLABS, AND BETWEEN CONSECUTIVELY PLACED CUSTOM PRECAST SLABS SHALL BE 1'-0" ON CENTER ACROSS THE ENTIRE JOINT.
  - B. THE DOWEL BARS OF CUSTOM DESIGNED ISOLATED PRECAST SLABS PLACED ON TANGENT MAINLINE PAVEMENT FOR MID SLAB CRACK REPAIR OR FOR JOINT REPLACEMENT CAN BE EITHER RETROFITTED ACROSS THE JOINT IN ACCORDANCE WITH DETAIL C (SEE SHEET 13), OR FULLY INSERTED INTO THE ADJACENT PAVEMENT IN ACCORDANCE WITH DETAIL G (SEE SHEET 17). THE LOCATIONS AND SPACING OF ALL FIELD RETROFITTED OR FIELD INSERTED DOWEL BARS SHALL COMPLY WITH THE SPECIFIED TOLERANCES AS SHOWN ON SHEETS 4 AND 5. FIELD INSERTION OF DOWEL BARS SHALL BE IN ACCORDANCE WITH NOTE 6(D) ABOVE.
  - C. NO END DOWEL BARS SHALL BE RETROFITTED OR INSERTED WITHIN 8" OR NO MORE THAN 1'-7" FROM THE CORNER OF THE PRECAST SLAB OR ADJOINING CONCRETE PAVEMENT SLAB THAT EXISTS.

LONGITUDINAL TIE BAR STITCHING:

8. THE LOCATIONS OF LONGITUDINAL TIE BARS SHALL BE DETERMINED BASED ON THE CRITERIA THAT LONGITUDINAL TIES SHALL BE REQUIRED FOR ANY CLASS B FULL DEPTH REPAIR AND PRECAST REPAIR GREATER THAN 20 FT. IN LENGTH OR WITH ANY PRECAST REPAIR THAT REQUIRES MORE THAN 3 CONSECUTIVE PRECAST SLABS.
9. THE SPACING BETWEEN TIE BARS SHALL BE NO LESS THAN 24 INCHES. TIE BAR INSERTIONS SHALL BE NO LESS THAN 24 INCHES FROM ANY EXISTING TRANSVERSE JOINT OR FROM THE LOAD TRANSFER JOINTS OF ANY PLACED PRECAST SLAB OR CAST-IN-PLACE CONCRETE PATCH IN EITHER LANE ADJACENT TO THE LONGITUDINAL JOINT. THE PROCEDURE AND LOCATIONS FOR TIE BAR STITCHING SHALL BE IN ACCORDANCE WITH DETAIL H (SEE SHEET 19).

MATERIALS:

10. FOR GRADE SUPPORTED PRECAST SLABS, THE BEDDING AND UNDERSEALING MATERIAL FOR LEVELING AND SUPPORT SHALL CONSIST OF:
  - A. LEVELING SAND SHALL BE 100% CRUSHED FINE AGGREGATE OF AN FA-6, FA-20, OR FA-21 GRADATION AS SPECIFIED IN SECTION 1003 OF THE STANDARD SPECIFICATIONS. THE FINE AGGREGATE SHALL BE REASONABLY FREE FROM AN EXCESS OF SOFT AND UNSOUND PARTICLES AND OTHER OBJECTIONABLE MATTER. THE TYPICAL THICKNESS OF THE LEVELING SAND LAYER SHALL BE APPROXIMATELY 1/4 INCH WITH A MAXIMUM THICKNESS OF 1 INCH.
  - B. FOR GRADE SUPPORTED SLABS, UNDERSEALING GROUT SHALL BE USED AFTER SLAB INSTALLATION TO FILL ALL VOIDS BENEATH THE PRECAST PANELS. THE MIXTURE USED FOR UNDERSEALING GROUT SHALL CONSIST OF PORTLAND CEMENT, FLY ASH, GROUND GRANULATED BLAST FURNACE SLAG (OPTIONAL), A SUPERPLASTICIZER, AND WATER ALL IN ACCORDANCE WITH DIVISION 1000 OF THE STANDARD SPECIFICATIONS. THE CONTRACTOR SHALL SUBMIT THE PROPOSED MIX DESIGN FOR UNDERSEALING GROUT TO THE ENGINEER FOR TOLLWAY APPROVAL PRIOR TO PLACEMENT. THE UNDERSEALING GROUT PRODUCED SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
    - i) THE UNDERSEALING GROUT SHALL REMAIN FLUID AND NOT EXHIBIT A RESISTANCE TO FLOW FOR A MINIMUM OF ONE HOUR. THE GROUT MIXTURE SHALL HAVE A FLOW RATE OF 15 TO 25 SECONDS AS MEASURED BY ASTM C 939 TO ENSURE FLUIDITY.
    - ii) THE UNDERSEALING GROUT SHALL ACHIEVE AN INITIAL SET IN LESS THAN 4 HOURS AND A COMPRESSIVE STRENGTH AS MEASURED BY ASTM C 942 OF 300 PSI BEFORE OPENING THE SLAB TO TRAFFIC AND A COMPRESSIVE STRENGTH OF 500 PSI IN 12 HOURS.
11. FOR PRECAST SLABS SUPPORTED AND LEVELED BY FLOWABLE FILL PLACED BEFORE SLAB INSTALLATION, THE FLOWABLE FILL SHALL CONSIST OF PORTLAND CEMENT, FLY ASH, COARSE AND/OR FINE AGGREGATES, WATER, AND AIR ENTRAINING ADMIXTURE (OPTIONAL). THE CONTRACTOR SHALL SUBMIT THE PROPOSED MIX DESIGN FOR FLOWABLE FILL TO THE ENGINEER FOR TOLLWAY APPROVAL PRIOR TO PLACEMENT. THE FLOWABLE FILL PRODUCED SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
  - i) PORTLAND CEMENT SHALL BE TYPE 1 CEMENT IN ACCORDANCE WITH SECTION 1001 OF THE STANDARD SPECIFICATIONS.
  - ii) FLY ASH SHALL BE IN ACCORDANCE WITH SECTION 1010 OF THE STANDARD SPECIFICATIONS.
  - iii) FINE AGGREGATE SHALL BE IN ACCORDANCE WITH SECTION 1003 OF THE STANDARD SPECIFICATIONS.
  - iv) COARSE AGGREGATE, IF USED, SHALL BE IN ACCORDANCE WITH SECTION 1004 OF THE STANDARD SPECIFICATIONS WITH A MAXIMUM AGGREGATE SIZE OF 12.5 MM.
  - v) IF AN AIR ENTRAINMENT ADMIXTURE IS USED, THE AIR CONTENT OF THE FLOWABLE FILL SHALL NOT EXCEED 35% OF THE FLOWABLE FILL VOLUME.
  - vi) THE COMPRESSIVE STRENGTH OF THE FLOWABLE FILL MIXTURE SHALL NOT BE LESS THAN 50 PSI AT 3 DAYS, NOR LESS THAN 75 PSI OR GREATER THAN 150 PSI AT 28 DAYS.
  - vii) THE FINAL SET TIME SHALL BE DETERMINED IN ACCORDANCE WITH ASTM C403 ON A TRIAL BATCH SPECIMEN.
  - viii) THE MAXIMUM THICKNESS OF THE LEVELING FILL SHALL BE 1 INCH.

12. FOR PRECAST SLABS SUPPORTED AND LEVELED BY HIGH-DENSITY FOAM PLACED AFTER SLAB INSTALLATION, THE HIGH-DENSITY FOAM SHALL BE EXPANDING POLYURETHANE FOAM HAVING A WATER INSOLUBLE DILUENT AND SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
 

i) DENSITY (LBS./CU. FT.)-AIR RISE	6.0 MIN.
TENSILE STRENGTH (PSI) ASTM D 1623	100 MIN.
ELONGATION (%)	5.0
COMPRESSIVE STRENGTH (PSI) ASTM D 1621 (AT YIELD)	100 MIN.
VOLUME CHANGE (% OF ORIGINAL)	0

D THE MANUFACTURER SHALL PROVIDE DOCUMENTATION THAT THE LOT(S) OF FOAM MEETS THE SPECIFIED PROPERTIES. MANUFACTURER'S CERTIFICATION SHALL LIST LOT NUMBER(S) AND DOCUMENTATION OF COMPLIANCE WITH THE SPECIFICATION.

