

**501 – PORTLAND CEMENT CONCRETE MATERIALS**

- 501.2        Associated Specifications  
Except as hereinafter otherwise noted, the WDOT Standard Specifications for Highway and Structure Construction - latest edition, with all current supplemental specifications, are, by reference, made part of these specifications.
  
- 501.3        Material Source  
The source of materials for use on the project shall be subject to the approval of the Engineer.
  
- 501.4        Concrete  
Concrete shall consist of a mixture of the Portland cement, fine aggregate, coarse aggregate, and water, and shall be proportionally mixed in such a manner as to provide for a hard, durable, impervious substance, free from the effects of any spalling, disintegration, or cracking.
  
- 501.4.1      Cement Content  
Six (6) bags per cubic yard, unless otherwise specified in the special provisions. (High Early mix shall consist of a 7 bag mix, or as specified in the Special Provisions for the work).
  
- 501.4.2      Water  
Intended to be used with cement in concrete masonry shall be clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious substances. Water which is suitable for drinking or for ordinary household use shall be considered satisfactory.
  
- 501.4.3      Aggregates  
Coarse and fine aggregates furnished for use in concrete masonry shall conform to the pertinent requirements hereinafter set forth.
  
- 501.4.4      Fine Aggregates  
Fine aggregates shall consist of a combination of sand with fine gravel, crushed gravel, or crushed stone consisting of hard, strong, durable particles conforming to the requirements set forth in this section. At the time of its use, the fine aggregate shall be free of deleterious substances such as frozen material and all foreign material such as wood, hay, burlap paper, or dirt. The fine aggregate shall also be free from injurious amounts of organic impurities.
  
- 501.4.4.1    Size Requirements  
Fine aggregates for curb & gutter, sidewalk, and concrete pavements shall be well graded from coarse to fine and shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>% Passing (By Weights)</u>
3/8 inch	100
No. 4	90 - 100
No. 16	45 - 80
No. 50	10 - 30
No. 100	2 - 10

These above gradation requirements for fine aggregate represent the extreme limits to be allowed for use in determining the suitability of material from all possible sources of supply.

501.4.5 Coarse Aggregates  
 Coarse aggregates shall be those aggregates predominately retained on the No. 4 sieve. Coarse aggregates shall be clean, hard, durable gravel, crushed gravel, or crushed stone free from an excess of thin or elongated pieces, frozen lumps, vegetation, deleterious substances, or adherent coating which would be considered injurious. The amount of acceptable deleterious substances present in coarse aggregate shall be negligible. A maximum amount of allowable chert is 5% by weight.

501.4.5.1 Size Requirements  
 Coarse aggregate for curb and gutter and pavement shall be well graded combination of Size No. 1 and No. 2 between the limits specified in the following:

<u>Sieve Size</u>	<u>% Passing (By Weight) Size No. 1</u>	<u>% Passing (By Weight) Size No. 2</u>
2 inch	-----	100
1 1/2 inch	-----	90 - 100
1 inch	100	20 - 55
3/4 inch	90 - 100	0 - 15
3/8 inch	20 - 55	0 - 5
No. 4	0 - 10	-----
No. 8	0 - 5	-----

501.4.6 Sidewalk Size Requirements  
 Coarse aggregate for sidewalk shall be well graded between the limits specified above for Size No. 1 only.

501.4.7 Admixtures and Additives  
 The following admixtures and additives may be used in the mix design as long as they conform to the stated conditions. The use of other admixtures or additives without prior written approval of the Engineer is prohibited.

501.4.7.1 Air Entraining  
 Require six (6) percent ( $\pm$  one (1%) percent) air (by volume).  
 Air entraining admixture conforming to ASTM C 260 is permitted.

501.4.7.2 Fly Ash  
 Permitted up to twenty (20%) percent of the weight of the cement by weight. Only Type "C" fly ash will be allowed.

501.4.7.3 Maximum Mixing Time  
 One and one-half (1 1/2) hours.

501.4.7.4 Minimum Mixing Time  
 Twenty (20) revolutions prior to discharging.

501.4.7.5 Minimum Air Temperature at Time of Pour  
 Thirty-five (35) degrees and rising.

501.4.7.6 Concrete Temperature at Time of Pour  
 Minimum temperature fifty (50) degrees Fahrenheit.  
 Maximum temperature ninety (90) degrees Fahrenheit.

