

City of La Crosse Standard Procedures

By: City of La Crosse Engineering

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I. Demolition and Site Clearance

- A. No structure or accessory building shall be removed from the premises as a whole, or in a substantially whole condition, but all such structures and accessory buildings shall be demolished on the premises.
- B. Demolition and disposal of rubbish and debris shall proceed simultaneously.
- C. The City assumes no responsibility for the condition of existing buildings and structures and other property on the site, nor for their continuance in the condition existing at the time of issuance of the Invitation for Bids or thereafter. No adjustment of contract price or allowance for any change in conditions, which may occur after the Invitation for Bids has been issued, will be made.
- D. Once the demolition is started, it shall be continued until completed.
- E. A Wrecking Permit shall be procured from the Inspection Department before commencing demolition. There will be no charge for the permit.
- F. The Contractor shall comply with all applicable laws, ordinances and codes of the City of La Crosse and in particular, your attention is directed to Building Code, Chapter 16, General Building Restrictions 16.09 G (1) (2) (4):

Sec 103-103: WRECKING OF BUILDINGS AND STRUCTURES.

- 1. Before a building can be demolished or removed, the owner or his agent shall notify all utilities having service connections within the building, such as water, electricity, gas, sewer and other connections. The wrecking permit shall not be issued until a release is obtained from the utilities stating that their respective service connections and appurtenant equipment, such as meters and regulators, have been removed or sealed and plugged in a safe manner.
 - 2. Whenever a building is demolished, the roof and each upper story shall be taken down before the demolition of the next lower story is begun; no material shall be placed in such a manner as to overload any part of such building in the course of demolition; all brick, stone, timber and structural parts of each story shall be lowered to the ground immediately upon displacement; all dry mortar, lime, brick dust, plaster, or other flying material shall before and during removal be dampened sufficiently to prevent it from floating or being blown into the street or on adjoining property; and all sidewalks shall be protected by fences and scaffolds as required by this code for the protection of sidewalks during the erection of buildings.
 - 3. Excavations from demolished buildings or structures shall not be filled with any materials subject to deterioration. The Inspection Department, upon notification by the permit holder, the owner or his agent, in writing and upon form provided by the Inspection Department for that purpose, shall inspect each excavation, or any part thereof, before filling any excavations and it shall be unlawful to fill any such excavation without inspection and approval of the Inspection Department. Voids in excavations shall not be permitted.
- G. Whenever the Engineering Department determines that construction or repair work may endanger the traveling public, the Contractor, at the request of the department, shall erect roofed passageways extending over public thoroughfares at least six (6) feet, the roof of which shall be not less than a double thickness of 2 inch thick lumber.
 - H. If buildings to be demolished are surrounded by a number of trees and bushes, and if during demolition a sufficient number of limbs are broken or hanging to present a safety hazard, the Engineer will order the removal of such trees at no additional cost to the City.
 - I. No part of the abutting streets, including the public walks and boulevard areas, shall be occupied by the Contractor and his equipment. Boulevard trees, public walks and boulevards shall be preserved and properly protected.

- J. Upon request, the City Engineer may permit the Contractor and his equipment to occupy a maximum of one-third of the adjacent street area. Granting this permission does not change the Contractor's responsibility in regard to damage to private or public property.
- K. The Contractor's operations shall be confined to the parcels of land included in the demolition.
- L. Arrangements shall be made with the Police Department to prohibit parking of vehicles in the near vicinity of the actual demolition.
- M. The Contractor shall be responsible for all damage to private or public property as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all work performed until completion and final acceptance.
- N. In order to prevent the blowing of dust and dirt, the Contractor will be required to wet down and keep wet the structures before and during wrecking operations, all rubbish and debris stockpiled on the site, and all rubbish or debris is being loaded for disposal.
- O. All obstructions shall be adequately barricaded and lighted at night.
- P. Demolition and site clearance will consist of the demolition and removal of all structures and accessory buildings, walks, concrete slabs, retaining walls, trees and bushes, and including foundation walls, columns, floors, piers, partitions, walls, stoops and any other subsurface structures to the level of the demolition grade; filling all excavations to the existing ground elevation; and the grading and smoothing of the site. All shall be done in a lump sum bid.
- Q. When the work of demolition is substantially complete, the Contractor shall notify the Engineering Department that the work will be ready for final inspection.
- R. The Contractor shall comply with applicable laws and ordinances governing the disposal of materials, debris, rubbish and trash off or on the project area; and shall commit no trespass on any private property in the disposal of the materials without permission of the property owners involved.

II. Concrete Construction

A. SCOPE OF WORK

This section describes the proper specification and methods of mixing and placement of all concrete within the City of La Crosse Right-of-way and properties. It will include but not limited to sidewalk, curb & gutter, driveways/alleyways, and pavement.

B. CEMENT

The Portland cement shall conform to A.S.T.M. Designation C-150 with the following type:

1. Normal shall conform to Type IA and Type I may be used with the addition of an air entraining agent approved by the Engineer and added in amounts designated by the manufacturer.
2. High-Early strength shall conform to Type IIIA and Type III may be used with the addition of an air entraining agent approved by the Engineer and added in amounts designated by the manufacturer.
3. Extreme heat conditions shall conform to Type IIA and Type II may be used with the addition of an air entraining agent approved by the Engineer and added in amounts designated by the manufacturer.

C. WATER

Water shall be used and paid for by the contractor under the rules and regulations of the La Crosse Water Utility and shall be clean, free from oil, acids, alkali, or vegetable matter.

D. FINE AGGREGATE

Fine aggregate shall consist of sand, sandstone with similar characteristics, or a combination thereof. It shall meet requirements of the State of Wisconsin Sec. 501.3.6.3 of the Standard Specifications for Road and Bridge Construction, current edition.

The fine aggregate shall be well graded from course to fine and shall conform to the following requirements:

| <u>SIEVE SIZE</u> | <u>PASSING BY WEIGHT</u> |
|-------------------|--------------------------|
| 3/8" | 100% |
| No. 4 | 95-100% |
| No. 16 | 45-80% |
| No. 50 | 10-30% |
| No. 100 | 2-10% |

E. COARSE AGGREGATE

Coarse aggregate shall consist of clean, hard, durable gravel, crushed gravel, crushed boulders, or crushed stone. It shall meet the requirements of the State Department of Transportation of Wisconsin Section 501.3.6.4 of the Standard Specifications for Highway and Structure Construction, current edition.

| <u>SIEVE SIZE</u> | <u>PASSING BY WEIGHT</u> | |
|-------------------|--------------------------|-------------------|
| | <u>Size No. 1</u> | <u>Size No. 2</u> |
| 2" | ----- | 100% |
| 1" | 100% | 20-55% |
| 3/4" | 90-100% | 0-15% |
| 3/8" | 20-55% | 0-5% |
| No. 4 | 0-10% | ----- |
| No. 8 | 0-5% | ----- |

F. AIR ENTRAINMENT

Air-Entrained Concrete shall be produced, as previously set forth, by the use of Air-Entraining Portland Cement, by an admixture used with Non-air-Entraining Portland Cement or by a combination of an admixture with Air-Entraining Portland Cement under the circumstances hereinafter delineated.