iii) THE MAXIMUM THICKNESS OF THE HIGH DENSITY FOAM SHALL BE 1 INCH.
13. HARDWARE GROUT/ADHESIVES
  - A. FOR DOWEL BAR RETROFITS OR INSERTIONS, FOR THE FILLING OF ANY GROUT PORT HOLES USED FOR HIGH DENSITY FOAM INJECTIONS, FOR THE FILLING OF DOWEL SLOTS AND FOR THE FILLING OF RECESSED LIFTING DEVICES, THE BACKFILL MATERIAL SHALL BE:
    - 1) FIVE STAR HIGHWAY PATCH AS MANUFACTURED BY FIVE STAR PRODUCTS INC. FAIRFIELD, CONNECTICUT.
    - 2) HIGHWAY DB RETROFIT MORTAR AS MANUFACTURED BY DAYTON SUPERIOR, MIAMISBURG, OHIO.
    - 3) A TOLLWAY APPROVED EQUIVALENT THAT HAS BEEN TESTED AS A RAPID SET CONCRETE PATCHING MATERIAL PER THE AASHTO NATIONAL TRANSPORTATION PRODUCT EVALUATION PROGRAM (NTPPEP), WHICH CONFORMS TO ASTM C 928. THE GROUT MATERIAL IS REQUIRED TO PROVIDE A COMPRESSIVE STRENGTH OF 4,000 PSI IN 24 HOURS (OPENING TO TRAFFIC AFTER 3,000 PSI) PER ASTM C 39, EXHIBITS EXPANSION OF LESS THAN 0.10 PERCENT PER ASTM C 531, AND HAS A CALCULATED DURABILITY FACTOR OF 80.0 PERCENT MINIMUM AT THE END OF 300 FREEZE-THAW CYCLES PER ASTM C 666. THE PROPOSED MATERIAL SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO ANY PLACEMENT.
  - B. FOR TIE BAR STITCHING AN APPROVED CHEMICAL ADHESIVE IN ACCORDANCE WITH ARTICLE 1027.01 OF THE STANDARD SPECIFICATIONS SHALL BE USED AS THE ANCHORING MATERIAL FOR STITCHED TIE BARS.
  - C. FOR DOWEL BAR INSERTIONS, AN APPROVED CHEMICAL ADHESIVE OR EPOXY IN ACCORDANCE WITH ARTICLE 1027.01 OF THE STANDARD SPECIFICATIONS SHALL BE USED WITH PLACEMENT IN ACCORDANCE WITH ARTICLE 442.06 (a)(2) OF THE STANDARD SPECIFICATIONS WITH RETENTION DISCS OR WASHERS PLACED AGAINST THE FACE OF THE SLAB.
14. EPOXY COATED DOWEL BARS SHALL COMPLY WITH ASTM A 615 GRADE 60. ANY ADDITIONAL MATERIAL REQUIRED FOR DOWEL BAR RETROFITTING SHALL BE IN ACCORDANCE WITH THE TOLLWAY SPECIAL PROVISION FOR "DOWEL BAR RETROFIT".
15. EPOXY COATED TIE BARS FOR STITCHING SHALL COMPLY WITH THE REQUIREMENTS OF ARTICLE 1006.10 OF THE STANDARD SPECIFICATIONS.
16. THE BACKER ROD USED AS A GROUT CHANNEL GASKET AROUND THE PERIMETER OF A SLAB, AT THE BOTTOM OF THE JOINTS, SHALL BE A CLOSED-CELL, PLASTIC FOAM ROD COMPATIBLE WITH THE SEALANT AND THE ELEVATED TEMPERATURES OF FINAL JOINT SEALANT APPLICATION.

EQUIPMENT:

17. FOR BASE PREPARATION, A MECHANICALLY-CONTROLLED SCREEDING DEVICE OR STRAIGHTEDGE DEVICE CAPABLE OF GRADING FULLY COMPACTED FINE AGGREGATE USED AS THE LEVELING SAND TO A TOLERANCE OF 1/8 INCH PER 6 FT. LENGTHS OF PLACEMENT.
18. CHIPPING HAMMERS SHALL BE HAND HELD AND HAVE A MAXIMUM WEIGHT OF 30 LBS. PRIOR TO ANY HANDLE MODIFICATION WHERE APPLICABLE.
19. WITH ANY FIELD RETROFITTING OF DOWEL BARS, A TEMPLATE SHALL BE ROUTINELY USED FOR ALL STANDARD SLABS IN ORDER TO LOCATE AND ALIGN THE SAWCUTS CONSISTENTLY. EITHER SINGLE DIAMOND BLADED SAWS OR DIAMOND BLADED GANG SAWS SHALL BE USED TO MAKE SAW CUTS PERPENDICULAR TO THE TRANSVERSE (NON-SKEWED) JOINT LINE TO ALLOW FOR DOWEL BAR PLACEMENTS WITHIN THE FOLLOWING TOLERANCES:
  - ± 1/2 INCH OF THE MIDDLE OF THE CONCRETE SLAB DEPTH.
  - ± 1/2 INCH OF BEING CENTERED OVER THE TRANSVERSE JOINT
  - ± 1/4" FROM PARALLEL TO THE CENTERLINE OVER 12 INCHES OF THE BAR
  - ± 1/4" FROM PARALLEL TO THE ROADWAY SURFACE OVER 12 INCHES OF THE BAR

SAWCUTS SAWS ACROSS SKEWED JOINTS SHOULD ALLOW EQUAL LENGTH OF THE DOWEL BAR TO BE PLACED ACROSS THE TRANSVERSE JOINT. THE ALIGNMENT OF SAWCUTS MUST BE PARALLEL TO THE ROADWAY CENTERLINE, REGARDLESS OF TRANSVERSE JOINT SKEW.
20. WITH ANY FIELD INSERTIONS OF DOWEL BARS INTO PREDRILLED HOLES, THE DRILLING MACHINE SHALL BE IN ACCORDANCE WITH ARTICLE 442.03(g) OF THE STANDARD SPECIFICATIONS. HAND HELD DRILLING TOOLS WILL NOT BE ALLOWED.



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APPROVED: ..... DATE: 5-1-2009