- 501.4.7.7 Compression Strength  
Minimum 3,500 P.S.I. @ 28 days.
- 501.4.7.8 Calcium Chloride  
The use of up to 2% calcium chloride in the concrete mix is permitted when temperatures may drop below freezing within 24 hours of finishing of concrete, unless reinforced concrete is specified.
- 501.4.7.9 Admixtures  
Except as noted above will not be permitted.
- 501.5 Concrete Requirements  
Concrete shall conform to Section 501.4.1 of these Standard Specifications.
- Ready mix concrete shall conform to Section 501.8, Wisconsin D.O.T. Specifications and also the requirements of the Standard Specifications for Ready Mix Concrete, ASTM C 94.
- The ready mix supplier shall furnish duplicate delivery tickets, one for the Contractor and one for the Engineer, which shall provide all pertinent information as specified in Section 501.8 of these Standard Specifications.
- Batching plants shall conform to Section 501.7.5, D.O.T. Specifications, and all scales used shall be certified by the State, prior to construction.
- The use of site mixed concrete shall not be permitted for Village sidewalk, curb & gutter, or pavements.
- 501.6 Concrete Design Mix  
The Contractor shall secure a concrete design mix from the concrete supplier, which conforms to the concrete requirements of these specifications. The exact proportions of fine and coarse aggregate and the amount of water used per cubic yard of concrete will be the responsibility of the Contractor. Prior to placing of any concrete, the Contractor shall submit to the Engineer for his review, the name of the concrete supplier and the concrete suppliers proposed design mix for the contract. The Engineer reserves the right to reject any, or all, design mixes and suppliers, if he feels that they will not meet the defined concrete requirement criteria. If a design mix fails to meet the requirements as specified, the Contractor shall remove any and all concrete installed which used the non-conforming design mix and replace it with concrete meeting these specifications at no cost to the owner. The design mix once reviewed by the Engineer, shall not be altered in any way without the consent of the Engineer.
- 501.7 Consistency  
The concrete consistency shall conform to section 415.5.4 of the D.O.T. Specifications. The consistency shall be tested and regulated by means of the slump test (ASTM C 143).
- 501.7.1 Jointing Material  
Expansion joint filler shall conform to the requirements of Section 415.2.4 of the D.O.T. Specifications.

501.7.2

Concrete Curing Agents

Curing shall be accomplished by the use of a liquid membrane- forming compound. Materials for moist curing of all concrete work shall be on hand at all times, shall be applied at a rate of 200 square feet per gallon, and shall conform to the requirements of ASTM C 309, White Pigmented.

501.8

Load Ticket

With each load of concrete delivered to the job, the concrete producer shall furnish duplicate delivery tickets, one for the Contractor and one for the Engineer, certifying to the following data pertaining to the concrete delivered.

- Date
- Name of ready mix concrete plant or other supplier
- Project location
- Truck number
- Type (Standard, A.E. or H.E.S.)
- Brand of cement used in batch
- Cement content in bags per cubic yard of concrete
- Aggregate size
- A.E. admixture, if used
- % Fly ash, if used
- Other admixtures (Only with prior approval of the Engineer)
- Batch out time
- Arrival time at job site
- Time truck finished unloading
- Total amount of water added after batching (in gallons)

## **502 - CONSTRUCTION STANDARDS & METHODS - GENERAL**

- 502.1      Construction Work Area  
The Contractor shall be liable for any damage caused beyond the construction work area, as noted above, unless otherwise specified in the Contract Documents. Restoration of the area within the construction work area shall be included in the bid price for the work being done.
- 502.2      Phasing of Work  
On all projects where both curb & gutter and sidewalk are to be constructed, the curb & gutter shall be installed prior to the installation of the sidewalk.
- 502.3      Damage By the Contractor  
Except as directed by the Engineer, the Contractor shall be responsible for the restoration of all areas outside the project limits of the contract. This shall include, but not be limited to lawn, pavement, sidewalk, curb & gutter, utilities, land survey monuments, trees, other vegetation, and topsoil.  
  
Any damage that causes a complaint to be registered against the Contractor shall require a written release from the complainant prior to processing final payment of the contract. The Contractor shall be responsible for negotiating and obtaining said written release.
- 502.4      Traffic Control  
The Contractor shall provide adequate traffic control devices in conformance with Section 900 of these Standard Specifications.
- 502.5.1    Concrete Pavement  
The standard Portland cement concrete pavement thickness shall be in accordance with Section 303.3.1 of these standard specifications.
- 502.6      Curb Ramps  
Any person constructing new curbs or sidewalks or replacing curbs or sidewalks within five (5) feet of a crosswalk within the Village of Slinger shall construct a curb ramp meeting the requirements of Section 505.5 of these standard provisions.
- 502.7      Date Stamp  
The Contractor shall mark the ends of all pavement, sidewalk, and curb & gutter placed with a date stamp. The date stamp shall contain the Contractor's name and the current year of construction. The Contractor shall place the date stamp at the end of his work at the point where it joins existing work. If only one section of sidewalk, or curb & gutter is being constructed, the new slab shall be marked on one end.
- 502.8      Paving Machine  
Paving machines will be permitted for the placement of concrete pavement, curb & gutter, and new sidewalk. No modifications to manhole frames and covers, or catch basin/inlet frames and grates shall be made to accommodate the use of paving machines. The Contractor shall be required to accommodate the standard Village manhole and inlet frames and covers as well as water valve boxes in his work. The Contractor shall make such modifications and adjustments to his work as required to accommodate the facilities. The Contractor shall also comply with the details of these Standard Specifications as to dimensions for curb & gutter.

502.9

Forms

Forms shall be of a minimum height equal to the thickness of the concrete slab. Forms shall be free from twists, bends, warps, and kinks and shall be of sufficient strength and rigidity to resist pressure or load.

Metal forms shall be used on all standard work and on sixty-five (65) foot or larger radius curves. Only in special cases, such as irregular shapes and short sections, will wood forms be permitted. If the Contractor has flexible metal forms that can be used on said special cases, he shall use the flexible metal forms instead of wood forms.

