Section 603. CONCRETE PAVEMENT RESTORATION

603.01. Description. This work consists of restoring concrete pavement including the following:

A. Removing and repairing portions of a concrete pavement, one lane wide and 100 feet long, or less, with reinforced and non-reinforced portland cement concrete, with the type of joint required;
B. Diamond grinding portland cement concrete pavement;
C. Resawing and sealing existing longitudinal pavement joints;
D. Sawing, cleaning, and sealing cracks in concrete pavements;
E. Removing sections of concrete pavement, one lane wide and greater than 100 feet long in accordance with section 204 or subsection 603.03.B.1, as determined by the Engineer; and
F. Replacing sections of concrete pavement one lane wide and greater than 100 feet long in accordance with section 602.

Refer to Standard Plan R-44 Series, R-45 Series and the contract for details.

603.02. Materials. Provide material in accordance with the following:

Concrete, Grades, P1, P1M 601
Concrete, Grades P-MS, P-NC 603
Course Aggregate, 21AA, 22A 902
Curing Materials for Pavements 903
Insulating Blankets 903
HMA Mixtures for Restoring Shoulders 904
Steel Reinforcement 905
Epoxy Coated Dowel Bars and Deformed Tie Bars 914
Joint Materials 914

For concrete pavement repairs, the Engineer will determine the required concrete grade, based on the required opening of repairs to traffic, in accordance with Table 603-1. The Engineer will not require 28-day compressive strength test cylinders for concrete pavement repairs.

Table 603-1
Opening to Traffic Strengths

From Casting to Scheduled Opening	Concrete Grade	Minimum Flexural Strength
<72 hours	Grade P-NC	300 psi
≥3 days	Grade P1, P1M	550 psi

Provide the cement and admixture combinations necessary to obtain the strength specified in Table 603-1 in the required time period. Do not use

a calcium chloride admixture. Provide coarse aggregate with no greater than 2.5 percent absorption in accordance with ASTM C 127.

The Engineer will proportion Grade P-NC mixtures. Provide the mixture as ready-mixed concrete, with the required consistency, to the project.

Use Grade P-NC concrete patching mixture containing 658 pounds per cubic yard (7 sacks) of cement when the forecasted air temperature is above 59 °F. Use 752 pounds per cubic yard (8 sacks) of concrete when the forecasted air temperature is 59 °F or less.

The Contractor may provide a non-chloride, Type C, or Type E, set accelerating admixture, from the Qualified Products List, with the required cement content to achieve the flexural strength of 300 psi by the required opening-to-traffic time.

603.03. Construction.

A. **Equipment Requirements.** Provide equipment necessary to perform the work in accordance with section 602 and the following:

1. **Drilling Machine.** Provide a drilling machine and use methods to drill holes in the existing pavement vertical surfaces in accordance with the following:

    a. Drill the holes to the required diameter and depth (±½ inch) midway between the top and bottom surfaces of the concrete pavement.
    b. Drill holes parallel to the pavement surface and parallel to the longitudinal joint within a tolerance of ±⅛ inch.
    c. When positioned against the face of the existing pavement, drill holes parallel to the longitudinal joint.
    d. Support the drill on rails that rest on the pavement surface at both ends of an 8 foot long repair, or by other alignment methods approved by the Engineer, to ensure holes meet the requirements of subsection 603.03.A.1.b.
    e. Provide a drill that uses mechanically applied pressure for forward and reverse travel. Match the drill and pressure mechanism to drill the nominal depth holes to prevent cracking the concrete and causing spalls more than ½ inch horizontally or vertically.
    f. Equip the drill with a snug fitting drill guide bushing, positioned against the face of the concrete to prevent eccentricity or overriding of the holes more than 1/16 inch, and to maintain the alignment tolerances.
    g. Space bars in accordance with Standard Plan R-44 Series.

h. Drill dowel bar holes and deformed tie bar holes for transverse joints with a diameter of 1⅜ inch, and 9 inches ±⅜ inch deep.
i. Drill deformed lane tie bar holes for longitudinal joints with a diameter of ¾ inch and 7 inches ±⅜ inch deep.