The Contractor will be required to follow an approved procedure for adding the specified amount of air-entraining admixture to each batch and will be held responsible for its uniform operation during the progress of the work.

Unless specified otherwise, Air-Entrained Concrete shall contain 6.0 percent air, plus or minus 1.5 percent. The quantity of admixture to be used shall be sufficient to provide such percentage.

Field or commercially prepared solutions of the air-entraining admixture shall be added to the batch as prescribed in the Department of Transportation Standard Specifications, current edition.

For stationary or truck mixers the air-entraining agent shall be measured and introduced into the batch by an approved mechanical dispenser capable of being pre-set to deliver a specified quantity of admixture to each batch.

In the event the Contractor uses air-entraining cement and the quantity of entrained air is outside of the range specified to the degree that it cannot be corrected by slightly varying the ratio of sand to coarse aggregate or the mixing procedures, and the amount of air is beyond the maximum permitted, the cement causing such excess air will be rejected. The mixing time in no event shall be reduced below the minimum required elsewhere in the specifications. In the event insufficient air is entrained, which cannot be corrected as set forth in the above, the Contractor may increase the amount of air produced, by the addition of a sufficient amount of

the admixtures previously described as are approved by the Engineer as compatible with that originally interground, to yield the desired results.

Tests for air-entrainment will be made throughout the progress of the work with such frequency and at such intervals as the Engineer may deem necessary to assure compliance with the requirements therefore.

The field determination of entrained air in the concrete shall control in the matter of acceptability of the Air-Entraining Portland Cement or other materials over the laboratory tests determining the potential properties of the respective materials themselves.

The tests for air-entrainment will be made on the freshly produced concrete.

In making the tests the Engineer may employ such accepted procedure as will measure the volume of air directly. Such tests, however, shall be subject to a check test at the request of the Contractor in the event of dispute or controversy over the method otherwise selected by the Engineer for these purposes, which check test shall be performed in accordance with the Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method, ASSHD Designation: T 152.

G. STEEL REINFORCEMENT

See Section #3 for requirements.

H. PROPORTIONING

The following table sets forth the master limits of the job mix for the several grades of concrete, and designates the quantities of materials and relative proportions for each grade of concrete. For Air-Entrained High-Early-Strength Concrete, as required or permitted when High-Early-Strength Cement is used, the proportions shall be as given in the table.

The quantities of aggregates set forth in the tabulations are for oven dry materials having a bulk specific gravity of 2.65. For aggregates having a different specific gravity, the weights shall be adjusted in the ratio that the specific gravity of the material used bears to 2.65.

MASTER LIMITS OF JOB MIX

| Concrete Grade & Class | Nominal Cement Factor (SKs./Cu. Yd.) | Water-Cement Ratio (Gals./Sk.) | | SPECIFIED QUANTITIES FOR A * NOMINAL 1 CUBIC YARD OF CONCRETE | | | |
|------------------------|--------------------------------------|--------------------------------|-------------|---|--------------------------|-----------------------------|------------------------|
| | | Alld. | Max. (Lbs.) | Total Cem. Coarse (Lbs.) | Total Fine & Agg. (Lbs.) | Fine Agg. (% of Total Agg.) | Max. Mix Water (Gals.) |
| A Air-Entrained | 6.0 | 5.1 | 6.0 | 565 | 3050 | 30-45 | 36 |
| B Air-Entrained | 4.25 | 6.8 | 8.0 | 400 | 3220 | 30-45 | 34 |
| C Air-Entrained | 7.0 | 5.1 | 6.0 | 660 | 2850 | 35-45 | 42 |
| D Air-Entrained | 6.5 | 5.0 | 5.5 | 610 | 2960 | 30-45 | 36 |

*A "nominal" one cubic yard is defined as one having the above-prescribed quantities of cement and total aggregate, the "design" quantities of mixing water and an air-content of 6.0 percent.

The quantity of coarse aggregate shall be the difference between the total aggregate and the fine aggregate. The total quantity of coarse aggregate thus determined shall be proportioned between the two sizes as necessary to secure suitable workability and shall generally be within the range of 35-65 percent of Size No. 1 with Size No. 2 comprising the remainder, except when only one size is required.

The above mix is designed to produce a minimum 28-day compressive strength 3500 p.s.i. In the event that the test cylinders show strengths inconsistent with the desired strength, the City reserves the right to alter the design mix to achieve such results. Grade A concrete shall be used for concrete pavements.

I. JOB MIX

Prior to the start of construction, the successful contractor or his suppliers shall have an independent testing and engineering laboratory prepare a design mix under Section 501 of the Standard Specifications, State of Wisconsin, Department of Transportation. Any costs for setting up the design shall be borne by the Contractor. The design mix shall be submitted to the City Engineer for his approval.

From the master limits of the job mix adjusted as necessary for the specific gravities of the aggregate furnished, the independent testing and engineering laboratory will determine the job mix, using the lowest quantity or percentage of fine aggregate within the range shown therefore which, without exceeding the maximum quantity of water permitted, will yield a mix possessing the necessary workability.

The difference between the amount of fine aggregate so determined and the total aggregate shall be coarse aggregate so proportioned between the two sizes within the limits set therefore, except when only one size is required, as necessary to yield the proper workability. In the event the characteristics of the aggregates proposed for use on the job by the Contractor are such that a workable mix cannot be produced with the maximum limits of fine aggregate and water set forth in the tabulation, the quantity of total aggregates shall be reduced sufficiently and the mix re-proportioned so that a workable mix will be produced without exceeding the maximum permitted quantity of water.

The amount of water permitted shall include the free moisture in the aggregates, exclusive of the absorbed moisture determined as indicated in AASHTO Designations: T 84 and T 85. The amount of water to be introduced into the batch shall be just that portion of the maximum, which in the opinion of the Engineer will produce a mixture of the consistency, plasticity and workability meeting the requirements for the class of work being built. The Engineer will designate, as the work progresses, the amount of water to be introduced into each batch and adjustments shall be made only by him or at his direction. Determination of stockpile moisture of the aggregates or absorption of moisture by aggregate during the period of mixing and handling will be made by the Engineer throughout the construction period as job conditions warrant, and the Engineer will make such corrections in aggregate weights for moisture as are necessary. Within the limitations designated, the relative proportions of fine and coarse aggregate may be varied from the initial determination, as the characteristics of the aggregate necessitate, in order to maintain workability.

Except as hereinbefore set forth, no adjustments in the mix or its proportions shall be made, nor shall the quantity of total aggregate adjusted as necessary for the specific gravities and moisture content shown in the tabulation be exceeded.

No guarantee of yield is expressed or implied by anything contained in these requirements.

The specified amounts of aggregate shall be measured by weight into each batch. Equipment for weighting shall be approved by the Engineer. Cement in sacks may be proportioned by volume. Cement in bulk shall be proportioned by weight.

A uniform consistency shall be continuously maintained in consecutive batches of concrete. Slipformed pavement concrete and formed pavement concrete consolidated by vibration shall have a slump of 1 to 2 inches.