Wood forms are permitted for short sections of remove & replace sidewalk, new sidewalk and curb & gutter where full length forms are not practical. They shall be commercially surfaced two (2) inch thick planks having a minimum height equal to the proposed thickness of the concrete being poured. Standard 2 x 4's will not be permitted for sidewalk construction. Form lumber having less width may be permitted, but only on irregular shapes and on radii of less than sixty-five (65) feet.

Forms shall be staked and set to the proper line and grade.

String line grade shall be set not less than two hundred (200) feet in advance of the forms.

The forms shall be completely cleaned of all mortar and foreign substances. The forms shall also be thoroughly oiled before the concrete is placed into them.

The foundation under the form shall be firm and cut true to grade so that the form, when set upon it, will be firmly in contact with the foundation for its entire length and so that the form is set at the desired grade.

The conformity of the alignment and grade shall be checked with the required alignment and grade of the proposed work, and necessary corrections shall be made by the Contractor prior to placing the concrete.

Where any form has been disturbed, it shall be reset and rechecked.

Forms shall be set a reasonable distance in advance of the placing of the concrete, so that satisfactory alignment, both vertically and horizontally, can be obtained to the satisfaction of the Engineer.

In areas of fill, the forms shall be placed after the subgrade has been placed and compacted. Forms set before subgrade is compacted shall be removed and reset after compaction is completed. Compaction shall conform to Section 305 of these Standard Specifications.

502.10

Placing of Concrete

Concrete shall not be placed on projects until the Village Engineer has given written approval to the subgrade proofroll, crushed stone base course proofroll, and the pavement mix design.

Concrete shall not be placed before 7:30 A.M. or after 4:00 P.M. without the prior permission of the Engineer.

The Contractor may, with the approval of the Engineer, elect to use a machine for placing, forming, or consolidating the work. If a machine is used, the resulting work

shall be of such quality as to equal or exceed that produced by methods herein described.

The subgrade, forms, and any required reinforcement shall be checked and approved by the Engineer prior to the placing of concrete.

After any necessary corrections have been completed, the concrete shall be placed on a moist subgrade.

The concrete shall be placed in such a manner that will provide for one course construction. Placement in layers will not be permitted. The concrete shall be tamped, spaded, or vibrated in such a manner to prevent any honeycombing when the forms are removed. If honeycombing is found, it will be the decision of the Engineer whether to patch, or to remove and replace the defective section. The Contractor shall perform said patching or removal and replacement at no cost to the Village. If patching is allowed, the voids shall be filled with a well mixed grout composed of one (1) part Portland Cement and three (3) parts of fine aggregate. The surface shall then be finished to a true surface. No feathering of the grout will be allowed on exposed surface.

The concrete shall be placed promptly after mixing and in such a manner to prevent any segregation of the mix. The concrete shall be distributed to such a depth and sufficiently above grade so that, when consolidated and finished, the slab or curb thickness required by the plans will be obtained at all points and the surfaces will conform to all specified grades and slopes.

Placing of the concrete shall be continuous. In case of a temporary shut down, the unfinished end of the concrete slab or curb shall be covered with wet burlap. When the delays are of such a duration as to permit the concrete to attain its initial set, or if the delay exceeds more than thirty minutes, a construction joint shall be installed.

The placing of the concrete shall be discontinued whenever the finishing and curing operation cannot keep up with the placing, or whenever materials, workmanship, or the resultant product fail to meet the requirements of the contract.

The Engineer reserves the right to discontinue or halt any concrete placement if, in the opinion of the Engineer, the Contractor has failed to comply with any portion of the plans and specifications.

Concrete shall not be placed around any frames, castings, catch basin/inlets, or stop boxes until they have been properly aligned and/or accurately adjusted to the specified pitch, alignment, and grade required by the work.

502.11

Expansion Joints

A one-half (1/2) inch wide expansion joint shall be installed at the junction of the sidewalk and the back of curb. Where the sidewalk is constructed curbside, a one-half (1/2) inch wide expansion joint shall be installed between the walk and the curb.

A one-half (1/2) inch expansion joint shall be installed at the following locations; the junction of either side of the walk and a concrete driveway, the intersection of two concrete walks, and at the junction with a building or other stationary object.

A one-half (1/2) inch expansion joint shall be installed between the back of curb and a concrete driveway approach, at the ends of all radii for curb and gutter, and at points of curvature (P.C.) of curb and gutter curves.

A one-half (1/2) inch expansion joint shall be placed at two hundred and fifty (250) foot maximum intervals for sidewalk and curb and gutter.

At catch basin and storm inlet structures a one-half (1/2) expansion joint shall be installed in the curb and gutter on both sides of the structure at ten (10) from the edges of the structure.

The joint filler shall extend through the entire cross section of the curb and gutter and sidewalk and be placed flush with the exposed surfaces.

502.12

Sawcut Joints

Contraction joints at least one (1) inch in depth and approximately one-eighth (1/8) inch in width may be sawed in the concrete curb and gutter or sidewalk.

The sawing shall be done as soon as practical after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking takes place in the concrete.

Contraction joints in concrete pavements shall be constructed in accordance with WDOT standard detail drawing 13c 1-11 (Concrete Pavement Longitudinal Joints and Pavement Ties) for longitudinal joints and 13c 13-4 (Urban Doweled Concrete Pavement) for transverse joints. Contraction joints shall be sealed in accordance with section 506.4 of these standard specifications.

502.13

Finishing Concrete

Before the mortar has set, the concrete surface shall be worked until a uniform, thin mortar surface is obtained.