**INSTALLATION GENERAL NOTES**

21. THE COMPRESSOR FOR AIR BLASTING SHALL HAVE A MINIMUM CAPACITY OF 120 CFM. THE COMPRESSED AIR SHALL BE FREE FROM OIL AND OTHER CONTAMINANTS.
22. CONSOLIDATION EQUIPMENT USED TO CONSOLIDATE THE CONCRETE REPAIR MATERIAL IN THE RETROFITTED DOWEL BAR SLOTS SHALL BE INTERNAL VIBRATORS WITH A MAXIMUM DIAMETER OF 1 INCH AND SHALL HAVE A RESILIENT COVERING THAT WILL NOT DAMAGE THE EPOXY COATED REINFORCEMENT DURING USE. ANY VIBRATORS OR RODS USED FOR CONSOLIDATION OF THE REPAIR MATERIAL FOR NARROW MOUTH SLOTS SHALL HAVE A DIAMETER OF LESS THAN 1 INCH.
23. BATCHING EQUIPMENT FOR FLOWABLE FILL SHALL HAVE DEVICES DESIGNED TO MEASURE THE SPECIFIED QUANTITIES OF EACH COMPONENT MATERIAL, AND MIXING SHALL BE OF SUFFICIENT DURATION TO INSURE UNIFORM CONSISTENCY OF THE MIXTURE. NO WATER WILL BE ADDED TO THE FLOWABLE FILL MIXTURE AFTER BATCHING. WATER CONTENT SHALL BE MAINTAINED SUCH THAT COMPRESSIVE STRENGTHS ARE ACHIEVED AND A UNIFORM, FLOWABLE MIXTURE IS DEVELOPED THAT IS ESSENTIALLY SELF-LEVELLING WHEN PLACED.
24. EQUIPMENT FOR HIGH-DENSITY FOAM INJECTION SHALL INCLUDE A TRUCK MOUNTED PUMPING UNIT CAPABLE OF INJECTING THE POLYURETHANE BETWEEN THE CONCRETE AND THE SLAB SUBBASE. THE PUMP SHALL BE CAPABLE OF CONTROLLING THE RATE OF RISE OF THE PAVEMENT SLAB. A LEVELING UNIT SHALL BE PROVIDED TO ENSURE THE SLABS ARE RAISED TO AN EVEN PLANE, WITH VERTICAL ELEVATION DIFFERENCE ACROSS ANY CORNER NOT TO EXCEED 1/4 INCH.
25. EQUIPMENT FOR MIXING AND PUMPING ANY GROUT/ADHESIVE MATERIALS FOR BEDDING THE SLABS, RETROFITTING DOWEL BARS, OR CROSS STITCHING TIE BARS SHALL BE IN ACCORDANCE WITH THE MATERIAL MANUFACTURER'S INSTRUCTIONS AND THE SPECIFICATIONS.
26. PERIMETER SAWCUTTING OF THE REMOVAL AREA AND SAWCUTTING OF THE DOWEL BAR SLOTS SHALL NOT BE CARRIED OUT MORE THAN (1) WEEK IN ADVANCE OF THE EXPECTED DATE OF REPAIR. THE CONTRACTOR SHALL USE A TEMPLATE TO PRECISELY DELINEATE THE LIMITS OF THE AREAS TO BE REPAIRED AS DEFINED ON THE CONTRACT DOCUMENTS AND APPROVED SHOP DRAWINGS. WITHIN A TOLERANCE OF 1/2 INCH, REPAIRS SHALL BE NO LESS THAN THE FULL WIDTH OF A LANE AND THE FULL DEPTH OF CONCRETE.
27. REMOVAL OF EXISTING PAVEMENT SHALL BE IN ACCORDANCE WITH SECTION 440 OF THE STANDARD SPECIFICATIONS EXCEPT AS FOLLOWS:
  - A. THE OUTER LIMITS OF THE REPAIR AREA WILL BE SAWCUT FULL DEPTH AND SHALL NOT EXTEND (OVERCUT) BY MORE THAN 10 INCHES INTO THE ADJACENT CONCRETE THAT IS TO REMAIN IN PLACE. OVERCUTS SHALL BE FILLED WITH A PRODUCT ACCEPTABLE TO THE TOLLWAY. THE OUTER LIMITS FOR REPAIR SHALL BE MARKED OUT BY THE CONTRACTOR AND APPROVED BY THE ENGINEER PRIOR TO ANY SAWCUTTING.
  - B. REMOVAL OF CONCRETE WITHIN THE PERIMETER SAWCUTS SHALL BE BY THE LEFT-OUT METHOD, AND CONCRETE BETWEEN SAWCUTS FOR DOWEL BAR RETROFFITS SHALL BE REMOVED USING JACKHAMMER AND HAND TOOLS. THE CONTRACTOR SHALL ENSURE THAT REMOVALS ARE CARRIED OUT WITHOUT DAMAGING THE ADJACENT CONCRETE PAVEMENT OR ASPHALT SHOULDER OR DISTURBING THE UNDERLYING BASE. HEAVY BREAKING EQUIPMENT SUCH AS HOE RAMS SHALL NOT BE USED IN THE REMOVAL OPERATION. THE CONCRETE PAVEMENT SHALL NOT BE BROKEN IN PLACE.
  - C. IF DURING THE REMOVAL PROCESS THE ADJACENT CONCRETE IN THE SAME LANE IS DAMAGED OR CRACKED DUE TO THE CONTRACTOR'S REMOVAL PROCEDURE, THE DAMAGED AREA SHALL BE CUT BACK FULL DEPTH TO SOUND CONCRETE AND REPLACED AT THE CONTRACTOR'S EXPENSE. IF CONCRETE IN THE ADJOINING LANE IS DAMAGED DURING THE REMOVAL PROCESS, THE DAMAGED CONCRETE SHALL BE REPAIRED IN ACCORDANCE SECTION 442 OF THE STANDARD SPECIFICATIONS AT THE CONTRACTOR'S EXPENSE. ASPHALT SHOULDER DAMAGED DURING THE REMOVAL PROCESS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL PROVIDE A PROPOSAL FOR REPAIRS TO THE TOLLWAY FOR APPROVAL.
  - D. DISPOSAL OF EXCAVATED MATERIALS FROM THE REMOVAL OF CONCRETE AND FROM ANY BASE COURSE RESTORATION SHALL BE IN ACCORDANCE WITH THE APPLICABLE PORTIONS OF ARTICLE 202.03 OF THE STANDARD SPECIFICATIONS AT THE CONTRACTOR'S EXPENSE.
28. IF THE ENGINEER DETERMINES THAT THE EXISTING GRANULAR SUBBASE IS UNSUITABLE FOR THE INTENDED PURPOSE, THE CONTRACTOR SHALL REMOVE THE UNSUITABLE MATERIAL IN THE PAVEMENT REMOVAL AREAS TO THE DEPTH SPECIFIED BY THE ENGINEER AND NO LESS THAN 2 INCHES. THE MATERIAL REMOVED SHALL BE REPLACED WITH AN EQUAL THICKNESS OF NEW MATERIAL PLACED AND COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOLLWAY SPECIAL PROVISION FOR "AGGREGATE FOR BASE COURSE RESTORATION, SPECIAL".
29. LEVELING MATERIAL PLACED BEFORE SLAB INSTALLATION SHALL BE EITHER A FLOWABLE FILL OR A FINE AGGREGATE MEETING THE REQUIREMENTS OF THIS CONTRACT DOCUMENT. FLOWABLE FILL SHALL BE USED AS A LEVELING MATERIAL ONLY ON TANGENT PAVEMENT SECTIONS. GRADE CONTROL SHALL BE ESTABLISHED FOR ALL LEVELING MATERIAL USING STRINGLINES, LASER GUIDANCE, OR OTHER APPROVED METHODS. THE TEMPERATURE OF THE FLOWABLE FILL MIXTURE AS MANUFACTURED AND DELIVERED SHALL BE AT LEAST 50F. NO FLOWABLE FILL WILL BE ALLOWED IF THE ANTICIPATED AIR TEMPERATURE WILL BE 36F OR LESS WITHIN 24 HOURS OF SLAB PLACEMENT. THE FLOWABLE FILL MUST OBTAIN FINAL SET BEFORE THE PAVEMENT MAY BE OPENED TO TRAFFIC.
30. WHEN FLOWABLE FILL IS USED AS THE LEVELING MATERIAL WITH SLAB INSTALLATION, A PERIMETER BACKER ROD WILL NOT BE REQUIRED AROUND THE PERIMETER OF THE SLAB.
31. LEVELING MATERIAL PLACED IMMEDIATELY AFTER SLAB INSTALLATION SHALL ONLY BE A HIGH-DENSITY POLYURETHANE FOAM MEETING THE REQUIREMENTS OF THIS CONTRACT DOCUMENT. PLACEMENT OF POLYURETHANE FOAM SHALL FILL ALL VOIDS BENEATH THE PRECAST PANELS THAT MAY BE PRESENT AFTER PLACING THE PANELS OVER THE PREPARED SUBBASE AND LEVELING AGGREGATE. PLACEMENT OF THE POLYURETHANE SHALL UTILIZE THE UNDERSLAB GROUT PORT HOLES AS SHOWN ON THE PLANS. THE PORT HOLES ARE TO BE FILLED WITH THE DOWEL BAR BACKFILLING MATERIAL.
32. FOLLOWING PROPER REMOVAL OF EXISTING PAVEMENTS AND ACCEPTABLE BASE PREPARATION/LEVELING, THE CONTRACTOR SHALL HAVE ALL EQUIPMENT REQUIRED FOR PANEL INSTALLATION ON-SITE PRIOR TO BEGINNING PANEL INSTALLATION. LIFTING AND TRANSPORTING EQUIPMENT SHALL NOT DAMAGE THE PREPARED SUBBASE/LEVELING MATERIALS PRIOR TO OR DURING PANEL INSTALLATION.
33. PANELS SHALL BE INSTALLED ONE AT A TIME, AND SHALL BE INSTALLED IN SUCH A MANNER THAT THE SUBBASE/LEVELING MATERIAL OR ANY REMAINING PAVEMENT IS NOT DAMAGED DURING INSTALLATION. DURING PLACEMENT OF THE SLABS, USE TIE OFF ROPES TO AVOID CHIPPING OR SPALLING EDGES OF THE PRECAST UNITS. USE WOOD SHIMS OR WEDGES TO GUIDE THE SLAB INTO THE CORRECT POSITION. THE USE OF STEEL PRY BARS THAT CHIP EDGES SHOULD BE AVOIDED.
34. IMMEDIATELY AFTER THE SLAB HAS BEEN SET AND LEVELED, SURVEY THE VERTICAL ELEVATION ACROSS ALL CORNERS TO VERIFY THAT THE VERTICAL DIFFERENCE BETWEEN ADJACENT SLABS ACROSS ANY CORNER DOES NOT EXCEED 1/4 INCH. IF THE DIFFERENCE EXCEEDS 1/4 INCH, THAN THE SLAB SHALL BE REMOVED AND RESET OR THE SURFACE SHALL RECEIVE A CORRECTIVE DIAMOND GRIND AT THE CONTRACTORS EXPENSE AFTER ANY REQUIRED BEDDING GROUT OR LEVELING MATERIAL HAS BEEN PLACED UNLESS COMPLETE PROFILE DIAMOND GRINDING OF THE ENTIRE PAVEMENT IS INCLUDED IN THE CONTRACT.
35. NO CUSTOM SLAB EQUAL TO OR GREATER THAN 6 FT. IN LONGITUDINAL LENGTH SHALL BE SET AND OPENED TO TRAFFIC BEFORE GROUTING IS COMPLETE UNLESS THE SLAB WAS FABRICATED WITH TWO MATS OF STEEL REINFORCEMENT IN ACCORDANCE WITH THE DESIGN REQUIREMENTS SHOWN ON SHEETS 2 AND 3. IF THE SET PRECAST SLAB IS OPENED TO TRAFFIC BEFORE THE SLAB IS DOWEL RETROFITTED, TIE BAR STITCHED, OR UNDERSLAB GROUTED, PLACE INCOMPRESSIBLE SHIMS APPROVED BY THE ENGINEER DURING INSTALLATION IN EACH TRANSVERSE AND LONGITUDINAL JOINT TO CORRECT AND MAINTAIN HORIZONTAL ALIGNMENT OF THE SLABS. THE TOTAL THICKNESS OF SHIMS USED IN ANY JOINT SHALL BE NO MORE THAN 1/2 INCH. BACKFILL MATERIAL MUST BE PLACED THREE DAYS OF EACH SLAB'S PLACEMENT. BEFORE OPENING A NON-GROUTED SLAB TO TRAFFIC, BACKFILL THE ASPHALT SHOULDERS TO MAINTAIN HORIZONTAL ALIGNMENT. ANY WIDE MOUTH DOWEL SLOTS LEFT OPEN BEFORE THE SLAB IS OPENED TO TRAFFIC SHALL BE TEMPORARILY FILLED WITH A COMPRESSION SEAL APPROVED BY THE ENGINEER TO WITHIN 1 INCH OF THE PAVEMENT SURFACE. ANY NARROW MOUTH DOWEL SLOTS MAY BE LEFT OPEN AFTER THE SLAB IS OPENED TO TRAFFIC.
36. PRIOR TO DOWEL BAR PLACEMENT, THE TRANSVERSE JOINT SHOULD BE CAULKED WITH A SILICONE SEALANT AT THE BOTTOM AND SIDES OF THE SLOT. THE CAULKING FILLER SHOULD NOT BE PLACED ANY FARTHER THAN 1/2 INCH OUTSIDE EITHER SIDE OF THE JOINT, AND APPLIED SUFFICIENTLY TO PREVENT ANY PATCHING MATERIAL FROM ENTERING THE JOINT AT THE BOTTOM OR SIDES OF THE SLOT. EXCESSIVE SEALANT AROUND THE SLOT DOES NOT ALLOW THE CONCRETE PATCHING MATERIAL TO BOND TO THE SIDES OF THE SLOT. BEFORE PLACEMENT, THE DOWEL BARS SHOULD BE LIGHTLY COATED WITH PARTING COMPOUND AND FULLY RETROFITTED DOWEL BARS PLACED ON A CHAIR THAT WILL PROVIDE A MINIMUM 1/2 INCH CLEARANCE BETWEEN THE BOTTOM OF THE DOWEL AND THE BOTTOM OF THE SLOT. FOR ANY DOWEL BARS INSERTED INTO PREDRILLED EPOXIED HOLES, AN APPURATUS CAPABLE OF MAINTAINING VERTICAL ALIGNMENT OF THE DOWEL AND TO PROVIDE A MINIMUM 1/2 INCH CLEARANCE BETWEEN THE BOTTOM OF THE DOWEL AND THE BOTTOM OF THE SLOT SHALL BE PROVIDED BY THE CONTRACTOR. A 3/4 INCH THICK FOAM INSERT SHOULD BE PLACED AT THE MIDDLE OF THE DOWEL TO MAINTAIN THE TRANSVERSE JOINT. THE FOAM INSERT SHOULD FIT TIGHTLY AROUND THE DOWEL, THE BOTTOM, AND THE EDGES OF THE SLOT, AND BE UP TO THE SURFACE OF THE EXISTING CONCRETE SURFACE. THE FOAM INSERT SHOULD BE CAPABLE OF REMAINING IN A VERTICAL POSITION AND HELD TIGHTLY TO ALL EDGES DURING PLACEMENT OF THE PATCH. IF FOR ANY REASON THE FOAM INSERT SHIFTS DURING PLACEMENT OF THE CONCRETE PATCHING MATERIAL, THE WORK SHALL BE REJECTED AND REDONE AT THE CONTRACTOR'S EXPENSE.
37. PLACEMENT OF HARDWARE GROUT/ADHESIVES
  - A. DOWEL BARS - THE PLACEMENT OF ANY APPROVED BACKFILL MATERIAL FOR DOWEL BAR RETROFITTING OR FOR DOWEL BAR INSERTIONS SHALL BE IN ACCORDANCE WITH THE TOLLWAY SPECIAL PROVISION FOR "DOWEL BAR RETROFIT". THE PAVEMENT WILL NOT BE OPENED TO TRAFFIC UNTIL THE BACKFILL MATERIAL AROUND THE PAVEMENT HARDWARE OBTAINS 3,000 PSI COMPRESSIVE STRENGTH. ALL CONCRETE SURFACES WITHIN THE SLOT SHALL BE SOLID, FREE FROM LOOSE OR UNSOUND FRAGMENTS. BEFORE GROUTING, SANDBLAST ALL EXPOSED SURFACES IN THE DOWEL BAR SLOT FOLLOWED BY AIR BLASTING TO REMOVE ANY DUST, RESIDUE OR DEBRIS LEFT IN THE SLOT. UPON COMPLETION OF THE RETROFITTING WORK, THE GROUT OR CONCRETE PATCH MATERIAL SHALL FILL ALL SLOTS TO THE SURFACE OF THE EXISTING PAVEMENTS. ANY SLOTS INSUFFICIENTLY FILLED BELOW EXISTING PAVEMENT SURFACES SHALL BE REDONE AT THE CONTRACTOR'S EXPENSE.
  - B. TIE BARS - A FOAM BOARD GASKET SHALL BE INSERTED INTO THE LONGITUDINAL JOINT AT THE STITCHING LOCATION AND THE TIEBAR HOLE PREDRILED THROUGH THE GASKET. AFTER PREDRIILLED HOLES ARE AIR BLASTED, PRESSURE INJECT THE APPROVED ADHESIVE INTO THE PREDRIILLED HOLES, LEAVING SOME VOLUME FOR THE BAR TO OCCUPY THE HOLE. INSERT THE TIEBAR INTO THE HOLE, LEAVING ABOUT 1 INCH FROM THE TOP OF THE TIE BAR TO THE PAVEMENT SURFACE. REMOVE EXCESS ADHESIVE AND FINISH FLUSH WITH THE PAVEMENT SURFACE.
  - C. FILL LIFTING INSERT HOLES WITH THE APPROVED GROUT USED FOR DOWEL BAR RETROFITTING.
38. PLACEMENT OF UNDERSEALING GROUT SHALL FILL ALL VOIDS BENEATH THE PRECAST PANELS AND GROUT PORT HOLES THAT MAY BE PRESENT AFTER PLACING THE PANELS OVER THE PREPARED SUBBASE AND LEVELING AGGREGATE. PLACEMENT OF THE UNDERSEALING GROUT SHALL UTILIZE THE UNDERSLAB GROUT PORT HOLES AS SHOWN ON THE PLANS. PLACEMENT OF UNDERSEALING GROUT SHALL NOT OCCUR UNTIL AFTER ALL HARDWARE DEVICES ARE PLACED AND GROUTED. IF UNDERSEALING GROUT FILLS ANY LONGITUDINAL JOINT TO WITHIN 9" OF THE SLAB SURFACE, A 9" SAW CUT OF THE JOINT SHALL BE REQUIRED DURING INSTALLATION. IF UNDERSEALING GROUT FILLS ANY TRANSVERSE JOINT TO WITHIN 9" OF THE SLAB SURFACE, THEN A 9" SAW CUT OF THE JOINT SHALL BE REQUIRED FOLLOWED BY REMOVAL AND FULL RETROFITTING OF ALL SEVERED DOWEL BARS ACROSS THE JOINT.
39. AFTER INSTALLATION AND GROUTING IS COMPLETED ALL LONGITUDINAL AND TRANSVERSE JOINTS SHALL BE SEALED IN ACCORDANCE WITH ARTICLE 420.12.