Formed concrete pavement, placed and consolidated by machine methods without vibration, shall have a slump of 1 ½ to 3 inches, except that when the Contractor elects to place Ready-Mixed Concrete and discharges the concrete directly upon the subgrade from truck mixers or agitators by use of spouts, the slump shall be from 1 to 2 ½ inches.

Pavement concrete placed and consolidated by hand methods may have a slump not exceeding 3 inches.

Slump tests of concrete shall be made in accordance with the Method of Test for Slump of Portland Cement Concrete, AASHTO Designation: T119.

J. ACCELERATED HARDENING OF CONCRETE

Concrete may, when permitted by the engineer, have a non-chloride hardening additive added to the mix to accelerate the hardening of the concrete.

The quantity of non-chloride additive to be used per batch shall follow the manufacturer's recommendations per sack (94 pounds) of cement. Calcium chloride **WILL NOT BE ACCEPTED** as a hardening additive in any circumstances.

K. SUB-GRADE

The subgrade shall be thoroughly compacted within two inches of proper elevation before the forms are set.

After the forms have been set, fine grading shall then be completed and the subgrade thoroughly compacted.

The street or alley subgrade shall be tested by means of a templet. The templet shall be so constructed to indicate correctly locations where the subgrade does not conform to specified elevation and section. High areas shall be trimmed and low areas brought to proper elevation. A subgrade planer shall be used immediately before concrete is placed as a final check. The planer shall have a cutting edge set to conform to subgrade. It shall be mounted on rollers or wheels and shall be of sufficient weight to shave off high spots.

Concrete shall not be deposited on a dry subgrade. The subgrade shall be well sprinkled with water in advance.

L. FORMS

1) BOARDS

Forms shall be of wood or metal, and shall be straight and of sufficient strength to resist springing, tipping, or other displacement during the process of depositing and consolidating the concrete.

The forms shall be of the full depth of the required item being poured and shall be of such design as to permit secure fastening.

They shall be set upon the prepared subgrade to proper line and grade and firmly staked in position. Before placing any concrete, the subgrade shall be thoroughly moistened and the contact surfaces of the forms shall be oiled.

2) REMOVAL

Forms shall not be removed until the concrete has set for at least 12 hours, unless authorized by the Engineer. Forms shall not be dropped or stacked on pavement, which is less than seven days old.

3) SLIP FORMING

The Contractor may, with the approval of the engineer, elect to use a machine for placing, forming, and consolidating curb, curb and gutter, combination curb and gutter, and or pavement. Such machine must be approved by the engineer and the resulting curb, curb and gutter, combination curb and gutter, or pavement shall be of such quality, and as per standard details, to equal or exceed that produced by method herein before described.

The slip form paving operation of depositing, spreading, consolidating and finishing shall be such that, insofar as possible, continuous operation of the paver will be maintained. Starting and stopping of the paver should be kept to a minimum. The concrete shall be vibrated, either externally or internally, with sufficient intensity to consolidate it throughout its entire width and depth. Whenever, for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately, and not restarted until the forward motion of the paver resumes.

Vibrators, when used for full width consolidation of concrete pavement slabs, may be either the surface pan type or the internal type with either immersed tube or multiple spuds. Such vibratory equipment shall meet with the approval of the engineer. It shall operate attached to the concrete spreader, finisher, or may be mounted on a separate carriage, and shall not come in contact with the forms or joint assemblies. The frequency of the surface pan type vibrators shall not be less than 4,000 impulses per minute and the frequency of the internal type not less than 5,000 for tube vibrators and 7,000 for spud vibrators, unless modified by the engineer.

Single spud type internal vibrators, either hand operated or attached to spreaders or finishing machines, and used to consolidate concrete pavement adjacent to forms, joints or fixtures shall have a frequency of not less than 4,000 impulses per minute.

The vibratory equipment shall be capable, when operated in accordance with the manufacturer's recommendations, of thoroughly and uniformly consolidating the concrete for its full width and depth.

A uniform consistency shall be continuously maintained in consecutive batches of concrete.

M. SITE MIXED CONCRETE

The Contractor and/or supplier may use site mixed concrete and must demonstrate to the Engineer that such concrete produced with such equipment in such plant will meet all the requirements for uniformly and quality contemplated under these specifications. The Engineer reserves the right to test scales at such plants or require that they be tested by an authorized testing firm or agency. In any case, however, when bulk cement is used it shall be weighed on a scale separate from those used for weighing other materials and in a hopper entirely free and independent of the hoppers used for weighing the aggregates. Concrete shall be mixed in a batch mixer of approved type and capacity for a period on not less than one minute. The mixer shall be equipped with an approved timing device to insure proper mixing time.

In the event equivalent results are not realized with the equipment on hand, such concrete will not be accepted from such plant unless and until the equipment is brought up to meet the requirements previously set forth.

N. READY MIXED CONCRETE

Ready-mixed concrete may be used in lieu of Site-Mixed Concrete. Ready-Mixed Concrete shall be construed to include central-mixed, transit-mixed and shrink-mixed concrete, described as follows:

Central-mixed concrete is concrete, which has been completely mixed in a stationary mixer and transported to the point of delivery with or without mechanical agitation in the transporting vehicle.

Transit-mixed concrete is concrete, which has been completely mixed in a truck mixer.

Shrink-mixed concrete is concrete, which has been mixed partially in a stationary mixer with the mixing completed in a truck mixer.

Except as hereinafter provided all of the requirements of the specifications will be applicable to Ready-mixed concrete.

Ready-mixed concrete shall be delivered at a rate that will assure reasonably continuous progress in the placing and finishing operations. In the event the time intervals between successive loads or batches are such as to cause a partial drying of previously placed concrete, the Contractor shall provide additional equipment of the kind necessary to preclude such delays. Failing in this the use of Ready-mixed concrete shall be discontinued and Site-mixed concrete shall be used.

Unless otherwise provided in the contract, concrete pavement, except continuously reinforced pavement, constructed with Ready-mixed concrete may be placed in either single-lane or double-lane widths in a single construction operation, provided that when the Contractor elects to place such concrete in double-lane widths, facilities for the production and delivery are such as to assure placement at a uniform rate of not less than 80 cubic yards per hour.

Ready-mixed concrete shall be delivered to the site of the work and be completely discharged from the transporting vehicle, other than non-agitating types, within the following time limits commencing with the introduction of the mixing water to the cement or the cement to the aggregates:

For Class C concrete, ---- 1 hour.

For Class A and B concrete, and for Class D concrete for use in seals, when the atmospheric temperature at time of placement is 60F or higher ---- 1 ½ hours.

For Class A and B concrete, and for Class D concrete for use in seals, when the atmospheric temperature at time of placement is 60F or higher ---- 1 hour.

These times may be reduced by the Engineer or Inspector under conditions contributing to quick stiffening of the mix, or during cold weather when loss of heat occurs to such an extent that the concrete will not be at the proper temperature when placed.

Except during the mixing revolutions, the drum or agitator of the vehicle shall operate at agitating speed until discharge of the mix.

The concrete at the time of delivery shall be uniform in composition, of the required consistency and shall have the required air content.

Non-agitating type truck haulage of concrete is not permitted.