Immediately after the water glaze or sheen has disappeared, the surface shall be troweled smooth. The application of neat cement to the surface is prohibited.

After the surface has become partially set and the water glaze or sheen has disappeared, the surface shall be brushed lightly with a damp fine bristle broom. Care shall be taken in brushing so that scratches or ridges are not formed.

Forms shall not be removed until the concrete has been allowed to set.

502.14

Curing

Curing shall be required for all concrete masonry work and shall be accomplished by the impervious coating method. Failure to provide a sufficient amount of approved curing materials or failure to properly perform the requirements prescribed herein shall be cause for immediate suspension of concrete placing operations.

Curing of concrete shall be as described in Section 415.5.10 of the WDOT Specifications.

The curing material shall be applied to form a uniform coverage at the rate of not less than one (1) gallon per two-hundred (200) square feet of surface area, unless the manufacturer recommends a heavier application.

During hot weather, the forms shall be loosened as soon as practical without damaging the concrete. The sides of the work shall then be coated with curing

compound at the same rate as specified above.

502.14.1 Cold Weather Curing

Cold weather curing of concrete shall be in accordance with Section 415.5.13 of the WDOT Specifications as modified in Attachment 1 dated August 1999.

502.15 Protection Of The Work

Protection of freshly poured concrete shall be provided by the Contractor. The Contractor shall erect and maintain suitable barricades and employ watchmen as may be necessary to exclude (pedestrian or vehicular) traffic from the newly constructed concrete masonry until it has sufficiently cured that it will not be affected by the traffic.

The Contractor shall have sufficient materials available to protect the unhardened concrete against damage by rain or hail. When rain is imminent, the unhardened concrete shall be immediately covered with paper, plastic sheeting, or other suitable material, and planks or forms shall be placed along the edge of the work to hold the protective materials in place.

Prior to acceptance, any part of the concrete damaged by traffic, weather, or other causes shall be repaired or replaced by the Contractor in a manner satisfactory to the Engineer and at no cost to the Village in accordance with Sections 105.10. and 107.14 of the WDOT specifications.

Grinding or rubbing of minor defects will be allowed as an alternative to removal, provided the finish appearance is not damaged to the point of being noticeable.

Epoxy grout will only be permitted if the area of repair is minor and the color of the epoxy is similar to weathered concrete. Use of epoxy grout will not be permitted for repair of cracked sidewalk.

If, in the opinion of the Engineer, the repair work is not acceptable, the Contractor shall remove and replace the affected work at no cost to the Village.

502.16 Opening to Traffic

The contractor shall keep traffic off of all new concrete and shall not work adjacent to new concrete until the requirements of Section 415.5.15 of the WDOT specifications, as modified in Attachment 1 dated August 1999, have been met.

502.17 Construction Work Area Restoration

Restoration of the lawn area shall be done in conformance with the Section 700 on landscaping in these Standard Specifications and as specified herein.

Restoration shall be completed within ten (10) days after the area is disturbed.

Damage restoration outside the specified construction work area shall not be a pay item unless authorized by the Engineer prior to the Contractor disturbing the area.

502.18 Concrete Disposal

The Contractor shall properly dispose of all waste material from the project in accordance with Section 209 of these specifications.

502.19 Protection of Vegetation

The Contractor shall protect and preserve trees, shrubs, plantings, and other vegetation not shown to be removed in the Contract Documents. The contractor shall

repair all damage outside of the specified construction work area, to the satisfaction of the Engineer, and no cost to the Village.

## 503 - TESTING

503.1

### Cylinder Tests

The Contractor shall be responsible for making all cylinder samples required for the work. The Contractor shall pay for the taking of the cylinders, protection of cylinders until delivered to the certified testing lab, the transportation to the certified testing lab, the testing of the cylinders by the certified testing lab, and the cost of mailing a copy of the test results to the Engineer.

Test cylinders shall be prepared and handled in accordance with ASTM C-31 Standard Practice for Making and Curing Concrete Test Specimens in the field.

A minimum of one set of three (3) 12 inch x 6 inch diameter cylinders shall be prepared for each fifty (50) cubic yards, excluding the first five (5) cubic yards per pour day, as shown in the following chart.

<u>Amount of Concrete Placed Per Day</u>	<u>Test Cylinders Required</u>
< 5 Cubic Yards / Pour Day	0 Sets
5 - 60 Cubic Yards / Pour Day	1 Set
61 - 120 Cubic Yards / Pour Day	1 Additional Set
121 - 180 Cubic Yards / Pour Day	2 Additional Sets
181 - 240 Cubic Yards / Pour Day	3 Additional Sets

The Engineer may direct when the cylinders are to be taken, within the above guidelines. This does not, however, remove the responsibility from the Contractor for the taking of the test cylinders as prescribed above.

Unless specified otherwise in the Contract Documents, two of the three test cylinders shall be used for a 7-day and a 28-day compression strength test, leaving the third test cylinder as a spare. In exceptional cases upon written request by the Contractor, and for concrete sidewalk and curb and gutter the 7-day test and test cylinder may be waived by the Engineer thus requiring two cylinders per set instead of three.

