SECTION 605 -- CONCRETE PAVEMENT REPAIR

605.01 -- Description

1. This work shall consist of repairing portland cement concrete pavement at the locations shown in the plans or as designated by the Engineer. The work shall include removing deteriorated concrete, disposing of the old concrete, preparation of the repair area, and furnishing, placing, finishing, and curing the concrete for the repairs.

2. Concrete pavement repairs are grouped into 3 types based on the surface area of the patch (see Table 605.01). If a pavement failure extends across more than one lane, each lane will be counted as a separate repair.

Table 605.01

PCC Pavement Repair Groups	
Type	**Size (square meters)**
A	Less than 5
B	5 to 15
C	More than 15

3. Full width pavement panels shall be a minimum of 2 m in length.

4. Removal of concrete for partial depth pavement repair shall be to the depth necessary to reach sound concrete. The minimum depth of removal shall be 75 mm.

5. Full depth pavement repair shall be constructed on a prepared subgrade or foundation course as prescribed in the plans. The thickness of the new concrete pavement will be as shown in the plans or the thickness of the adjacent pavement, as appropriate.

605.02 -- Material Requirements

1. Repairs shall be made with Class PR1-20 or Class PR3-20 concrete when the repair work is done under traffic maintained conditions, and Class 47B-20 when traffic is detoured.

2. All materials shall be furnished by the Contractor and shall conform to the requirements in Table 605.02.

Table 605.02

Material Requirements	
Applicable Materials	**Section**
Portland Cement Concrete	1002
Curing Compounds (Without Asphalt Overlay)	1012
Curing Compounds (With Asphalt Overlay)	1013
Joint Sealing Filler	1014
Admixtures	1007
Water	1005

605.03 -- Equipment

1. A mobile mixer conforming to the requirements of Section 1002 may be used.

2. Adequate hand tools shall be provided, including an internal vibrator.

3. Vibrating screeds, either mechanical or hand operated, shall be used to finish the concrete.

605.04 -- Construction Methods

1. a. The Contractor shall remove the concrete pavement without damaging the adjacent concrete pavement.

b. The Contractor shall use a diamond blade to cut around the perimeter of the repair area to a depth of 50 mm.

c. The Contractor shall use hand or pneumatic tools to remove the concrete pavement. If the patch is full depth Type C, then a drop hammer may be used to remove the pavement.

2. The Contractor shall cut and chip the pavement edges to form vertical faces that are parallel or perpendicular to the traveled way.

3. The Contractor shall break the old pavement into manageable-size pieces and stockpile or dispose of them as shown in the plans.

4. When concrete dowel bars in longituidinal joints are damaged during concrete removal, they shall be replaced by the Contractor at no additional cost to the Department with reinforcing bars (16 mm in diameter and 460 mm in length). The new dowel bars shall be installed into holes drilled in the existing concrete and secured in place with an approved non-shrink grout.

5. If reinforcing fabric is encountered, it shall not be replaced.

6. When concrete tie bars in longitudinal joints are damaged during concrete removal, they shall be replaced by the Contractor at no additional cost to the Department with

reinforcing bars (16 mm in diameter and 460 mm in length). The new tie bars shall be installed into holes drilled in the existing concrete and secured in place with an approved non-shrink grout.

7. The Contractor shall compact the subgrade or foundation course under full depth patches to 100 percent of the maximum density as determined by NDR T 99 or NDR T 238. Water shall be sprinkled on the subgrade before placing the concrete.

8. Forms for concrete pavement repair shall conform to the requirements of Section 603, except that forms may be wood when the length of the patch is less than 4 m.

9. a. The surface of the partial depth concrete repairs shall be free from loose concrete, sand, and other debris and shall be maintained in a dry and clean condition before grouting.

b. The clean, dry surface shall be coated with bonding grout, which consists of equal parts of cement and grout sand mixed with water to a consistency of paint, just before placing the new concrete.

c. The grout shall be applied to the vertical faces and any cracks near the repair with a brush. Transverse and longitudinal joints shall not be coated with grout.

d. The grout's application rate shall be limited so the grout does not become dry before it is covered with new concrete.

10. The transverse and longitudinal joints shall be reestablished with a 12 mm wide closed cell thermo-setting polyurethane or styrofoam bond breaker for the repair depth before placing new concrete.

11. The Contractor shall furnish and place the concrete. The concrete shall be handled and consolidated so there will be no separation of the aggregate and the mortar.