2. **Grout Dispenser.**

   a. **Bulk Grout Systems.** For bulk grouting, provide a grout dispenser and static mixing nozzle system recommended by the grout material manufacturer. Use a machine that proportions the components, mixes the components as they are extruded through the static nozzle, and deposits the mixed material in the back of the hole.

      If using a bulk grout system, provide two bulk grout dispensers on the project or provide one bulk grout dispenser and a two-day supply of prepackaged grout material, dispensers, and static mixing nozzles.

   b. **Prepackaged Injection Grout Systems.** For prepackaged injection grouting, provide a grout dispenser and static mixing nozzle supplied by the manufacturer of the grout material. Use a static mixing nozzle capable of depositing grout to the back of the hole.

3. **Vibratory or Roller Screeds.** Provide a steel-shod vibratory screed, with the weight and vibrating frequency required to screed concrete flush with the existing pavement in a single pass.

   Provide a roller screed with the weight and speed required to screed the concrete surface flush with the existing pavement in two or more passes.

   Provide screeds at least 6 inches longer than the width of the concrete pavement repair.

4. **Diamond Grinding Equipment.** Provide diamond blades, spaced as required for the application, and mounted on a self-propelled machine designed for grinding and texturing pavement. Use equipment that will not cause damage to the underlying surface of the pavement. Do not use grinding equipment that ravels or spalls the concrete pavement, fractures aggregate, or damages the transverse or longitudinal joints. Provide grinding equipment that produces the required texture. To remove residue and excess water, provide vacuum equipment that extracts the slurry material from the pavement and prevents dust from escaping into the air.

5. **Equipment for Sawing and Sealing Cracks.** Provide equipment for sawing and sealing cracks in accordance with subsection 602.03.A.13. Equip the saw with a diamond blade with a diameter of 8 inches or less.

B. **Construction of Concrete Pavement Repair.** Construct concrete pavement repairs, 50 feet long, or less, in accordance with section 602, except as modified by this subsection.

To make repairs, remove existing concrete pavement in sections at least 4 feet long. If the repair area is less than 4 feet from an existing joint, remove the existing concrete pavement to at least one foot beyond the joint. If the repair area is less than 8 feet from the next repair area, remove the concrete pavement between the two areas.

For repairs greater than 15 feet long, control the grade by separately casting adjacent lanes, ramps, or shoulders in the repair area.

For repairs greater than 50 feet long, establish and control grades in accordance with subsection 602.03.

If the lane adjacent to a repair area is damaged, cast the repair area and open to traffic, then perform the removal and recasting of concrete repairs in the adjacent lane. The Engineer must approve the adjacent lane repair.

1. **Removing Existing Pavement (Concrete Pavement Repair).**

   a. **Removing and Repairing Pavement Damaged by the Contractor.** The Engineer will not allow the use of removal equipment that damages the concrete pavement required to remain in place. If the plans do not show the disturbance of the base, complete the work in accordance with this subsection. Repair remaining concrete pavement, damaged during removal operations, at no additional cost to the Department.

      Saw cut, remove, dispose, and provide additional concrete to repair spalls at no additional cost to the Department. Fill isolated spalls, less than 10 square inches, with a hot-poured joint sealant. Repair the following in accordance with subsection 602.03.P.2:

      i. Isolated spalls, at least 10 square inches;
      ii. Numerous spalls in the same joint area; and
      iii. Intermediate spalls.

Repair major spalls in accordance with subsection 602.03.P.3 by re-sawing. Place the new saw cuts in line with, or at least 2 feet from, saw cuts in adjacent lane repair areas.

b. **Planned Pavement Removal and Repair.** Remove part-depth or full-depth hot mix asphalt (HMA) patches, included in the portion of pavement being removed, as removal of concrete, without regard to additional effort that may be involved in the removal of dissimilar materials. Avoid disturbing the base during removal.

If the plans show repair areas that include concrete shoulders, perform shoulder removal using the same method as concrete pavement removal.