503.1.1

### Test Cylinder Handling

Following the preparation of the test cylinders per ASTM C-31, they shall be covered with a plastic bag, and labeled as to the date made and the location, or address, of the pour. They shall then be placed in the box and surrounded with the bedding medium. The box shall be placed in a location of maximum shade and protection from the elements and other disturbances. They shall be left in that location until being transported to the lab. If weather conditions require, the bedding medium shall be kept moist during the initial curing period. Wet burlap may also be placed over the box to keep the samples cool.

Test cylinders are to be transported to the certified testing lab within not less than twenty-four (24) hours nor more than forty-eight (48) hours of being molded.

The certified testing lab shall send one copy of the test report directly to the Engineer as soon as the data from the seven (7) day and the twenty-eight (28) day tests are available.

503.1.2

### Failure of Cylinder Test

In the event that the twenty-eight (28) day cylinder fails to meet the required design compressive strength, the spare cylinder shall be tested. If the spare test cylinder also

fails to meet the required design compressive strength, the Contractor may elect to take a series of standard cores from the actual concrete in question. Said cores shall be taken and tested in accordance with ASTM Designation C-42 by a certified testing laboratory. If these test cores fail to show that the design compressive strength has been met, that lot of nonconforming concrete will be considered unacceptable and shall be removed and replaced by the Contractor at no additional cost to the Village. The Engineer will determine the quantity of material to be replaced based on the project testing data and an inspection of the completed concrete work. If the Engineer decides to leave the nonconforming materials in place, the concrete will be paid for at seventy-five (75%) percent of the contract unit price for the item of concrete work.

If the nonconforming materials are placed in a private development requiring acceptance by the Village and if the Engineer decides to leave the nonconforming materials in place, the Developer shall pay to the Village an amount equal to the quantity of nonconforming concrete multiplied by 0.25 times the average unit price submitted by the bidders awarded contracts for similar concrete items on public works projects in the Village during the year in which the concrete is placed and during the previous year. At the discretion of the Engineer, the Village may accept a 5-year warranty on the nonconforming concrete items in lieu of the payment described in the preceding sentence.

503.2

Slump, Air Entrained, and Concrete Temperature Testing

The Engineer shall complete all tests for slump, air entraining, and concrete temperature at no cost to the Contractor.

Failure of the concrete to pass the slump, air entrainment, or concrete temperature tests shall result in rejection of the load being tested. The Engineer may require that concrete placed prior to the testing be removed from the work. The Contractor shall not be compensated for additional costs for labor, equipment, materials, supervision, supplies, tools, or incidentals due to rejection of the materials by the Engineer.

## **504 - CURB & GUTTER**

- 5041      Scope of Work  
The work under this section shall consist of constructing new concrete curb and gutter or the removal and replacement of existing concrete curb and gutter of the dimensions and design shown on the plans or as specified in the Contract Documents. The work shall be placed in one course on the prepared foundation or base, at the specified locations, and to the required lines and grades.
- The Contractor shall furnish all labor, equipment, materials, supervision, supplies, tools, and incidentals for the work.
- 504.2      Jointing  
Curb and gutter shall be constructed in ten (10) foot sections with scored, sawed, or expansion joints separating the sections.
- 504.3      Expansion Joints  
Placement of expansion joints shall conform to Section 502.12 of these Standard Specifications.
- 504.4      Fill Areas  
The contractor shall excavate and fill as required to install the curb and gutter to the lines and grades shown on the project plans.
- All fill placed to necessitate the installation of curb and gutter shall meet the requirements of Section 303.2 of these Standard Specifications.
- 504.5      Base Material  
The Contractor shall undercut and place a minimum of six (6) inches of granular base under all areas where the curb and gutter is to be removed and replaced.
- In all areas where new curbs and gutter is to be placed, the contractor shall furnish and place the depth of base course shown on the plans.
- All base course material shall be furnished and placed in accordance with Section 303 of these standard specifications.
- 504.6      Curb Ramps  
The contractor shall remove and replace existing curb and gutter to facilitate the installation of new curb ramps. A suitable amount of existing curb and gutter shall be removed and replaced so that existing drainage patterns are maintained and no puddles are created.
- New curb ramps shall be constructed in accordance with Section 502.6 of these standard specifications.
- 504.7      End of Curb Transition  
When the curb and gutter terminates, said termination shall include a transition curb head which shall consist of tapering the curb head from a normal six (6) inch high curb to matching the gutter. The transition shall be one (1) foot in length. A one-half (1/2) inch expansion joint shall be located a minimum of six (6) feet and a maximum of ten (10) feet from the gutter end of the transition.

504.8

Driveway Curb Cuts

All materials used to construct the driveway approaches shall be in accordance with Section 501 of these standard specifications.

The driveway approach and the sidewalk sections located adjacent to the driveway shall be constructed with a minimum of seven (7) inches of concrete and with a minimum of four (4) inches of crushed stone or crushed concrete base. For driveway approaches and sidewalk at industrial locations, the concrete shall be a minimum of eight (8) inches and the base shall be a minimum of eight (8) inches.

Expansion joints shall be placed in accordance with Section 502.12 of these standard specifications.

Driveway curb cuts shall be constructed in one (1) of the following ways.

