VILLAGE OF MCFARLAND *NOTICE OF PUBLIC MEETING*

PUBLIC WORKS COMMITTEE

Tuesday, February 9, 2016 **6:00 P.M.** **McFarland Municipal Center**
Conference Room "A"

AGENDA

1. Call to Order.
2. Public Comments.
3. Review and possible approval of draft Minutes of the Public Works Committee meeting of January 12, 2016.
4. Update and possible recommendation regarding Broadhead/MN Road project.
5. Update and possible recommendation regarding Holscher Road construction project.
6. Detail of railroad crossings.
7. Discussion and possible recommendation to Village Board on what role this Committee would like to play in the Village of McFarland Master Plan Update.
8. Review, discussion and possible recommendation to the Village Board regarding the adoption of standard construction specifications for street and utility projects.
9. Review, discussion and possible recommendation regarding proposal for convenience store/gas station at 4814 Freedom Ring Drive, Madison.
10. Staff update.
11. Set next meeting date and possible agenda items.
12. Adjournment.

NOTES:
1) Persons needing special accommodations should call 838-7287 at least 24 hours prior to the meeting.
2) A quorum of The Village Board may attend this meeting for the purpose of gathering information relevant to their responsibilities as Village trustees. No matter shall be considered nor shall any action be taken by said Village Board members at this meeting.
3) More specific information about agenda items may be obtained by calling 838-7287.

This agenda was posted, or caused to be posted, by my hand on the 5th day of February, 2016 at the following three (3) posting places in the Village of McFarland, to wit: McFarland Municipal Center, 5915 Milwaukee Street; E.D. Locke Public Library, 5920 Milwaukee Street; and McFarland State Bank, 5990 Hwy. 51.

Tracey Berman, Clerk/Deputy Treasurer

Linda Dieckhoff

From:	Brian Berquist <brian@tcengineers.net>
Sent:	Friday, February 05, 2016 11:08 AM
To:	Linda Dieckhoff
Cc:	Allan Coville
Subject:	RE: Public Works Meeting
Attachments:	Village Standard Specifications - February 2015.pdf
Follow Up Flag:	Follow up
Flag Status:	Flagged

Linda-

Thanks for sending this over. Attached please find the current Village specifications. These are unchanged from last year's version, but can certainly be modified as desired.

See you on Tuesday,

Brian
Brian R. Berquist, P.E. – Vice President, Municipal Services
brian@tcengineers.net
Town & Country Engineering, Inc.
2912 Marketplace Drive, Suite 103
Madison, WI 53719
(608) 273-3350 Fax: (608) 273-3391

From: Linda Dieckhoff [mailto:linda.dieckhoff@mcfarland.wi.us]
Sent: Friday, February 05, 2016 8:13 AM
To: Brian Berquist <brian@tcengineers.net>
Subject: Public Works Meeting

Hi Brian,

Here is the attachment.

Attached is the agenda for the Public Works Meeting on Tuesday, February 9.

Do you have anything for the standard construction specifications?

Linda L. Dieckhoff
Public Works/Utilities Clerk
Village of McFarland
Telephone (608)838-7287
Fax (608)838-6823
linda.dieckhoff@mcfarland.wi.us

Total Control Panel Login

To: linda.dieckhoff@mcfarland.wi.us Remove this sender from my allow list
From: brian@tcengineers.net

STANDARD SPECIFICATIONS

Village of McFarland, Wisconsin

02221	Trench Excavation, Backfill & Compaction
02230	Road Subgrade Excavation, Backfill, Embankment and Compaction
02232	Crushed Aggregate Base Course
02270	Erosion Control
02486	Lawn Seeding
02511	Asphaltic Concrete Paving (Hot-Mix)
02514	Asphaltic Tack Coat
02516	Black Boiler Slag Seal Coating
02521	Concrete Sidewalks
02522	Concrete Curb & Gutter
02601	Manholes
02602	Internal Manhole Chimney Seals
02701	Water Main
02721	Storm Sewers
02722	Sanitary Sewers

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SECTION 02221
TRENCH EXCAVATION, BACKFILL, & COMPACTION

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section describes the conditions under which the Contractor shall perform trenching and excavation necessary to construct all parts of underground pipe system and appurtenances. This section also covers the refilling and compaction by the Contractor of all trenches and excavations, and the disposal of all surplus material and excavated material unsuitable for use in backfill operations.

1.2 Notification of Utility Companies

The Contractor shall notify all affected utility companies of his construction operations to coordinate his work regarding poles, wires, valve boxes, and other surface obstructions and to determine the location of gas, water main, power, light, telephone or telegraph conduit or service connections thereto or any other sub-surface structure that crosses or passes through the space occupied by any of the proposed improvements. The Contractor shall make arrangements with the utility companies for any relocation of interfering utilities.

PART 2 - MATERIALS & EQUIPMENT

2.1 Gravel Bedding

Gravel used for bedding shall be ¾-inch crushed aggregate imported from off the project site, meeting Wisconsin Department of Transportation for ¾-inch dense graded base course.

2.2 Granular Backfill

Material used for granular backfill shall be pit run coarse sand (free of organic debris, rubble or cinders) or gravel imported from off the project site.

PART 3 - CONSTRUCTION

3.1 Limits of Amount of Work Opened

In no case shall the Contractor open any trench more than 100 feet in advance of the pipe laying unless otherwise permitted by the Engineer. The backfilling shall be kept within 300 feet of the completed pipe laying. Not more than one (1) street crossing may be obstructed by the same trench at any one time.

3.2 Obstructions

Clearing and grubbing, removal of pavements, sidewalks, curbs, signs, poles, fences, trees, shrubs and other surface obstructions shall be done only as necessary for the completion of the work. Mailboxes, street signs, and traffic signs shall be stored and protected or temporarily relocated by the Contractor as specified elsewhere in these specifications and shall be replaced as directed by the Owners. The Contractor shall dispose of brush, trees, shrubs, rubble, and other items not intended to be reinstalled, such disposal being in a legal manner off the site of the work. Burning of any material is not permitted.

Monuments from land surveys which are shown on the plans or which are clearly visible in the field and which are in the path of the work shall be carefully protected from movement. If the Contractor feels that removal is necessary he shall notify the Engineer at least 48 hours in advance of such removal. If the Engineer concurs that removal is necessary, the municipality will assume the cost of resetting those monuments, unless a bid price is provided in the Bid Proposal or unless elsewhere in the specifications it is stated that removal and replacement of monuments is incidental to the bid price(s). Monuments that the Contractor moves due to failure to exercise reasonable precautions or proper construction techniques, or for which he has failed to notify the Engineer sufficiently in advance, shall be replaced at the Contractor's cost.

The project plans show the approximate location and size of sewers, drains, culverts, gas mains, water mains, electric, and telephone conduits and other underground structures or utilities, as such locations and sizes are available to the municipality, or as surface markings indicate their existence. The Contractor shall arrange with the utility companies for exact location of utilities and for necessary relocations or modifications of interfering utilities. The cost of arranging such relocations or modifications, and the cost of any "downtime" resulting from delays or changes to the Contractor's work schedule as a result of waiting for a private utility (gas, electric, telephone, cable TV) to make the relocation or modifications shall be incidental to the Contractor's bid. The Contractor shall use caution in excavating and trenching so that the exact location of underground structures, both known and unknown, may be determined; the Contractor shall be held responsible for the repair

of such structures when broken or otherwise damaged during construction. When the Owner permits the Contractor to make a change in the project to avoid utility relocation, the Engineer shall determine whether the change constitutes extra work as defined in the General Conditions. Such relocations shall not be cause for extension of contract time of completion.

During the construction of pipelines, it may be necessary to cross under other pipelines or pass around underground structures. Where necessary, the flow in such existing pipelines shall be diverted so that the excavation may be kept dry during the progress of construction work. The Contractor shall make every effort to prevent damage to such pipelines, conduits, or structures. Wherever such pipelines, conduits, or structures are disturbed or damaged, the Contractor shall restore them to their original conditions at no additional cost to the municipality. The Contractor shall use ¾-inch crushed aggregate, thoroughly compacted, six (6) inches under and around to six (6) inches above such pipelines and structures when it is necessary to excavate around or under them or to repair them. Such crushed aggregate bedding and backfill shall not merit extra payment as supplemental backfill. Unless otherwise authorized by the Engineer, when water services must be cut and that cut is within 10 feet of the water main, new copper shall be installed from the cut all the way to the main. The cost of the necessary copper tubing and fittings shall be incidental to the bid items. If a water service lateral is broken by a pulling action, that service shall be replaced all the way to the main and all the way to the curb stop.

All structures, sidewalks, driveways, curb and gutter, trees, shrubs, lawns, signs, fences, utilities, survey monuments, pavements, culverts, underground pipelines, or conduits, and other features which are adjacent to the work area or easement, shall be carefully protected by the Contractor against damage from construction activities. In the event that there is any question whether any features are located in the construction zone where it is necessary to disturb them in order to complete the project the Engineer's decision shall be binding upon the municipality and the Contractor. In the event of damage or inadvertent injury or removal of surface or subsurface features, the Contractor shall bear the full cost and responsibility for repair for his own failure to exercise reasonable precautions or to use proper construction techniques. The Contractor shall replace the item or repair such damage as early as possible. In determining contract completion time there will be no allowance for such repairs or replacements.

3.3 Trench Excavation

Excavation shall be made in such a manner that the pipe can be laid safely and accurately to the line and grade shown on the Plans. Topsoil shall be salvaged and used in restoring the surface of the trench, where applicable.

Excavation shall extend from the surface to the bottom of the pipe bedding, as defined below for different types of soils. Unnecessary excavation below the specified level shall be backfilled at the Contractor's expense with gravel as approved by the Engineer.

In firm clay soils the bottom of the trench must be dug to a depth of four (4) inches below the pipe barrel and three (3) inches below the bell to make room for the imported bedding material. Bell holes must be hand excavated to allow for proper jointing and to insure that the pipe rests evenly along the barrel and is not resting on the bell.

Where rock occurs at the bottom of the trench, the depth of excavation shall be a minimum of six (6) inches below the pipe barrel to provide space for the imported bedding material. Bedding material shall be evenly spread, compacted and shaped to conform to the pipe.

Trench widths for different soil conditions are illustrated on the plan detail sheet. Trench widths at the top of the pipe shall provide at least a six (6) inch clearance on either side of the barrel to allow for the free flow of bedding material between the pipe and the trench wall. Maximum trench width at the top of the pipe shall be the outside pipe diameter plus 24 inches. However, the trench width need not be less than 36 inches for any size of pipe. The trench width above a point 12 inches above the top of the pipe may be sloped, stepped, or vertical in order to comply with State and Federal regulations regarding trenching, bracing, and shoring. In unconsolidated materials (not rock), trench shields narrower than four feet inside dimension will not be required.

In rock the maximum trench width (and maximum payment width, whether or not a Contractor chooses to use a trench shield) shall be the outside of the pipe diameter plus 18 inches, as measured at the top of the pipe. However, even in rock the trench width need not be less than 36 inches for any size of pipe. In rock, the maximum trench width shall be assumed to have vertical sides. Where a new pipeline is installed in the same location where a pipeline already exists, rock excavation will <u>not</u> be paid for the existing pipeline and any open space above, below or around the existing pipeline. Rather, rock excavation will be paid only for actual rock material to the extent that the existing open area must be widened or deepened to meet the minimum clearances set forth herein or on the plan details.

Rock excavation shall be defined to include all hard, solid rock in ledges, bedded deposits, boulders greater than one (1) cubic yard in volume, and all naturally conglomerated deposits, such as silt stone, sandstone, shale, or conglomerate so firmly deposited or cemented as to possess all the characteristics of solid rock. Buried concrete structures shown on the Plans which must be removed in the course of the work shall be considered as rock. Material shall be classified as rock if

it is deemed by the Engineer to be so hard that it cannot be excavated with a 50,000 pound or larger track backhoe with a 30-inch bucket with rock teeth used by an experienced operator. Shale, hard pan, masonry and concrete rubble, and boulders less than one (1) cubic yard in volume that are not a part of or attached to substrata of rock shall not be considered rock excavation. The Engineer's judgment of what is classified as rock shall be binding upon the municipality and the Contractor.

Blasting will be permitted only after the Contractor secures the Engineer's approval. To secure such approval the Contractor must show evidence of insurance specifically for such work and must demonstrate that the blasting will be conducted in such a manner that adjacent existing structures or completed work, persons and property will be protected. The hours of blasting may be fixed by the Engineer. Any blasting shall be done in accordance with the provisions of the Wisconsin Administrative Code and any applicable local ordinances. The Contractor shall conduct and document pre-blast and post-blast surveys of any nearby buildings or structures as required by the scaled-distance equation specified in Chapter COMM 7 of the Wisconsin Administrative Code. These surveys shall consist of visually inspecting and recording all existing defects in the structures, both before and after the blasting operations, including use of photographs and video recording. All blasting shall be done under the direct supervision of a certified blaster. Any damage caused by the blasting shall be repaired or replaced at the Contractor's expense. Contractor shall hold Owner and Engineer harmless from legal costs of any lawsuits resulting from blasting.

Contractor shall segregate materials that are suitable for replacement in the trench from those which are not suitable. Contractor shall spread and attempt to dry materials that are unsuitable for replacement in the trench due solely to moisture content. All such segregation and drying efforts shall be at no additional cost.

All excavated material to be used for trench backfilling must be stored so that it will cause a minimum of inconvenience to public travel, adjacent owners, or tenants and other Contractors or Subcontractors. The excavated material that is not to be used for trench backfilling shall be removed immediately from the site of the work.

A temporary water-tight stopper or plug shall be installed on the upper end of each pipe being laid at the end of each day and at the end of each pipe being laid during the day if there is danger of soil or debris being washed into the pipe, or if runoff or rainfall could enter the pipe and cause back-up.

3.4 Sheathing and Bracing

Tight sheathing will be required where it is necessary to protect nearby structures and pavements or when the trench must be confined to allow for traffic flow. Sheathing must be driven unless soil conditions allow the sets to be placed after

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excavation. If the sheathing is placed after excavation the voids between the trench wall and the sheathing must be immediately filled with sand.

Removal of sheathing must not take place until the trench is backfilled. If flooding or jetting is used to achieve compaction it shall be done after the sheathing is removed. However, this removal of sheathing from the uncompacted trench shall be done in such a manner as to prevent disturbance to the completed pipelines and adjacent ground. The Engineer may order, in writing, leaving some or all of the sheathing in place. Sheathing ordered left in place shall have the upper portion within three (3) feet of the surface cut off and removed.

The right of the Engineer to order sheathing and bracing left in place shall not be construed as creating any obligation on his part to issue such orders. His failure to exercise his right to do so shall not relieve the Contractor of any liability for damages to persons or property occurring from or upon the work of constructing the pipeline or appurtenances occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place in the trench sufficient sheathing and bracing to prevent the caving or moving of the ground, or disturbance of the completed work or any of the surface or subsurface structures.

Spot braces, individual shorings spaced at various intervals along the trench and portable trench boxes or sliding shields will be considered incidental to the cost of pipe construction. When portable trench boxes or sliding shields are used the Contractor shall provide an acceptable method of rechecking line, grade and horizontal location of the pipe after the shield has been moved ahead. If the pipe has moved, it shall be reset to the proper line and grade. The width of the trench shield or box shall be such that a minimum six (6) inch horizontal clearance is maintained between the pipe and shield at all times. Any voids occurring between the trench box or shield and the undisturbed trench wall within the pipe zone (bottom of the trench to the top of the initial backfill zone) shall be filled with gravel immediately after the box or shield is positioned.

3.5 Wet Trench Conditions

The Contractor shall keep all excavations free of water or sewage during preparation of the trench for pipe laying and during pipe laying. The Contractor shall attempt to dispose of all ground water and surface drainage seeping into the trench by employing ordinary dewatering techniques, such as the use of sump pumps, dikes, etc. When the trench bottom is unstable because of ground water the Engineer may require extra excavation to remove the unstable material and replacement with fabric-wrapped Breaker Run as shown on the plan detail sheet. Bedding as required in Paragraph 3.6 of this section shall then be placed on the stone foundation before the pipe is laid.

Where, in the opinion of the Engineer, the trench cannot be kept dry by ordinary dewatering techniques a well point system shall be employed to effectively dewater the trench. If wells are approved for dewatering, the wells shall be constructed, maintained and abandoned in accordance with the requirements of the Department of Natural Resources. The Contractor shall be responsible for contacting the Department of Natural Resources Private Water Supply Section for a permit for all wells installed or operated for which the single or aggregate capacity may be in excess of 70 gallons per minute. The Private Water Supply Section's address is:

Wisconsin Department of Natural Resources
Private Water Supply Section
101 South Webster
P.O. Box 7921
Madison, WI 53707

Where operating or abandoned landfills, leaking underground storage tanks, or hazardous substance spills are known to be adjacent to the project site the Contractor shall contact the Department of Natural Resources district solid waste coordinator for assistance prior to installing the dewatering wells.

The Contractor shall also be responsible for obtaining the necessary discharge permit from the Department of Natural Resources for all dewatering systems and for maintaining the discharge quality in accordance with that permit.

Allowing the water to flow into the pipe system being constructed will not be permitted except in the case of a storm sewer.

3.6 Pipe Base and Bedding

Any time the Contractor encounters material such as muck, sawdust, bark, or other materials which would not form suitable and permanent base below the limits of normal excavation required to place the pipeline, the Contractor shall notify the Engineer to obtain approval to remove that material and replace it with an approved foundation material. Such replacements will merit extra payment unless specified elsewhere as being incidental. This foundation material shall be compacted as directed by the Engineer.

Trenches shall have as bedding 1-inch maximum size gravel from the bottom of the trench to a point one foot above the top of the pipe. Where wet trench conditions are encountered and sumping is used for dewatering, clear stone (maximum 1½-inch) may be used for pipe base and bedding up to the springline of the pipe. Then, however, bentonite or clay cut-offs two feet wide shall be used in lieu of the clear stone every 400 feet, maximum, and on each service lateral to prevent groundwater flow from following the pipe. All base, bedding and cut-offs shall be incidental to the

per foot lineal pipeline price and shall not merit extra payment. Required trench bedding is illustrated on the plan detail sheet.

3.7 Backfilling and Restoration

The Contractor shall backfill the trench to the existing surface, with allowance for pavement and base course, if applicable, as soon as possible after the installation of the pipe, unless otherwise approved or directed by the Engineer. Unless otherwise approved by the Engineer, partial payments for pipeline construction will be made only for the cost of materials, based upon submitted invoices and as provided in Specification Section 01600, until restoration is complete and approved by the Engineer.

The initial backfill material to a minimum depth of one (1) foot above the top of the pipe shall be placed by hand and shall be well compacted with hand tampers or by mechanical means to achieve a density equal to that of the undisturbed earth. Special care shall be taken in placing and tamping the initial backfill material so that the alignment and grade of the pipe will not be disturbed nor the pipe damaged. In all areas where settlement is not greatly important, the backfilling above the initial one-foot backfill zone may be done from the top of the trench by mechanical means. In no case shall the backfill material be dropped from such a height or in such volume that its impact upon the pipe will cause damage or misalignment. Large rocks, rubbish, wood and other undesirable material shall not be used for backfill material.

The material placed in the initial backfill zone from the pipe bedding to a depth of one (1) foot above the top of the pipe shall be imported ¾ inch crushed aggregate.

Under low temperature conditions the Contractor shall use only loose, thawed material in the initial backfill zone. No frozen material shall be placed in the trench within two (2) feet of the top of the pipe. No frozen material shall be placed around manholes or structures. No lumps of frozen material larger than six (6) inches in any dimension shall be placed anywhere in the trench.

Where the trench is in an existing street or in a location in which a street will be constructed, as shown on the Plans, the top 12 inches of backfill (that portion just beneath the final street pavement) shall be new ¾-inch crushed aggregate, provided incidentally to the contract cost, unless otherwise shown on the Plans or specified in the Special Conditions, the Measurement and Payment section of the specifications or the Bid Proposal.

Contractor shall move excess excavated materials that are suitable for replacement in the trench as backfill from one point of the project to other parts of the project where insufficient suitable backfill materials exist at no extra cost.

Supplemental backfill provided by the Contractor when the excavated material is unsuitable for use shall be placed only after the Engineer has approved its use in advance so the volume may be measured for payment, if extra payment is to be provided. If extra payment is to be provided, where a trench shield is used the maximum payment width shall be the inside shield width plus 24 inches, with a minimum payment width of 6 feet. (Shields wider than 4 feet inside dimension shall be used only where a combination of pipe diameter and minimum clearances around the pipe so necessitate, in the judgment of the Engineer.) Trench walls shall be assumed to be vertical. If a trench shield is not used, the maximum payment width 12 inches above the top of the pipe shall be no wider than the outside diameter of the pipe plus 24 inches, with the trench widths above that point being no wider than required to meet OSHA safety standards. In no case shall a quantity of supplemental backfill be paid for a trench where a shield is not used greater than if a shield was used.

3.8 Trench Compaction

Compaction shall be of the class indicated on the Plans or in the Special Conditions to these specifications. The classes of compaction are as follows:

Class I - Class I trench compaction shall consist of mechanically compacting the backfill in 12 inch or thinner layers from a distance of one (1) foot above the top of the pipe to the surface. The degree of compaction shall be 90 percent of Modified Proctor Density at depths greater than three (3) feet below the finished surface. Within three (3) feet of the finished surface, compaction shall be a minimum of 95 percent of Modified Proctor Density. The Contractor shall use smaller lifts if the required compaction cannot be obtained with 12 inch lifts. If the Owner desires to check the compaction he shall hire an independent testing laboratory at his own expense. If the tests show that the required compaction was not achieved, the Contractor shall re-compact the areas designated by the Engineer and shall bear the cost of retesting to prove that the required compaction was achieved.