If the repair areas include repairing concrete curb, curb and gutter, or valley gutter, remove the curbing adjacent to the repair and in line with the joints of the repair. If curbing removal leaves a section length, less than 6 feet from the saw cut to the nearest existing curb joint, remove the concrete curb to the existing joint. Construct the curb joint at the existing joint. Do not extend the joint created by the concrete pavement repair into the curb.

Do not begin sawing more than two weeks before concrete pavement removal. Saw the concrete full depth using multiple passes within the same 12-hour period, or in one pass. Make straight, transverse saw cuts, at right angles to the centerline of the concrete pavement, within a tolerance of ±1 inch per lane width. Saw the longitudinal joint full depth between adjacent lanes, ramps, shoulders, or curb and gutter. Use water, immediately after sawing, to flush slurry off the surface of the pavement.

Place concrete repairs the same day as the removal of existing concrete pavement. Remove concrete pavement between narrowly spaced saw cuts at the end of a slab with air hammers and hand tools. Except for utility cuts, install lifting devices in the slab. Lift the slab without disturbing the base. Clean the area with hand tools. Remove slurry from sawed surfaces.

2. **Installing Dowels or Deformed Tie Bars in Transverse Joints.** Drill the faces of the existing concrete pavement to allow the insertion of dowel bars or deformed tie bars. Re-drill holes that do not meet the required depth, diameter, and alignment at no additional cost to the Department.

After drilling the holes, clean with a blast of oil-free compressed air with at least 90 psi. Fully insert the air wand into the holes.

After cleaning the holes, fill with a grout selected from the Qualified Products List. Fill the holes with grout to their full length to ensure the grout covers the embedded length of the inserted dowel bars or deformed bars. Slowly insert the bars into the holes using hand pressure and a twisting motion, until fully seated. Wipe excess grout, extruded around the bars onto the face of the concrete, using a metal trowel. Do not proceed until the Engineer verifies the dowel bars are properly installed and the grout set.

For expansion joints (Erg), drill or punch the fiber filler to match the location of the holes in the existing pavement. Drill or punch the holes in the fiber filler to produce neat, clean holes without excessively tearing the filler. After grouting the dowel bars in place, install the filler and position it against the existing pavement. Extend the fiber filler the full depth of the repair and install flush with the existing pavement surface. Ensure fiber filler fully contacts, and covers the entire vertical surface of the sawed joint face. Place fiber filler in one continuous length across the joint, except for pavements wider than the nominal lane width, the Engineer will allow a short piece of filler.

Coat the portions of dowel bars that extend beyond the face of the existing pavement or the fiber filler with an approved bond-breaking coating. Do not coat deformed bars used with tied joints (Trg) or grouted-in-place lane ties with bond-breaking coating.

Install an approved expansion cap on the end of each dowel bar for expansion joints (Erg), after applying the bond breaker.

3. **Site Preparation.** If the plans show base corrections, excavate and backfill in accordance with section 205 and section 302. If the existing base is greater than 2 inches lower than the required grade, and the condition existed before concrete removal, correct the low base by adding base course aggregate and compacting to the required density and elevation. If the existing base is 2 inches or less below the required grade, or lower than the required grade as the result of concrete pavement removal operations, fill the area with concrete during repair construction.

   Set forms to the line and grade shown on the plans. Use one-piece forms for repairs 10 feet or less. For repairs greater than 10 feet, use forms that lock together or splice sections to provide a continuous form. Provide metal or wood forms. If using wood forms,

provide 2-inch thick lumber for shoulder side forms and 1-inch thick lumber for side forms between lanes.

Position and support reinforcement in accordance with the standard plans.

4. **Longitudinal Joints.** If casting more than one lane in a single pour, construct longitudinal joints in line with the existing longitudinal joints. Make the depth of the longitudinal joint ⅓ the thickness of the pavement. Construct longitudinal joints by sawing before opening to traffic or by forming. Do not construct an external longitudinal joint between concrete pavement repairs and concrete curbing or shoulders.