1. In areas where new curb and gutter is being installed and the location and dimension of driveways is known, the driveway curb cuts may be constructed during the construction of the curb and gutter.
2. The entire section of curb and gutter shall be removed and replaced. The contractor shall repair or replace any damaged pavement to the satisfaction of the Engineer.
3. The existing curb and gutter shall be cut from the back of curb using truck or rail mounted equipment specifically designed for this type of work. To allow for the cutting of curb, the area behind the back of curb shall be excavated a minimum of three (3) feet in width and a depth of one (1) inch below the elevation of the gutter.

The existing curb shall transition from the normal six (6) inch curb head to the driveway curb in a minimum of twelve (12) inches and a maximum of eighteen (18) inches.

The curb cuts shall be angled one (1) inch from the back of curb towards the gutter to allow for positive drainage into the gutter. The curb cut shall terminate a minimum of one-half (1/2) inches to a maximum of one (1) inch above the flow line of the gutter.

504.9

Measurement

Curb and gutter, completed in accordance with the terms of the contract, will be measured by length in feet along the base of the curb face or along the flow line of the gutter and such measurements shall be continuous along such line extended across driveway and alley entrance returns or ramps.

All excavation required for and performed during construction of curb and gutter, when covered by a bid item in the contract, will be measured for payment as provided in the specifications; however, when the contract does not provide a bid items for Excavation, such work required and performed will not be measured for payment but will be considered as subsidiary to and a part of the item of curb, gutter, or curb and gutter, as the case may be.

504.10

Payment

The quantity, measured as provided above, will be paid for at the contract unit price per foot installed and accepted by the Engineer. This price shall be full compensation for all work described above and for all excavation and preparation of foundation and all special construction required at driveway and alley entrances or curb ramps; for furnishing all materials, including concrete masonry, expansion joints, and

reinforcement tie bars; for placing, finishing, protecting and curing; for sawing of joints; and for all labor, tools, equipment and incidentals necessary to complete the work, including disposal of surplus material from excavation and restoring the site of the work provided.

## **505 - SIDEWALK**

- 505.1 **Grade**  
The standard grade of the walk is one-third (1/3) of an inch per foot above the top of the curb to the street side of the walk, with the distance being measured from the face of curb. In addition, the standard transverse pitch of the standard five (5) foot walk is 0.08 foot, or one (1) inch down toward the street.
- The maximum pitch, across the width of the standard five (5) foot walk, shall not exceed two-tenths (0.20) foot or two and a half (2 1/2) inches down toward the street.
- 505.2 **Jointing**  
Sidewalk shall be constructed in five (5) foot sections with construction joints separating the sections. The construction joints shall be prepared by scoring or sawing or by installing expansion joints.
- 505.3 **Expansion Joints**  
Placement of expansion joints shall conform to Section 503.15 of these Standard Specifications.
- 505.4 **Base Material**  
For all sidewalks, the Contractor shall furnish and place minimum of a four (4) inch crushed stone base. The crushed stone base shall meet the requirements of Section 303 of these standard specifications.
- 505.5 **Curb Ramps**  
Curb ramps shall have a slope not to exceed one (1) inch vertical to twelve (12) inches horizontal (8.33%).
- All curb ramps shall be constructed in accordance with WDOT standard detail drawing 8D 5-8 (curb ramps).
- Curb ramps shall be bordered on both sides of the ramp and on the curb line with a four (4) inch wide yellow paint stripe.
- A suitable amount of existing sidewalk shall be removed and replaced to in order to meet the maximum ramp slope specified above.
- 505.6 **Thickness of Sidewalk**  
Unless specified otherwise in the Contract Documents, the thickness of sidewalk shall be a minimum of seven (7) inches at locations adjacent to driveways and four (4) inches at all other locations.
- 505.7 **Measurement**  
Sidewalks, including curb ramps, will be measured by area in square feet, and the quantity measured for payment shall be the amount actually completed and accepted in accordance with the terms of the contract, computed from dimensions as shown on the plans or as altered by direction of the Engineer.

505.8

Payment

Payment for sidewalks, measured as provided above, will be paid for at the contract unit price per square foot, which price shall be full compensation for furnishing all materials, including concrete masonry, reinforcement and expansion joints; for all work described above and for all excavation and preparation of foundation, backfilling and disposal of surplus material; for placing and compacting the crushed stone base material; for placing, finishing, protecting and curing; and for all labor, tools, equipment and incidentals necessary to complete the work and restore the site of the work provided.

## **506 - CONCRETE PAVEMENT**

### 506.1 Scope of Work

The work under this section shall consist of construction of new concrete pavement or of the repair or removal and replacement of existing concrete pavement as shown on the plans or as specified in the Contract Documents. The work shall be placed in one course on the prepared foundation or base, at the specified locations, and to the required lines and grades.

The Contractor shall furnish all labor, equipment, materials, supervision, supplies, tools, and incidentals for the work.

### 506.2 Reinforcement

All concrete roadways within the Village of Slinger shall be non-reinforced with dowel bars meeting the requirements of Section 415 of the WDOT specifications. Dowel bars and tie bars shall meet the requirements of Section 505 of the WDOT specifications.

#### 506.2.1 Dowel Bars

The size, location and spacing of dowel bars shall be in accordance with WDOT standard detail drawing 13C 13-4 (Urban Doweled Concrete Pavement).

#### 506.2.2 Tie Bars

The size, location and spacing of tie bars shall be in accordance with WDOT standard detail drawing 13C 1-11 (Concrete Pavement Longitudinal Joints and Pavement Ties)>

### 506.3 Expansion Joint Filler

Expansion joint filler shall conform to the requirements of Section 415.2.4 of the D.O.T. Specifications.

