

City of West Allis
West Allis, Wisconsin

**STANDARD SPECIFICATIONS
FOR
STREET CONSTRUCTION**

January, 2020

**SEWER AND WATER SPECIFICATIONS
ADDENDUM**

January, 2020

Engineering Department

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PART I

GENERAL CONDITIONS

CHAPTER 1.1.0 - DEFINITIONS AND TERMS

1.1.1 GENERAL.

Whenever in the specifications, or in any documents or instruments in construction operations where the specifications govern, the following abbreviations, terms, or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

1.1.2 ABBREVIATIONS.

- (a) AASHTO. The American Association of State Highway and Transportation Officials.
- (b) ADMINISTRATIVE CODE. Rules of Wisconsin Code.
- (c) ANSI. American National Standards Institute.
- (d) AREA. The American Railway Engineering Association.
- (e) ASME. The American Society of Mechanical Engineers.
- (f) ASTM. The American Society for Testing Materials.
- (g) AWWA. The American Water Works Association.
- (h) DNR. Wisconsin Department of Natural Resources.
- (i) FEDERAL SPECIFICATIONS. The specifications of the United States Federal Specifications Board.
- (j) OSHA. Federal Occupational Safety and Health Administration.
- (k) SSPC. Steel Structures Painting Council.
- (l) STATE SPECIFICATIONS. Current Edition, State of Wisconsin Standard Specifications for Highway and Structure Construction, and Addenda.

1.1.3 ADVERTISEMENT.

The official notice inviting bids for all proposed improvements included in any one letting.

1.1.4 ADDENDA.

All revisions of and supplements to the plans and specifications incorporated in or attached to and becoming an integral part of the Contract Documents.

1.1.5 ARCH.

The upper inside section of a sewer or water main above the spring line.

1.1.6 AWARD.

The acceptance by the Owner of a bid.

1.1.7 BIDDER.

Any individual, firm, partnership or corporation, or a combination of any or all, jointly submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

- 1.1.8 BUILDING SEWER.
A conduit which carries the drainage from a building or private property to a street sewer. Building sewers may be sanitary or storm.
- 1.1.9 CALENDAR DAY OR DAY.
Every day shown on the calendar, Sundays and Holidays included.
- 1.1.10 COMBINED SEWER.
A conduit which receives both surface run-off and sewage.
- 1.1.11 COMPLETION DATE OF CONTRACT.
The calendar date shown in the proposal on or before which all the work contemplated under the Contract shall be completed.
- 1.1.12 COMPLETION DATE OF WORK.
Date of completion shall be the date certified by the Engineer or his duly authorized representative.
- 1.1.13 CONTRACT BOND.
The approved form of security furnished by the Contractor and his Surety as a guarantee of good faith on the part of the Contractor to execute the work in accordance with and complying with all the terms and conditions of the Contract Documents.
- 1.1.14 CONTRACT CHANGE ORDER.
A written order by the authorized representative of the Owner covering work not otherwise provided for, revision in or amendments to the Contract, or conditions specifically prescribed in the specifications as requiring Contract change orders. Such document becomes a part of the Contract.
- 1.1.15 CONTRACT DOCUMENTS.
All the integral documents of the Contract comprised of: (a) written agreement (Contract) covering the performance of the work and furnishing of materials for the construction of the improvement; (b) official notice; (c) Instructions to Bidders; (d) General Conditions; (e) Specifications; (f) Special Provisions; (g) Proposal; (h) Plans; (i) Schedule of Fixed Prices; (j) supplemental agreements; and (k) all addenda, as fully as though they had been set forth therein in full in the body of the Contract.
- 1.1.16 CONTRACT PERIOD.
The period from the date of commencing work to the date of completing work, both dates inclusive, as specified in the Contract.
- 1.1.17 CONTRACT TIME.
The number of calendar or working days shown in the proposal representing the time allowed for the completion of work contemplated in the Contract.
- 1.1.18 CONTRACTOR.
Any individual, firm, partnership or corporation, or a combination of any or all, jointly submitting a proposal to whom the Contract is awarded by the Owner or its heirs, executors, administrators, successors or assigns.
- 1.1.19 ENGINEER.
The Director of Public Works/City Engineer or an Engineer of the City of West Allis, including such assistants as are authorized to represent him, or the consulting Engineer acting through his authorized agents, who represents the City of West Allis during the construction activities.
- 1.1.20 FLOW LINE.
The inside bottom at the vertical line of a sewer or water main.

- 1.1.21 INSPECTOR.
The authorized representative of the Owner assigned to make a detailed inspection of any and all portions of work or materials thereof.
- 1.1.22 INVERT.
The lower inside section of a sewer or water main below the spring line.
- 1.1.23 INVITATION FOR BIDS (OFFICIAL NOTICE).
The advertisement for proposals for all work or materials on which bids are required. Such advertisement will indicate with reasonable accuracy the location and character of the work to be done or materials to be furnished and the time and place of submitting the proposals.
- 1.1.24 NOTICE TO PROCEED.
A written notice to the Contractor by the Owner's authorized representative of the time within which he shall begin the prosecution of the work.
- 1.1.25 OWNER.
The City of West Allis, Wisconsin, a municipal corporation, acting through its legally constituted officials, officers or employees.
- 1.1.26 PLANS.
All contract drawings, reproductions of drawings, sketches and revisions thereof pertaining to the work covered by the Contract on file in the office of the Engineer.
- 1.1.27 PROPOSAL.
The offer of the Bidder, submitted on the prescribed proposal form, to perform the work, including the furnishing of labor and materials at the prices quoted by the Bidder.
- 1.1.28 PROPOSAL FORM.
The approved form on which the Owner requires bids to be prepared and submitted for the work.
- 1.1.29 PROPOSAL GUARANTEE.
The security furnished with a bid to guarantee that the Bidder will enter into the Contract if his bid is accepted.
- 1.1.30 SANITARY SEWER.
A conduit which carries sewage and to which storm, surface and ground waters are not intentionally admitted.
- 1.1.31 SCHEDULE OF FIXED PRICES.
The fixed prices as listed in the Contract documents.
- 1.1.32 SEWAGE.
The water carried wastes created in and to be conducted away from residential, industrial, commercial and public buildings, as defined in Section 101.01 of the Wisconsin Statutes with such surface or ground water as may be present.
- 1.1.33 SPECIAL PROVISIONS.
The special body of directions, provisions, or requirements peculiar to a project and otherwise not thoroughly or satisfactorily detailed or prescribed in the specifications. The requirements of these Special Provisions shall govern the work and shall take precedence over the specifications or plans whenever they conflict.
- 1.1.34 SPRING LINE.
The line on either side of a sewer or water main where the invert and arch meet and become tangent to the vertical.

- 1.1.35 **STANDARD SPECIFICATIONS.**
This bound document entitled CITY OF WEST ALLIS STREET CONSTRUCTION SPECIFICATIONS, 2020.
- 1.1.36 **STORM SEWER.**
A conduit which carries storm water and surface water, street wash and other wash waters or drainage, but excludes sewage and industrial wastes.
- 1.1.37 **SUBCONTRACTOR.**
The individual, firm, partnership or corporation to whom the Contractor, with the written consent of the Engineer, sublets, assigns, or otherwise disposes of any part of the work covered by the Contract documents.
- 1.1.38 **SUBSTANTIAL COMPLETION.**
Substantial completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents, in the opinion of the Engineer, so that Owner can occupy or utilize the Work for its intended use.
- 1.1.39 **SURETY.**
The approved surety corporation licensed to do business in the State of Wisconsin bound with and for the Contractor to insure his acceptable performance of the Contract and for his payment of all obligations under the Contract.
- 1.1.40 **WATER MAIN.**
A conduit and appurtenances from which a supply of water is delivered to the water service piping leading to specific premises.
- 1.1.41 **WORK.**
Work shall be understood to mean the furnishing of all labor, materials, equipment, and other incidentals necessary or convenient in the successful completion of the project or particular part of the project in accordance with the requirements of the Contract.
- 1.1.42 **WORKING DAY.**
A calendar day, except Saturday, Sunday and nationally recognized legal holidays where, in the opinion of the Engineer, it is possible for the Contractor to start and continue construction operations and any "no work" days due to concrete curing time. Days of inclement weather will not be considered as working days.
- 1.1.43 **WORKING HOURS.**
Daylight hours between 7:00 a.m. and 6:00 p.m.

CHAPTER 1.2.0 - NECESSARY NOTICES AND PERMITS

- 1.2.1 **NOTICE TO ENGINEER.**
The Contractor shall notify the Engineer not less than five (5) working days prior to the date of commencement of work on the contract.
- 1.2.2 **NOTICE FOR INSPECTION.**
The Contractor shall notify the Engineer at least five (5) working days before commencing work or adding another crew so that an inspector can be assigned.
- 1.2.2a **NOTICE TO WORK ON SATURDAYS, SUNDAYS, OR HOLIDAYS.**
If the Contractor or Subcontractors deems it necessary to work outside of normal working hours or on Saturdays, Sundays, or Holidays, they shall notify the Engineer twenty-four (24) hours in advance to obtain permission and inspection for such work. If said work is approved and the Contractor does not

work or does work which, in the opinion of the Engineer, did not require inspection, the Contractor will be charged a \$500.00 inspection and supervision fee.

- 1.2.3 **NOTICE TO FIRE, POLICE, AND SHERIFF'S DEPARTMENTS.**
The Contractor shall give written notice to the Fire and Police Departments of the City of West Allis and/or to the Sheriff's Department at least twenty-four (24) hours before closing off or affecting, in any manor, through vehicular traffic on any street.
- 1.2.4 **NOTICE TO RESIDENTS AND BUSINESSES.**
As part of the work the Contractor shall give written notice to residents and businesses at least twenty-four (24) hours before removing or obstructing any private driveway.
- 1.2.5 **NOTICE FOR COUNTY AND STATE HIGHWAYS.**
Whenever the Work will obstruct or in any way disrupt vehicular traffic on County or State highways, the Contractor shall give notice in advance thereof to the County and the State of Wisconsin, Department of Transportation, and the municipality in which the Work is being performed.
- 1.2.6 **NOTICE TO RAILROADS.**
The Contractor shall notify, by registered mail, the District or Division Engineer or persons in charge of the operations of trains for any railroad at least ten (10) days prior to doing any work on the right-of-way or track zone. He shall comply with all rules and regulations requested by the railroad.
- 1.2.7 **NOTICE TO UTILITIES.**
The Contractor shall give notice in writing to all utilities (such as the Gas, Electric, Telephone, Transport Company, Water Department, Cable T.V., and all other utilities) that may be affected by the Contractor's operations at least three (3) working days before starting work. The Contractor shall not hinder or interfere with any person in the protection of such work, or with the operation of buses, at any time, except with the written permission of the Engineer.
- 1.2.8 **PERMIT FOR PARKS AND PARKWAYS.**
The Contractor shall obtain a permit from the local park authority for construction work to be done within the limits of parks or parkways.
- 1.2.9 **PERMITS AND LICENSES.**
The Contractor shall procure all necessary permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work.
- 1.2.10 **NOTICE FOR LOCAL SEWERAGE DISTRICT CONNECTION.**
The Contractor shall give written notice to the local sewerage district at least three (3) days before cutting into or connecting to any sewerage district intercepting sewer, sewerage district manhole, or watercourse under the jurisdiction of such district.
- 1.2.11 **COPIES OF NOTICES AND PERMITS.**
Copies of all written notices and permits shall be submitted to the Engineer and Owner prior to the commencement of construction.
- 1.2.12 **PRECONSTRUCTION MEETING.**
A preconstruction meeting will be required before the start of any project. The Contractor must be present or an authorized representative and a construction superintendent or field representative.

CHAPTER 1.3.0 - CONTROL OF WORK AND MATERIALS

- 1.3.1 **AUTHORITY OF ENGINEER.**
All work shall be done in compliance with the Contract documents. The Engineer shall decide all questions which shall arise as to the quality and acceptability of materials furnished, work performed,

workmanship, rate of progress of the work, interpretation of the plans and specifications, acceptable fulfillment of the Contract, compensation, disputes, and mutual rights between Contractors under the specifications. He shall determine the amount of work performed and materials furnished.

1.3.2 AUTHORITY AND DUTIES OF INSPECTORS.

Inspectors employed by the Owner shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication or manufacture of the materials to be used. The Inspector is not authorized to revoke, alter or waive any requirements of the specification, nor is he authorized to approve or accept any portion of the completed project. He shall call the attention of the Contractor to any failure of the work or materials to conform to the specifications and Contract, and shall have the authority to reject materials. Any dispute between the Inspector and Contractor shall be referred to the Engineer. Any advice which the Inspector may give the Contractor shall in no way be construed as binding the Engineer in any way or releasing the Contractor from fulfilling any of the terms of the Contract.

1.3.3 PLANS AND SPECIFICATIONS TO BE AVAILABLE.

The Contractor shall keep a legible copy of the plans and specifications at the site of the work at all times.

1.3.4 CONTRACTOR'S REPRESENTATIVE.

The Contractor shall have at the site of the work at all times, while work is in progress, a competent superintendent or foreman having the authority and ability to both receive orders from the Engineer and to act for the Contractor.

Such representative must be acceptable to the Engineer and must have a thorough understanding of the plans and specifications and must be capable of directing the work as called for in the Contract documents.

1.3.5 PERFORMANCE OF WORK.

All work to be performed must be in accordance with the Contract documents, subject to approval and acceptance of the Owner.

1.3.6 RIGHT TO SAMPLE AND TEST MATERIALS.

The Engineer shall have the right to take samples of and test the materials furnished in accordance with Part X.

1.3.7 RIGHT TO WEIGH MATERIALS.

The Engineer reserves the right to have any load or material delivered checked for weight at a truck scale; no claim for loss or delay will be allowed on this account.

1.3.8 INSPECTION.

All materials and each part or detail of the work shall be subject at all times to inspection by the Engineer or his authorized representatives, and the Contractor will be held strictly to the true intent of the specifications in regard to quality of materials, workmanship, and the diligent execution of the Contract. Such inspection may include the mill, plant or shop inspection, and any material furnished under these specifications is subject to such inspection. The Engineer or his representatives shall be allowed access to all parts of the work, and shall be furnished with such information and assistance by the Contractor as is determined by the Engineer or his representative, to make a complete and detailed inspection.

The Contractor shall, if the Engineer requests, remove or uncover such portion of the finished work as the Engineer may direct before the final acceptance of the same. After the examination, the Contractor shall restore said portion of the work to the standard required by the specifications. If the work thus exposed or examined proves acceptable, the expense of uncovering or removing and replacing of the parts removed shall be paid for as extra work, but if the work so exposed or examined is unacceptable, the expense of uncovering or removing and replacing of the same in accordance with the specifications

shall be borne by the Contractor.

Failure or negligence on the part of the Engineer to condemn or reject substandard or inferior work or materials shall not be construed to imply an acceptance of such work or materials if it becomes evident at any time prior to the final acceptance of the work done by the Owner. Neither shall it be construed as barring the Owner, at any subsequent time, from the recovery of damages or of such a sum of money as may be needed to build anew all portions of the substandard or inferior work or replacement of improper materials wherever found.

1.3.9

CONTINUOUS WORK.

The Contractor shall execute the work only in the presence of the Engineer, or his representative, during the working hours of the day, unless at his own volition upon due notice to the Engineer and with his approval, he desires to prosecute the work continuously or at night. In all cases, the Contractor shall provide such facilities for carrying on night work as the Engineer directs. No claim will be allowed for extra payment for night or continuous work, nor for damages or detriment to the quality of work which may be incurred by the Contractor in being permitted to carry on work during such time, it being understood that full compensation for night or continuous work, and all expenses incident thereto, are included in the prices for the various items in the Contract.

1.3.10

DEFAULT AND COMPLETION OF WORK.

The Owner has the right, in cases of improper or imperfect performance of the work, or failure to prosecute the work, to insure its completion within the time limits specified by the Contract documents and upon certification of the Engineer that sufficient cause exists to justify action, to give written notice to the Contractor and the Surety stating said default. If the Contractor does not remedy such default within ten (10) days after such notice is given, the Owner has the right to suspend all work by the Contractor. When the Contractor and Surety are notified that the Owner has elected to suspend the work, the Contractor shall cease to have the right to occupancy of the work site, and the Owner shall have the right to forthwith take possession of the work site. The Surety shall have the right to complete the Contract, but in the event that performance has not been commenced by the Surety within ten (10) days from the date of the notice of suspension, the Owner has the right to continue in the possession of and utilize, for the completion of the Contract, any and all materials, tools, equipment and plant which the Contractor has had delivered upon the site of the work, and to prosecute the work to the completion, either by force account or by Contract.

Expenditures made by the Owner in completing the work under the Contract and in payment of valid claims arising under the terms of the Contract shall be deducted from monies due or which would have become due the Contractor upon completion of the Contract. No claims for "extras" arising from the Owner's actions in completing the work will be allowed. The Contractor and Surety shall be liable and shall reimburse the Owner for any costs, in excess of the Contract amount, required to complete the work.

1.3.11

ASSUMPTION OF CONTROL OF WORK NOT A WAIVER.

Neither an extension of time for any reason beyond that fixed in the Contract for the completion of the work, nor the performance nor acceptance of any portion of the work as called for in the Contract documents, nor any partial payment made on account of work done, nor the use of any portion of the work by the Owner, shall be deemed a waiver by the Owner of its rights to assume control of the work done in the manner above set forth, nor be any excuse for the Contractor or Surety to fail to fulfill all the stipulations set forth or reasonably implied in the Contract documents.

1.3.12

WORKMANSHIP.

All workmanship shall conform to the best standard practice. Unless otherwise specified, the specifications of recognized association of manufacturers and Contractors or industrial manufacturers shall be used as guides for the standards of workmanship.

All exposed items of work shall present a neat workmanlike appearance and shall be as true to shape and alignment as is possible to obtain with measuring or leveling instruments generally used in the

respective types of work. Items of work shall be sound and fully protected against damage and premature deterioration. It is specifically understood that in all questions of quality and acceptability of workmanship, the Contractor agrees to abide by the decisions of the Engineer.

The Contractor shall furnish all labor, materials, necessary tools, equipment, and accessories that are necessary for integrating all portions of the work included in the Contract to fulfill the true purpose and intent of the Contract.

1.3.13

PARTIAL ACCEPTANCE.

When requested by the Contractor and upon specific approval of the Engineer, prior to final inspection and acceptance, the Contractor may be relieved of maintenance or sections of the work which have been completed. Such partial acceptance and assumption of the maintenance by the Owner shall be covered by a written notice from the Engineer to the Contractor, and such notice shall definitely designate the sections of the work on which the Contractor is to be relieved of maintenance and shall also set forth the date upon which such notice will be effective.

The assumption of maintenance by the Owner, however, will not relieve the Contractor of any responsibility for defective workmanship or materials or for damages caused by the contractor's own operations.

Such action will not be construed to be a final inspection or acceptance of any part of the work nor waiver of any legal rights.

1.3.14

FINAL ACCEPTANCE.

The Engineer will make an inspection of the work included in the Contract as soon as practical after notification by the Contractor and confirmation by the Inspector that such work has, in their opinion, been completed and final clean-up performed.

Should the inspection disclose any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of the same, and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection provided the work has been satisfactorily completed.

When all work included in the Contract has, in the opinion of the Engineer, been completed, the Owner will make the final acceptance and will certify the date of completion of work.

1.3.15

CLEANING OF SEWERS, WATER MAINS, AND APPURTENANCES.

The interior of all sewers, water mains, and appurtenances affected by the work shall be freed from all dirt and extraneous materials of all types as the work progresses, and left clean at the completion of the work embraced in the Contract.

1.3.16

SOURCE OF SUPPLY AND QUALITY.

The specifications contemplate the use of new, high-quality materials throughout the work, except as may specifically be provided elsewhere in the specifications, on the plans, or in the Special Provisions, incorporated in the work in a manner to produce completed construction which is acceptable in every detail.

Only previously tested and/or approved materials shall be incorporated in the work; however, some manufactured products normally used in large quantities immediately upon or soon after delivery to the project may, with permission of the Engineer, be incorporated in the work when they are furnished from sources deemed by the Engineer to have a proven record of furnishing materials complying with specification requirements. The permitted use of an untested material shall not, however, be construed as implied approval of the material, and such use shall be at the Contractor's risk.

When fabricated materials are obtained by the Contractor from commercial sources, the materials, manufacturer and supplier thereof shall, at the Engineer's discretion, be subject to his approval before

delivery of the material to the job site. Furthermore, the Contractor may be required to obtain material from another approved source, if it is determined that the product of a manufacturer or supplier is not of satisfactory uniformity or consistent quality.

In the case of materials obtained or produced from natural deposits, either commercially or by the Contractor, the Contractor shall obtain the Engineer's preliminary approval of the source. The Contractor shall furnish samples as required, representative of the material proposed for the work, in sufficient time to permit testing as necessary to establish a basis for approval. Such samples shall be obtained under the observation of and with methods approved by the Engineer. Tests will be made on these preliminary samples and reports rendered, but it is to be understood that such tests are for information only and that any preliminary approval based thereon shall not be construed as a guarantee of acceptance of any material which may be delivered later for incorporation into the work.

The Contractor shall assume full responsibility for the furnishing of uniform and satisfactory materials. When materials are obtained from local deposits, the Contractor shall be responsible for any losses or damages resulting from the opening and operation thereof, or from the failure of the deposit after development to produce acceptable materials.

1.3.17 DEFECTIVE MATERIALS.

All materials not conforming to the requirements of the Contract documents shall be considered as defective and all such materials, whether in place or not, shall be rejected and shall be removed from the work by the Contractor at his expense. Upon failure on the part of the Contractor to comply with any order of the Engineer relative to the provisions of this article, the Engineer shall have authority to remove and replace such defective material and to deduct the cost of removal and replacement from any monies due or which may become due to the Contractor.

1.3.18 SCALES FOR WEIGHING MATERIALS.

All scales used in the weighing of materials to be used in the work shall have been tested by a Sealer of Weights and Measures and shall bear a current stamp of approval.

1.3.19 EMPLOYEE QUALIFICATIONS.

The Contractor shall employ only such foremen, mechanics, laborers or other employees as are physically fit, competent, experienced, and qualified to handle each class of work on which they are employed.

1.3.20 EMPLOYEES TO BE REMOVED FOR CAUSE.

When any employee is abusive or disrespectful to the general public or to the Owner's representatives, such employee shall, upon written or verbal order from the Owner, be removed from the work.

1.3.21 PROSECTION OF WORK.

When the public interest necessitates, the Engineer may determine the place of commencement and the sequence of operations of the Contractor. At any time, when in the judgment of the Engineer, the Contractor has obstructed or closed a street or is carrying on operations of a greater portion of the Contract than is necessary for the proper prosecution of the work, the Engineer may require the Contractor to finish the sections on which work is in progress before work is started on any additional section.

1.3.22 EXCESSIVE NOISE AND VIBRATION.

The Contractor shall not produce noise in excess of 86 dba at or across a real property boundary without prior written approval from the Engineer and the City Health Commissioner. The Contractor shall not operate any device which produces vibration in excess of the vibration limitations set forth in City of West Allis ordinances.

CHAPTER 1.4.0 - CARE AND STORAGE OF MATERIALS

1.4.1 STORAGE OF MATERIALS.

Materials delivered for the Contractor are to be neatly and compactly placed along or near the site in such manner as to cause the least inconvenience to the property owners and insure the safety of the general public. Materials shall not be placed within twenty (20) feet of any hydrant, pedestrian crossing, driveway, or intersection.

1.4.2 **RESPONSIBILITY FOR MATERIAL FURNISHED BY OWNER.**

The Contractor shall be responsible for the care and protection of all material furnished to the site of the work by the Owner.

The Contractor shall inspect all of this material and shall immediately notify the Engineer if any is defective. The Owner will substitute new material for any accepted as sound by the Contractor, but found defective after installation; however, the Contractor shall remove the defective material and install all the replaced material at his own expense, furnishing all the labor, supplies and facilities necessary to complete the work in accordance with the specifications.

CHAPTER 1.5.0 - SCOPE OF WORK AND SPECIFIC INSTRUCTIONS

1.5.1 **INTENT OF CONTRACT DOCUMENTS.**

The true intent of the Contract documents is to provide for the construction, execution, and completion in every detail of a complete work or improvement which the Contractor undertakes to do in full compliance with the Contract documents and in accordance with recognized engineering and construction principles. The Contractor shall perform all items of work covered and stipulated in the Proposal and perform altered and extra work, all in accordance with the lines, grades, typical sections, and dimensions given, and shall furnish, unless otherwise provided in the Contract documents, all materials, implements, machinery, equipment, tools, supplies, transportation, electric power, and labor necessary to the prosecution and completion of the work.

1.5.2 **CLEANING UP WORK.**

The Contractor shall at all times keep the site of the work, including all private or public property involved in or adjacent to the work, free from any rubbish, surplus or waste materials deposited by persons engaged in the work, or which have accumulated as a result of the work.

The Contractor shall remove all surplus materials, tools, equipment or plant, leaving the site of the work and all portions of the finished work clean, unobstructed and ready for use before the work will be considered completed. After written or verbal notification, the Engineer may have removed from the site of the work all rubbish, surplus or waste materials which the Contractor has neglected or refused to remove and deduct the costs of such removal from any monies due the Contractor.

1.5.3 **LOCATION OF UNDERGROUND STRUCTURES.**

It is the responsibility of the Contractor to acquaint himself with the location of all underground structures which may be encountered or which may be affected by work under the Contract.

The locations of any underground structures furnished, shown on the plans or given on the site are based upon the available records, but are not guaranteed to be complete or correct and are given only to assist the Contractor in making a determination of the location of all underground structures.

1.5.4 **COOPERATION WITH OTHER CONTRACTORS.**

The Contractor shall work in harmony with other Contractors, or with utilities or Owner's forces engaged in collateral work. No extra payments, extra working days or calendar days will be granted for progress interruption, remobilization, traffic control, etc., resulting from cooperation delays. In case of dispute, the decision of the Engineer shall be final and binding upon the parties affected.

1.5.5 **WORK TO BE DONE AT CONTRACTOR'S RISK.**

All work to be done under the Contract documents from the commencement until the final acceptance of such work shall be done entirely at the Contractor's risk. No partial payment for, or partial acceptance of any part of the work shall absolve him from such risk.

1.5.6

GUARANTEE.

All work shall be and is guaranteed for a period of one (1) year from and after the completion date of work. If, within said guarantee period, repairs or changes are required in connection with the work, which in the opinion of the Engineer is rendered necessary as the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract, the Contractor shall promptly, upon receipt of the notice from the Engineer, and without expense to the Owner, restore the work to a satisfactory condition, correct all defects, make good all damage to the structure, site or contents thereof, which damage, in the opinion of the Engineer, results from the use of such inferior or defective materials, equipment, or workmanship.

If within ten (10) days after notice the Contractor fails to comply with the terms of any guarantee herein contained, the Owner may have the defects corrected and the Contractor or his Surety shall be liable for all expenses incurred; except when, in the opinion of the Engineer, delay in correcting the defects would cause serious cost or damage, repairs may be made by the Owner without notice being given to the Contractor and the Contractor shall pay the cost thereof.

All special guarantees or warranties applicable to specific parts of the work as may be stipulated in the Contract specifications or other documents being a part of this Contract shall be subject to the terms of this paragraph during the one (1) year guarantee period. All special guarantees and manufacturers' warranties shall be delivered to the Engineer before shop drawings on items of major equipment are approved. Guarantees and warranties for other items shall be furnished prior to the acceptance of the work.

1.5.7

ITEMS NOT LISTED IN "ESTIMATE OF QUANTITIES."

Sundry items which are incident to or required in the construction of the work but are not included as items in the estimate of quantities shall be considered an integral part of the Contract, and all labor, materials, etc., required for such items shall be furnished by the Contractor and the cost included in the unit price bid for other items of work.

1.5.8

OMISSION, DISCREPANCIES, AND CORRECTIONS.

It is the intent of the Contract documents that all performance under the Contract be in accordance with the best practice. The Contractor shall carefully check the plans both before commencing and throughout the work. The contractor shall immediately call the Engineer's attention to any errors, omissions, or discrepancies that the contractor may discover in the plans before proceeding with the work affected. The Engineer reserves the right to make such corrections as deemed necessary for the fulfillment of the true intent of the Contract documents.

1.5.9

SUBSTITUTION OF MATERIALS.

The Contractor may submit plans and specifications for a type of material other than those covered by the Contract documents, provided they conform to the requirements of the Contract documents covering the particular type of materials for which a substitute is proposed. In all cases, however, the plans and specifications for the proposed substitution must be approved by the Engineer in writing.

In the event of such substitution, the Owner will require from the Contractor a credit deduction from the Contract amount equal to any saving in material cost resulting from use of the proposed substitute. The name of the manufacturer and location of the plant must be furnished along with the proposal for the use of any substitute.

CHAPTER 1.6.0 - EXTRA WORK AND CREDITS

1.6.1

REVISION OF PLANS.

If the Owner deems it proper or necessary in the execution of the work to make any alteration which will increase or diminish the quantity of labor or materials, or the cost of the work, such alteration shall not annul or vitiate the Contract or agreement, nor release the Surety. The Contractor shall

furnish the necessary labor, material, etc. to complete the Contract as altered within the time limit originally specified, or as extended by the Engineer. Additions or deductions need not be accepted by the Contractor if the total cost of the additions or deductions exceeds fifteen percent (15%) of the total cost of the project as originally bid by the Contractor. The value of the work so added or omitted shall be added or deducted from the amount otherwise due the Contractor, as the case may be, and shall be determined in accordance with the methods described in Section 1.6.3.

1.6.2 **AUTHORITY FOR ALTERED WORK.**

No extra work of any kind will be allowed unless ordered in writing by the Engineer prior to commencing work which will entail such extras. No verbal orders shall be construed as authorizing or laying the foundation for extra compensation for either extra work or materials, or for damages because of said Contractor's compliance therewith. Verbal orders or suggestions may be given from time to time, as to the performance of the work, but in case they appear to the Contractor to involve extra work for which he should receive extra compensation, he must ask for the regular written order.

In the event of any disagreement as to the amount of work involved under any authorized order for extra work, it is hereby agreed that the decision of the Engineer shall be binding and conclusive.

1.6.3 **BASIS OF PAYMENT OR CREDIT FOR ALTERED WORK.**

The method of determining the basis of payment or credit resulting from such altered work shall be:

- (a) Unit bid prices for the particular item as established in the original Contract or the Schedule of Fixed Prices.
- (b) For such items for which unit prices have not been established in the Contract, by agreement with the Contractor, following a request by the Engineer for a written quotation for the item of work to be performed, or the elimination of an item of work.
- (c) If an agreement cannot be made between the Contractor and the Engineer for items of work for which unit prices are not set forth in the Contract, then the value shall be determined by using the actual cost of labor (hourly wages calculated from basic hourly plus contributions plus sixty (60) percent maximum insurance increase), materials and insurance, plus fifteen percent (15%) for superintendence, general expenses and profit, plus equipment rental at fair market rates.

Claims for such work will not be considered unless the Contractor presents to the Engineer's representative a daily-itemized statement in duplicate of the hours of labor, quantities of materials, etc. upon which payment is to be based. The Engineer's representative on the work will check such amounts daily and will retain the original for the Engineer and return the copy to the Contractor. The approval of such items by the Engineer's representative, shall not in itself, however, be construed as authorizing or accepting such claims. No claims will be considered until the original bills, receipts, or vouchers have been furnished to the Engineer by the Contractor.

CHAPTER 1.7.0 - PROTECTION OF WORK - PUBLIC AND PRIVATE

1.7.1 **PROTECTION OF WORK.**

During performance and up to the completion date of work, the Contractor shall be under an absolute obligation to protect finished and unfinished work against any damage, loss or injury from rain, vandalism, or other causes of premature deterioration. In the event of such damage, loss or injury, the Contractor shall promptly replace or repair such work, whichever the Engineer shall determine to be preferable.

1.7.2 **PROTECTING OPENINGS.**

Adequate protection shall be provided around all openings wherever required to safeguard the work or the public. All openings and surface obstructions shall be protected with barricades, signs and warning devices in accordance with local requirements.

1.7.3

STREET BARRICADES, SIGNS AND WARNING DEVICES.

The Contractor shall be responsible for the erection and maintenance of all barricades, lights and signs necessary for public safety and convenience in accordance with all applicable requirements. In general, all hazards within the limits of the work or on detour around the work must be marked with well-painted, well-maintained barricades, reflectors, electric lights, flashers and warning and directional signs in sufficient quantity and size adequate to protect life and property (See Figure 18). These safeguards shall be moved, changed, increased or removed as required during the progress of the work to meet changing conditions and shall be rechecked at the end of each workday.

It shall be a requirement that, during hours of darkness, warning lights shall be used on all drums, barrels, barricades, vertical panels and portable barriers. These lights shall be operated in the FLASHING mode when the aforementioned devices are used singly, and in the STEADY BURN mode when the devices are used in a series for traffic channelization.

The Contractor shall provide continuous twenty-four (24)-hour-a-day availability of equipment and forces to expeditiously restore barricades, lights, signs, or other traffic control devices that are damaged or disturbed and in no case shall the elapsed time between the notification of damage and restoration of traffic control devices exceed two (2) hours. The cost to maintain and restore the above shall be considered incidental to the item of Traffic Control and no additional payment will be made therefore.

When a street is closed to through traffic, barricades shall be placed at the adjacent intersections as well as at the location of the obstruction. Detour signs shall be attached to the barricades at the adjacent intersections. Detour signs shall be adequately illuminated and/or reflectorized so as to be clearly visible at all times.

The Engineer reserves the right to require that "snow fence" be installed at locations where streets or alleys are closed for the full width of the roadway. Barricades shall be maintained in rigidly assembled condition. All warning devices shall be kept clean and in good repair so as to be readily discernible at all times.

1.7.3a

TRAFFIC CONTROL.

All signs and barricades shall conform with Part 6, Temporary Traffic Control Section of the Federal Highway Administration Manual on Uniform Traffic Control Devices for Streets and Highways. Proposed signing and barricading must be approved by the Engineer.

1.7.4

FLAGMEN REQUIRED.

Whenever the Contractor's operations obstruct or endanger a traffic lane, and no marked detour has been provided, he shall furnish a flagman to direct traffic through or around the congested area. The Engineer shall have the right to require additional flagmen as he may deem necessary.

1.7.5

REMOVAL OF SNOW.

The Contractor shall be responsible for immediate removal of snow from those sections of streets which he has obstructed.

1.7.6

DUST PALLIATIVE.

When directed by the Engineer, the Contractor shall furnish and apply an approved dust palliative on the trench surfacing or temporary roadways which he has provided around his work. This dust palliative shall be applied uniformly and shall be repeated as required. Payment shall be made at the price named in the Schedule of Fixed Prices.

1.7.7

ACCESS TO PROPERTIES.

The Contractor shall neither shut off nor unnecessarily interfere with either pedestrian or vehicular access to property without the consent of the Engineer.

1.7.8 PROTECTING PRIVATE PROPERTIES.

All private properties shall be fully protected by the Contractor. All trees, bushes, shrubs, sod, survey monumentation (ex. lot corner pipes), buildings, garages, other structures, etc. on private property damaged by the Contractor shall be repaired or replaced by the Contractor at no cost to the private owner, and to the satisfaction of the Engineer.

1.7.9 PROTECTION OF ADJOINING PROPERTY AND BUILDINGS.

Unless waived by adjoining owners, at least thirty (30) days prior to commencing the excavation, the excavator shall notify, in writing, all owners of adjoining buildings of his or her intent to excavate. The notice shall state that the adjoining buildings may require permanent protection. The owners of adjoining property shall have access to the excavation site for the purpose of protecting their buildings, all in compliance with Section 101.111 of the Wisconsin Statutes. In this section "excavator" means any owner of an interest in land making or causing an excavation to be made.

1.7.10 DRAINAGE.

Drainage must not be obstructed at any time. When necessary, a continuous pipe or drain, of ample capacity, shall be laid to carry off the storm water. Such pipe or drain shall be kept open and free of obstructions.

All storm or ground water, which is to be removed from the site of the work, must be conveyed to an inlet of a storm sewer, or, when so approved by the Engineer, to some other point of disposal. All sanitary sewage must be conveyed by closed pipe or hose to an inlet of a sanitary sewer, or when so approved by the Engineer, to some other point of disposal. Proper precautions must be taken to prevent excessive quantities of clay, sand or silt from entering existing sewers. All existing structures which are disturbed must be restored to a condition at least equal to their original condition and to the satisfaction of the Engineer.

1.7.11 ACCESS TO PUBLIC AND PRIVATE FACILITIES.

Access must always be maintained to fire hydrants, water and gas gate valves, catch basins, and sewer, water, utility and other manholes. Whenever access to any such facility shall have been obstructed or interfered with during the progress of the work, the Contractor must immediately remove at his own expense such obstruction or interference.

1.7.12 TRAFFIC.

The Contractor shall maintain vehicular traffic as specified in the Contract documents or as otherwise directed by the Engineer.

1.7.13 WORK IN PRIVATE RIGHT-OF-WAY.

Whenever the work is to be prosecuted through private property for which the Owner has obtained a license or an easement, the Contractor must abide fully with the terms of the license or the easement, a copy of which is on file with the Owner.

1.7.14 APPROVAL OF EASEMENT RESTORATION.

Prior to final payment, the Contractor shall send a notice to all easement grantors by certified mail, return receipt requested, a copy of which shall be filed with the Owner, said notice to be similar to the following:

The undersigned Contractor has completed the restoration of the construction site on which you have granted an easement for installation of certain utilities and improvements. If said site restoration is not completed to your satisfaction, please contact (name of Engineer, address and name of Municipality) in writing and arrangements will be made immediately to view the site and restore the site in conformance with our contract obligations.

If (name of Engineer, address, name of Municipality) does not hear from you in writing within ten (10) days from the above date, site restoration of your property will be deemed completed and approved by you.

(Name of Contractor)
(Address of Contractor)

Owner shall furnish Contractor with names and addresses of easement grantors.

Upon receipt of a notice of deficiency, the Owner or his representative will examine the site, and direct the Contractor to complete all work which may be necessary to satisfy the terms of the Contract. Should the Contractor refuse to comply, the Owner reserves the right to have the work done by contract or force account and deduct the cost thereof from the monies due the Contractor. Should conditions exist which preclude the Contractor from completing satisfactory restoration, the Owner may require the Contractor to furnish a bond in a sum sufficient to cover any legal claims for damages. When the Owner is satisfied that the work has been completed in agreement with the Contract documents and the terms of the license or easement, he reserves the right to waive the requirement of obtaining the statement.

1.7.15 SANITARY PROVISIONS.

The Contractor shall provide and maintain properly sheltered sanitary conveniences for his employees, and their use must be strictly enforced.

1.7.16 EMERGENCY MAINTENANCE AND PROTECTION.

In the event it becomes necessary for the Owner to perform emergency maintenance and protection, which is the responsibility of the Contractor under the Contract documents, the cost of such work shall be billed to the Contractor and deducted from his final payment if not paid.

CHAPTER 1.8.0 - LEGAL RELATIONS

1.8.1 LAWS TO BE OBSERVED.

The Contractor, his agents and employees, shall at all times observe and comply with all Federal and State laws, local laws, ordinances, codes and regulations which in any manner affect the conduct of the work and all such orders or decrees as exist at the present and which may be enacted later, or bodies or tribunals having jurisdiction or authority over the work. He shall protect and save harmless the Owner, its officers and representatives, against any claim or liability arising from the violation of any such law, ordinance, code, regulation or order.

1.8.2 SUBCONTRACTING.

The Contractor shall not subcontract any work to be performed without the written consent of the Owner. If the Contractor shall sublet any part of this Contract, the Contractor shall be as fully responsible to the Owner for the acts and omissions of his Subcontractor and of the persons either directly or indirectly employed by his Subcontractor as he is for the acts and omissions of persons directly employed by himself.

Neither the approval, endorsement of the Engineer nor anything contained in the Contract documents shall be construed as creating any contractual relationship between any Subcontractor and the Owner.

The Contractor hereby agrees to bind every Subcontractor, and every Subcontractor in turn agrees to be bound to the Contractor, by such terms of the Contract documents as are in any measure pertinent to his work.

1.8.3 PATENTS AND TRADE SECRETS.

It is hereby expressly agreed that alleged ownership, by any Contractor or any Subcontractor, of trade secrets as to materials or mixtures used in any part of the work, or the preparation of any work

mixtures for such work, shall not be recognized by the Owner in the performance of the Contract.