   Install lane ties in accordance with Standard Plan R-44 Series. Construct grouted-in-place lane ties in accordance with subsection 603.03.B.2, for deformed bars used with tied joints (Trg), except the Engineer will allow the use of handheld drills.

5. **Transverse Joints.** If the contract requires an existing curb left in place, and there is an expansion space in the adjacent lane repair, saw or chip an expansion joint (Esc) in the curb. Construct the joint in line with and equal width to the expansion joint in the adjacent lane repair. Shape the fiber joint filler to match the curb cross section.

6. **Placing Concrete.** Immediately before concrete placement, wet the faces of the existing pavement and the surface of the aggregate base with water.

   Cast each repair in one continuous full-depth operation. Consolidate the concrete using a hand-held immersion-type vibrator, approved by the Engineer. Consolidate the concrete around dowel bars, deformed tie bars, and deformed lane tie bars.

7. **Finishing Concrete.** Strike off the surface flush with the existing pavement surface at least twice with a vibratory or roller screed. Do not float in lieu of striking off. For repairs 15 feet long or less, place the screed parallel to the centerline of the roadway. For repairs greater than 15 feet long, place the screed perpendicular to the centerline.

   While the concrete is still plastic, check that the edges of the repair surface are flush with the edges of the existing concrete pavement, and test to ensure the repaired surface meets the required line and grade. Use a straightedge in accordance with this subsection.

For repairs 10 feet long or less, place the straightedge parallel to the pavement centerline with the ends resting on the existing pavement and draw the straightedge across the repair. For repairs 10 feet long, or less, use a straightedge no greater than 6 inches longer than the repair. Ensure the straightedge remains in contact with the existing pavement while drawing it across the repair. Correct high or low spots greater than ⅛ inch, recheck the surface after making corrections, and eliminate irregularities.

For repairs greater than 10 feet long, straightedge in accordance with subsection 602.03.I. Make the first and the last measurement with half the straightedge resting on the existing pavement. Make the second and the next to last measurement with 2 inches to 3 inches of the straightedge resting on the existing pavement. Correct high or low spots greater than ⅛ inch.

Before texturing, run an edger with a ⅛-inch to ¼-inch radius along the perimeter of the repair. Remove temporary forms after the concrete attains the strength required to prevent sagging or spalling upon removal of the forms.

8. **Texturing.** Texture the surface of the repair to match texturing on the adjacent concrete pavement.

9. **Stenciling.** Stencil the month and the year in each repair in accordance with subsection 602.03.L. If repair operations cause the removal of the existing stationing, stencil the station in the repair at the required location.

10. **Curing.** Apply curing compound immediately after free water evaporates from the concrete pavement surface. Do not delay curing compound application for other work during concrete pavement placing and finishing operations. Continuously apply curing compound.

    Use white membrane curing compound, unless the repair requires a bituminous overlay. For repairs requiring bituminous overlay, use transparent curing compound. Apply the required curing compound in two coats, at a rate of at least 1 gallon per 25 cubic yards for each coat.

    Stop concrete pavement placement if the curing compound application process fails to meet the requirements specified in this subsection. Maintain the placed and finished concrete in a continuously moist condition until membrane curing compound application. Fog mist the pavement without damaging the concrete pavement surface.

Reapply curing compound immediately to surfaces damaged by rain, joint sawing, Contractor foot traffic, or other activities.

Place insulated blankets to meet open-to-traffic requirements and protect the concrete pavement from weather damage. Provide insulated blankets at least 2 inch thick. When the air temperature falls below 50 °F during the curing period, place blankets over the repaired area, as soon as the curing compound dries. Secure edges and seams in the blanket to prevent heat loss. Protect the concrete until it attains the minimum flexural strength specified in subsection 603.02.

Conform to methods included in the concrete quality control plan, the method for achieving the open-to-traffic strength within the required time period.

The Contractor may use the maturity method to determine the in-place, opening-to-traffic flexural strength, if the Contractor makes the necessary preliminary flexural strength versus opening-to-traffic time correlations before placing the concrete.