### 506.4 Joint Sealer

All contraction and expansion joints and all sawed longitudinal joints in the concrete pavement shall be sealed with a hot-poured sealer. The material for the hot-poured sealer shall conform to the requirements of the specifications for joint sealants, hot-poured, for concrete and asphalt pavements, ASTM designation: D3405.

The operation of sealing shall be performed as soon as practicable upon elapse of the curing period and in any event prior to the time traffic of any kind uses the pavement. Joints shall not be sealed until they have been inspected and approved by the Engineer and cleaned if necessary.

Should any spalling of the sawed edges occur that would in the judgment of the engineer detrimentally affect the joint-sealing ability, such spalled areas shall be patched with an approved epoxy which shall be allowed to harden prior to installation of the joint seal. Each patch shall be true to the intended neat lines of the finished cut joint.

Application of the joint sealer shall be made when the joint surfaces are clean and dry.

#### 506.4.1 Joint Cleaning

Air compressors shall have suitable water and oil traps to eliminate oil and moisture adulteration of the concrete.

Jets of water and compressed air shall have sufficient pressure to thoroughly and completely clean the joint of any slurry, dust or debris, except that a minimum of 80 psi shall be used for compressed air.

Immediately after the second sawing of the joint is completed to final configuration, the slurry resulting from the sawing operation shall be completely removed from the joint and immediate area by flushing with a jet of water under pressure. The joint shall then be blown with a jet of clean, oil-free compressed air to remove the flushing water, all cuttings or other debris remaining on the faces or in the joint opening. When the joint is drysawed, the flushing with water may be omitted when the joint can be satisfactorily cleaned by compressed air. The newly exposed joint faces shall then be cleaned by sandblasting using a minimum of 1500 psi pressure. A multiple-pass technique shall be used until the surfaces are free of sawcutting fines that might prevent bonding. For final cleaning immediately prior to installation of the backer rod or sealer, as the case may be, the joints shall be blown clean with compressed air and left completely dry and free of sand. When placement of the joint sealant is delayed such as overnight or when debris or moisture accumulate in the joint or on the faces of the joint, the joint shall be blown out with clean, oil-free compressed air immediately prior to placement of the joint sealant.

#### 506.4.2 Applying Joint Sealer

The sealing compound shall be heated to the pouring temperature recommended by the manufacturer in an approved kettle or tank, constructed as a double boiler, with the space between the inner and outer shells filled with oil or other satisfactory heat transfer medium. The heating kettle shall be equipped with a mechanical agitator, positive temperature control and an approved dial thermometer for checking temperatures of the compound. The heating kettle, if and when operated on concrete, shall be properly insulated against the radiation of heat to the concrete surface.

The sealing compound shall not be heated above the maximum safe heating temperature. The maximum safe heating temperature shall be determined from tests made on samples from each lot or shipment of the material delivered to the project. When so approved by the engineer, the manufacturer's recommended maximum safe heating temperature shall be discarded.

Pouring of joints shall be made when the sealing material is at the required temperature and, insofar as practicable, the sealing compound shall be maintained at a uniform temperature during pouring operations. Pouring shall not be permitted when the temperature of the sealing compound in the applicator, as it is applied to the joint, is more than 10 F below the recommended pouring temperature. Pouring of the molten sealer in the joint opening shall be done with such equipment that the sealer completely fills the joint opening without overflowing on the adjoining surface and when finished, after shrinkage, the sealer is approximately ¼ inch below the adjoining surfaces. In the event satisfactory sealing of a joint is not accomplished in a single pouring the sealing compound shall be placed in two pourings. At least one-half of the required amount shall be placed in the first pouring, and the second pouring shall follow the first as soon as practicable after the first pouring has attained maximum shrinkage but not later than one hour after the first pouring.

#### 506.5 Forms For Slip Form Paving

Whenever forms, box-out lumber, etc. are used, they shall be of a height equal to the thickness of the concrete immediately adjacent to the boxout. Wood forms shall be two (2) inch surfaced plank. Lumber of less thickness will be permitted only on irregular shapes and short curves.

Whenever the paving machine deviates from proposed alignment to pave around hydrants, poles, etc., forms shall be set to proper grade at these locations to contain the concrete.

During the finishing of the curb opening for a driveway, forms of proper height shall be set to maintain the section of the pavement.

506.6 Driveway Openings  
The contractor shall construct driveway openings at the locations and dimensions shown on the project plans.

506.9 Expansion Joints  
Expansion joints shall be constructed in accordance with recognized standards of the American Concrete Pavement Association.

506.10 Utility Fixture Boxouts  
The contractor shall construct utility fixture boxouts (isolation joints) for all utility fixtures located within the concrete pavement in accordance with recognized standards of the American Concrete Pavement Association. All longitudinal and transverse contraction joints in concrete roadways shall meet the requirements set forth in section 502.13 of these standard specifications.

506.11 Full Depth Patches  
The dimensions of concrete pavement repairs shall be reviewed and approved by the Engineer prior to sawcutting of the pavement.

Concrete pavement repair shall be in accordance with section 416.3.7 of the WDOT specifications.

Full depth patches shall be the same thickness as the existing pavement.