Class II - Class II trench compaction shall consist of jetting and flooding the trench using at least a 1½ inch diameter hose to carry the water from available hydrants. A 1½ inch diameter steel pipe with a minimum length of four (4) feet shall be attached to the end of the hose. This pipe shall be inserted into the fully-backfilled trench. The pipe shall be inserted at intervals of no more than three (3) feet along the trench, the hose being left in place until that section of the trench is saturated. The hose shall be equipped with a throttling valve to allow the hydrant valve to remain fully open. Depression caused by settlement shall be backfilled. Water for jetting will

be provided by the Owner at the Contractor's cost, and the methods and times of removal shall be subject to the Owner's approval. Percent compaction requirements shall be as specified for Class I.

Class III Class III trench compaction shall consist of refilling the trench in lifts of no greater than three (3) feet, mechanical compaction, and mounding of soil over the trench to allow for settlement due to natural forces. This class of compaction shall be used only where compaction is not of great importance, and where water is not available for jetting and flooding or the backfill material is not conducive to compaction by jetting and flooding.

Where no class is otherwise specified on the plans or in other specification sections, Class I compaction shall be used.

3.9 Disposal of Excess or Undesirable Material

Surplus material shall include all that material which is more than the amount needed for backfilling or which is undesirable for backfilling. Surplus material shall be disposed of by the Contractor incidentally to the completion of the project. The Owner reserves the right to designate a disposal site within two (2) miles of the point of loading.

END OF SECTION

SECTION 02230
ROAD SUBGRADE EXCAVATION, BACKFILL, EMBANKMENT & COMPACTION

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

The Contractor shall complete excavation, backfill, embankment, compaction, and grading as necessary to prepare the roadway for application of base course and pavement to the cross-section shown on the plan sheets. The work covered by this section includes legally disposing of all excess or unsuitable materials. This section also includes excavation and/or embankment to blend private driveway and alley entrances (from the property line to the edge of the roadway) with the new road grade.

PART 2 - MATERIALS & EQUIPMENT

2.1 Backfill and Embankment Materials

Materials used for embankment shall not contain logs, stumps, brush, perishable materials, frozen lumps of soil, or rocks or pieces of pavement of such size or conformation that they would interfere with proper compaction. Materials to be incorporated in the top 18 inches of earth embankments shall be free of stones, or pieces of pavement, which are greater than six (6) inches in any dimension.

2.2 Classification of Excavation

Excavation will be classified according to the definitions listed below by the Engineer, based upon his judgment of the character of the materials and the site conditions.

COMMON EXCAVATION

Common excavation shall be defined as the excavation of all materials that can be excavated, transported, and unloaded by the use of heavy ripping equipment and wheel tractor scrapers with pusher tractors or that can be excavated and dumped into place or loaded onto hauling equipment by means of excavators having a rated capacity of one (1) cubic yard equipped with attachments (such as shovel, bucket, backhoe, dragline, or clam shell) appropriate to the character of the materials and the site conditions.

For the purposes of this classification heavy ripping equipment shall be defined as a rear-mounted, heavy duty, single tooth, ripping attachment mounted on a tractor having a power rating of 200-300 net horsepower, at the flywheel, such equipment being in well-maintained condition. Pusher tractor shall be defined as a track-type tractor having a power rating of 200-300 net horsepower, at the flywheel, equipped with appropriate attachments and being in well-maintained operating condition.

ROCK EXCAVATION

Rock excavation shall be defined as the excavation of all hard, compacted or cemented materials, the excavation of which requires blasting or use of excavators larger than defined for common excavation. Such rock excavation shall include all hard, solid rock ledges, bedded deposits or any other material as firmly-cemented as to present all the characteristics of solid rock. The excavation and removal of isolated boulders or rock fragments larger than one (1) cubic yard in volume encountered in materials otherwise conforming to the definition of common excavation shall be classified as rock excavation. Rock excavation will merit extra payment unless a separate bid item has been provided or unless elsewhere in the specifications such rock excavation is declared incidental to the work.

Existing asphaltic or concrete pavements, curb & gutter, sidewalk and utility structures shall be classified as common excavation.

The presence of isolated boulders or rock fragments larger than one (1) cubic yard in size will not, in itself, be sufficient cause to change the classification of surrounding material.

PART 3 - CONSTRUCTION

3.1 Clearing and Grubbing; Stripping and Stockpiling Topsoil; Protection of Trees and Shrubs

Clearing and grubbing, the Contractor shall strip and stockpile whatever suitable topsoil exists within the excavation and embankment limits. This topsoil shall be used in surface restoration at the completion of construction of the roadway. Excess topsoil remaining after construction shall be stockpiled as directed by the Owner.

Trees and shrubs shall be preserved when so indicated on the plans or in the field by the Engineer. The Contractor shall protect such trees and shrubs from scarring or from injury of any type. The excavation operations shall not disturb the original ground surface within one (1) foot of trees or shrubs or within twice the diameter of trees, whichever is greater. Roots which may be exposed as a result of excavation shall be cut cleanly and covered with soil with high humus content. When

necessary, or when required by the Plans or the Special Conditions, tree wells shall be constructed to protect trees and shrubs from embankments. In such cases, tree well design shall be as shown on the Plans or as approved by the Engineer.

3.2 Salvage of Existing Granular Material for Use as Fill

The Contractor shall salvage and stockpile existing granular material that must be excavated to establish the new roadway grade. Existing asphaltic pavements, broken into small pieces, which may be suitable for reuse as granular subbase course, shall be stockpiled separately in such a manner as to minimize material segregation.

3.3 Earthwork

The Contractor shall excavate as shown on the Plans and legally dispose of all excess materials to allow construction of the roadway. Earthwork shall include, but not be limited to, excavation within the roadway; embankments with the roadway; excavation and embankments to create intersections, ditches, channels, waterways and dikes; grading of the roadway subgrade, entrances and approaches; and other such activities outside the right-of-way as may be specifically designated on the Plans. Earthwork shall include the removal and reuse or satisfactory disposal of existing pavements and base courses, masonry or concrete structures, and other structures that may be within the right-of-way.

Monuments from land surveys which are shown on the plans or which are clearly visible in the field and which are in the path of the work shall be carefully protected from movement. If the Contractor feels that removal is necessary he shall notify the Engineer at least 48 hours in advance of such removal. If the Engineer concurs that removal is necessary, the municipality will assume the cost of resetting those monuments, unless a bid price is provided in the Bid Proposal or unless elsewhere in the specifications it is stated that removal and replacement of monuments is incidental to the bid price(s). Monuments that the Contractor moves due to failure to exercise reasonable precautions or proper construction techniques, or for which he has failed to notify the Engineer sufficiently in advance, shall be replaced at the Contractor's cost.

The Contractor shall notify utility companies of any interfering structures or cables and shall arrange for those structures or cables to be moved, if necessary. The project plans show the approximate location and size of sewers, drains, culverts, gas mains, water mains, electric, and telephone conduits and other underground structures or utilities, as such locations and sizes are available to the municipality, or as surface markings indicate their existence. The Contractor shall arrange with the utility companies for exact location of utilities and for necessary relocations or modifications of interfering utilities. The cost of arranging such relocations or

modifications, and the cost of any "downtime" resulting from delays or changes to the Contractor's work schedule as a result of waiting for a private utility (gas, electric, telephone, cable TV) to make the relocation or modifications shall be incidental to the Contractor's bid. The Contractor shall use caution in excavating and trenching so that the exact location of underground structures, both known and unknown, may be determined; the Contractor shall be held responsible for the repair of such structures when broken or otherwise damaged during construction. When the Owner permits the Contractor to make a change in the project to avoid utility relocation, the Engineer shall determine whether the change constitutes extra work as defined in the General Conditions. Such relocations shall not be cause for extension of contract time of completion.

The Contractor shall also, at least one week in advance of his operations, notify private property owners who have structures or who have planted trees, shrubbery, or flowers in the right-of-way so that the private property owners may remove and reinstall such features if they so wish. The Contractor shall be responsible for removal, temporary relocation, and replacement of all mail and newspaper delivery boxes. The Contractor shall contact the local postmaster to determine acceptable locations and heights of such boxes. Replacement of such boxes shall be in locations acceptable to the property owner.

Deposits of frost heave material, unstable soils such as clay or muck, soil containing considerable amounts of organic matter, or other undesirable foundation material shall be excavated as directed by the Engineer. The Contractor shall notify the Engineer of such questionable materials and obtain the Engineer's approval prior to excavating them. Failure to notify the Engineer of such questionable materials shall be cause for the forfeiture of right to extra payment.

The Contractor shall scarify the subgrade to such depth as necessary to accomplish grading and shaping operations as specified in Subsection 3.5 of this section.

The Contractor shall conduct earthwork operations in such a manner as to avoid removing or disturbing any material or structure outside of the designated construction limits, as shown on the Plans or as defined in the Special Conditions. Should any such material or structure be removed or disturbed the Contractor shall assume the expense of restoring it to its original condition.

3.4 Backfill and Embankment

The Contractor shall, if possible and feasible, utilize all suitable excavated material for backfill and embankment with the roadway in conformity with the lines, grades, cross-sections and dimensions shown on the Plans or in these Specifications or at other places shown on the Plans. When excavated materials are insufficient or unsuitable the Contractor shall furnish materials from borrow pits approved by the

Engineer. Before use of borrow materials, the Contractor shall notify the Engineer so that the materials may be inspected.

Backfill or embankments shall be made in successive uniform layers not exceeding 12 inches in depth. Each layer shall cover the entire area and shall be compacted before additional layers are placed. Prior to compaction each layer shall be worked to break up clods over six (6) inches in any dimension and to obtain uniform moisture content. In the case of filling on steep slopes construct the fill in such layers as can be achieved by the equipment until the fill can be constructed in 12 inch layers. Each layer shall be compacted to 95 percent of maximum density as measured by AASHTO Designation: T99, Method C, with replacement of the fraction of material retained on the ¾ inch sieve with No. 4 to ¾ inch material.

3.5 Grading and Shaping

The Contractor shall shape the subgrade for the full width of the roadbed in advance of base or surface laying operations. The grade of the completed course shall at all points be within + or - 0.04 foot of the grade shown on the Plans, as measured at the curb line or the edge of the pavement, but without more than 5 percent net over-excavation or under-excavation of the subgrade materials for the project. Subgrade need not be crowned between measurement points at opposite edges of the roadway. He shall maintain the subgrade in a firm smooth condition, removing any ruts or surface irregularities produced by hauling equipment or other traffic until final acceptance or until laying of the subbase or base course. The subgrade shall have a compaction of 95 percent of maximum density as measured by AASHTO Designation: T99, Method C, with replacement of the fraction of material retained on the ¾ inch sieve with No. 4 to ¾ inch material. Any soft or yielding places, holes or other defects which may develop in the subgrade by reason of traffic, hauling, poor drainage, unstable materials, or from any other cause shall be corrected before acceptance or before the base or surface course is placed thereon.

Unless otherwise approved by the Engineer, the subbase shall be compacted before any crushed aggregate is added in other to minimize crushed aggregate being forced down into the subbase.

All intersecting road, approaches, entrances and driveways shall be graded as shown on the Plans or as designated in the field by the Owner's Authorized Representative.

3.6 Drainage During Construction

During construction, the Contractor shall assure that all ditches and channels are drained at all times by keeping the excavation areas and embankments sloped to the approximate section of the final earth grade. If existing surface drainage must be interrupted alternate drainage shall be provided.

Construction in and adjacent to flowing streams shall be performed to avoid washing, sloughing or deposition of materials into the channel which may obstruct or impair stream flow or which may result in contamination and/or silting of the waterway. The Contractor shall comply with any requirements or permits from the Owner or obtained by the Owner from the Department of Natural Resources and shall use erosion control measures in the locations shown on the Plans or as specified elsewhere in the specifications.

The Contractor shall take precautions to preserve, protect, and continue service of all existing tile drains, sewers and other subsurface utilities and shall repair any damage to drains, sewers and utilities.

3.7 Performance Testing

A test-roll of the graded and compacted subbase will be required. This test-roll shall be performed with a fully loaded tri-axle dump truck (60,000 pound minimum total weight) with the tag-wheels lifted, provided by the Contractor. The test-roll shall be performed on the entire length and width of the subbase in the presence of an Engineer. Any deflection of the sub-base, wheel rutting, or cracking of the subbase will signify a failure of the subbase. The Engineer shall make the determination of subbase course acceptance or failure. In the case of subbase failure, the Engineer shall determine the area and depth of undercut or other corrective action.

*** END OF SECTION ***

SECTION 02232
CRUSHED AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

The Contractor shall provide the necessary materials, equipment and labor to construct, on the prepared road subgrade, a crushed aggregate base course, and shall construct such a base course in the locations shown on the Plans to the depths shown in Section 02230 of these Specifications. Fine grading of the base course to the tolerances discussed in Paragraph 3.1 is included in the scope of work under this section.

1.2 Relationship to Other Contracts

On contracts under which the prepared roadbed or subbase has been substantially completed under a previous contract, any requirements of the specifications shall not be considered presumptive as to the character of the materials which may be encountered on the work to be performed under this section.

PART 2 - MATERIALS & EQUIPMENT

2.1 Crushed Aggregate Base Material

The material used for constructing crushed aggregate base coarse shall be hard, durable particles of virgin crushed stone or virgin crushed gravel and a filler of natural sand, stone sand, or other finely divided mineral matter. Unless specifically allowed in the Bid Proposal recycled materials shall not be used. Oversize material encountered in deposits from which the material is taken shall be removed by screening or shall be crushed to the required sizes. The composite material shall be free from organic matter, shale and lumps or balls of clay and shall meet the gradation requirements specified in Paragraph 2.2 of this section.

The right is reserved to prohibit the use of crushed stone from limestone deposits having thinly bedded strata or strata of shale or to reject material from any source where the character of the material will not meet the applicable requirements.

The aggregate, including any blended filler, shall have a liquid limit of not more than 25 and a plasticity index of no more than 6, except in the case of

aggregates for base course placed between old and new pavements, where the plasticity index shall not exceed 3.

At least 45 percent of the particles of aggregate retained on the No. 4 sieve shall have at least one (1) surface or face produced by the fracture of a larger particle.

Aggregate shall have a percentage of wear of not more than 50, as determined by AASHTO Designation: T 96, unless otherwise noted.

When the fraction of aggregates retained on the No. 4 sieve is subjected to five cycles of the sodium sulfate soundness test (AASHTO Designation: T 104), the weighted loss shall not exceed 18 percent, by weight.

2.2 Gradation Requirements - ¾-Inch Crushed Aggregate

The aggregates shall be well graded between the limits specified and unless otherwise specified, shall conform to the gradation requirements for ¾-inch dense graded base of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, most current edition Specification No. 305.2.2.1, as follows:

Sieve Size		Percent Passing, by weight
1 inch	(25 mm)	100
¾ inch	(19 mm)	95 - 100
⅜ inch	(9.5 mm)	50 - 90
No. 4	(4.75 mm)	35 - 70
No. 10	(2.00 mm)	15 - 55
No. 40	(425 µm)	10 - 35
No. 200	(75 µm)	5 - 15

If filler is necessary in addition to that naturally present in the base coarse material for meeting the gradation requirement, or for satisfactory binding of the material, it shall be uniformly blended with the base course at the screening plant or on the road. The material obtained for such purpose shall be obtained from sources approved by the Engineer, shall be free from agglomerations or lumps, and shall contain not more than 15% of material retained on a No. 4 sieve.

2.3 Gradation Requirements – 1¼-Inch Crushed Aggregate

Where ¼-inch base course is specified the aggregate shall be well graded between the limits specified and shall conform to the gradation requirements for 1¼-inch dense graded base of the State of Wisconsin Department of

Transportation Standard Specifications for Highway and Structure Construction, most current edition, , Specification No. 305.2.2.1, as follows:

		Percent Passing, by weight
1¼ inch	(37.5 mm)	95 – 100
1 inch	(25.0 mm)	-
¾ inch	(19.0 mm)	70 – 93
⅜ inch	(9.5 mm)	42 – 80
No. 4	(4.75 mm)	25 – 63
No. 10	(2.00 mm)	16 – 48
No. 40	(425 µm)	8 – 28
No. 200	(75 µm)	2 – 12

2.4 Gradation Requirements - Breaker Run

The aggregate shall be Breaker Run, with fines, well graded between the limits specified, as follows:

Sieve Size		Percent Passing, by weight
6-inch		100
1½-inch	(37.5 mm)	60 – 85
1-inch	(25.0 mm)	-
¾-inch	(19.0 mm)	40 – 65
⅜-inch	(9.5 mm)	-
No. 4	(4.75 mm)	15 – 40
No. 10	(2.0 mm)	10 – 30
No. 40	(425 µm)	5 – 20
No. 200	(75 µm)	2 - 12

PART 3 - CONSTRUCTION

3.1 Placing the Base Course

The Contractor shall place the crushed aggregate base material to the depth, line, and grade shown on the Plans. Contractor shall do his own "blue-top" staking to establish crown elevation. Engineer will not perform such staking.

Base course placement shall be in conformance with Sections 301 and 305 of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, most current edition, , except as modified below. The grade of the completed course shall at all points be within + or - 0.04

feet of the grade shown on the Plans, providing that the thickness of the course is at least that specified and there will not be more than a 5 percent total increase or decrease in the planned overlay asphalt or concrete thickness over the points measured. This includes fine grading in preparation for pavement construction. The Contractor shall maintain the prepared roadbed or subbase course ahead of the crushed aggregate base course laying operations in a smooth condition and at not less than the densities specified in paragraph 3.2, below. Any ruts or surface irregularities produced on the prepared road bed or subbase course by reason of traffic, hauling, poor drainage, unstable materials, or from any other cause, shall be corrected before crushed aggregate base course is placed. Snow or ice, if any, shall be removed from the prepared roadbed before the base course is placed. The base course Contractor shall coordinate with the paving Contractor and give written notice to the Engineer and paving Contractor at least seven (7) calendar days prior to acceptance of the base course. Once the base course is accepted by the Owner/Engineer, any damage to the base by traffic, poor drainage, or any other cause shall not be the responsibility of this Contractor. The repair of that damage shall be the responsibility of the paving Contractor.

If the required compacted depth of the base course exceeds 12 inches, the base shall be constructed in two or more layers of approximately equal thickness. The ¾-inch and 1¼-inch material shall be compacted in lifts not greater than 6 inches. The 3-inch material shall be compacted in lifts not greater than 9 inches. The base course material shall be deposited in such a manner as to minimize segregation and to facilitate spreading in a uniform layer of the required thickness. Excessive manipulation or mixing that causes segregation between the course and fine materials shall be avoided.

The work shall generally proceed so that the hauling equipment will travel over previously placed material, and the hauling equipment shall be routed as uniformly as possible over all portions of the previously constructed courses or layers of the base course.

The Contractor shall refer to Specification Section 02601 and the Plan Detail sheet for manhole adjustment requirements. Manhole rims shall be tipped, if necessary, to match the slope of the finished pavement surface. Water valve boxes and curb boxes shall be adjusted by the Contractor after coordinating with the Owner.

3.2 Compaction

The Contractor shall compact the base course to 95 percent of maximum density as determined by AASHTO Designation: T 99, Method C, with replacement of the fraction of material retained on the ¾-inch sieve with No. 4 to ¾-inch material.

3.3 Acceptance Testing

The Engineer, if he questions the compliance with the material specification for the crushed aggregate base, may order the Contractor to demonstrate compliance by obtaining, at the Contractor's own expense, tests by an independent laboratory. Such tests shall be performed in accordance with the following AASHTO standard testing methods:

Sampling Aggregate	T 02
Material Finer Than No. 200	T 11
Sieve Analysis of Aggregates	T 27
Sieve Analysis of Mineral Filler	T 37
Liquid Limit of Soils	T 89
Plastic Limit of Soils, Plasticity Index of Soils	T 90
Los Angeles Abrasion of Coarse Aggregate	T 96
Specific Gravity and Absorption of Fine Aggregate	T 84
Specific Gravity and Absorption of Coarse Aggregate	T 85*
Soundness of Aggregates	T 104

** As revised by the Department of Transportation Method T 85-1*

A test-roll of the fine graded and compacted base course will be required. This test-roll shall be performed with a fully loaded tri-axle dump truck (60,000 pound minimum gross weight) with the tag-wheels lifted, provided by the Contractor. The test-roll shall be performed on the entire length and width of the base course in the presence of the Engineer. Any deflection of the base course, wheel rutting, or cracking of the base will signify a failure of the base. The Engineer shall make the determination of base course acceptance or failure. In the case of failure, the Engineer shall determine the area and depth of undercut or other corrective action.

If the Owner so desires, compaction tests may be taken. The Owner shall pay for the first set of such tests at locations to be designated by the Engineer. If these tests show that compaction in accordance with these specifications has not been achieved, the Contractor shall re-compact the areas designated by the Engineer at its own expense. The Contractor shall then pay for tests to be performed by an independent testing laboratory to verify compliance with the specifications.

END OF SECTION

SECTION 02270
EROSION CONTROL

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section describes the requirements for control of erosion on construction sites. The Contractor shall provide the necessary materials, equipment, and labor to control erosion by the methods specified herein. If no specific quantities are shown on the Plans, the Contractor shall use whatever quantities are necessary to prevent sediment transport into adjacent storm water conveyances or streams. Other similar products may be used only with the prior approval of the Engineer.

PART 2 - MATERIALS & EQUIPMENT

2.1 Temporary Grass Seed

Temporary grass seed shall be annual ryegrass, annual oats or winter wheat, depending upon the time of year as set forth in Part 3. Grass seed shall be delivered to the site in bags, tagged, or labeled to show the percentage of purity and germination. The seed shall have been tested by a recognized seed-testing laboratory within one (1) year before the date of seeding and shall conform to the latest laws of the U.S. and the State of Wisconsin. Upon request, the Contractor shall furnish to the Engineer copies of the test results.

2.2 Straw Mulch

Unless otherwise specified, mulch shall be straw, reasonably free of grain, weed, seed, and mold. Mulch materials shall not contain excessive moisture that might prevent feeding through a mulch blower machine. Other fibers may be used only upon approval by the Engineer.

2.3 Filter Fabric

Filter fabric for inlet bags shall meet the requirements of the Wisconsin Department of Transportation Product Acceptability List, Type D, or equal, and shall be ultraviolet stabilized.

2.4 Sediment Control (Silt) Fence

Sediment control fence shall meet the requirements of the Wisconsin Department of Natural Resources Conservation Practice Standard 1056.