It is also mutually understood that, without exception, Contract prices are to include all royalties and cost arising from patents, trademarks and copyrights in any way involved in the work. The Contractor and the Surety in all cases shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of any such patent design, device, material or process to be performed under the Contract, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay, by reason of such infringement at any time during the prosecution of the work.

1.8.4

INSURANCE.

The Contractor shall not commence work under a Contract until he has obtained all insurance required by the Contract and has filed certificates thereof with the Owner, nor shall the Contractor allow a Subcontractor to commence work until all similar insurance required has been so obtained and filed.

PART II

REMOVALS, GRADING, AND MISCELLANEOUS ITEMS

CHAPTER 2.1.0 - GENERAL

2.1.1 DESCRIPTION.

The grading of streets, alleys, parking lots and sidewalks, etc., shall conform to the requirements of these Specifications. Under these items and in accordance with these Specifications, the Contractor shall clear the ground of all obstructions and unsuitable debris, do all excavating and filling, dispose of surplus excavation, and do all other necessary work incidental to the construction work in conformance with the Plans as ordered in the field by the Engineer.

2.1.2 DUST CONTROL.

The Contractor shall be responsible for the control of dust during the construction period. Dust shall be controlled by the use of water or other methods. If, in the opinion of the Engineer, this is not effective in controlling the dust, the Engineer may order the use of calcium chloride. When so ordered, this calcium chloride shall be applied uniformly and shall be repeated as required. Payment for this calcium chloride shall be made at the fixed extra price.

2.1.3 PROTECTION OF UTILITY INSTALLATIONS.

The Contractor will be held responsible for any damages caused by employees or equipment to all underground or surface utilities.

WATER VALVE BOXES AND STOP BOXES.

Prior to the beginning of the project, Water Department personnel will expose, examine the condition, make necessary repairs, clean out, protect by guard stakes, or otherwise identify all water valve boxes and stop boxes. The Contractor must continually maintain the guard stakes or other identification during the progress of the work.

INLET PROTECTION BARRIERS.

When directed by the Engineer, all storm sewer catch basins and inlets shall be protected from sediment with barriers installed and maintained for the duration of the project as shown in the Erosion Control Requirements for all Contracts in the City of West Allis.

MANHOLE PROTECTION BARRIERS.

To help insure adequate protection from debris entering sewer lines, the Contractor may be required to install approved barriers in all of the manholes as shown in Figure 17, Manhole Protection Barrier, prior to any pavement removal work. These barriers shall be removed by the Contractor when the frame adjustment work is completed.

The Contractor shall exercise extreme caution while working adjacent to all manholes and catch basins. Wooden inserts shall be used to cover all manhole and catch basin openings when the covers or grates are removed to facilitate construction. Three-eighths inch (3/8") thick metal plates shall be used to cover all manholes and catch basins when the frames are removed. The Contractor shall immediately remove any earth, debris, or foreign material of any type found in a manhole or catch basin.

In the event that foreign material is found within a sewer main where it is inaccessible by ordinary means, the Contractor must immediately notify the Inspector and the City Yard. Such notification will in no way relieve the Contractor of the responsibility of paying for the full cost of all cleaning work performed by the City, nor for the cost of damage to the abutting properties due to sewer back-up.

2.1.4 PRIMARY LINE AND GRADE.
Primary line and grade will be established by the Engineer. The Contractor shall render whatever assistance may be required by the Engineer and shall arrange his work operations in such manner as to avoid interference with the establishment of primary lines and grades. The Contractor shall check the accuracy of line and grade stakes by means of visual and taping checks and he shall be responsible for the protection and preservation of such stakes. The cost of restaking due to the Contractor's negligence shall be charged to the Contractor.

2.1.5 IDENTIFICATION STAMP.
The Contractor shall mark the ends of each portion of concrete work with a stamp as directed by the Engineer. The stamp shall be as shown in Figure 10, Identification Stamp, City of West Allis.

CHAPTER 2.2.0 - CONSTRUCTION METHODS

2.2.1 EARTH EXCAVATION.
Earth in excavation shall be removed to the proper cross section as shown on the Plans. The Contractor shall dispose of all excess earth not required in the Contract, and shall also dispose of earth not suitable in the judgment of the Engineer to be used in the work. When unsuitable material is encountered below subgrade, this material shall be removed and replaced as directed by the Engineer. When this removal can be accomplished by using grading equipment available on the job, the Contractor shall be paid the Contract unit price for excavation. When special equipment must be used, the Contractor shall be paid as specified in Section 1.6.3.

Large rocks and other natural obstructions shall be removed to a depth of not less than one (1) foot below subgrade or to existing ground elevation, whichever is lower. The cost of this work is to be included in the price bid for "Excavation."

For rough grading a tolerance of two (2) inches from the required cross section will be permitted, but the deviation shall not be consistent in any one direction.

The approaches to the street being graded shall be sloped as indicated on the Plan or as directed in the field. The side slopes shall be graded at a three-to-one slope unless otherwise directed.

2.2.2 SURPLUS EXCAVATION.
The Engineer reserves the right to order up to ten percent (10%) of the surplus excavation to be delivered to streets, alleys, public properties or other locations designated by the Engineer. The cost of delivering such surplus material to any point within a driving distance of five (5) miles from the site of the work shall be included in the unit prices bid for the work. After delivery to any designated location, such material shall be leveled off by the Contractor within one (1) week of delivery. The material shall be free of debris and concrete or asphalt pieces four inches (4") and over.

2.2.3 EARTH FILL.
Earth taken from excavation shall be placed in embankment to the proper cross section as shown on the Plans. Such filling shall be placed in layers not to exceed eight inches (8") in depth and shall be uniformly spread and compacted in such a manner and with such equipment as is deemed acceptable by the Engineer. All sod and other vegetable matter shall be stripped from the ground surface before any filling operations begin. Material used in the preparation of the subgrade shall consist of suitable sand, clay, earth or gravel, free from animal or vegetable matter.

The Contractor shall grade the walk area to the proper cross section for topsoil before paving. This work shall be done by hand methods or by the use of equipment which, in the opinion of the Engineer, will not cause damage to the curb, walk or trees. Backfill material placed between the curb and the lot line shall be free from roots, rocks, and construction debris, and shall be subject to the approval of the Engineer.

2.2.4

BORROW EXCAVATION.

Borrow excavation shall consist of furnishing, placing, and compacting approved soil behind the curb in areas where sod is to be installed and other areas as needed prior to placing topsoil and sod.

2.2.5

TREES.

(a) **CLEARING AND GRUBBING.**

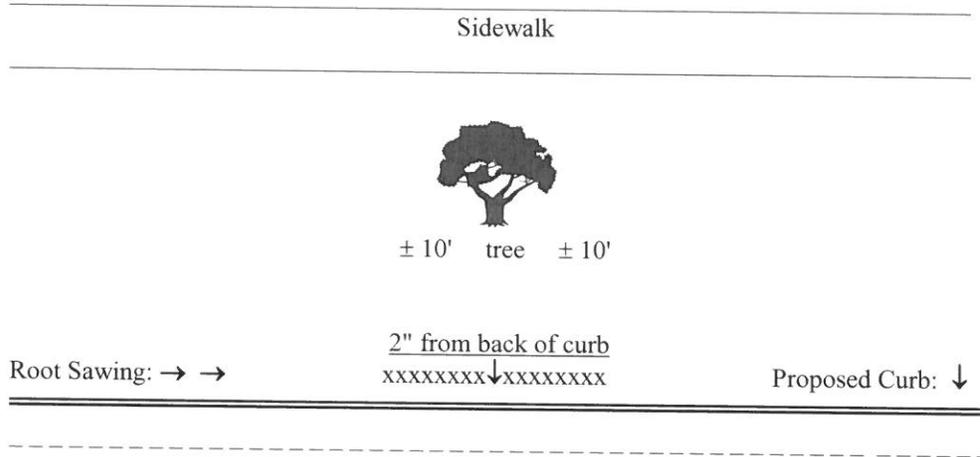
The Contractor shall clear the ground, remove and dispose of designated trees, as well as stumps, roots, rubbish or other refuse found within the limits of the work. The price bid for grading shall include the removal of trees and stumps smaller than four (4) inches in diameter. Separate payment will be made for clearing and grubbing trees and stumps four (4) inches in diameter and larger.

Stumps and roots shall be ground by an approved mechanical grinding machine to a depth of eighteen (18) inches below the proposed ground elevation. Other methods of grubbing may be used only with the approval of the Engineer.

All grubbing holes shall be cleaned of chips and grindings and filled with approved compacted fill. The top three (3) inches shall be topsoil.

(b) **ROOT SAWING.**

This item of work shall consist of sawing the roots two (2) inches behind the back of the proposed curb, approximately ten (10) feet either side of each tree, and to a depth of eighteen (18) inches, as directed by the Engineer and as shown below. This may require the concrete curb and gutter to be constructed by steel or wood forms, i.e. "hand" methods, at some tree locations if conventional slip form machinery cannot be used. The cost of this additional work shall be included in the contract unit price bid per lineal foot of "31" Concrete Curb & Gutter." All street lighting cable will be de-energized and replaced after new curb installation.



The Contractor shall take all necessary precautions to protect trees at the work site. An approved mechanical root cutter shall be used to saw the tree roots which interfere with the proposed curb and gutter construction, except in those situations where hand implement usage is adequate.

When tree roots are sawed, the following provisions shall apply:

ROOTS SHALL BE SAWED ON ONLY ONE SIDE OF A TREE.

The root system shall not be sawed deeper than eighteen (18) inches below the proposed elevation of the new curb and not more than two (2) inches from the back of the proposed curb.

Caution shall be used during root sawing operations, so as not to cause unnecessary damage to the tree or its root system.

All debris from the root sawing operation shall be used to fill root sawing trenches before the end of the workday.

Root foundations for all trees must remain adequate to withstand heavy windstorms.

All exposed and severed tree roots shall be immediately covered with a mulch and watered to prevent drying until such time that the concrete work is complete, the form removed and the area between the tree and concrete work backfilled with approved topsoil. The time duration for completion of the backfilling operations shall not exceed five (5) days from the time the concrete was placed.

"Root Sawing" shall be measured and paid for at the unit price bid per lineal foot of actual root sawing at each tree location.

(c) **TREE PROTECTION.**

Effective planning before and during an excavation or construction project can often prevent damage to or loss of trees. The Contractor shall take all necessary precautions to protect trees at the work site. Where a contractor perceives, that even with reasonable care, damage may occur during construction, the Forestry Division shall be contacted at (414) 302-8811 to request a preconstruction meeting on site.

(1) **ROOT PROTECTION ZONE.**

Root foundations must remain adequate to withstand heavy windstorms.

To protect the immediate portion of the tree roots, a Root Protection Zone will be maintained. This Zone area is five feet (5') on each side of the centerline of the tree trunk parallel with the street and from the backside of the curb to the backside of the walk. No construction equipment or materials, sand, soil, gravel, block or pipe shall be placed, parked or stored within this area. No chemicals, rinsates or petroleum products shall be deposited within this area. (See Figure 14.)

All cutting for the removal of sod and soil in order to establish a finished grade within this Zone must be done manually.

No excavation shall occur within this Zone.

Tree roots interfering with the work shall be completely severed with a clean sharp tool; i.e., axe, pulaski, chain saw, etc., and removed with an approved machine or other approved methods. An approved mechanical root cutter shall be used to saw the roots which interfere with the proposed sidewalk construction, except in those situations where hand implement usage is specified.

When tree roots are cut, the following provisions shall apply:

- [a] **CONCRETE WALK.** The root system on the walk side of the tree shall not be cut by means of mechanical root cutting machines. If root removal is essential to concrete walk replacement, interfering roots shall be manually cut with hand implements.

Roots below the proposed walk shall be removed only to a depth of nine (9) inches below the proposed elevation of the new five-inch (5") concrete walk.

When replacement walk is two feet (2') or less from the surface of a City tree trunk, the walk will be narrowed one foot (1'). All old walk should be removed prior to any root cutting in narrowed area. If the root system is to be cut, the cut must be within two inches (2") of the edge of the proposed new walk and not more than nine inches (9") below the proposed elevation of the new walk. (See Figure 14.)

- [b] CARRIAGE WALK. The edge of the new walk closest to a City tree shall be at least six feet (6') from the centerline of the tree. (See Figure 14.) All old walk should be removed prior to any root cutting. Roots shall not be cut by means of mechanical root cutting machines. If root removal is essential to carriage walk replacement, interfering roots shall be manually cut with hand implements. If the root system is to be cut, the cut must be within two inches (2") of the edge of the proposed new walk and not more than nine inches (9") below the proposed elevation of the new walk. (See Figure 14.)
- [c] DRIVEWAYS. All old concrete should be removed prior to any root cutting. Roots shall not be cut by means of mechanical root cutting machines. If root removal is essential to driveway replacement, interfering roots shall be manually cut with hand implements. If the root system is to be cut, the cut must be within two inches (2") of the edge of the proposed new concrete and not more than nine inches (9") below the proposed elevation of the new concrete. (See Figure 14.)

Caution shall be used during root cutting operations, so as not to cause unnecessary damage to the tree or its root system.

All debris from the root sawing operations shall be removed from the sidewalk area and root sawing trenches must be filled with approved topsoil before the end of the workday.

Root foundations for all trees must remain adequate to withstand heavy windstorms.

All exposed and severed tree roots shall be immediately covered with a mulch and watered to prevent drying until such time that the concrete work is complete, the form removed and the area between the tree and concrete work backfilled with approved topsoil. The time duration for completion of the backfilling operations shall not exceed twenty-four (24) hours from the time the concrete was placed.

(2) CREDITS AND CHARGES FOR DAMAGE.

Damage to trees caused by construction work ranges both above and below ground. Root systems can suffer both mechanical and chemical damage. Tree trunks and crowns are subject to various degrees of mechanical damage. Through their short-term and long-term effects on tree health, these types of damage can be quite serious.

The most serious construction damage to a tree is usually done to the unseen portion of that tree. Overlooked and misunderstood, tree roots often suffer extensive, if unintended, injury and loss as a result of construction work happening around them. Mechanical destruction of roots or chemical contamination of soil in the root zone is the main cause of construction damage below ground.

The soil at a construction site can suffer compaction damage by general construction

traffic, operation of heavy equipment and by the storage of construction materials. Compaction of the soil changes soil structure and increases bulk density. This leads to either drying or water-logging of soils surrounding tree roots.

Excessive root loss may also occur when no concern is given to root systems during trenching and excavating activities by trenching machines, backhoes and bulldozers. Roots can be severed, torn away or crushed causing serious wounding and oftentimes loss of normal structural stability. This can lead to direct tree mortality and/or uprooting.

Leaking fuel, lubricants or hydraulic oils and spills or dumping of masonry rinsates, paints, acids, solvents, etc. may kill roots or impede their functions. This can adversely affect the tree health or cause direct tree mortality.

Many construction activities cause aboveground damage to street trees. This damage includes broken, split and scarred branches and/or tree trunks. Small broken branch-ends may be unavoidable and of little consequence to overall tree health. However, when large branches are torn away, damage is substantial. Total leaf area is also reduced by leaf scorch and twig death caused by hot exhaust gases venting from construction equipment operating beneath tree crowns.

Trunk wounding can range from minor outer bark damage to total structural failure of the main stem. These wounds provide entrance for decay fungi. The spread of decay in the main trunk may become so extensive as to compromise structural stability. Severe impacts can crack or split the main stem. Structural damage this extensive is usually obvious. The danger of such trees to people and property requires immediate action.

Effective planning before and during an excavation or construction project can often avert the damage to, or loss of trees. Sometimes trees must be removed to accommodate construction. Charges for any or all of the following may be levied: the appraised value of the tree, cost of removal and the cost of replacement planting.

Caution should be used during the construction process to avoid damage to the roots, trunk and branches of all street trees. Damage caused to any street tree will be repaired only by the City Forestry Division. The costs of repair, rejuvenation and/or value lost will be billed to the contractor or credited against the contract, at the option of the City.

At locations where the contractor has not complied with the City of West Allis Standard Specifications for Street Construction, and the minimum clearance was not maintained, a minimum credit to the City of fifty dollars (\$50.00) per location will be taken. The credit will increase in proportion to the variance beyond the allowable minimum. The credit will be fifty dollars (\$50.00) for each two-inch (2") increment or part thereof in excess of the allowable minimum. If, in the opinion of the Forestry Division, the tree has been damaged to the point that it warrants removal, the credit that will be taken will be equal to one hundred dollars (\$100.00) per inch diameter of the tree. A field measurement will be taken at four and one-half feet (4.5') above ground to determine the tree diameter.

If required, Forestry personnel can perform clearance pruning to raise the crowns of the trees on the site. This pruning eliminates overhead conflicts without overpruning or deforming the trees.

If you have any questions or concerns regarding the trees on your construction site, please contact the Forestry Division of the City of West Allis at (414) 302-8811.

(c) ROOT CUTTING.

The Contractor shall take all necessary precautions to protect trees at the work site which are not to be removed. Tree roots interfering with the work shall be completely severed with a clean sharp tool; i.e., axe, pulaski, chain saw, etc., and removed with an approved machine or other approved methods so that no portion of the root is within two (2) inches of new concrete. An approved mechanical root cutter shall be used to saw the roots which interfere with the proposed sidewalk construction, except in those situations where hand implement usage is specified.

When tree roots are cut, the following provisions shall apply:

- (1) CONCRETE WALK. The root system on the walk side of the tree shall not be cut deeper than nine (9) inches below the proposed elevation of the new five inch (5") concrete walk and not more than five inches (5") from the edge of the proposed walk.

Roots below the proposed walk shall be removed only to a depth of nine (9) inches below the proposed elevation of the new five inch (5") concrete walk.
- (2) CARRIAGE WALK. Roots shall not be cut by means of mechanical root cutting machines. If root removal is essential to carriage walk replacement, interfering roots shall be manually cut with hand implements.
- (3) CURB AND GUTTER. The root system on the curb side of the tree shall not be cut deeper than eighteen inches (18") below the proposed elevation of the new curb and not more than eight inches (8") from the back of the proposed curb.
- (4) DRIVEWAYS. Roots shall not be cut by means of mechanical root cutting machines. If root removal is essential to driveway replacement, interfering roots shall be manually cut with hand implements.

Caution shall be used during root cutting operations, so as not to cause unnecessary damage to the tree or its root system.

All debris from the root sawing operations shall be removed from the sidewalk area and root sawing trenches must be filled with approved topsoil before the end of the work day.

Root foundations for all trees must remain adequate to withstand heavy windstorms.

All exposed and severed tree roots shall be immediately covered with a mulch and watered to prevent drying until such time that the concrete work is complete, the form removed and the area between the tree and concrete work backfilled with approved topsoil. The time duration for completion of the backfilling operations shall not exceed twenty-four (24) hours from the time the concrete was placed.

2.2.6

CULVERTS.

New culverts shall be placed at such locations and elevations as shown on the Plans or as directed in the field. Culverts shall be supported their entire length by a well compacted subgrade.

The Contractor must use reasonable caution in removing existing culverts within the right-of-way. The cost of this removal is to be included in the price bid for "Excavation." The culverts thus removed shall be deposited on the right-of-way for removal by City crews. When, in the opinion of the Inspector, the culverts have no salvage value for the City, said culverts shall become the property of the Contractor and are to be disposed of at his discretion.

2.2.7

CONCRETE SAWING.

The work under this item consists of sawing existing concrete or asphaltic pavements, curb and gutter, driveways, or sidewalks and the washing of the sawing debris at locations shown on the Plan or as directed by the Engineer. The saw cut shall be straight, and a minimum of four inches (4") deep. The sawing of the existing pavement and curb and gutter shall be full depth.

Washing off of the sawing debris shall be required when the pavement being cut will be open to traffic. The City shall supply the water for pavement washing.

No payment shall be made for sawing that is not straight or for sawing where the sawing debris is not washed off of pavement that is open to traffic.

2.2.8

REMOVING EXISTING STRUCTURES.

This work shall consist of removing old pavement, curb and gutter, sidewalk, driveways, and other similar structures to the lines as shown on the Plans or as directed in the field.

The Contractor may break existing pavements by the use of a drop weight or by a pneumatic pavement breaker if, in the opinion of the Engineer, said uses are unlikely to cause damage to utilities or adjacent property. The Engineer reserves the right to order the Contractor to change the method of pavement breaking during the progress of the work if damages seem likely to occur. In any event, the Contractor shall be solely responsible for all damages.

Service walks, fences, and other structures within the grading limits belonging to abutting property owners shall be removed and delivered to the abutting property when ordered by the Engineer. Any other material not required by the City shall become the property of the Contractor, who shall remove and dispose of such material at his own expense.

2.2.9

TOPSOIL.

Topsoil shall be completed within ten (10) days after proper compressive strength on the pavement is achieved. If needed, the Contractor will be required to retopsoil in spring on any project initially topsoiled after October 15th the previous year. Payment for the retopsoiling shall be calculated at the unit price bid for the topsoil on the original Contract. The Contractor shall grade the area between the curb and walk or lot line to a plane three inches (3") below finished grade by hand methods or by the use of equipment which, in the opinion of the Engineer, will not cause damage to the curb or walk. Topsoil conforming to the requirements of Chapter 10.5.0 shall then be spread, leveled off, and compacted to finished grade.

The borrow excavation soil behind the new curb and gutter shall be compacted by methods acceptable to the Engineer prior to the placement of topsoil.

2.2.10

SODDING.

(a) DESCRIPTION OF WORK. The work shall consist of the furnishing and laying of live sod on the shoulders, slopes, ditches, or other locations as designated, and the construction of sod ditch checks or similar appurtenances as shown on the Plans, in the contract or as ordered and laid out in the field by the Engineer in accordance with the specifications.

(b) MATERIALS. The sod shall consist of a dense, well-rooted growth of permanent and desirable grasses, indigenous to the general locality where it is to be used, and shall be free from weeds or undesirable grasses. At the time the sod is cut, the grass shall be approximately two inches (2") long and raked free from debris. The sod shall be cut in strips with a minimum size of 18" x 72". The thickness of the sod shall be at least three-quarters inch (3/4") so that the sod can be handled without undue tearing or breaking. The Contractor shall take steps to insure that the sod is in a well-moistened condition prior to installation.

(c) CONSTRUCTION METHODS.

- (1) PREPARATION OF EARTH BED. The area to be sodded shall have been previously constructed to the required cross-section contour and the tops and bottoms of the slopes shall be rounded to a minimum four foot radius. The areas to be sodded shall be free from stones, roots or other foreign material.

The initial topsoil placement shall be three inches (3") in cross section and thoroughly compacted so as to prevent settlement once the sod has been laid. After compaction, the topsoil shall be fine graded and loosened so as to consolidate the root growth of the sod with the topsoil and establish a smooth surface. Additional topsoil may have to be added to low spots.

Sod shall be laid so that the joints caused by abutting ends of the strips are not continuous. Each sod strip shall be laid so as to abut snugly against the strip previously laid, or existing grass surfaces. The minimum width of a sod strip shall be nine inches (9").

As the sod is being laid it shall be rolled. Or, the sod shall be firmly but lightly tamped with a suitable wooden or metal tamper as approved by the Engineer.

At points where water will flow over a sodded area or at the limits of the sodded area, the upper edges shall be turned into the soil below the adjacent area and a layer of earth placed over the juncture.

- (2) STAKING AND CLEANUP. On all slopes steeper than one foot (1') vertical to four feet (4') horizontal, the sod shall be staked or pegged. Stakes shall preferably be placed near the top edge of the sod strip and shall be driven plumb through the sod to be flush with the sod. All sod placed in ditches shall be staked regardless of the slope. After staking, the sod surface shall be cleared of loose sod or excess debris.
- (3) WATERING. After staking and cleanup, the sod shall be thoroughly moistened with water. All sodded areas shall be kept thoroughly moist by watering daily, when rainfall is deficient, for a period of twenty-one (21) days. The City shall supply the water for sod watering at no cost to the Contractor. The Contractor shall obtain a permit and meter fitting from the West Allis Water Department (302-8830) and use only on the designated hydrants.

2.2.11 SEEDING AND MULCHING.

2.2.11.1 SEEDING.

- (a) DESCRIPTION OF WORK. This work shall consist of preparing seed beds, furnishing and sowing the required seed on shoulders, slopes, appurtenances and other areas as shown on the Plans or designated in the Contract, or as ordered to be seeded by the Engineer.
- (b) GENERAL REQUIREMENT. All seed shall conform to the requirements of the Wisconsin Statutes and of the Wisconsin Administrative Code Chapter Agriculture, Trade and Consumer Protection 20, regarding noxious weed seed content and labeling. Seed shall not be used on the work later than one year after the test date which appears on the label.
- (c) STORAGE. Any seed delivered prior to use shall be stored in such a manner that it will be protected from damage by heat, moisture, rodents or other causes. Any previously accepted seed that has become damaged shall be discarded and replaced by the Contractor.

- (d) COMPOSITION.
The seed mixture required, unless otherwise noted shall be:

The following percentages apply to the No. 10 mix:

Kentucky Blue Grass	50%
Creeping Red Fescue	25%
Perennial Rye Grass	25%

- (e) CONSTRUCTION METHODS. Seeding when performed in conjunction with mulching may be done at any time during the growing season when soil conditions are suitable. Seeding shall be done with the selected seed mixture sown at the specified rate.

- (1) PREPARATION OF SEED BED. Grading, shouldering and topsoiling when part of the work under Contract, shall be completed before seeding. The three inch (3") layer topsoil shall be thoroughly compacted so as to prevent settlement in the newly seeded area.

The area to be seeded shall be worked with discs, harrows, or other appropriate equipment until a reasonable even and loose seed bed is obtained immediately in advance of the seeding.

- (2) SOWING. Unless otherwise specified, seeds may be sown at the option of the Contractor by either Method A or B.

METHOD A

The selected seed mixture shall be sown by means of equipment adapted to the purpose, or it may be scattered uniformly over the areas to be seeded, and lightly raked or dragged to cover the seed with approximately one-fourth inch (1/4") of soil.

After seeding, the areas shall be lightly rolled or compacted by means of suitable equipment, preferably of the cultipacker type when such equipment can be operated, or by means of light hand tampers.

Scattering seed by hand shall be done only with satisfactory hand seeders and only at such times when the air is sufficiently quiet to prevent seeds from blowing away.

METHOD B

Upon the prepared seed bed, the seed shall be sown or spread by means of a stream or spray of water under pressure operated from an approved type of machine designed for that purpose. The selected seed mixture and water shall be placed into a tank, provided within the machine, in sufficient quantities that when the contents of the tank are sprayed on a given area the seed will be uniformly spread at the required rate of application. During the process the contents of the tank shall be kept stirred or agitated to provide uniform distribution of the seed.

- (3) SEEDING RATES. The seeding rate, unless otherwise noted, shall be 3 lbs./1000 square feet.

2.2.11.2

MULCHING.

- (a) DESCRIPTION. This work shall consist of furnishing, placing and anchoring a mulch cover,

usually in connection with seeding on surfaces of such portions of the roadway as provided by the Plans, in the Contract, or as designated in the field by the Engineer.

- (b) MATERIALS. Mulching material shall consist of any straw or hay in an air-dry condition or wood excelsior fiber, wood chips or other suitable material of a similar nature which is free of noxious weed seeds and objectionable foreign matter.
- (c) CONSTRUCTION METHODS. Unless otherwise directed, the mulch shall be placed on a given area within three (3) days after the seeding has been completed. Mulching operations shall not be performed during periods of excessively high winds which would preclude the proper placing of the mulch. The placed mulch shall be loose or open enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, conserve soil moisture and prevent erosion.

The Contractor shall repair any damaged mulch until the time of final acceptance of the work.

2.2.12

ADJUST UTILITY FRAMES.

When the Contract items include the bid items "Adjust Catch Basin Frames" or "Adjust Storm Manhole Frames" or "Adjust Sanitary Manhole Frames", the Contractor shall adjust to finished grade all catch basins and City manhole frames. The masonry mortar and concrete bricks shall comply with the requirements of Section 519 of the State Specifications. Utility frame adjustments may include rebuilding block or brick as designated on the Plans or as determined by the Engineer.

The contractor shall remove the existing catch basin or manhole frame, adjust the top of the existing masonry structure, and reinstall the frame. A vertical change in the elevation of a frame, or replacement of deteriorated masonry that together exceeds six inches, will be covered by the Rebuild Manhole bid item specifications.

(a) Surface Requirements.

The contractor shall set the frames, grates and lids accurately so the complete installation is at the correct elevation required to fit the adjoining surfaces. The frames shall be set in pavement areas so that they comply with the following surface requirements. Place a 6-foot straightedge over the centerline of each frame parallel to the direction of traffic at the completion of the paving. Make a measurement at each side of the frame and average the 2 measurements. If this average is greater than 5/8 inch, reset the frame to the correct plane and elevation. If this average is 5/8 inch or less but greater than 3/8 inch, the City will allow the frame to remain in place but shall pay only 50 percent of the contract unit price for adjusting catch basin or manhole frames. If the frame is higher than the adjacent pavement, then make the 2 measurements at each end of the straightedge and average them.

(b) Repudiation of Past Practice.

Observations of manhole and catch basin structures of various ages have disclosed numerous cases where the frames have settled below the adjacent pavement or gutter, and investigation has revealed the materials used to support and adjust the frames have deteriorated to the extent that such materials could either be removed by hand or had already fallen into the structure. Such conditions are the result, at least in part, of the improper methods used in setting or adjusting the frames when they were installed. In the past, frames were often temporarily supported on a variety of shims or wedges while the adjacent concrete was being placed. Later, a cosmetic layer of mortar was applied from the inside of the structure with little, if any, mortar getting under the flange of the casting. This practice of adjusting the masonry structure to near the final grade, supporting the frames on small wedges while placing the adjacent concrete, then later attempting to force mortar under the flange, has proven unsatisfactory and will **not be permitted**.

The practice of boxing out frames and then placing adjacent concrete promotes random cracking and will **not be permitted**. The following construction practices will be required:

- (1) Whenever possible, the frames should be adjusted and set to grade on a full bed of mortar in advance of the paving operation or curb and gutter placement (except on asphalt pavement and asphalt resurfacing projects where the manhole frames shall only be adjusted **after the lower layer** of hot mix asphalt pavement is completed).
- (2) In the case of catch frames covers where slip-form methods of curb and gutter placement are utilized, the frames can be preset approximately one (1) inch low, the curb box removed, and the slip-form operation run continuously through the inlet location. Later, the curb section can be shoveled out, the curb box replaced, and the concrete patched in by hand on either side. The gutter section can be worked down to the frame elevation within a short distance on either side of the catch basin.
- (3) In the case of a manhole frame in the pavement (slip-form operation), or any other case where the fixture cannot be set prior to the placement of the adjacent concrete, the structure should be covered with a temporary cover such as a steel plate, the location carefully noted, and the concrete placed over the structure. When the paving operation has passed, the concrete over the structure can be shoveled out, the plate removed, and the frame placed and supported on the masonry structure in such a way that an opening exists between the top of the masonry structure and the bottom of the casting flange. The subgrade around the structure should be sloped down to the top of the masonry structure on about a two-to-one slope to allow concrete to flow into the opening under the flange. A form must be placed inside the structure to retain the concrete. As the concrete is placed adjacent to the frame, it should be carefully spaded and vibrated to force it under the flange. All remaining voids are to be pressure grouted with no shrink grout before opening the highway to traffic. Curing usually is not required for brick or concrete block masonry; however, the curing requirements are necessary when the manhole or inlet is constructed with concrete masonry.

An inspection will be made of the interior of all manholes and catch basins before final acceptance. The contractor should fill any voids between the flange and the top of the structure. Prior to final inspection and acceptance, all new, reconstructed or existing storm sewers, catch basins, manholes or other drainage structures are to be cleaned by the general contractor of debris that has accumulated as a result of work operations under the contract.

(c) Asphalt Pavement and Asphalt Resurfacing Projects.

Adjusting catch basin and manhole frames shall only be done after the lower layer of hot mix asphalt pavement is completed on asphalt pavement and asphalt resurfacing projects.

The lower layer of hot mix asphalt pavement shall be removed only after a vertical edge has been sawed in a box around the frame. The removal and sawing of any lower layers shall be incidental to the work. The area of asphalt removed around the frame shall be large enough to fully accommodate compaction by a self-propelled pneumatic roller completely within the patched area. The use of plate compactors will not be permitted for compacting the lower layer around manholes. Replacement of asphalt or concrete base around adjusted catch basin and manhole frames shall be paid at the contract unit price for "HMA Pavement" or "8" Concrete Base." Replacement of granular backfill with slurry on asphalt streets shall be incidental to the work.

If only one layer of asphalt is to be laid, as the plans show for the interim resurfacing project, then the adjustment of catch basin and manhole frames shall be done before the upper layer is laid.

Any castings required to complete the job shall be furnished by the Contractor.

2.2.13

ADJUSTING WATER VALVE BOXES.

The Contractor shall furnish all labor and equipment necessary to adjust all water valve boxes within the street right-of-way within the actual work limits. This work requires the boxes to be placed at

grade and operational.

In asphaltic pavement, all valve boxes shall be set to finished grade after any binder courses and prior to installation of the surface course.

After the pavement is installed, if the Water Department determines the valve is inoperable due to displacement or faulty adjusting or lack of protection, the Contractor will be required to perform all work necessary to correct the condition with materials purchased from the West Allis Water Department and make the valve operational at his own expense and within five (5) days of notification by the City.

2.2.14

PAVEMENT MILLING.

Pavement milling shall consist of removing existing asphaltic or concrete pavement surfaces by milling as indicated on the Plans and as directed in the field by the Engineer.

The Contractor shall grind the existing pavement in the locations indicated on the Plans and as directed in the field to a nominal depth of three (3) inches for asphalt pavement or one and one-half (1-1/2) inches for concrete pavement. Following the milling operation and prior to resurfacing, the ground area shall be swept and flushed or blown clear of loose material and dust.

The equipment and construction methods shall meet the requirements of Section 330 of the State Specifications.

2.2.15

4" PIPE UNDERDRAIN

(a) DESCRIPTION. The work under this item shall consist of providing necessary subsurface drainage by constructing trenches, placing geotextile filtration fabric, laying perforated corrugated Polyethylene drainage pipe and backfilling trenches with approved backfill material, all as indicated on the Plans and Figure 17. The pipe, including all connections shall be of the size specified and shall be placed at the locations and to the lines and grades indicated on the Plans and laid out in the field by the Engineer.

(b) MATERIALS.

(1) CORRUGATED POLYETHYLENE DRAINAGE PIPE.

Corrugated polyethylene drainage pipe intended for underdrains shall conform to the requirements of the State Specifications.

(2) GEOTEXTILE FILTRATION FABRIC. The geotextile fabric shall be Type DF and shall meet the requirements of the State Specifications.

(3) BACKFILL. Backfill for the underdrain trench shall be coarse aggregate conforming to the requirements for Aggregate Size No. 1 of the State Specifications.

(c) CONSTRUCTION METHODS.

(1) EXCAVATION. The trenches for the underdrain shall be constructed as nearly as practicable at the locations and to the lines and grades indicated on the plans. However, when necessary, such locations, lines and grades may be altered by the Engineer to fit existing conditions.

Trench excavation shall begin at the outlet end of the underdrain and proceed toward the upper end. Trenches shall be of sufficient width to provide adequate free working space on each side of the pipe and also to permit compacting the backfill around the pipe. Any areas excavated below the established grade shall be restored by means of a layer of suitable material adequately compacted and shaped.

(2) GEOTEXTILE FABRIC PLACEMENT. Prior to the placement of the geotextile

fabric, the subgrade shall be smoothed, shaped and compacted to the required grade, section and density. After the fabric has been placed on the subgrade area, no traffic or construction equipment will be permitted to travel directly on the fabric.

The fabric shall be rolled out on the roadway and pulled taut manually to remove wrinkles. Separate pieces of fabric shall be joined by overlapping or sewing. The fabric in the overlapped joints shall be placed with a minimum overlap of 18 inches.

Weight or pins may be required to prevent lifting of the fabric by wind.

After placement, the fabric shall be exposed no longer than 48 hours prior to covering.

The base course material shall be placed over the fabric by back dumping with trucks and leveling with a crawler dozer. Construction equipment shall be such that ruts do not exceed three inches (3") in depth. All ruts shall be filled with additional material. The smoothing of ruts without adding additional material will not be permitted. Damaged areas shall be covered with a patch of fabric using a three (3) foot overlap in all directions.

- (3) LAYING PIPE. The laying of pipe in the trench shall, in general, be started at the outlet and proceed toward the upper end, true to line and grade. The joints between sections shall be made by fitting the ends as tightly as practicable.

Sections of corrugated polyethylene pipe shall be securely connected with fittings meeting the requirements of AASHTO M-252. Pipe shall be secured as necessary to prevent displacement during laying and backfilling operations.

Unless otherwise directed, perforated drainage pipe shall be laid with perforations on the underside of the pipe.

The connection shall be cut into an existing catch basin approximately two (2) ft. below the proposed street grade. The connection of the underdrain shall be made with an approved fitting.

Dead ends of pipe shall be tightly closed by means of approved caps fabricated from the same material used in the pipe and securely held in place.

- (4) BACKFILLING. Unless otherwise specified, perforated pipe or drain tile shall be covered immediately after laying.

2.3.1

EARTH EXCAVATION.

Earth excavation is calculated in cubic yards and will be paid for at the Contact unit price per cubic yard.

The quantity paid for as excavation will be as set forth in the Contract plans without measurement thereof. Any modifications to the Contract quantity caused by corrections or revisions of the original Contract Plan or undercut of soft subgrade which have been approved by the Engineer will be measured in accordance with the applicable section of the Standard Specifications and the Contract quantity will be adjusted accordingly to determine the final pay quantity.

2.3.2

EARTH FILL.

No payment will be made for filling. The cost of such work is to be included in the price bid for "Excavation."

- 2.3.3 BORROW EXCAVATION.
Borrow excavation is calculated in cubic yards and will be paid for at the Contract unit price bid per cubic yard.
- The quantity paid for borrow excavation will be as set forth in the Contract Plans without measurement thereof. Any modifications to the Contract quantity caused by corrections or revision of the original Contract Plan which have been approved by the Engineer will be measured in accordance with the applicable section of the Standard Specifications and the Contract quantity will be adjusted accordingly to determine the final pay quantity.
- 2.3.4 CLEARING AND GRUBBING.
Payment for the clearing of trees four (4) inches in diameter and over will be made at the Contract unit price. Trees will be measured approximately three (3) feet above ground line.
- Payment for grubbing of stumps four (4) inches in diameter and over will be made at the Contract unit price. Tree stumps will be measured approximately three (3) feet above ground line or near the top of stump.
- 2.3.5 ROOT SAWING.
Payment will be made at the contract unit price for lineal foot measured before beginning the work.
- 2.3.6 CULVERTS.
Payment will be made at the Contract unit price per linear foot for each size of new culvert included in the bid quantities and installed on the project.
- 2.3.7 ASPHALT/CONCRETE SAWING.
All concrete and asphalt pavement shall be sawed full depth, or to the depth indicated, at the locations shown on the Plans. All locations sawed shall have the sawing debris and slurry removed from roadways left open to traffic immediately upon the completion of the sawing.
- Payment will be made at the Contract unit price per lineal foot measured at the time of Substantial Completion. The cost of any asphalt or concrete pavement that requires sawing for the installation of underground utilities or to otherwise aide the Contractor in performing the Work shall be included in the price for other items bid.
- No payment shall be made for sawing that is not straight or for sawing where the sawing debris and slurry is not removed from the pavement or driveways that are open to traffic. The contractor will be required to re-saw any crooked cuts. The City will not pay for any additional removals, concrete pavements, HMA pavements, or other Work required due to cuts that must be re-sawed.
- The sawing of all trenches for the installation of underground utilities shall be incidental to the installation of those utilities. The cost of sawing pavement for underground utility installation shall be included in the price bid for utility installation.
- 2.3.8 REMOVING EXISTING STRUCTURES.
Payment will be made at the Contract unit price for each item of removal unless otherwise specified, however, curb removal may be paid as concrete pavement removal in reconstructed concrete streets. Final payment will be based upon field measurements taken immediately before the beginning of work.
- 2.3.9 TOPSOIL.
Topsoil will be measured by the cubic yard. A delivery ticket showing the cubic yard volume of topsoil for each load used in the project must be furnished to the Inspector at the time of delivery. Payment will be made at the Contract unit price. No payment will be made for topsoil exceeding 125% of final estimated quantities as computed by the Engineer.
- 2.3.10 SODDING.

Payment will be made at the Contract unit price per square yard measured in place. Three (3) inches of topsoil base, sod, installation and watering shall be included in the price bid per square yard of sodding.