Mixers may be stationary mixers or truck mixers and shall be of the revolving drum type or, subject to and with the written approval of the Engineer; they may be of other types specifically designed by the manufacturer for mixing purposes.

Agitators may be truck mixers or truck agitators. Each stationary mixer, truck mixer or truck agitator shall have attached in a prominent place, by the manufacturer, a metal plate on which is plainly marked the various uses for which the equipment is designed, the capacity of the drum or container in terms of volume of mixed concrete and speed of rotation of the mixing drum or blades.

When a stationary mixer is used for the complete mixing of the concrete, the mixing time for mixers having a rated capacity of one cubic yard or less shall be not less than one minute; for mixers having a rated capacity greater than one cubic yard, the mixing time shall be not less than one minute, provided that plant operating procedures are reasonably stabilized and controlled and that apparent blending of materials during charging is achieved to the satisfaction of the Engineer. Should such stabilization, control and blending not be so accomplished, the right is reserved by the Engineer to increase the mixing time to 75 seconds.

The maximum mixing time for stationary mixers shall not exceed the minimum hereinbefore specified for the respective size of mixer, by more than 60 seconds.

Transfer time in multiple drum mixers shall be counted as part of the mixing time.

For stationary mixers, the total volume of mixed concrete shall be computed on the basis of the nominal cubic yard of concrete as provided under paragraph 6, "Proportioning", and shall not exceed the manufacturer's rated maximum mixing capacity as given, for the type and volume of mixer used, in the latest edition of the Concrete Plant Mixer Standards of the Concrete Plant Manufacturer's Bureau.

When concrete is mixed in a truck mixer, each batch shall be mixed not less than 70 nor more than 110 revolutions of the drum or blades at the rate of rotation designated by the mixer manufacturer as mixing speed. Additional revolutions, if any, shall be at the speed designated by the manufacturer as the agitating speed. All materials, including mixing water, shall be in the mixer drum before mixing revolutions are started.

The mixing water shall be added at the batching plant but if additional mixing water is required to obtain the specified slump, water may be added with the permission of the Engineer. The total of all free and added water shall not be in excess of that permitted elsewhere in these specifications. If additional water is added at the site of the work, a minimum of 20 revolutions of the truck mixer at mixing speed will be required before discharge of any concrete. The additional water shall be added and the additional mixing done at the site of the work within 45 minutes after the introduction of the mixing water to the cement or the cement to the aggregates. This time may be extended, by the Engineer, to 75 minutes for those classes of concrete mixed under the conditions described in Subsection 501.8.2 for which the delivery time limit is 1-½ hours. When additional revolutions at mixing speed are required because of water added at the site, the total revolutions at mixing speed shall not exceed 110.

When a truck mixer or truck agitator is used for transporting concrete, which has been completely mixed in a stationary mixer, the drum or agitator shall rotate during transportation and until discharge at the agitating speed.

Truck mixers shall be equipped with an approved revolution counter and, unless equipped with an accurate and dependable device which will indicate and control the number of revolutions at mixing speed, the mixing shall be done at the job-site or at the batching plant and the mixing unit shall be operated at agitating speed between the plant and the job-site.

The foregoing requirement for a counter which records only at mixing speed or in lieu thereof mixing only at the plant or job site shall not apply to truck mixers operating from plants erected for the sole purpose of supplying concrete to highway projects when the delivery time is short enough so that the maximum number of revolutions for mixing cannot be exceeded in transit.

When a stationary mixer is used for partial mixing of the concrete (shrink-mixing), the mixing time in the stationary mixer may be reduced to the minimum required (about 30 sec.) to intermingle the ingredients.

When a truck mixer is used to finish the partial mixing done in a stationary mixer (shrink-mixing), each batch shall be mixed not less than 50 nor more than 110 revolutions of the drum or blades at the rate of rotation designated by the mixer manufacturer as the mixing speed.

For truck mixers, the total volume of concrete mixed per batch shall be computed on the basis of nominal cubic yard of concrete as provided under Paragraph 6, "Proportioning", and shall not exceed the manufacturer's rated capacity nor the following percentages of the gross volume of the drum.

**For complete mixing, 63 percent.
Partial mixing, initial (shrink) mixing done
in stationary mixer, 70 percent.**

O. PLACEING CONCRETE

Before placing concrete, forms, castings and frames shall be accurately adjusted and set to the required alignment and grade.

Concrete shall be placed immediately after mixing and in no case shall concrete be used which does not reach its final position in the form or slab, within 30 minutes after the time that the water is first added to the batch, except as specified under Ready-mixed concrete. The method and manner of placing shall be such as to minimize the possibility of segregation or separation of the aggregate.

Concrete retempered by adding water, or by any other means, shall not be used, except as herein stated in Paragraph 12.

The operation of proportioning, mixing, placing and finishing concrete for any monolithic unit shall, except as otherwise specifically provided, be as nearly continuous as possible.

The operation of depositing and consolidating the concrete shall conform to the pertinent requirements specified under the specific contract items and, in general, shall be conducted so as to form a compact, dense, impervious, artificial stone of uniform texture which shall show smooth faces on all exposed surfaces.

In case of a temporary shutdown, the concrete at the unfinished end of the slab shall be covered with wet burlap. When a delay of more than 30 minutes occurs, a construction joint shall be installed. Sections of pavement less than 10 feet in length between joints will not be permitted.

1) JOINTS

a) GENERAL

- (1) Longitudinal and transverse joints** shall be constructed as indicated on the plans and in accordance with these requirements. All joints shall be constructed true to line with their faces perpendicular to the surface of the pavement. Joints shall not vary more than $\frac{1}{4}$ inch from a true line or from their designated position. The vertical surface of the pavement adjacent to all expansion joints shall be finished to a true plane and edged to a radius of $\frac{1}{4}$ inch, or as shown on the plans. The surface across the joints shall be tested with a 10-foot straightedge as the joints are finished, and any irregularities in excess of $\frac{1}{8}$ inch shall be corrected before the concrete has hardened. When required, keyways shall be accurately formed with template of metal or wood. The gauge or thickness of the material in the template shall be such that the full keyway, as specified, is formed and is in the correct location. Transverse joints shall be at right angles to the centerline of the pavement and shall extend the full width of the slab. The transverse joints in succeeding lanes shall be placed in line with similar joints in the first lane. In the case of widening existing pavements, transverse joints shall be placed in line with similar joints in the existing pavement. All joints shall be so prepared, finished, or cut to provide a groove of sufficient width and depth to receive and effectively retain joint-sealing material.
- (2) Tie bars installed principally in longitudinal joints** or as shown on the plans shall consist of deformed bars of $\frac{5}{8}$ -inch diameter and 30 inches long, or as designated on the plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals of 30 inches, unless otherwise specified. They shall be held in position parallel to the pavement surface and midway between the surfaces of the slab. When tie bars extend into an unpaved lane, they may be bent at right angles against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. These bars shall not be painted, greased, or enclosed in sleeves.
- (3) Dowel bars or other load-transfer units** of approved type shall be placed across transverse or other joints in the manner as specified on the plans. They shall be of the dimensions and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. The dowel or load-transfer and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. A metal, or other type, dowel expansion cap or sleeve shall be furnished for each dowel bar used with expansion joints. These caps shall be substantial enough to prevent collapse and shall be placed on the ends of the dowels as shown on the plans. The portion of each dowel painted with rust preventative paint shall be thoroughly coated with asphalt MC-70, or an approved lubricant, to prevent the concrete from binding to that portion of the dowel. An approved metal dowel cap or sleeve conforming to the requirements as shown on the standard detail sheet shall be furnished for each dowel bar used in expansion joints. The caps or sleeves shall fit the dowel bar tightly and the closed end shall be watertight. In lieu of using dowel assemblies at contraction joints, dowel bars may be placed in the full thickness of pavement by a mechanical device approved by the Engineer.