2.5 Double Sediment Control Barrier

Double sediment control barrier shall consist of a combination of sediment control fence and straw or hay bale erosion control barrier, with the fence being installed on the upstream side of the bales. The bales used in the double sediment control barrier shall be either hay or straw, have rectangular surfaces, and be tightly bound with twine, not wire. The material in the bales shall be reasonably free of grain, weed, seed, and mold, and shall be dry and suitable for the purpose intended.

2.6 Construction Entrance Material

The aggregate for construction entrances shall be 3 to 6 inch clear or washed stone. All material shall be retained on a 3-inch sieve.

2.7 Coconut Fiber Erosion Control Mat

The coconut fiber erosion control mat shall meet the requirements of the Wisconsin Department of Transportation Product Acceptability List, Class II, Type B machine-produced 100% biodegradable mat with a 100% coconut fiber matrix.

The erosion mat shall be of consistent thickness with the coconut fiber evenly distributed over the entire area of the mat. The mat shall be covered on the top and bottom with photodegradable woven netting. The netting shall consist of photodegradable polypropylene mesh openings of approximately ⅝ inch by ⅝ inch. The blanket shall be sewn together on two (2) inch centers photodegradable polypropylene thread.

2.8 Soil Stabilizers

Soil Stabilizers shall meet the requirements of the Wisconsin Department of Transportation Product Acceptability List, Type B. The polymer shall have no odor. The polymer shall be protected from ignition sources. Contact with strong oxidizing agents and heat shall be avoided.

2.9 Temporary Ditch Checks (Wattles)

Temporary ditch checks, also called wattles, shall be in accordance with the latest edition of the Wisconsin Department of Transportation Product Acceptability List.

PART 3 - CONSTRUCTION

3.1 Erosion Control Requirements - General

Water pumped from the site shall be treated by appropriate controls designed and used to remove particles of 100 microns or greater for the highest dewatering pumping rate. If the water is demonstrated to have no particles greater than 100 microns during dewatering operations, then no control is needed before discharge. Water may not be discharged in a manner that causes erosion of the site or receiving channels. The Contractor must obtain a pit/trench dewatering WPDES permit from the Wisconsin DNR prior to initiating operation if dewatering is required.

The Contractor shall construct clear stone entrance pads to the construction site and shall take all other possible precautions to prevent sediment from being tracked onto public or private roadways. Any sediment reaching a public or private road shall be removed by street cleaning (not flushing) before the end of each workday and before any rainfall occurs.

All storm drain or culvert inlets shall be protected utilizing acceptable methods approved by the Engineer.

Channelized runoff from adjacent areas passing through the site shall be diverted around disturbed areas, if practical. Otherwise, the channel shall be protected. Sheet flow runoff from adjacent areas greater than 10,000 square feet in area shall also be diverted around disturbed areas.

Diverted runoff shall be conveyed in a manner that will not erode the conveyance and receiving channels. (Note: Soil and Conservation Service guidelines for allowable velocities in different types of channels should be followed.)

All activities on the site shall be conducted in a logical sequence to minimize the area of bare soil exposed at any one time.

All disturbed ground left inactive for seven (7) or more days shall be stabilized by temporary seeding and mulching or by covering, or by other equivalent control measure.

Sediment control fences or equivalent control measures shall be placed along all sideslope and downslope sides of the site where runoff can reach a surface water course, wetland, or as shown on the Plans or specified in the Special Conditions. If a channel or area of concentrated runoff passes through the site, sediment control fences shall be placed along the channel edges to reduce sediment reaching the channel.

Any soil or dirt storage piles containing more than ten cubic yards of material should not be located with a downslope drainage length of less than 25 feet to a roadway or drainage channel. If remaining for more than seven (7) days, they shall be stabilized by mulching, vegetative cover, tarps, or other means. Erosion from piles, which will be in existence for less than seven (7) days, shall be controlled by placing hay bales or sediment control fence barriers around the pile. In-street utility repair or construction soil, or dirt storage piles located closer than 25 feet to a roadway or drainage channel must be covered with tarps or a suitable alternative control must be used if exposed for more than seven (7) days, and storm drain or culvert inlets must be protected with straw bales or other appropriate filtering barriers.

3.2 Seeding

Seeding, where used for erosion control, shall be temporary grass seed as follows:

Before June 15	Annual Oats
June 15 to September 15	Annual Ryegrass
After September 15	Winter Wheat

The Contractor shall apply the seed using a hydroseeder, a power-drawn drill, or spreader, or approved blower equipment with an adjustable disseminating device capable of maintaining a constant measurement rate of material discharge that will insure an even distribution of seed and fertilizer. Seed mixture shall be applied at the rates of 3 lbs/1,000 ft^2.

Seedbeds shall be maintained in a moist growing condition. When necessary, the Contractor shall soak the seedbed by sprinkling with water.

3.3 Application of Straw Mulch

The Contractor shall furnish, haul and evenly apply straw mulch at a rate not less than 1½ tons per acre. Mulch shall be placed loose and open enough to allow some sunlight to penetrate and air to circulate but still cover a minimum of 70% of the soil surface. The mulch spreading equipment shall utilize forced air to blow mulch material onto the seeded area, unless otherwise approved by the Engineer. Where mulch is used, alone, as a temporary cover, the rate of application shall be not less than three (3) tons per acre cover a minimum of 80% of the soil surface. .

Unless otherwise designated the Contractor shall anchor the straw mulch by crimping so that the mulch is partially embedded in the soil.

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3.4 Placing Straw or Hay Bale Barriers as Part of Double Sediment Control Barrier

Sufficient bales shall be on the site to create the necessary barriers before the start of groundbreaking operations. The bales shall be stacked and covered with plastic sheeting until required for use.

The bales shall be placed with the cut side of the bale downward, in a shallow trench excavated for that purpose. The bales shall be fixed in place using reinforcing rod or steel fence posts extending completely through the bale and driven at least 18 inches into the ground. Two (2) rods or posts shall be placed in each bale, one at each ⅓ point.

If a bale in a barrier is wholly or partially destroyed during the course of the project the Contractor shall, at its own expense, replace the bale with a fresh, unused bale.

3.5 Construction of Sediment Control Fence

Sediment control fence shall be constructed according to the manufacturer's recommendations and generally as follows:

- Excavate a six inch by six inch (6"x 6") trench along the upslope perimeter of the fence location
- Unroll the fencing fabric a section at a time and position the posts against the downslope side of the trench, with the fabric on the upslope side of the posts. Drive the posts into the ground until the support netting is approximately two (2) inches from the trench bottom (the fabric should extend several inches below the netting.)
- Lay the toe-in flap of fabric onto the undisturbed trench bottom, backfill the trench and tamp the soil down firmly.

3.6 Installing Coconut Fiber Erosion Control Mat

Coconut Fiber Erosion Control mat shall be constructed according to the manufacturer's recommendations and generally as follows:

- Prepare soil before installing blankets, including any application of fertilizer and seed.
- Begin at the top of the channel by anchoring the blanket in a six (6) inch deep by six (6) inch wide trench with approximately 12 inches of blanket extended beyond the up-slope portion of the trench. Anchor the blanket with a row of staples/stakes approximately 12 inches apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to compacted soil and fold remaining 12-inch portion of blanket back over seed and compacted soil. Secure blanket over compacted soil with a row

of staples/stakes spaced approximately 12 inches apart across the width of the blanket.

- Roll center blanket in direction of water flow in bottom of channel. Blankets will unroll with appropriate side against the soil surface. All blankets must be securely fastened to the soil surface by placing staples/stakes in appropriate locations as recommended by the manufacturer.
- Place consecutive blankets end over end (shingle style) with a four (4) to six (6) inch overlap. Use a double row of staples staggered four (4) inches apart and four (4) inches on center to secure blankets.
- Full-length edge of blankets at top of side slope must be anchored with a row of staples/stakes approximately 12 inches apart in a six (6) inch deep by six (6) inch wide trench. Backfill and compact the trench after stapling.
- Adjacent blankets must be overlapped four (4) inches (depending on blanket type) and stapled.
- A staple check slot is required at 30 to 40 foot intervals. Use a double row of staples staggered four (4) inches apart and four (4) inches on center over entire width of the channel.
- The terminal end of the blankets must be anchored with a row of staples/stakes approximately 12 inches apart in a six (6) inch deep by six (6) inch wide trench. Backfill and compact the trench after stapling.

NOTE: In loose soil conditions, the use of staples or stake lengths greater than six (6) inches may be necessary to property anchor the blankets.

3.7 Application of Soil Stabilizer

Minimum application rates shall be as recommended by the manufacturer.

PART 4 – DOCUMENTATION

4.1 Inspections

Contractor shall be responsible for all inspections of erosion control provisions from the beginning of the project to stabilization of all disturbed surfaces. Inspections of implemented erosion control best management practices must be performed weekly and within 24 hours after a precipitation event of 0.5 inches or greater which results in runoff. Department of Natural Resources form 3400-187 (Construction Site Inspection Report) shall be used.

END OF SECTION

SECTION 02486
LAWN SEEDING

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section describes the requirements for restoration of disturbed earth surface by the Contractor. Part 2 specifies materials and equipment to be used. Part 3, Subsection 3.1, specifies the general requirements the Contractor is expected to follow.

The Contractor shall provide the necessary materials, equipment and labor to accomplish the seeding by the methods specified herein.

PART 2 - MATERIALS & EQUIPMENT

2.1 Topsoil

Topsoil shall be fertile, friable, natural loam surface soil, completely free of subsoil, clay lumps, brush, weeds, weed seed and free of roots, stumps, stones larger than one (1) inch in any dimension, and other matter harmful to plant growth. Topsoil to supplement insufficient topsoil on the site shall originate from local sources, but not from bogs or marshes. Such topsoil shall be shredded immediately prior to placement.

2.2 Lime

Lime used for soil amendment shall be agricultural grade limestone ground sufficiently fine so that 80 percent passes a No. 8 sieve. Lime shall contain 80 percent calcium carbonate equivalent. Moisture shall not exceed 10 percent.

2.3 Fertilizer

Fertilizer used in conjunction with seeding shall be dry, free-flowing granular fertilizer suitable for application by agricultural fertilizer spreaders or blower equipment, or non-volatile liquid commercial fertilizer, having an analysis of 20-10-10 (Nitrogen-Phosphoric Acid-Potash), or approved equal. Fertilizer having other analysis shall be applied at a rate to achieve at least the individual following amounts of nutrient per unit area:

Nutrient	Per Acre	Per 1000 Square Ft.
Nitrogen (N)	100 pounds	2.3 pounds
Phosphoric Acid (P_2O_5)	50 pounds	1.2 pounds
Potash (K_2O)	50 pounds	1.2 pounds

2.4 Grass Seed

Grass seed shall be delivered to the site in bags, tagged or labeled to show the percentage of purity and germination. The seed shall have been tested by a recognized seed testing laboratory within one (1) year prior to the date of seeding and shall conform to the latest laws of the U.S. and the State of Wisconsin. Upon request the Contractor shall furnish to the Engineer copies of the test results. Permanent seed mixtures shall consist of the following percentages of various varieties of grass seed, each of which shall have the designated minimum percent purity and germination:

Species	Purity Min. %	Germination Min. %	Mixture Proportions, Percent
Kentucky Bluegrass	85	80	35
Creeping Red Fescue	97	85	20
Improved Hard Fescue	97	85	20
Improved Fine Perennial Ryegrass	96	85	25
*Pure Live Seed. These grasses shall contain no improved varieties			

The "Madison Parks" mix may be used as a permanent seed mixture.

As a companion seeding to the above seed mixture annual ryegrass of the same purity and germination standards shall be provided and applied as set forth in Part 3.

2.5 Straw Mulch

Unless otherwise specified in the Special Conditions to the specifications, mulch shall be straw, free of grain, weed, seed and mold. Mulch materials shall not contain excessive moisture which might prevent feeding through a mulch blower machine. Wood cellulose fiber, hay or "marsh hay" may not be used.

PART 3 - CONSTRUCTION

3.1 Preparation

The Contractor shall grade and smooth the area to be seeded, filling in all gullies and washes. A minimum of four (4) inches of topsoil shall be placed over the entire area before seeding takes place. No clumps of dirt larger than 1½ inches shall remain after preparation of the area to be seeded. All stones or other foreign material larger than one (1) inch in any dimension shall be removed. The presence of gravel in the top four inches of the topsoil will not be allowed. Any topsoil containing gravel shall be removed and replaced with fresh top soil. Immediately prior to seeding the topsoil shall be loosened to a depth of three (3) inches. (If necessary, the Contractor shall apply lime to produce a soil pH of 6.5 and shall mix the lime thoroughly into the topsoil.) After preparation and prior to seeding the Contractor shall notify the Engineer so that the prepared surface may be inspected. Seeding shall not take place until the prepared surface is inspected by the Engineer or the Owner's Authorized Representative.

3.2 Fertilizing

Fertilizer shall be applied with a hydroseeder, power-drawn drill or spreader, or blower equipment either separately from or concurrently with the grass seed. Fertilizing shall not be done with "broadcast"-type equipment during windy weather, and not at all when the ground is frozen or excessively moist. Fertilizer shall be applied at the rates specified in Part 2 of this section of the specifications.

3.3 Seeding

The Contractor shall apply the seed using a hydroseeder, a power-drawn drill or spreader, or approved blower equipment with an adjustable disseminating device capable of maintaining a constant measurement rate of material discharge that will insure an even distribution of seed and fertilizer.

Permanent seed mixture shall be applied at the rate of 2 lbs/1000 sq. ft. A companion seeding of annual ryegrass shall also be made at an application rate of 1 lb/1000 sq. ft.

After the seeding is completed and prior to mulching the contractor shall rake the surface with an inverted leaf rake to set the seed.

3.4 Application of Straw or Hay Mulch

The Contractor shall furnish, haul and evenly apply straw or hay mulch at a rate not less than 1½ tons per acre to a loose depth of one (1) to two (2) inches. The mulch spreading equipment shall utilize forced air to blow mulch material onto the seeded

area, unless otherwise approved by the Engineer. Mulching shall not be conducted during very windy conditions.

The mulch shall not be left in clumps and shall not be blown onto healthy grass, trees, shrubs, curbs, pavements, vehicles, etc. Any mulch which blows onto areas not intended to be mulched, such as those defined above, shall be immediately removed.

Following application of the mulch, the Contractor shall anchor the straw or hay mulch by cutting the mulch into the soil with notched edges of a weighted disc so that the mulch is partially embedded in the soil, or by other methods acceptable to the Engineer.

3.5 Watering

The Contractor shall soak the seed bed by thoroughly sprinkling with water upon completion of the seeding, fertilizing and mulching operation.

3.6 Post-Construction Care Instruction

After the seeding operation is completed the Contractor shall provide and distribute to each property owner a sheet of instructions on how to care for the seed bed and insure acceptable grass growth.

*** END OF SECTION ***

SECTION 02511
ASPHALTIC CONCRETE PAVING (HOT-MIX)

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

The Contractor shall apply an asphaltic pavement consisting of a lower course and an upper course, placed on the prepared base course, to the thickness and cross-sections shown on the Plan Detail Sheets, and to the lines and grades shown on the Plans. Fine grading in preparation for paving will have been completed under Specification Section 02232. Any repair of this fine grading due to damage by poor or excessive drainage, traffic, or other causes shall be part of this paving work.

Manhole casting adjustment methods are described in Specification Section 02601. Payment provisions and responsibility for work associated with manhole casting adjustments and paving around manhole castings are set forth in Specification Sections 01000 and 01001. The paving contractor shall turn valve boxes to finished grade as part of the paving work without extra payment.

The Contractor shall conform to the requirements of the following sections of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, most current edition, and all incorporated errata, annotated revisions, and subsequently issued supplemental specifications, except where this specification is more strict.

450 General Requirements for Asphaltic Pavement
455 Asphaltic Materials
460 Hot-Mix Asphalt Pavement

The Engineer may elect to enforce the most stringent testing requirements in these specifications regardless of the tonnage placed under the project.

Unless otherwise specified in the Special Conditions or the Bid Proposal, the pavement shall be Asphaltic Concrete Pavement, Type E-1.

PART 2 - MATERIALS & EQUIPMENT

2.1 Asphaltic Concrete

The asphaltic materials shall be performance grade asphalt, PG 58-28 or 64-22 for the lower layer and PG 64-22 for the upper layer on curbed streets. For rural sections, PG 58-28 may be used for both layers.

2.2 Lower Course Aggregate

The Contractor shall use hard, durable angular crushed stone, crushed gravel, manufactured sand or natural sand conforming to the gradation requirements for E-1 pavement with a nominal 12.5 millimeter aggregate size as specified under the appropriate section of the Wisconsin Standard Specifications for Highway and Structure Construction as referenced above.

2.3 Upper Course or Surface Course Aggregates

The Contractor shall use hard, durable angular crushed stone, which, including mineral filler, shall conform to the gradation requirements for E-1 pavement with a 9.5 millimeter nominal aggregate size as specified under the appropriate section of the Wisconsin Specifications for Highway and Structure Construction as referenced above.

2.4 Recycled Asphaltic Materials

The mix shall contain no more of such materials than allowed by the appropriate section of the Wisconsin Specifications for Highway and Structure Construction as referenced above.

2.5 Paving Equipment

The Contractor shall use hauling, paving and compacting equipment, as specified in the appropriate section of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction as referenced above.

PART 3 - CONSTRUCTION

3.1 Submittals Prior to Construction

The Contractor shall submit the job mix formula for the aggregate and bitumen content to the Engineer prior to use. The formula shall have been derived from tests performed and approved by Wisconsin Department of Transportation within the previous 12 months. A previous mix design using the same aggregates from the same source and using the same brand and type of asphaltic material may be used with the approval of the Engineer. The tests shall have been performed by a qualified, certified testing laboratory.

3.2 Fine Grading

The Contractor shall repair, as necessary, fine-graded unpaved surfaces to the grade shown on the Plans before paving operations begin. Fine grading will have been completed previously in accordance with Section 02232 of these Specifications. Any repair due to traffic, poor or excessive drainage, or other causes shall be the responsibility of the Asphalt Paving Contractor. Soft spots shall be excavated and such cavities and other holes or depressions filled with crushed aggregate base course in accordance with Section 02232 of these Specifications.

3.3 Construction Prerequisites

The Contractor shall place asphaltic paving mixture only on a prepared, firm, and compacted base or foundation course, substantially surface -dry and free and clear of loose and foreign material. The Contractor shall incorporate loose aggregate existing on the roadbed into shoulder construction, if any, or dispose of such aggregates as directed by the Engineer.

Holes and depressions in existing paved surfaces which are to be overlaid shall be prepared by removing all loose and defective material from the hole or depression and replacing with a hot-mix asphalt patching material, compacted to produce a tight surface conforming to the adjacent area.

If any repair work in the fine graded surface is necessary, the Contractor shall proof-roll prepared surfaces to check for unstable areas requiring additional compaction. If the Contractor finds such areas, notification of these unsatisfactory conditions to the Engineer shall be made and paving work shall not begin until such conditions have been corrected.

The Contractor shall not place asphaltic paving mixtures during the calendar period from October 15 to May 1, of the next succeeding year, regardless of temperature, except with the written authorization of the Owner or the Engineer.

Immediately prior to paving, the Contractor shall saw cut all intersecting streets and adjacent pavements to form a straight, vertical joint line.

Asphaltic paving mixtures shall not be placed over frozen subgrade or base or where the roadbed underlying the foundation or base is temporarily unstable from the effects of frost heaving.

The Contractor shall not place asphaltic paving mixtures when it is raining or snowing; any mixture exposed to rain or snow before final rolling which has, in the judgment of the Engineer, been adversely affected thereby, shall be removed and replaced at the Contractor's expense.

The Contractor shall not place asphaltic paving mixtures when the air temperature at the site of work, approximately three (3) feet above the ground in the shade and away from the effects of artificial heat is less than 36° F. The Contractor may place lower layer mixtures at a lower temperature with the Engineer's written approval.

3.4 Preparation and Transport of the Mixture

The paving mixture shall be composed of a homogeneous mixture of coarse and fine aggregate, mineral filler (when required), and asphalt cement heated to the proper viscosity for uniform distribution throughout the mixture.

Aggregates shall be fed uniformly to the plant so that surpluses and shortages will not occur, thereby causing breaks in the continuous operation. The aggregate shall be heated to provide a paving mixture temperature immediately after mixing of 300°F, plus or minus 15°. Mixing time shall be sufficient to provide uniformly coated aggregate.

Contractor shall deliver the mixture to the paver receiving hopper at a temperature no lower than 275°F (135°C). Contractor shall cover all loads during transport in periods of inclement weather or when the ambient temperature falls below 65°F (18°C).

The Engineer may reject asphaltic paving mixture not sufficiently mixed or defective in any manner.

3.5 Spreading and Finishing

The Contractor shall place the asphaltic mixtures by use of self-propelled spreading and finishing machines conforming to the specified requirements to the thicknesses shown on the Plans. The compacted thickness of individual lower courses shall not be greater than three (3) inches nor less than 1¾ inches. The compacted thickness of individual surface courses shall not be greater than 2 inches nor less than 1½ inches.

The operating speed of the paving machine when it is placing the asphaltic mixtures shall be consistent and shall not exceed that speed which is appropriate for the type of paver and type of mixture to produce a uniformly spread and struck-off layer having a dense, smooth texture without any tearing or segregation of the material, and without rolls or bumps in the surface. The speed shall coincide as closely as possible with the rate of delivery of the asphaltic mixture to provide, as nearly as possible, a continuous paving operation. The speed of the paver shall be subject to the approval of the Engineer.

Spreading and finishing shall be in accordance with the requirements of the appropriate section of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction as referenced above.

3.6 Compaction

The Contractor shall compact the course thoroughly and uniformly by rolling after spreading and strike-off. The initial rolling shall begin as soon as practical after the mixture is spread but not until the mixture will bear the roller weight without displacement, hair-cracking, or checking. The roller speed shall be slow enough to avoid undue displacement of the mixture. Keep roller wheels moistened to keep the mixture from sticking to them, without using excessive water. Rolling shall begin at the sides and proceed longitudinally parallel to the road centerline, each trip overlapping the previous trip and progressing to the crown of the road, except that when paving abuts a previously placed strip, the longitudinal joint shall be rolled first.