**REMOVAL/INSTALLATION:**



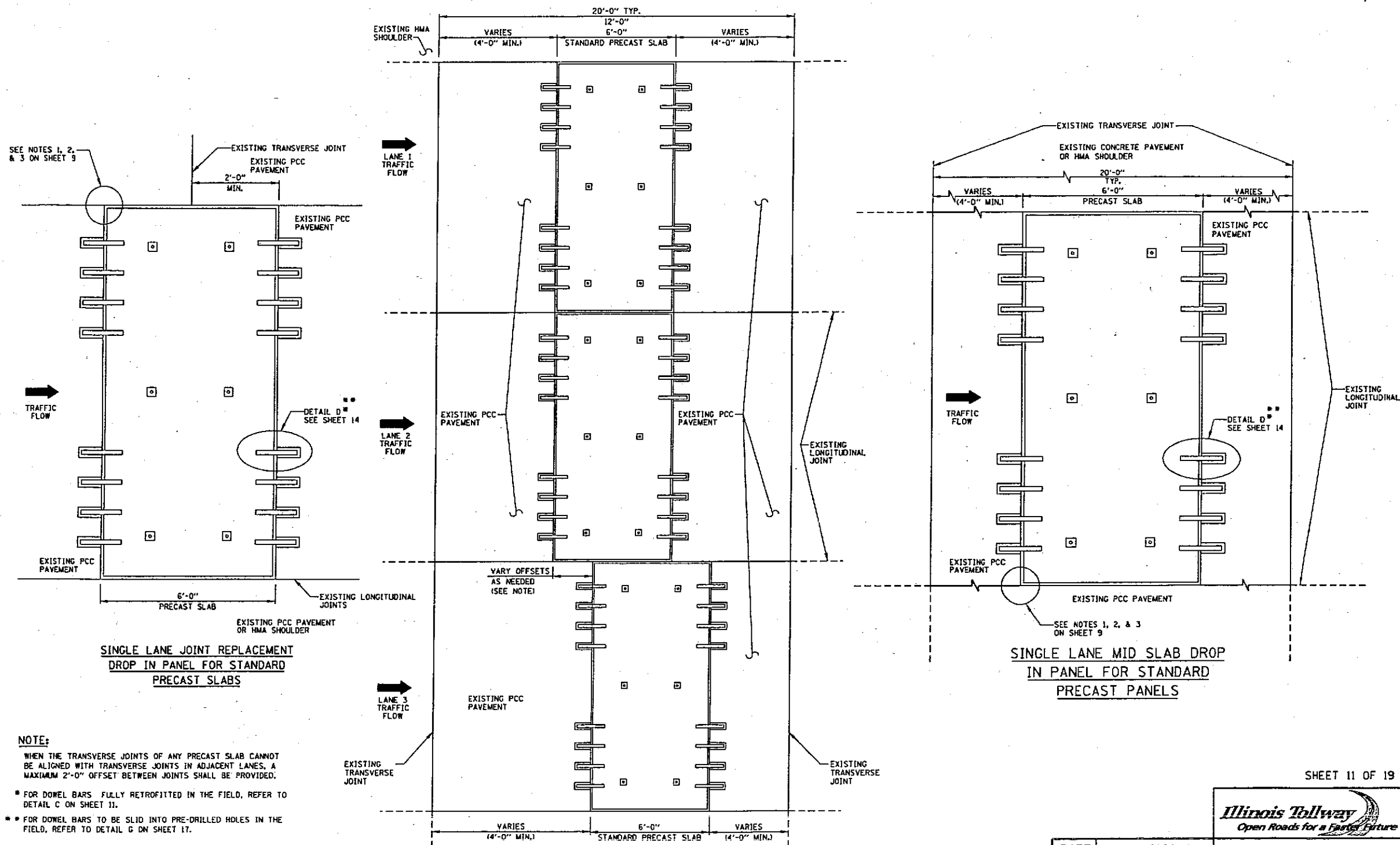
DATE	REVISIONS

PRECAST PAVEMENT SLABS  
STANDARD A18-01

APPROVED: *Paul Kovacs* DATE 5-1-2009



INSTALLATION OF ISOLATED STANDARD PRECAST SLABS



SEE NOTES 1, 2, & 3 ON SHEET 9

EXISTING TRANSVERSE JOINT

LANE 1 TRAFFIC FLOW

TRAFFIC FLOW

LANE 2 TRAFFIC FLOW

LANE 3 TRAFFIC FLOW

SINGLE LANE JOINT REPLACEMENT DROP IN PANEL FOR STANDARD PRECAST SLABS

SINGLE LANE MID SLAB DROP IN PANEL FOR STANDARD PRECAST PANELS

MULTIPLE LANE MID SLAB DROP IN PANEL FOR STANDARD PRECAST PANELS

**NOTE:**  
 WHEN THE TRANSVERSE JOINTS OF ANY PRECAST SLAB CANNOT BE ALIGNED WITH TRANSVERSE JOINTS IN ADJACENT LANES, A MAXIMUM 2'-0" OFFSET BETWEEN JOINTS SHALL BE PROVIDED.  
 \* FOR DOWEL BARS FULLY RETROFITTED IN THE FIELD, REFER TO DETAIL C ON SHEET 11.  
 \* FOR DOWEL BARS TO BE SLID INTO PRE-DRILLED HOLES IN THE FIELD, REFER TO DETAIL G ON SHEET 17.