The edges of full depth patches shall be tied to the adjoining existing pavement using epoxy-coated deformed steel tie bars. The tie bars shall be one-half (1/2) inch diameter, two (2) feet long, and shall be placed at two (2) feet on center and in accordance with the requirements of Sections 416.3.5 and 505.2.6.2 of the Wisconsin D.O.T. Specifications.

506.12 Measurement  
Concrete pavement and concrete pavement repairs will be measured by area in square yards and the quantity to be paid for shall be the number of square yards of concrete pavement completed and accepted, measured complete in place. The width for measurement will be the width from outside to outside of completed pavement, but not to exceed the width as shown on the plans or as ordered by the engineer. The length will be the actual length measured along the riding surface.

Filletts for widened sections or at drain basins and similar locations, placed monolithic with the pavement, will be measured as pavement.

506.13

Payment

Payment for concrete pavement, and concrete pavement repairs, completed and accepted, measured as provided above, will be paid for at the contract unit price per square yard, which price shall be full compensation for all items listed above and for furnishing, hauling, preparing, placing, curing and protecting of all materials, including cement, concrete masonry, joints and joint materials, joint sealer, dowels and tie bars, unless otherwise provided; for preparing foundation, unless otherwise provided; for filling core holes; and for all labor, equipment, tools and incidentals necessary for constructing the pavement complete.

## **507 - MUDJACKING**

### 507.1 Scope of Work

The work under this section shall consist of the adjustment of concrete slabs by the process of mudjacking the slabs to bring them into alignment with the adjoining slabs. The work shall be at the locations shown on the plans or specified in the Contract Documents.

### 507.2 Materials

The materials for mudjacking shall consist of the proper proportions of topsoil, ground limestone, sand, Portland Cement, and water. A mix of stiff consistency shall be used for raising pavement slabs and a more fluid mix shall be used for filling voids.

Soils - less than 50% passing #200 sieve and more than 50% of coarse fraction passing #4 sieve.

Ground Limestone - 100% passing #50 sieve and less than 40% passing #200 sieve.

A minimum compressive strength for the grout mix of 300 psi at seven days shall be required.

The Contractor shall submit his mix design to the Engineer for review and approval prior to the start of the work.

### 507.3 Mudjacking Construction Requirements

#### 507.3.1 Size and Location of Holes

The holes in the slab through which the "mud" is to be pumped shall be approximately two and one-half (2 1/2) inches in diameter. The hole shall be core drilled the full depth of the concrete curb and gutter, sidewalk, or pavement section. The core removed shall be cylindrical in shape.

The hole locations shall be not less than twelve (12) inches or more than eighteen (18) inches from a transverse joint.

The holes shall be spaced not more than six (6) feet on center, so that not more than thirty (30) square feet of slab is raised by pumping into any one hole.

Cracked slabs shall not be raised.

For a pumping joint where faulting has not yet occurred, a minimum of two holes can be used.

For a pumping joint with one corner of the slab faulted, the hole at the low corner shall be set back to avoid raising the adjacent slab.

Additional holes may be required to ensure filling all the voids under the slab.

Holes shall be spaced so that they will all be the same distance apart and/or lay in circular patterns about each other.

If a slab is settled on one side or end and requires only a few holes in that section to raise it, the holes shall be spaced in the same relationship with the slab as if it were necessary to drill the entire section.

If offset adjacent slabs refuse to separate or slide, relative to each other, a saw cut shall be made along the entire joint and run the full depth of the slab.

507.3.2 Order of Pumping

For correcting a dip or sag in the pavement, jacking should begin at the low point in the sag and progress in such an order to prevent cracking of the slab. The mudjacking shall continue until the slab has been raised to the desired elevation. All holes shall then be pumped so that no voids remain under the slab.

Slabs shall not be raised more than one-quarter (1/4) inch while pumping in any one hole at any time. No part of a slab shall lead any other part of the slab or any adjacent slab more than one-quarter (1/4) inch at any time. When using two jacks, two adjacent holes shall not be worked simultaneously.

After jacking operations are completed, all holes shall be filled with a stiff grout. The grout shall consist of one part sand and three parts cement and shall be tamped into place and fluted to a smooth finish.

507.3.3 Line and Grade

Pavement sections shall be raised to the original roadway cross section in areas where entire sections of roadway have settled. In areas where only localized settlement has occurred, individual slabs shall be raised to the level of the adjacent slab. The completed operation shall produce a slab that is within one-eighth (1/8) inch tolerance of the desired finished grade.

Any pavement slab damaged in raising operations shall be removed and replaced by the Contractor at his own expense.

507.4 Method of Measurement

The method of measurement for mudjacking will be per square foot for concrete pavement and sidewalk raised and per lineal foot for curb and gutter raised.

507.5 Basis of Payment

The basis of payment for mudjacking shall be as measured above and paid for per the contract unit price for Mudjack Sidewalk. Said payment shall be full and complete compensation for all labor, equipment, materials, supervision, supplies, tools, and incidentals required to furnish, mix, and pump the mixture (as required to bring the work within the required alignment with the adjacent existing work) and to sawcut joints as specified above.

507.6 Restoration

After the work has been completed, the Contractor shall restore any damaged areas, clean up the site, and remove all waste materials from the surface and surrounding area to the provisions of Section 700 of these Specifications.

- END OF SECTION 500 -