The Contractor shall compact with hot hand tampers or vibratory compactors in areas inaccessible to rollers. The Contractor shall not use pneumatic tire rollers for rolling of driveways and other areas where roller tire marks will not roll out smooth.

The Contractor shall check the surface after the initial rolling and shall repair displaced areas by loosening and filling, if required, with hot material. Following initial rolling and while the mixture has been compacted to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment.

The Contractor shall perform finish rolling while the mixture is still warm enough for removal of roller marks, and shall continue rolling until all roller marks are eliminated.

The lower course shall be compacted to 91½ percent Laboratory Density as determined by the nuclear density tests performed by a nuclear density technician certified at Level 1 and provided by the Contractor. Where a lower course is constructed directly over base course the compaction shall be 89½ percent density determined by the same test. The surface course shall be compacted to 91½ percent density determined by the same test. There will be no incentive pay adjustment for densities above the minimum specified.

3.7 Joints

The placing of any course or layer thereof shall be as nearly continuous as possible without joints. The Contractor shall not roll the unprotected end of the freshly laid mixture unless placement is discontinued long enough to permit the mixture to cool.

The Contractor shall make joints between old and new pavement and between fresh and previously cooled work so as to ensure bonding for the full depth of the course or layer. When laying is resumed, the Contractor shall clean the contact surfaces and apply emulsified asphalt tack coat. Joints for continuing work shall be formed by cutting back on the previous run so as to expose the full depth of the coarse or layer with a ½- to 1-inch vertical notch being created at the top of tapers on all layers. When a new mat is adjoining an old mat, the joint shall be formed by sawcutting the old mat on a straight line to provide a butt joint for the full depth of the new mat. The surface of the two courses or layers shall be co-planer across the joint.

3.8 Surface Requirements

The finished surfaces shall be smooth and true. The Contractor shall test surfaces by means of a 10 foot straightedge laid parallel to the centerline of the road. Irregularities in the binder course surface which vary in excess of ¼ inch from the lower edge of the straightedge between any two contact points shall be corrected.

Irregularities in the surface course that vary in excess of ⅛ inch from the lower edge of the straightedge between any two contact points shall be corrected.

3.9 Maintenance

Maintain and protect the work during the various stages of construction until the final acceptance. Any rich or bleeding areas, any breaks, raveled spots, or other unsatisfactory areas in the wearing surfaces shall be corrected during such maintenance period.

3.10 Traffic – Protection of Work

One lane of traffic shall be maintained on the street at all times. Access to private driveways shall not be prevented for more than one 24 hour period. Property owners shall be notified one day in advance of periods of restricted access.

The work shall be properly protected by barricades, flares, and flagmen to prevent damage to freshly placed asphalt until the pavement has cooled and hardened, and to prevent damage to vehicles.

3.11 Alley and Driveway

All requirements for grading, compaction and supplementing the base course that are set forth herein for the roadway, also apply to alleys and driveways, and for pavement construction shown on the Plans or specified to be paved.

3.12 Acceptance Testing

For all projects, the Contractor shall provide to the Engineer a sample of the job mix to be kept for future testing if required. The sample shall be of sufficient size to measure asphalt content, aggregate gradation, and volumetrics. The sample shall be taken from the actual mix delivered to the job site.

When so determined by the Engineer or the Owner's Authorized Representative the Contractor shall cut samples from the finished pavement at locations selected by the Engineer and restore the surface with new compacted material. The samples shall be tested by a recognized testing laboratory approved by the Engineer for pavement thickness, pavement density, asphalt content, and aggregate gradation. Samples shall extend the full depth of the pavement and shall be not less than 65 square inches.

One sample may be required from each day's run. The cutting of the sample, restoration of the surface and testing of the sample shall be incidental to the contract unit price for asphaltic concrete paving.

For all projects, the Contractor shall submit test results for the mixtures used from the manufacturer's Quality Management Program. Such tests shall be performed under the supervision of a Certified Asphaltic Technician. Such tests shall include aggregate gradation, percent asphalt content, and air voids.

3.13 Guarantee

The Contractor shall guarantee all materials and workmanship for one year from the date of approval of the final payment request by the Owner. This guarantee shall cover, but not be limited to, edge cracking, block cracking and raveling. Defects appearing within that period shall be corrected by the Contractor at his own expense.

*** END OF SECTION ***

SECTION 02514
ASPHALTIC TACK COAT

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

The Contractor shall provide and apply an asphaltic tack coat on all existing asphaltic surfaces. The Contractor shall conform to the requirements of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, most current edition, and all incorporated errata, annotated revisions, and subsequently issued supplemental specifications, unless the requirements set forth elsewhere in this section are more stringent.

PART 2 - MATERIALS & EQUIPMENT

2.1 Tack Coat

The tack coat shall be emulsified asphalt, conforming to AASHTO Designation, M140 or M208, as appropriate. The tack coat shall be SS-1, SS-1h, or CSS-1h with the asphalt emulsion diluted with equal parts water. The Contractor shall submit the material specification to the Engineer for approval prior to use.

2.2 Application Equipment

The Contractor shall furnish and use a pressure distributor capable of applying tack material uniformly, without atomization. He shall provide all tools as necessary to complete the work.

PART 3 - CONSTRUCTION

3.1 Construction Methods

The Contractor shall place tack coat in a single operation, but only during daylight hours when the air temperature is 40 degrees Fahrenheit or more and only upon a prepared, existing pavement which is dry and free of loosen dirt, dust or other foreign matter. The tack coat shall not be applied when it appears probable that the surface may be exposed to moisture during the penetration period. Immediately prior to the application of tack coat the prepared base shall

be thoroughly swept with a power broom to remove dust and loose dirt. Care shall be taken to avoid overlapping of joints.

3.2 Heating and Applying Tack Coat Materials: Application Rate

The asphaltic materials shall be heated and applied by equipment suitable for that purpose. The rate of application shall be 0.05 to 0.15 gallons per square yard, with a target application rate of 0.10 gallons per square yard. The amount shall be sufficient to wet, but not flood the surface.

3.3 Protection of Surfaces

The Contractor shall protect all adjacent surfaces, including curb and gutter, by some method satisfactory to the Engineer, to prevent their being spattered or disfigured by tacking operations. Traffic shall not be permitted on the tack coat until paving has occurred or for a period of time sufficient to allow the tack coat to penetrate and/or evaporate so that vehicles and pedestrians are not spattered. One line of the street shall remain open and untacked at all times. The work shall be properly protected by barricades and flagmen to prevent damage to freshly placed tack coat.

3.4 Drying Time

Daily application of the tack coat shall be limited to approximately that area of surface which can reasonably be expected to be paved during the same day. The area tacked shall not be paved until a period sufficient to allow for proper penetration and curing has elapsed.

3.5 Correction of Deficient Work

Any areas containing an excess or deficiency of asphaltic material and any breaks, reveled spots or other unsatisfactory areas in the tack coat shall be corrected prior to paving by the Contractor at his own expense.

END OF SECTION

SECTION 02516
BLACK BOILER SLAG SEAL COATING

PART 1 - GENERAL

1.1 Description of the Work Covered by This Specification Section

This section describes the provision of materials for and the application of an asphalt emulsion and slag seal coat composed of an application of asphalt binder material, with a covering of fine aggregate, on an existing paved roadway surface.

PART 2 - MATERIALS & EQUIPMENT

2.1 Asphalt Binder

The asphaltic material for seal coat shall be CRS-2P, Polymer modified. This asphaltic material shall be rapid set emulsion that has elastic properties and shall comply with AASHTO M316, meeting the applicable requirements of Section 475 of the State of Wisconsin Department of Transportation Standard Specifications for Road and Bridge Construction.

2.2 Aggregate

The aggregate for the "SLAG" roadways shall consist of hard durable particles of BLACK BOILER SLAG (by product of coal). Gradation requirements for the slag material shall conform to the following.

Sieve No.	Percent Passing
3/8-inch	100
¼-inch	95-100
No. 4	90-100
No. 8	45-75
No. 16	20-35
No. 30	05-10
No. 50	00-04
No. 100	00-02
No. 200	00-01

A sample is required before the start of the project.

Materials may be stockpiled no more than two weeks prior to start of the project. This may be amended with the consent of the Owner. Erosion control measures shall be put in place by Contractor to the satisfaction of the Owner to assure materials are contained to the stockpile area. The storage areas shall be cleaned

and swept by the contactor within one week of completion of the project to the satisfaction of the Owner.

2.3 Equipment

The Contractor shall have available on the site and use as appropriate an asphalt distributor, an aggregate spreader, two pneumatic rollers, and a power broom. The variation in the longitudinal spread of the distributor shall not vary by more than 10%, and the variation in the longitudinal spread of the distributor shall not vary by more than 15%. The rollers shall be self-propelled, smooth-tread, pneumatic-tired rollers. Rollers with a combination of pneumatic tires and steel drums are not allowed.

All rollers and brooms shall be equipped with a flashing amber or flashing amber lights visible from the front and rear and shall conform to standard DOT safety specifications.

PART 3 - CONSTRUCTION

3.1 Preparation of Existing Surface

Existing pavements to receive seal coat shall be cleaned over the full width to be treated immediately prior to the application of the asphalt binder. Particular care shall be taken to thoroughly clean the outer edges of the pavement to be treated.

The Contractor shall remove all loose material, silt spots, vegetation and other objectionable material from the street surface prior to applying a seal coat. Owner or Engineer shall verify roads are ready for seal coating prior to beginning work. The Contractor shall locate and protect all inlets, manhole covers, and valves boxes prior to applying seal materials. If during the Contractor's operations these castings are covered by any sealing materials, the Contractor will be responsible for cleaning or replacing castings at their own expense. All protection measures shall be removed within 2 weeks of completion of the final sweeping by the Contractor.

3.2 Application of Asphalt Binder

The asphalt binder layer shall be applied at a rate of 0.28 to 0.32 gallons per square yard in accordance with the provisions of Section 475 of the State of Wisconsin Department of Transportation Standard Specifications for Road and Bridge Construction. The temperature of the asphaltic emulsion at the time of application shall not be less than 150° or more than 180°, and shall be applied only when the air temperature is 50 degrees Fahrenheit, or higher, and when the surface is dry. Application shall not take place when rains are known or believed to be impending. The surface area treated with binder in any day shall be limited to the amount which can be properly covered with aggregate and rolled in that same day. The surface

which has been treated shall be closed to traffic until the aggregate is applied and rolled.

3.3 Application of and Rolling of Aggregate

Aggregate shall be spread in accordance with the equipment requirements and methods specified in Section 475 of the State of Wisconsin Department of Transportation Standard Specifications for Road and Bridge Construction. When the desired stage of tackiness of the applied asphalt binder is attained the aggregate shall be spread uniformly over the treated surface at an average rate of 18 to 22 pounds per square yard. The aggregate shall be damp to surface dry and, if necessary, it shall be moistened with water to reduce the dust coating which might affect its bond to the asphalt binder. Immediately after the aggregate is spread the surface shall be rolled.

Initial rolling shall consist of one (1) complete coverage performed with a pneumatic-tired roller and shall begin immediately behind the spreader. Binder and screenings shall not be spread more than 500 feet ahead of completion of initial rolling operations. Secondary rolling shall begin immediately after completion of the initial rolling. The amount of secondary rolling shall be sufficient to adequately seat the screening and in no case shall be less than two (2) complete coverages.

Following the seal coating process, the Contractor is responsible for the sweeping of the aggregate material within 48 hours after the seal process. All street, roads, and avenues shall be swept with a sweeper that picks up loose material. Owner shall be notified within 48 hours of this sweeping process being completed.

Traffic signs shall then be erected to limit speeds to 35 miles per hour for the next 24 hours where regulated speeds are greater than 35 miles per hour.

3.4 Warranty

The Contractor shall warrantee the materials and workmanship for a period of one year following acceptance of the work, as signified by final payment. Any defects in materials and workmanship found within the warrantee period shall be repaired by the Contractor or the affected areas shall be re-treated, at no cost to the Owner.

END OF SECTION

SECTION 02521
CONCRETE SIDEWALKS

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section describes the methods by which and the materials from which the contractor shall construct concrete sidewalks. Included in this work is the construction of sidewalk ramps with surface corrugations and thickened sidewalk sections at alleys and driveways.

1.2 Applicable Laws, Codes and Standards

The Contractor shall construct sidewalk ramps in accordance with Section 66.616 of Wisconsin Statutes and any applicable standards of the municipality.

PART 2 - MATERIALS & EQUIPMENT

2.1 Forms

The forms used in constructing sidewalk shall be made of steel or of wood and shall be of sufficient size and strength to resist movement during placement of concrete and to retain alignment and grade. Straight section wood forms shall be at least two (2) inches in nominal thickness. Curved sections of sidewalk shall be constructed using flexible spring steel forms or laminated boards.

2.2 Gravel Base

Gravel used for base under sidewalks shall be Wisconsin Department of Transportation Gradation No. 2 or No. 3, maximum particle sieve size being ¾ inches.

2.3 Concrete

Concrete shall be Class BB, as specified in Section 03301 of these specifications. All concrete shall be provided with synthetic fiber reinforcement at a minimum of 1.5 lbs/cu. yd.

2.4 Expansion Joint Filler

Expansion joints shall be created using pre-molded joint filler, bituminous fiber type or asphalt impregnated type, ASTM D994. The filler material shall be three-

quarters (¾) of an inch in thickness and of sufficient size to provide a continuous joint from the top surface to the bottom surface of the sidewalk and from one side of the walk to the other.

2.5 Curing Compound

Curing compound shall be wax resin, white-pigmented type, ASTM C309, Type 2. The compound shall be such that the coating formed by its application on concrete surfaces will provide an effective seal for at least 10 days. It shall adhere firmly to concrete, either partially set or hardened, and shall be ready-mixed for immediate use without alteration other than stirring.

PART 3 - CONSTRUCTION

3.1 Removal of Obstructions – Clearing and Grubbing

The Contractor shall remove all old sidewalk, curb and gutter, driveways, pavements, drains, trees, shrubs and any other items necessary to allow construction of the new sidewalks.

Tree roots shall be removed to a depth of 12 inches below the bottom of the sidewalk sand or gravel base materials and shall be cut at a point at least 12 inches horizontally from the finished edge of the sidewalk. Holes left from the removal of trees or obstructions shall be backfilled with sand and shall be thoroughly compacted and moistened before concrete is placed. All removed trees and obstructions shall be disposed of at a location outside the project area, such location and manner of disposal being acceptable to the Owner and in conformance with applicable solid waste disposal regulations.

3.2 Excavation, Backfilling and Grading

The Contractor shall excavate or backfill as necessary to meet the line and grades established in the field by the Owner, shown on the Plans, defined in the Special Conditions, or defined in these specifications. All existing sod, pavements, and other surface materials obviously unsuitable for subgrade materials must be removed and disposed. The Contractor shall notify the Engineer at least three working days in advance of his need for lines and grades. Where lines and grades are staked in the field stakes will be provided at an offset convenient for the Contractor at 50 foot intervals. Where curb & gutter exists, the top of curb shall be used for grade.

The costs of excavation and backfill shall be incidental to the unit bid price for concrete sidewalk being constructed in that location, unless the materials being excavated are being removed after the surface sod, pavements, etc., have been

removed, are below the subgrade, are unsuitable for subgrade materials and are ordered removed by the Engineer. In such cases, an extra payment shall be negotiated as provided in the General Conditions.

Obstructions shown on the Plans or visible from the ground surface prior to clearing and grubbing and which can reasonably be expected to be removed in order for construction of new sidewalk will not be basis for extra payment. Nor will extra payment be allowed for excavations below grade or for backfill materials required to fill such excavations when such excavation is caused by negligence of the Contractor.

Backfilling shall be accomplished by placing approved backfill materials in lifts not to exceed 12 inches. Each lift shall be mechanically compacted to a density greater than or equal to 95% of maximum density as determined by the Modified Proctor test or by AASHTO Designation: T99, Method C, with replacement of the Fraction of material on the ¾-inch sieve with No. 4 to ¾-inch material. The Owner shall pay for the first series of compaction tests, if such tests are ordered by the Engineer. If the compaction tests fail the Contractor shall recompact those areas and shall pay for the compaction tests on the recompacted areas.

After completion of necessary excavation and/or backfilling the Contractor shall grade the subgrade to within one inch of established grade and the area between the sidewalk and the adjacent property line shall be shaped to line, grade and section shown on the Plans, in the details at the end of this section, or defined in the Special Conditions. He shall remove all loose material from the subgrade, proof roll the subbase to check for unstable areas needing additional compaction and shall furnish the compacted subgrade to a true, uniform and smooth surface. All work in the boulevard area or in the area between the sidewalk and the adjacent property line shall be incidental to the payment for sidewalk.

3.3 Base Preparation

The contractor shall provide a crushed aggregate base to a minimum six (6) inch thickness for all sidewalks, unless otherwise shown on the Plans or specified in the Special Conditions. These materials shall be compacted as required for backfill in the previous subsection and shall be fine graded to the established grade. Any valve or curb stop boxes, catch basins, manholes or other utility appurtenances which exist within the limits of the sidewalk construction shall be adjusted to the finished grade at no extra cost so that the new construction will not interfere with the proper operation of the facility.

The base shall be thoroughly dampened before the time the concrete is placed. It is the sole responsibility of the Contractor to arrange for the water necessary for such dampening. No extra payment will be made for water or for the dampening process.

3.4 Form Construction

The Contractor shall set the forms to the required grades and lines, rigidly brace the forms, and secure them. Where the Owner selects to provide no line and grade, such as in cases where individual sections of existing walks are being replaced, it is the Contractor's sole responsibility to establish his own line and grade to construct the sidewalk in such a manner as to blend, both horizontally and vertically, with the existing walks or pavements.

Unless otherwise specified or ordered by the Engineer where the new sidewalk is being constructed adjacent to a street with existing curb and gutter the sidewalk shall be constructed at a grade at the front of the walk 0.3 foot higher than the grade of the top of the curb.

Tolerances for formwork grade and alignment, and for the resulting finished sidewalk, from the established line and grade, from 0.3 foot above the adjacent top of curb, or from the existing walks or pavements with which the new sidewalk is being blended shall be as follows:

Alignment and Grade Tolerance	- Less than or equal to ¼-inch
Surface Variation	- Less than or equal to ¼-inch in 10 feet
Vertical and /or Horizontal Joint Displacement With Reference to Existing Walks or Pavements	- Less than or equal to ¼-inch

Variations greater than those specified above shall be grounds for rejection of the work.

Where new sidewalks are being constructed, the forms shall be set and the sidewalk constructed with a transverse slope of ¼-inch per foot, toward the street side of the walk.

3.5 Joints

The Contractor shall construct weakened plane (contraction), expansion and construction joints with faces perpendicular to the sidewalk surface and transverse (at right angles) to the centerline of the walk, unless otherwise shown on the Plans or specified in the Special Conditions.

The Contractor shall provide expansion joints on each side of driveways; at

abutting concrete curbs, structures and other fixed objects; and at not more than 96 foot centers. Joint fillers shall extend the full width and depth of the joint, terminating not less than two (2) inches nor more than one (1) inch below the top surface of the finished sidewalk. On the sides of the walk, the joint filler shall be trimmed even with the concrete.

Joint fillers shall be provided in one-piece lengths, except as approved by the Engineer. Where more than one piece of joint filler is allowed the Contractor shall lace or clip together the sections of the filler.

Weakened plane (contraction) joints shall be formed by grooving the fresh concrete to a depth of at least ¼ of the walk thickness with a cutting tool. Transverse joints, either weakened place or expansion, shall be spaced at five foot centers.

Joints shall be matched to joints in adjacent driveways and curbs.

3.6 Concrete Thickness and Placement

Sidewalk thickness is shown on the Plan Detail Sheets, in the Special Conditions, or in the Bid Proposal.

Concrete shall be placed and cured in accordance with the requirements of Section 03301 of these specifications. The contractor shall also comply with the provisions of that section and with Subsection 2.3 of this section with regard to proportioning, mixing, and testing.

The contractor shall not place the concrete until the subgrade and forms have been checked for line and grade. He shall moisten the subgrade as required to provide a uniform dampened condition at the time the concrete is placed.

The contractor shall spread the concrete uniformly between the forms and shall strike it off and thoroughly compact it with a steel shod strikeboard.

3.7 Finishing Concrete

After the concrete has been thoroughly compacted and leveled, it shall be floated with wood or metal floats to smooth the surface and to eliminate irregularities and honeycombed areas. The surface shall be tested for trueness with a 10 foot straightedge.

Joints shall be edged with a $\frac{1}{8}$ to ¼-inch radius edger. Sidewalk edges shall be tooled with a ¼ to 2-inch radius edger.

The Contractor shall then create a brushed finish using a fiber-haired brush drawn transversely to the centerline of the sidewalk, except at driveway and alley crossings where the brush finish shall be longitudinal to the centerline of the walk.

The Contractor shall wet cure or cure finish the concrete with a white pigmented curing compound meeting the requirements or Subsection 2.6.

3.8 Curb Ramps

The Contractor shall construct curb ramps at all intersections. Such ramps shall be Type 1, as shown on the ramp detail at the end of this section, in all areas where the distance from the back of the curb to the back of the sidewalk is less than 12 feet. Type 2 curb ramps shall be constructed in all areas where the distance from the back of the curb to the back of the sidewalk is 12 feet or greater, unless otherwise shown on the Plans or specified in the Special Conditions.

Curb ramps shall be no less than 40 inches wide. The ramp slopes shall not exceed one (1) inch in 12 inches from the flow line elevation of the gutter to the sidewalk surface. The transversely sloped sides of the ramps shall not be more than 24 inches nor less than 18 inches in width at the curb. The Contractor shall provide normal sidewalk apron, sloping from the sidewalk elevation to the top of the curb, on each side of the ramp when constructing Type 1 ramps, and between each ramp when constructing Type 2 ramps.