2.3.11 SEEDING AND MULCHING.

Payment will be made at the Contract unit price per square yard measured in place. Three (3) inches of topsoil base, seed, installation and mulching shall be included in the price bid per square yard of seeding and mulching.

2.3.12 ADJUST UTILITY FRAMES.

Payment for Adjust Catch Basin Frames, Adjust Storm Manhole Frames, or Adjust Sanitary Manhole Frames is full compensation for providing all required materials; and for removing, reinstalling and adjusting frames. Payment shall be made at the contract unit price for **each** individual frame acceptably completed.

The removal and sawing of any lower layers shall be incidental to the Contract unit price for Adjust Catch Basin Frames, Adjust Storm Manhole Frames, or Adjust Sanitary Manhole Frames. Replacement of asphalt or concrete base around adjusted catch basin and manhole frames shall be paid at the contract unit price for "HMA Pavement" or "8" Concrete Base." Replacement of granular backfill with slurry on asphalt streets shall be included in the contract unit price for Adjust Catch Basin Frames, Adjust Storm Manhole Frames, or Adjust Sanitary Manhole Frames.

2.3.13 ADJUSTING ROADWAY WATER VALVE BOXES.

Payment will be made at the Contract unit price for each box adjusted.

2.3.14 ADJUSTING WATER CURB STOP BOXES.

No payment shall be made to the Contractor for the adjustment of water curb stop boxes.

2.3.15 PAVEMENT MILLING.

Payment will be made at the Contract unit price per square yard within the lines designated or given, which shall include removal and disposal of all millings or grindings.

2.3.16 4" PIPE UNDERDRAIN.

Payment will be made at the Contract unit price per lineal foot measured in place, which price shall be payment in full for constructing trench, installing pipe underdrain including all fittings, connections, geotextile fabric and backfill.

2.3.17 TRAFFIC CONTROL.

Traffic control will be paid as a lump sum and shall include the installation, maintenance and removal of all required traffic control devices.

2.3.18 MANHOLE AND INLET PROTECTION BARRIERS.

Payment will be made at the Contract unit price for each barrier installed and maintained.

PART III

SIDEWALK, DRIVEWAY, STEPS AND CURB RAMPS

CHAPTER 3.1.0 - GENERAL

- 3.1.1 DESCRIPTION.
Concrete walks shall be constructed five (5) feet wide and five (5) inches thick and to the line and grade shown on the Plans unless otherwise specified. The walk portions of residential driveways shall be five (5) inches thick and commercial driveways seven (7) inches thick and shall be built to the width and location directed by the Engineer. All driveway approaches and curb ramps shall be seven (7) inches thick. See Figures 1 through 8.
- 3.1.2 MATERIALS.
The materials used in the construction of sidewalks and driveways shall meet the requirements of Part X.

CHAPTER 3.2.0 - CONSTRUCTION

- 3.2.1 SUBGRADE.
The subgrade shall be thoroughly compacted within two (2) inches of proper elevation before the forms are set. Any soft or spongy subgrade material shall be removed and replaced with suitable filling material. Where the walk is to be poured adjacent to the curb, the backfill material behind the curb shall be crushed stone, compacted in a manner suitable to the Engineer.
- 3.2.2 FORMS.
The forms shall be an approved type of metal or wood extending the full depth of the concrete. The forms shall be set upon the prepared subgrade to proper line and grade and firmly staked in position. The slope across the walk shall be one-fourth (1/4) inch per foot unless otherwise directed or shown on the Plans. Where sidewalk is being installed on a radius of less than two hundred fifty (250) feet, flexible forms shall be used. The fine grading shall then be completed and the subgrade thoroughly compacted by an approved power roller weighing not less than three (3) tons. Areas which are inaccessible to the roller shall be compacted by using an approved mechanical vibratory compactor. The contact surfaces of the forms shall be clean and coated with oil. The Contractor must continually have, in advance of the concrete pour, at least two hundred (200) linear feet of form setting and fine grading completed for inspection.

The forms and form pins shall not be removed for at least four (4) hours after the concrete is finished.
- 3.2.3 PLACING CONCRETE.
Before placing concrete, the forms shall be checked for correct line and grade and the subgrade checked for correct height. The subgrade shall then be sprinkled with sufficient water to thoroughly dampen it, but not enough to form muddy areas. The concrete shall then be placed to the proper height, consolidated and struck off flush with the top of the forms.
- 3.2.4 JOINTS.
One-half (1/2) inch expansion joint material extending the full depth of adjacent concrete shall be installed at or near all street lines and all other locations as designated in the field. The expansion joint shall be held in place by the use of full depth plates firmly staked in place and the top shall be slightly below the finished surface of the sidewalk. One-half (1/2) inch expansion joint material shall also be furnished at all locations where the sidewalk abuts the curb, and at a building or other fixed

obstruction. The jointer shall produce a clear joint three-sixteenths (3/16) inch in width and one and one quarter (1-1/4) inch in depth for five (5) inch thick sidewalk and one and three-quarters (1-3/4) inch in depth for seven (7) inch thick sidewalk or driveway. Joints shall not be sawed unless approved by the Engineer.

Driveway joints shall be as shown on Figures 1- 4, or as directed in the field. No joint shall deviate more than two (2) degrees from a position perpendicular to the surface of the finished sidewalk.

3.2.5 FINISHING.

After depositing the concrete, the surface of the walk shall be struck off at finished grade with an approved type of screed. A mechanical vibrator shall be attached to the screed if directed.

The surface shall then be worked with wood or metal floats until a uniform mortar surface is obtained. A hand float operated in a circular motion shall be the final floating operation. Immediately after the water glaze or sheen has disappeared, the surface troweling shall be performed with a rectangular steel trowel operated by hand in a circular motion. The application of neat cement to the surface is prohibited.

As soon as the concrete will retain its shape, the joints shall be recut with the jointer and the edges of all slabs rounded with an edging tool having a one-quarter (1/4) inch radius. After all troweling and edging is completed and the concrete has attained a partial set, the surface shall be brushed with a damp soft bristle brush.

3.2.6 SLIP FORM SIDEWALK.

If slip form sidewalk machines are used, joints shall be hand cut.

3.2.7 CURING.

Curing of the concrete shall comply with the requirements of Chapter 10.6.0.

3.2.8 TIME LIMITATIONS.

Where non-continuous walk removal and replacement is encountered, the Contractor shall replace the walk sections within three (3) days after removal. Residential driveways shall be replaced within five (5) days after removal. In the case of walk abutting commercial properties such as hospitals, churches, businesses, etc., the walk shall be replaced within one (1) day. Driveway access to commercial and industrial properties shall be maintained at all times whenever possible. This may require driveways to be constructed one-half at a time, steel plates, and/or the coordination with business or industry. Backfilling and cleanup at each work location shall be completed within five (5) working days after the finishing operation.

CHAPTER 3.3.0 - CONCRETE DRIVEWAYS

3.3.0 DRIVEWAYS.

Driveways shall be constructed in accordance with the design, dimensions, and details shown on the plans, or in Figures 1 - 4, or as directed in the field.

CHAPTER 3.4.0 - CONCRETE STEPS

3.4.1 STEPS.

When construction of steps is included in the Contract, they shall be built at the locations and in accordance with the design dimensions and details shown in the Plans or in Figure 13. All exposed surfaces shall be true to shape and alignment and finished with workmanship conforming to the best standard practice.

CHAPTER 3.5.0 - CURB RAMPS

3.5.1 RAMPS.

Curb ramps shall be installed as required by Wisconsin Statutes and in accordance with the design, dimensions and details shown on the Plans or in Figures 5 - 7.

All curb ramps, when being completely replaced, shall include an engineer approved detectable warning field.

CHAPTER 3.6.0 - MUDJACKING

3.6.1 MUDJACKING.

The City will designate settled sidewalk slabs judged for correction by mudjacking. If, however, prior to drilling holes, the Contractor can show evidence that the slab cannot be adjusted by mudjacking, the City will choose another method of repair.

The minimum size hole for mudjacking operations shall be one and one-half (1-1/2) inches and spaced to firmly adjust the walk stone with a minimum of one (1) hole for ten (10) square feet of walk. The hole shall be filled with an acceptable mortar mix to the depth of the existing sidewalk slab. Mudjack holes shall not be cleaned out and filled within twelve (12) hours of mudjacking to allow for the mudjack mix to stabilize.

CHAPTER 3.7.0 - MEASUREMENT AND PAYMENT

3.7.1 PAY MEASUREMENT FOR CONCRETE SIDEWALK AND DRIVEWAYS.

Sidewalk and driveways shall be measured by area in square feet. The area of the work to be paid for shall be the actual area paved by the Contractor within the lines designated, except that deductions will be made for any existing fixture larger than one (1) square foot in area. Payment will be made at the Contract unit price.

3.7.2 PAY MEASUREMENT FOR CONCRETE STEPS.

Concrete steps will be paid for by the linear foot of tread, computed by multiplying the width of the steps by the number of steps.

3.7.3 PAY MEASUREMENT FOR CURB RAMPS.

Curb ramps will be paid for by the square foot as seven (7) inch concrete sidewalk and driveway.

3.7.4 PAY MEASUREMENT FOR DETECTABLE WARNING FIELD.

Detectable warning fields will be paid for by the square foot as "Detectable Warning Field" in addition to the seven (7) inch concrete sidewalk below the detectable warning field.

3.7.5 PAY MEASUREMENT FOR MUDJACKING.

Pay measurement for mudjacking shall be measured by area in square feet. Payment will be made at the Contract unit price.

PART IV

CONCRETE CURB AND GUTTER

CHAPTER 4.1.0 - GENERAL

4.1.1 DESCRIPTION.

The work shall consist of preparing the subgrade and constructing a concrete curb and gutter to the line and grade as shown on the Plans. The cross section of the twenty-five (25) inch and the thirty-one (31) inch concrete curb and gutter shall conform to Figure 11.

4.1.2 MATERIALS.

The materials used in the construction of concrete curb and gutter shall meet the requirements of Part X.

CHAPTER 4.2.0 - CONSTRUCTION

4.2.1 SUBGRADE.

The subgrade shall be thoroughly compacted within two (2) inches of proper elevation before the forms are set. Any soft or spongy subgrade material shall be removed and replaced with suitable filling material.

4.2.2 FORMS.

The forms shall be an approved type of metal or wood extending the full depth of the concrete, and shall be equipped with fastening devices to prevent movement in any direction. Flexible forms of an approved type shall be used for all radii under two hundred (200) feet. Flexible face forms shall be used on radii of less than three hundred (300) feet. When flange forms without a bar recess are used, the Contractor shall provide a metal parting strip for the reinforcing steel so that the steel will be fully exposed when the forms are removed. All rubble, broken concrete and other debris shall be removed from the area between the curb and lot line before curb forms are set.

The forms shall be set upon the prepared subgrade to proper line and grade and firmly staked in position. The fine grading shall then be completed and the subgrade thoroughly compacted by using and approved mechanical vibratory compactor. Before steel reinforcing or concrete is placed, the contact surfaces of the forms shall be cleaned and oiled. Driveway openings shall be located as directed in the field.

The Contractor must continually have, in advance of the concrete pour, at least two hundred (200) linear feet of form setting and fine grading completed for inspection.

Forms and form pins shall not be removed for at least four (4) hours after the concrete is finished. The removal of forms and form pins shall be at a time and in a matter that will not cause damage to the newly poured concrete.

4.2.3 JOINTS.

The joints in curb and gutter shall be either expansion joints or contraction joints. When the roadway is to be paved with concrete, the joints in the curb and gutter on each side of the street shall be opposite each other and at right angles to the centerline of the street.

(a) EXPANSION JOINTS.

Expansion joints shall be constructed with one (1) inch expansion joint material precut to match the curb section and placed in alignment with the pavement contraction joints.

In addition, expansion joints shall be constructed at all points of curvature and at such other locations as directed by the Engineer. Where a catch basin frame is near the expansion joint, the Contractor shall install two (2) No. 6 dowel bars and caps through the expansion joint four (4) inches above subgrade. No extra payment will be made for this installation.

(b) CONTRACTION JOINTS.

When concrete curb and gutter abuts new concrete pavement, contraction joints shall be constructed coincident with pavement joints at approximately fifteen (15) foot intervals. Contraction joints at other locations shall be placed at approximately ten (10) foot intervals. The contraction joint may be formed by placing a steel template three-sixteenths (3/16) inch thick, two (2) inches deep and cut to the cross section of the curb and gutter, on the back form and flange form. At radii and where the height of face varies, the Contractor may use three-sixteenths (3/16) inch thick plates cut to the exact cross section of the full depth of the curb and gutter. In all cases, the finished joint shall be perpendicular or radial to the forms.

The Contractor shall provide whatever assistance is requested by the Inspector to properly locate all joints.

The location and spacing of contraction joints shall be determined by both the Contractor and the Engineer. In the event that both cannot agree upon a joint's location, the decision of the Engineer shall be utilized.

4.2.4 REINFORCING BARS.

The curb and gutter section shall be tied to the concrete pavement, concrete base, or concrete driveways by reinforcing bars as shown in Figure 11. Parting strips shall be used when directed by the Engineer. The cost of reinforcement shall be included in the price bid for curb and gutter.

4.2.5 PLACING CONCRETE.

After all the form work has been completed and inspected, the concrete shall be deposited in the forms in as nearly a continuous operation as possible. The concrete shall be thoroughly spaded or vibrated against the forms.

4.2.6 FINISHING.

Immediately after depositing and spading the concrete, the exposed surfaces shall be floated with wood floats, troweled and edged. As soon as the concrete has sufficiently set, the face forms shall be removed and separator plates withdrawn. All exposed surfaces shall be checked with a straight edge ten (10) feet in length. All deviations shall be immediately corrected. The edges along the back of curb, flange and the joints shall be finished with suitable tools.

The radii at the top and bottom of the curb face shall be rounded with special tools that fit the cross section. All exposed surfaces shall then be troweled smooth.

As soon as partial set has taken place and the water glaze or sheen has disappeared, the surface shall be brushed lightly with a damp, soft bristle brush.

4.2.7 CURB AND GUTTER MACHINE.

The Contractor may, with prior approval of the Engineer, elect to use a machine for placing, forming and consolidating the curb and gutter. The machine must be of the tracked vehicular type rather than rubber tired. If a machine is used, extreme care shall be used when inserting the steel rods. Any deformations shall immediately be repaired to the satisfaction of the Engineer or the use of such machine shall be discontinued. The resulting curb and gutter shall be of such quality as to equal or exceed that produced by methods described above. Final finishing operations shall be the same as that for hand poured curb and all excess concrete behind the curb shall be removed at this time.

Curb and gutter machinery and/or machines which form integral curb and pavement shall not be utilized to construct curb with a radius of thirty (30) feet or less.

In the event that curb and gutter is constructed integral with pavement by approved machinery, the Contractor will not be required to install curb and gutter reinforcing bars. No adjustment in the unit price bid will be made for the addition or deletion of curb reinforcement bars.

Supports for the line and grade control line shall have a maximum spacing of twenty-five (25) feet.

If machine methods are used for forming and finishing curb and gutter, the Contractor may saw contraction joints approximately one-eighth (1/8) inch thick and two (2) inches deep, cut to the cross section of the curb.

The depth of cut shall be two (2) inches and the equipment used in sawing shall meet the approval of the Engineer. The sawing shall be done as soon as practicable after the concrete has set sufficiently to preclude raveling during the sawing and before any cracking takes place in the concrete. If this method results in random cracking, the Contractor shall be required to use the partial depth plates.

Before pouring the curb with the slip form machine, the following should be checked by the Inspector and Contractor; the tracing area shall be uniformly graded so as not to produce undue stress on the self-leveling mechanisms, the machine must have an operational, calibrated variable slope control in order to vary the flange or widening pitch, and the cross-section of the slip form machine shall be the cross-section called for on the plans. All vibrators must be operational and the machine must be set at the correct line and grade. Adjustments to slump must be approved by the Engineer who also reserves the right to reject the use of the machine.

4.2.8

CURING.

Curing of the concrete shall comply with the requirements of Chapter 10.6.0.

4.2.9

REMOVING FORMS.

Immediately after removing the back form of the curb and gutter, spots where honeycomb areas exist shall be filled with the proper mix of cement and sand and troweled smooth. All excess concrete behind the curb shall be removed at this time.

CHAPTER 4.3.0 - MEASUREMENT AND PAYMENT

4.3.1

PAY MEASUREMENT FOR CONCRETE CURB AND GUTTER.

The curb and gutter will be measured by length in linear feet along the face of curb or along the gutter line extended across driveways. A deduction in length will be made for the space occupied by catch basins on all construction. Payment will be made at the Contract unit price per linear foot.

PART V

DENSE GRADED BASE

CHAPTER 5.1.0 - GENERAL

- 5.1.1 **DESCRIPTION.**
Dense graded base shall be crushed limestone or recycled concrete, gradation 1-1/4 inch, constructed to the thickness as shown on the plans or as directed in the field.
- 5.1.2 **MATERIAL.**
The materials used in construction shall meet the requirements of Part X.

CHAPTER 5.2.0 - CONSTRUCTION

- 5.2.1 **SUBGRADE.**
Before depositing stone, the Contractor shall shape the subgrade and roll it with a power roller weighing not less than five (5) tons or with an approved type of pneumatic-tired roller in such a manner that the subgrade will be compacted uniformly over its entire length and width and be at the proper elevation. Areas which are inaccessible to the roller shall be thoroughly compacted with a hand tamper.
- The contractor shall attempt to locate any soft or spongy areas in the subgrade using a method approved by the Engineer. Any soft or spongy areas in the subgrade must be removed and replaced with suitable material as directed by the Engineer. The Contractor shall not do unnecessary hauling upon the finished subgrade. Any ruts or holes that develop during trucking operations shall be regraded and compacted.
- 5.2.2 **PLACING DENSE GRADED BASE.**
The subgrade shall be checked and approved, crushed dense graded base, gradation 1-1/4 inch, shall be placed, flushed with water and compacted by means of a pneumatic-tired roller to a five (5) inch thickness. Flushing and rolling shall continue until a firm, unyielding base is obtained. The voids in any unkeyed areas on the final surface due to segregation of stone shall be keyed and filled by use of crushed limestone or recycled concrete, gradation ¾ inch. Soft or yielding spots must be reworked or removed and replaced and rolled until the dense graded base is uniformly compacted over its entire length and width with no tendency to ravel.

CHAPTER 5.3.0 - MEASUREMENT AND PAYMENT

- 5.3.1 **PAY METHOD FOR DENSE GRADED BASE.**
All materials as herein specified will be measured by the ton (2,000 pounds). Material must be weighed on a scale approved by the Engineer and weight tickets showing the new weight of each load must be supplied to the Engineer. The item of base aggregate dense, measured as provided above, will be paid for at the Contract unit price per ton and shall be the full compensation for the construction of the dense graded base.
- No payment will be made for dense graded base quantities exceeding one hundred twenty-five per cent (125%) of the final estimated quantities as computed by the Engineer unless additional earth excavation has been approved by the Engineer.

PART VI

CONCRETE PAVEMENT

CHAPTER 6.1.0 - GENERAL

6.1.1 DESCRIPTION.

The pavement shall be a concrete pavement constructed on a prepared dense graded base to the elevations shown on the Plans.

6.1.2 MATERIALS.

The materials used in the construction of a concrete pavement shall meet the requirements of Part X.

CHAPTER 6.2.0 - CONSTRUCTION

6.2.1 PREPARATION OF SUBGRADE.

The earth subgrade shall be thoroughly compacted to within two (2) inches of proper elevation before the forms are set.

6.2.2 DENSE GRADED BASE.

The Contractor shall shape the subgrade and compact it with an approved type of steel vibratory roller. After compaction, the base course subgrade shall be five (5) inches below the concrete subgrade, unless otherwise specified. Base aggregate dense shall then be deposited, spread, flushed with water and rolled. Shaping and rolling shall continue until no deflection is observed under the roller and the surface of the dense graded base is at pavement subgrade. The Contractor shall furnish the City with a sieve analysis of the material done by an approved Materials Testing Laboratory confirming to base aggregate dense, gradation 1-1/4 inch specified in 10.9.2(a).

6.2.3 FORMS.

The forms shall be an approved type of metal form extending the full depth of the concrete. The forms shall be set upon the prepared subgrade to proper line and grade and firmly staked in position. Flexible forms shall be used where the radius is less than two hundred (200) feet. The fine grading shall then be completed and thoroughly compacted by a power roller weighing not less than five (5) tons.

Where finishing machinery is to ride on the forms, the Contractor shall use an approved type of "Road" form. The foundation under the forms shall be firm and cut true to grade so that the form, when set upon it, will be firmly in contact for its whole length and at the desired grade. The material under the forms shall be mechanically tamped so no settlement or springing of forms under the finishing equipment occurs.

Before concrete is poured, dense graded base shall be checked for correct elevation and sprinkled with sufficient water to thoroughly dampen it, but not enough to form soft areas. The concrete shall then be placed in as nearly a continuous operation as possible.

6.2.4 JOINTS.

The joints in a concrete pavement shall be either construction joints, or contraction joints.

(a) CONSTRUCTION JOINTS.

Construction joints shall be constructed at the formed edges of all pavement slabs. Reinforcing bars, one-half (1/2) inch round by twenty-four (24) inch deformed bars, bent 90° at the center, shall be placed at thirty-six (36) inch centers midway between the top and bottom of the slab. The ends of the rods shall be bent down or suitable chairs provided so that the main portion of the bar is parallel to the surface of the slab. The forms and form pins

shall not be removed for four (4) hours after the concrete is placed. The removal of forms and form pins shall be at a time and in a manner that will not cause damage to the newly poured concrete. The reinforcing bars shall be straightened before the adjacent slab is poured.

(b) CONTRACTION JOINTS.

Sawed contraction joints shall be provided to a depth of one-third (1/3) of the pavement thickness by using a blade that cuts approximately one-eighth (1/8) of an inch in width. During the finishing sequence, hand cut joints shall be provided at approximately eighty (80) foot intervals. The length of time between the finishing of the concrete and the sawing of joints shall not exceed twelve (12) hours for transverse joints and twenty-four (24) hours for longitudinal joints. "Soft-cut" or other methods for the construction of contraction joints shall be subject to the approval of the Engineer prior to their use.

6.2.5 PAVEMENT TIES.

When shown on the plans or directed in the field by the Engineer, the Contractor shall install pavement ties in accordance with Figure 16 to tie together new pavement with existing concrete pavement.

6.2.6 JOINT LOCATIONS.

(a) TRANSVERSE JOINTS.

All transverse joints shall be installed at right angles or radial to the centerline of the pavement unless otherwise shown in the Plans or directed by the Engineer.

(1) Construction joints shall be provided at the end of each day's pour or at locations where the interval of time between loads of concrete exceeds one (1) hour. Construction joints shall be constructed only at regular planned joint locations. (See Figure 15.)

(2) Contraction joints shall be provided at approximately fifteen (15) foot intervals, or less, between construction joints. The joint spacing and the decision concerning the location of sawed or formed contraction joints shall be entirely at the discretion of the Engineer.

(b) LONGITUDINAL JOINTS.

Longitudinal joints shall be constructed as, and in the locations shown on the Plans. Joints shall be true to line and perpendicular to the surface of the pavement. Longitudinal joints may consist of construction joints where new work joins work previously completed. All other longitudinal joints shall be constructed by sawing in accordance with the Plans.

Reinforcing bars, one-half (1/2) inch round by twenty-four inches in length shall have been previously placed at thirty-six (36) inch centers midway between the top and bottom of the slab.

6.2.7 FINISHING.

(a) GENERAL.

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

The machine method of strike-off and consolidation shall be employed, except that for areas where the slab width is variable for strips or lanes of pavement uniformly less than ten (10) feet in width, and other areas where the use of machine methods is impractical, as determined by the Engineer, hand methods may be allowed. All finishing equipment and tools shall be cleaned immediately after use and kept clean so as to maintain such equipment in satisfactory condition during use.

The Contractor shall provide whatever assistance is requested by the Inspector to check the adjustment and operating condition of the machine.

(b) MACHINE STRIKE-OFF.

- (1) After the concrete is deposited, the surface of the pavement shall be struck off by the use of an approved type of finishing machine. The screeds shall be adjusted to the grades indicated on the Plans. The surface of the pavement shall be struck off a sufficient number of times to form a consolidated mass of concrete with a mortar surface at finished grade.
- (2) Immediately after the last pass of the finishing machine, the surface of the pavement shall be floated by the use of an approved mechanically operated float or a "pan" attached to the finishing machine. Each type of float finisher shall be in first class mechanical condition, adjusted to conform to required crown and grade and shall be capable of producing the required surface finish. The width of the "pan" type of float shall be less than the width to be paved.
- (3) The finishing of the pavement shall comply with the provisions of Section 6.2.7(c)(2). Unless otherwise specified, provide a final finish with an engineer-approved artificial turf drag. Use a drag made of molded polyethylene with synthetic turf blades approximately 0.85 inches long and containing approximately 7200 individual blades per square foot. Use a seamless strip of artificial turf approximately full pavement width and of sufficient size that during the finishing operation approximately 2 feet of turf, measured parallel to the pavement centerline, is in contact with the pavement surface. Pull the drag with an engineer-approved device that allows control of the time and rate of texturing. Operate the drag in a longitudinal direction to produce a finish acceptable to the engineer. Weight the drag as necessary to maintain contact with the pavement. Keep each drag clean and free of particles of hardened concrete. Replace the drag as necessary to produce the desired finish.
- (4) All edges of each slab including the edges of the joints shall be floated by hand and finished with an edging tool with a one-half (1/2) inch radius. At the proper time, depending upon the rate of set of the concrete, the contraction joints shall be recut and the finishing of the joint completed. The completed pavement surface, including areas at expansion and contraction joints, shall not deviate more than one-eighth (1/8) inch from the edge of a ten (10) foot testing device.
- (5) SLIP FORM MACHINE STRIKE-OFF. Before constructing pavement with slip form machines, the following shall be checked by the Inspector and Contractor; the tracking area shall be uniformly graded so as not to produce undue stress on the self-leveling mechanisms. The machine must have an operational, calibrated variable slope control. The machine must have the ability to produce a cross section complying with the required crown sections shown on the Plans or Special Provisions.

All vibrators must be in good operating condition. Slumped edges must be immediately corrected by the use of forms. In all cases, the use of the slip form machine shall produce a continuous cross section as shown on the Plans. The use of hand methods in conjunction with slip form equipment may be allowed only with the permission of the Engineer. The Engineer reserves the right to reject the use of this machine.

(c) HAND STRIKE-OFF.

- (1) After the concrete is deposited, the surface of the pavement shall be struck off with an approved type of screed that is cut to the required form of the pavement surface. A mechanical vibrator shall be attached to the screed. The surface of the pavement shall be struck off a sufficient number of times to form a consolidated mass of concrete with a mortar surface at finished grade.

- (2) The entire surface shall then be floated by means of a long handled float until all surface irregularities are corrected. The pavement must then be checked by pulling a ten (10) foot metal straight-edge over the surface. For this purpose, the Contractor shall furnish and use an accurate ten (10) foot straight-edge with a handle at least three (3) feet longer than one-half (1/2) the width of the slab. The straight-edge shall then be held in successive positions parallel to the street centerline in contact with the surface and the whole area gone over from one side of the slab to the other as necessary. Advance along the street shall be in successive stages of not more than one-half (1/2) the length of the straight-edge. Any depressions found shall be immediately filled with fresh concrete, struck off, consolidated and refinished. Projections also shall be struck off and finished. The straight-edge testing and refloating shall continue until the entire surface is found to be free from observable deviations or irregularities and the slab has the required grade and contour. Following this, the pavement shall be finished by dragging a seamless strip of artificial turf over the full width of the pour. This operation shall be done at such times and in such manner that will produce a surface texture satisfactory to the Engineer.
- (3) All edges of each slab including the edges of the joints shall be floated by hand and finished with an edging tool with a one-half (1/2) inch radius. At the proper time, depending upon the rate of set of the concrete, the contraction joints shall be recut and the finishing of the joint completed. The completed pavement surface, including areas at expansion and contraction joints, shall not deviate more than one-eighth (1/8) inch from the edge of a ten (10) foot testing device.

6.2.8 CURING.

The curing of the concrete shall comply with the requirements of Chapter 10.6.0.

6.2.9 SEALING PAVEMENT JOINTS.

The work shall consist of preparing the pavement joint and furnishing and installing the sealant. The materials shall meet the requirements specified in Part X, Materials 10.8.1. Sealing shall only be done at those locations shown on the plans.

The pavement joint shall be cleaned of all foreign material prior to the installation of the joint sealer. All joints shall be hand sawed as necessary to provide an approximately one-eighth (1/8) inch wide by a minimum of one (1) inch deep recess for joint sealant. A jet of compressed air shall be used to remove any water or dirt from the joint or crack and to dry the joint. The sealant should be heated in a kettle or melter, constructed as a double boiler with the space between the inner and outer shell filled with oil or other heat transfer medium. Positive temperature control, mechanical agitation and recirculating pumps should be provided. Direct heating shall not be used. The sealant shall be heated to the temperature range specified by the manufacturer. The atmosphere and concrete temperature shall be above 40°F. The sealant shall be transferred from the boiler or melter directly into a pouring can or other suitable placing device. Care shall be exercised when applying the sealant to avoid over-filling the joint or crack. Dummy, contraction and expansion joints shall be filled in a neat, workmanlike manner to within one-fourth (1/4) inch below the surface of the pavement. Construction joints shall be sealed flush and cracks when directed shall also be sealed flush. Traffic shall be excluded from the immediate area until the sealant has cooled sufficiently to insure that it will not adhere to vehicle wheels.

CHAPTER 6.3.0 - PROTECTION AND CLEANUP

6.3.1 CURING TIME AND CLEANUP.

Concrete pavements shall be closed to all Contractor's equipment and traffic until the concrete has cured to sufficient strength as determined by the Engineer. (The usual standard in making this determination is for a representative number of concrete cylinders to test at a minimum compressive strength of 2700 psi.) When directed to open the street to vehicular traffic, the Contractor shall clean the area of all forms, lumber, dirt and other debris to the satisfaction of the Engineer.

When a concrete saw has been utilized to cut joints, the Contractor will be required to flush the pavement with water prior to opening the street to vehicular traffic. This cleanup operation shall be accomplished by the use of equipment that will provide a flushing force capable of removing all residual materials of the sawing operation.

CHAPTER 6.4.0 - MEASUREMENT AND PAYMENT

6.4.1 **PAY MEASUREMENT FOR PAVEMENT.**

The area of concrete pavement to be measured shall be the area in square yards paved by the Contractor within the lines designated, except that deductions will be made for any existing fixtures within the pavement larger than one (1) square yard in area. Payment will be made at the Contract unit price.

The Engineer may require that payment for pavement shall be determined by measurement of core depths. The determination of pavement thickness by this method shall be as specified in Section 415 of the State Specifications.

The basis of payment for concrete pavement by this method shall be as follows:

CONCRETE PAVEMENT DEFICIENCY

DEFICIENCY IN THICKNESS DETERMINED BY CORES - INCHES	PROPORTIONAL PART OF BID PRICE ALLOWED
0.00 to 0.25	100 percent
0.26 to 0.35	80 percent
0.36 to 0.45	72 percent
0.46 to 0.55	68 percent
0.56 to 0.75	57 percent
0.76 to 1.00	50 percent

Areas of pavement determined to be deficient in thickness by more than one (1.0) inch shall be removed and replaced by the Contractor at his expense with concrete pavement of specified plan thickness. The Engineer may permit the deficient pavement to remain in place, in which case, it will not be paid for. If the contract includes a separate item and unit price for any of the following items, such item or items will be paid for in accordance with the basis of payment above set for Concrete pavement.

ITEM	UNIT OF MEASUREMENT
Concrete Sidewalk	sq. ft.
Concrete Driveway	sq. ft.
Concrete Alley	sq. yd.

6.4.2 **PAY METHOD FOR JOINT SEALING.**

Sealed pavement joints will be measured in square yards as the actual area of pavement sealed within the lines designated or given.

6.4.3 **PAY METHOD FOR PAVEMENT TIES.**

Payment will be made at the Contract unit price for each tie installed. Pavement ties installed in place of missing reinforcing bars in new concrete pavement joints specified in Section 6.2.4 shall not be paid.

PART VII

CONCRETE ALLEY PAVEMENT

CHAPTER 7.1.0 - GENERAL

- 7.1.1 DESCRIPTION.
Concrete alley pavement shall be seven (7) inches thick and constructed on a prepared dense graded base to the elevations shown on the Plans.
- 7.1.2 MATERIALS.
The materials used in the construction of alley pavements shall meet the requirements of Part X.

CHAPTER 7.2.0 - CONSTRUCTION

- 7.2.1 PREPARATION OF SUBGRADE.
The subgrade shall be thoroughly compacted to within two (2) inches of proper elevation before the forms are set.
- 7.2.2 DENSE GRADED BASE.
The construction of the dense graded base shall comply with the requirements of Chapter 6.2.2.
- 7.2.3 FORMS.
The forms shall be clean, straight, approved type of metal or wood. The forms shall extend the full depth of the concrete and be set at proper elevation and firmly staked into position. The fine grading shall then be completed and the subgrade thoroughly compacted by a power roller weighing not less than three (3) tons.
- 7.2.4 JOINTS.
The joints in a concrete alley pavement shall be either construction joints, or contraction joints as specified in Chapter 6.2.4. The minimum depth of a hand tooled transverse joint shall be one and three quarter (1 $\frac{3}{4}$) inch.
- 7.2.5 JOINT LOCATIONS.
- (a) TRANSVERSE JOINTS.
 - (1) One-half (1/2) inch expansion joint material shall be placed where the alley abuts a concrete driveway, sidewalk or other structures.
 - (2) Construction joints shall be provided at the end of each day's pour or at locations where the interval of time between loads of concrete exceeds one (1) hour. Construction joints shall be provided only at regular planned joint locations.
 - (3) Contraction joints shall be provided at fifteen (15) foot intervals, or less, between expansion or construction joints. The joint spacing shall be entirely at the discretion of the Engineer.
 - (b) LONGITUDINAL JOINTS.
 - (1) A construction joint two (2) feet from the centerline of the alley shall be provided where the width of the alley is such that it may be poured in two (2) strips.

- (2) A sawed joint, approximately one-eighth (1/8) inch in width, one (1) foot offset from the centerline of the alley shall be provided where the width of the alley is such that it must be poured full width. No. 4 reinforcing bars, twenty-four (24) inches in length shall be placed at thirty-six (36) inch centers midway between the top and bottom of the slab.

7.2.6 CROSS SECTION.

Unless otherwise provided for on the Plans, the transverse slope of the alley from the gutter line at the center to the edges of the alley shall be .04 ft./ft. for alleys twenty (20) feet wide or more; for alleys seventeen (17) feet wide to nineteen (19) feet wide, the transverse slope shall be .05 ft./ft.; and for alleys sixteen (16) feet wide or less, the transverse slope shall be .06 ft./ft.

7.2.7 PLACING CONCRETE.

Before the concrete is poured, the forms shall be checked for correct height. The contact surface of the forms shall be cleaned and oiled and the dense graded base shall be sprinkled with sufficient water to dampen it but not enough to form soft areas. The concrete shall then be placed in as nearly a continuous operation as possible.

The contractor shall pour the concrete alley pavement with power buggies unless alternative methods are approved by the engineer twenty-four (24) hours before the dense graded base is proof rolled and approved.

7.2.8 FINISHING CONCRETE.

The finishing of concrete alley pavements shall conform to the applicable requirements of Chapter 6.2.7.

7.2.9 CURING.

The curing of the concrete shall comply with the requirements of Chapter 10.6.0.

7.2.10 SEALING ALLEY PAVEMENT JOINTS.

The work shall consist of preparing the pavement joint and furnishing and installing the sealant. The materials shall meet the requirements specified in Part X, Materials 10.8.1. Sealing shall only be done at those locations shown on the plans.

The pavement joint shall be cleaned of all foreign material prior to the installation of the joint sealer. All joints shall be hand sawed as necessary to provide an approximately one-eighth (1/8) inch wide by a minimum of one (1) inch deep recess for joint sealant. A jet of compressed air shall be used to remove any water or dirt from the joint or crack and to dry the joint. The sealant should be heated in a kettle or melter, constructed as a double boiler with the space between the inner and outer shell filled with oil or other heat transfer medium. Positive temperature control, mechanical agitation and recirculating pumps should be provided. Direct heating shall not be used. The sealant shall be heated to the temperature range specified by the manufacturer. The atmosphere and concrete temperature shall be above 40°F. The sealant shall be transferred from the boiler or melter directly into a pouring can or other suitable placing device. Care shall be exercised when applying the sealant to avoid over-filling the joint or crack. Dummy, contraction and expansion joints shall be filled in a neat, workmanlike manner to within one-fourth (1/4) inch below the surface of the pavement. Construction joints shall be sealed flush and cracks when directed shall also be sealed flush. Traffic shall be excluded from the immediate area until the sealant has cooled sufficiently to insure that it will not adhere to vehicle wheels.

The joints containing expansion material shall have that material removed to a depth of one (1) inch prior to sealing. Sealed pavement joints will be measured in square yards as the actual area of pavement sealed.

CHAPTER 7.3.0 - PROTECTION AND CLEANUP

7.3.1 CURING TIME AND CLEANUP.

Concrete alley pavements shall be closed to all Contractor's equipment and traffic until the concrete has cured to sufficient strength as determined by the Engineer. (The usual standard in making this determination is for a representative number of concrete cylinders to test at a minimum compressive strength of 2700 psi.) When directed to open the alley to vehicular traffic, the Contractor shall clean the area of all forms, lumber, dirt and other debris. When the Contract bid items include crushed stone base course or crushed limestone, such material shall be used for backfilling at driveways or garage entrances.

CHAPTER 7.4.0 - MEASUREMENT AND PAYMENT

7.4.1 PAY MEASUREMENT FOR CONCRETE ALLEY PAVEMENT.

The area of concrete alley pavement to be measured shall be the area in square yards paved by the Contractor within the lines designated, except that deductions will be made for any existing fixtures within the pavement larger than one (1) square yard in area. Payment will be made at the Contract unit price.

7.4.2 PAY MEASUREMENT FOR DENSE GRADED BASE.

Payment shall comply with the requirements of Chapter 5.3.1.

PART VIII

CONCRETE BASE

CHAPTER 8.1.0 - GENERAL

8.1.1 DESCRIPTION.
The concrete base shall be eight (8) inches thick, constructed on a prepared subgrade to elevations three (3) inches below the finished grades as shown on the Plans or designated by the Engineer.

8.1.2 MATERIALS.
The materials used in the construction of a concrete base shall meet the requirements of Part X.

CHAPTER 8.2.0 - CONSTRUCTION

8.2.1 PREPARATION OF SUBGRADE.
The subgrade shall be thoroughly compacted to within two (2) inches of proper elevation before the forms are set.

8.2.2 FORMS.
Forms shall be used when concrete base is not poured against existing concrete pavement. The forms shall be an approved type of metal or wood extending the full depth of the concrete. The forms shall be set upon the prepared subgrade to proper line and grade and firmly staked in position. The fine grading shall then be completed and thoroughly compacted by a power roller weighing not less than five (5) tons, or other methods approved by the Engineer.

8.2.3 JOINTS.
(a) The joints in a concrete base shall be construction joints conforming with Chapter 6.2.4 except that the edges of the slab need not be finished with an edging tool.
(b) The distance between longitudinal construction joints shall not exceed twenty (20) feet when finishing is done by hand methods. The joint locations shall be as directed by the Engineer.

8.2.4 PAVEMENT TIES.
When shown on the plans or directed in the field by the Engineer, the Contractor shall install pavement ties in accordance with Figure 16 to join together new base with existing concrete pavement.

8.2.5 PLACING CONCRETE.
Before concrete is poured, the forms shall be checked for correct line and grade and the subgrade checked for correct height. The contact surfaces of the forms shall be cleaned and oiled. The subgrade shall then be sprinkled with sufficient water to thoroughly dampen it, but not enough to form soft areas. The concrete shall then be placed in as nearly a continuous operation as possible.

8.2.6 FINISHING.
(a) After depositing the concrete, the surface of the pavement shall be struck off with an approved type of screed that is cut to the required form of the pavement surface. A mechanical vibrator shall be attached to the screed unless otherwise allowed by the Engineer. The surface of the pavement shall be struck off a sufficient number of times to form a consolidated mass of concrete with a mortar surface three (3) inches below finished grade. A finishing machine will not be required unless stipulated in the "Special Provisions."
(b) The entire surface shall then be floated by means of a long handled float until all surface irregularities are corrected. Following this floating, the surface of the pavement shall be finished by a seamless strip of artificial turf pulled longitudinally over the pavement or with a broom.