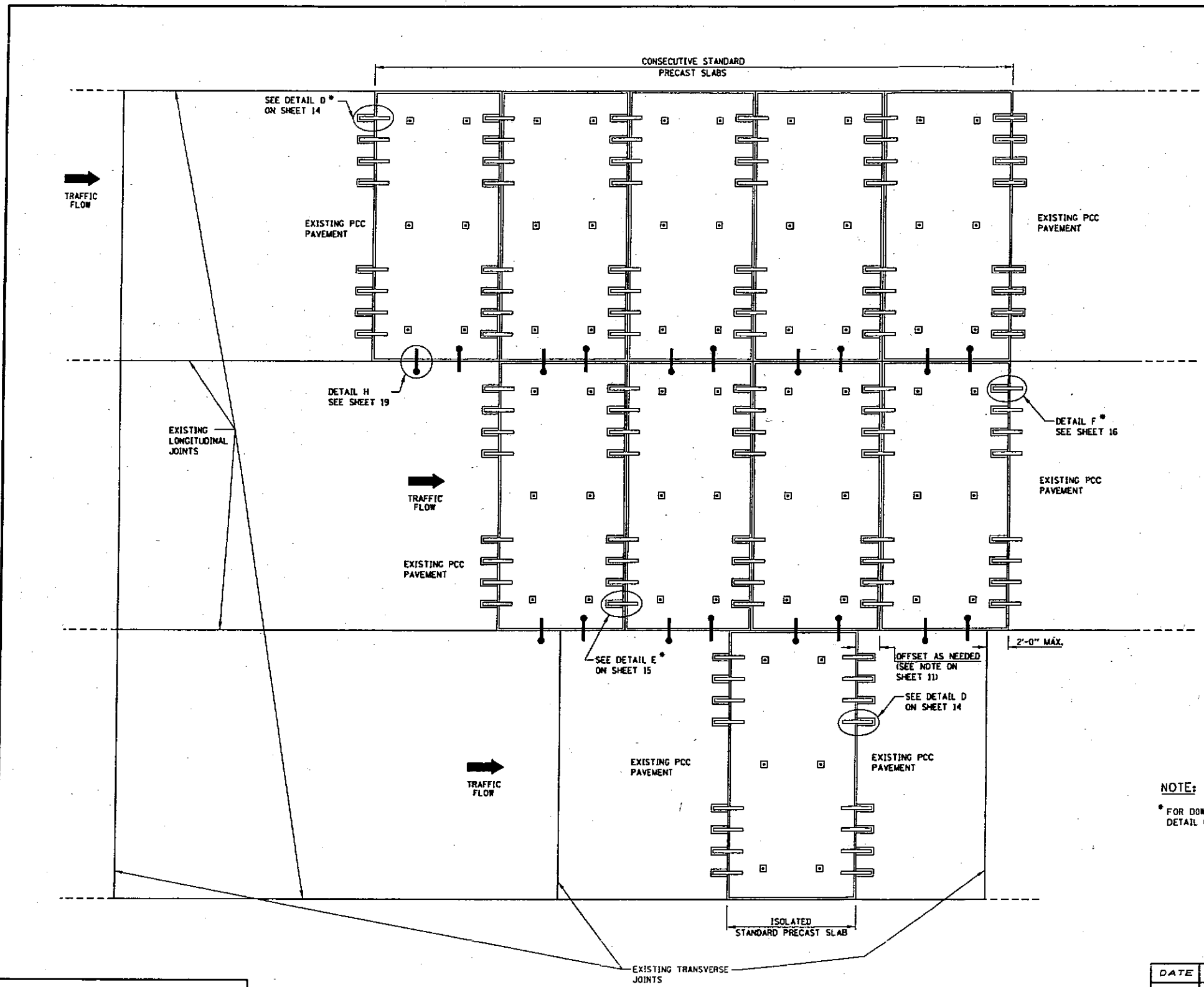
SHEET 11 OF 19



DATE	REVISIONS

PRECAST PAVEMENT SLABS  
 STANDARD A18-01

APPROVED: *Paul Kovacs* CHIEF ENGINEER DATE: 5-1-2009.



**NOTE:**  
 \* FOR DOWEL BARS FULLY RETROFITTED IN THE FIELD, REFER TO DETAIL C ON SHEET 13.

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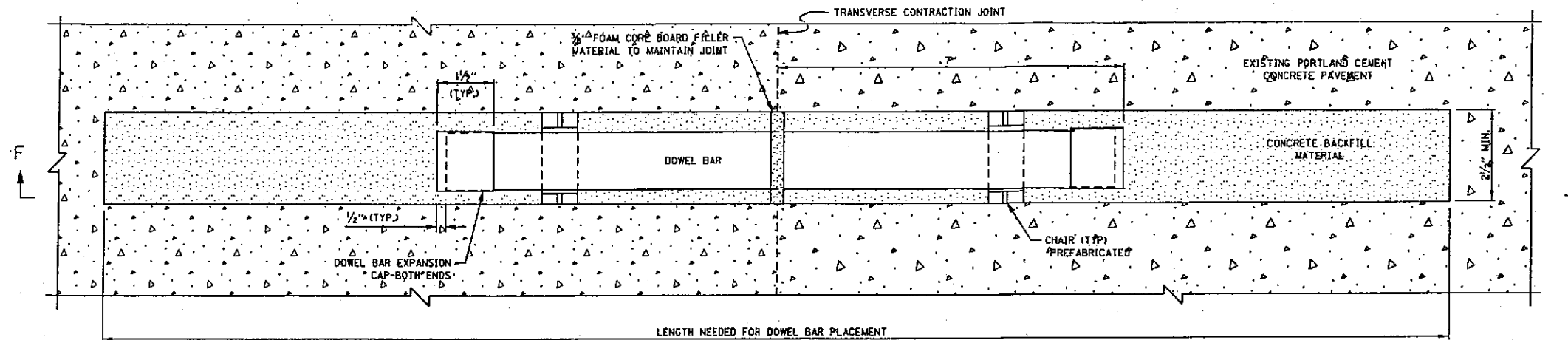


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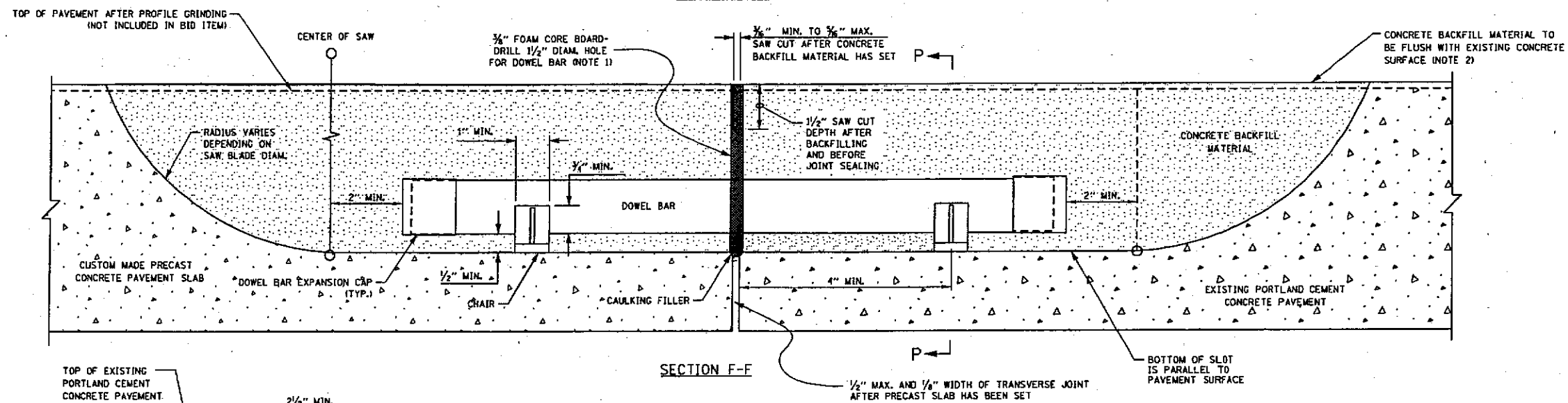
PRECAST PAVEMENT SLABS  
 STANDARD A18-01

APPROVED: *Paul Kovacs*  
 DATE: 9-1-2009

INSTALLATION OF CONSECUTIVE STANDARD PRECAST SLABS

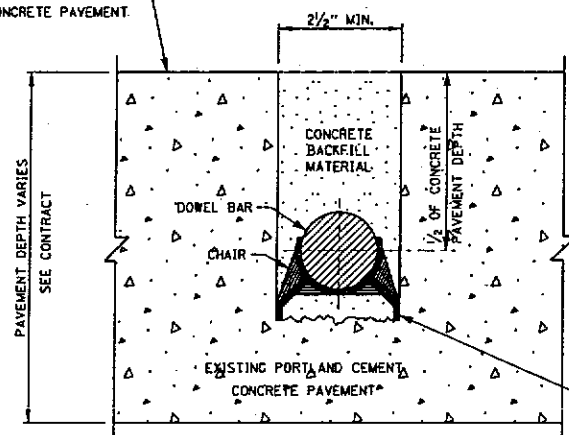


PLAN VIEW

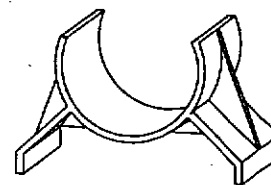


SECTION F-F

DETAIL-C, WIDE MOUTH DOWEL BAR PLACEMENT DETAIL FOR ALL CUSTOM MADE PRECAST PANELS AND OPTIONAL FOR STANDARD SLABS



SECTION P-P



CHAIR DETAIL

NOTES:

1. PLACE FOAM CORE BOARDS TO THE TOP OF PATCH.
2. UPON COMPLETION, THE FINISHED SURFACE OF THE CONCRETE BACKFILL MATERIAL SHALL NOT BE BELOW EXISTING CONCRETE SURFACE.