All ramps shall have a surface texture. Surface texturing shall consist of linear impressions approximately ¼-inch to ⅜-inch in depth and width, oriented to provide a uniform pattern of diamond shapes measuring approximately 1¼ inches in width by 2¼ inches in length, with the length being parallel to the direction of pedestrian movement. This surface texture may be achieved by impressing and removing a piece of expanded metal regular industrial mesh into the surface of the ramp while the concrete is in a plastic state. If state or federal codes require a surface texture at variance with this requirement, those codes shall govern.

3.9 Alleys and Driveways

Sidewalks at alleys and driveways shall be constructed to the minimum thickness shown on the plan detail sheet. Transverse slopes of sidewalks at driveways and alley entrances shall match the slope of the driveway or alley ramp, but shall not exceed 6%.

Where a new concrete driveway pavement joins an existing concrete driveway pavement with at least a 7-inch average thickness, the two pavements shall be

joined by drilling ties made of No. 4 reinforcing rod at least six inches into the existing pavement at the midpoint of the thickness and extending those ties at least six inches into the new pavement. Ties shall be placed at 24 inches on center or closer. These ties shall be paid on a per tie basis separately from the concrete sidewalk or driveway.

3.10 Restoration of Boulevard Areas and Embankment and Excavation Slopes

The Contractor shall finish all boulevard areas and embankment and excavation slopes in accordance with Section 02570 of these specifications to the blend lines or points shown on the plans or plan cross-sections. If only blend points are shown on plan cross-sections the Contractor shall, for bid purposes, interpolate between adjacent sections. For blend areas, where topsoil cover will be greater than two (2) inches, the existing sod shall be removed before new topsoil is placed. The Contractor shall also repair all other areas he has disturbed in accordance with the provisions of Section 02570.

3.11 Protection

The Contractor shall protect sidewalk from damage until acceptance of the work. The Contractor shall exclude traffic from sidewalk for at least 7 days after placement and shall repair or replace broken or defective sidewalk as directed. He shall make provisions for pedestrians and vehicular traffic both during construction and during the 7 day traffic exclusion period using whatever barricades, warning signs, lanterns, and lights may be necessary.

3.12 Guarantee Period

The Contractor shall guarantee the sidewalk to remain free from cracks, chips, and spalling due to weather related or settlement causes for a period of one year from acceptance. The Owner may inspect the sidewalk after it has passed through the first winter for such defects and may call the Contractor back to the project area to repair or replace broken, cracked, chipped or defective sidewalks at no cost to the Owner.

*** END OF SECTION ***

SECTION 02522
CONCRETE CURB & GUTTER

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

The Contractor shall construct curb & gutter, curb transitions, gutter sections for ramps for the handicapped, drive-over gutter sections, and incidental appurtenances. The Contractor shall construct these structures in the locations and to the lines and grades shown on the Plans. The work includes protecting the work against damage until restoration is complete.

1.2 Codes and Standards

The Contractor shall construct the curb and gutter in accordance with the provisions of the current edition of the State of Wisconsin Department of Transportation, Standard Specifications for Road and Bridge Construction, except as modified herein, and in conformance with Wisconsin Statues, 66.0909, Curb Ramping.

PART 2 - MATERIALS & EQUIPMENT

2.1 Concrete

The Contractor shall use concrete that complies with the specifications for Type BB concrete as set forth in Section 03301 of these specifications. Special care shall be taken to use aggregates that yield concrete of the proper workability for this application.

2.2 Forms

Forms may be either stationary or slip-type forms. If machine pavers and slip forms are used for placing, forming, and consolidating the concrete, the finished curb and gutter shall be of quality equal to that produced by stationary forms and the methods described below.

Forms for straight sections shall be steel and shall be straight and free from defects. They shall be of such size and strength that when properly supported they can resist movement in any direction during concrete placement and can retain horizontal and vertical alignment. Bent, warped, split, or defective form materials are not permitted. Forms shall be full depth of curb and gutter sections.

The Contractor shall use flexible spring steel forms or laminated boards to form radius sections.

2.3 Joint Fillers

Joint fillers shall be used in expansion joints and for joints between the curb and existing sidewalk or other structures. Such fillers shall be pre-molded joint fillers, bituminous fiber type, or asphalt-impregnated felt type, complying with ASTM D994 or AASHTO Designation M213. Such fillers shall be ½ inch in thickness and shall extend the full depth of the concrete. Pre-molded joint fillers shall be kept on a flat surface in storage before insertion in the concrete. No warped or damaged material shall be used.

2.4 Curing Compound

Curing compound shall be wax resin, white-pigmented, conforming to the requirements of ASTM C309, Type 2. It shall be ready-mixed for immediate use without alteration other than stirring. It shall adhere firmly to concrete, either partially set or hardened.

2.5 Granular Base Course

Base course materials shall comply with the materials specification paragraphs in Section 02232 of these specifications.

PART 3 - CONSTRUCTION

3.1 Curb and Gutter Conformation

The Contractor shall construct curb and gutter to the conformations shown for Standard Curb and Gutter in detail shown on the Plan detail sheets except for drive-over curb, where noted on the Plans or ordered by the Engineer in the field and where sidewalk ramps are required. If curb and gutter terminates at a ditch, the Contractor shall construct a flared flume to match the topography.

3.2 Line and Grade

Line and grade shall be as shown on the Plans and as shown on the Plan detail sheet. The Contractor shall notify the Engineer at least three (3) working days in advance of his need for lines and grades. Stakes will be provided at 25 foot intervals at an offset convenient to the Contractor. All stakes and reference marks shall be carefully preserved by the Contractor. If these marks are disturbed, they shall be replaced at the Contractor's expense.

Care shall be taken to provide a uniform grade. The Contractor shall carefully check the grade and shall report irregularities to the Engineer. Deviations from established lines and grades shall be cause for rejection of all or part of the work.

3.3 Clearing and Grubbing, Removal of Obstructions

The Contractor shall coordinate with the local postmaster regarding relocation of mailboxes during the construction period. The Contractor shall, incidentally to the curb & gutter bid items, temporarily move such mailboxes as required by the local postmaster and shall permanently reinstall such mailboxes in locations and at elevations acceptable to the local postmaster and the property owner.

The Contractor shall cut and dispose of trees and shrubs, remove and dispose of roots, stumps, old curb and gutter, sidewalks, driveways, pavements, drains and other obstructions in the curb area, as necessary to complete the construction as shown on the Plans. Roots of trees shall be cut at a point at least one (1) foot from the nearest surface of the curb and gutter. Any items or materials of apparent value, such as culvert pipes, shall be salvaged for the Owner and transported to a location designated by the Owner, such location being within the municipality. Holes remaining from the removal of obstructions shall be filled with granular subbase course or crushed aggregate base course, and such fill material shall be thoroughly compacted.

3.4 Excavation, Backfilling and Grading

The Contractor shall excavate or backfill as necessary to meet the line and grades established in the field by the Owner, shown on the Plans, defined in the Special Conditions, or defined in these specifications. All existing sod, pavement, and other surface materials obviously unsuitable for subgrade materials must be removed and disposed of.

The costs of excavation and backfill shall be incidental to the unit bid price for curb & gutter being constructed in that location, unless the materials being excavated are being removed after the surface sod, pavements, etc., have been removed, are below the subgrade, are unsuitable for subgrade materials and are ordered removed by the Engineer. In such cases, an extra payment shall be negotiated as provided in the General Conditions.

Obstructions shown on the Plans or visible from the ground surface prior to clearing and grubbing and which can reasonably be expected to be removed in order for construction of new curb & gutter will not be basis for extra payment. Nor will extra payment be allowed for excavations below grade or for backfill materials required to fill such excavations when such excavation is caused by

negligence of the Contractor.

Backfilling shall be accomplished by placing ¾ inch crushed aggregate material in lifts not to exceed 12 inches. Each lift shall be mechanically compacted to a density greater than or equal to 95 percent of maximum density as determined by the Modified Proctor test or by AASHTO Designation: T99, Method C, with replacement of the Fraction of material on the ¾ inch sieve with No. 4 to ¾ inch material. The Owner shall pay for the first series of compaction tests, if such tests are ordered by the Engineer. If the compaction tests fail, the Contractor shall re-compact those areas and shall pay for the compaction tests on the re-compacted areas.

3.5 Base Preparation

The Contractor shall fill all holes and depressions with crushed aggregate base course, compact this backfill, and smooth the surface of the subgrade. The Contractor shall place four (4) inches of crushed aggregate base course under the entire curb and gutter area and to a point one (1) foot beyond the front and back faces of the curb and gutter.

If it is specified in the Special Conditions that the base course will be placed by another contractor in the process of construction of a new street, the Contractor shall grade and thoroughly compact the base to the foundation elevation necessary to construct the curb and gutter. The Contractor shall thoroughly moisten the surface of the base course and lightly oil the forms immediately before placing the concrete.

The Contractor shall also, before placing the concrete, adjust valve boxes, curb stops, storm water inlets, manhole frames and other utility structures to finished grade of new construction in a manner such that the new construction will not interfere with proper operation of the structures. Storm water inlets and manhole frames shall be adjusted by removing or adding concrete adjusting rings or masonry and then fixing them in place with a collar of concrete masonry. Storm water inlets shall be adjusted with a 1" PVC drainage pipe being incorporated from the base course on the street side of the inlet, through the adjusting ring to the inside of the inlet.

3.6 Forms

The Contractor shall set the forms to the required lines and grades and brace and secure the forms to assure rigidity. The Contractor shall use sufficient forms to allow continuous progress of the work and to permit the forms to remain in place for at least six hours after concrete placement.

The vertical face of the forms shall not vary from the established line by more than one (1) inch, and the change in line of the vertical face shall not exceed ¼ inch in 10 lineal feet of curb. The top of the curb shall not vary from the established grade more than ½ inch, and the change in grade of the top of the curb relative to the established grade shall not exceed $\frac{1}{8}$ inch in 10 lineal feet.

Slip forming methods shall produce equivalent results.

3.7 Joints

The Contractor shall construct expansion, contraction, and construction joints with faces perpendicular to the curb surface and at right angles to the curb line.

Expansion joints shall be constructed at each end of radius sections; at about three (3) feet from one side of abutting storm water inlets, at abutting walks, structures, and other fixed objects; and at 300 foot centers. Where practical, expansion joints in the curb should be placed at the same locations as existing expansion joints in adjacent pavement.

The Contractor shall extend joint fillers the full width and depth of expansion joints. Such fillers shall terminate not less than ½ inch or more than one (1) inch below the under-surface of the curb and gutter. Joint fillers shall be in one piece, wherever possible. Where more than one piece is required, the Contractor shall lace or clip joint filler sections together.

The Contractor shall construct contraction joints consisting of a slot or groove at least two (2) inches in depth by ¼ inch in width, at not less than six (6) nor more than twelve (12) foot intervals, and at two (2) feet from the top of the flare on each side of driveway aprons, at about three (3) feet from the side of street inlets opposite the side on which the expansion joint is placed. When machine methods are used for forming and finishing, the Contractor shall saw construction joints or create planes of weakness by insertion of partial separator plates having a minimum depth of two (2) inches. The depth of cut and the equipment used in sawing shall be done as soon as practical after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking takes place in the concrete. If this method results in random cracking, the Contractor shall use separator plates. Separator plates shall be removed as soon as practical after the concrete has been struck off, consolidated, and set sufficiently to preserve the shape and width of the joint.

3.8 Curb Ramping

The Contractor shall provide transitions and gutter sections to accommodate ramps at all intersections. (See the Plan Detail sheet.)

3.9 Drive Over Sections

At all driveway and alley entrances and at other locations designated on the Plans the Contractor shall construct drive over sections as shown on the Plan detail sheet.

3.10 Curb and Gutter Terminations

Where curb and gutter ends, including at the ends of radius sections, the Contractor shall create a four (4) foot long transition section in which the curb back is brought down to the gutter elevation. These transition sections may not be shown on the Plans and will be in addition to the length shown on the Plans. The transition section shall be separated from the standard curb and gutter by means of a contraction joint.

3.11 Concrete Placement

The Contractor shall comply with the requirements of Section 03301 for proportioning, mixing, testing, and placing concrete. The Contractor shall not place concrete until the base on which the curb and gutter will be poured and the forms have been checked for line and grade. The Contractor shall clean the forms before each use and coat them with non-staining form release agent to insure separation from concrete without damage, or discoloration to the concrete. He shall moisten the base, as required to provide a dampened condition at the time concrete is placed. Concrete shall not be placed around structures and frames until they have been brought to the required grade and alignment.

3.12 Finishing

After consolidating and striking-off concrete, the Contractor shall float the surface to smooth it, compact it and to produce a uniform texture.

The Contractor shall test the surface for trueness with a 10 foot straightedge. He shall distribute concrete as required to remove surface irregularities and honeycombed areas, and shall float repaired areas to provide a continuous, smooth finish.

The work shall be performed in a manner that results in curb and gutter uniform in appearance and structurally sound. Curbs found with unsightly bulges, ridges, low spots in the gutter or other defects shall be removed and replaced at the

Contractor's expense if the Engineer considers them to be irreparable.

The faces of the curb and gutter shall be thoroughly troweled and brushed. The Contractor shall round the edges of gutters, the back edge of curb and edges adjacent to expansion and contraction joints with a $\frac{1}{8}$ inch to ¼ inch radius edging tool. The Contractor shall then eliminate any tool marks on the concrete surface.

The Contractor shall create a brushed or broomed finish unless otherwise designated on the Plans or in the Special Conditions. After excess moisture (surface sheen) has disappeared, he shall provide this finish by drawing a fine-hair broom across concrete surfaces perpendicular to the line of traffic. The brooming operation shall be repeated if required to produce a fine-line texture.

The location of all sewer and water services crossing under the curb & gutter shall be marked by stamping an "S" or "W" in the top of the curb at the location of the crossing. The stamp shall be cast with 3" tall letters approved by the Village or the Engineer.

After removal of forms, the Contractor shall repair honeycombed and defective area with Portland cement grout.

3.13 Curing

The concrete shall be protected against excess loss of moisture and rapid temperature changes by use of approved curing methods. The Contractor shall wet cure the concrete using waterproof paper or white polyethylene sheets, or shall cure-finish the concrete with curing compound. If curing compound is used the Contractor shall apply it at a rate of 200 square feet per gallon to all formed surfaces immediately after the forms are removed. If the curing compound is damaged by rain or any other cause, it shall be restored to the original condition by reapplication.

3.14 Protection

The Contractor shall protect curbs from damage until acceptance of the work. He shall exclude traffic from curbs for at least seven (7) days after placement and shall repair or replace broken or defective curbs as directed. He shall make provisions for pedestrians and vehicular traffic both during construction and during the seven (7) day traffic exclusion period using whatever barricades, warning signs, lanterns and lights may be necessary.

3.15 Restoration of Adjacent Areas

The Contractor shall restore all surfaces or disturbed areas in accordance with Section 02570, but at least to the condition which existed before construction. Restoration shall continue from the curb to the blend lines or points shown on the plans or plan cross-sections. If only blend points are shown on the plan cross sections the Contractor shall, for bid purposes, interpolate between adjacent sections. For blend areas where topsoil cover will be greater than two (2) inches, the existing sod shall be removed before new topsoil is placed. Contractor shall leave a small amount of additional topsoil on each side of driveways to be restored with asphalt to allow property owners to blend topsoil to the edge of the driveway after the paving has been completed. If base course exists on the street side of the gutter the Contractor shall backfill and compact this base course adjacent to the new gutter so that the base course is suitable for subsequent paving and as necessary to protect the new curb and gutter. He shall backfill and grade the complete area from the curb to the sidewalk or property line. He shall provide four (4) inches of topsoil and shall apply fertilizer, seed, and mulch.

3.16 Guarantee

The Contractor shall, for a period of one (1) year following acceptance of the work, guarantee that the curb and gutter will not chip, crack, or spall from natural causes. Should such defects occur, the Contractor shall return to the job site and replace the defective sections of curb and gutter at his own expense.

END OF SECTION

SECTION 02601
MANHOLES

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section establishes the Contractor's responsibility for providing all necessary materials and equipment to construct manholes and for the construction of manholes where shown on the Plans.

PART 2 - MATERIALS & EQUIPMENT

2.1 Concrete Manhole Materials

For the vertical walls of the manholes, the Contractor shall provide forty-eight (48) inch internal diameter precast reinforced concrete rings conforming to ASTM C478. Joint shape shall be compatible with the joint materials specified below. Only where noted on the Plans or where specified in the Special Conditions shall rings of greater internal diameter than forty-eight inches be used.

Joints between manhole riser sections and/or between manhole riser and manhole top shall be sealed with a preformed butyl sealant. The butyl sealant shall meet or exceed the requirements of Federal Specification SS-S-210(210A), AASHTO M-198 and ASTM C990. The sealant shall be ConSeal CS-102 or CS 202, E-Z Stik by Press-Seal Gasket Corp, or approved equal.

Precast bases shall be a minimum of eight (8) inches thick, integral with the first riser section. Cast-in-place concrete bases shall be cast with the first riser section embedded at least four (4) inches into the base. Concrete for cast-in-place manhole bases shall be Type CC, as specified in Section 03301.

The manhole top shall be a precast eccentric cone, with a chimney of precast reinforced adjusting rings. The chimney shall not be greater than 9 inches high. Where space does not permit a cone top, a slab top with an eccentric opening may be used.

2.2.1 Manhole Pipe Seals - Sanitary Sewer Manholes

Flexible, watertight, rubber wedge ring, O-ring compression, or boot-type clamp-on seals for pipe entrance holes meeting the requirements of ASTM C923 shall be installed in the manholes. Grouting in pipes will not be allowed. Wedge ring type

seals shall be Press-Seal II, manufactured by the Press-Seal Gasket Corporation, or approved equal. O-ring type seals shall be Res-Seal, by Scales Manufacturing Corporation, A-LOK or approved equal. Boot-type external clamp-on seals shall have a stainless steel, external, adjustable clamp and shall be Kor-N-Seal, by NPC, Inc., or approved equal. Pipe to manhole connectors shall be of a size specifically designed for the pipe material and size specified on the plans.

2.2.2 Manhole Pipe Seals - Storm Sewer Manholes

Pipe to manhole connections for storm sewer shall be made by thoroughly grouting the connection both inside and outside the manhole to provide a smooth surface.

2.3 Manhole Castings

Manhole frames, lids, grating and steps shall be cast iron, ASTM A48, Class 35-B, of uniform quality, free from blow holes, porosity, hard spots, shrinkage defects, cracks or other serious defects. Castings shall have no jagged edges, shall be blast cleaned and shall be coated with a tar pitch varnish which will make a smooth, tough coating, not tacky under any weather conditions. Lids for sanitary manholes shall have concealed pick holes. The type of castings shall be as designated in Detail 02601-A of the Construction Details in the Plans.

2.4 Manhole Steps

Manhole steps shall consist of a ½" grade 60 steel reinforcing rod meeting the requirements of ASTM A615 encapsulated by an injection molded copolymer polypropylene meeting the requirements of ASTM D4101. Steps shall meet the requirements of ASTM C478 and shall be ML-10 steps as manufactured by American Step Company, Inc., steps provided by M.A. Industries, Inc., or approved equal.

PART 3 - CONSTRUCTION

3.1 Manhole Construction

The Contractor shall construct manholes in the locations shown on the Plans, using the precast or cast-in-place bases, precast risers, adjusting rings, and precast top sections specified in Part 2. Precast bases shall be set on firm, compacted level granular bedding. Compaction shall be to a density of 95% of Modified Proctor density. If over-excavation occurs, the Contractor must backfill with gravel and compact the backfill to a density of 95% of Modified Proctor density.
If the Contractor uses cast-in-place concrete bases, they shall be poured on a 12 inch thick layer of compacted crushed aggregate over undisturbed earth. The first

riser section shall be supported on brick and be embedded in the base a minimum of four (4) inches.

Risers, top sections, adjusting rings, and castings shall be joined using compatible rubber rings or plastic gasket materials specified in Part 2. When plastic gasket material is used, the joining surfaces shall receive the manufacturer's approved primer. Under the weight of superimposed riser sections, the gasket material shall form a tightly packed, watertight seal in the annular joint space.

Lift plugs shall be completely grouted shut and smoothed to match the inner surface of the manhole. Adjusting rings shall be grouted in place, with grout being placed so that the outer surface is completely covered with a thin layer of grout.

No visible leakage shall occur at any joint.

3.2 Pipe Connection to Manholes

Smooth flow channels connecting inlet and outlet pipes, with smooth radius transitions when manholes have more than one entrance pipe and when there are changes in alignment or grade at the manhole shall be constructed. For sanitary sewers, the flow channel of the invert may be precast where possible. It shall be troweled smooth and the bench shall be finished with a brush.

For sanitary sewer construction, the Contractor shall install pipe seals in accordance with the recommendations of the manufacturer of the seals. For storm sewer construction, the pipe to manhole connections shall be thoroughly grouted to form a smooth, watertight surface both inside and outside the manhole.

The Contractor shall take extreme care to support the pipes immediately outside manholes until those pipes reach undisturbed soil.

Connections for future sanitary sewers, where indicated on the Plans, shall consist of a short piece of sewer terminating with a bell end and stopper, or bulkhead, not more than one (1) foot or one stub diameter outside the manhole wall, unless otherwise shown on the Plans. If no elevation is given, the Contractor shall set the invert of the stub equal to the invert of the main sewer entrance.

Variations of greater than 0.02 feet from the manhole pipe inverts shown on the plans shall be cause for rejection of the manhole. Unless shown otherwise on the plans a minimum drop of 0.10 feet shall be provided from the lowest incoming sanitary sewer invert to the outgoing sanitary sewer invert.

3.3 Pipe Drop Connection

Where the vertical distance from the invert of the incoming sewer to the spring line of the out-going sewer is equal to or greater than two (2) feet, manhole connections shall be drop connections, with concrete encasement, constructed according to the Construction Detail sheets in the Plans. The drop assembly shall consist of a tee or wye connecting to the inflowing sewer, a drop pipe of the same diameter as the inflowing sewer, and a 90-degree bend at the bottom. Unless otherwise indicated, the entire assembly shall rest on the manhole base or an extension of the manhole base. When encasement is required, in order to allow for some in-field adjustment of pipe inverts, the upper pipe connection shall be encased in concrete in the field and shall not be pre-cast. The lower pipe connection may be pre-cast to a point no closer than six inches below the upper pipe connection. The final upper pipe connection shall have a removable bulkhead or cap on the inside of the manhole.