Cure test beams for open-to-traffic strengths the same as the repair.

11. **Cleaning Joints.** Before blast cleaning, remove concrete from the top of the filler in the expansion joint. Immediately before sealing joints, blast clean, except tied joint (Trg), and clean with a jet of compressed-air, free of oil and water, with at least 90 psi. Place a silicone coated, paper bond breaker tape, with pressure sensitive adhesive on one side, in the bottom of the contraction joint (Crg) groove after the final cleaning and before sealing.

12. **Sawing and Sealing Joints.** Do not construct reservoirs for seals in the following joints that do not require sealing:

    a. Longitudinal bulkhead joints;
    b. Joints in base course repairs;
    c. Joints in repairs constructed in preparation for HMA overlays; and
    d. Reinforced grouted tied joints.

    For all other joints and saw cuts in concrete pavements, shoulders, or gutters, caused by overcutting, clean and seal using hot-poured joint sealant.

    Before sealing joints with fiber filler, remove the joint fiber filler at the concrete pavement surface by sawing 1 inch wide and 1½ inches deep.

Saw joint grooves for the contraction joints (Crg) as required by the contract.

Saw joint grooves for C2 joints and E2 joints after the concrete pavement attains the strength required to prevent excess raveling or spalling, but before random cracks develop. The Engineer will not allow forming of joint grooves. Saw the initial relief cut and extend the groove to the plan width and depth in accordance with subsection 602.03.N, or initially saw to the width and depth shown on the plans.

13. **Resealing Transverse and Longitudinal Pavement Joints.** After completion of concrete pavement repairs, spall repairs, and pavement texturing, seal transverse and longitudinal concrete pavement joints with hot-poured sealant in accordance with subsection 602.03.S. Resaw the transverse and longitudinal joints over the existing joint groove to produce a finished joint with two freshly sawed faces. Immediately after sawing, flush the joint groove with water to remove the slurry and debris. After final cleaning of the joints, insert a backer rod into the joint, creating a 1:1 width to depth ratio for hot-poured sealant. Seal the joint groove to no greater than ⅛ inch (after cooling) below the concrete pavement surface.

14. **HMA Shoulder Replacement.** Before opening to traffic, restore HMA shoulders to the existing line and grade using a plant-mixed HMA, as directed by the Engineer. Replace cold patch mixtures for temporary patching with plant-mixed HMA, unless the plans show shoulder reconstruction as part of the project. Compact the HMA using mechanical or hand methods required for the size of the repair area. Fill the voids and compact flush with the surrounding shoulder. Place HMA at the required compaction temperatures.

    Properly dispose of materials removed from the shoulder.

15. **Opening to Traffic.** Ensure the concrete pavement attains the required minimum flexural strength, and ensure joints are sawed in accordance with subsection 603.03.B.12 before opening to traffic. The Engineer will allow traffic over the repair before the Contractor cleans and seals the joints.

C. **Diamond Grinding Concrete Pavement.** Complete joint restoration work, except sealing, before diamond grinding.

Diamond grind concrete pavement in the longitudinal direction beginning and ending at lines perpendicular to the pavement centerline. Stop grinding if conditions cause water to freeze.

Do not disturb Reflective Pavement Markers (RPM). Taper grinding to the existing pavement surface within 2 inches of the RPM.

Texture at least 95 percent of the pavement surface unless otherwise directed by the Engineer. The Engineer will not require extra depth grinding to eliminate minor depressions.

After initial grinding, regrind faulted areas, greater than 1/16 inch, at transverse cracks and joints, until faulting is less than 1/16 inch.

Uniformly grind a parallel corduroy-type texture, consisting of grooves from 1/16 inch to 1/8 inch wide, 1/16 inch deep, and from 1/16 inch to 1/8 inch on center. Ensure the mean texture depth is at least 0.03 inch, in accordance with ASTM E 965.

Construct a uniform transverse slope with no depressions or misalignment greater than 1/8 inch when checked with a 10-foot straightedge. The Engineer will not apply straightedge requirements across longitudinal joints or outside ground areas. Provide for cross slope drainage.