SHEET 13 OF 19

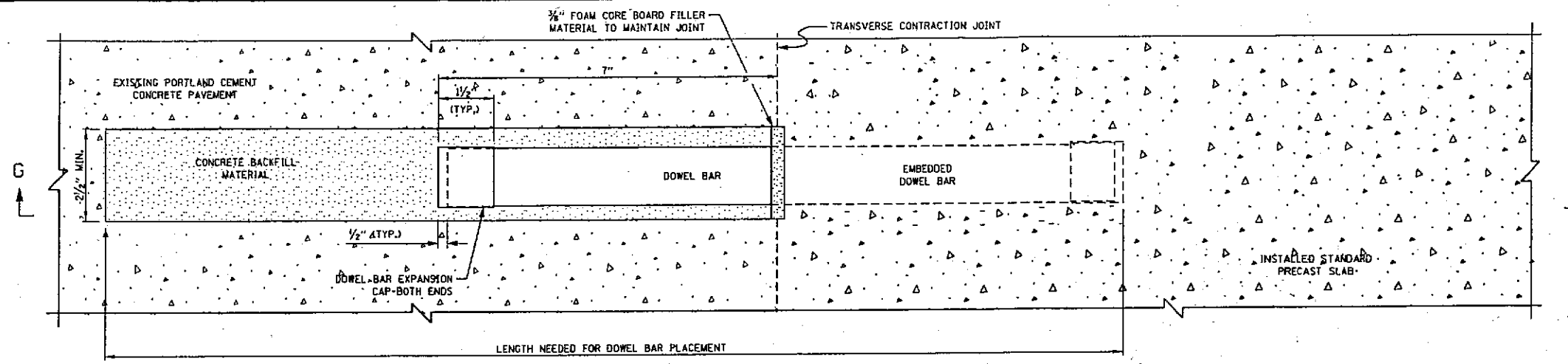


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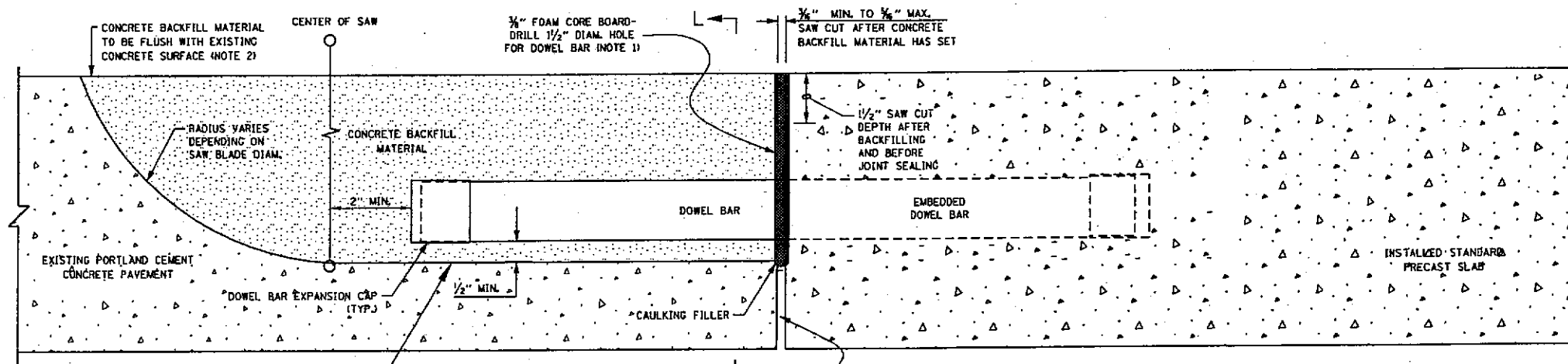
PRECAST PAVEMENT SLABS

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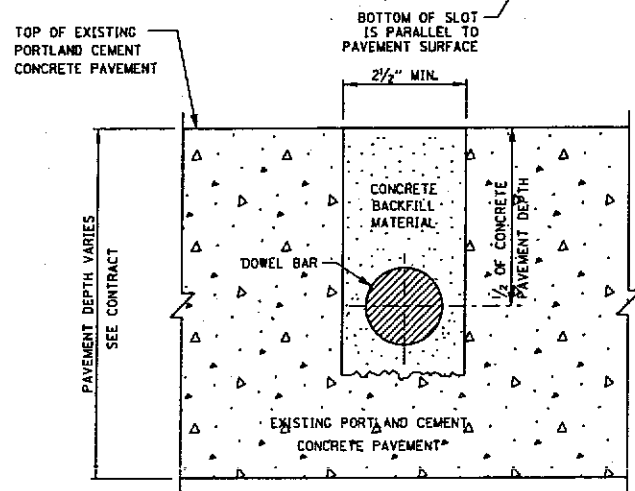
APPROVED: *Paul Kovacs* DATE: 5-1-2009  
CHIEF ENGINEER



PLAN VIEW



SECTION G-G



SECTION L-L

DETAIL D - WIDE MOUTH DOWEL BAR PLACEMENT  
 DETAIL FOR STANDARD PRECAST PANELS  
 (FOR APPLICATION WITH ALL ISOLATED STANDARD  
 SLABS AND WITH INITIAL PLACEMENT OF  
 CONSECUTIVE STANDARD SLABS)

NOTES:

1. PLACE FOAM CORE BOARDS TO THE TOP OF PATCH.
2. UPON COMPLETION, THE FINISHED SURFACE OF THE CONCRETE BACKFILL MATERIAL SHALL NOT BE BELOW EXISTING CONCRETE SURFACE.

SHEET 14 OF 19

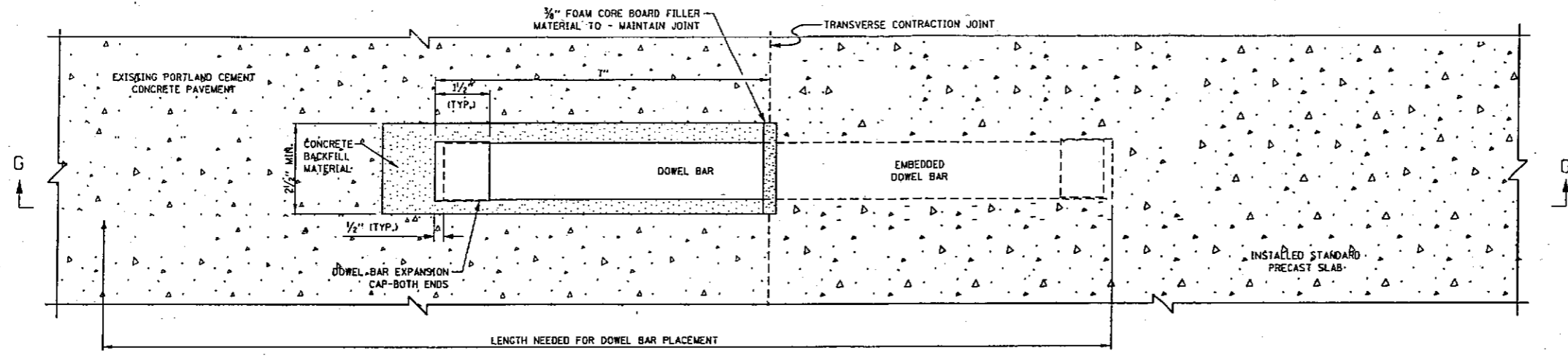


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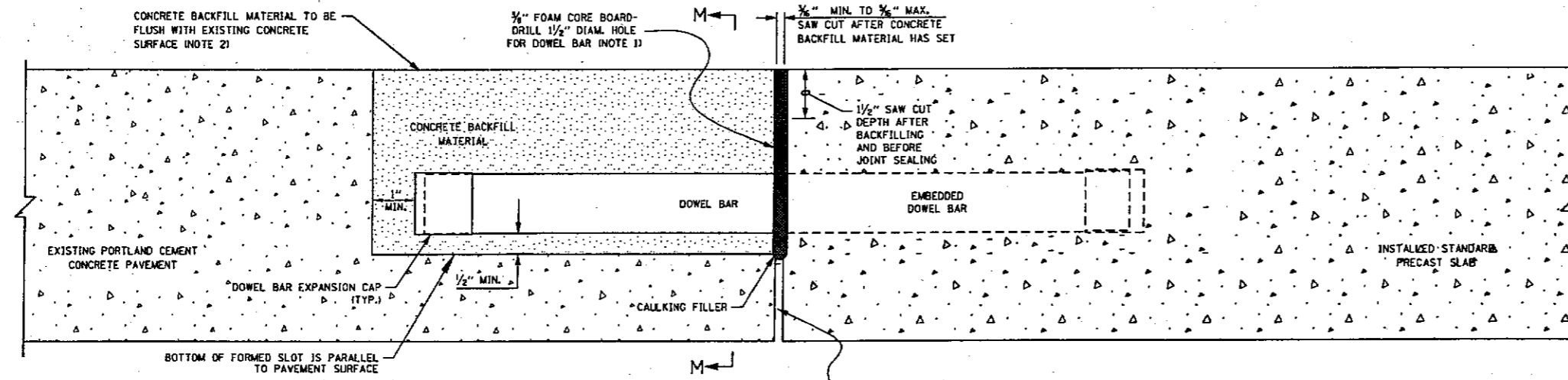
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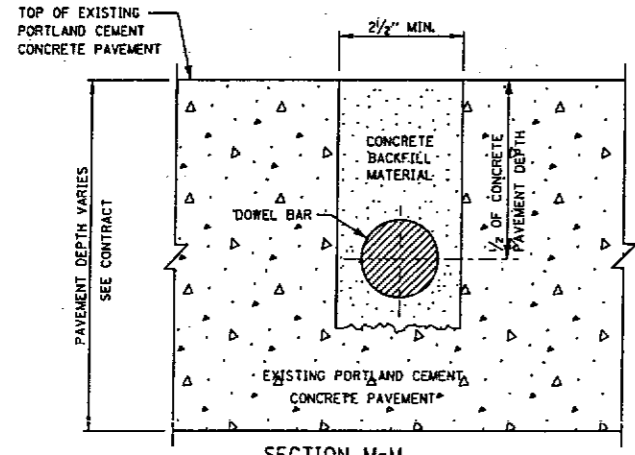
APPROVED: *Paul Horvath*  
 DATE: 5-1-2009  
DIST. ENGINEER



PLAN VIEW



SECTION G-G



SECTION M-M

DETAIL E - WIDE MOUTH DOWEL BAR PLACEMENT DETAIL FOR CONSECUTIVE STANDARD PRECAST PANELS

NOTES:

1. PLACE FOAM CORE BOARDS TO THE TOP OF PATCH.
2. UPON COMPLETION, THE FINISHED SURFACE OF THE CONCRETE BACKFILL MATERIAL SHALL NOT BE BELOW THE EXISTING CONCRETE SURFACE.