CHAPTER 8.3.0 - PROTECTION AND CLEANUP

8.3.1 CURING TIME.

Concrete base shall be closed to all Contractor's equipment and traffic until the concrete has cured to sufficient strength as determined by the Engineer. (The usual standard in making this determination is for a representative number of concrete cylinders to test at a minimum compressive strength of 2700 psi.)

CHAPTER 8.4.0 - MEASUREMENT AND PAYMENT

8.4.1 PAY MEASUREMENT FOR CONCRETE BASE.

The area of concrete base to be measured shall be the area in square yards paved by the Contractor within the lines designated, except that deductions will be made for any existing fixtures within the pavement larger than one square yard in area. Payment will be made at the contract unit price.

8.4.2 PAY MEASUREMENT FOR PAVEMENT TIES.

Payment will be made at the Contract unit price for each tie installed. Pavement ties installed in place of missing reinforcing bars, in new concrete base joints specified in Section 8.2.3(a), shall not be paid.

PART IX

HMA PAVEMENT

CHAPTER 9.1.0 - GENERAL

- 9.1.1 DESCRIPTION.
The nominal thickness of the lower layer shall be one and one-half (1-1/2) inches and of the upper layer one and one-half (1-1/2) inches unless otherwise provided for on the Plans or in the "Special Provisions" in the locations shown on the Plans, or as directed by the engineer.
- 9.1.2 MATERIALS.
The materials used in the construction of an HMA pavement shall meet the requirements of Part X.

CHAPTER 9.2.0 - CONSTRUCTION

- 9.2.1 CONSTRUCTION PROCEDURE.
The construction of HMA pavement shall meet the requirements of Sections 450, 455 and 460 of the State Specifications, but with the following exceptions:
- (a) Delete those portions of Section 450.3.2.1 referring to the dates the Contractor may work. The Contractor may work at any time that is acceptable to the Engineer.
- 9.2.2 PREPARATION OF BASE.
The surface of the base shall be clean, dry and free of foreign material.
- (a) DENSE GRADED BASE.
Prior to placing the lower layer, the dense graded base shall be proof-rolled with a fully loaded tandem-axle dump truck. Any soft, spongy, or otherwise unsuitable areas shall be removed as necessary and replaced with base aggregate dense, gradation ¾ inch.
- (b) TACK COAT OF OLD CONCRETE OR HMA PAVEMENT.
Except when otherwise specifically provided by the Contract or ordered by the Engineer, penetration tack coat shall be placed in a single application. The rate of application of asphaltic material shall be determined on the basis of the condition of the surface to be treated and the requirements to produce the contemplated results and the amount per square yard to be applied will be specified by the Engineer. The asphaltic material shall not be applied at such a rate as will cause it to flow off the surface. The grade of emulsified asphalt and the time interval between application of tack and laying of HMA pavement shall also be entirely at the discretion of the Engineer.
- (c) CONCRETE BASE PREPARATION.
Prior to HMA pavement resurfacing, the surface of the existing concrete pavement shall be prepared as follows: Existing asphaltic surface and all loose patching material or asphaltic patches which protrude above the existing concrete pavement shall be removed. This removal shall be accomplished by scraping of the pavement with the blade of a motor grader or other approved means.
- Joint, crack and pavement surface spalls exceeding one and one-half (1-1/2) inches in width, with a depth of less than four (4) inches, shall have all loose or deteriorated concrete removed to sound concrete. The void shall be vacuumed thoroughly clean.
- The cleaned void shall be filled with HMA to the level of the pavement and compacted by hand operated vibratory compactors and/or motorized rollers approved by the Engineer. HMA shall be placed in lifts to assure complete compaction.

Alternate methods and materials may be used when approved by the Engineer in writing. Requests for use of alternate methods and materials must be submitted at least two (2) weeks prior to the date of proposed use.

9.2.3

HMA PAVEMENT

The requirements of Sections 450, 455 and 460 of the State Specifications, shall be applicable to this work, except as hereinafter otherwise stipulated.

This work shall consist of the construction of a plant mixed HMA pavement on the approved prepared foundation, base course, or existing surface in accordance with the specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the Plans or established by the Engineer.

Subsection 450.3.2.8, Joints, is hereby supplemented as follows:

When the surface has cooled to a temperature of 140°F, or less, the edges of longitudinal joints shall be painted with hot asphalt cement, or heated to the point of softening with an infra-red joint heater, before work is resumed.

The finishing machine shall lap previously laid HMA material a minimum of three (3) inches and the material left sufficiently high to allow for compaction. The longitudinal joints in each layer shall be offset from the previous layer by a minimum of six (6) inches.

Payment for the Hot Mix Asphalt Pavement of various types as shown on the plans, is full compensation for providing HMA mixture designs, quality control program, testing (including density testing), and for furnishing, preparing, hauling, mixing, placing, and compacting the mixture used in the upper layer, lower layer and leveling courses; and for furnishing all materials including asphaltic materials.

9.2.4

QUALITY CONTROL

The Contractor shall provide and maintain a quality control program. A quality control program is defined as all activities, including mix design, process control inspection, sampling and testing, and process adjustments related to producing and placing hot mix asphalt pavement conforming to the specifications. **The testing shall include density testing of in-place HMA pavement with the use of nuclear density gauges.** Section 460 of the State of Wisconsin Standard Specifications for Highway and Structure Construction shall be modified by these special provisions to **require the Contractor to test for nuclear density** a minimum of every **300 feet** along the centerline of the street

The Contractor shall perform HMA pavement density testing with nuclear gauges operated by a Nuclear Technician I who has been certified by the Highway Technician Certification Program. The Contractor shall furnish nuclear gauges from the State of Wisconsin's 2007 "List of Approved Nuclear Density/Moisture Gauges".

The Contractor shall select the test site, station and offset distance randomly as specified in the State of Wisconsin Construction & Materials Manual. The Contractor shall provide the Engineer with the original data sheet for each lot within 24 hours of testing completion for that lot. A lot represents 750 tons of a mixture placed within a single layer for each location and target maximum density category.

The Contractor shall not re-roll compacted mixtures with deficient density test results or operate continuously below the specified minimum density. The Contractor shall stop production, identify the source of the problem, and make corrections to produce work meeting specification requirements.

The cost of furnishing a quality control program and providing the tests and reports as specified, including density testing, shall be construed to be included in the respective Contract unit price bid for "Hot Mix Asphalt Pavement".

9.2.5

ASPHALTIC SURFACE PATCHING.

The work under this item shall consist of furnishing and placing HMA at various locations and depths as directed by the Engineer and in base preparation construction procedures previously described.

The HMA mixture shall be used to correct deficiencies in the surface of the roadway in trenches, around unadjusted utility frames, for ramps along butt joints, and at directed locations being used to carry traffic during construction.

CHAPTER 9.3.0 - MEASUREMENT AND PAYMENT

9.3.1

PAY MEASUREMENT FOR HMA PAVEMENT AND ASPHALTIC SURFACE PATCH.

HMA pavement shall be paid for at the Contract unit price per ton (2,000 pounds). Material must be weighed on a scale approved by the Engineer and weight tickets showing the gross, tare and net weight of each load must be supplied to the Engineer or Inspector at the time of delivery. Payment will be made for the tons of material incorporated in the work. Such payment shall be the full pay for all equipment, material and construction costs.

9.3.2

PAY MEASUREMENT FOR TACK COAT.

Tack coat material shall be paid for according to the Contract unit price per gallon of material incorporated in the work.

9.3.3

PAY MEASUREMENT FOR CONCRETE BASE PREPARATION.

Concrete base preparation shall be paid for according to the Contract unit price per 100 ft. station.

- (a) The cost of the HMA placed shall be paid for under the unit price bid for "Asphaltic Surface Patch."
- (b) Any joint and crack repair over four (4) inches deep will be removed and replaced and paid under the respective items for concrete base patching.

PART X

MATERIALS OF CONSTRUCTION

CHAPTER 10.1.0 - GENERAL

- 10.1.1 **QUALITY.**
It is the intent of these Specifications to secure new, first class materials. Only materials conforming to the specification requirements may be used. The source of supply of all materials shall be subject to the approval of the Engineer. Such approval may be rescinded at any time should the source of supply fail to produce materials of satisfactory quality or quantity.
- 10.1.2 **SAMPLES AND TESTS.**
All materials required for use in construction of the work shall be subject to sampling and testing by the City of West Allis. The samples required by the City shall be furnished free of all charges by the Contractor. All tests will be made by and at the expense of the City. The Engineer reserves the right to have any load of material delivered to a truck scale in order to check the weight of the load. No claims for loss or delay will be allowed on this account.
- 10.1.3 **DELIVERY TICKETS.**
The Engineer shall be furnished copies of delivery tickets of materials delivered to the job at the time of delivery unless otherwise specifically allowed. Where the Contract unit prices necessitate payment for materials on a volume or weight basis, the City will pay only for the materials for which delivery tickets have been provided.

CHAPTER 10.2.0 - CONCRETE REINFORCEMENT

- 10.2.1 **GENERAL REQUIREMENTS.**
Epoxy coated reinforcing bars shall conform to the Standard Specifications for Billet-Steel Bars for Concrete Reinforcement, AASHTO Designation M-31, Grade 40. Dowel bars shall conform to the requirements of AASHTO Designation M-227, Grade 80.
- 10.2.2 **EPOXY COATING.**
Reinforcing bars shall be epoxy coated in accordance with the requirements of Section 505 of the State Specifications. All epoxy coated reinforcing bars damaged due to straightening, to tie adjacent concrete together, shall be field coated with similar epoxy material at the bend location after straightening.

CHAPTER 10.3.0 - EXPANSION JOINT MATERIAL

- 10.3.1 **GENERAL REQUIREMENTS.**
Expansion joint filler shall conform to the requirements for "Bituminous Fiber Type" Expansion Joint Material, AASHTO Designation M-213 or other materials approved by the engineer.

CHAPTER 10.4.0 - CORRUGATED METAL CULVERT PIPE

- 10.4.1 **GENERAL REQUIREMENTS.**
Corrugated metal culvert pipe shall conform to the requirements of the "Standard Specifications for Corrugated Metal Culvert Pipe," AASHTO Designation N-36. Metal bands of the same material as the pipe shall be used in making field joints.

10.4.2

CORRUGATED METAL PIPE DIMENSIONS AND GAUGES.

NOMINAL DIA. IN.	MINIMUM GAUGE NO.	SHEET THICKNESS IN.
6	18	0.052
8	16	0.064
10	16	0.064
12	16	0.064
15	16	0.064
18	16	0.064
21	16	0.064

The average inside diameter of circular pipe shall not vary more than plus or minus one-half (1/2) inch or one (1) percent, whichever is greater, from the nominal diameter.

10.4.3

TYPES AND SIZES.

The culvert pipe to be furnished shall be of the size and shape as shown on the Plans or as provided for in the Contract bid items.

CHAPTER 10.5.0 - TOPSOIL

10.5.1

GENERAL REQUIREMENTS.

Topsoil shall consist of the natural loam, sandy loam, silt loam, silty clay loam, or clay loam humus bearing soils adapted to the sustenance of plant life and such topsoil shall be neither excessively acid nor excessively alkaline.

The topsoil shall be a finely divided material free from lumps or balls of clay and containing no rocks, pebbles or other foreign substances. One Hundred (100) percent of the topsoil shall pass a one (1) inch sieve.

CHAPTER 10.6.0 - CURING AGENT FOR CONCRETE

10.6.1

GENERAL REQUIREMENTS.

The liquid curing compound shall conform to AASHTO Designation M-148, Type II, and shall meet the tests for AASHTO Designation T-155.

- (a) When directed by the Engineer, new concrete construction shall be cured with a pigmented emulsified linseed oil membrane forming concrete curing compound meeting the requirements of AASHTO Designation M-148, Type II, exhibiting a daylight reflectance of not less than sixty (60) percent that of magnesium oxide.

10.6.2

APPLICATION.

Immediately after finishing operations are completed, the entire exposed surface of the concrete shall be covered uniformly with the curing compound applied as a fine spray at the minimum rate of one (1) gallon per two hundred (200) square feet of surface to achieve a uniformly white appearance.

When slip form machine methods of concrete placement are used, the exposed sides of the work shall also be uniformly covered with curing compound.

CHAPTER 10.7.0 - ASPHALTIC MATERIALS

10.7.1

GENERAL REQUIREMENTS.

All asphalts and asphaltic road oils shall conform to the requirements of Section 455 of the State Specifications.

CHAPTER 10.8.0 - JOINT SEALER

10.8.1

GENERAL REQUIREMENTS.

All joint sealers shall conform to the requirements of the Specifications for Joint Sealants, Hot-Poured, for Concrete and HMA Pavements, ASTM Designation: D 3405.

10.8.2

APPLICATION.

Joint sealer shall be composed of a mixture of materials that will form a resilient and adhesive compound capable of effectively sealing joints in concrete against the infiltration of moisture and foreign material throughout repeated cycles of expansion and contraction with temperature changes and that will not flow from the joints or be picked up by vehicle tires at summer temperatures. The material shall be capable of being brought to a uniform pouring consistency suitable for completely filling the joints without inclusion of large air holes or discontinuities. The joint sealer shall be melted, by indirect heat, in suitable equipment provided with positive temperature control and mechanical agitation. The material shall not be damaged when heated to the temperature required for satisfactory pouring.

CHAPTER 10.9.0 – BASE AGGREGATE DENSE

10.9.1

GENERAL REQUIREMENTS.

Base aggregate dense shall conform to the requirements of Section 305 of the State Specifications.

10.9.2

GRADATIONS.

(a) BASE AGGREGATE DENSE, 1-1/4 inch

SIEVE SIZE	PERCENTAGE PASSING BY WEIGHT
1-1/4 in.	95 – 100
1 in.	–
3/4 in.	70 – 93
3/8 in.	42 – 80
No. 4	25 – 63
No. 10	16 – 48
No. 40	8 – 28
No. 200	2 – 12

(b) BASE AGGREGATE DENSE, ¾ inch

SIEVE SIZE	PERCENTAGE PASSING BY WEIGHT
1 in.	100
¾ in.	95 – 100
⅜ in.	50 – 90
No. 4	35 – 70
No. 10	15 – 55
No. 40	10 – 35
No. 200	5 – 15

CHAPTER 10.10.0 - HMA

10.10.1 GENERAL REQUIREMENTS.

The materials, equipment and methods used to produce an HMA pavement shall, unless otherwise directed in these Specifications, conform to the requirements of Sections 450, 455 and 460 of the State Specifications.

10.10.2 QUALITY CONTROL.

The Contractor shall provide and maintain a quality control program. A quality control program is defined as all activities, including mix design, process control inspection, sampling and testing, and necessary adjustments in the process that are related to the production of an HMA pavement which meets the requirements of the specifications.

The cost of furnishing a quality control program and providing the tests and reports as specified, shall be construed to be included in the respective Contract unit price bid for "HMA Pavement."

10.10.3 CONTRACTOR ASPHALTIC MIXTURE DESIGN.

For each course, the Contractor shall submit, for the Engineer's review, an asphaltic mix design meeting all necessary criteria. The asphaltic mix design shall consist of aggregate gradations, aggregate blend percentages, Job Mix Formula (JMF), recommended asphalt content, recommended plant mix temperature range, and shall be signed by a Certified Asphaltic Technician III. The design shall be conducted according to procedures in the latest version of the Department's Test Method 1559, Standard Method of Asphaltic Mix Design. The Contractor will run tests on the quality of the aggregates, review the asphaltic mixture design and issue a report. The asphaltic mixture design shall be in effect until modified, in writing, by the Engineer.

10.10.4 SAMPLES.

For the purposes of mix design verification, the Contractor shall supply aggregate samples, representative of the average gradation of the job materials, along with the complete Contractor Asphaltic Mix Design, to the City at least fourteen (14) calendar days prior to use in the work. No aggregate shall be used in the production of mixtures without prior approval of the Engineer.

10.10.5 HMA PAVEMENT.

HMA pavement materials shall conform to the requirements of Sections 450, 455 and 460 of the State Specifications.

CHAPTER 10.11.0 - CONCRETE

10.11.1 GENERAL REQUIREMENTS.

The materials, equipment and methods used to produce concrete shall, unless otherwise directed in these Specifications or in the Special Provisions, conform to the requirements of Section 501, Concrete Masonry, of the State Specifications

10.11.2 AGGREGATES.

The aggregates used in concrete shall conform to the requirements of Section 501 of the State Specifications except that the coarse aggregate for concrete in Grade A2 shall consist entirely of size No. 1.

10.11.3 MIX DESIGN.

(a) Concrete for the various intended uses shall conform to the following requirements:

GRADE	USE OF CONCRETE	TYPE OF CEMENT	CEMENT CONTENT BAGS PER CU. YD.	DESIGNED COMPREHENSIVE STRENGTH AFTER 28 DAYS	AIR CONTENT
A	Street & Alley Pavement, Concrete Base	Type I Air Entrained	6.0	3,600 psi	4 - 7%
A2	Curb & Gutter, Drives, Walks, Etc.	Type I Air Entrained	5.63	3,600 psi	4 - 7%
A-FA	Street & Alley Pavement, Concrete Base, Concrete Curb & Gutter	Type I Air Entrained	4.2 bags of cement & 170 lbs. of Class C fly ash	3,600 psi	4 - 7%
C-IP	Street & Alley Pavement, Concrete Base	Type IP Air Entrained	7.0	3,600 psi	4 - 7%
E	Street & Alley Pavement, Concrete Base	Type I Air Entrained	8.75	3,600 psi	4 - 7%

(b) The consistency of the freshly mixed concrete shall be such that when measured by means of a 4 x 8 x 12 slump cone, the slump shall not exceed three (3) inches. Concrete that is rejected on the work site for any reason shall not be retempered and used in the work without specific approval of the Engineer.

(c) ADMIXTURES. The Contractor may incorporate into the concrete mixture an approved water reducing admixture meeting the requirements of AASHTO Specification M-194 Type A or D when approved by the Engineer. The cement content may be reduced to 5.8 sacks per cu. yd. when the admixture is used at the manufacturer's recommended rate.

10.11.5 MIXING AND TRANSPORTATION OF CONCRETE.

Concrete shall be mixed and transported to the job site as required in Section 501 of the State Specifications except that the **"non-agitating" type of truck body shall not be used.** All concrete shall be "Ready-Mixed" unless otherwise specifically allowed in writing by the Engineer. All concrete shall be deposited on the job site within one (1) hour from the time that the mixing water is added. Loads of concrete rejected by the Inspector at the work site shall not be retempered or adjusted by additional ingredients.

10.11.6

CONCRETE PLANT.

- (a) The Contractor shall, at his own expense, provide telephone service at the site of the concrete plant and provide a means of communication from the construction site to the concrete plant that is acceptable to the Engineer.
- (b) The concrete plant shall conform to the requirements set forth in Section 501.2.1.2 of the State Specifications.

10.11.7

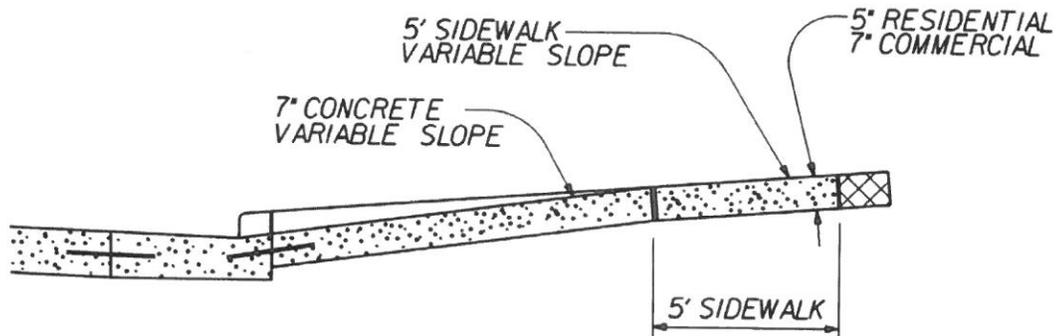
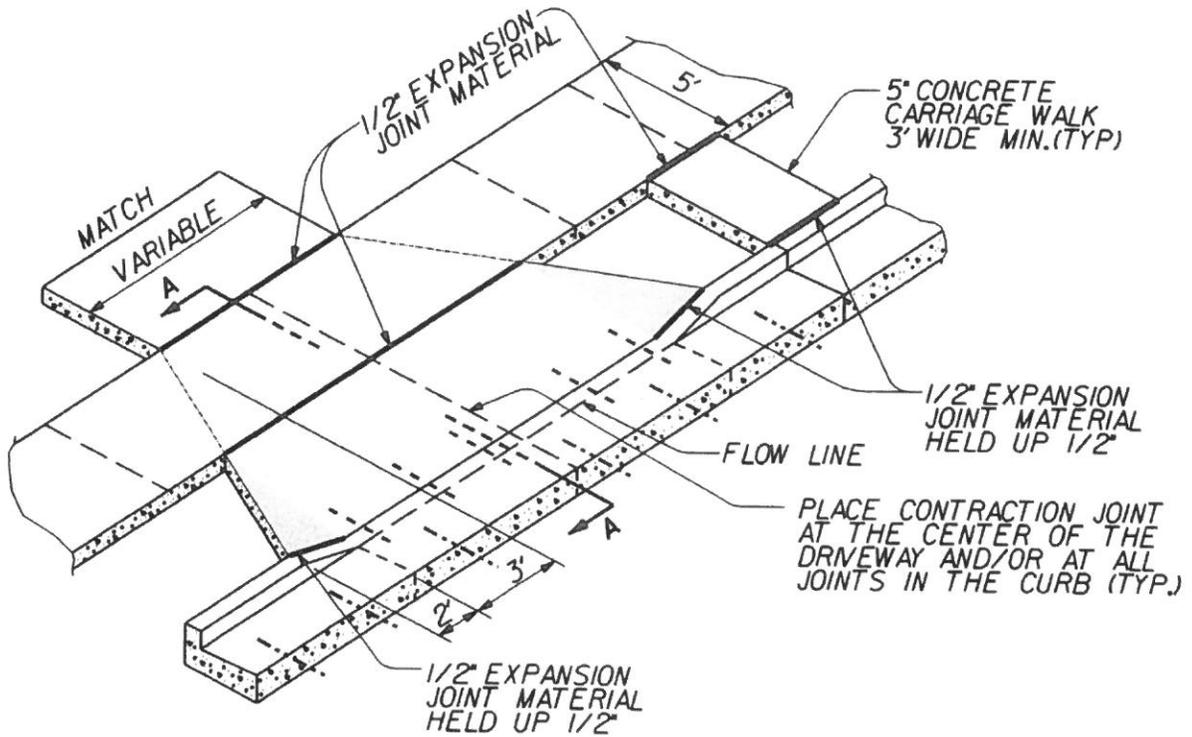
CONCRETING DURING COLD WEATHER.

- (a) Concrete shall not be placed on a frozen subgrade or when the air temperature is less than thirty-two (32) degrees F. The Engineer at his discretion may order the concrete work to cease, irrespective of air temperature if it is anticipated that the temperature will drop below freezing.

The Contractor shall remove and replace at his expense any concrete damaged by frost or freezing, irrespective of the fact that the Contractor may have had the approval of the Engineer to pour said concrete.

- (b) When concreting during cold weather, the water and the aggregates in the concrete mixture may be heated. When specifically allowed by the Engineer, the Contractor may use magnesium free calcium chloride as an admixture in the concrete. The maximum quantity to be used shall not exceed one (1) percent of the cement content of the mix.
- (c) When the air temperature is expected to drop below freezing, the Contractor shall cover the surface of the concrete with straw or hay to a sufficient depth to prevent freezing and such protection shall be furnished for at least five (5) days after the concrete has been poured. Any concrete less than five (5) days old shall be covered when directed by the Engineer.

Other methods of protection from freezing may be used when allowed by the Engineer.



SECTION A-A

PAVEMENT TIES FOR NEW CONCRETE:
24" NO.4 DEFORMED BARS, 36" ON CENTER, EPOXY COATED

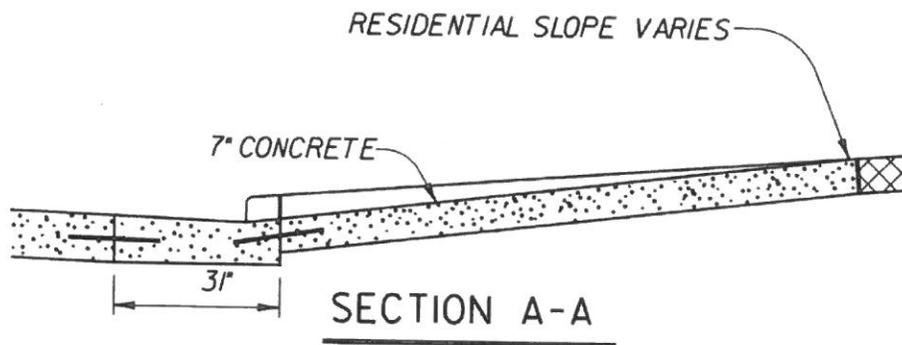
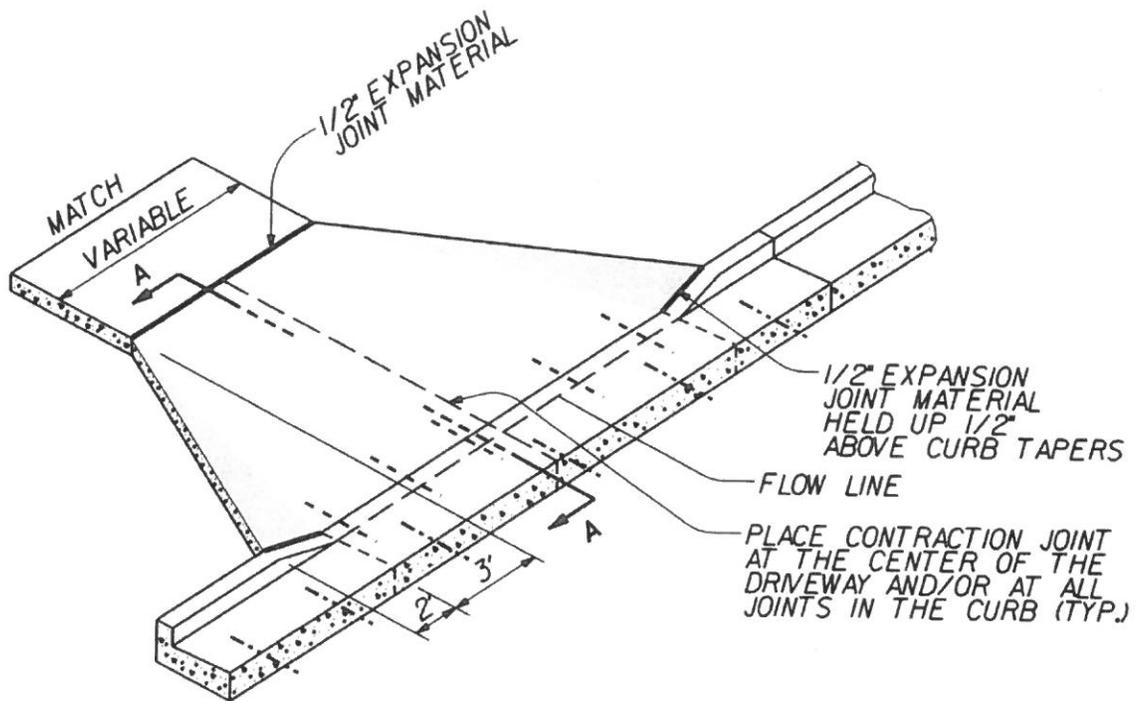
PAVEMENT TIES DRILLED INTO EXISTING PAVEMENT:
12" NO.6 DEFORMED BARS, 36" ON CENTER, EPOXY COATED

RESIDENTIAL MAX OPENING 20 FT.
COMMERCIAL MAX OPENING 30 FT.
MIN. OPENING AT CURB 14 FT.

REVISED JAN. 2017
CITY OF WEST ALLIS

STANDARD DRIVEWAY
W/ CONCRETE WALK

FIGURE 1



PAVEMENT TIES FOR NEW CONCRETE:
 24" NO.4 DEFORMED BARS, 36" ON CENTER, EPOXY COATED

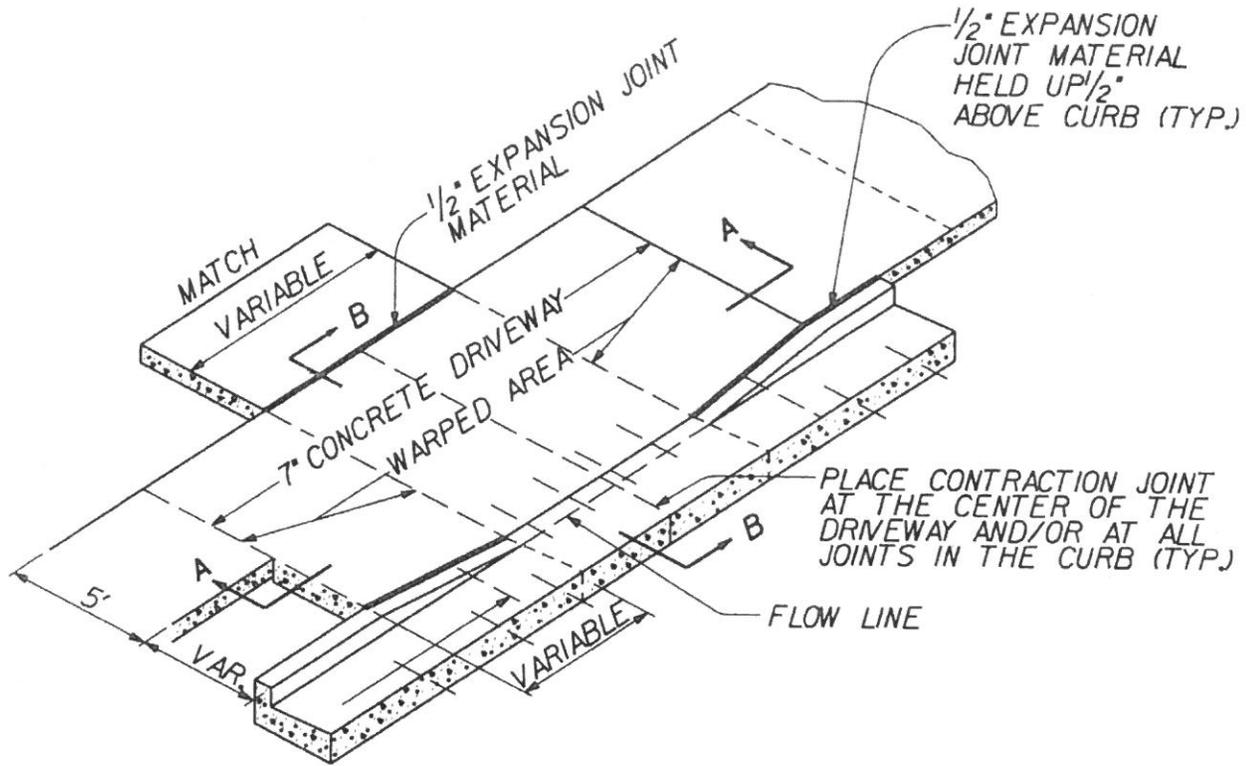
PAVEMENT TIES DRILLED INTO EXISTING PAVEMENT:
 12" NO.6 DEFORMED BARS, 36" ON CENTER, EPOXY COATED

RESIDENTIAL MAX OPENING 20 FT.
 COMMERCIAL MAX OPENING 30 FT.
 MIN. OPENING AT CURB 14 FT.

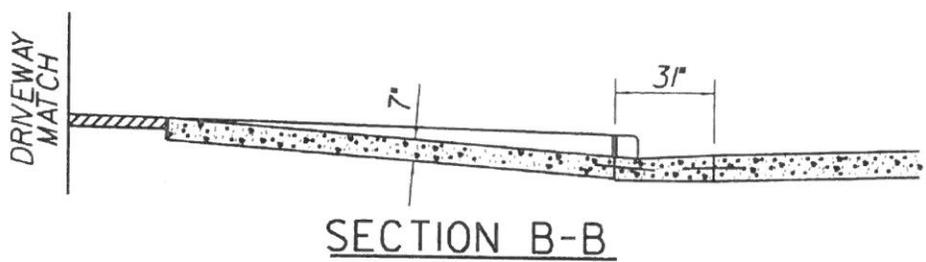
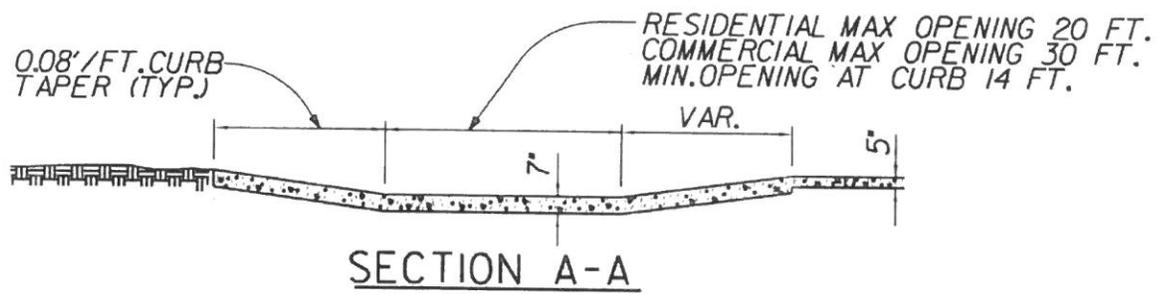
REVISED JAN. 2017
 CITY OF WEST ALLIS

STANDARD DRIVEWAY
 WITHOUT CONCRETE WALK

FIGURE 2



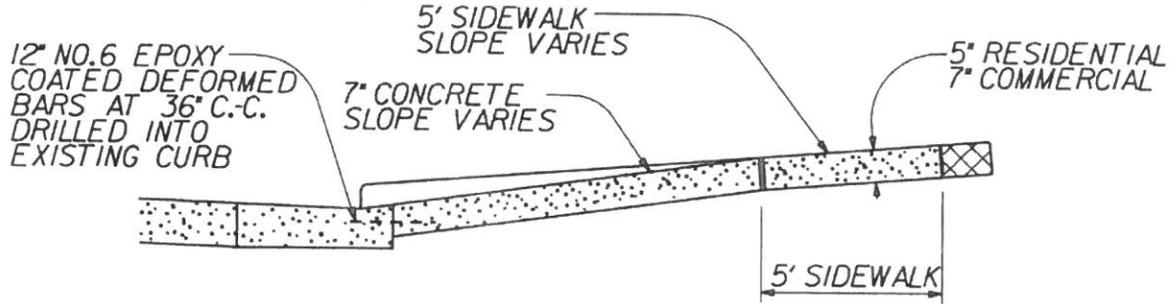
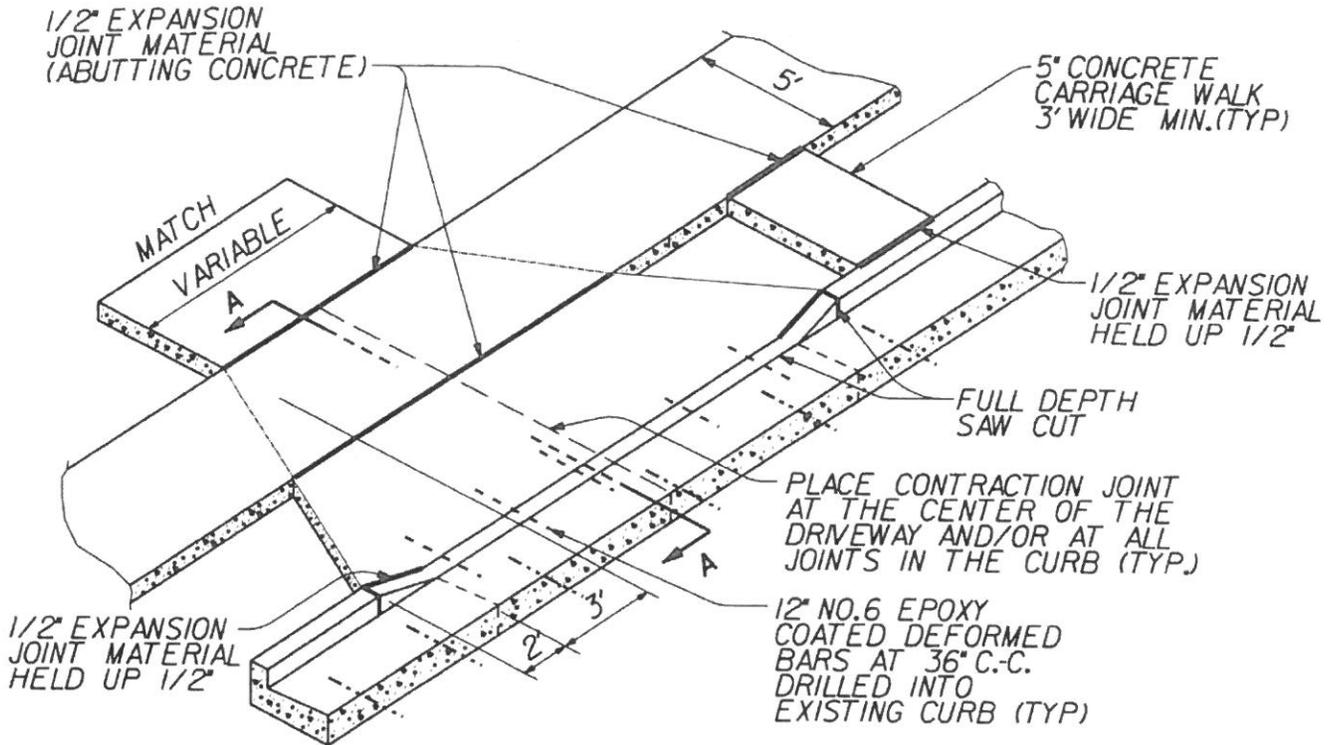
LONGITUDINAL & TRANSVERSE SLOPE VARIES



PAVEMENT TIES FOR NEW CONCRETE:
 24" NO.4 DEFORMED BARS, 36" ON CENTER, EPOXY COATED

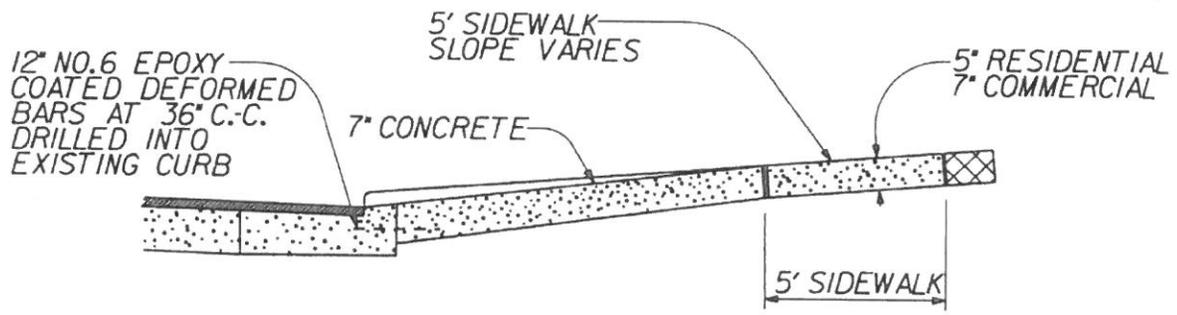
PAVEMENT TIES DRILLED INTO EXISTING PAVEMENT:
 12" NO.6 DEFORMED BARS, 36" ON CENTER, EPOXY COATED