To provide drainage and the required riding surface, transition grind auxiliary or ramp lanes from the mainline edge. The Engineer will determine the transitions from ground to unground pavement surfaces.

Seal joints after grinding.

1. **Control and Disposal of Grinding Residue.** Before beginning grinding, obtain the Engineer's approval of the grinding residue spreading and disposal method.

   Do not allow grinding residue to enter enclosed drainage systems.

   If approved by the Engineer, spread residue along the roadway slopes with the following restrictions:

   a. Spread residue at least 5 feet away from the curb.
   b. Do not spread the residue within 100 feet of a natural stream or lake.
   c. Do not spread residue within 5 feet of a water-filled ditch.

   If surface runoff occurs, collect and haul the grinding residue to an Engineer-approved location on the project. Collect, haul and dispose of grinding residue at no additional cost to the Department.

2. **Testing Diamond Grinding Residue.** The Department will take random samples of the grinding residue and cooling water for chemical testing. Allow Department personnel access to obtain the samples.

D. **Sawing and Sealing Pavement Joints.** Saw, or re-saw, clean, and seal longitudinal and transverse concrete pavement joints in accordance with subsection 602.03.S and the following.

Use low-modulus hot-poured joint sealant.

Repair spalls before resawing the longitudinal joint and as directed by the Engineer.

Saw longitudinal and transverse joints in new repairs as required by the contract. Resaw existing longitudinal and transverse joints from 1 inch to 1¼ inches deep, and from ¼ inch to ½ inch wide. Immediately after sawing, flush the joint groove with water to remove slurry and debris. Saw, or resaw, longitudinal joints before resealing the intersecting transverse joints.

Provide a final cleaning just before sealing, in accordance with subsection 602.03.R. After the final cleaning, insert a backer rod into the longitudinal joint to provide a 1:1 width to depth ratio of joint sealant.

Ensure the joint faces and pavement surface are dry before sealing joints. Seal the joint groove to no greater than ⅛ inch (after cooling) below the surface of the pavement.

E. **Sawing and Sealing Cracks.** Seal cracks with a hot-poured sealant as follows:

Saw cracks from ½ inch to ⅝ inch deep and from ⅜ inch to ½ inch wide.

After sawing, use hand tools or a lightweight chipping hammer to remove slivers of concrete, less than 1 inch wide, along the crack. Immediately before sealing, blast both faces of the sawed crack with dry abrasive to remove contamination and texture the faces. After dry abrasive blasting, clean the crack of debris and residue with oil-free compressed air with at least 90 psi.

Ensure the joint faces and pavement surface are dry before sealing joints. If the crack below the sealant reservoir is greater than ⅜ inch wide, insert a backer rod into the crack to form the bottom of the reservoir at the required depth. Seal the crack to no greater than ⅛ inch (after cooling) below the surface of the pavement.

If required by the crown of the roadway and the slope of the shoulder, fill the reservoir in two or more passes, place temporary dikes in the sealed reservoir, or use both methods. Remove the temporary dikes before the sealant fully cools and seal the resulting cavity. Apply the additional sealant before the previous application becomes contaminated.

603.04. Measurement and Payment.

Pay Item	Pay Unit
Pavt Repr, Rem	Square Yard
Saw Cut, Intermediate	Foot
Pavt Repr, Reinf Conc, __ inch	Square Yard
Pavt Repr, Nonreinf Conc, __ inch	Square Yard
Non-Chloride Accelerator	Gallon
Joint, Contraction, Crg	Foot
Joint, Expansion, Erg	Foot
Joint, Expansion, Esc	Foot
Joint, Tied, Trg	Foot
Lane Tie, Epoxy Anchored	Each
Diamond Grinding Conc Pavt	Square Yard
Sawing and Sealing Longit Pavt Joints	Foot
Sawing and Sealing Trans Pavt Joints	Foot
Resealing Trans Joints with Hot-Poured Rubber	Foot
Resealing Longit Joints with Hot-Poured Rubber	Foot
Crack Sealing, Conc Pavt	Foot
Cement	Ton

A. **Price Adjustments for Concrete Pavement Repairs.** The Engineer will determine the final concrete pavement repair thickness in accordance with subsection 603.04.C. The Department may core the concrete pavement repairs and will adjust the unit prices for repairs that do not meet the required depth or the required reinforcement location in accordance with subsection 602.04.