SHEET 15 OF 19

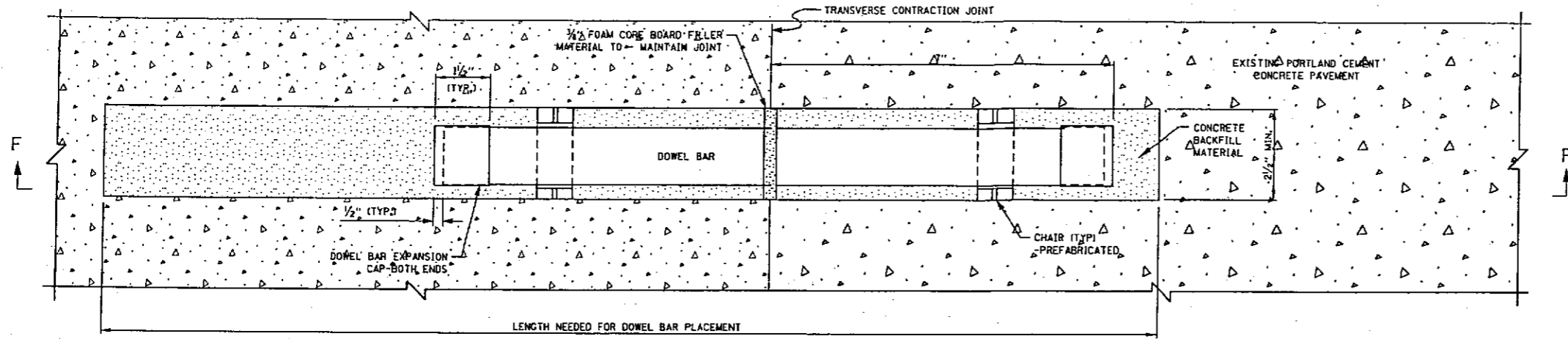


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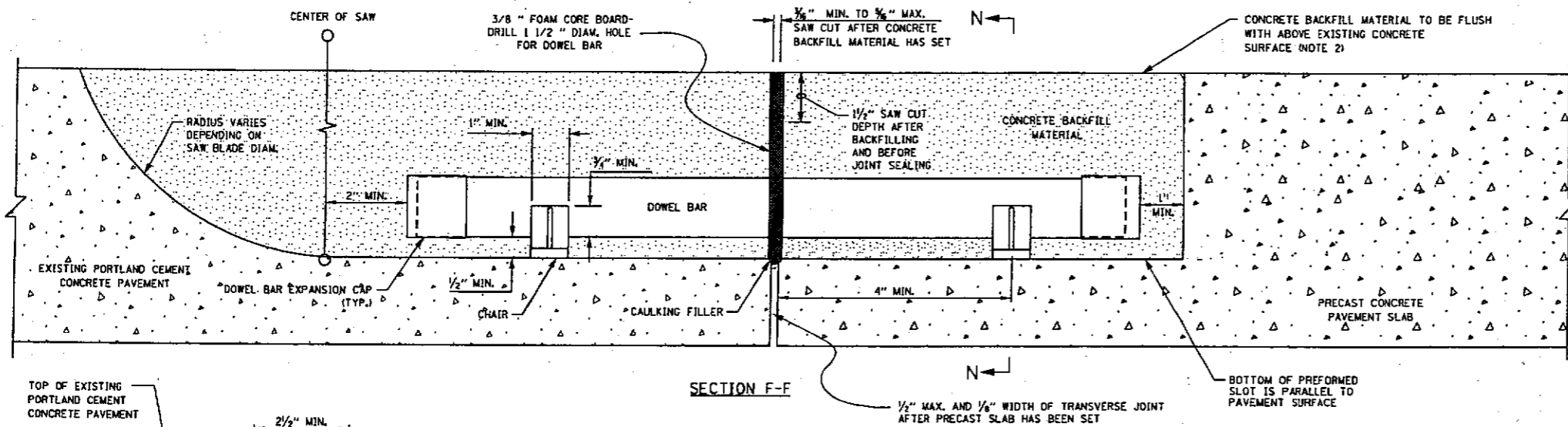
PRECAST PAVEMENT SLABS

STANDARD A18-01

APPROVED *Paul Kovacs* DATE 5-1-2009  
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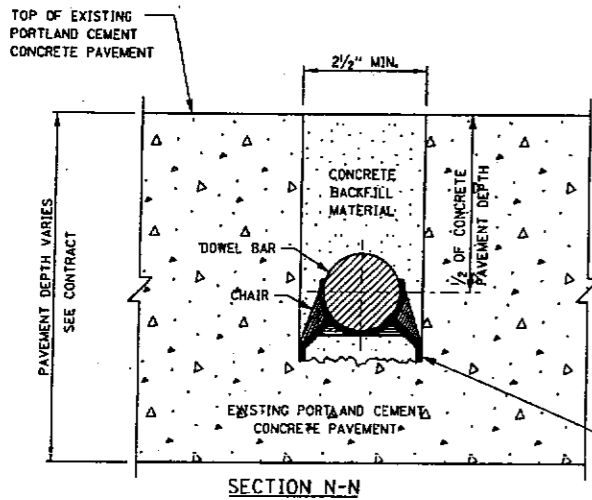


PLAN VIEW

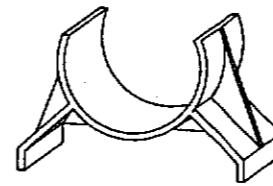


SECTION F-F

DETAIL-F, WIDE MOUTH DOWEL BAR PLACEMENT DETAIL FOR THE LAST TRANSFER JOINT OF CONSECUTIVELY PLACED STANDARD PRECAST PANELS



SECTION N-N



CHAIR DETAIL

NOTES:

1. PLACE FOAM CORE BOARDS TO THE TOP OF PATCH.
2. UPON COMPLETION, THE FINISHED SURFACE OF THE CONCRETE BACKFILL MATERIAL SHALL NOT BE BELOW THE EXISTING CONCRETE SURFACE.

SHEET 16 OF 19

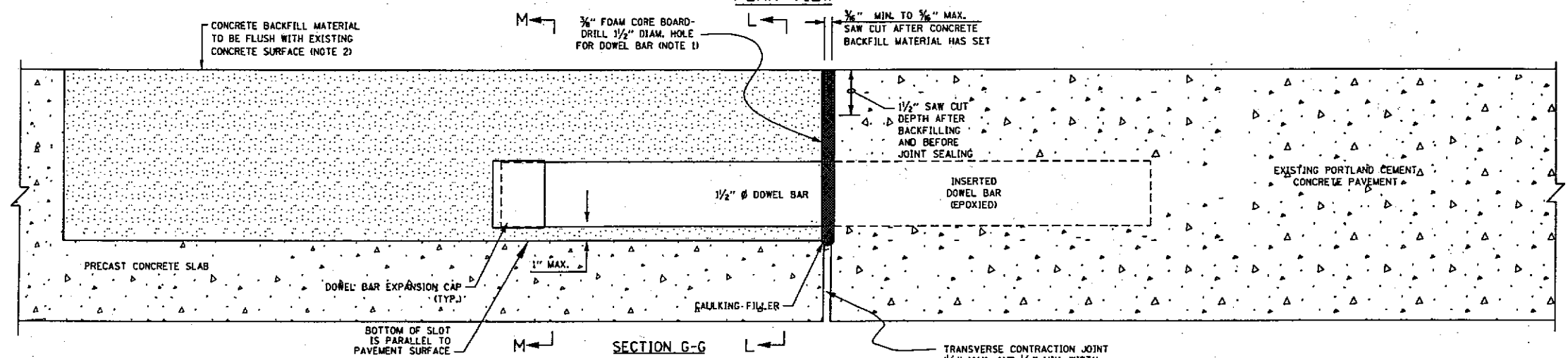
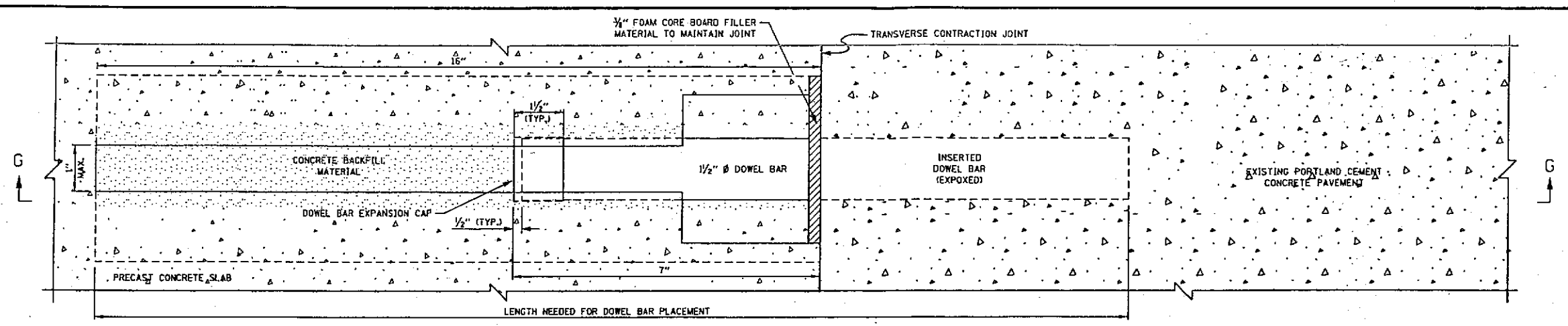