REVISED JAN. 2016
 CITY OF WEST ALLIS
 DEPRESSED DRIVEWAY
 FIGURE 3



SECTION A-A

FINAL CONCRETE TO BE 1/4" ABOVE ASPHALT



SECTION A-A WITH ASPHALT

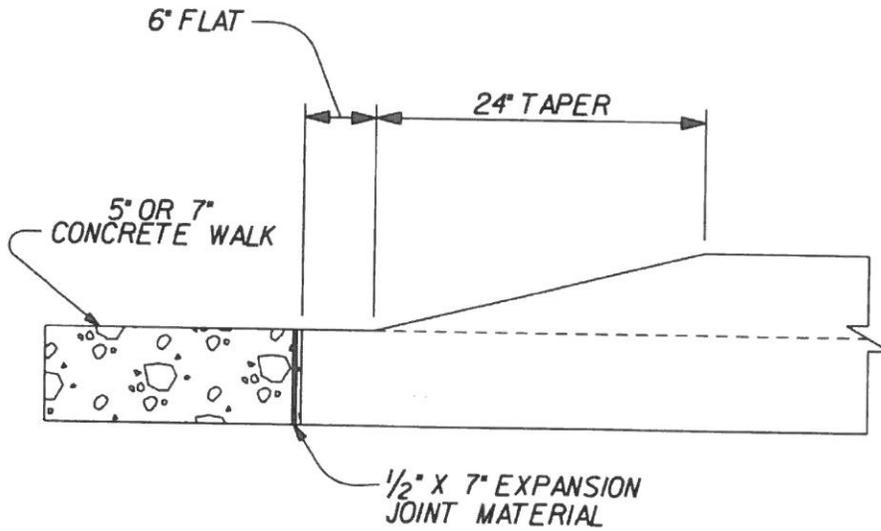
REVISED JAN. 2016
CITY OF WEST ALLIS

RESIDENTIAL DRIVEWAY APPROACH
REPLACEMENT TO CURB FACE
FIGURE 4

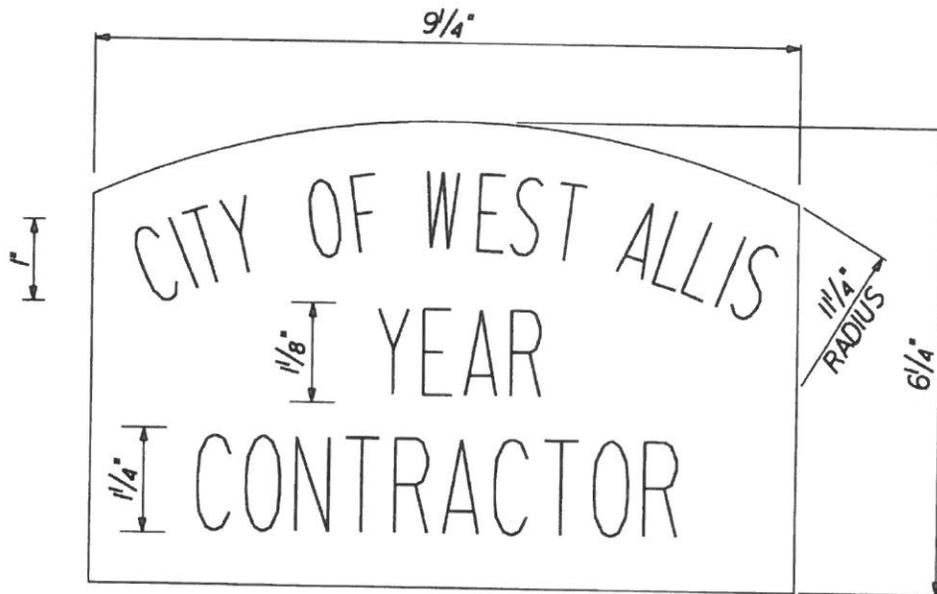
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REVISED JAN.2020
CITY OF WEST ALLIS

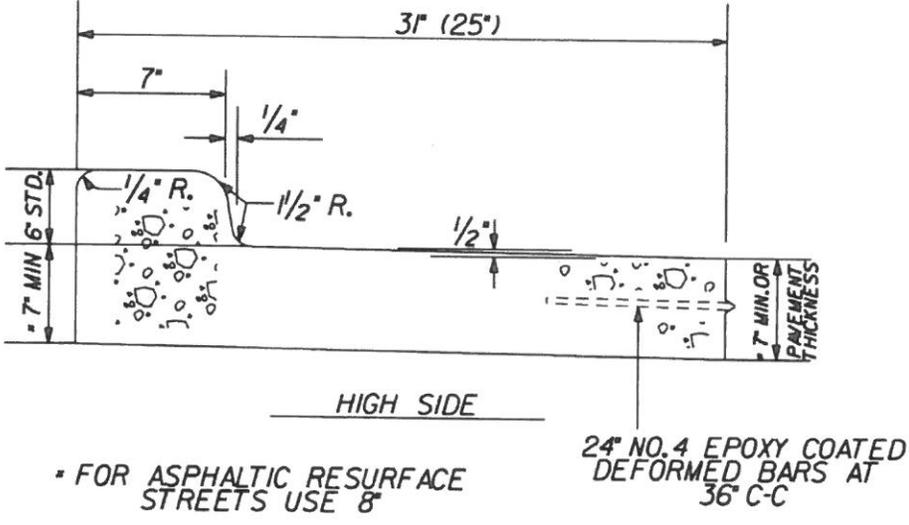
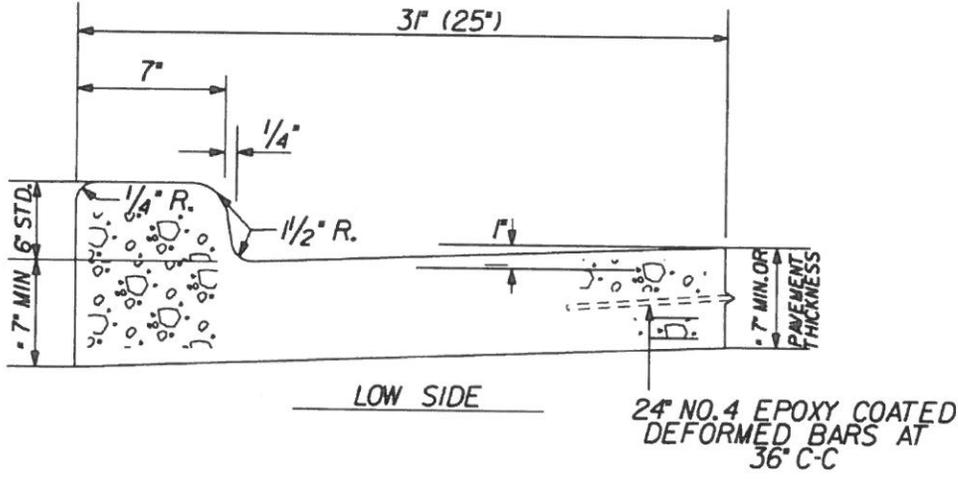
<p>CURB RAMP FULL WALKWAY/TEE INTERSECTION</p>
<p>FIGURE 8</p>



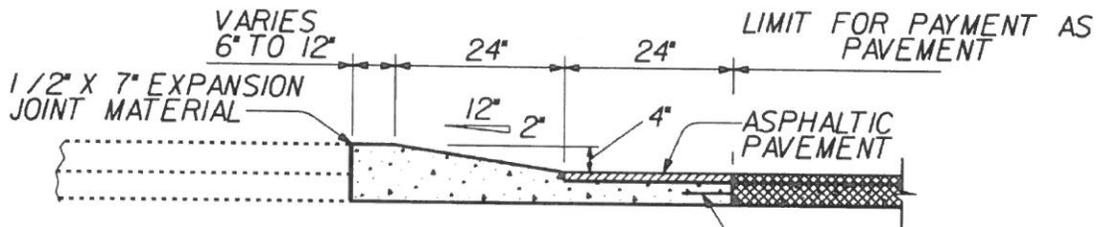
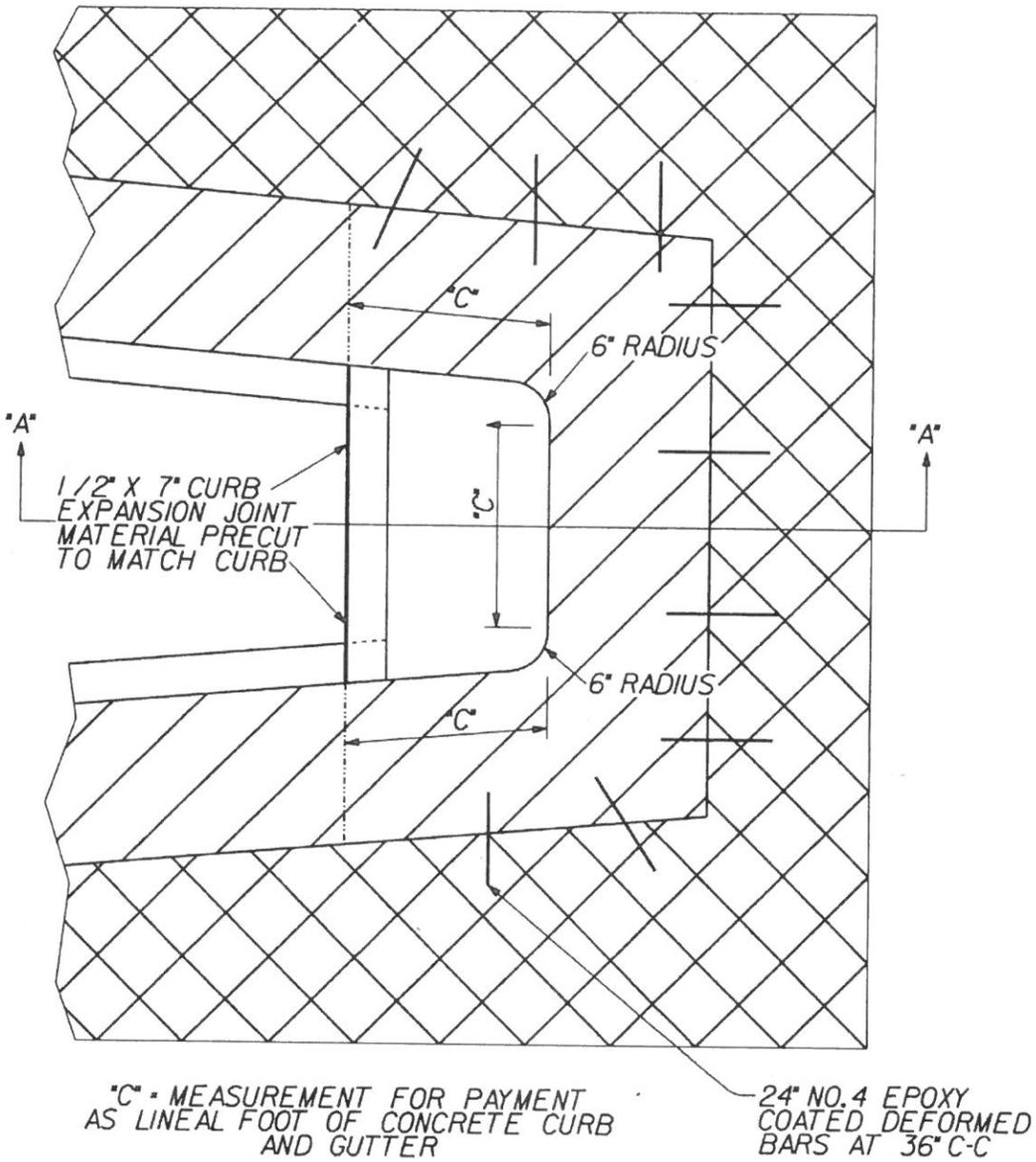
CITY OF WEST ALLIS
 END OF CURB TAPER
 ABUTTING WALK
 FIGURE 9



CITY OF WEST ALLIS
 IDENTIFICATION STAMP
 FIGURE 10

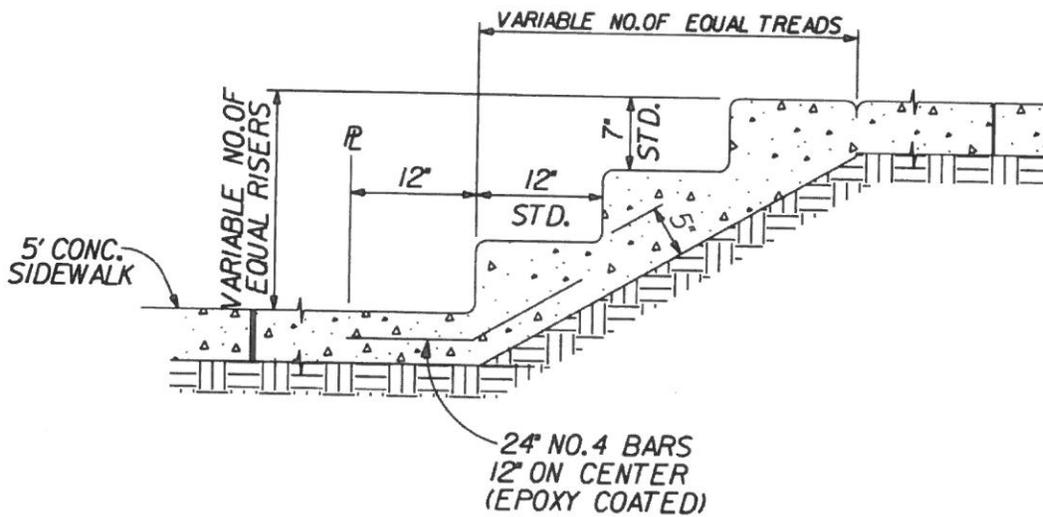
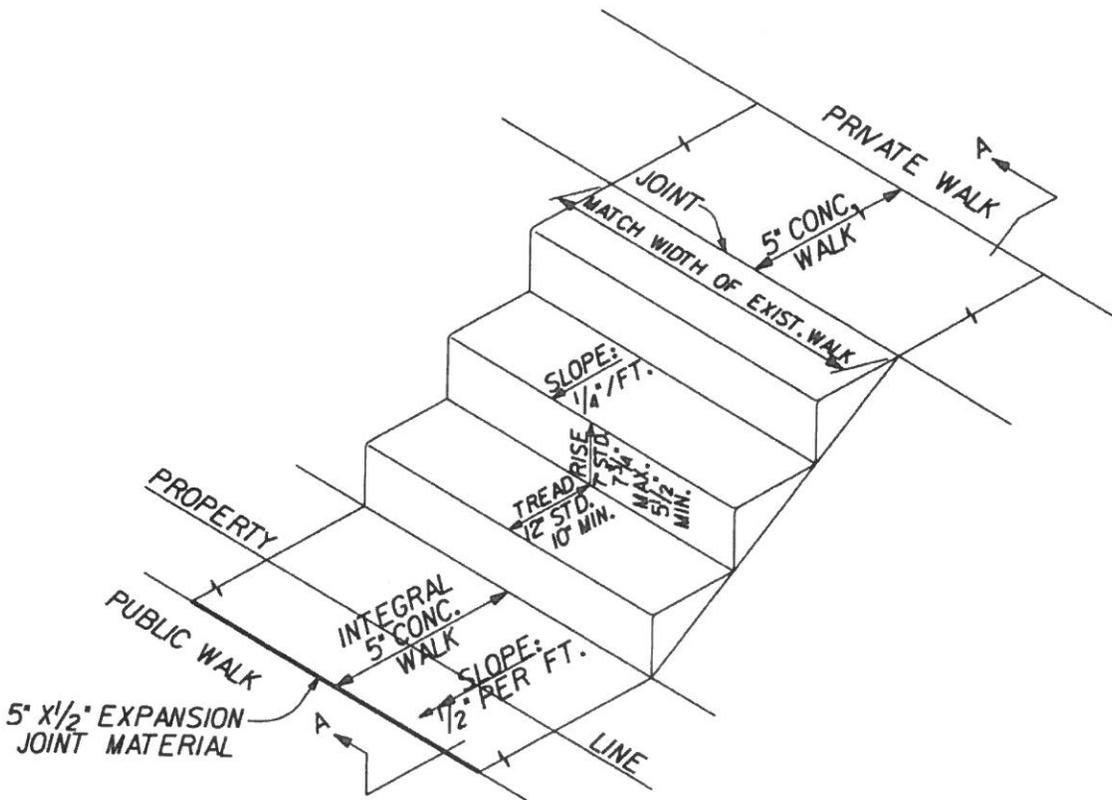


CITY OF WEST ALLIS
 3' (25') CONCRETE
 CURB & GUTTER
 FIGURE II

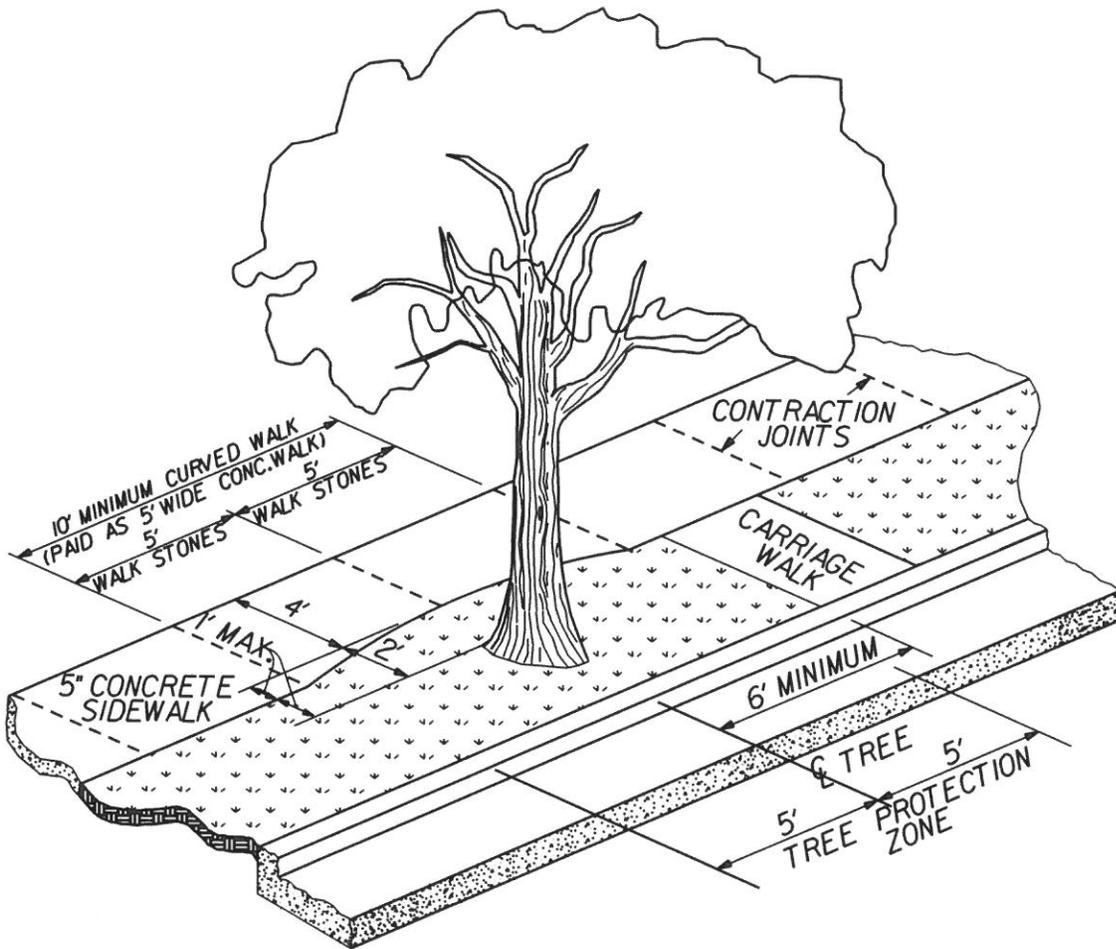


NOTE:
THE COST FOR THE ADDITIONAL MATERIALS AND LABOR IN THIS SECTION SHALL BE INCLUDED IN THE PRICE BID FOR CONCRETE CURB AND GUTTER.

SECTION A-A

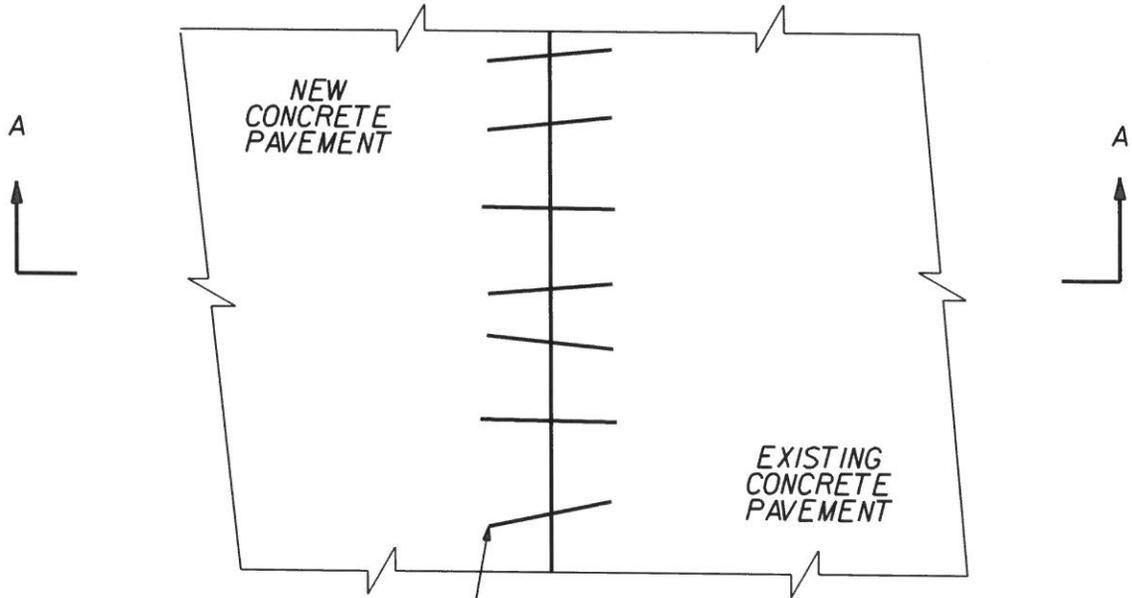


SECTION A-A

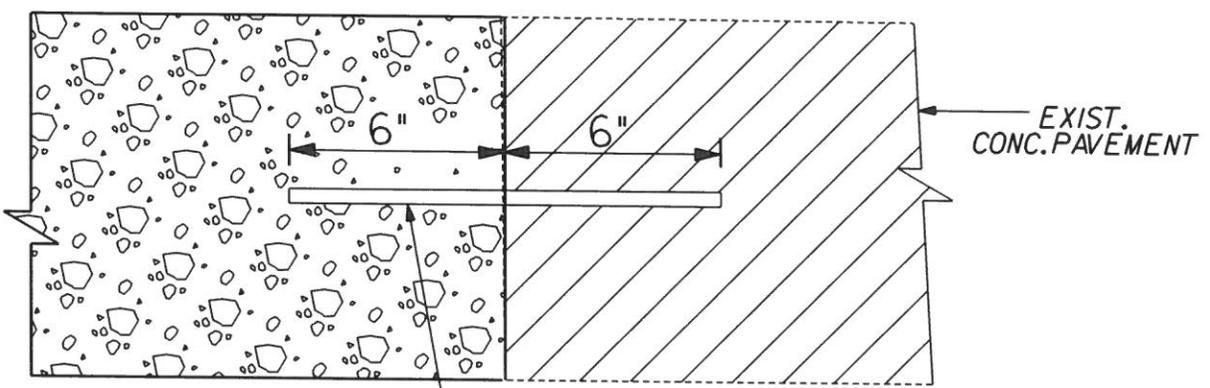


REVISED JANUARY 2020
CITY OF WEST ALLIS

WALK REPAIR AT TREE LOCATIONS
FIGURE 14



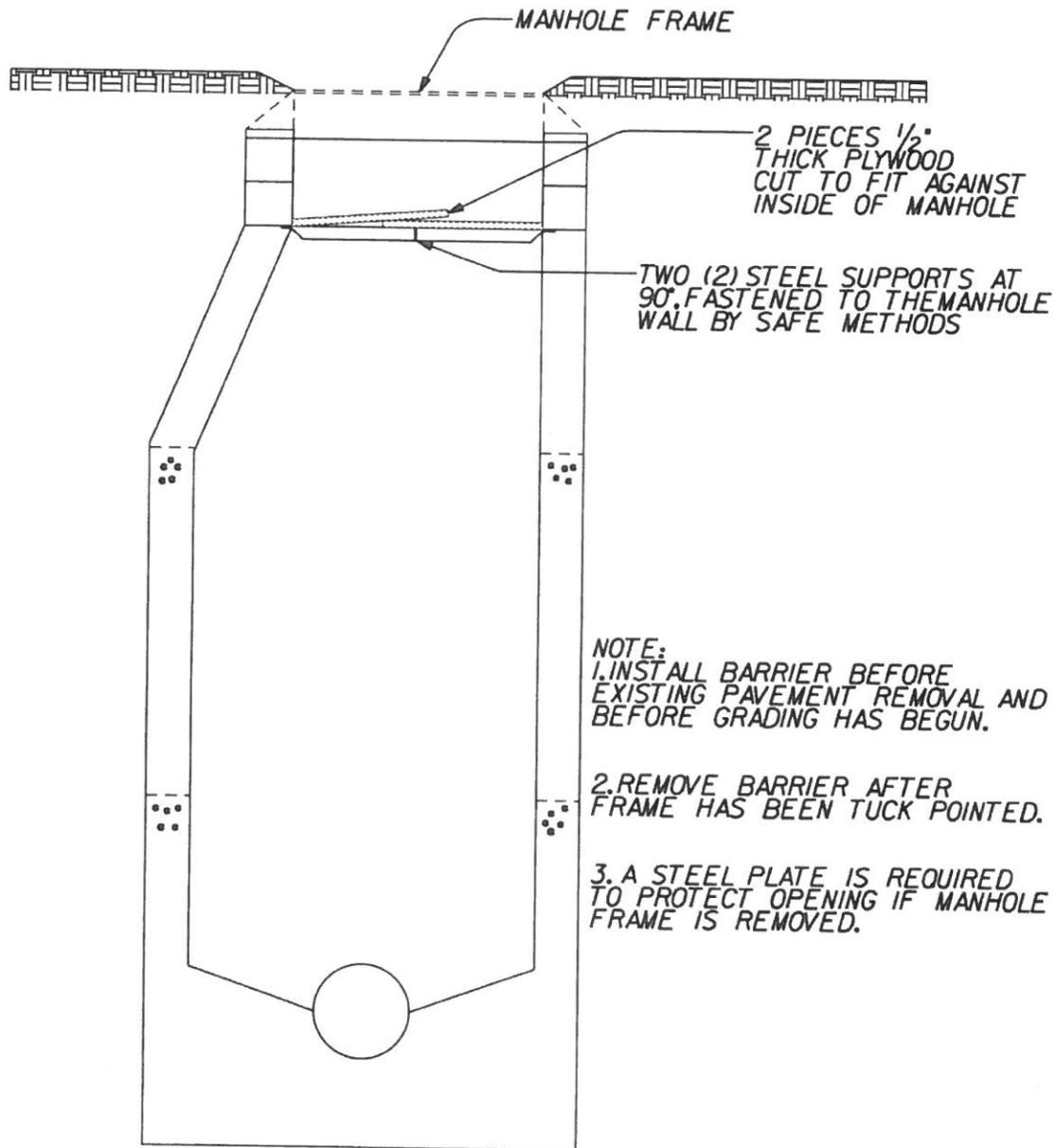
12" NO.6 EPOXY COATED DEFORMED BARS AT 36" C-C, INSTALLED ON 6:1 SKEW HORIZONTALLY. DIRECTION OF SKEW ALTERNATING AFTER EVERY ONE OR TWO BARS MINIMUM 4 BARS PER EXCAVATION

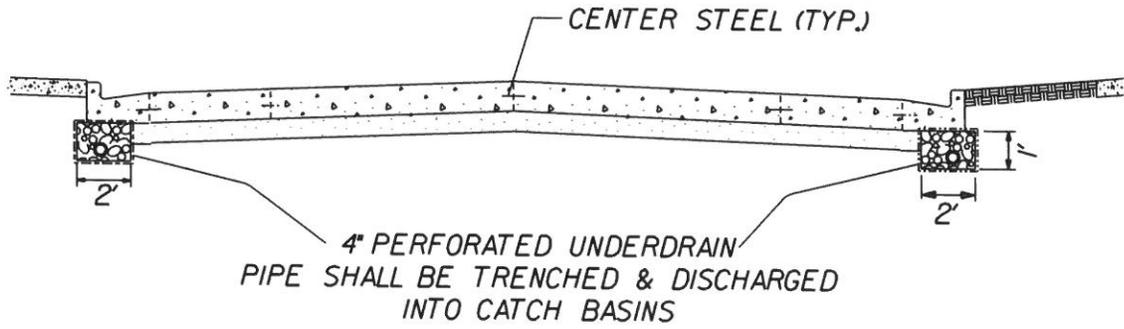


SECTION A-A

THE HOLE FOR THE BAR SHALL BE DRILLED TO A DEPTH OF 7" AND TO A DIAMETER AS TO PROVIDE A TIGHT DRIVEN FIT IN THE CENTER OF THE EXISTING CONCRETE PAVEMENT

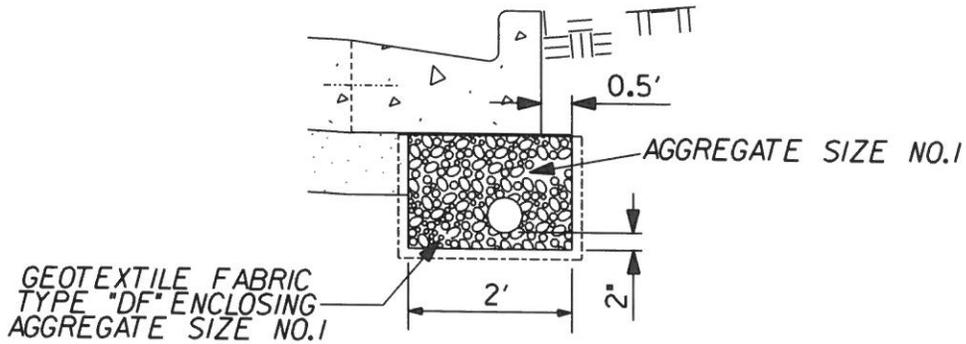
REVISED JAN 2020
CITY OF WEST ALLIS
PAVEMENT TIES
FIGURE 16



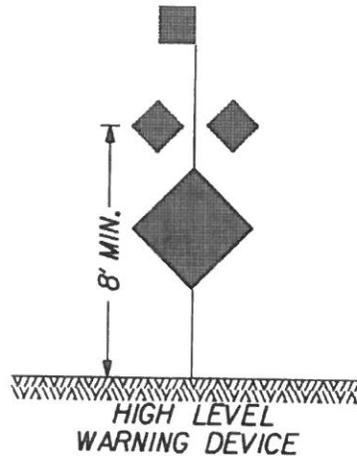
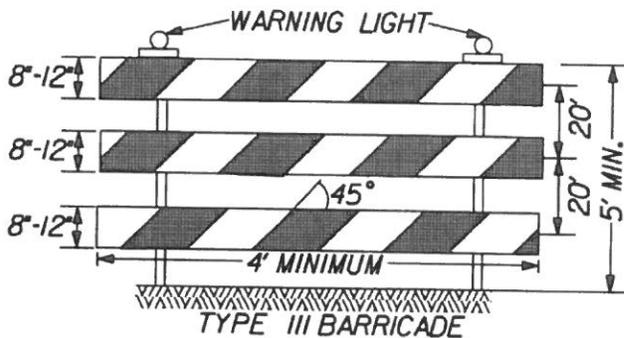
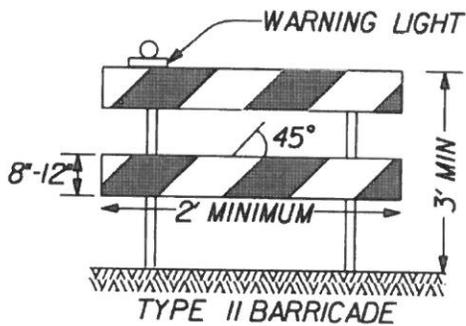
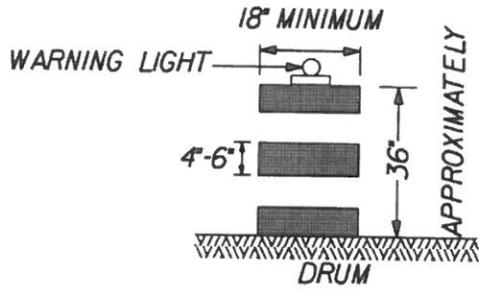
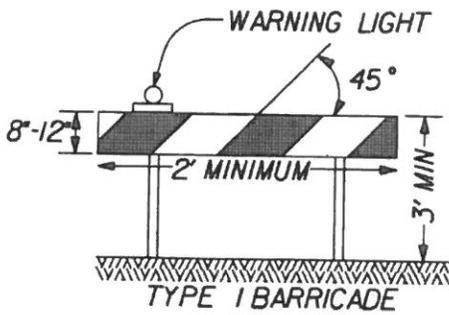


AGGREGATE SIZE NO.1 SIZE REQUIREMENTS	
Sieve Size	Percentage by Weight Passing
	(No. 67*)
2-Inch	---
1-1/2-Inch	---
1-Inch	100
3/4-Inch	90-100
3/8-Inch	20-55
No. 4	0-10
No. 8	0-5

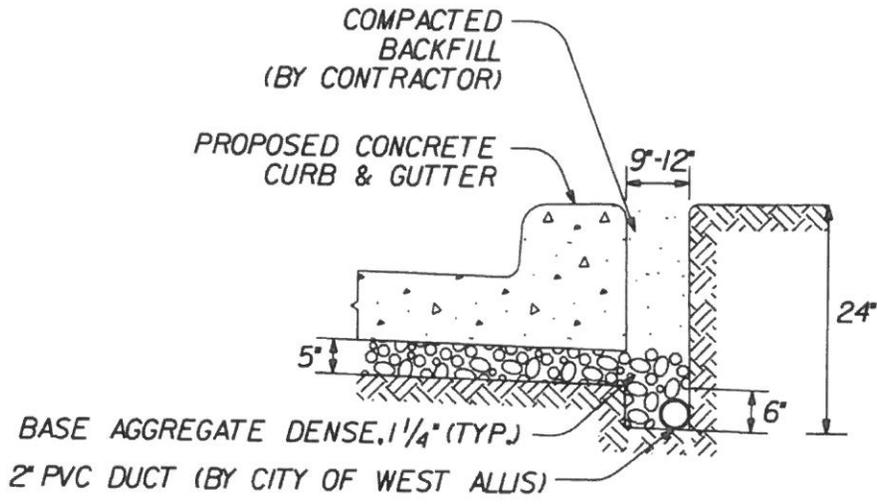
*Size No. AASHTO Designation: M 43.



REVISED JAN. 2020
CITY OF WEST ALLIS
PAVEMENT DETAILS
FIGURE 18

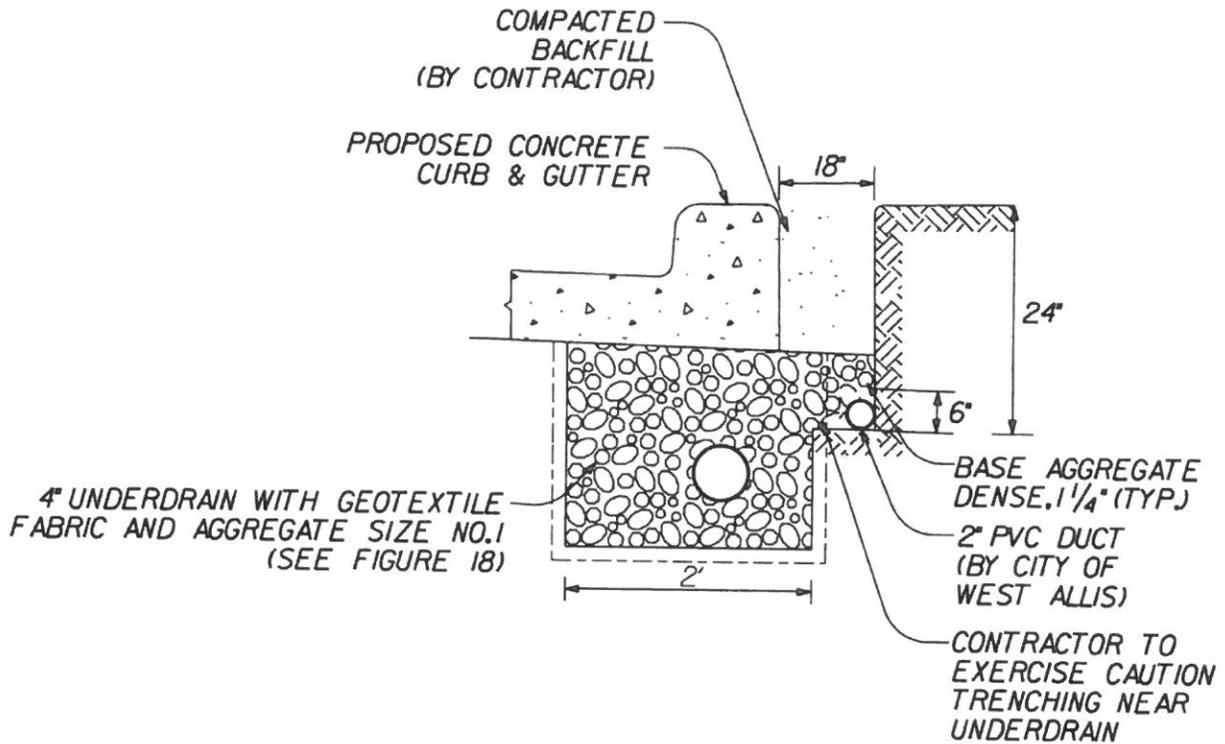


- NOTES: 1. STRIPES ON BARRICADE RAILS SHALL SLOPE DOWNWARD.
2. BARRICADE RAIL STRIPE WIDTHS SHALL BE 6 INCHES EXCEPT WHERE RAIL LENGTHS ARE LESS THAN 36 INCHES THEN 4 INCHES WIDE MAY BE USED.
3. THE SIDES OF THE BARRICADES FACING TRAFFIC SHALL HAVE RETRO REFLECTIVE RAIL FACES.



TRENCHING DETAIL

(NOT TO SCALE)



TRENCHING WITH UNDERDRAIN DETAIL

(NOT TO SCALE)

CITY OF WEST ALLIS

TRENCHING DETAIL
FIGURE 20

SCHEDULE OF FIXED PRICES

Street Construction

Excavation.....	\$25.00/cu. yd.
Borrow Excavation	25.00/cu. yd.
Root Sawing	5.00/lin. ft.
Sodding	10.00/sq. yd.
Seeding and Mulching	6.00/sq. yd.
Topsoil, spread.....	30.00/cu. yd.
Tree Clearing.....	30.00/in. dia.
Grubbing	20.00/in. dia.
Asphalt/Concrete Sawing.....	3.00/lin. ft.
Walk and Drive Removal.....	1.00/sq. ft.
Curb Removal: Less than 40 lin. ft.....	6.00/lin. ft.
More than 40 lin. ft.	4.00/lin. ft.
Pavement Removal	10.00/sq. yd.
Asphaltic Surface Removal.....	8.00/sq. yd.
Pavement Milling.....	6.00/sq. yd.
5" Concrete Sidewalk & Driveway.....	5.00/sq. ft.
7" Concrete Sidewalk & Driveway.....	6.00/sq. ft.
Concrete Curb and Gutter, less than 40 l.f.....	30.00/lin. ft.
8" Conc. Base or 7" Conc. Pavement, Less than 20 sq. yds. in place.....	40.00/sq. yd.
High Early Strength Pavement.....	125% of bid price
Concrete Steps	75.00/lin. ft.
Pavement Ties.....	12.00/each
Base Aggregate, Dense, 1-1/4", tons in place	18.00/ton
Crushed Limestone, tons in place	18.00/ton
Joint Sealing.....	1.50/sq. yd.
4" Pipe Underdrain (Complete)	15.00/lin. ft.
Tack Coat	3.00/gal.
HMA Pavement, tons in place, Less than 30 tons in place	100.00/ton
Greater than 30 tons in place.....	90.00/ton
Asphaltic Surface Patch	120/ton
Adjust Utility Frames.....	275.00/vert.ft.
Adjust Water Valve Boxes.....	100.00/each
Inlet or Sanitary Manhole Protection Barriers	50.00/each
Silt Fence	5.00/lin. ft.
Calcium Chloride, spread.....	20.00/80 lbs.
Concrete Pole Base Removal.....	100.00/each
Buried Concrete Removal.....	150.00/cu. yd.
Internal Manhole Frame Seal Removal or Installation	300.00/unit
2" Illumination Duct Installation.....	10.00/lin. ft.
Slurry Backfill, 5 cu. yds. or more	60.00/cu. yd.