B. **Pavement Repair, Removal.** The Department considers **Pavt Repr, Rem** the removal of pavement sections without disturbing the base, as shown on the plans. The unit price for **Pavt Repr, Rem** includes the cost of the following:

1. Moving from repair to repair;
2. Saw cutting;
3. Removing adjacent concrete shoulders, curb, curb and gutter, and valley gutter;
4. Removing part-depth or full-depth HMA patches;
5. Lifting the repair section without disturbing the base;
6. Loading, hauling, and disposing of the removed material; and
7. Placing HMA mixture, as necessary, to restore the shoulders to the existing line and grade.

The Department will include the pay item, **Saw Cut, Intermediate** for sections of pavement on which the plans show **Pavt Repr, Rem**. The Department will not include the pay item, **Saw Cut, Intermediate** for

sections of pavement on which the plans show **Pavt, Rem**. The Department will pay for intermediate saw cuts for concrete pavement repairs over 6 feet long, but less than 50 feet long, to allow loading onto hauling units, as **Saw Cut, Intermediate**. The Department will not pay separately for additional saw cuts, made by the Contractor to reduce slabs into pieces smaller than one lane width by 6 feet long.

The Department will pay for the removal of portions of concrete that contain partial, or full-depth HMA patches as **Pavt Repr, Rem**.

C. **Pavement Repair, Reinforced Concrete, and Pavement Repair, Non-reinforced Concrete.** The Department will establish a concrete pavement thickness for repairs, as shown on the plans, based on the original plan thickness of the existing concrete pavement plus 1 inch. The minimum thickness of the concrete pavement repair may vary by no greater than ±1 inch from the thickness shown on the plans.

The Department will not pay separately for work required to correct low base conditions caused by Contractor removal operations. The Department will pay for site preparation to correct base, more than 2 inches below the required grade, not caused by Contractor operations, under the relevant pay items. If the contract does not include a relevant pay item, the Department will pay for base corrections greater than 2 inches deep, not caused by Contractor operations, as extra work.

1. **Repair.** The Engineer will measure **Pavt Repr, Reinf Conc**, and **Pavt Repr, Nonreinf Conc**, of the thickness specified, longitudinally along the pavement surface, and will use the transverse dimension shown on the plans.

   The unit prices for **Pavt Repr, Reinf Conc**, and **Pavt Repr, Nonreinf Conc** include the cost of the following:

   a. Moving from repair to repair;
   b. Providing, placing, finishing, texturing, stenciling, and curing the concrete;
   c. Providing and placing bar chairs and the steel reinforcement; and
   d. Providing additional concrete, as necessary, to correct low base conditions that do not exceed 2 inches measured from the required grade.

2. **Tied Joints (Trg).** The unit price for **Joint, Tied, Trg** includes the cost of the following:

   a. Removing saw slurry from the pavement surface and sawed faces;

b. Drilling and cleaning holes for dowel bars and deformed bars;
c. Providing, mixing, and installing grout; and
d. Providing and installing dowel bars or deformed bars.

3. **Contraction Joints (Crg).** The unit price for **Joint, Contraction, Crg** includes the cost of work specified by subsection 603.04.C.2 and the following:

a. Sawing the joint grooves;
b. Cleaning and preparing the joint groove;
c. Providing and applying the dowel bar bond breaker coating;
d. Providing and installing the bond breaker tape; and
e. Providing and installing the joint groove sealant.