3.4 Setting of Castings

Manhole castings shall be set by the Contractor to the elevations shown on the plans. On street construction projects, if the surface asphalt will not be constructed in the same year as the manhole, the casting shall be adjusted by setting to final plan grade and constructing an asphalt ramp surrounding the casting. Ramp diameter shall be sufficient to not impede snowplowing operations, minimum ten feet. The ramp shall be milled prior to surface course construction. This method shall be used unless otherwise called out on the plan sheets.

*** END OF SECTION ***

SECTION 02602
INTERNAL MANHOLE CHIMNEY SEALS

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section includes the materials and procedures required for the internal sealing of the entire chimney area of sanitary manholes.

1.2 Definitions

A. Chimney - The cylindrical variable height portion of the manhole structure used to support and adjust the finished grade of the manhole frame. The chimney extends from the top of the cone to the base of the manhole frame.

B. Cone - That portion of the manhole structure which slopes upward and inward from the barrel of the manhole to the required chimney or frame diameter.

1.3 System Description

A. Design Requirements - The manhole frame seal shall be designed to prevent leakage of water through the above described portions of the manhole throughout a 25 year design life. The seal shall also be designed so that it can be installed in manholes where the diameters of the frame and chimney differ by up to 20%.

B. Performance Requirements - The frame seal shall be capable of repeated vertical movement of not less than two inches and/or repeated horizontal movement of not less than 2 inch after installation and throughout its design life.

1.4 Submittal

A. Shop drawings shall be submitted in accordance with Section 01300.

B. Test Report - A test report from an approved testing agency, showing that the seal meets the performance requirements of Section 1.3(B) shall be provided by each frame seal manufacturer or supplier.

1.5 Manufacturer

The chimney seals shall be manufactured by Cretex, Inc., or approved equal.

PART 2 - MATERIALS & EQUIPMENT

2.1 Frame Seal

Frame seals shall consist of a flexible internal rubber sleeve and extension and stainless steel compression bands, all conforming to the following requirements:

A. Rubber Sleeve and Extension - The flexible rubber sleeve, extensions and wedge strips shall be extruded or molded from a high grade rubber compound conforming to the applicable requirements of ASTM C-923, with a minimum 1500 psi tensile strength, maximum 18% compression set and a hardness (durometer) of $48^{+}/-5$.

   The sleeve shall be either double or triple pleated, with a minimum unexpanded vertical height of 8 inches and 10 inches respectively and a minimum thickness of 3/16 inches. The top and bottom sections of the sleeve shall contain an integrally formed expansion band recess and multiple sealing fins.

   The top section of the extension shall have a minimum thickness of 3/32 inches and shall be shaped to fit into the bottom band recess of the sleeve under the bottom chimney seal band, and the remainder of the extension shall have a minimum thickness of 3/16 inches. The bottom section of the extension shall contain an integrally formed expansion band recess and multiple sealing fins matching that of the rubber sleeve.

   Any splice used to fabricate the sleeve and extension shall be hot vulcanized and have a strength such that the sleeve shall withstand a 180 degree bend with no visible separation.

   The continuous wedge strip used to adapt the rubber sleeve to sloping surfaces shall have the slope differential needed to provide a vertical band recess surface, be shaped to fit into the band recess and have an integral band restraint. The length of the wedge strip shall be such that, when its ends are butted together, it will cover the entire inside circumference of that band recess needing slope adjustment.

B. Expansion Bands - The expansion band used to compress the sleeve against the manhole shall be integrally formed from 16 gauge stainless steel conforming to ASTM A-240 Type 304, with no welded attachments and shall have a minimum width of 1-3/4 inches.

   The bands shall have a minimum adjustment range of 2 diameter inches and the mechanism used to expand the band shall have the capacity to develop the

pressures necessary to make a watertight seal. The band shall be permanently held in this expanded position with a positive locking mechanism. Any studs and nuts used for this mechanism shall be stainless steel conforming to ASTM F-923 and 594, Type 304.

2.2 Installation Equipment

The Contractor shall have a manufacturer's recommended expansion tool and all other equipment/tools necessary to install the frame seals.

2.3 Cementitious Grout

Cementitious grout shall be premixed, non-metallic, high strength, non-shrink grout which meets the requirements of ASTM C-191 and C-827 as well as CRD-C588 and C621. When mixed to a mortar or 'plastic' consistency, it shall have minimum one day and 28 day compressive strength of 6,000 and 9,000 psi, respectively.

PART 3 - CONSTRUCTION

3.1 Field Measurements

The Contractor shall measure the manhole to determine the information required on the manufacturer's 'Sizing and Ordering' procedure. This information is needed to obtain the proper size of bands, the size and shape of the rubber sleeve and the need for and size of any extensions.

3.2 Surface Preparation

All sealing surfaces shall be reasonably smooth, clean and free of any form offsets or excessive honeycomb.

The top internal portions of the cone shall have a minimum 3 inch high vertical surface. The preparation of this vertical surface when none exists shall be in accordance with the frame seal manufacturer's instructions.

3.3 Installation of Frame Seal

The internal frame seals and extensions shall be installed in accordance with the manufacturer's instructions. Where sanitary manholes are within the pavement surface, the seal shall only be installed after the lower course of pavement has been placed, unless specifically indicated in the Special Conditions.

END OF SECTION

SECTION 02701
WATER MAIN

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section covers the construction of water main, hydrants, valves, and appurtenances as shown in the details on the plan sheets. This section includes specifications for corporation stops, curb stops and water service pipe. This section covers all materials, labor, tools and equipment necessary to construct the water main and all appurtenances, complete and in place.

PART 2 - MATERIALS & EQUIPMENT

2.1 Water Main

Unless otherwise designated on the Plans or in the Special Conditions water main shall be ductile iron pipe. This pipe shall conform to ANSI A 21.5 and AWWA C-151, Class 52. Fittings shall conform to the requirements for straight sections of pipe.

The pipe shall be straight, true and circular in section, with the inner and outer surfaces concentric. Pipe lengths shall be at least 16 feet long, exclusive of the socket. Each length shall have the class designation and manufacturer's name and ASTM or AWWA designation conspicuously marked upon it.

The wall thickness of the pipe shall be adequate for the depth of cover shown on the Plans, but for at least seven feet of cover, using any of the trench beddings shown in the detail on the Plan sheets. The thickness shall also be sufficient to withstand a working pressure of 150 pounds per square inch, plus a water hammer allowance of an additional 100 pounds per square inch.

The pipe shall have a standard cement mortar lining on the inside surface. The lining shall be 1/16 inch in thickness for pipes 3 through 12 inches in diameter, and 3/32 inch in thickness for pipes with nominal diameters over 12 inches. A bituminous seal coat, conforming to ANSI 21.4 shall be applied to the exterior of all pipes and fittings.

The pipe shall be encased in polyethylene conforming to AWWA C-105/A21.5.

2.2 Water Main Joints and Fittings

Joints connecting pipe to pipe shall be slip-joint (push-on) type. Joints connecting pipes to fittings shall be mechanical joint type. Joints shall conform to ANSI 21.11 and AWWA C-111. Acceptable brand names of joints shall be Tyton, Bell-Tite, Super Bell-Tite, Fastite or approved equal.

Fittings shall be ductile iron, conforming to ANSI/AWWA standard C110/A21.10, latest version, for long body fittings, and ANSI/AWWA standard C153/A21.53, latest version, for compact fittings. All fittings shall be pressure rated at 350 psi, minimum. All fittings shall be cement-lined and seal-coated in accordance with ANSI/AWWA standard C104/A21.4, latest version, and shall be outside coated with a 1 millimeter thick bituminous material, factory applied. To ensure quality control all products must be manufactured in accordance with applicable AWWA standards through ISO 9001-2000 approved manufacturing facilities. A current ISO certificate that matches the company name on the product is required for traceability. These manufacturing facilities must be covered under a single ISO certificate for periodic audits by third party accreditation bodies for evaluations. These evaluations shall include manufacturing processes, quality control, corrective and preventive actions, document control and customer surveys. These periodic confirmation tests and surveillance audits shall document continuation of product approvals by auditing the entire quality systems including design, infrastructure, system implementation, distribution, training, quality control and assurance, and document control. AWWA fittings must be NSF61 listed and certificates available upon request. Fittings shall be manufactured by Tyler Pipe Industries, Star Pipe Products or approved equal.

Electrical conductivity across joints and fittings shall be provided according to the manufacturer's recommendations. Conductivity devices may be cable bond type or a copper conductivity strip. Either shall be capable of carrying 500 amperes continuously. Metal wedges are not permitted. Lead-tipped rubber gaskets or lead-caulked joints are not permitted.

For fittings, hydrants, valves and shortened pipe sections where cable bond type or copper conductivity type continuity devices are not provided by the manufacturer the Contractor shall field weld a lug onto the fitting, hydrant, valve or shortened pipe section and shall field install a strip or cable capable of carrying 500 amperes continuously between the sections. Cable bonds or copper conductivity strips can be installed around such fittings, valves or shortened pipe sections; but hydrants shall be equipped with continuity devices.

2.3 Valves and Valve Boxes

Unless specified elsewhere, all water valves shall be gate valves.

Gate valves for main 12 inches in diameter or smaller shall be designated for continuous cold hydrostatic working pressure of 150 pounds per square inch and shall be shop tested to 300 pounds per square inch. They shall be iron body, fully bronze mounted, bronze stem, double disc, resilient-seated gate valves, conforming to AWWA C-515. They shall have a non-rising stem, a 2-inch square operating nut, which opens counterclockwise, an O-ring stem seal, and mechanical joint ends. All mechanical joint connections to valves and the valves themselves shall use stainless steel bolts.

The nominal diameter of the valves shall be the same as that of the water main in which the valves are used. Where a valve is placed at the junction of two different diameters of water main the nominal diameter of the valve shall equal that of the larger water main, unless otherwise designated on the Plans.

All valves for water mains 14 inches in diameter and greater shall be of the same type of construction as for valves used in smaller water mains as specified above, however, valves 12 inches in diameter and smaller shall be placed in valve boxes, whereas, valves 14 inches in diameter and greater shall be placed in valve manholes.

Valve boxes shall be of a type approved for use by the valve manufacturer. Valve boxes shall be three-piece, 5 ½ inch diameter shaft, cast iron, screw-type, bell type base, as manufactured by Tyler, with allowance for adjustments up to 6 inches above or below the final grade shown on the Plans, unless otherwise specified in the Special Conditions to these specifications. Non-locking stay-on type covers, shall be provided and shall be marked "Water". Valve box inserts are not allowed for adjustment of valves to final pavement grade. All materials and castings used in valve boxes and valve manholes shall be suitable for roadway installations.

2.4 Corporation Stops, Curb Stops and Curb Stop Boxes

All corporation stops and curb stops shall be 1 inch minimum diameter.

Corporation stops shall serve as shut-off valves on the service taps at the main and shall have flared or compression joints, with conductivity being provided across the joint. They shall be Mueller H15008N (1") or H15013N (1½" or 2").

Curb stops shall serve as shut-off valves at or near the property lines of water services and shall be Mueller H15155N (1") or H15209N (1½" or 2"), with

compression type joints. Joints shall be both sides for copper. Conductivity shall be provided across all joints.

Curb stop boxes shall be Minneapolis pattern, Mueller H10300, with 7-8 foot extensions. The curb boxes shall be slip-type extension, with the upper section being 1 ½ inches in diameter. The curb stop boxes shall not be provided with stationary rods and guide rings unless the box is to be installed at deeper than seven feet, in which case a rod shall be provided to bring the top of the rod to less than 6½ feet from the ground surface. Curb stop boxes shall be furnished with brass or plastic pentagon head plug type lids. Blind services shall end after the curb stop with a 1 foot long section of copper, capped to withstand 150 psi. The lid and base of the curb box shall be cast iron, the upper section shall be steel pipe. Each box shall be heavily coated with black asphaltum paint.

2.5 Water Services

Water service pipe shall be soft annealed seamless copper tubing designated for use as water service pipe, 1 inch minimum diameter. It shall be soft type "K" copper tubing conforming to ASTM B-88. All pipe shall be circular in section, with the inner and outer surfaces concentric. The pipe shall be adequate for the depth of cover shown on the Plans, but at least for seven feet of cover, without deformation resulting. The pipe shall be designated to withstand a working pressure of 160 pounds per square inch, or greater. The pipe shall be marked at evenly-spaced intervals of not greater than 1½ feet with the nominal diameter, type, class, ASTM designation and the manufacturer's name and trademark.

Fittings shall be of cast brass having an alloy of 85% copper, 5% tin, 5% zinc and 5% lead, and shall be uniform in wall thickness and strength and free of any defect which may affect serviceability. Connections shall be compression type. All joints shall be conductive. Each fitting shall be permanently and clearly marked with the manufacturer's name or trademark.

2.6 Fire Hydrants

All fire hydrants shall be furnished with a main valve opening of at least 5¼ inches, and a 6-inch mechanical joint inlet connection, one 4½ inch pumper nozzle and two 2½ inch hose nozzles. The pumper and hose nozzles shall have National Standard Threads. The hose nozzles shall have a screw-on cap, secured by heavy chains. The caps and the hydrant mechanism shall be operated by pentagonal operating nuts, one inch on each side, which open counterclockwise. Hydrants shall be sandblasted and painted as described in Section 3.5. The hydrants shall be constructed for the trench depth shown on the Plans, or for 7½ feet if not otherwise specified. Hydrants shall have cast or ductile iron bodies, shall be fully bronze mounted, and shall conform to the latest AWWA specifications. Each hydrant shall

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have a traffic flange, unless otherwise specified in the Special Conditions to these specifications. Hydrants shall be Waterous Pacer model, with bronze-to-bronze seats.

2.7 Concrete

Concrete used for buttressing or offsets and elbows and in other places in water main construction shall be Type CC as specified in Section 03301 of these specifications.

PART 3 - CONSTRUCTION

3.1 Line and Grade

Primary line and grade for water main will be staked, or otherwise established, in the field by the Engineer. This, in conjunction with information shown on the Plans, will be sufficient control for the work. The Contractor shall be responsible for preserving the control stakes, marks or nails, and, if such control stakes, marks or nails are disturbed, for whatever reason, the Contractor shall pay the actual cost of replacement. The Contractor shall give notice to the Engineer at least three days in advance of the day he wishes the project to be staked, in order that the Engineer may have enough time to schedule and complete the establishment of control.

The Contractor shall, using methods approved by the Engineer, transfer line and grade from the primary control to the actual pipeline. Such methods may vary at different locations to achieve the desired degree of accuracy. The Engineer may elect to provide no control stakes, marks or nails. In such cases the Contractor shall construct the water main at a depth such that seven feet of cover over the top of the pipe to the finished grade shown on the Plans or the existing grade, whichever results in greater burial, is provided.

3.2 Laying of Water Main

All pipe and other material shall be handled carefully so that the surface coatings are not damaged nor the material chipped or cracked. Materials shall be stored with similar care to prevent damage. Any damaged materials shall not be used on this project. If coatings are damaged they may be touched up with a compatible finish upon approval by Engineer.

The Contractor shall provide and use proper implements, tools and facilities satisfactory to the Engineer to assure the safe and convenient execution of the work. Individual pipes and fittings shall be carefully lowered into the trench by means of a derrick, ropes or other suitable tools or equipment, in such a manner as

to prevent damage to protective coatings and linings. Under no circumstances shall water main materials be dropped into the trench.

All foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench, and they shall be kept clean during and after laying. All openings in the pipe which are not to be immediately connected to other pipes or fittings shall be securely closed, and if work is suspended, suitable stoppers shall be placed to prevent earth or other substances from entering the main.
Every length of pipe shall be bedded uniformly throughout its entire length. Necessary deflections of joints shall not exceed those recommended by the manufacturer.

All pipe shall be encased in polyethylene as described in AWWA C-105/A21.5.

Installation of ductile iron mains and their appurtenances shall be in conformance with AWWA standard C600-10, with the provisions of this specification and with the details shown on the plan detail sheet. Where there is a conflict between the provisions of these three documents the strictest provision shall be considered to apply.

No pipe shall be laid in water or when the trench conditions are unsuitable for such work.

All existing curb stops, valves, or hydrants which are removed during the project shall be salvaged for the Owner and shall be transported to the Owner's utility garage, unless otherwise specified.

The Contractor shall be responsible for all temporary buttresses and restraints for testing, and for exposing existing mains, tees, etc., for making connections. Care shall be taken to de-pressurize mains as necessary in making connections and in protecting workers from possible blow-offs of tees, valves, elbows, etc. Restraints shown on plan details are intended only for use in a finished, buried system, not as sufficient restraint in an exposed system such as will occur during connections to pressurized mains.

3.3 Joints

Mechanical joint surfaces which are to bear against the rubber gaskets shall be thoroughly brushed and cleaned. The rubber gasket shall be cleaned with soapy water and placed on the plain end while the gasket is still wet. The bolts on the mechanical joint shall be alternately tightened in a manner providing even pressure around the entire circumference of the gland. The applied torque shall be according

to the manufacturer's recommendations. The wrench handle shall be more than eight inches long, but less than ten inches long.

Slip-on (push-type) joints shall be made in accordance with the directions of the manufacturer. The resilient joint filler or sealer and the area against which it bears shall be thoroughly cleaned and wiped just before assembly. Joint lubricant shall be organic sterile material approved by the State Department of Safety and Professional Services.

3.4 Valves

The Contractor shall provide and install valves where shown on the Plans. A valve box shall be provided, except where a valve manhole is shown or is required by these specifications. Such valve boxes shall be installed so that they will not transmit shock or stress to the valves. Each valve box shall be centered and plumb over the wrench nut of the valve, and the box cover shall be flush with the finished surface. The material under the valve box opening at the top of the valve, itself, shall be compacted clay rather than compacted granular backfill. The valve box details are shown on the Plan sheets. The Contractor shall install the boxes and manholes in accordance with the provisions of the appropriate detail on the Plan sheets. Hydrant valves shall not be placed so that the valve box is in, or touching the curb & gutter. The Contractor shall move the valve closer to the water main to avoid the curb & gutter or behind the back of curb only if locating it in the asphalt pavement is not possible.

Valves shall be connected to the nearest tee and restrained with MegaLugs in accordance with the detail on the Plan sheets.

3.5 Fire Hydrants

The exact location of the hydrants will be staked by the Owner or the Engineer. The Contractor shall place one-half cubic yard of washed gravel under the hydrant base for drainage. Hydrants shall be thoroughly cleaned of dirt or other foreign materials before they are set. They shall stand plumb, with hose nozzles parallel facing the curb or the edge of the pavement and with the pumper nozzle facing the curb or the edge of the pavement. Hydrants shall be carefully braced and blocked to prevent disturbance during backfilling and during their normal operation. Detail 02701-A on the Plan sheets provides directions which the Contractor shall follow for hydrant installation. A retainer gland shall be used in connecting the hydrant to the hydrant lead.

After installation but prior to acceptance, each hydrant shall be sand-blasted and re-painted.

All work must conform to the accepted practices for sandblasting, priming and painting of fire hydrants. Work shall include complete sandblasting, one coating of primer material to be applied immediately after sandblasting, one coating of paint material 4 to 28 hours after primer application on each fire hydrant and one coat of paint on the caps of the hydrant nozzles. The Contractor is responsible for cleanup of excess sandblast material from the sidewalk, driveway, surrounding paved area and turf and/or landscaping. The Contractor shall provide protection to any sidewalk, driveway, paved area, turf and/or landscaping so spray primer/paint material does not discolor said sidewalk, driveway, paved area, turf and/or landscaping. If Storz adaptors are on the hydrants, they shall be removed before sandblasting and reinstalled after painting. Hydrant heads shall be rotated before painting so that they are installed at a 45° angle to the right as viewed from the curb. Chains shall be painted by spraying. Tape shall be used to keep sand out of the hydrant mechanism.

The Contractor shall use the following materials for priming and painting of the fire hydrants and shall follow all recommended specifications and procedures outlined by the product manufacturer:

Primer- Sherwin Williams High Performance Alkyd Kembond, 3 mils dry film thickness

Paint – Sherwin Williams High Performance Acrylic "Sher-Cryl HPA" Model B66-300 Series Gloss (Safety Red) SW4081, 3 mils dry film thickness

or

Primer- PPG Pittsburgh Paints Pitt-Tech 90-712 Primer/Finish Waterborne Acrylic, 3 mils dry film thickness

Paint – PPG Pittsburgh Paints Pitt-Tech 90-Line Waterborne Acrylic Satin Gloss (Safety Red), 3 mils dry film thickness

3.6 Reaction Blocks, Buttresses, MegaLugs and Rodding

The Contractor shall install reaction blocks of poured concrete at all tees, opposite of branch, and on the outside of all bends which deflect more than 12 degrees. Reaction blocks of solid concrete shall be used for hydrants, end caps and plugs, supports for fixtures and where otherwise directed by the Engineer.

Where a horizontal offset is made by means of bends, all bends shall be secured by two means of restraint. Vertical offsets shall be secured by both rodding and MegaLugs. MegaLugs shall be used on all joints within 2 full pipe lengths back from joints for temporary or permanent 'dead ends'.

Concrete reaction blocks, buttresses and strapping shall be installed in accordance with the details on the plan sheets.

3.7 Interruptions to Existing Services

When active water services must be interrupted to make necessary tie-ins to existing mains the Contractor shall notify the Owners and users affected by the shut-off 24 hours in advance. No shut-off shall take place until the necessary trenching has been completed, the new pipe has been cut to length, all necessary fittings are on hand at the site and the Owner has approved the shut-off.

3.8 Water Service Installation

Water service connections shall be laid to individual lots or sites as shown on the Plans. The Contractor shall make the necessary connections or taps in the main and shall install corporation stops or valves as shown in the details on the Plan sheets. Wisconsin Administrative Code SPS 382.40(8), as administered by the State Department of Safety and Professional Services, shall govern the installation of water services.