12. An internal vibrator shall be used to consolidate the concrete. Excessive vibration shall be avoided.

13. After the concrete is consolidated, it shall be struck off to a uniform height approximately 10 mm above the finished surface.

14. A vibrating screed that spans the paved surface shall be used to finish the concrete to the final elevation.

15. Immediately after finishing the concrete, it shall be floated with a magnesium bull float and then given a drag finish with wet burlap, carpet, or canvas in a direction parallel to the traffic flow.

16. The Contractor shall cut joints to match the existing pavement joints. Transverse joints shall be established by sawing to a minimum of one-third the actual thickness of the slab and then creating a well as shown in the plans.

17. The Contractor shall edge the surface that abuts a transverse joint to provide a well 10 mm wide and 15 mm deep.

18. The Contractor shall use an edging tool to finish all exterior edges of the new concrete.

19. a. The Contractor shall apply curing compound to all concrete pavement repairs.

b. White pigmented curing compound shall be used when surfaces are exposed to view.

c. The application rate shall be 0.2 L/m².

20. a. Class PR1-20 or PR3-20 concrete pavement repairs shall be covered with polyethylene film and insulation board immediately after the curing compound has been applied.

b. The insulation board shall have an R-value (thermal resistance) equal to or greater than 1.0 m²(°C/W).

c. The insulation board shall be protected from the rain.

d. Insulation must be covered with sheeting to form a tight seal around the concrete and must have an adequate anchor placed on it to keep the insulation in place.

e. Insulation board and sheeting shall be maintained for at least 4 hours.

21. a. Class PR1-20 or PR3-20 concrete pavement repairs shall not be opened to traffic until the compressive strength reaches 20 MPa. Table 605.03 is a guide to the minimum time before traffic will be allowed on new concrete.

Table 605.03

Time Unit Traffic Allowed (Class PR1-20 and PR3-20)	
Minimum Ambient Air Temperature (Degrees Celcius)	**Minimum Time Before Opening (Hours)**
Below 41	12
41 - 60	8
Above 60	4

b. Concrete shall not be placed when ambient air temperatures are expected to drop below 0°C during the cure period.

22. a. Class 47B-25 concrete pavement repairs shall not be opened to traffic until the compressive strength reaches 25 MPa. Table 605.04 is a guide to the minimum time before traffic will be allowed on the new concrete.

Table 605.04

Time Unit Traffic Allowed (Class 47B-25)	
Minimum Ambient Air Temperature (Degrees Celcius)	**Minimum Time Before Opening (Hours)**
Below 4	120
4 - 15	72
Above 15	48

b. Concrete shall not be placed when ambient air temperatures are expected to drop below 0°C during the cure period.

23. Disturbed or damaged areas in the existing surface shoulder resulting from the repair operation shall be repaired by the Contractor at no additional cost to the Department.

24. The Contractor shall seal all transverse and longitudinal joints as prescribed in Section 603.

605.05 -- Method of Measurement

The quantity of each type of concrete pavement repair is measured in square meters of pavement replaced in each separate lane.

605.06 -- Basis of Payment

1.

Pay Item	Pay Unit
Concrete Pavement Repair, Type A, Partial Depth	Square Meter (m^2)
Concrete Pavement Repair, Type B, Partial Depth	Square Meter (m^2)
Concrete Pavement Repair, Type C, Partial Depth	Square Meter (m^2)
Concrete Pavement Repair, Type A, Full Depth	Square Meter (m^2)
Concrete Pavement Repair, Type B, Full Depth	Square Meter (m^2)
Concrete Pavement Repair, Type C, Full Depth	Square Meter (m^2)
Concrete Pavement Repair	Square Meter (m^2)
Concrete Pavement Joint Repair	Square Meter (m^2)

2. When the Engineer directs that partial depth concrete pavement repairs are constructed with a thickness greater than what is shown in the plans, an adjustment will be made to provide compensation for the work. The adjustment will be as follows:

$$\text{Adjusted Unit Price} = \text{Bid Price} \times \frac{\text{(Actual Thickness Placed)}}{\text{(Thickness Shown in the Plans)}}$$

3. a. The 28-day compressive strength of each day's production will be determined from cylinder strength tests.

b. Payment shall be reduced by the amount prescribed in Table 603.02.

c. (1) The Contractor has the option to take 3 core samples at no additional cost to the Department. The average compressive strength of these cores will be used to determine the actual 28-day compressive strength of each day's production.

(2) Cores must be taken within 30 days from the date the concrete was poured.

(3) The Engineer shall select the site where the cores will be taken.

4. Payment is full compensation for all work prescribed in this Section.