January, 2020

STREET CONSTRUCTION
CONVERSION TABLES

<u>ITEM</u>	<u>YIELD</u>
5" Concrete Sidewalk & Driveway	64.8 SF/C.Y.
7" Concrete Sidewalk & Driveway	46.3 SF/C.Y.
31" Concrete Curb & Gutter	
Low Side 6"F - 7" Thick	15.10 LF/C.Y.
6"F - 8" Thick	13.37 LF/C.Y.
High Side 6"F - 7" Thick	15.10 LF/C.Y.
6"F - 8" Thick	13.37 LF/C.Y.
7" Concrete Pavement.....	5.14 SY/C.Y.
8" Concrete Pavement.....	4.50 SY/C.Y.
9" Concrete Pavement.....	4.00 SY/C.Y.
Base Aggregate Dense, 1 ¼" - 5"27 T/S.Y.
Base Aggregate Dense, 1 ¼" - 7"375 T/S.Y.
Tack Coat	
Streets1 Gal/S.Y.
Alleys18 Gal/S.Y.
HMA Pavement	
1 1/2"085 T/S.Y.
2"113 T/S.Y.
3"170 T/S.Y.
4"226 T/S.Y.
Area of Circle $A=\pi R^2$	
Circumference $C=\pi D$	

February, 2010

**SEWER AND WATER SPECIFICATIONS
ADDENDUM JANURARY 2020**

All sewer and water construction shall be in accordance with Standard Specifications for Sewer and Water Construction in Wisconsin, Sixth Edition, December 22, 2003, and any addenda, which are included by reference as part of this contract and are on file in the office of the City Engineer.

ADDENDA TO STANDARD SPECIFICATIONS

The following exceptions, additions, and deletions to the Standard Specifications for Sewer and Water Construction in Wisconsin, Sixth Edition, December 22, 2003, and any addenda are to govern the work and take precedence over the Standard Specifications.

PART I. GENERAL CONDITIONS

- 1.1.19 ENGINEER.
Shall be altered to read:
The Director of Public Works/City Engineer or an Engineer of the City of West Allis, including such assistants as are authorized to represent him, or the consulting Engineer acting through his authorized agents, who represents the City of West Allis during the construction activities.
- 1.1.42 WORKING DAY.
Add the following:
Any "no work" days for disinfection and testing water mains or due to curing concrete pavement shall be considered as working days.
- 1.1.42a WORKING HOURS.
Daylight hours between 7:00 a.m. and 6:00 p.m.
- 1.2.2a NOTICE TO WORK ON SATURDAYS OR SUNDAYS OR HOLIDAYS.
If the Contractor or Subcontractors deems it necessary to work on Saturdays, Sundays or Holidays, they shall notify the Engineer twenty-four hours in advance to obtain permission and inspection for such work. If said work is approved and the Contractor does not work or does work which, in the opinion of the Engineer did not require inspection, the Contractor will be charged a \$500.00 inspection and supervision fee.

- 1.2.11 PRECONSTRUCTION CONFERENCE.
A preconstruction conference will be required before the start of any project. The Contractor must be present or his authorized representative and his Construction Superintendent or Field Representative.
- 1.3.22 EXCESSIVE NOISE AND VIBRATION.
The Contractor shall not produce noise in excess of 86 dba at or across a real property boundary without prior written approval from the Engineer and the City Health Commissioner. The Contractor shall not operate any device which produces vibration in excess of the vibration limitations set forth in City of West Allis ordinances.
- 1.5.4 COOPERATION WITH OTHER CONTRACTORS.
Shall be altered to read:
The Contractor shall work in harmony with other Contractors, or with utilities or Owner's forces engaged in collateral work. No extra payments will be made for progress interruption, remobilization, traffic control, etc., resulting from cooperation delays. In case of dispute, the decision of the Engineer shall be final and binding upon the parties affected.
- 1.6.3 BASIS OF PAYMENT OR CREDIT FOR ALTERED WORK.
(d) *Add the following:*
(Hourly wages calculated from basic hourly plus contributions plus sixty (60) percent maximum insurance increase).
- 1.7.3a TRAFFIC CONTROL.
Add the following:
All signs and barricades shall conform with Part 6, Temporary Traffic Control Section of the Federal Highway Administration Manual on Uniform Traffic Control Devices for Streets and Highways. Proposed signing and barricading must be approved by the Engineer.

Unless otherwise specified, the cost of traffic control shall be included in the prices for other items bid.
- 1.8.4 LIABILITY AND INSURANCE.
(c) *Add the following:*
NOTE: The required limits of liabilities may be obtained with primary liability policies or in combination with an umbrella excess third party liability policy. The City of West Allis must be named as an additional insured as its interest may appear on the Contractor's comprehensive general liability and property damage insurance which insures the City up to the limits stated in 1.8.4(b).

1.8.5 CONTRACT BONDS.

Replace with:

After opening of bids, but before signing of Contract, the bidder to whom award is made shall have executed, through a Surety company authorized to do business in the state of Wisconsin and acceptable as Surety to City, bonds in the form included in the Contract documents for the faithful performance of the Contract and payment for all work and labor performed and materials furnished to complete the work. The bonds shall be for the full amount of the Contract and shall be adjusted to incorporate all extras, credits and change orders through final payment.

Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the Surety to affix thereto a certified and current copy of his Power of Attorney indicating the monetary limit of such power. Bidder shall pay the cost of the bonds.

1.10.5 CONTRACTOR TO BE CHARGED FOR INSPECTION AFTER TIME ALLOWED FOR COMPLETION HAS EXPIRED.

Replace with:

All inspection costs are included in Section 1.10.4 "FAILURE TO COMPLETE WORK ON TIME."

PART II. CONSTRUCTION - GENERAL

2.1.1 INTERFERENCE OF UNDERGROUND STRUCTURES.

Add the following:

No additional compensation will be allowed the Contractor where the original line and/or grade of the proposed sewer or water main can be altered by the Engineer without causing a substantial change in the amount of work. The judgment of the Engineer shall be final.

2.1.3(a) ROOT CUTTING.

ROOTS SHALL BE SAWED ON ONLY ONE SIDE OF A TREE.

The root system shall not be sawed deeper than eighteen (18) inches below the proposed elevation of the new top of curb and not more than two (2) inches from the back of the proposed curb.

Caution shall be used during root sawing operations, so as not to cause unnecessary damage to the tree or its root system.

All debris from the root sawing operation shall be used to fill root sawing trenches before the end of the workday.

Root foundations for all trees must remain adequate to withstand heavy windstorms.

All exposed and severed tree roots shall be immediately covered with mulch and watered to prevent drying until such time that the concrete work is complete, the form removed and the area between the tree and concrete work backfilled with approved topsoil. The time duration for completion of the backfilling operations shall not exceed five (5) days from the time the concrete was placed.

2.2.6

SAWING AND BREAKING PAVEMENT.

The first sentence shall read:

All concrete or asphalt pavements, or concrete bases, shall be sawed to full depth prior to being shattered.

Add the following:

The cost of sawing, breaking and removing pavement, concrete curb and gutter, sidewalks and driveways, shall be included in other items bid unless otherwise specified.

2.2.11(b)

SURPLUS EXCAVATED MATERIAL.

The last sentence shall read:

The cost of delivering such surplus material to any point within a driving distance of five miles from the site of the work shall be included in the unit price bid for the work.

2.2.12(a)

DRAINAGE OF EXCAVATION.

Add the following:

During sanitary sewer relay work, all sewage flowing from the nearest upstream manhole shall be pumped to a downstream sanitary sewer manhole with approved methods.

2.6.1

EXCAVATED MATERIAL FOR BACKFILL.

Shall be altered to read:

Trenches may not be backfilled with material excavated from an open trench which conforms to the requirements of Section 8.43.5 unless specified in the contract documents or approved by the Engineer.

2.6.2

GRANULAR BACKFILL.

Shall be replaced with:

All trenches shall be filled with graded aggregate which conforms to the requirements of Section 8.43.7, unless otherwise specified. 1-1/2 inch graded crushed concrete backfill which conforms to the requirements of Section 8.43.7 is an acceptable alternative and may be specified on the contract Plans or Special Provisions.

2.6.3

GRANULAR BACKFILL CREDITS.

The last sentence shall be altered to read:

The cubic yardage of such backfill shall be determined using the outside diameter of the pipe plus twenty-four (24) inches at the top of the pipe and the outside diameter of the pipe plus forty-eight (48) inches at the surface. Granular backfill shall be considered to be 1.80 tons per cubic yard.

2.6.14

CONSOLIDATION OF BACKFILL.

Shall be altered to read:

Backfill shall be consolidated by flooding unless otherwise specified in the contract documents.

(a) *Last sentence shall read:*

The City shall supply the water for consolidation of backfill at no cost to the Contractor. The Contractor shall obtain a meter and apply for a Water Use Permit from the West Allis Water Department (6302 W. McGeoch Ave. - Ph. 302-8830) for each City project. The permit shall be obtained at least twenty-four (24) hours in advance of any water use. The Water Department shall designate the hydrants to be used for water supply. The Contractor, as part of the permit requirement, shall make the meter available to Water Department staff and document the amount of water used and shall report this information to the Water Department as requested.

2.7.3

REPLACEMENT OF PAVEMENTS.

(c) Additional requirements for replacement of pavements are shown on Plan File No. V-112 and V-113.

2.7.4

REPLACEMENT OF LAWNS.

Shall be amended to read:

The Contractor shall restore the damaged area with Type "A" lawn replacement instead of Type "C" unless otherwise directed by the Engineer or specified in the contract documents.

TYPE "A" LAWN REPLACEMENT

Add the following sodding specifications:

(a) Description of Work. The work shall consist of the furnishing and laying of live sod on the shoulders, slopes, ditches or other locations as designated, and the construction of sod ditch checks or similar appurtenances as shown on the plans, in the contract, or as ordered and laid out in the field by the Engineer in accordance with the specifications.

(b) Materials. The sod shall consist of a dense, well-rooted growth of permanent and desirable grasses, indigenous to the general locality where it is to be used, and shall be free from weeds or undesirable grasses. At the time the sod is cut, the grass shall be approx. 2" long and raked free from debris. The sod shall be cut into strips with a minimum size of 18" x 72". The thickness of the sod shall be at least 3/4" so that the sod can be handled without undue tearing or breaking. The Contractor shall take steps to insure that the sod is in a well-moistened condition prior to installation.

(c) Construction Methods.

(1) Preparation of Earth Bed. The area to be sodded shall have been previously constructed to the required cross-section, contour and the tops and bottoms of the slopes shall be rounded to a minimum four-foot radius. The areas to be sodded shall be free from stones, roots or other foreign material.

The initial topsoil placement shall be 3" in cross section and thoroughly compacted so as to prevent settlement once the sod has been laid. After compaction, the top 3/4" of topsoil shall be loosened so as to consolidate the root growth of the sod with the topsoil.

Sod shall be laid so that the joints caused by abutting ends of the strips are not continuous. Each sod strip shall be laid so as to abut snugly against the strip previously laid.

As the sod is being laid it shall be rolled. Or, the sod shall be firmly but lightly tamped with a suitable wooden or metal tamper as approved by the Engineer.

At points where water will flow over a sodded area or at the limits of the sodded area, the upper edges shall be turned into the soil below the adjacent area and a layer of earth placed over the juncture.

(2) Staking and Cleanup. On all slopes steeper than one foot vertical to four feet horizontal the sod shall be staked or pegged. Stakes shall preferably be placed near the top edge of the sod strip and shall be driven plumb through the sod to be flush with the sod. All sod placed in ditches shall be staked regardless of the slope. After staking, the sod surface shall be cleared of loose sod or excess debris.

(3) Watering. After staking and cleanup, the sod shall be thoroughly moistened with water. All sodded areas shall be

kept thoroughly moist by watering daily, when rainfall is deficient, for a period of twenty-one (21) days.

The City shall supply the water for sod watering at no cost to the Contractor. The Contractor shall obtain a permit and meter fitting from the West Allis Water Department and use only on the designated hydrants.

TYPE "C" LAWN REPLACEMENT

Add the following seeding and mulching specifications:

1. SEEDING

- (a) Description of Work. This work shall consist of preparing seed beds, furnishing, sowing, and watering the required seed on shoulders, slopes, appurtenances and other areas as shown on the plans or designated in the contract, or as ordered to be seeded by the Engineer.

The City shall supply the water for seed watering at no cost to the Contractor. The Contractor shall obtain a permit and meter fitting from the West Allis Water Department and use only on the designated hydrants.

- (b) General Requirement. All seed shall conform to the requirements of the Wisconsin Statutes and of the Wisconsin Administrative Code Chapter Agriculture 20, regarding noxious weed seed content and labeling. Seed shall not be used on the work later than one year after the test date which appears on the label.
- (c) Storage. Any seed delivered prior to use shall be stored in such a manner that it will be protected from damage by heat, moisture, rodents or other causes. Any previously accepted seed that has become damaged shall be disregarded and replaced by the Contractor.
- (d) Composition. The seed mixture required, unless otherwise noted, shall be of the Wisconsin Department of Transportation seed mix #4.

The following percentages apply to the #4 mix:

Kentucky Blue Grass 60%
Creeping Red Fescue 30%
Perennial Rye Grass 10%

(e) Construction Methods. Seeding, when performed in conjunction with mulching, may be done at any time during the growing season when soil conditions are suitable. Seeding shall be done with the selected seed mixture sown at the specified rate.

(1) Preparation of Seed Bed. Grading, shouldering and topsoiling, when part of the work under contract, shall be completed before seeding. The 3" layer topsoil shall be thoroughly compacted so as to prevent settlement in the newly seeded area.

The area to be seeded shall be worked with discs, harrows or other appropriate equipment, until a reasonably even and loose seed bed is obtained immediately in advance of the seeding.

(2) Sowing. Unless other specified, seeds may be sown at the option of the Contractor by either Method A or B.

METHOD A

The selected seed mixture shall be sown by means of equipment adapted to the purpose, or it may be scattered uniformly over the areas to be seeded, and lightly raked or dragged to cover the seed with approximately one-fourth inch of soil. After seeding, the areas shall be lightly rolled or compacted by means of suitable equipment, preferably of the cultipacker type when such equipment can be operated, or by means of light hand tampers.

Scattering seed by hand shall be done only with satisfactory hand seeders and only at such times when the air is sufficiently quiet to prevent seeds from blowing away.

METHOD B

Upon the prepared seed bed, the seed shall be sown or spread by means of a stream or spray of water under pressure operated from an approved type of machine designed for that purpose. The selected seed mixture and water shall be placed into a tank, provided within the machine, in sufficient quantities that when the contents of the tank are sprayed on a given area the seed will be

uniformly spread at the required rate of application. During the process, the contents of the tank shall be kept stirred or agitated to provide uniform distribution of the seed.

- (3) Seeding Rates. The seeding rate, unless otherwise noted, shall be 3 lbs./1000 square feet.

2. MULCHING

(a) Description. This work shall consist of furnishing, placing and anchoring a mulch cover, usually in connection with seeding, on surfaces of such portions of the roadway as provided by the plans, in the contract, or as designated in the field by the Engineer.

(b) Materials. Mulching material shall consist of any straw or hay in an air-dry condition or wood excelsior fiber, wood chips or other suitable material of a similar nature, which is free of noxious weed seeds and objectionable foreign matter.

Bituminous material, if used, shall be an emulsified asphalt meeting the requirements for Type SS-1 of the Specifications for Emulsified Asphalt AASHTO Designation = M140. Any other material must be approved by the Engineer.

(c) Construction Methods. Unless otherwise directed, the mulch shall be placed on a given area within three days after the seeding has been completed. Mulching operations shall not be performed during periods of excessively high winds which would preclude the proper placing of the mulch. The placed mulch shall be loose or open enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, conserve soil moisture and prevent erosion.

The Contractor shall repair any damaged mulch until the time of final acceptance of the work.

2.8.1

EROSION CONTROL - GENERAL CRITERIA.

Local Ordinances shall refer to:

Erosion Control Requirements for all Contracts

City of West Allis

Engineering Department

Pages 7.1 to 7.29

- 2.9.9 **PAY MEASUREMENT FOR WATER SERVICES.**
Edit the following:
...to the end of the pipe laid, shall be ...to the end of the curb stop. I.E. Pay measurement for water services shall extend from the center of the water main to the curb stop.
Add the following:
The copper service pipe used on the house side of the curb stop for reconnection to the existing private service line is incidental to the Water Service Installation, unless otherwise stated in the contract documents.
- 2.9.12 **PAY MEASUREMENT FOR MANHOLES (EXCLUDING TEE MANHOLES)**
Add the following:
The cost of rebuilding or replacing the structures shall also include any incidental pipe required to reconnect existing or future sewer lines, laterals, or drains unless otherwise noted. Reconnection pipe shall be of the same diameter and material as the existing pipe or as approved by the Engineer.
- 2.9.14 **PAY MEASUREMENT FOR CATCH BASINS AND STORM WATER INLETS.**
Replace with the following:
Catch basins and storm water inlets shall be paid for per unit constructed. This shall be a lump sum bid which includes the setting of all castings.

The cost of rebuilding or replacing the structures shall also include any incidental pipe required to reconnect existing or future sewer lines, laterals, or drains unless otherwise noted. Reconnection pipe shall be of the same diameter and material as the existing pipe or as approved by the Engineer.
- 2.9.20 **PAY MEASUREMENT, LAWN SPRINKLERS.**
Pay measurement for sprinkler services shall extend from the center line of the water main to the service box. This measurement shall be made horizontally. Sprinkler services shall be paid for at the unit price bid per lineal foot, unless a lump sum bid is requested in the proposal, and shall include the cost of the water tap, permits and furnishing and setting all necessary materials, unless otherwise stated in the contract documents.

PART III. CONSTRUCTION - STORM AND SANITARY SEWERS

- 3.1.1 **WIDTH OF TRENCH.**
Add the following:
Unless specifically noted on the plans, the maximum trench width shall be the normal trench width as defined in 3.1.1 (a). The term "unlimited trench conditions" where shown on the sewer plans signifies that the pipe section used has adequate strength for an unlimited width, but in no way gives permission for the Contractor to exceed the normal width.

3.2.6 PIPE SEWER BEDDING SECTIONS.

(c), (d) & (e) *Add the following:*

Concrete cradle, cap, or envelope sections shall be Class D ready-mix concrete with 4 - #6 dia. steel rods 4" centered from each corner continuous throughout the entire section. In the event one days pour is terminated at the face of the bell end of the pipe, enough steel shall be exposed to insure, at minimum, a 1' splice with the next section.

3.2.10 TYPE OF JOINT TO BE USED ON PIPE SEWERS.

(b) For Storm Sewer:

1. Concrete Pipe

Delete the following:

a. Cement mortar

3.2.24 ABANDONED SEWER, DRAINS, AND SEWER STRUCTURES.

Add the following:

...3 feet below the proposed or established grade or existing street grade, whichever is lower. However, at some point along the wall of the structure, the Contractor shall remove the masonry completely to the bottom to avoid trapping water in the abandoned portion of the structure.

3.5.3 TYPES OF MANHOLES

(a) Sanitary Manholes.

Add the following:

Internal Manhole Frame Seal

Internal manhole seals shall be installed in all sanitary sewer manholes to provide a watertight, interior flexible seal between the manhole frame and the manhole cone section.

All internal manhole seals and extensions shall be supplied by the City, unless specifically noted on the plans or in the Special Provisions.

Internal manhole seals shall be installed after final pavement or surface restoration is complete. All manhole frames must be tuck-pointed to the chimney section using approved masonry and mortar prior to seal installation.

Internal chimney seals and extensions shall be installed in strict accordance with the manufacturer's specifications and recommendations, including use of butyl caulk on the lower portion of the seal when installed in brick manholes. The installation of the chimney seal and extension shall include the preparation of the wall surfaces in the chimney area and the cleaning or grinding of the frame as required by the manufacturer's specifications and recommendations.

Irregularities and surface imperfections in the chimney section of the manhole shall be repaired using a quick setting, high strength, non-shrinking, polymer modified mortar.

A water test shall be performed on all internal manhole seals. After any extensions and the lower compression bank of the seal is installed, the area between the seal and the manhole structure is to be filled with water. If a leak is found, the bands shall be adjusted until the seal is leak free. No water leakage shall be permitted. After testing, the water shall be removed and installation of the seal completed.

3.5.4

GENERAL REQUIREMENTS.

- (d) Walls, Corbel and Chimney.

Add the following:

The maximum chimney height shall not exceed 14" in sanitary manholes and 16" in storm manholes and catch basins.

- (e) Castings.

Replace with the following:

Castings, manhole frames and covers shall be furnished and installed by the contractor. The Contractor shall supply the following for:

Sanitary Manholes: Neenah Type R-1661-2001 (Frame) with Neenah Type R-1661-0010 (Heavy Duty Solid Gasketed Lid) or approved equal. Note: the lids are a special order item. If a shallow frame is needed use Neenah Type R-1661-2003 or approved equal.

Storm Manholes: Neenah Type R-1661-2001 (Frame) with Neenah Type R-1660-0003 (8 hole cover lid) or approved equal. If manhole is acting as inlet, in area such as parking lot or grass, use Cover- Neenah Type R-2467-0001 or approved equal. If a shallow frame is needed use Neenah Type R-1661-2003 or approved equal.

Catch Basins: Neenah Type R-3222-LA- Combination Inlet, with curb box or approved equal. Specifically, frame- Neenah Type R-3222-0004, Grate- R-3222-0015, and curb box- R-3222-0016 with environmental notice, or approved equal. If no curb box is needed use Neenah Type R-3222-2014 Frame or approved equal.

Alley Catch Basins: Neenah Type R-3517 Frame and Grate or approved equal. Note: these are special order items.

All existing castings shall remain the property of the City and shall be returned by the Contractor to the City Yard located at 6300 W. McGeoch Ave. The Contractor will be charged for castings not accounted for.

3.6.1

CATCH BASINS.

(a) *Replace with:*

Road-Type Catch basins shall be as shown on Figure V-117, which is included in the addenda to the specifications, unless noted otherwise. Alley type catch basins shall be constructed as shown on Figure V-116, which is included in the addenda to the specifications. Holes for connecting pipe shall be cut-in on site, unless specified on the Plans or in the Special Provisions.

(h) Grades of Setting Catch Basin Frames.

The last sentence shall read:

A chimney shall be constructed on the top of the corbel section or deck except that the chimney on a curb-type basin shall be kept 4 inches low behind the existing or proposed curb line to receive the curb box.

(i) Castings.

Replace with Section 3.5.4(e) as shown in this addenda.

3.7.1

GENERAL.

Add the following:

The low-pressure air test shall be used for all new sanitary main sewers. Low-pressure air tests shall not be performed on relayed sanitary sewer mains.

PART IV. CONSTRUCTION - WATER MAIN

4.1.1

MATERIAL FURNISHED.

Add the following:

The Contractor shall furnish all pipe which shall be ductile iron pipe with rubber gasket joints as specified in Section 8.18.0 thickness Class 53 and encased in polyethylene wrap as specified in Section 4.4.4. unless specifically noted on the plans or contract documents. The Contractor shall furnish all special fittings such as tees, crossover plugs, sleeves, offsets, reducers, bends, etc. They shall be equipped with either hub ends for, mechanical joints, or rubber gasket joints. All fittings shall have a pressure rating of 250 PSI and conform to Section 8.22.0.

4.3.3

BEDDING.

Replace the first sentence with:

All water main pipe and fittings shall be double polyethylene wrapped and laid with crushed limestone bedding and cover conforming to Section 8.43.6.

4.15.0

HYDROSTATIC TESTS.

Add the following:

a. Pressure and leakage testing shall be in accordance with the latest

edition of A.W.W.A. Standard C600.

- b. Pressure testing of the installed pipe shall be completed by the Contractor under City's supervision.
- c. Following examination of exposed parts of the system ("wet-hand" test); the test pressure will be increased to 150 psi read at the point of lowest elevation on the main for duration of one hour. There should be no noticeable pressure drop in the test section.
- d. If it is found unnecessary to add water during the duration of the pressure test, the Engineer may waive the leakage test.
- e. If leakage test is not waived, test shall be in accordance with Chapter 4.15.3 of "Standard Specification for Sewer & Water Construction in Wisconsin" latest edition.

4.16.0

DISINFECTION OF WATER MAINS.

Add the following:

- a. All new, cleaned or repaired water mains shall be disinfected in accordance with A.W.W.A. Standard C651 and Wisconsin Administrative Code NR 811.07 (3).
- b. The new water main can remain disconnected from the existing main until disinfection and final bacteriological tests have been completed. The water required for hydrostatic testing, disinfection, and flushing would be supplied through a temporary connection controlled by a control valve at a hydrant that is separated from the existing water system.
- c. If approved by the City, the new water main can be connected to the existing main during construction for disinfection purposes. Contractor will submit to the City, backflow protection procedure to keep contaminated water from entering the existing main.
- d. Methods of Chlorination
 - i. Tablet - Hypochlorite tablets can be used during construction in accordance with Chapter 4.3.12 of "Standard Specification for Sewer & Water Construction in Wisconsin" latest edition.
 - ii. Continuous feed - This method consists of placing calcium

hypochlorite granules in the main during construction, completely filling the main to remove all air pockets, flushing the completed main to remove particulates, and filling the main with potable water. Chlorine concentration should be tested at regular intervals downstream of where the water is added to verify the minimum free chlorine residual does not drop below 25 mg/l.

- iii. Slug - The procedure is similar to the continuous-feed method except the dose of chlorine fed at a constant rate increases the concentration to 100mg/L. The chlorinated water slowly flows through the pipe for at least 3 hours, exposing all interior surfaces to the high concentration. Valves and hydrants should be treated with this water also. During the 3 hour period, the water should have a residual of 50 mg/L free chlorine or more.

e. Bacteriological Test

- iv. After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken 24 hours apart, shall be collected from the main. A set is made up from groups of samples collected every 1,200 feet of new main, groups of samples taken at each branch, and a group of samples taken at the end of the line.
- v. All samples shall be collected in sterile bottles treated with sodium thiosulfate as required by the Standard Methods for the Examination of Water and Wastewater. A suggested combination blowoff and sampling tap is useful for mains up to 8 inches in diameter. A corporation cock may be installed on the main with a copper-tube gooseneck assembly. No hose or hydrant shall be used to collect samples.
- vi. All samples shall be tested for bacteriological quality in accordance with Standard Methods for the Examination of Water and Wastewater, and shall be void of coliform organisms.
- vii. If trench water or excessive quantities of dirt and debris have entered the new main during construction, bacteriological samples may be taken at marked intervals of 200 feet. Any water left in the main for 16 hours or more must be tested for bacterial contamination.

PART V. CONSTRUCTION - BUILDING SERVICES

5.1.5

FEES.

The Contractor shall procure the necessary plumbing inspection permits prior to start of construction. The permit fees are waived on City contracts.

5.3.2

CUT-IN CONNECTIONS.

Add the following:

- (d) Where PVC building storm sewer is connected to a concrete main sewer, the following type of connection shall be used: After the main sewer has been cored, an approved rubber fitting shall be installed flush with the inside of the main sewer and held in place with an internal snap ring assembly. The building sewer shall be installed in the open end of the fitting and secured with a stainless steel strap. Any other type of connection must be approved by the Engineer prior to bidding.

5.3.10

TYPE OF PIPE TO BE USED.

Replace with the following:

Sanitary building sewers shall be SDR 35 PVC. Storm building sewers shall be concrete or PVC. However, any storm building sewer which will have less than 3 1/2 feet of cover either at the time of construction or in the future (as established by proposed street grades), shall be concrete sewer pipe. PVC sewer pipe may be used in this situation if it is encased in a concrete envelope. PVC pipe shall be connected to the concrete sewer main with approved adapters.

5.3.11

TYPE OF JOINT TO BE USED ON PIPE.

Add the following:

The joints for building storm sewers shall be constructed with rubber type gaskets conforming to the requirements of Section 8.41.2 and 8.41.4. The use of cement mortar joints will not be permitted.

5.5.8

CONNECTION TO WATER MAIN.

Add the following:

- (a) General.

The Contractor shall supply the corporation, curb stop with curb box and the adaptor to connect to the existing service on site. Corporations shall be Ford FB600 Series, McDonald 74701B Series or Mueller B25000 Series. Corporations may be either flared or compression fitting. Curb Stops shall be Minneapolis type, full port, ball valve, and copper tube size compression fitting. Acceptable models are Mueller B-25155, Ford B44, or A.Y. McDonald 76100. Curb stop boxes shall

be “Minneapolis Pattern” manufactured by A.Y. McDonald, model #5614 or #5615, or approved equal.

5.5.20

INSULATION.

Replace with the following:

Building water services and hydrant branches shall be insulated in accordance with Section 4.17.0 wherever the depth of cover is less than five (5) feet, or passing within two (2) feet of an underground structure which may experience freezing temperatures.

Insulation shall be supplied by the City of West Allis Water Department. The cost of installation by the Contractor shall be included in other items bid.

5.6.3(b)

RELOCATION OF CURB STOPS AND SERVICE BOXES.

Add the following:

The existing curb stop shall be removed and replaced with copper piping of the same size as the existing water service piping, but no smaller than three-quarter (3/4) inch.

5.6.3(d)

RECONNECTION OF WATER SERVICE.

Add the following:

When reconnecting to existing lead services, a No-Contact Lead Pak compression coupling shall be used to prevent direct contact of the lead plumbing line with other metallic water system components. An approved product is by The Ford Meter Box Company.

All copper tubing for water service must be re-rounded with re-rounding tool after cutting pipe.

PART VIII. MATERIAL SPECIFICATIONS

8.10.3

DIMENSION.

Table 19 - PVC Pipe Dimensions

Add the following:

Minimum wall thickness as shown in Table 19 shall be for ASTM D 3034 SDR 35 and ASTM F 679 12454C only.

8.22.2a

FITTINGS FOR WATER MAIN.

The use of Smith-Blair, split sleeve or similar sleeves shall not be allowed. The Contractor will be required to use the approved monolithic ductile iron sleeve with mechanical joints. When connecting to an older existing main, the use of an oversized sleeve may be required. The use of any other type of sleeve shall be approved by the Engineer before use.

8.26.1

FIRE HYDRANT REQUIREMENTS.

Add the following:

The Contractor shall supply the hydrant, 6" valve and valve box on site. Hydrants shall be Kennedy Guardian, Mueller Centurian A-423, Clow Medallion or approved equal.

All Hydrants 1997 or newer shall remain the property of The City of West Allis. The water department will pick these hydrants up.

Hydrants shall have the following construction requirements:

- Cast or ductile iron discharge pipe.
- Breakaway flange conforming to AWWA C502-94 Section 3.1.
- Main valve opening of 5¼" diameter minimum.
- Main valve composed of molded rubber with durometer hardness factor of 90 +/- 5.
- Operating nut shall be a one-piece bronze casting, pentagonal in shape, 1¾" from point to flat, 1-11/16" at top, 1" high.
- A weather shield shall protect the clearance area between the top casting and the operating nut.
- 2 - 2½" x NST fire hose nozzles.
- 1 - 4½" x NST pumper nozzle.
- Cast iron nozzle cap with rubber gasket, attached chains at a point lower than the centerline of the nozzle. Nut shall conform to AWWA C502-94 Section 3.2.97.
- Counterclockwise opening operation.
- Automatic drain valve operated by main valve rod. Includes brass port, seat and lower valve.
- Oversize mechanical joint inlet designed to be installed on Class D pit cast pipe, Class 250 cast iron pipe, or Class 55 ductile iron pipe using one of 2 gaskets furnished. Gaskets to be color-coded for cast and ductile iron pipe.
- Internal ferric metal surfaces of hydrant and lower valve stem from boot or shoe to ground line shall be coated with epoxy at a minimum thickness of 4 mils.
- Hydrant nozzle capable of 360° rotation with respect to standpipe.
- Minimum 18" from center of lowest nozzle to ground.
- Permanent marking stating manufacturer, main valve size, year of manufacture.
- Bronze upper valve plate and seat. Seat shall thread into a bronze drain ring or shoe bushing. Zinc content of bronze not to exceed 16%. Threads on drain ring and seat ring to have water soluble, environmentally safe lubricant applied at factory.
- Bottom of pipe to grade to be 6½' as defined by Section 3.2.5 of

AWWA C502-94. Torque requirement shall comply with the same section.

- Fasteners between the shoe and standpipe and any standpipe flange shall be low-zinc bronze or 300 series 18-8 stainless steel. Fasteners on the mechanical joint boot shall be corten steel.
- All exterior recesses or pocket that can hold water, above or below ground, shall be sealed with approved material.
- Top section shall be painted with one coat of primer and two coats of either Safety Red (19) or Pennsburg 9050 Setter Red Hydrant-Hide paint.

8.27.1

GATE AND RESILIENT WEDGE VALVE REQUIREMENTS.

Add the following:

Valves shall be Kennedy 157, Mueller C-2360, Clow F6111 or approved equal.

Valves shall have the following construction requirements:

- Elastomer seat with a bubble tight seal at a full differential of 200 PSIG tested from both directions. Each valve shall also be tested in the open position at 400 PSIG resulting in a full shell test. There shall be no leakage at any of the valves joints or connections.
- Bronze stem and nut, open right.
- 2" square operating nut, to be painted bright and shiny red.
- Fasteners connecting valve bonnet to body shall be 18-8 stainless steel.
- All mechanical joint accessory fasteners shall be corten steel.
- Internal parts shall be accessible without removing the main body from the pressure line.
- "O" ring seals above and below thrust collar.
- All cast iron internal surfaces shall be coated with corrosion resistant coating, which shall be "holiday free".
- Pipe way of valve shall have an inside diameter to accept ductile iron, sand-cast iron and pit cast iron pipe. Both sides will be so shaped, i.e. "cut-in" style.

8.28.1

BUTTERFLY VALVE REQUIREMENTS.

Add the following:

Butterfly Valves shall be Mueller B-3211, M & H 450 and Pratt Groundhog or approved equal.

Butterfly valves shall have the following construction requirements:

- Red operating nut, open right.
- Stainless steel valve body bolts.
- Mechanical joint - both ends.
- Gland bolts to be included, glands and gaskets for both ductile and cast

iron pipe.

Installation of Butterfly valves shall be placed north of the main or east of the main.

8.29.1 CAST IRON VALVE BOX REQUIREMENTS.

Add the following:

Gate valve boxes shall be 6860 screw type, manufactured by Tyler.

Butterfly valve boxes shall be 6850 screw type, manufactured by Tyler.

8.29.3 GATE VALVE ADAPTORS.

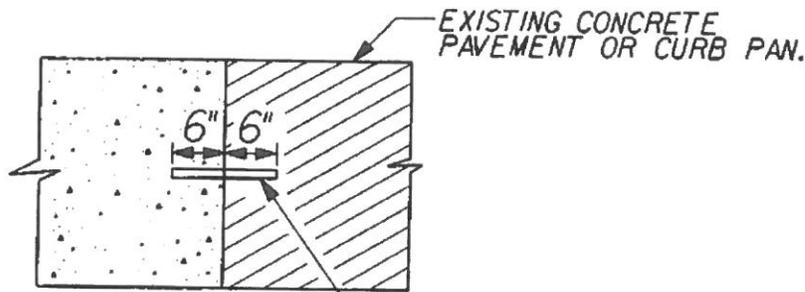
Add the following:

The approved gate valve adaptor is "6 Base Multi-Fit Adaptor", manufactured by Adaptor, Inc. or an approved equal. The approved butterfly valve adaptor is "Butterfly Valve Adaptor", manufactured by Adaptor, Inc. or an approved equal.

8.38.4 COLORED BRICK.

Replace with the following:

1 Only "Red or Pink" brick and block manufactured in accordance with the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, Subsection 519.2.2, Concrete Brick and Block Masonry Units, may be used.



SECTION A-A

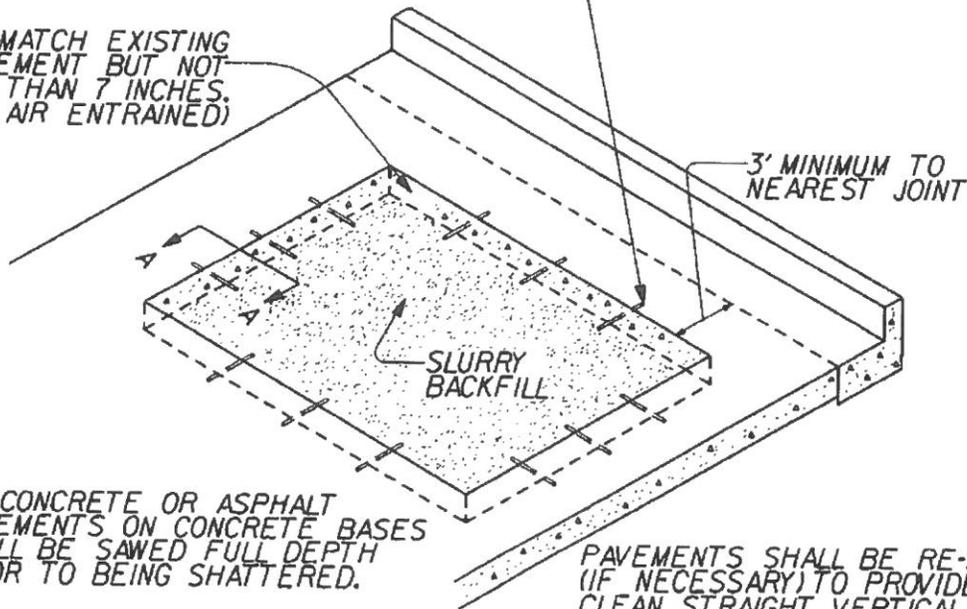
PAVEMENT TIES

EXISTING CONCRETE PAVEMENT OR CURB PAN.

THE HOLE FOR THE BAR SHALL BE DRILLED TO A DEPTH OF 7" AND TO A DIAMETER AS TO PROVIDE A TIGHT DRIVEN FIT IN THE CENTER OF THE EXISTING CONCRETE PAV'T

12" NO.6 EPOXY COATED DEFORMED BARS AT 36" C-C. MINIMUM 4 PER EXCAVATION

MATCH EXISTING PAVEMENT BUT NOT LESS THAN 7 INCHES. (7-BAG AIR ENTRAINED)



3' MINIMUM TO NEAREST JOINT

SLURRY BACKFILL

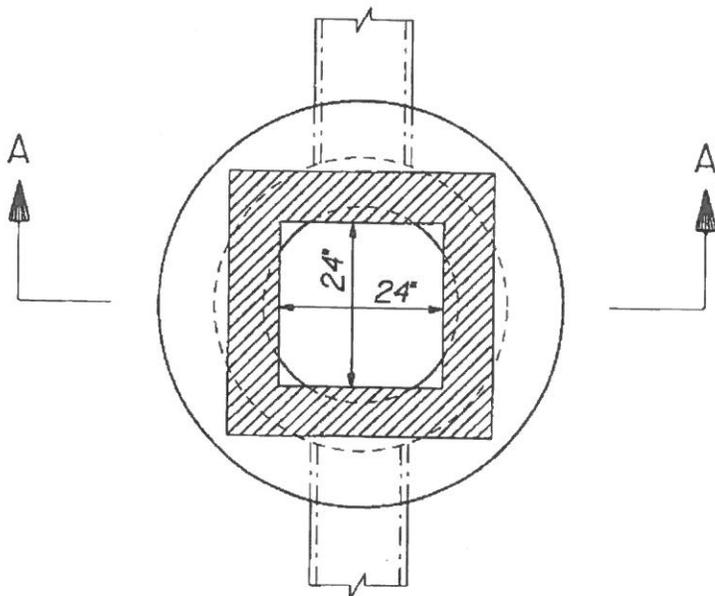
ALL CONCRETE OR ASPHALT PAVEMENTS ON CONCRETE BASES SHALL BE SAWED FULL DEPTH PRIOR TO BEING SHATTERED.

PAVEMENTS SHALL BE RE-SAWED (IF NECESSARY) TO PROVIDE A CLEAN STRAIGHT VERTICAL EDGE TO REPLACEMENT.