b) INSTALLATION

If the paving mixer is operated from an adjacent lane, any joint materials required shall be set immediately after the final testing of the grade. If the paving mixer is operated from the lane being poured, the materials shall be set immediately after the mixer moves forward to permit as much time as possible for proper installation. All joint materials required shall be put in place on the completed and accepted grade. The materials and joint position shall be either at right angles or parallel to the centerline of the pavement, except for fillets or irregular sections. The top of an assembled joint device shall be set at the proper distance below the pavement surface and the elevation shall be checked.

Such devices shall be set to the required position and line and shall be securely held in place by stakes or other means during the pouring and finishing of the concrete. The pre-molded joint material shall be placed and held in a vertical position; if constructed in sections, there shall be no offsets between adjacent units. Dowel bars shall be checked for exact position and alignment as soon as the joint device is staked in place and the device shall be tested to determine whether it is firmly supported. Any joint installation not firmly and securely supported shall be reset.

When joints in concrete pavements are sawed, the joints shall be cut at the time and in the manner approved by the Engineer.

The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions and at the required rate. The Contractor shall provide at least one standby saw in good working order. An ample supply of saw blades shall be maintained at the site of the work at all times during sawing operations. The Contractor shall provide adequate artificial lighting facilities for night sawing. All of this equipment shall be on the job both before and at all times during concrete placement.

The circular cutter shall be capable of cutting a groove in a straight line; the circular cutter shall produce a slot at least 1/8 inch wide. When shown on the plans or required by the specifications, the top portion of the slot or groove shall be widened by means of a second shallower cut or by suitable and approved beveling to provide adequate space for joint sealers. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing. Sawing shall be carried on both during the day and night as required. The joints shall be sawed at the required spacing consecutively in sequence of the concrete placement, unless otherwise approved by the Engineer.

c) LONGITUDINAL JOINTS

(1) Construction.

Joints necessary for lane construction shall be formed against suitable side forms (usually made of steel) with keyways, unless otherwise indicated in the plans. Wooden forms may be used under special conditions, when approved by the Engineer. In those instances where the keyed construction joint is not designated, a butt-type joint with dowels shall be installed. The dowels for this type shall follow section 3 and be greased. The edges of the joint shall be finished with a grooving tool or edging tool and a space or slot shall be formed along the joint of the dimensions, as indicated, to receive the joint sealing material. Provisions shall be made for the installation of tie bars as noted on the plans.

(2) Contraction or weakened-plane type.

The groove formed or sawed in the top of the slab shall be installed where indicated on the drawings. The groove shall be formed in the plastic concrete with suitable tools or material to obtain the width and depth specified, or it shall be sawed with approved equipment in the hardened concrete to the dimensions required. When the groove is formed in plastic concrete, it shall be true to line with not more than ¼ inch variation in 10 feet; it shall be uniform in width and depth; and the sides of the groove shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The sawed groove shall be straight and of uniform width and depth. In either case, the groove shall be clean cut so that spalling will be avoided at intersections with transverse joints. Tie bars shall be installed across these joints, unless otherwise shown on the plans.

d) TRANSVERSE JOINTS

(1) EXPANSION

Expansion joints for pavement shall be installed at the locations and spacing as shown on the plans. The joints shall be installed at right angles to the centerline and perpendicular to the surface of the pavement. The joints shall be so installed and finished to insure complete separation of the slabs.

Expansion joints for curb and gutter shall be placed at the end of all radii, i.e., street intersections, private or alley driveways, but in no case shall the distance between expansion joints exceed 160 feet.

Expansion joint material shall consist of one-half inch expansion joint filler conforming to the requirements of the standard specifications for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction, AASHTO Designation: M153, Types I, II, or III, or the Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction, AASHTO Designation: M213, as per State D.O.T. Standard Specification Latest Designation. Also approved for expansion joint filler material is material conforming to A.S.T.M. D-1751 Specifications and/or U.S. Federal Specification HH-F-35le Type 1.

Expansion joints shall be equipped with dowels of the dimensions and at the spacing and location indicated on the plans. The dowels shall be firmly supported in place and accurately aligned parallel to the subgrade and the centerline of the pavement by means of a dowel assembly, which will remain in the pavement and will insure that the dowels are not displaced during construction.

Other types of load-transfer devices may be used, when approved by the Engineer.

(2) CONTRACTION

Transverse contraction joints, weakened-plane joints, or both, shall be installed following the requirements below.

- i. Pavement: Shown on plans
- ii. Curb and Gutter: Minimum of 6 feet and a maximum of 12 feet
- iii. Sidewalks: Every 6 feet

These joints will be installed by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened in the same manner as specified. Dowel bar assembly shall be installed, when required, as shown on the plans. Reinforcing steel mesh or bars shall be continued through the weakened-plane joints as shown for reinforced concrete pavement.

(3) CONSTRUCTION

Transverse construction joints shall be installed, when it is necessary to suspend work for more than 30 minutes, in accordance with details on the plan. The standard transverse construction joint shall be used when such suspension of work can be planned in advance so that the joints is located at the normal location for contraction or expansion joint. Should the discontinuance of paving operations fall short of normal location of contraction or expansion joint, it will be required that a tied construction joint be installed, as shown on the standard detail. If the pouring of concrete has been stopped falling within the 8-foot limitations, the fresh concrete shall be removed back to the previous normal transverse construction joint.

e) SEALING JOINTS

Unless otherwise provided in the contract, all contraction and expansion joints in concrete pavement, which are required to be sealed, shall be sealed with Hot-Poured Elastic Type Joint Sealer equal to Sealtight Hi-Spec. Polymeric Compound and meeting Fed. Specs. SS-S-1401B and ASTM Specs. D3405. The sealer shall be installed in accordance with the manufacturer's recommendations, which includes "tooling" the surface of the sealant with a blunt instrument so that the surface is slightly concave and approximately one-quarter inch below the pavement surface. Tooling should be done before skin forms on the sealant, usually within ten minutes of application.

Each lot of the sealer shall be delivered in containers plainly marked with the manufacturer's name or the trademark and the date of manufacture.

A certificate of compliance (manufacturer's certification) to the effect that the material furnished complies with the specified requirements for the item shall be submitted to the Engineer in triplicate and acceptance of the material shall be obtained before installation in the work will be permitted.

Joints shall not be sealed until they have been inspected and approved by the Engineer.