The Contractor shall furnish and install service pipe from the corporation stop or valve to the point shown on the Plans. The Contractor shall place a brick under the stop. Services shall be one inch nominal diameter unless otherwise indicated on the Plans or in the Special Conditions to these specifications.

A horizontal gooseneck or offset of the service shall be provided near the main with the gooseneck placed in such a manner that the backfill tends to tighten the corp stop joint. The Contractor shall exercise care in laying and backfilling the service pipe so that it shall be reasonable straight and free from kinks or compressed areas. The service pipe shall be placed at least seven feet below the established grade. If existing services are buried less than 7 feet adjustment to existing service grade shall be made using copper pipe on the property side of the curb box. During backfilling all valve boxes used shall be supported in a vertical position accurately centered over the valve or stop. Curb boxes shall be adjusted to finished grade elevation.

Full lengths of pipe, free from splices, shall be installed between the main and the curb stop. Any existing services broken or disturbed during construction shall be totally replaced from corporation stop to curb stop. Splicing is not acceptable. Joints shall be compression or flared flanged type, as appropriate for the type of pipe used. Flared flanged type joints for copper pipe shall be made on-site with a flaring tool and securely tightened against the beveled fitting with the sleeve nut. The use of jointing compound with flared flanged type fittings is prohibited.

Connections of new services to old lead services or repair of lead services shall be made using a soldered and wiped joint, according to standard plumbing procedures.

The location of all water services crossing under the curb & gutter shall be marked by stamping a "W" in the top of the curb at the location of the crossing. The stamp shall be cast with a 3" tall letter approved by the Village or the Engineer.

3.9 Disinfection of Water Mains

Disinfection of water mains shall be in accordance with these specifications, the current Wisconsin Department of Natural Resources standards and with AWWA standard C651. Where there is a conflict between the provisions of these three documents the strictest provision shall be considered to apply. During water main installation Calcium Hypochlorite shall be used to disinfect the main. The chlorine concentration resulting from this disinfection shall be at least 50 parts per million. Upon completion of the main, it shall be filled with water and left to stand for at least 24 hours. Intermediate valves shall be operated during this period. The Contractor can then flush the main. The Contractor shall obtain all necessary permits from the Department of Natural Resources for disposal of flushing water.

3.10 Acceptance Testing

The Contractor shall pressure test each valved section of water main as soon as possible after its construction and after the backfilling of the trench has been completed. The test shall be completed with corporation stops installed. The test pressure at the lowest point of the test section shall be 150 pounds per square inch and shall last for two (2) hours. The pressure shall not vary by more than +/-5 psi during the test. Leakage allowed shall be 0.485 gallons per hour per mile of pipe per inch nominal diameter of pipe.

The Contractor shall furnish all necessary equipment and labor for the test. The testing procedure shall be approved by the Engineer and the Engineer shall be notified so that he may be present at the time of the test. Should any test of pipe disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defect or defects and retest that section until the leakage is within the specified allowance.

Following satisfactory completion of the pressure test the Contractor shall test the water for coliform bacteria. If the test shows the presence of coliform bacteria, the Contractor shall rechlorinate the main and repeat the test until a satisfactory result is obtained.

Fittings, taps and all extra work involved in sampling or rechlorinating shall be provided by the Contractor at no extra cost to the Owner.

The Contractor shall perform an electrical continuity test on the entire project between hydrants or any other accessible points of the backfilled water main system. If the test indicated a lack of electrical continuity, the contractor shall find and repair the connection at the point at which the circuit is broken.

3.11 Abandonment of Existing Mains, Service Laterals and Valve Boxes

Any existing mains to be abandoned shall be exposed at the tee, severed and capped. Any existing laterals to be abandoned shall be exposed at the corporation stop, the corporation stop shall be closed, the lateral removed from the corporation stop and a cap applied. Any laterals abandoned shall then be opened and tested at the old curb stop or other point of reconnection to be sure that the lateral is not being fed from another source. Any valve boxes, and stems that are abandoned shall be removed within 2 feet of surface and backfilled to the main. The work shall be at no additional cost to the Owner.

PART 4 - SUMMARY OF REQUIRED WATER MAIN APPURTENANCES (OR

APPROVED EQUALS)

Main:	Polyethylene encasement
Valves:	American Flow Control 2500; stainless steel bolts
Valve Boxes:	Three piece; 5½-inch diameter shaft; custom; screw-type; bell-type base, Tyler; non-locking, stay-on type cover marked "water" Valve box inserts are **not** allowed.
Corporation Stops:	Mueller H15008N (1-inch) or H15013N (1½-inch or 2-inch)
Joints:	Compression Type
Restraining:	Hydrants shall be blocked and Megalugged. If end of pipe, pipe shall be restrained at least 2 full pipe lengths and 3 joints
Hydrant Type:	Waterous Pacer, WB-90 model, bronze-to-bronze seats - installed with ½ cu. yd. washed stone and blasted/re-painted upon installation
Curb Stop:	Mueller H15155N (1-inch) or H15209N (1½-inch or 2-inch); compression joints, both sides copper
Curb Stop Box:	Minneapolis pattern, Mueller H103200 – with 7-8 foot extensions, slip-type extension, upper section 1½ inch in diameter, no stationary rods unless box is deeper than seven feet

END OF SECTION

SECTION 02721
STORM SEWERS

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

The Contractor shall furnish all materials, labor, tools, and equipment to construct, complete in place, storm sewer and all appurtenances.

This section specifies materials to be used in storm sewer construction and how to handle and install the pipe, and contains general information regarding line and grade, testing for acceptance and measurements for payment.

PART 2 - MATERIALS & EQUIPMENT

2.1 Sewer Pipe

Each length of pipe shall bear the name or trademark of the manufacturer, the location of the plant, and the date of the manufacturer. Each length shall likewise be marked to designate the class, wall thickness designation, and strength of the pipe. The markings shall be made on the exterior or interior of the pipe barrel and shall be clearly visible. Pipe with either elliptical or quadrant reinforcement shall have the words "top" or "bottom" clearly stenciled on the inside of the pipe at the correct place to indicate the proper position for installation.

Pipe handling holes are permitted only on reinforced concrete storm sewer pipe 21 inches in diameter, or larger. One (1) handling hole is permitted on straight lengths of pipe less than 48 inches in diameter, and two (2) on pipe 48 inches in diameter and greater. After the pipe has been installed the handling holes shall be promptly plugged with mortar.

Pipe shall be subject to rejection for:

- cracks passing through the pipe wall, or socket
- chips or fractures on the interior of the pipe
- defects that indicate improper proportioning, mixing and molding
- variations of more than ⅛-inch per lineal foot in alignment of pipe intended to be straight

- damaged ends which would, in the opinion of the Engineer, prevent or make difficult the completion of a satisfactory joint

- extensive patching or painting of any surface of the pipe

Unless a specific pipe material and type is designated on the Plans or in the Special Conditions, the Contractor shall use Reinforced Concrete Pipe, as specified below, for all areas under pavement. Joints shall be of the designated type, unless otherwise approved by the Engineer.

The Engineer may require that standard ASTM specification tests be made on pipe supplied. These tests shall be made by an independent laboratory, at no extra cost to the Owner, and a certified test report shall be furnished to the Engineer.

Reinforced Concrete Pipe -

Reinforced concrete pipe shall conform to ASTM C76 for circular pipe or ASTM C507 for elliptical pipe. If the class of pipe is not specified elsewhere Class III will be the minimum strength class acceptable.

The following types of pipe are permissible only in areas where they are not under pavement and where they are called out on the Plans or specified elsewhere in the specifications.

PVC Pipe and Fittings -

PVC pipe and fittings shall meet the requirements of ASTM D3034, Type PSM SDR-35 Poly Sewer Pipe and Fittings. PVC plastic material shall have a cell classification designated in ASTM D3034.

Smooth Interior Wall Polyethylene

Polyethylene pipe shall be smooth interior wall pipe meeting the following specifications:

AASHTO M252, eight (8) inches and 10 inches
AASHTO M294, Type S, 12 inches to 36 inches
ASTM D3350

Such pipe shall be Hancor Hi-Q, ADS N-12, or approved equal.

The following pipe types are permissible only where specifically called out on the Plans or elsewhere in the specifications:

Corrugated Metal Pipe, Pipe Arch, and Structural Plate -

Corrugated metal pipe (CMP) and pipe arch shall meet the requirements set forth in AASHTO M-36. Structural plate shall meet the requirements of AASHTO M-167.

2.2 Joints, Coupling Bands and Gaskets

Concrete pipe shall have flat internal compression type rubber ring gaskets, external joint wrap-around gaskets, or flexible plastic gaskets.

Flat internal compression gaskets shall conform to ASTM designation C443. These flat internal joint gaskets shall have at least two (2) rubber sealing fins and shall be of such conformation that the gaskets are compressed as the pipe is seated. Flat internal compression gaskets shall be Press-Seal, Tylox Type CR, or approved equal.

External wrap-around gaskets for concrete pipe, where required on the Plans or specified in the Special Conditions, or if used in lieu of flat gaskets shall consist of an outer layer of polypropylene, with an under layer of rubberized mastic that is reinforced with a woven polypropylene fabric. There shall be a peelable protective paper against the mastic that is to be removed when the collar is applied to the joint. The gasket shall have a minimum width of not less than twice the depth of the groove of the pipe, or as follows:

Pipe Diameter	Gasket Width	Permissible Joint Opening If Gasket Is Used Alone
21-33 inches	7 inches	⅜-inch
36-54 inches	9 inches	½-inch
60-78 inches	11 inches	¾-inch
84 inches and larger	13 inches	1-inch

The length of the gasket shall be equal to the outside circumference of the pipe plus the width of the gasket so that adequate overlap is achieved.

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Flexible plastic gasket joints for concrete pipe shall comply with the physical requirements for Type "B" gaskets in AASHTO Designation M198, or Federal Specifications SS-S-00210.

Joints for standard PVC pipe and fittings shall be elastomeric gasket type. Elastomeric gaskets shall be ASTM Designation C361.

Joints for corrugated metal pipe shall be coupling bands conforming to AASHTO M36, fabricated from the same base material as the pipe. These bands shall be at least seven (7) inches wide for pipe diameters of eight (8) inches to 30 inches, at least 12 inches wide for pipe diameters of 36 inches to 60 inches, and at least 24 inches wide for pipe diameters greater than 60 inches. Bands shall be constructed to lap an equal portion on each pipe section being connected, and shall be connected at the ends by galvanized steel angles having minimum dimensions of two-inch -inch by two-inch -inch by 3/16-inch -inch (2"x2"x 3/16"). Seven (7)-inch -inch bands shall have at least two (2) galvanized bolts, each not less than ½-inch -inch in diameter. Twelve-inch bands shall have three (3) such ½-inch diameter bolts. Twenty-four-inch bands shall have at least five (5) such ½-inch diameter bolts. Bands shall be gasketed using ⅜-inch thick be 12-inch minimum width closed cell synthetic sponge rubber, conforming to the requirements of ASTM D1056, grade SCE-43, fabricated in the form of a cylinder with a diameter of approximately 10 percent less than the nominal pipe diameter. The gasket shall be centered under the band and lapped an equal distance on the ends of the adjoining pipe sections.

2.3 Castings

Castings for storm water inlets and catch basins, shall be of uniform quality, free from blow holes, porosity, hard spots, shrinkage defects, cracks or other serious defects. They shall be smooth and well cleaned by sand or shot blasting, and coated with a tar pitch varnish which will make a smooth, tough and tenacious coating, not tacky under any weather condition. Iron used shall conform to ASTM A48, Class 30 B. All manhole castings shall be true to pattern with machined bearing faces between the frame and cover. Castings shall be manufactured by Neenah Foundry, Badger Iron Works, or equal. The type of castings shall be as designated on the Detail(s) at the end of this section.

PART 3 - CONSTRUCTION

3.1 Line and Grade

Line and grade on stakes, nails, or markings set at an offset convenient to the Contractor shall be provided at the Owner's expense. The Contractor shall be responsible for the preservation of the line and grade stakes, nails, or markings and if these markings are disturbed, he shall pay the cost of replacement. The Contractor shall give notice to the Engineer at least three (3) working days in advance of the time line and grade is desired.

The Contractor shall transfer the line and grade from the offset to the sewer by means of laser beam equipment, batter grade boards and plumb line, or other methods approved by the Engineer. The Contractor shall, prior to construction, inform Engineer of this proposed methods and the equipment to be used for transferring grades. The Engineer may order any method discontinued if at any time the method or equipment being used does not produce an accurate control for setting line and grade.

3.2 Laying of Sewer Pipe

The Contractor shall begin to lay the sewer at the lowest point of the line. Pipe shall be laid with the bell end or receiving groove edge-up stream in the direction of laying. The Contractor shall cut in and connect to the existing manhole, where applicable. If connecting to an existing sewer the Contractor shall uncover the end of the existing sewer and contact the Engineer if any adjustments are necessary.

Laying of the sewer pipe may begin following the trench preparation and bedding provisions of Section 02221, except as noted below for flexible sewer pipe, or unless special bedding types are designated on the Plans.

Ropes, slings, or other devices must be used for lowering the pipe into the trench. Pipe shall not be dropped into the trench. Only pipe which is undamaged and is suitable for use is to remain on the site of the work. Damaged or broken pipe is to be immediately separated from acceptable pipe, and the damaged or broken pipe is to be removed immediately from the site of the work.

All pipe shall be laid uniformly to line and grade on a prepared bedding which will provide even support along the entire barrel. Bell holes shall be excavated in the bedding material so that the pipe will be resting on the barrel and not on the bell.

Each pipe that is laid and graded shall be carefully bedded by hand and shall be backfilled to provide 12 inches of cover before subsequent pipes are laid. The

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space filled between the pipe and trench wall shall be compacted manually in six (6)-inch layers. Pipe sizes larger than 18 inches in diameter may require mechanical compaction of the bedding material.

Bedding and initial backfill for PVC SDR-35, and other designated flexible pipe used in storm sewers, shall be placed in accordance with Class I or II of ASTM D2321 rather than as shown in Section 02221.

As work progresses, the interior of the sewer shall be cleared of all dirt and debris. No pipe shall be laid where water is above the bedding material. Water may be allowed to flow into the newly installed pipe when pipe laying is not in progress and when provisions are made to prevent dirt from washing in with the water.

3.3 Special Requirement for Laying Corrugated Metal Pipe, Pipe Arch, and Structural Plate Sections

Laying of corrugated metal pipe, metal arch pipe and structural plate sections shall be in accordance with the provisions of Specification Section 02221 and of Subsection 3.2 above, with the following exceptions:

The trench shall be wide enough to permit thorough compaction of backfill materials, but the width on each side of the pipe 24 inches in diameter, and larger, shall be one (1) foot. After bedding is completed the pipe shall be backfilled simultaneously on both sides of the pipe to a level even with the top of the pipe with sand or gravel passing a one (1)-inch screen, mechanically tamped in six (6)-inch layers to 85 percent of Standard Proctor density.

CMP or arch pipe shall not be allowed to deflect during construction more than 5 percent of its nominal vertical dimension. Supports shall be used if necessary to prevent deflection during installation and backfill.

When corrugated metal pipe is used as an inlet or outlet section, the lower 90 degree quadrant of the pipe shall be bedded in undisturbed or compacted soil which has been shaped to fit the pipe. The bedding and backfill material around the pipe and to a level one (1) foot above the outside top of the pipe shall be dry, finely broken up clay or loam, brought up simultaneously on both sides of the pipe. The backfill shall be tamped in six (6)-inch layers, except that no tamping shall be done directly over the pipe.

3.4 Construction of Joints

Joint procedures shall conform to the manufacturer's recommendations and good pipe-laying practice.

Rubber ring gasket joints for concrete pipe shall be completed as follows:

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Thoroughly clean the receiving bell and spigot end of any sand or dirt. Spread a liberal amount of lubricant/sealer of vegetable origin on the resilient material and upon all sliding surfaces. Position the spigot end to the bell end of the pipe previously laid, and, using slight pressure with the aid of a bar and wood block or shovel, force the pipe home.

Joints of external wrap-around gaskets shall be made as follows:

After the pipes are joined together, the area of the outer pipe barrel at the joint where the gasket will be applied shall be cleaned and pre-wetted. The gasket shall then be formed to the barrel of the pipe by pressing it against the pipe by hand to assure maximum contact with the pipe surface. When the inside joint opening between the ends of pipes exceeds the permissible joint opening, the entire inner joint shall be filled with mortar.

Joints for CMP shall be made with coupling bands installed in accordance with the manufacturer's recommendations.

Alternate methods of pipe coupling shall be submitted to the Engineer for approval.

3.5 Laying Sewer Pipe for Curves

Sewers laid on curves shall be constructed by one of the following methods:

- Deflection of Pipe Joints
- Miter or Cut-off Pipe

Deflection of pipe joints will be permitted when the joint opening is less than ¼ of the length of the tongue when rubber gasket joints are used. Otherwise cut-off pipe or miter pipe must be used to make the bends.

Cut-off pipe shall be molded with the difference between the longest and shortest sides, measured along the outside of the pipe, conforming to the values given in the table below. Only four (4) foot long pipe sections shall be used.

Miter pipe shall be manufactured by the removal of the wedge from the center of the pipe to provide for the required angle of deflection. Sufficient additional reinforcement shall be added at the spring lines and top and bottom of the pipe to prevent shearing after installation. Repairs to complete the pipe shall be such that the concrete shall have strength equivalent to that of the remainder of the pipe barrel and shall not spall or separate.

Miter pipe shall be used for all elliptical pipe laid on a curve. Miter pipe for circular sewers shall be used only with the approval of the Engineer.

Cut-Off of Pipe for Curved Sewer (Inches)
Radius of Curve (Feet)

Pipe I.D. (Inches)	40	50	57.3	60	70	80	90	100
21	2 5/8	2 1/8	1 3/4	1 3/4	1 1/2	1 3/8	1 1/4	1 1/8
24	2 7/8	2 3/8	2	2	1 3/4	1 1/2	1 3/8	1 1/4
27	3 1/4	2 5/8	2 1/4	2 1/8	1 7/8	1 5/8	1 1/2	1 3/8
30	3 1/2	2 7/8	2 1/2	2 3/8	2 1/8	1 7/8	1 5/8	1 1/2
36	4 1/4	3 3/8	3	2 7/8	2 1/2	2 1/8	1 7/8	1 3/4
42	-	3 7/8	3 3/8	3 1/4	2 7/8	2 1/2	2 1/4	2
48	-	4 3/8	3 7/8	3 3/4	3 1/4	2 7/8	2 1/2	2 1/4
54	-	-	4 3/8	4 1/8	3 5/8	3 1/8	2 7/8	2 1/2
60	-	-	-	-	4	3 1/2	3 1/8	2 3/4
66	-	-	-	-	4 3/8	3 3/4	3 3/8	3
72	-	-	-	-	-	4 1/8	3 5/8	3 3/8
78	-	-	-	-	-	4 3/8	4	3 5/8
84	-	-	-	-	-	4 3/4	4 1/4	3 7/8
96	-	-	-	-	-	-	4 7/8	4 3/8

3.6 Catch Basins and Inlets

Catch basins, street inlets and inlet manholes shall be constructed as shown on the Detail(s) at the end of this section and placed in the locations shown on the Plans. Adjusting rings shall be grouted into place. A one (1)-inch grout allowance shall be made between the top of the uppermost ring and the bottom of the casting. Steps 16 inches, on center, shall be provided wherever the depth of the structure is greater than five (5) feet. Concrete sections shall be cast-in-place or precast concrete. Castings shall be as shown on the Detail(s) at the end of this section.

Standard manhole construction, including standard castings (not inlet castings) stubs for future manhole connections and related accessories shall be constructed in accordance with Section 02601.

3.7 Acceptance Testing

All storm sewers will be checked by the Engineer for infiltration or sand leakage. All infiltration sites and sand leaks shall be repaired by the Contractor at the Contractor's expense.

The alignment and grade of the sewer shall be checked by laser or lamping methods, with all equipment to be provided by the Contractor. Defects shall be corrected by the Contractor before final acceptance. If closer inspection is warranted, the Owner may arrange for a televised inspection. The Owner will assume the cost of televised inspection if no serious defect is found. If defects are found which the Engineer attributes to the failure of proper installation or flawed materials, the Contractor shall pay for the test. Defects shall be promptly corrected, and the Contractor shall pay for a second television inspection to demonstrate that such correction has been successful.

Deflections in HDPE pipe and PVC pipe shall be limited to 5 percent of the base inside pipe diameter within thirty days of backfill and 7 percent thereafter. The Contractor shall supply and hand pull through the sewer an appropriate sized mandrel within thirty days following completion of the street or ground surface above the pipe. If the surface course of asphalt is delayed until the year following the completion of the lower course of asphalt this acceptance test shall be performed within thirty days following completion of the lower course of asphalt. Failure of the mandrel to freely pass through shall be cause for rejection of the sewer. The Contractor, at his own expense, shall repair or replace the sections which have been rejected and restore all affected surfaces.

END OF SECTION

SECTION 02722
SANITARY SEWERS

PART 1 - GENERAL

1.1 Description of Work Covered by This Section

This section covers the construction of sanitary sewers, including materials specifications, instructions for handling and installing pipe and tests for acceptance of the work. The work done under this section includes furnishing all materials, labor, tools and equipment to construct the sanitary sewers, service laterals and all appurtenances, complete and in place.

1.2 Abbreviations and Acronyms

Designation	Full Title
ASTM	American Society for Testing & Materials
Poly	Polyvinyl Chloride
PVC	Polyvinyl Chloride

PART 2 - MATERIALS & EQUIPMENT

2.1 General Requirements for Sanitary Sewer Materials

Unless otherwise shown on the Plans or specified elsewhere in these specifications the Contractor shall use PVC pipe in accordance with subsection 2.2.