D. **Concrete Grade P-NC.** If the Engineer determines the time from casting the repair area to the intended opening-to-traffic requires the use of Grade P-NC concrete mixtures, the Engineer will measure, and the Department will pay for the extra cement based on the following:

1. If the forecasted air temperature is above 59 °F, 94 pounds per cubic yard; or
2. If the forecasted air temperature is 59 °F and below, 188 pounds per cubic yard.

E. **Type C and Type E Non-Chloride Accelerator.** If the Engineer requires the addition of Type C or Type E non-chloride accelerator to the concrete mixture, the Engineer will measure, and the Department will pay for **Non-Chloride Accelerator** based on the quantity printed on the automated batch ticket. The Department will make deductions for wasted or rejected materials.

F. **Repair of Concrete Shoulders, Curbs, and Curb and Gutter.** The Engineer will measure repairs for concrete shoulders, curbs, and curb and gutter as **Pavt Repr, Nonreinf, Conc**, at the same thickness as adjacent concrete pavement repairs. The Department will pay for repairing concrete shoulders, curbs, and curb and gutter as **Pavt Repr, Nonreinf, Conc**.

G. **Joints.**

1. **Joint, Expansion, Esc.** The unit price for **Joint, Expansion, Esc** includes the cost of sawing and chipping the joint and providing and installing the joint filler material.

2. **Expansion, Erg.** The unit price for **Joint Expansion Erg** includes the cost of the following:

a. Making the saw cuts required at the ends of the repairs;

b. Removing the saw slurry from the pavement surface and sawed faces;
c. Drilling and cleaning the holes for the dowel bars and deformed bars;
d. Providing, mixing, and installing the grout;
e. Providing and installing the dowel bars and deformed bars;
f. Providing and applying the dowel bar bond breaker coating;
g. Providing, drilling or punching, and installing the fiber filler;
h. Providing and installing the dowel bar expansion caps;
i. Sawing the joint grooves;
j. Cleaning and preparing the joint groove; and
k. Providing and installing the joint groove sealant.

The Department will pay for sawing depths, greater than 1 inch below the depth shown on the plans, as extra work.

3. **Transverse Plane-of-Weakness Joints D1.** The Engineer will measure, and the Department will pay for transverse plane-of-weakness joints D1 in accordance with subsection 602.04.

4. **Transverse Plane-of-Weakness Joints U.** The unit prices for other concrete pavement repair pay items include the cost of transverse plane-of-weakness joints U.

H. **Lane Tie, Epoxy Anchored.** The unit price for **Lane Tie, Epoxy Anchored** includes the cost of the following:

1. Drilling and cleaning the holes;
2. Providing, mixing, and installing the grout; and
3. Providing and installing the deformed bars.

The unit prices for other pay items include the cost of final trim and clean-up, part-width construction, and restoring shoulders.

I. **Diamond Grinding Concrete Pavement.** The Engineer will include the final textured surface area in the measurement for **Diamond Grinding Conc Pavt**. The Department will not deduct minor areas of untextured pavement if the minor areas total no greater than 5 percent of the area shown on the plans.

The unit price for **Diamond Grinding Conc Pavt** includes the cost of collecting, hauling, and spreading grinding residue. The unit prices for other pay items include the cost of additional passes or regrinding to meet ride quality requirements.

J. **Longitudinal Pavement Joints and Transverse Pavement Joints.** The unit prices for **Sawing and Sealing Longit Pavt Joints** and **Sawing**

and Sealing Transv Pavt Joints include the cost of sawing or resawing, cleaning, and sealing the joints with hot-poured rubber.

K. **Resealing Transverse and Longitudinal Joints with Hot-Poured Rubber.** The Engineer will measure **Resealing Transv Joints with Hot-Poured Rubber** and **Resealing Longit Joints with Hot-Poured Rubber** in a straight line in the direction of each joint. The unit prices for **Resealing Transv Joints with Hot-Poured Rubber** and **Resealing Longit Joints with Hot-Poured Rubber** include the cost of removing existing sealants, cleaning, and sealing the joints.

L. **Crack Sealing, Concrete Pavement.** The Engineer will measure **Crack Sealing, Conc Pavt** in a straight line in the direction of each crack.