Should any spalling of the sawed edges occur that would in the opinion of the Engineer detrimentally affect the joint sealing ability, it shall be patched with an approved epoxy and 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.

The operation of sealing shall be performed as soon as practical upon elapse of the curing period, and in any event; prior to the time traffic of any kind uses the pavement. All joint sealing shall meet requirements of the Department of Transportation of Wisconsin, Standard Specifications for Highway and Structure Construction, current edition, Except for material to be used as specified above.

P. TEST SPECIMENTS

Test cylinders shall be taken by the contractor, project engineer, or project inspector per ASTM C 31. Cylinders shall be taken at the following minimums:

- 1) Curb and gutter: one 7-day and one 28-day cylinder for each 350 feet of gapped curb or 750 feet of continuous curb and gutter poured.
- 2) Bump-outs: one 7-day and one 28-day cylinder for each set of four bump-out or for each day of pouring.
- 3) Alley and Pavement: one 7-day and one 28-day cylinder for each lane of alley or pavement.

The project engineer or project inspector has the option of taking samples whenever they deem necessary.

The contractor shall provide cylinders and pay all transportation and testing costs. The unit price of curb and gutter or alley/pavement shall include these charges. Tests shall be tested by either a DOT approved/independent test laboratory approved by the City of La Crosse.

Q. CONSOLIDATION AND FINISHING

The sequence of operations shall be – strike-off, consolidation, screeding, float finishing, straight edging, joint finishing, edging, and final surface finish.

1. Strike-off and Consolidation:

The machine method of strike-off and consolidation shall be employed except that area where slab width is variable, or lanes of pavement less than 9 ft. in width, and other areas where in the opinion of the Engineer the use of machine methods is impractical, then hand methods may be allowed.

The machine equipment shall be of the screeding and troweling type, designed and operated both to strike off and to consolidate. The machine shall go over each area of pavement as many times as necessary to give the proper compaction and to leave a surface of uniform texture, true to grade and contour. At least three trips shall be required but if necessary, additional screeding shall be done. The concrete near the forms shall be vibrated or hand spaded.

All equipment operating over fresh concrete shall have adequate drip pans beneath the motors to protect the concrete from spillage of oil.

When the hand method is permitted, the entire surface shall be tamped until the required compaction and reduction of surface voids is secured. The strike-off or tamping templet shall be of steel or wood shod with metal. No less than four men shall be engaged in the exclusive work of strike-off.

Surface type vibratory screeds may be used for hand strike-off and consolidation, provided equivalent or better results are produced.

2. Longitudinal Floating:

Following the final trip of the finishing machine, the surface of the pavement shall be floated by an approved mechanical longitudinal float or by means of a hand-operated float. The float shall be rigid 10-16 ft. long, made of 2" X 6" metal shod plank. The float shall be operated with a sawing motion parallel to the road centerline with its bottom in full contact with the pavement, and pass gradually from one side of the pavement to the other. Floats of other designs may be used where found effective and approved by the Engineer. Advancing movements along the pavement shall be in increments of not more than one-half the length of the float.

3. Straight edging:

After the longitudinal floating has been completed, the slab surface shall be made smooth and tested for trueness by dragging a 10 ft. straightedge. The straightedge shall be placed at the center of the slab with the blade parallel to the centerline and pulled slowly and uniformly to the edge.

The advance along the road shall be made in stages not more than one-half the length of the straightedge. Any depressions found shall be filled and projections struck off.

4. Final Surface Finish:

The pavement shall be given a surface finish by brooming or burlap drag as set forth in Standard Specifications for Highway and Structure Construction, Dept. of Transportation, current edition.

5. Edging:

After final surface, but before the concrete has taken its initial set, the edges of the slab and the expansion joints shall be finished with an edger having a radius of not more than ¼" and the pavement left smooth and true to line.

6. Surface Test:

After the concrete has hardened, the surface of the pavement shall be tested with a 10 ft. straightedge. Any portion of the pavement which shows a variation or departure from the testing edge of more than 1/8 inch will be plainly marked and shall be removed or reduced by the Contractor by rubbing with a carborundum brick and water. Rubbing shall be discontinued as soon as the contact with the coarse aggregate is made. In no case shall the rubbing be done in such manner that the bond between the mortar and particles of coarse aggregate will be broken.

R. CURING

Immediately after finishing operations have been completed, the entire surface of the concrete shall be sealed by spraying thereon an impervious membrane. The liquid curing compounds shall conform to the requirements of the Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete, AASHTO Designation, M-148, Type 2, White Pigmented. Unless a greater rate of coverage is specified by the manufacturer, it shall be at 200 square feet per gallon of curing agent. Within 30 minutes after the forms are removed, the edges of the pavement shall be coated with curing compound.

S. PROTECTION OF CONCRETE

1. GENERAL

The Contractor shall protect the new pavement from traffic damage at his expense. This includes erection and maintenance of barricades, warning lights or signs, and watchmen to direct traffic. Traffic shall be excluded from newly constructed pavement for not less than 7 days when the temperatures are generally 70°F. or higher and not less than 10 days when the temperatures are generally not lower than 60°F. traffic shall be kept off for any length of time the Engineer may require up to 21 days. Any part of the pavement damaged by traffic or otherwise damaged prior to its final acceptance shall be repaired or replaced by and at the expense of the Contractor to the satisfaction of the Engineer.

2. COLD WEATHER/NIGHT

Except by specific written permission, concreting operations shall not be continued when a descending air temperature in the shade and away from artificial heat falls below 40 degrees F. nor resumed until an ascending air temperature in the shade and away from artificial heat reaches 35 degrees F. When operations are so permitted, and for all concrete pavements placed on and after October 1 and on or prior to May 15, the temperature of the mixed concrete as placed shall be not less than 50 degrees F or more than 80 degrees F.

If necessary, the water or aggregates or both may be heated. When the aggregates are frozen or contain frost, they shall be heated. Aggregates may be heated by steam or by other means in a manner which will heat the mass uniformly and preclude the possible occurrence of overheated areas. Mixing water shall be heated in such a manner that its temperature is accurately controlled.

The temperature of either the mixing water or the aggregates shall not be in excess of 100 degrees F. when placed together with the cement in the mixer, and the temperature of the water and the aggregates shall be such that the temperature of the batch of mixed concrete will not be less than 50 degrees F. nor more than 80 degrees F. If either the aggregate or the mixing water is heated to a temperature in excess of 100 degrees F the water and the aggregates shall first be mixed together in such a way that the resulting temperature of the combined water and aggregates is not in excess of 100 degrees F. before being mixed with the cement.

The Contractor shall take all precautions necessary to prevent freezing of the concrete and to produce quality concrete.

Beginning not later than October 1 or prior to May 16, as the case may be, the Contractor shall provide along the work a sufficient supply of curing paper to protect all of the concrete pavement placed within the preceding 72 hours. In lieu of the curing paper clear, black or white polyethylene sheeting; clear, black or white polyethylene coated burlap; or other curing paper which as determined by the engineer has water resistance strength and insulating properties suitable for the purpose, may be used. When the official Weather Bureau forecast for the construction area predicts freezing temperatures or below within the next 24 hours, all of the concrete pavement placed within the preceding 72 hours shall be covered with the curing paper. The paper shall remain in place until at least 7 but not more than 14 days shall have expired for the date of placement of the concrete.