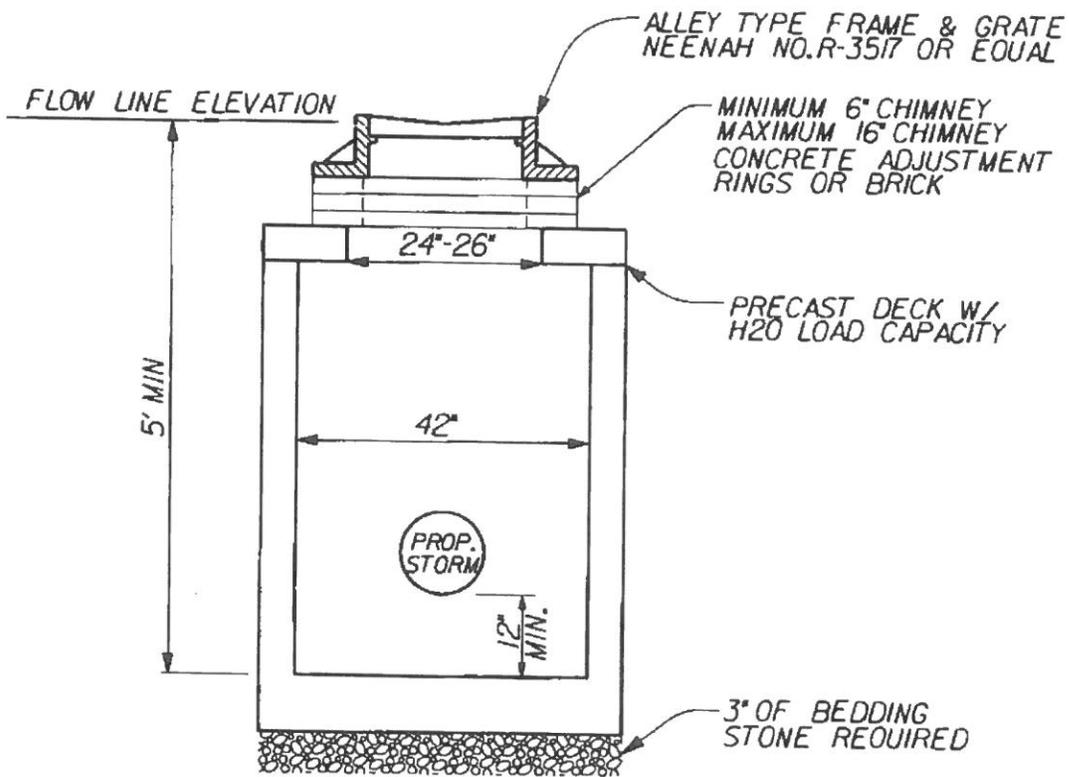
CITY OF WEST ALLIS
STANDARD PAVEMENT REPLACEMENT
FIGURE V-II2

PROCEDURE	CONCRETE PAVEMENT	CONCRETE BASE & ASPHALT RESURFACE	ASPHALT PAVEMENT
	TYPE "B" PAVEMENT REPLACEMENT	TYPE "A" PAVEMENT REPLACEMENT	TYPE "C" PAVEMENT REPLACEMENT
SAWING	FULL DEPTH (USE EXISTING JOINTS IF CLOSER THAN 3 FT.)	FULL DEPTH	FULL DEPTH
BREAKING	DROP WEIGHT OR PNEUMATIC	DROP WEIGHT OR PNEUMATIC	BACKHOE OR APPROPRIATE
BACKFILL	SLURRY OR FLUSHED GRAVEL IF ALLOWABLE	SLURRY OR FLUSHED GRAVEL IF ALLOWABLE	SLURRY OR FLUSHED GRAVEL IF ALLOWABLE
TIE BARS	3'0" MAXIMUM SPACING	NOT REQ'D IF CONC. BASE HAS ROUGH EDGE OR IS IN POOR CONDITION	NOT REQUIRED
PAVEMENT REPLACEMENT	MATCH EXISTING PAVEMENT BUT NOT LESS THAN 7 INCHES. (7-BAG, AIR ENTRAINED) UNLESS OTHERWISE SPECIFIED	7" MINIMUM THICKNESS CLASS "A" CONCRETE (7-BAG, AIR ENTRAINED; *2 STONE) 1/2" ASPHALT BINDER, 1/2" ASPHALT TOP LAID PER WIS.D.O.T. SPECIFICATIONS	6" CRUSHED STONE BASE 3" BINDER 1/2" TOP LAID PER WIS.D.O.T. SPECS.
JOINT SEAL	ALL JOINTS (EXCEPT ON NEW ROADWAY CONSTRUCTION)	BUTT JOINT W/ 4" WIDE APPLICATOR (EXCEPT ON NEW ROADWAY CONSTRUCTION)	

CITY OF WEST ALLIS
PAVEMENT REPLACEMENT SPECIFICATIONS
 FIGURE V-113



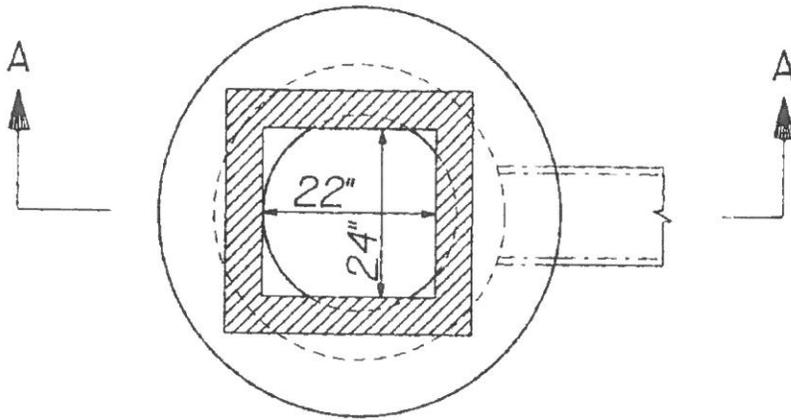
PLAN VIEW



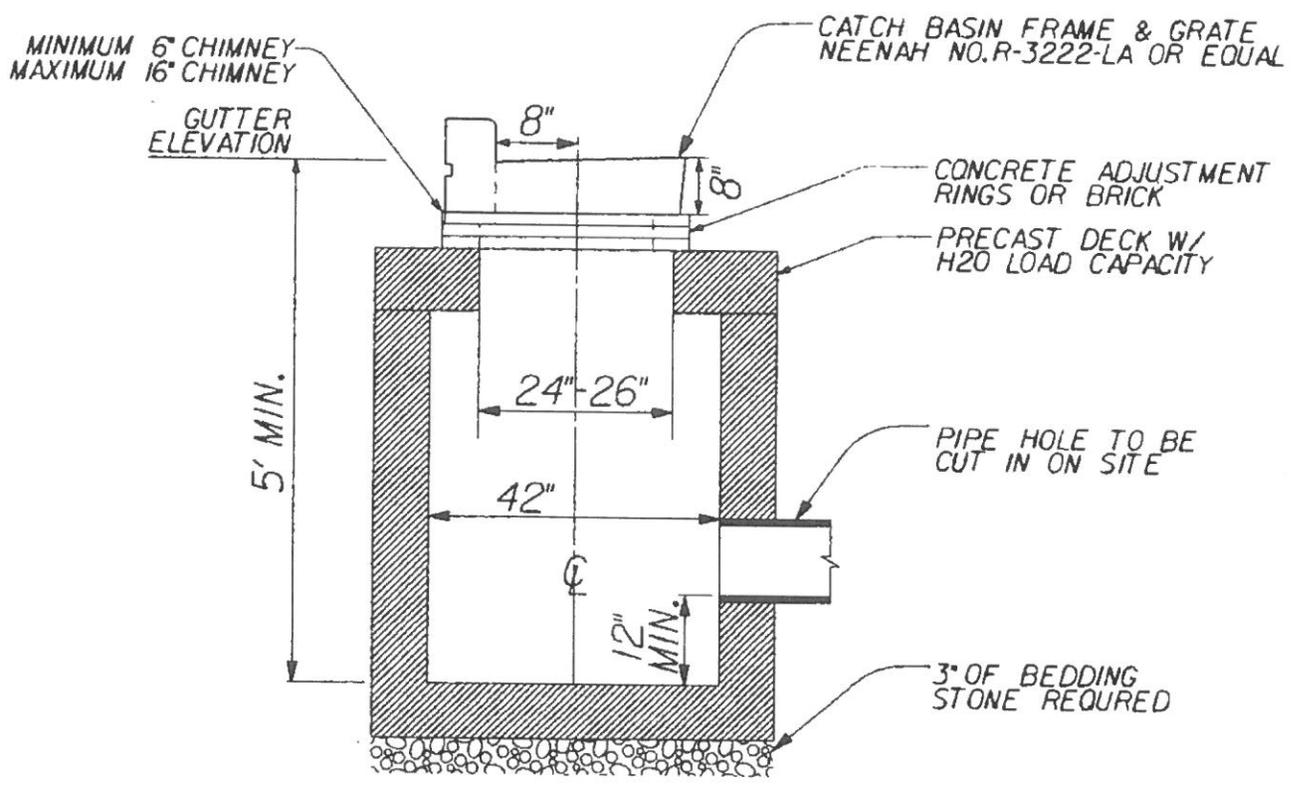
SECTION A-A

REVISED JAN.2016
CITY OF WEST ALLIS

ALLEY TYPE CATCH BASIN
FIGURE V-116



PLAN VIEW



SECTION A-A

REVISED JAN. 2016
 CITY OF WEST ALLIS
 ROAD TYPE
 CATCH BASIN
 FIGURE V-II7

Figure 7

SCHEDULE OF FIXED PRICES
SEWER AND WATER CONSTRUCTION

Install or Relay Building Storm Sewers			\$ 45.00/l.f.
Relay or Reconnecting Existing Building Sanitary Sewers.....			50.00/l.f.
Disconnect Water Service at Main (inc. backfill)			350.00/ea.
Water Service Alteration.....			300.00/ea.
Excavation & Locating Water Curb Box or			
Water Main Valve (inc. backfill).....			200.00/ea.
Water Curb Stop Relocation (inc. backfill).....			350.00/ea.
Inserting Pipe with Wye Branch in Existing Sanitary Sewer			300.00/ea.
Rock or Buried Concrete Excavation and Disposal.....			150.00/c.y.
Removal of Existing Concrete Envelope or Cradle			
(not shown on plans).....			150.00/c.y.
Misc. Lateral Excavation & Backfill.....			200.00/ea.
#2 Crushed Stone (for unstable trench bottom, in place)			
(1 cu. yd. shall be considered to weigh 2,500 lbs.)			
(up to 10' f/l).....			10.00/ton
(over 10').....			15.00/ton
Concrete Envelopes, Cradles and Caps:			
Envelopes:	4" min. thickness	6" dia. pipe.....	4.60/l.f.
	4" min. thickness	8" dia. pipe.....	5.65/l.f.
	4" min. thickness	10" dia. pipe.....	6.60/l.f.
	4" min. thickness	12" dia. pipe.....	8.30/l.f.
	4" min. thickness	15" dia. pipe.....	10.10/l.f.
Cradles & Caps:	4" min. thickness	6" dia. pipe.....	2.30/l.f.
	4" min. thickness	8" dia. pipe.....	2.80/l.f.
	4" min. thickness	10" dia. pipe.....	3.35/l.f.
	4" min. thickness	12" dia. pipe.....	4.15/l.f.
	4" min. thickness	15" dia. pipe.....	5.10/l.f.
Sheathing and Bracing Left in place			1,000.00/1000 BM
Gravel Backfill Credit.....			5.00/c.y.
Lawn Replacement:	Type A – Sodding		10.00/s.y.
	Type B - Field Sod		8.00/s.y.
	Type C - Seed & Mulch		6.00/s.y.
Concrete Sawing (up to 50').....			4.00/l.f.
Concrete Sawing (over 50').....			3.00/add.l.f.
Pavement Removal.....			10.00/s.y.
Walk and Drive Removal.....			1.00/s.f.
Curb Removal (up to 40').....			8.00/l.f.
Curb Removal (over 40').....			5.50/add.l.f.
Pavement Replacement:	Type A.....		45.00/s.y.
	Type B.....		40.00/s.y.
	Type C.....		30.00/s.y.
	Type D.....		100.00/ton
	Type E.....		20.00/ton
	Temporary Resurface (premix)		60.00/ton
	Sidewalk (5" concrete)		5.00/s.f.
	Sidewalk (7" concrete)		6.00/s.f.
	Concrete Curb & Gutter		35.00/l.f.
Tree Clearing.....			10.00/in. dia.
Tree Grubbing.....			10.00/in. dia.
Calcium Chloride (spread)			30.00/80 lb.
Pavement Tie Bars			8.00/ea.
Silt Fence.....			5.00/l.f.
Hay Bales			10.00/bale
Inlet Protection Barriers			50.00/unit
Slurry Backfill vs. Gravel.....			35.00/c.y.
Manhole Steps (in place).....			50.00/each
Internal Manhole Frame Seal Removal or Installation.....			150.00/unit

**EROSION CONTROL REQUIREMENTS
FOR ALL CONTRACTS**

**CITY OF WEST ALLIS
ENGINEERING DEPARTMENT**

FORWARD

The intent of these requirements is to define erosion control practices that will reduce the amount of sediment and other pollutants leaving construction sites during land disturbing or developing activities.

APPLICABILITY

Erosion Control Methods shall be in place before any activities causing potential erosion begin.

STANDARDS AND CRITERIA FOR EROSION AND POLLUTANT CONTROL MEASURES

A. **GENERAL STANDARDS**

All erosion control measures required to comply with these specifications shall meet the designated criteria, standards, and specifications as identified by the City of West Allis Engineering Department.

B. **MAINTENANCE OF CONTROL MEASURES**

All settling basins and other control measures necessary to meet the requirements of these specifications shall be maintained by the contractor in a satisfactory manner to ensure adequate performance and to prevent nuisance conditions.

C. **SITE DEWATERING**

Water pumped from the site shall be treated by temporary settling basins, grit chambers, sand filters, upslope chambers, hydro cycloner, swirl concentrators, or other appropriate best management practices designed and used to remove suspended particles for the highest dewatering rate. If the water is demonstrated to have no particles, then no control is needed before discharge, except as determined by the City of West Allis Engineering Department. Water may not be discharged in a manner that causes erosion of the site or receiving channels. Dewatering practices shall follow WI DNR Code Number 1061.

D. WASTE AND MATERIAL DISPOSAL

All waste and unused building materials (including garbage, debris, cleaning wastes, wastewater, toxic material or hazardous materials) shall be properly disposed of and not allowed to be carried by runoff into a receiving channel or sewer system.

E. STONE TRACKING PAD AND TIRE WASHING

A stone tracking pad or tire washing station shall be used at all points of construction egress where construction traffic is likely to transport sediment offsite. These practices shall follow WI DNR Code Number 1057.

F. DRAIN INLET PROTECTION

All storm drain inlets shall be protected with straw bales, filter fabric or equivalent barrier meeting the standards of WI DNR Code Number 1060.

G. ADVANCED CONSTRUCTION SITE EROSION CONTROL

In the event of involved erosion control, such as relocation of waterways, retention basins, settling basins, severe runoff, etc. The City of West Allis Engineering Department shall design the erosion control measure to be used and incorporate these in the contract documents.

1. All disturbed ground left inactive for fourteen (14) or more calendar days shall be stabilized by seeding or sodding, mulching or covering or other equivalent control measures as approved by the Engineer.
2. Any soil or dirt storage piles containing more than 10 cubic yards of material should not be located with a downslope length of less than 25 feet to a roadway or drainage channel. If remaining for more than seven (7) calendar days, they shall be stabilized by mulching, vegetative cover, tarps or other means as approved by the Engineer. Erosion from piles which will be in existence for less than seven (7) calendar days shall be controlled by placing straw bales or filter fence barriers around the pile. In street utility repair or construction or soil storage piles located closer than 25 feet to a roadway or drainage channel must be covered with tarps or other approved methods if exposed for more than seven (7) calendar days and the storm inlets must be protected with straw bales or other appropriate filtering barriers.

SCOPE OF WORK AND SPECIFIC INSTRUCTIONS

A. The contractor shall properly barricade all erosion control measures and will be held responsible for all damages or claims arising from the use of the erosion control methods employed on the City of West Allis Public Works Projects.

B. The contractor will be required to:

Install all control measures as identified on the construction plans or as directed by the Engineer.

1. Maintain all road drainage systems, storm and sanitary systems, control measures and other facilities as identified on the construction plans or as directed by the Engineer.
2. Repair any situation or erosion damage done to adjoining surfaces and drainage ways resulting from land disturbing or development activities.
3. Inspect the construction control measures after each rain of 0.5 inches or more or at least once each week and make needed repairs.

ENFORCEMENT

In the event the contractor does not comply with any of the erosion control methods described in these specifications, the Engineer or his representative may halt the work on the project until corrective measures are taken.

SILT FENCE

All Silt Fence on site shall comply with WI DNR Code Number 1056.

SEDIMENT BALE BARRIER

All Sediment Bale Barriers shall comply with WI DNR Code Number 1055.

STORM DRAIN INLET PROTECTION FOR CONSTRUCTION SITES

All Storm Drain Inlet Protection for Construction Site shall comply with WI DNR Code Number 1060.

DEWATERING

All Dewatering shall comply with WI DNR Code Number 1061.

STONE TRACKING PAD AND TIRE WASHING

All Stone Tracking Pad and Tire Washing practices shall comply with WI DNR Code Number 1057.

Silt Fence

(1056)

Wisconsin Department of Natural Resources
Conservation Practice Standard

I. Definition

Silt fence is a temporary sediment barrier of entrenched permeable geotextile fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff from small areas of disturbed soil.

II. Purpose

The purpose of this practice is to reduce slope length of the disturbed area and to intercept and retain transported sediment from disturbed areas.

III. Conditions Where Practice Applies

- A. This standard applies to the following applications:
1. Erosion occurs in the form of *sheet and rill erosion*¹. There is no concentration of water flowing to the barrier (*channel erosion*).
 2. Where adjacent areas need protection from sediment-laden runoff.
 3. Where effectiveness is required for one year or less.
 4. Where conditions allow for silt fence to be properly entrenched and staked as outlined in the Criteria Section V.
- B. Under no circumstance shall silt fence be used in the following applications:
1. Below the ordinary high watermark or placed perpendicular to flow in streams, swales, ditches or any place where flow is concentrated.
 2. Where the maximum gradient upslope of the fence is greater than 50% (2:1).

IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state, and local laws, rules, regulations, or permit requirements governing the use and placement of silt fence. This standard does not contain the text of federal, state, or local laws.

V. Criteria

This section establishes the minimum standards for design, installation and performance requirements.

A. Placement

1. When installed as a stand-alone practice on a slope, silt fence shall be placed on the contour. The parallel spacing shall not exceed the maximum slope lengths for the appropriate slope as specified in Table 1.

Slope	Fence Spacing
< 2%	100 feet
2 to 5%	75 feet
5 to 10%	50 feet
10 to 33%	25 feet
> 33%	20 feet

2. Silt fences shall not be placed perpendicular to the contour.
 3. The ends of the fence shall be extended upslope to prevent water from flowing around the ends of the fence.
- B. **Height** – Installed silt fences shall be a minimum 14 inches high and shall not exceed 28 inches in height measured from the installed ground elevation.

Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local WDNR office or the Standards Oversight Council office in Madison, WI at (608) 833-1833.

¹ Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

C. **Support** – Silt fences shall be supported by either steel or wood supports as specified below:

1. Wood supports
 - a. The full height of the silt fence shall be supported by 1 1/8 inches by 1 1/8 inches air or kiln dried posts of hickory or oak.
 - b. The silt fence fabric shall be stapled, using at least 0.5-inch staples, to the upslope side of the posts in at least 3 places.
 - c. The posts shall be a minimum of 3 feet long for 24-inch silt fence and a minimum of 4 feet for 36-inch silt fence fabric.

2. Steel supports

- a. The full height of the silt fence shall be supported by steel posts at least 5 feet long with a strength of 1.33 pounds per foot and have projections for the attachment of fasteners.
 - b. The silt fence fabric shall be attached in at least three places on the upslope side with 50 pound plastic tie straps or wire fasteners. To prevent damage to the fabric from fastener, the protruding ends shall be pointed away from the fabric.
3. The maximum spacing of posts for non-woven silt fence shall be 3 feet and for woven fabric 8 feet.
 4. Silt fence shall have a support cord.
 5. Where joints are necessary, each end of the fabric shall be securely fastened to a post. The posts shall then be wrapped around each other to produce a stable, secure joint or shall be overlapped the distance between two posts.
 6. A minimum of 20 inches of the post shall extend into the ground after installation.

D. **Anchoring** – Silt fence shall be anchored by spreading at least 8 inches of the fabric in a 4 inch wide by 6 inch deep trench, or 6 inch deep V-trench on the upslope side of the fence. The trench shall be backfilled and compacted. Trenches shall not be excavated wider and deeper than necessary for proper installation.

On the terminal ends of silt fence the fabric shall be wrapped around the post such that the staples are not visible.

E. **Geotextile Fabric Specifications** – The geotextile fabric consists of either woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride. Non-woven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof. All fabric shall meet the following requirements as specified in Table 2.

Test Requirement	Method	Value ¹
Minimum grab tensile strength in the machine direction	ASTM D 4632	120 lbs. (550 N)
Minimum grab tensile strength in the cross machine direction	ASTM D 4632	100 lbs. (450 N)
Maximum apparent opening size equivalent standard sieve	ASTM D 4751	No. 30 (600 µm)
Minimum permittivity	ASTM D 4491	0.05 sec ⁻¹
Minimum ultraviolet stability percent of strength retained after 500 hours of exposure	ASTM D 4355	70%

(WisDOT Standard Specifications for Road and Bridge Construction, 2001)

¹ All numerical values represent minimum / maximum average roll values. (For example, the average minimum test results on any roll in a lot should meet or exceed the minimum specified values.)

Silt fence shall have a maximum flow rate of 10-gallons/minute/square foot at 50mm constant head as determined by multiplying permittivity in 1/second as determined by ASTM D-4491 by a conversion factor of 74.

F. **Removal** – Silt fences shall be removed once the disturbed area is permanently stabilized and no longer susceptible to erosion.

VI. Considerations

- A. Improper placement as well as improper installation and maintenance of silt fences will significantly decrease the effectiveness of this practice.

Silt fences should be considered for trapping sediment where sheet and rill erosion may be expected to occur in small drainage areas. Silt fences should not be placed in areas of concentrated flow.
- B. Silt fences should be installed prior to disturbing the upslope area.
- C. Silt fences should not be used to define the boundaries of the entire project. Silt fence should be placed only in areas where it is applicable due to its cost and the fact that it is not biodegradable. For example, silt fence should not be placed in locations where the natural overland flow is from an undisturbed area into disturbed areas of the project. It should also not be used as a diversion.
- D. Silt fence should not be used in areas where the silt fence is at a higher elevation than the disturbed area.
- E. When placing silt fence near trees, care should be taken to minimize damage to the root system. Avoid compaction and root cutting within 1.5 feet multiplied by the inch diameter of the tree (for example: for 10-inch trees keep out a 15-foot radius from the trunk). Refer to UWEX publication Preserving Trees During Construction for more information.
- F. To protect silt fence from damage in areas of active construction or heavy traffic, silt fence should be flagged, marked, or highlighted to improve visibility.
- G. Silt fence effectiveness is generally increased when used in conjunction with other upslope erosion control practices. To further strengthen the silt fence, straw / hay bales can be placed on the down slope side.
- H. To help ensure effectiveness, silt fence should be inspected and repaired as necessary prior to forecasted rain events.

- I. Where installation with wood posts is difficult, such as when hard or frozen ground is encountered, the use of steel post is recommended.
- J. Silt fence can be mechanically installed with a plow type device provided that the silt fence is trenched in a manner such that equivalent performance is achieved to that specified in Section V.D.

VII. Plans and Specifications

- A. Plans and specifications for installing silt fence shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The plans and specifications shall address the following:
 - 1. Location of silt fence
 - 2. Contributory drainage area
 - 3. Schedules
 - 4. Material specification conforming to standard
 - 5. Standard drawings and installation details
 - 6. Restoration after removal
- B. All plans, standard detail drawings, or specifications shall include schedule for installation, inspection, and maintenance. The responsible party shall be identified.

VIII. Operation and Maintenance

- A. Silt fences shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.
- B. Damaged or decomposed fences, undercutting, or flow channels around the end of barriers shall be repaired or corrected.
- C. Sediment shall be properly disposed of once the deposits reach ½ the height of the fence.

IX. References

X. Definitions

Channel Erosion (III.A.1): The deepening and widening of a channel due to soil loss caused by flowing water. As rills become larger and flows begin to concentrate, soil detachment occurs primarily as a result of shear.

Sheet and Rill Erosion (III.A.1): Sheet and rill erosion is the removal of soil by the action of rainfall and shallow overland runoff. It is the first stage in water erosion. As flow becomes more concentrated rills occur. As soil detachment continues or flow increases, rills will become wider and deeper forming gullies.

Sediment Bale Barrier (Non-Channel) (1055)

Wisconsin Department of Natural Resources
Conservation Practice Standard

I. Definition

A temporary sediment barrier consisting of a row of entrenched and anchored straw bales, hay bales or equivalent material used to intercept sediment-laden sheet flow from small drainage areas of disturbed soil.

II. Purpose

The purpose of this practice is to reduce slope length of the disturbed area and to intercept and retain transported sediment from disturbed areas.

III. Conditions Where Practice Applies

- A. This standard applies to the following applications where:
1. Erosion occurs in the form of *sheet and rill erosion*¹. There is no concentration of water flowing to the barrier (*channel erosion*).
 2. Where adjacent areas need protection from sediment-laden runoff.
 3. Effectiveness is required for less than 3 months.
 4. Conditions allow for the bales to be properly entrenched and staked as outlined in the Criteria Section V.
- B. Under no circumstance shall sediment bale barriers be used in the following applications:
1. Below the ordinary high watermark or placed perpendicular to flow in streams, swales, ditches or any place where flow is concentrated.

2. Where the maximum gradient upslope of the sediment bale barriers is greater than 50% (2:1).

IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state, and local laws, rules, regulations, or permit requirements governing the use and placement of the sediment bale barrier. This standard does not contain the text of federal, state, or local laws.

V. Criteria

This section establishes the minimum standards for design, installation and performance requirements.

A. Placement

1. At a minimum, sediment bale barriers shall be placed in a single row, lengthwise on the contour, with the ends of adjacent sediment bale barriers tightly abutting one another. The holes between bales shall be chinked (filled by wedging) with straw, hay or equivalent material to prevent water from escaping between the bales.
2. The maximum allowable slope lengths contributing runoff to a sediment bale barrier are specified in Table 1.

Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local NRCS office or the Standards Oversight Council office in Madison, WI at (608) 833-1833.

¹ Words in the standard that are shown in italics are described in IX. Definitions. The words are italicized the first time they are used in the text.

Slope	Barrier Row Spacing
< 2%	100 feet
2 to 5%	75 feet
5 to 10%	50 feet
10 to 33%	25 feet
33 to 50%	20 feet
> 50%	Not Permitted

3. Sediment bale barriers shall not be placed perpendicular to the contour.
 4. The end of the sediment bale barrier shall be extended upslope to prevent water from flowing around the barrier ends.
- B. Height** – Installed sediment bale barrier shall be a minimum of 10 inches high and shall not exceed a maximum height of 20 inches from ground level.
- C. Anchoring and Support**
1. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a sediment bale barrier and the length of the proposed barrier to a minimum depth of 4 inches. After bales are staked and chinked, the excavated soil shall be backfilled and compacted against the barrier. Backfill to ground level on the down slope side. On the upslope side of the sediment bale barrier backfill to 4 inches above ground level.
 2. At least two wood stakes, "T" or "U" steel posts, or ½ inch rebar driven through at equidistance along the centerline of the barrier shall securely anchor each bale. The minimum cross sectional area for wood stakes shall be 2.0 by 2.0 inches nominal. The first stake in each bale shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven a minimum 12-inches into the ground to securely anchor the sediment bale barriers.
 3. Bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales

in order to prevent deterioration of the bindings.

VI. Considerations

- A. Improper placement as well as improper installation and maintenance of sediment bale barriers will significantly decrease the effectiveness of this practice.
- B. Sediment bale barriers should not be used upslope of the disturbed area.
- C. A double row of sediment bale barriers may be installed in areas where additional protection is needed.
- D. For safety, place all anchoring flush with the sediment bale barrier or cap any exposed anchoring device.

VII. Plans and Specifications

- A. Plans and specifications for installing sediment bale barriers shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The plans and specifications shall address the following:
 1. Location of sediment bale barrier
 2. Contributory drainage area
 3. Schedules
 4. Standard drawings and installation details
 5. Restoration after removal
- B. All plans, standard detail drawings, or specifications shall include schedule for installation, inspection, and maintenance. The responsible party shall be identified.

VIII. Operation and Maintenance

- A. Sediment bale barriers shall, at a minimum, be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.
- B. Damaged or decomposed sediment bale barriers, any undercutting, or flow channels

around the end of the sediment bale barriers shall be repaired.

- C. Sediment shall be properly disposed of once the deposits reach 1/2 the height of the sediment bale barrier.
- D. Sediment bale barriers and anchoring devices shall be removed and properly disposed of when they have served their usefulness, but not before the upslope areas have been permanently stabilized.
- E. Any sediment deposits remaining in place after the sediment bale barrier is no longer required shall be dressed to conform to the existing grade, prepared and seeded.

IX. Definitions

Channel Erosion (III.A.1): The deepening and widening of a channel due to soil loss caused by flowing water. As rills become larger and flows begin to concentrate soil detachment occurs primarily as a result of shear. The transport capacity of the flow in a channel is based on the availability of sediment and is a monatomic function of velocity.

Sheet and Rill Erosion (III.A.1): Sheet and rill erosion is the removal of soil by the action of rainfall and shallow overland runoff. It is the first stage in water erosion. As flow becomes more concentrated rills occur. As soil detachment continues or flow increases, rills will become wider and deeper forming gullies.

Storm Drain Inlet Protection for Construction Sites (1060)

Wisconsin Department of Natural Resources
Conservation Practice Standard

I. Definition

A temporary device installed in or around a storm drain inlet, drop inlet, or curb inlet.

II. Purposes

This practice is intended to minimize sediment from entering storm drainage systems in areas where the contributing drainage area is temporarily disturbed.

III. Conditions Where Practice Applies

This practice applies where runoff from construction sites enters conveyance system structures, such as drain inlets, drop inlets, and curb inlets. Inlet protection devices are for drainage areas of one acre or less. Runoff from areas larger than one acre shall be routed through a properly designed sediment trapping or settling practice upstream of the inlet.

IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state and local laws, rules, regulations, or permit requirements governing the use and placement of storm drain inlet protection. This standard does not contain the text of federal, state, or local laws.

V. Design Criteria

This section establishes the minimum standards for design, installation, and performance requirements.

The appropriate type of inlet protection shall be installed prior to drain, drop, or curb inlet receiving runoff. The device shall remain in place and be maintained until the disturbed area is stabilized.

A. General Criteria Applicable to All Inlet Protection Devices

1. Ponding water to settle sediment is encouraged; however ponding shall not interfere with the flow of traffic, create a safety hazard, or cause property damage. All devices shall have provisions such as overflow holes or "emergency spillways" to

safely pass water if the device becomes clogged.

2. The contributing drainage area to the inlet protection device shall be one acre or less. In instances where a larger contributing drainage area exists, runoff shall be routed through a properly designed sediment trapping or settling practice upstream of the inlet.
3. No gaps shall be left in the material that would allow the flow of water to bypass the inlet protection device, except for overflow holes.
4. All fabrics used as part of Type A, B, C, D, D-M and D-HR inlet protection devices must meet WisDOT specifications for the specified fabric. Type FF geotextile fabric, as specified in the Wisconsin Department of Transportation (WisDOT) Erosion Control Product Acceptability List (PAL), shall be used for Type A, B, C or D inlet protection. Types R, DF, and HR fabrics, as specified in the WisDOT Standard Specifications for Highway and Structure Construction, shall be used for Types D-M and D-HR inlet protection, however Types D-M and D-HR are not allowed on WisDOT projects.
5. Type D-M inlet protection fabric shall be Type FF for both the upper section and the outer lower sections of the device. The replaceable interior filter fabric type shall be based according to the particle size trapped. Refer to Table 1 for the filter fabric type and exposed soil particle diameter where the device is appropriate.
6. Type D-HR inlet protection fabric shall be Type FF for the upper half of the device. Type HR fabric shall be used in the lower half of the device. Refer to Table 1 for filter fabric type and exposed soil texture and particle diameter where the device is appropriate.

Exposed Soil Texture	Exposed Soil Particle Diameter (average) (mm)	Filtering Fabric Type*	Recommended Inlet Protection Device Type
Coarse (Sand)	≥ 0.0625	FF	D, D-M
Medium (Silt Loam)	0.0624 – 0.005	DF	D-M
Fine (Clay)	≤ 0.004	R	D-M
		HR	D-HR

* DF, R or HR filters may be used where FF is the required minimum standard. R or HR filters may be used where DF is the required minimum standard.

B. Criteria Applicable to Inlet Protection Devices for Unpaved Areas or the Pre-Paving Phase of Construction

1. Inlet protection (all device types) - See Figures 1-3.
 - a. Type A devices shall be utilized around inlets in unpaved areas and should be maintained until permanent stabilization has been established. Type A devices shall be utilized on inlets prior to installation of curb and gutter or pavement and where safety considerations are not compromised on the site.
 - b. Type B and C devices shall be utilized after the casting and grate are in place and may only be utilized when sufficient depth is not available to use Type D, D-M, or D-HR devices.
 - c. Inlet protection Type D-M and D-HR devices shall only be used after castings are in place on top of the inlet boxes.

Type D, D-M, and D-HR devices shall conform to the standard drawings as shown in the figures. To prevent the filter bag from blocking overflow water, there shall be three inches of clearance between the bag and the sides of the inlet. Type D, D-M and D-HR devices when used in inlets less than 30 inches in depth shall have the filter bag cinched to provide the required clearance for overflow.

2. Other inlet protection devices include, but are not limited to: straw bales, rock bags and stone weepers. These devices can be used to settle sediment or divert flow. Note: These devices are not applicable to areas adjacent to traffic and are not approved for inlet protection use on WisDOT projects.

C. Criteria Applicable to Inlet Protection Devices for the Post-Paving / Curbing Phase of Construction

1. Inlet protection Types B, C, D, D-M, and D-HR are applicable to post-paving construction. See Figures 1-3.
 - a. Type B devices shall be utilized on inlets without a curb box when Type D inlet devices cannot be used.
 - b. Type C devices shall be utilized on street inlets with curb heads. A 2-inch by 4-inch (nominal) piece of wood shall be wrapped and secured in the fabric and placed in front of the curb head, as shown in the figures. The wood shall not block the entire opening of the curb box and shall be secured to the grate with wire or plastic ties. Use Type C devices when Type D devices cannot be used.
 - c. Utilize Type D, D-M, and D-HR devices when the depth from the top of the grate to the bottom of the inlet is 30 inches or greater. Note: Type D style devices can be modified by cinching the filter bag to fit inlet structures that are less than 30 inches in depth. Utilize Type D, D-M, and D-HR devices where street flooding or ponding water and the associated traffic safety issues are a concern, or where more effective inlet filtering is needed.
2. Other inlet protection devices are applicable to post paving construction; these devices include but are not limited to: rock bags, manufactured bags, and stone weepers. These devices can be used to either settle sediment or divert flow. Note: Other than for internal to the inlet type filters, these devices are not applicable to areas adjacent to traffic.

- a. Manufactured rock bags shall conform to the WisDOT specification for rock bag material, including fill material.
- b. Straw bale installation shall conform to the criteria outlined in the WDNR Conservation Practice Standard (1062) Ditch Check.
- c. Stone weeper installation shall conform to the criteria in WDNR Conservation Practice Standard (1063) Sediment Trap.

VI. Considerations

- A. Inlet protection is only one element in an erosion control plan. Other practices, including temporary stabilization and area clean up, should also be utilized upstream of the inlet.
- B. Inlets should be temporarily closed or sealed to prevent entrance of runoff and sediment when site conditions allow.
- C. The disturbed area should be stabilized as quickly as possible. Timely stabilization is the most effective method to control sediment entering the storm sewer.
- D. Storm drain inlet protection consists of several different types of inlet filters and sediment traps. Inlet protection is only one element in an erosion control plan. Each type differs in application with selection dependent upon site conditions and inlet type. Not all designs are appropriate in all cases. The user must carefully select a design suitable for the needs and site conditions.
- E. Inlet protection is only as effective as the filter or device used around the inlet. Effectiveness decreases rapidly if the inlet protection is not properly maintained. In general, inlet protection provides relatively good removal of coarse and medium-sized soil particles from runoff; however, to effectively trap fine soil particles, other practices such as the use of polyacramides, may be required. (See DNR technical standard 1050.)
- F. Inlet protection requires routine inspection and maintenance. Field inspections have shown where inlet protection causes excessive ponding that the device is removed, punctured, or bypassed. In such situations, a structure with an

adequate overflow mechanism should be utilized instead of simply removing the inlet protection device.

- G. The effectiveness of inlet protection devices in unpaved areas can be enhanced by additional excavation to increase the storage capacity around the inlet.
- H. Good construction site housekeeping measures, such as maintaining clean gutters and street sweeping, are important.
- I. The use of fabric intended for a finer soil type on a construction site with coarser soil may increase the required maintenance frequency due to faster clogging.
- J. Consider using Type D-M and D-HR inlet protection rather than Type B, C, or D in areas with fine soils where more effective filtering is desired.
- K. Inlet protection devices listed in the WisDOT PAL are accepted for use in accordance with this standard.

VII. Plans and Specifications

Plans and specifications for installing inlet protection shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose:

- A. Locations and types of inlet protection.
- B. Material specification conforming to this standard.
- C. All construction documents shall identify the responsible party and include a schedule for installation, inspection, and maintenance requirements.

VIII. Operation and Maintenance

- A. Remove inlet protection devices once the contributing drainage area is stabilized with appropriate vegetation or impervious surface.
- B. Inlet protection shall be at a minimum inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

C. For Type A, B or C inlet protection:

1. Remove sediment deposits when sediment has accumulated between $\frac{1}{3}$ to $\frac{1}{2}$ of the design depth or the device is no longer functioning as designed.
2. Inspect the device routinely, and repair (if necessary) and restore to original dimension.
3. Sediment removed from the device shall be deposited in a suitable area and stabilized.

D. For Type D and D-M inlet protection;

1. Remove sediment when it accumulates to within 6 inches of the bottom of the overflow holes.
2. If standing water remains within 6 inches of the bottom of the overflow holes 24 hours after a runoff event, accumulated sediment shall be removed and the filtering capacity of the fabric shall be restored.
3. Holes in the Type FF fabric less than 2 inches in length may be repaired by stitching. The bag must be replaced if holes greater than 2 inches are observed in the Type FF fabric.
4. The insert filter fabric shall be replaced if any holes are observed in the fabric.
5. The filter must be replaced if the flap pockets sustain damage that compromises the integrity of the filter or the ability to perform maintenance.

E. For Type D-HR inlet protection:

1. Remove sediment when it has accumulated to within 6 inches of the bottom of the overflow holes.
2. If standing water remains within 6 inches of the bottom of the overflow holes 24 hours after a runoff event, accumulated sediment shall be removed and the filtering capacity of the fabric shall be restored.

3. Holes in the Type FF fabric less than 2 inches in length may be repaired by stitching.
4. The filter shall be replaced if any holes are observed in the Type HR fabric or holes greater than 2 inches are observed in the Type FF fabric.
5. The filter must be replaced if the flap pockets sustain damage that compromises the integrity of the filter or the ability to perform maintenance.

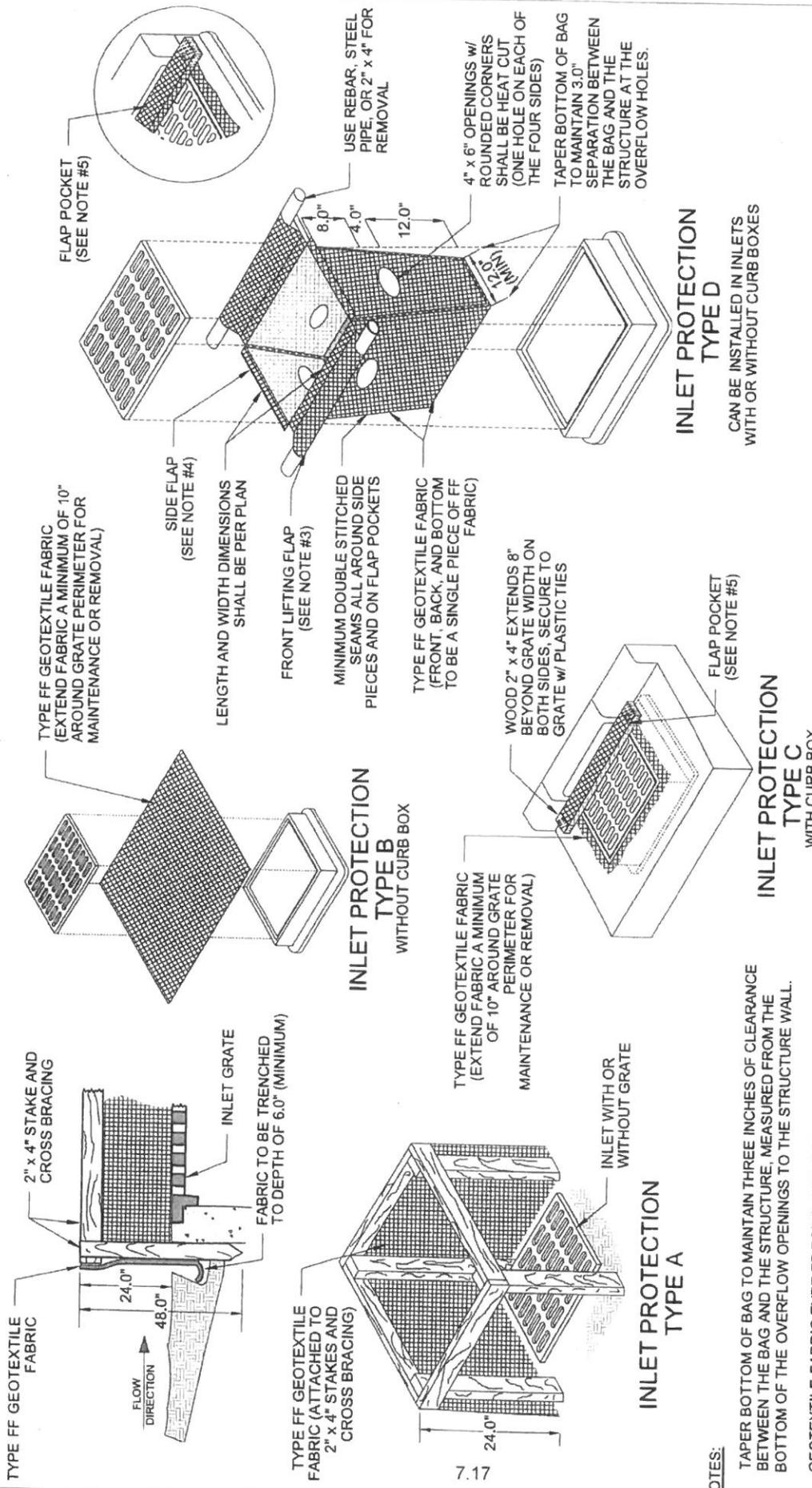
- F. Due care shall be taken to minimize sediment falling into the inlet. Any material falling into the inlet shall be removed.