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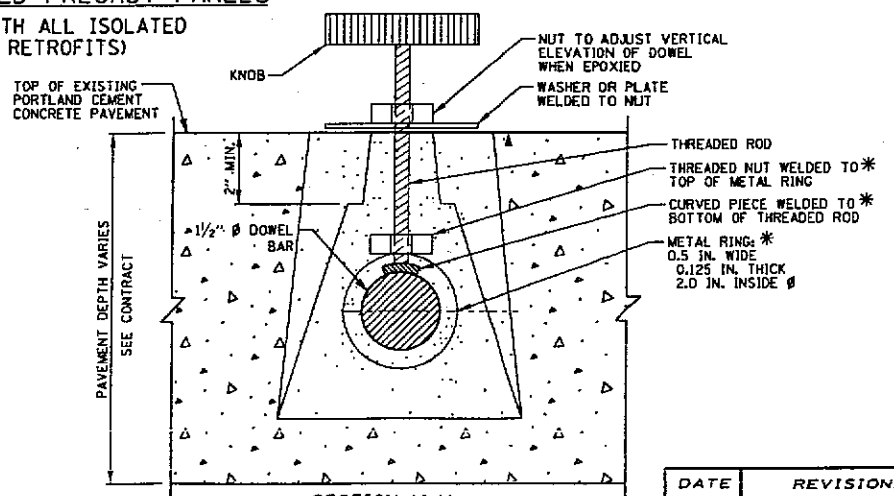
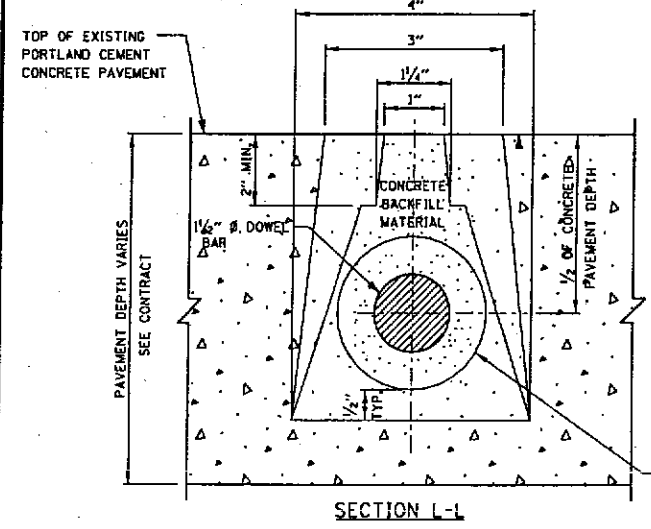
PRECAST PAVEMENT SLABS

STANDARD A18-01

Paul Kovacs  
 APPROVED DATE 5-1-2009



**DETAIL G - NARROW MOUTH DOWEL BAR  
PLACEMENT DETAIL FOR ISOLATED PRECAST PANELS**  
(FOR OPTIONAL APPLICATION WITH ALL ISOLATED  
SLABS IN PLACE OF FULL RETROFITS)



**SECTION M-M  
CLAMP DETAIL FOR SLIDING DOWEL BAR SLOTS**  
\* METAL RING MAY BE REPLACED WITH A STRONG MAGNET WELDED TO THE THREADED ROD, AT LEAST ONE CLAMP WILL BE NEEDED FOR EACH INSERTED DOWEL BAR TO MAINTAIN ALIGNMENT.

- NOTES:**
1. PLACE FOAM CORE BOARDS TO THE TOP OF PATCH.
  2. UPON COMPLETION, THE FINISHED SURFACE OF THE CONCRETE BACKFILL MATERIAL SHALL NOT BE BELOW EXISTING CONCRETE SURFACE.

APPROVED: *Paul Kovacs*  
DATE: 5-1-2009

DATE	REVISIONS

SHEET 17 OF 19

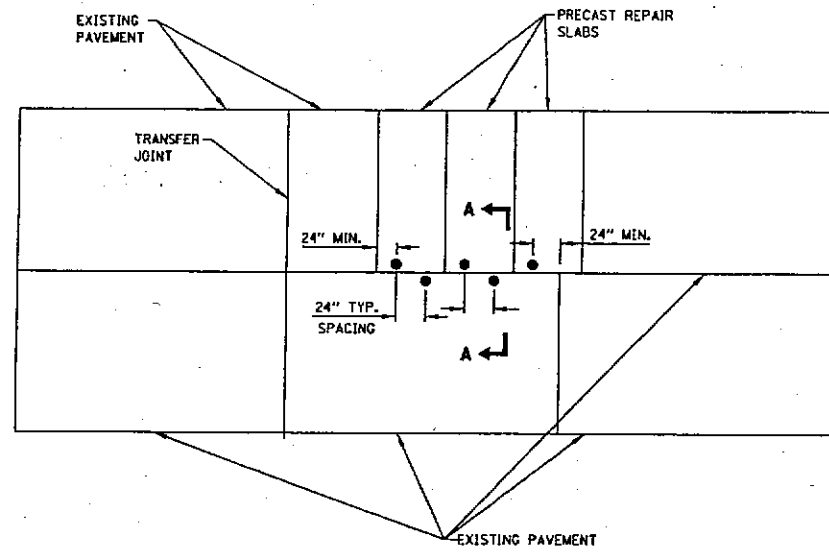
**Illinois Tollway**  
*Open Roads for a Safer Future*

PRECAST PAVEMENT SLABS

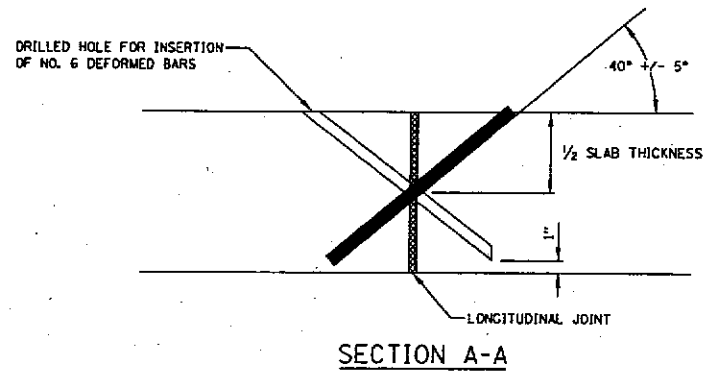
STANDARD A18-01







**DETAIL H - LONGITUDINAL TIE BAR STITCHING FOR PRECAST PANELS**



**NOTES FOR TIE BAR STITCHING:**

1. DRILL HOLES THAT ARE ORIENTED AT 40° ± 5° ANGLE TO THE PAVEMENT SURFACE SO THAT THEY INTERSECT THE LONGITUDINAL CRACK OR JOINT AT ABOUT MID-DEPTH. (IT IS IMPORTANT TO START DRILLING THE HOLE AT A CONSISTENT DISTANCE FROM THE JOINT, IN ORDER TO CONSISTENTLY CROSS AT THE MID-DEPTH OF THE SLAB.)
2. HOLE CENTERLINES ARE PERPENDICULAR TO THE JOINT (IN PLAN VIEW) AT EACH LOCATION BEING DRILLED.
3. SELECT A DRILL THAT MINIMIZES DAMAGE TO THE CONCRETE SURFACE, SUCH AS A HYDRAULIC POWERED DRILL. SELECT A DRILL DIAMETER NO MORE THAN 0.375 IN. LARGER THAN THE TIE-BAR DIAMETER. CHOOSE A GANG-MOUNTED DRILL IF A HIGHER PRODUCTIVITY IS NEEDED.
4. DRILL HOLES WITH NO LESS THAN A 24 INCH BAR SPACING. ADJACENT HOLES ARE DRILLED IN OPPOSITE DIRECTIONS ACROSS THE JOINT. THE HOLES AND INSERTED TIE BAR SHALL BE NO LESS THAN 24 INCHES FROM ANY EXISTING TRANSVERSE JOINT OR ANY PRECAST OR REPAIR TRANSFER JOINT.
5. HOLE BOTTOMS ARE NO MORE THAN 1 INCH FROM THE SLAB BOTTOM.
6. AIR BLOW THE HOLES TO REMOVE DUST AND DEBRIS AFTER DRILLING.
7. INJECT ADHESIVE INTO THE HOLE, LEAVING SOME VOLUME FOR THE BAR TO OCCUPY THE HOLE. (POURING THE ADHESIVE IS ACCEPTABLE FOR SMALL QUANTITIES.)
8. INSERT THE NO. 6 EPOXY COATED DEFORMED TIE BAR INTO THE HOLE, LEAVING ABOUT 1 IN. FROM THE TOP OF BAR TO THE PAVEMENT SURFACE. DEFORMED TIE BARS SHALL BE EPOXY COATED.
9. REMOVE EXCESS ADHESIVE AND FINISH FLUSH WITH THE PAVEMENT SURFACE.

SHEET 19 OF 19

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PRECAST PAVEMENT SLABS

STANDARD A18-01

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 APPROVED ..... CHIEF ENGINEER ..... DATE 5-1-2009.