Beginning on October 15, the Contractor shall cover with curing paper all concrete pavements placed regardless of temperature. The paper shall be placed, except on concrete placed prior to October 15 when freezing temperatures were not forecast, as soon as the concrete has been finished and has set sufficiently to prevent excessive marring of the surface. The paper shall be placed with not less than 12-inch end and side laps on adjacent sheets and necessary means shall be employed to hold the paper in place to form a closed joint. The paper shall extend sufficiently far over the pavement edges to completely seal and insulate the concrete. The paper covering

shall remain in place until at least 7 but not more than 14 days shall have expired from the date of placement of the concrete.

Beginning not later than October 15 a sufficient supply of straw or hay shall be provided along the work to protect the entire concrete pavement placed within the preceding 72 hours. All concrete pavement placed on or after October 15 shall be covered with paper as prescribed above and whenever the official Weather Bureau forecast for the construction area predicts freezing temperatures or below within the next 24 hours, all of the concrete pavement placed within the preceding 72 hours shall be covered with not less than 12 inches of loose, dry straw or hay. Other approved materials, including treated straw or hay, may be used in lieu of the loose, dry straw or hay, when such materials are placed to the thickness necessary to provide the same insulating protection as the 12 inches of loose, dry straw or hay. Such covering shall remain in place until at least 7 but not more than 14 days shall have expired from the date of placement of the concrete.

When High-Early-Strength Concrete is used, the above-required periods for covering may be reduced to not less than four days.

Where removal of the coverings is necessary to saw joints or to perform other required work, such removal shall be done as directed by the engineer and for the minimum time required.

Regardless of the precautions taken, the Contractor shall be responsible for the protection of the concrete placed, and any concrete damaged by freezing or frost action during the first 7 days following its placement shall be removed and replaced by the Contractor at his expense.

Heating of cement will not be permitted. The addition of salt or chemical admixtures to the concrete mix to prevent freezing will not be permitted.

Concrete shall not be placed on a frozen subgrade.

Concreting operations shall be discontinued due to insufficient natural light, unless an adequate and approved artificial lighting system is provided and operated.

T. OPENING TO TRAFFIC

The engineer reserves the right to determine the time when the pavement shall be opened to traffic either on the basis of test cylinders or minimum time periods related to atmospheric temperatures.

When opening of the pavement to traffic is controlled by cylinder tests, the pavement may be opened when the tests of cylinders show a compressive strength of the concrete of not less than 2,500 pounds per square inch.

At least two cylinders shall be tested in determining the attained strength of concrete for the purpose of opening the pavement to traffic. The average of test results for the two cylinders shall be used to determine compliance, except that neither cylinder may be less than 10 percent below the required strength. The cylinders shall be cured under conditions similar to those prevailing for the pavement, which they represent

When the opening is not controlled by cylinder tests, traffic shall be excluded from the newly constructed pavement for such periods as hereinafter designated:

For not less than 7 days when the atmospheric temperatures are generally 70 degrees F. or higher during the period.

For not less than 10 days when the atmospheric temperatures are generally not lower than 60 degrees F. during the period.

For not less than such a length of time up to 21 days as the engineer may require, taking into consideration the temperatures and protective measures, if any, when the atmospheric temperatures are generally lower than 60 degrees F.

When High-Early-Strength Concrete is used in the work, the above specific periods of 7, 10 and 21 days may be reduced to 3, 4 and 7 days respectively, under like conditions.

In all cases, the pavement shall be cleaned, and the joints shall be cleaned, filled, and sealed as hereinbefore provided, before traffic of any kind is permitted to use the pavement.

Any part of the pavement damaged by traffic or otherwise damaged prior to its acceptance shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the engineer. The Contractor shall protect the pavement against both public traffic and the traffic caused by his own employees and agents.

The Contractor shall have available materials for protecting the unhardened concrete against damage by rain. When rain is imminent, the unhardened concrete shall be immediately covered with paper, plastic film or other suitable material, and planks or forms placed along slip-formed pavement edges.

All ditches and drains shall be in such condition as to provide effective drainage.

U. GUARANTEE

Contractor shall be responsible for maintenance appurtenant items included in this contract, as a result of faulty materials or poor workmanship, for a period of one-year following installation.

III. Steel Reinforcement

A. SCOPE OF WORK

This section describes furnishing and placing bar steel, high-strength bar steel or coated high-strength bar steel.

B. MATERIAL

Use deformed reinforcing bars unless the contract specifies otherwise.

Unless the plans show otherwise or the special provisions specify otherwise, use the deformed type for all bar steel, all high-strength bar steel, and all coated high-strength bar steel reinforcement. If plain, round steel reinforcement is specified, conform to ASTM A675, grade 60.

Use fabrication tolerances for straight and bent bars specified in Subsection 4.3, Tolerances, of the American Concrete Institute Committee 315, in the American Concrete Institute Detailing Manual.

Unless the contract specifies otherwise, submit a manufacturer's certified report of test or analysis showing the reinforcement conforms to the specifications to the engineer before incorporating the reinforcement into the work.

C. COATING MATERIAL

Coat reinforcement according to ASTM A775 with a fusion-bonded powder from the department's APL. Provide written certification from the resin manufacturer that the coating material is the same

formulation and quality as submitted to the department for prequalification testing.

Furnish a two-part epoxy resin that meets ASTM A775 for field repairs and patching.

1. SURFACE PREPARATION

Ensure the bar surface is clean and free from rust, scale, oil, grease, and similar surface contamination, and slivers, scabs and other surface defects detrimental to proper coating.

Blast the surface to a near white No. 10 finish according to SSPC-SP 10. Provide an anchor pattern with blast profile maximum roughness depth readings within the range of 1.6 mils to 4.0 mils. Determine the readings according to NACE RP-287, using replica tape.

Remove all traces of grit and dust from the blasting before coating.

Apply the coating to the cleaned surface as soon as possible after cleaning and before visible oxidation of the surface occurs. The contractor shall not wait to apply the coating more than 8 hours after cleaning, unless the engineer directs otherwise.

D. DOWEL BARS AND TIE BARS

Furnish bars coated in a plant certified by the Concrete Reinforcing Steel Institute. For dowel bars and straight tie bars, there is no requirement for bend tests. Ensure that the bars are the specified diameter and length the plans show.

The contractor need not coat or patch sawed ends, sheared ends, cut ends, ends left bare during the coating process, or ends with damaged coating.

The contractor need not repair circumferential coating damage from shipping, handling, or installation, if the following conditions are met:

- (1) The damaged area is 1/4 inch square or smaller.
- (2) The total damaged area in any one-foot length does not exceed 2 percent of the circumferential area in that length.

Repair areas of damaged circumferential coating larger than 1/4 inch square. Reject bars with total damage greater than 2 percent of the bar's circumferential area.

1. DOWEL BARS

Ensure that the bars are straight, round, smooth, and free from burrs or other deformations detrimental to the free movement of the bar in the concrete.