IX. References

WisDOT "Erosion Control Product Acceptability List" is available online at <http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrcs/tools/pal/default.aspx>.

WisDOT "Standard Specifications for Highway and Structures Construction" is available at: <http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrcs/rdwy/stnds-spec.aspx>.

FIGURE 1. INLET PROTECTION TYPES A, B, C AND D

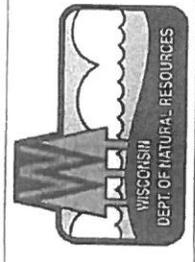


NOTES:

1. TAPER BOTTOM OF BAG TO MAINTAIN THREE INCHES OF CLEARANCE BETWEEN THE BAG AND THE STRUCTURE, MEASURED FROM THE BOTTOM OF THE OVERFLOW OPENINGS TO THE STRUCTURE WALL.
2. GEOTEXTILE FABRIC TYPE FF FOR FLAPS, TOP AND BOTTOM OF OUTSIDE OF FILTER BAG. FRONT, BACK, AND BOTTOM OF FILTER BAG BEING ONE PIECE.
3. FRONT LIFTING FLAP IS TO BE USED WHEN REMOVING AND MAINTAINING FILTER BAG.
4. SIDE FLAPS SHALL BE A MAXIMUM OF TWO INCHES LONG. FOLD THE FABRIC OVER AND REINFORCE WITH MULTIPLE STITCHES.
5. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" x 4". THE REBAR, STEEL PIPE, OR WOOD SHALL BE INSTALLED IN THE REAR FLAP AND SHALL NOT BLOCK THE TOP HALF OF THE CURB FACE OPENING.

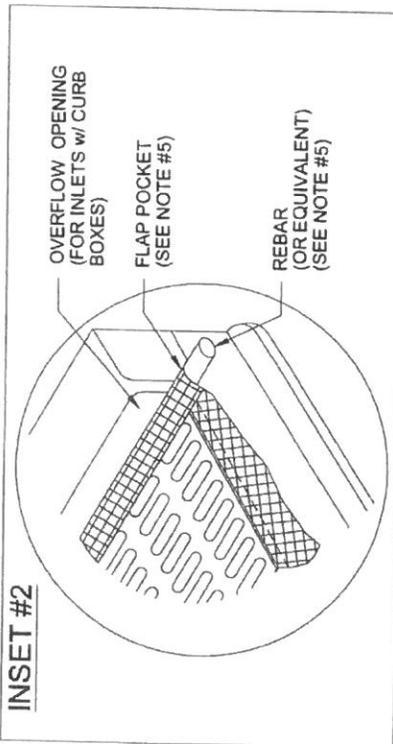
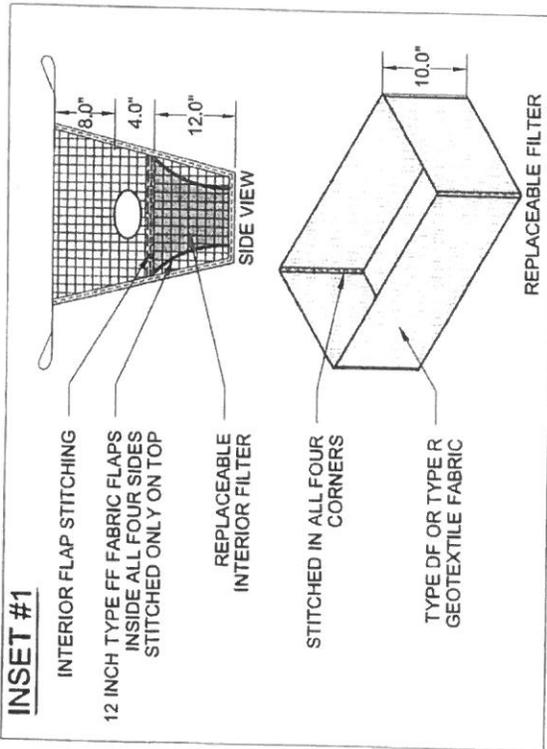
MAINTENANCE NOTES:

1. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED IN THE FABRIC DOES NOT FALL INTO THE STRUCTURE. MATERIAL THAT HAS FALLEN INTO THE INLET SHALL BE IMMEDIATELY REMOVED.



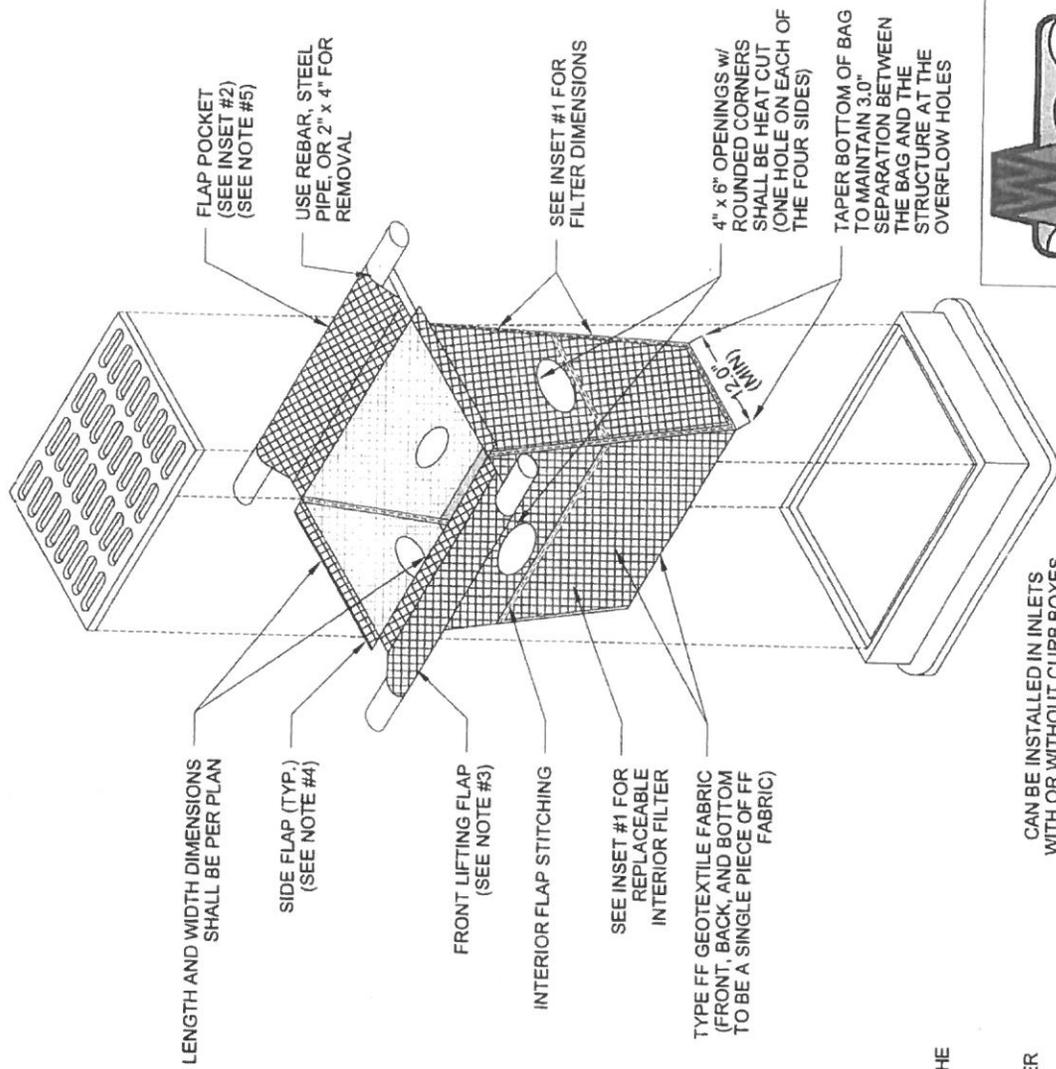
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TECHNICAL STANDARD NO.
08/2014
REVISION DATE
NOT TO SCALE

FIGURE 2. INLET PROTECTION TYPE D-M



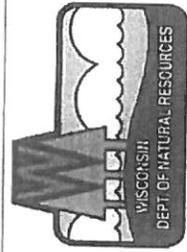
NOTES:

1. TAPER BOTTOM OF BAG TO MAINTAIN THREE INCHES OF CLEARANCE BETWEEN THE BAG AND THE STRUCTURE, MEASURED FROM THE BOTTOM OF THE OVERFLOW OPENINGS TO THE STRUCTURE WALL.
2. GEOTEXTILE FABRIC TYPE FF FOR FLAPS, TOP AND BOTTOM OF OUTSIDE OF FILTER BAG, FRONT, BACK, AND BOTTOM OF FILTER BAG BEING ONE PIECE.
3. FRONT LIFTING FLAP IS TO BE USED WHEN REMOVING AND MAINTAINING FILTER BAG.
4. SIDE FLAPS SHALL BE A MAXIMUM OF TWO INCHES LONG. FOLD THE FABRIC OVER AND REINFORCE WITH MULTIPLE STITCHES.
5. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" x 4". THE REBAR, STEEL PIPE, OR WOOD SHALL BE INSTALLED IN THE REAR FLAP AND SHALL NOT BLOCK THE TOP HALF OF THE CURB FACE OPENING.



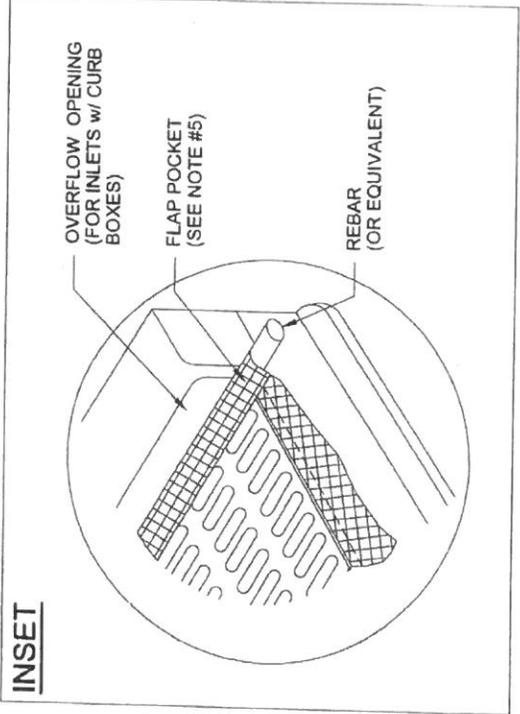
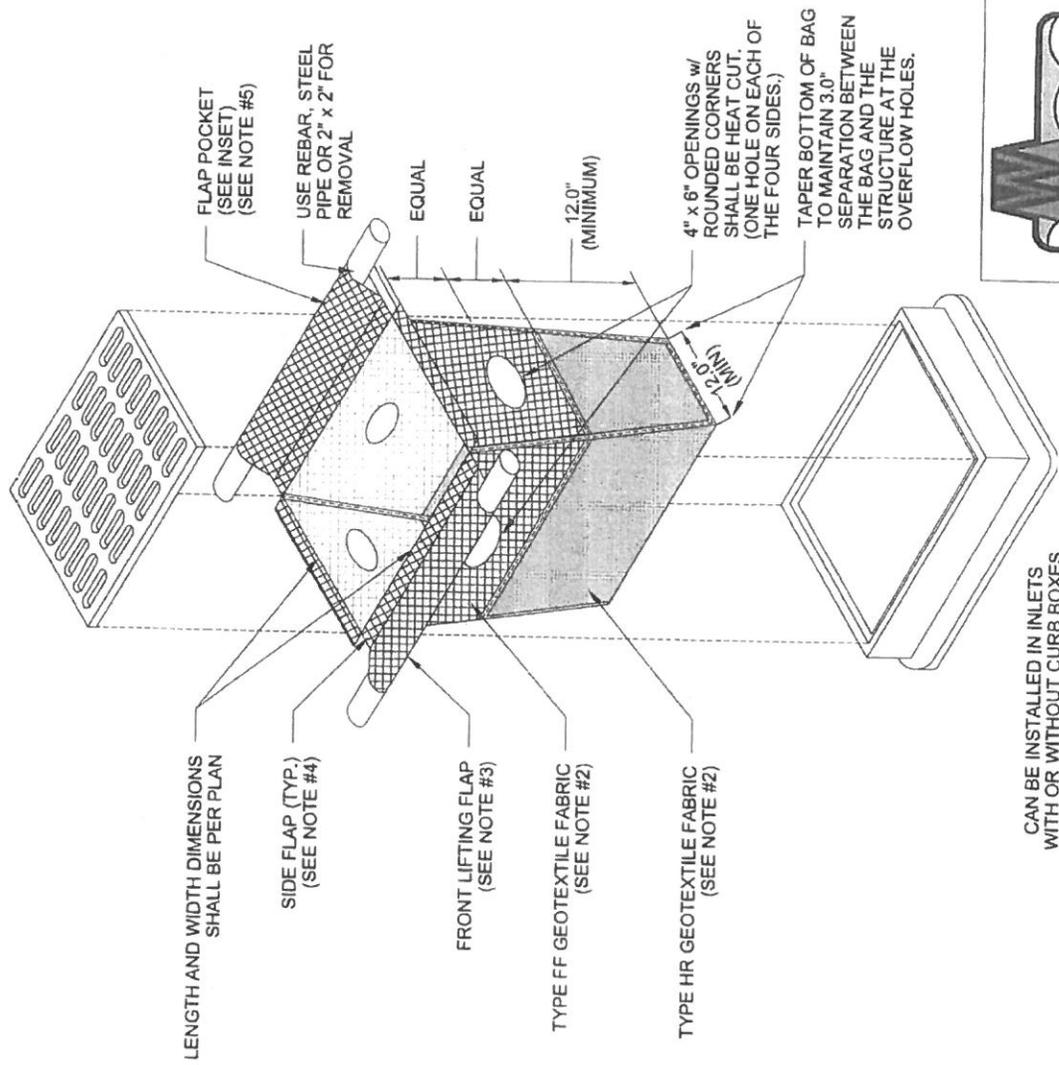
MAINTENANCE NOTES:

1. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED IN THE FABRIC DOES NOT FALL INTO THE STRUCTURE. MATERIAL THAT HAS FALLEN INTO THE INLET SHALL BE IMMEDIATELY REMOVED.



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FIGURE 3. INLET PROTECTION TYPE D-HR

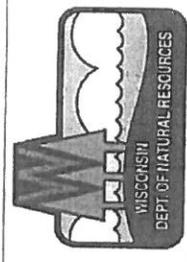


NOTES:

1. TAPER BOTTOM OF BAG TO MAINTAIN THREE INCHES OF CLEARANCE BETWEEN THE BAG AND THE STRUCTURE, MEASURED FROM THE BOTTOM OF THE OVERFLOW OPENINGS TO THE STRUCTURE WALL.
2. GEOTEXTILE FABRIC, TYPE FF FOR FLAPS AND TOP HALF OF FILTER BAG. GEOTEXTILE FABRIC, TYPE HR FOR BOTTOM HALF OF FILTER BAG WITH FRONT, BACK, AND BOTTOM BEING ONE PIECE.
3. FRONT LIFTING FLAP IS TO BE USED WHEN REMOVING AND MAINTAINING FILTER BAG.
4. SIDE FLAPS SHALL BE A MAXIMUM OF TWO INCHES LONG. FOLD THE FABRIC OVER AND REINFORCE WITH MULTIPLE STITCHES.
5. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" x 2". THE REBAR, STEEL PIPE, OR WOOD SHALL BE INSTALLED IN THE REAR FLAP AND SHALL NOT BLOCK THE TOP HALF OF THE CURB FACE OPENING.

MAINTENANCE NOTES:

1. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED IN THE FABRIC DOES NOT FALL INTO THE STRUCTURE. MATERIAL THAT HAS FALLEN INTO THE INLET SHALL BE IMMEDIATELY REMOVED.



TECHNICAL STANDARD NO.	1060
REVISION DATE	08/2014
NOT TO SCALE	

DEWATERING

Code No.
(1061)

Wisconsin Department of Natural Resources
Conservation Practice Standard

I. Definition

A compartmented container, settling basin, filter, or other appropriate best management practice through which sediment-laden water is conveyed to trap and retain the sediment.

II. Purposes

The purpose of this standard is to determine appropriate methods and means to remove sediment from water generated during dewatering activities prior to discharging off-site or to waters of the state. Practices identified in this standard shall be deemed to meet the de-watering performance standard to prevent the discharge of sediment to the maximum extent practicable (MEP) as defined in NR 151.11(6)(c).

III. Conditions where Practice Applies

This practice applies where sediment laden water needs to be removed for construction or maintenance activities. Dewatering practices shall be in keeping with the effective operating and applicability criteria listed on Figure 2, Dewatering Practice Selection Matrix.

This practice does not apply to:

- Water being discharged directly to groundwater or *karst features*¹. Refer to NR140.
- Well dewatering systems. Refer to NR 812.

IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state, and local laws, rules, regulations, or permit requirements governing the use and placement of this practice. This may include activities performed under NR 216 and Chapter 30 permits, for water bodies with *targeted performance standards* per NR 151.004, 303d waterbodies or others. This standard does not contain the text of federal, state, or local laws.

V. Criteria

This section establishes the minimum allowable limits for design parameters, installation and performance requirements.

Dewatering practices shall be selected based on the predominant soil texture encountered at the dewatering site with consideration given to pumping or flow rates, volumes and device effectiveness. Refer to Figure 1 USDA Soil textural triangle to assist with soil classifications at the site. Figure 2, Dewatering Practice Selection Matrix illustrates acceptable dewatering options and their effective ranges. Practices selected that are not on the matrix must provide an equivalent level of control, with justification provided to the reviewing authority.

A. Site Assessment - A site assessment shall be conducted and documented to determine the physical site characteristics that will affect the placement, design, construction and maintenance of dewatering activities. The site assessment shall identify characteristics such as ground slopes, soil types, soil conditions, bedrock, sinkholes, drainage patterns, runoff constituents, proximity to regulated structures, natural resources, and specific land uses. The site assessment shall include the following:

- Sanitary and storm sewer locations
- Potential contamination - Odor or discoloration other than sediment, or an oily sheen on the surface of the sediment laden water. If contamination is present, notify DNR Spills Reporting
- Soil textural class for areas where dewatering will occur. Soil investigation shall extend below grading and trenching activities
- Depth to the seasonally highest water table.
- Discharge outfall locations
- Distance and conveyance method to receiving waters

Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local WDNR office or the Standards Oversight Council office in Madison, WI.

¹ Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

B. General Criteria applicable to all dewatering activities

1. Contact the WDNR when the discharge from a dewatering practice will enter a WDNR listed *Exceptional Resource Water (ERW)*, *Outstanding Resource Water (ORW)*, or a wetland in an area of special natural resource interest as identified in NR 103.
2. Contact the owner or operator of the municipal separate stormwater system if the discharge is to a municipal storm water conveyance system. The allowable discharge rate shall be limited by the capacity of the system or requirements of the system owner.
3. When practical, dewatering effluent shall be collected in a pump truck for transport to a *treatment facility* or discharged directly to a treatment facility.
4. For surface dewatering, utilize a floating suction hose, or other method, to minimize sediment being sucked off the bottom.
5. For discharges that will be directed to locations on-site verify that the anticipated volume of water can be fully contained.
6. The topography and condition of the ground cover between the pump discharge point and potential receiving waters shall be evaluated for potential erosion. Appropriate stabilization measures shall be incorporated to prevent erosion.
7. When discharge to a karst feature or other direct groundwater connection can not be avoided, the dewatering system must be designed and operated to maintain compliance with the groundwater quality standards contained in applicable regulations, including ch. NR 140 Wis. Adm. Code.
8. If the discharge directly or indirectly enters a stream, the discharge flow rate shall not exceed 50 percent of the peak flow rate of the 2-year 24-hour storm event.

C. Geotextile Bags

1. Geotextile bags shall meet the criteria listed in Table 1.

Table 1: Properties for Geotextile Bags

Property	Test Method	Type I Value	Type II Value
Maximum Apparent Opening Sizes	ASTM D-4751	0.212 mm	0.212 mm
Grab Tensile Strength	ASTM D-4632	200 lbs.	300 lbs.
Mullen Burst	ASTM D-3786	350 psi	580 psi
Permeability	ASTM D-4491	0.28 cm/sec	0.2 cm/sec
Fabric	Nominal Representative Weight	8 oz	12 oz

2. Geotextile bags shall be sized according to the particle size being trapped, expected flow or pumping rate (gallons per minute) per square foot of fabric and a 50% clogging factor. The footprint of the bag shall be no smaller than 100 square feet.
3. Geotextile bags shall be securely attached to the discharge pipe.
4. Polymers can be used to enhance the efficiency of geotextile bags. If polymer is used, the polymer shall be approved by the WDNR and meet the criteria stipulated in WDNR Conservation Practice Standard 1051, Sediment Control Water Application of Polymers. The polymer supplier or applicator shall provide certifications showing that products have met the performance requirements of Standard 1051. If the manufacturer has not completed the required testing, the project may be used to gain that certification provided it meets the site requirements of Standard 1051. Any such testing will be monitored by DNR or WisDOT, with testing done by a qualified third party.

D. Gravity Based Settling Systems

Gravity based systems rely on settling of particles as the primary means of treatment. To effectively accomplish this, quiescent conditions should exist with sufficient detention time. Practices include portable sediment tanks, sediment traps, sediment basins and wet detention basins.

If polymer is used to enhance settling, the polymer shall be approved by the WDNR and meet the criteria stipulated in WDNR Conservation Practice Standard 1051, Sediment Control Water Application of Polymers. The polymer supplier or applicator shall provide certifications showing that products have met the performance requirements of Standard 1051. If the manufacturer has not completed the required testing, the project may be used to gain that certification provided it meets the site requirements of Standard 1051. Any such testing will be monitored by DNR or WisDOT, with testing done by a qualified third party.

1. Portable Sediment Tank: These tanks are intended to settle only sands, loamy sands, and sandy loams. If polymer is added, these tanks will also be appropriate for settling loams, silt loams and silts. Portable sediment tanks shall have a minimum of two baffled compartments, and be a minimum of three feet deep. The inlet and outlet pipe shall be a minimum diameter of three inches. Use one of the following methods to size a tank:
 - a. Settling: Account for settling of the suspended sediments with the following equation:

$$S_a = 1.83 * Q;$$
 where
 - S_a = Tank surface area (sq ft)
 - Q = Pumping rate (gallons per minute)

Note: 1.83 is a factor that includes the conversion from gpm to cfs (1 gpm = 0.0022 cfs) and the particle settling velocity for Soil Class I (0.0012 ft/sec) from WDNR Conservation Practice Standard 1064 Sediment Basin.
 - b. Filtration: Build the first chamber as large as possible to aid in settling. Flow capacity shall be determined by the end area of the filter media (fabric) and the flow rate (gallons per minute) per square foot of the finest filter media and a 50% clogging factor.
2. Sediment Trap or Sediment Basin: This device is a temporary sediment control device. The design, installation, and operation of the sediment trap or basin shall

meet the requirements stipulated in WDNR Conservation Practice Standard 1063 Sediment Trap or Standard 1064 Sediment Basin

3. Wet Detention Basin: This device is generally a permanent structure designed to address post-construction pollutant reduction requirements. The design, installation, and operation of the wet detention basin shall meet the requirements stipulated in WDNR Conservation Practice Standard 1001 Wet Detention Basin.

E. Passive Filtration Systems

Passive filtration systems rely on filtration as the primary method of removing particles. Sediment removal efficiency will be related to the particle size distribution in the stormwater. Practices include manufactured filters, filter tanks, filter basins, vegetative filters, grass swales, and filtration fabric.

Filter fabric sediment removal efficiency shall be based on the properties specified in Table 1.

1. Manufactured Filters: Filters shall be sequenced from the largest to the smallest pore opening. Sand media filters are available with automatic backwashing features that can filter to 50 μ m particle size. Screen or bag filters can filter down to 5 μ m. Fiber wound filters can remove particles down to 0.5 μ m.
2. Filter Tank (portable): Install, operate and maintain according to manufacturer recommendations.
3. Filter Basin: Install, operate and maintain according to Wisconsin Department of Transportation technical guidance.
4. Vegetative Filter: Refer to WDNR Conservation Practice Standard 1054 Vegetated Buffer for Construction Sites.

F. Pressurize Filtration Systems

Pressurized filtration systems differ from passive systems in that the water flowing through the media is pressurized and the filter media is designed to handle higher flow rates. Practices include portable sand filters, wound cartridge units, membranes and micro-filtration units.

Pressurized filters typically have automatic backwash systems that are triggered by a pre-set pressure drop across the filter. If the backwash water volume is small or substantially more turbid than the stormwater stored in the holding pond or tank, returning backwash water to the pond or tank may be appropriate. However, land application or another means of treatment and disposal may be necessary.

Screen, bag, and fiber filters must be cleaned and/or replaced when they become clogged.

1. Portable Sand Filter: Install, operate and maintain according to manufacturer recommendations.
2. Wound Cartridge Units: Secondary filtration of sediments using high efficiency filter cartridges may be necessary to remove fine particles such as clays. Install, operate and maintain according to manufacturer recommendations.
3. Membranes and Micro-filtration: Install, operate and maintain according to manufacturer recommendations.
4. If polymer is used to enhance settling, the polymer shall be approved by the WDNR and meet the criteria stipulated in WDNR Conservation Practice Standard 1051, Sediment Control Water Application of Polymers. The polymer supplier or applicator shall provide certifications showing that products have met the performance requirements of Standard 1051. If the manufacturer has not completed the required testing, the project may be used to gain that certification provided it meets the site requirements of Standard 1051. Any such testing will be monitored by DNR or WisDOT, with testing done by a qualified third party.

VI. Considerations

- A. It may be necessary to clean the municipal storm drainage system prior to and after discharging to the system to prevent scouring solids from the drainage system.
- B. Geotextile bags are generally not appropriate when discharging to ORW, ERW, waterbodies supporting cold water communities, trout

streams, or to *highly susceptible* and *less susceptible wetlands*.

- C. Pressurized filtration systems are the most efficient for removing fine sediments.
- D. Portable sediment tanks may be appropriate when other sediment trapping practices cannot be installed due to lack of space or other reasons.
- E. Filtration is not an efficient treatment of water with heavy sediment loads. Use a settling tank or sand filter as pretreatment when possible.
- F. It may be necessary to use a combination of dewatering practices to achieve the intended results.

VII. Plans and Specifications

All plans, standard detail drawings, or specifications shall include the schedule for installation, inspection, and maintenance and shall be kept on-site with the erosion control plan.

VIII. Operation and Maintenance

- A. Sediment shall be removed from devices to maintain effectiveness. All sediment collected in dewatering devices shall be properly disposed of to prevent discharge to waters of the state.
- B. The following monitoring shall be conducted. Test results shall be recorded on a daily log kept on site:
 1. Discharge duration and specified pumping rate
 2. Observed water table at time of dewatering.
 3. If used, type and amount of chemical used for pH adjustment
 4. If used, type and amount of polymer used for treatment
 5. Maintenance activities

IX. References

The American Association of State Highway Officials (AASHTO) Soil Classification System

X. Definitions

Exceptional Resource Waters (ERW) (V.B.1): are waters listed in s. NR 102.11.

Highly susceptible wetland (VI.B): include the following types: fens, sedge meadows, bogs, low prairies, conifer swamps, shrub swamps, other forested wetlands, fresh wet meadows, shallow marshes, deep marshes and seasonally flooded basins.

Karst feature (III): are an area or geologic feature subject to bedrock dissolution so that it is likely to provide a conduit to groundwater, and may include caves, enlarged fractures, mine features, exposed bedrock surfaces, sinkholes, springs, seeps or swallets.

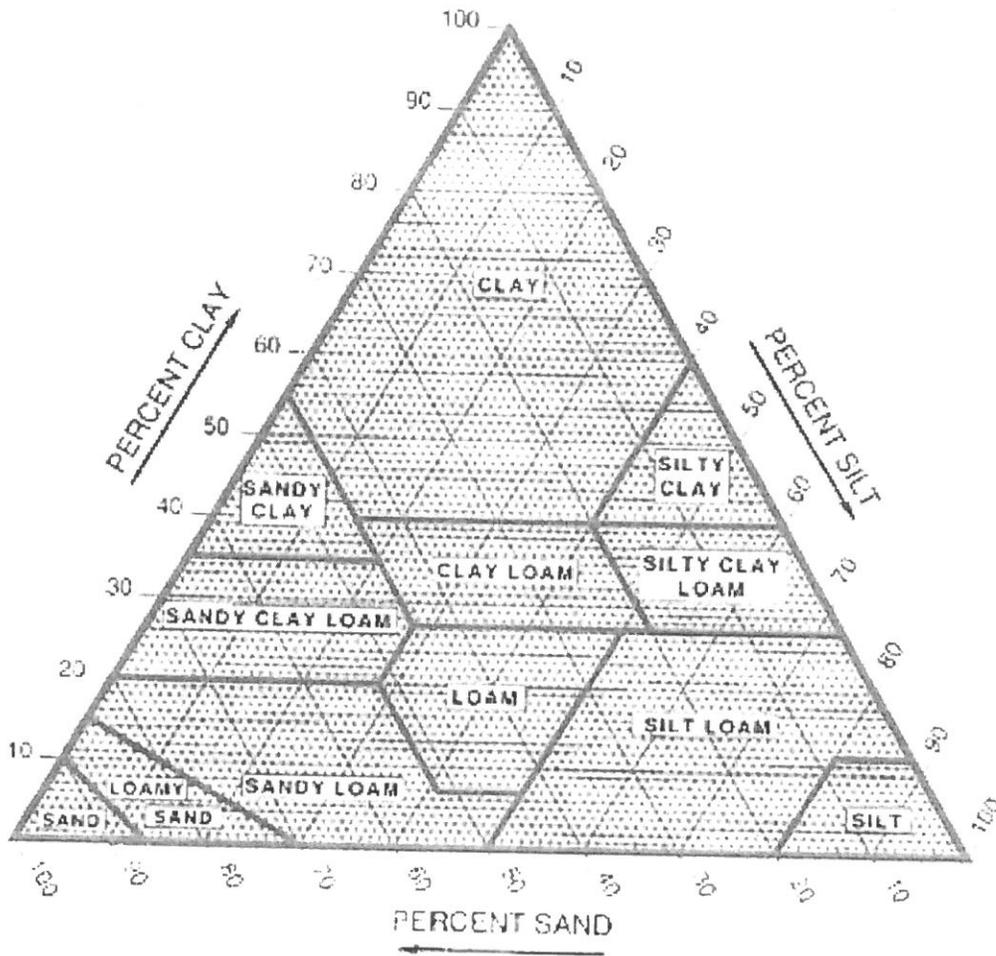
Less susceptible wetland (VI.B): include degraded wetlands dominated by invasive species such as reed canary grass.

Outstanding Resource Waters (ORW) (V.B.1): are waters listed in s. NR 102.10

Targeted performance standard (IV): means a performance standard that will apply in a specific area, where additional practices beyond those contained in NR 151 are necessary to meet water quality standards.

Treatment facility (V.B.3): includes wastewater treatment plants or wet detention basins constructed in accordance with WDNR Conservation Practice Standard 1001 Wet Detention Basin or other approved land application sites.

Figure 1: USDA Soil Textural Triangle

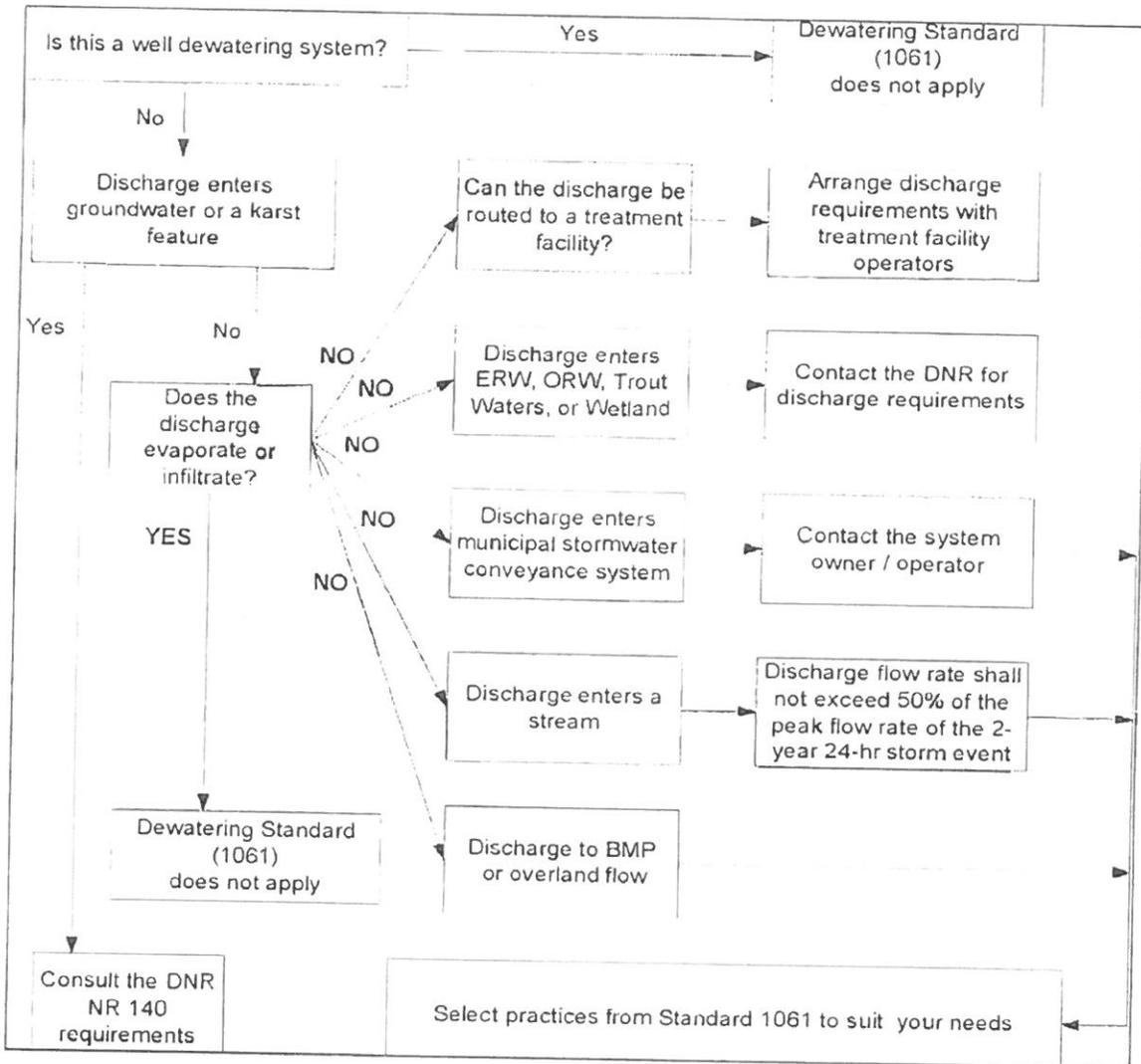


Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local WDNR office or the Standards Oversight Council office in Madison, WI.

WDNR, WI
4/07

¹ Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

**Figure 3: Factors Influencing
The Selection of Dewatering Practices**



If the dewatering effluent is discolored, has an odor, an oily sheen,
or other toxins are present notify the DNR immediately
24 Hours Spills Reporting Hotline 1-800-943-0003

Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local WDNR office or the Standards Oversight Council office in Madison, WI.

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Stone Tracking Pad and Tire Washing (1057)

Wisconsin Department of Natural Resources
Conservation Practice Standard

I. Definition

A stabilized pad of stone aggregate or tire washing station located at any point where traffic will egress a construction site.

II. Purpose

The purpose of this standard is to reduce off-site sedimentation by eliminating the tracking of sediment from construction sites.

III. Conditions Where Practice Applies

Either a stone tracking pad or tire washing station shall be used at all points of construction egress. This standard applies where construction traffic is likely to transport sediment off site.

IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state, and local laws, rules, regulations, or permit requirements governing the use and placement of this practice. This standard does not contain the text of federal, state, or local laws.

V. Criteria

This section establishes the minimum standards for design, installation and performance requirements.

A. Tracking Pad:

1. The tracking pad shall be installed prior to any traffic leaving the site
2. The aggregate for tracking pads shall be 3 to 6 inch clear or washed stone. All material to be retained on a 3-inch sieve.

3. The aggregate shall be placed in a layer at least 12 inches thick. On sites with a high water table, or where saturated conditions are expected during the life of the practice, stone tracking pads shall be underlain with a WisDOT Type R geotextile fabric to prevent migration of underlying soil into the stone.
4. The tracking pad shall be the full width of the egress point. The tracking pad shall be at a minimum 50 feet long.
5. Surface water must be prevented from passing through the tracking pad. Flows shall be diverted away from tracking pads or conveyed under and around them by using a variety of practices, such as culverts, *water bars*¹, or other similar practices.

B. Tire washing: If conditions on the site are such that the sediment is not removed from vehicle tires by the tracking pad, then tires shall be washed utilizing pressurized water before entering a public road.

1. The washing station shall be located on-site in an area that is stabilized and drains into suitable sediment trapping or settling device.
2. The wash rack shall consist of a heavy grating over a lowered area. The rack shall be strong enough to support the vehicles that will cross it.

C. Rocks lodged between the tires of dual wheel vehicles shall be removed prior to leaving the construction site.

Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local WDNR office or the Standards Oversight Council office in Madison, WI at (608) 833-1833

¹ Words in the standard that are shown in italics are described in IX. Definitions. The words are italicized the first time they are used in the text.

VI. Considerations

- A. Vehicles traveling across the tracking pad should maintain a slow constant speed.
- B. The best approach to preventing off-site tracking is to restrict vehicles to stabilized areas.
- C. It is always preferable to prevent sediment from being deposited upon the road than cleaning the road later. Sediment on a road can create a safety hazard as well as a pollution problem.
- D. Any sediment tracked onto a public or private road should be removed by street cleaning, not flushing, before the end of each working day.

VII. Plans and Specifications

- A. Plans and specifications for installing tracking pads shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The plans and specifications shall address the following:
 - 1. Location of all points of egress with tracking pad locations shown
 - 2. Material specifications conforming to standard
 - 3. Schedule for installation and removal
 - 4. Standard drawings and installation details
 - 5. Stabilization after removal
- B. All plans, standard detail drawings, or specifications shall include schedule for installation, inspection, and maintenance. The responsible party shall be identified.

VIII. Operation and Maintenance

- A. Tracking pads and tire washing stations shall, at a minimum, be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

- B. The tracking pad performance shall be maintained by scraping or top-dressing with additional aggregate.
- C. A minimum 12-inch thick pad shall be maintained.

IX. Definitions

Water bar (V.A.5): A shallow trench or diversion dam that diverts surface water runoff into a dispersion area.