Saw bars to the required length. For solid bars, the department will allow shearing if no damage occurs to the coating and shearing distortions do not exceed the following:

- (1) No distorted diameter is more than 0.04 inches greater than the true diameter.
- (2) No distortion extends more than 0.40 inches from the sheared end.

Apply a surface treatment to loose dowels, or furnish manufacturer-treated bars in dowel bar baskets, capable of preventing bond between the epoxy-coated bars and the concrete. Apply field surface treatments when loading bars in the dowel bar magazine.

B) SOLID DOWEL BARS

Furnish coated bars conforming to AASHTO M31 grade 40 or 60. Alternatively the contractor may furnish dowel bars conforming to AASHTO M227 grade 70-80. Coat with a thermosetting epoxy conforming to AASHTO M254, type B.

2. TIE BARS

Furnish coated bars conforming to AASHTO M31 grade 40 or 60. Coat tie bars as specified in 505.2.4 for coated high-strength steel reinforcement. Ensure that the tie bars are the shape the plans show.

Repair, with compatible coating material, the bend location of field-straightened coated tie bars.

E. BENDING

Use bent bar reinforcement cold bent to the shapes the plans show, and unless the plans show otherwise or the engineer directs otherwise, conform to Recommended Hooks All Grades and Recommended Sizes for Stirrup and Tie Hooks, of the American Concrete Institute Committee 315. Ensure all bending dimensions are out-to-out of the bar.

F. SPLICING

All steel reinforcement shall be spliced using a lapped joint. Joints shall be securely tied the entire length of lap joint to prevent movement. The lap joint shall have a length of not less than **72xDB**. DB is the diameter of the bar.

IV. Brick Pavers

A. SCOPE OF WORK

This section describes the proper specification and method of installation of all brick pavers within the City of La Crosse Right-of-way and properties.

B. MATERIAL

1. BRICKS

a) MANUFACTURERS

Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include the following or approved equal approved by the Project Engineer:

Interlock Concrete Products, Inc.
3535 Bluff Drive
Jordan, MN 55352-8302
(612) 492-3636
FAX (612) 492-3668

b) COLOR & DIMENTIONS

Pavers shall be one of three colors based on the bid item in the project bid tab. The approved colors within the City of La Crosse are as follows:

- (1) Red/red/charcoal blend, known as "La Crosse Blend" or "Rosewood",
- (2) Charcoal
- (3) Red/tan blend, range 9, terracotta/brown/buff known as "Desert"

The Contractor shall provide materials and products that result in colors and textures of exposed unit paver surfaces and joints complying with the following requirements:

Regular pavers shall be Holland style, 4"x8", 2.375" (6cm), solid, interlocking paving units, ASTM C 936 compliant, and made from normal-weight aggregates.

Permeable pavers shall be Holland Eco Style, 4.875"x9.75"x3.125", interlocking paving units, ASTM C 936 compliant, and made from normal-weight aggregates.

2. BEDDING MATERIAL

The base material shall be a crushed aggregate base course material that typically is used locally for aggregate base material under flexible asphaltic pavement, as specified in Section 305, State of Wisconsin, Standard Specifications for Highway and Structure Construction, Current Edition.

Sand for leveling base material shall be a fine, sharp, non-plastic aggregate complying with ASTM C 33.

3. JOINT FILL MATERIAL

Joint filling material for regular pavers shall be a fine, sharp, masonry sand with 100 percent passing the No. 16 (1.18 mm) sieve and no more than 10 percent passing the No. 200 (0.075 mm) sieve.

Joint filling material for permeable pavers shall be a one-quarter inch granite or trap rock material to allow for maximum porosity and reduce material breakdown.

C. SUBMITTALS

The Contractor shall submit the following information according to the conditions of the Contract.

1. Product data for the concrete pavers
2. Samples for initial selection in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of unit paver indicated.
3. Samples for verification in full-size units of each type of unit paver indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
4. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with names and addresses, names and addresses of architects and owners, and other information specified.

D. QUALITY ASSURANCE

An experienced installer shall be engaged who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Obtain each color, type, and variety of unit pavers, joint materials, and setting materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.

Prior to installing unit pavers, construct mockups for each form and pattern of unit pavers required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of work, including same base construction, special features for expansion joints, and contiguous work as indicated.

Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Engineer.

Notify Engineer one week in advance of the dates and times when mockups will be constructed.

Demonstrate the proposed range of aesthetic effects and workmanship.

Obtain Engineer's acceptance of mockups before start of final unit of Work.

Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

Accepted mockups in an undisturbed condition may become part of the completed work.

E. DELIVERY, STORAGE, & HANDLING

Pavers shall be wrapped in plastic or use other packaging materials that will prevent rust marks from steel strapping.

All materials shall be protected during storage and construction against soilage or contamination from earth and other materials.

F. EXECUTION

1. General Installation

Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work.

Mix pavers from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp edges, free of chips. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units and halves without cutting where possible. Hammer cutting is not acceptable. A block splitter may be used for concrete pavers.

Paver joint pattern shall be as indicated on the plans and standard specification.

Tolerances: do not exceed 1/32-inch (0.8-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet (3 mm in 3 m) from level, or indicated slope, for finished surface of pavers.

Provide edge restraint as indicated on the plans, prior to placing pavers.

2. Aggregate Setting-Bed Paver Installations

Contractor shall examine surfaces indicated to receive pavers, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit pavers. Do not proceed with installation until unsatisfactory conditions have been corrected and met.

Proof-roll prepared subgrade surface to check for unstable areas and areas requiring additional compaction. Do not proceed with installation of unit pavers until deficient subgrades have been corrected and are ready to receive base for unit pavers.

Once all deficient subgrades have been corrected, compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density.

Place aggregate base in thicknesses indicated in detail L on page D-6. Compact by tamping with plate vibrator and screed to depth required. Overlay with geotextile fabric. On top of the fabric, place sand for leveling course and screed to a thickness of 1 to 1-1/2 inches (25 to 38 mm), taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

Treat leveling base with soil sterilizer to prohibit growth of grass and weeds.

Set pavers with a minimum joint width of 1/16 inch (1.5 mm) and a maximum of 1/8 inch (3 mm), being careful not to disturb leveling base if pavers do not have spacer bars/tabs. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.

When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Perform at least 3 passes across paving with vibrator. Vibrate under the following conditions:

After edge pavers are installed and there is a completed surface or before surface is exposed to rain.

Before ending each day's work, fully compact installed concrete pavers within 36 inches (900 mm) of the working face. Cover the open layers with non-staining plastic sheets overlapped 48 inches (1200 mm) on each side of the working face to protect it from rain.

Spread joint material to fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add material until joints are completely filled, then remove excess material. Leave a slight surplus of sand on the surface for joint filling.

Do not allow traffic on pavers until material has been vibrated into joints.

Repeat joint-filling process 30 days later if needed.

3. Repair, Pointing, Cleaning & Protection

Contractor shall remove and replace unit pavers that are loose, settled, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units as intended and Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.

The contractor shall provide final protection and maintain conditions in a manner acceptable to the City of La Crosse that ensures that unit paver work is without damage or deterioration at the time of substantial completion.