The Engineer may order that samples of the pipe proposed or furnished be taken for the purpose of performing tests to verify compliance with this section. The Contractor will be responsible for delivery of all test specimens to the test laboratory designated by the Engineer at no additional cost to the Owner. The cost of the pipe selected for sampling shall also be borne by the Contractor. The costs of the initial tests shall be borne by the Owner. When every specimen tested conforms to the standards outlined in the appropriate subsections below all pipe in the shipment represented by those specimen shall be considered acceptable. However, when any test specimen fails to meet these requirements all pipe represented by that specimen shall be subject to rejection. Pipe that has been rejected by the Engineer shall be removed from the site of the work by the Contractor and replaced with pipe that meets the requirements, without additional cost to the Owner. The Contractor

shall take samples of the replacement pipe for testing by an independent laboratory approved by the Engineer. The costs of these additional tests shall be borne by the Contractor.

The Engineer may request copies of the manufacturer's or vendor's factory test results demonstrating compliance with these specifications. Copies of such test reports shall be submitted to the Engineer, at no cost to the Owner, before the pipe is installed in the project. Such tests shall have been conducted within the two (2) years previous to the date of the Engineer's request.

Each length of pipe shall bear the name or trademark of the manufacturer, the class, and the wall thickness designation or strength designation of the pipe. No pipe handling holes shall be allowed.

Acceptance of pipe and fittings shall be based upon visual inspection by the Engineer at the job site. Pipe and fittings may be rejected for fractures or cracks passing through the pipe wall; cracks or fractures on the interior of the pipe; defects that indicate improper proportioning, mixing and molding; variations in alignment, insecure attachment of branches, damaged ends and extensive patching or painting of any surface of the pipe.

2.2 PVC Pipe and Joints

Pipe furnished under this classification shall meet the requirements of ASTM D3034, SDR 35. PVC plastic material shall have a cell classification designated in ASTM D3034. Joints shall be either solvent-cemented, bell and spigot type or elastomeric gasketed joints meeting the requirements of the Department of Natural Resources. SDR 35 may be used only for cover depths of 15 feet or less. For cover depths in excess of 15 feet SDR 26 pipe shall be used.

2.3 PVC Truss Pipe and Joints

Pipe furnished under this classification shall meet the requirements of ASTM D2680. The PVC shall be virgin material extruded into a configuration of inner, outer and connecting truss members with the voids being filled with light weight concrete. All ends of the pipe shall be sealed to prevent liquid from entering the lightweight concrete filler. The PVC thermoplastic material shall be rigid PVC plastic conforming to ASTM D1784 for a minimum cell class of 12454B. The Portland cement, Perlite concrete, or other inert filler material shall be as described in Section 6.3 of ASTM D2680. Joints shall be sleeve coupling, solvent weld type or elastomeric gasketed type. These gasketed type joints shall meet the requirements of ASTM D3212. The solvent weld type joints shall meet the requirements of ASTM D2564.

2.4 Tees and Wyes

Tees and wyes, except as permitted below, shall consist of a short length of main sewer with a factory-fabricated spur attached. They shall be made in such a manner as will provide strength and water tightness at least equal to the class of the main pipe to which they are joined and shall conform to all other requirements specified for pipe of corresponding class and internal diameter. Fabricated branch fittings shall be flush with the inside surface of the main pipe. Tee branches shall have their axis perpendicular to the longitudinal axis of the main pipe. Wye branches shall have their axis approximately 45 degrees from the longitudinal axis of the main pipe. Tees shall be used for risers, wyes shall be used for all laterals. Saddle-type connections may be used only on PVC, or PVC Truss and shall be affixed using solvent cement and two steel bands for each connection.

Tees and wyes shall be four (4) inches in diameter, unless otherwise noted on the plans or specified in the Special Conditions.

2.5 Lateral Pipe

Sanitary sewer laterals shall be four (4) inch diameter pipes, unless otherwise indicated on the Plans or specified in the Special Conditions.

The type of pipe for the sewer main and the lateral shall be the same except in the case of PVC Truss pipe, for which the laterals shall be PVC pipe meeting the requirements of paragraph 2.2 above.

2.5 Tracer Wire

Tracer wire shall be solid copper wire, 10-gauge minimum, plastic coated. All tracer wire connections shall be soldered, split bolt connections. Mastic coating shall be applied to protect the connections.

Service box shall be a Bingham & Taylor Fig. 4901 2½-inch cast iron curb service box with lid marked "sewer" for the termination of the lateral tracer wire.

PART 3 - CONSTRUCTION

3.1 Width of Trench

The sanitary sewer trench shall be excavated according to Section 02221 of these specifications. If the maximum trench width specified therein is exceeded the Contractor shall, at his own expense, furnish a stronger pipe or a concrete cradle, cap or envelope, whichever is adequate.

3.2 Line and Grade

The Owner shall pay the cost of providing initial line and grade on stakes, nails or markings set at an offset convenient for the Contractor. The Contractor shall be responsible for the preservation of the line and grade stakes, nails or markings. If such line and grade stakes, nails or markings are disturbed the Contractor shall pay for replacement.

The Contractor shall, at his own expense, transfer the line and grade from the offset stakes, nails, or markings to the sewer by means of laser beam equipment, batter grade boards and plumb line, or other methods approved by the Engineer. The Contractor shall inform the Engineer of the methods he proposes to use. The Engineer may order any method discontinued if he determines that the method or the equipment being used does not produce accurate control for setting line and grade. The Contractor shall constantly check line and grade and, in the event they do not correspond with the line and grade provided by the Owner, shall stop work and notify the Engineer.

All pipe shall be laid uniformly to the required line and grade. Variances from the required grade of more than 0.04 feet at any point shall be cause for rejection. No variations shall be allowed which result in a level or reverse-sloping invert.

3.3 Laying Sewer Pipe

The laying of sewer pipe shall commence at the lowest point in the proposed sewer line, unless otherwise approved by the Engineer. Pipe shall be laid with the bell end or receiving groove end pointing upgrade. If a laser is to be used, the Contractor shall calibrate the laser in a manner acceptable to the Owner's Authorized Representative before pipe laying operations begin.

If applicable, the Contractor shall cut in and connect to existing manholes. When a new sewer is to be connected to an existing sewer, which does not terminate in a manhole, the Contractor shall uncover the end of the existing sewer and contact the

Engineer if any adjustments are necessary to make the existing sewer connection conform to the required grades.

Pipe laying shall begin only after trench excavation and bedding preparation as specified in Section 02221 of these specifications, except that bedding shall always be placed in accordance with Class I or Class II of ASTM D2321. Bedding material shall then be placed below and around the pipe up to the spring line in such a manner as to provide adequate side support and to prevent lateral movement or deflection of the pipe. Care shall be exercised when handling pipe. Ropes, slings, or other devices shall be used for lowering the pipe into the trench. Only pipe that is suitable for use is to remain on the site of the work. Damaged or broken pipe shall be immediately separated from acceptable pipe.

All pipe shall be laid uniformly to line and grade on a prepared bedding so that the finished sewer presents a uniform bore. Care shall be taken to insure that the pipe does not rest directly on the bell, but is uniformly supported throughout its entire length. No pipe shall be laid on frozen ground.

As work progresses the interior of the pipe shall be cleared of all dirt and debris. No pipe shall be laid in wet trench conditions, unless approved by the Engineer. At all times when the work is not in progress all open ends of the pipe fittings shall be securely closed so that no trench water, earth, or other substances enter the pipe. Laterals, pipe branches, stubs, or other open ends that are not to be immediately connected shall be blocked with the pipe manufacturer's approved stopper so as to withstand the pressure of leakage tests.

3.4 Jointing

The recommendations of the pipe manufacturer shall be followed in assembling joints.

Rubber-type (elastomeric) gasket joints shall be installed as follows:

Thoroughly clean the receiving bell or groove and spigot or tongue of any sand or dirt. Spread as liberal amount of lubricant sealer of vegetable origin on the outside of the gasket and the inside of the bell groove of the last pipe laid. Care shall be taken to properly align the pipe before joints are forced completely home. During insertion of the tongue or spigot into gasketed joints the pipe shall be partially supported by hand, sling, or crane to minimize unequal lateral pressure on gaskets and to maintain concentricity until the gasket is properly positioned. Position the spigot or tongue end to the bell or groove end of the pipe previously laid and, using slight pressure with the end of a bar and wood block or a shovel, force the pipe section home. Care shall be taken that the entering pipe is completely home.

Resilient-type factory-fabricated joints shall be installed in the same manner, except that only the resilient joint material need be lubricated, and that lubrication can be made with a non-vegetable origin lubricating adhesive furnished or recommended by the manufacturer.

Solvent-cemented joints may be used. In solvent cementing joints the bell and spigot ends of the pipe shall be cleaned and dried with a cloth moistened with methyl-ethyl-ketone (MEK). Solvent cement supplied by the manufacturer shall be liberally applied by brush, around the entire circumference of the spigot end for a distance equal to the joint depth, and shall be lightly applied to the inside surface of the bell. Immediately thereafter the joint shall be made by inserting the spigot into the bell, pushing in as far as possible, and at the same time turning the pipe ⅛ to ¼ turn to distribute the cement around the joint.

If pipe is to be laid in cold weather the Contractor shall heat the pipe and jointing materials to assure the tightness of the joint and to prevent freezing of joints. For solvent-cemented joints made in cold weather, care shall be taken to ensure the removal of all ice and snow from the jointed area before the application of solvent cement. The Engineer reserves the right to order that pipe laying be discontinued when, in the Engineer's judgment, there is a danger of cold weather impairing the quality of the work.

3.5 Placing Cover Materials

Cover material shall be placed after the pipe has been properly bedded and jointed. Placement of cover material in the initial backfill zone shall be by hand, or equally careful means, so as to avoid jarring or pushing the pipe and to assure that no large stones or foreign materials are allowed to come into contact with the pipe.

Cover material for PVC pipe shall be placed in two stages, one stage being to the top of the pipe, the other being to a level of 12 inches above the pipe. Each stage of cover material shall be compacted by hand or mechanical tamping.

3.6 Risers, Cradles, Tees & Wyes and Laterals

Tees or wyes shall be installed at all the locations shown or noted on the Plans or as specified in the Special Conditions. Wye fittings shall be installed at an angle of 45 degrees up from the horizontal, unless otherwise specified. If the connection is to be fitted with a riser-type extension, such an extension shall be made at an angle 45 degrees up from the horizontal. Risers shall be encased in a gravel envelope confined in a 12 inch diameter fibrous tube or other approved container. Detail

02722, as shown on the Plan detail sheets, shows how tees, wyes, risers, and laterals are to installed. The Contractor shall accurately record lateral locations.

The Contractor shall provide concrete cradles or envelopes where shown on the Plans or where specified in the Special Conditions. Concrete used for such purposes shall be Class CC, as specified in Section 03301 of these specifications.

The location of all sewer services crossing under the curb & gutter shall be marked by stamping an "S" in the top of the curb at the location of the crossing. The stamp shall be cast with a 3" tall letter approved by the Village or the Engineer.

3.7 Tracer Wire

Tracer wire shall be installed along the new lateral from the main to the service box, The box shall be placed upon a solid, flat concrete block. The box shall be located at the reconnection point (or end of pipe if a new lateral) and shall extend from the lateral pipe up to the surface, with provision for adjustment 6 inches above and below the surface. Contractor shall take care to ensure service box will be located behind new curb & gutter location and not in a sidewalk. The tracer wire shall extend to 18 inches above the surface and shall end in a loop, which shall be folded back into the box

3.8 Acceptance Testing - Leakage

The rate of infiltration of water into the completed and backfilled sewer, manholes and appurtenances shall not exceed 200 gallons per day per inch diameter per mile of sewer over the entire project. In addition, the rate of infiltration between any two adjacent manholes shall not be greater than 200 gallons per day per inch diameter per mile of sewer.

The Contractor is required to repair all visible leaks, even if the infiltration limits are met. Manhole allowances shall be computed using the vertical feet of manholes and the actual inside diameter of the manholes.

The Contractor shall provide all equipment, manpower and materials necessary to conduct leakage tests of the sewer. He shall notify the Owner at least one (1) working day in advance of conducting such tests so that the Owner may have a representative present to observe the test.

The test method shall be as follows:

Low Pressure Air Test

The Contractor shall furnish test plugs, an air compressor, test gauge, stopwatch, and personnel experienced in conducting the acceptance test. The Contractor may fill the pipe being tested with water to permit normal absorption into the pipe walls. The Contractor shall be responsible for all tees, wyes, laterals, and plugs being sealed and braced to withstand the test pressures. Air shall be added to the pipe to raise the pressure inside the pipe to 4.0 pounds per square inch gauge (psig) greater than the average backpressure of any groundwater that may be above the top of the pipe. After a pressure of 4.0 psig is obtained, the Contractor shall regulate the air supply so that the pressure is maintained between 3.5 and 4.5 psig above the average groundwater backpressure for a period of two (2) minutes. After the two (2) minute air stabilization period, the air supply shall be disconnected, and the test pressure shall be allowed to decrease to 3.5 psig. The Contractor shall measure the time required for the test pressure to drop from 3.5 psig to 2.5 psig. The pipe shall be acceptable if this time is greater than or equal to the following table:

Pipe Dia., inches	Min. Time, min:s	Length of Min. Time, feet	Time for Longer Length, s	Specification Time for Length (L) Shown, min:s							
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet
4	3:46	597	0.380L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.694L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768L	51:17	76.55	102:34	128:12	153:50	179:29	205.07	230:46

Minimum specified time required for a 1.0 psig pressure drop for size and length of pipe indicated.

The low-pressure air test, not withstanding the above test description, shall be at least as stringent as ASTM C828-06 for clay pipe, ASTM C924-02 for concrete pipe, or ASTM F1417-92 for plastic pipe.

3.9 Acceptance Testing - Alignment and Grade

Alignment and grade shall be checked by the lamping method. If lamping of the pipe shows poor alignment, offset joints, sags, kinks, or open joints, the defects shall be corrected by the Contractor before final acceptance. If the Owner deems that

closer inspection is warranted the Owner may arrange for inspection by use of a television camera. The Owner shall assume all cost of the initial television inspection. All defects found shall be promptly corrected. The Contractor shall bear all costs of correcting any deficiencies found during television inspection, including additional television inspection, arranged by the Contractor, to verify that the correction efforts were successful.

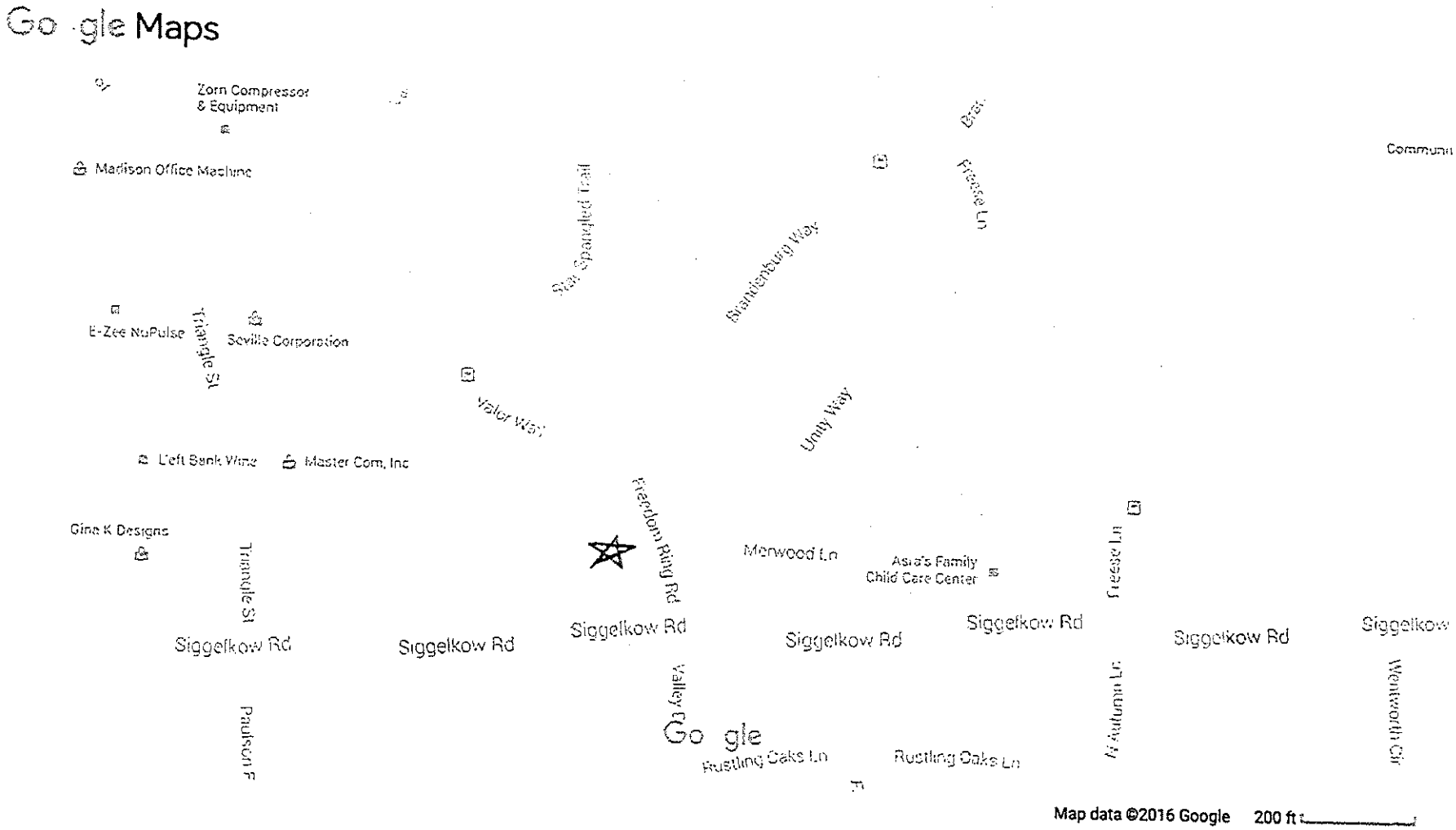
3.10 Acceptance Testing - Deflection

All sanitary sewers shall be tested for deflection after completion of backfill and compaction. Any diameter of installed pipe shall not be decreased by more than 5 percent from the original diameter, uninstalled. The test shall be conducted by pulling an appropriately sized mandrel through the completed pipeline. Failure of the mandrel to pass freely through the entire section being tested in one pass when pulled by hand, without excessive force, shall be grounds for rejection. The Contractor shall, at his own expense, locate and repair any section rejected on this basis.

3.11 Acceptance Testing - Televising

All sanitary sewer mains shall be televised after completion of backfill and compaction. A color DVD of the televising as well as a written report of the location of laterals and lengths of pipe shall be provided to the Owner before final acceptance of the sewer.

END OF SECTION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Left Bank Wine
Master Com, Inc
Gina K Designs
Freedom Ring Rd
Merwood Ln
Asia's Family Child Care Center
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Rustling Oaks Ln
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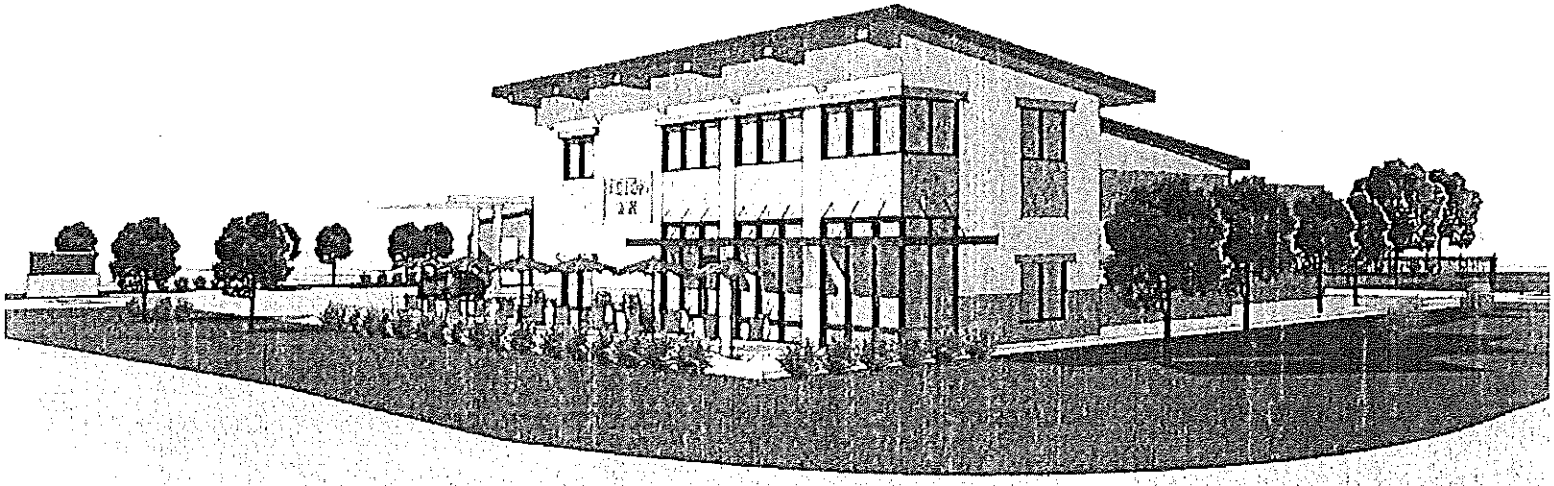
RETAIL SPACE FOR LEASE

NW OF SIGGLEKOW & FREEDOM RING, MCFARLAND, WI



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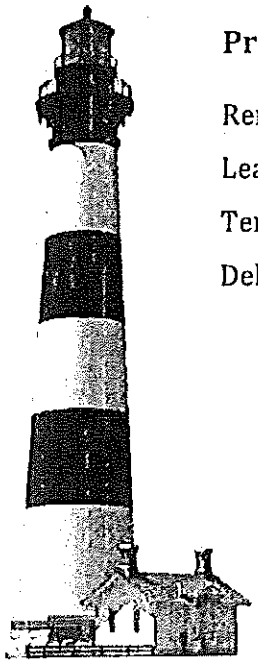

Property Information:

Rentable SF:	1,248 SF
Lease Rate:	$10.00/SF NNN
Term:	5 Years
Delivery:	Appx. Sep 2016

Property Features:

- 8,700 Vehicles Per Day
- White-Box Delivery
- New build adjacent to gas station
- Bathrooms provided by C-Store
- Great for retail, food, office, or health use

For more information:

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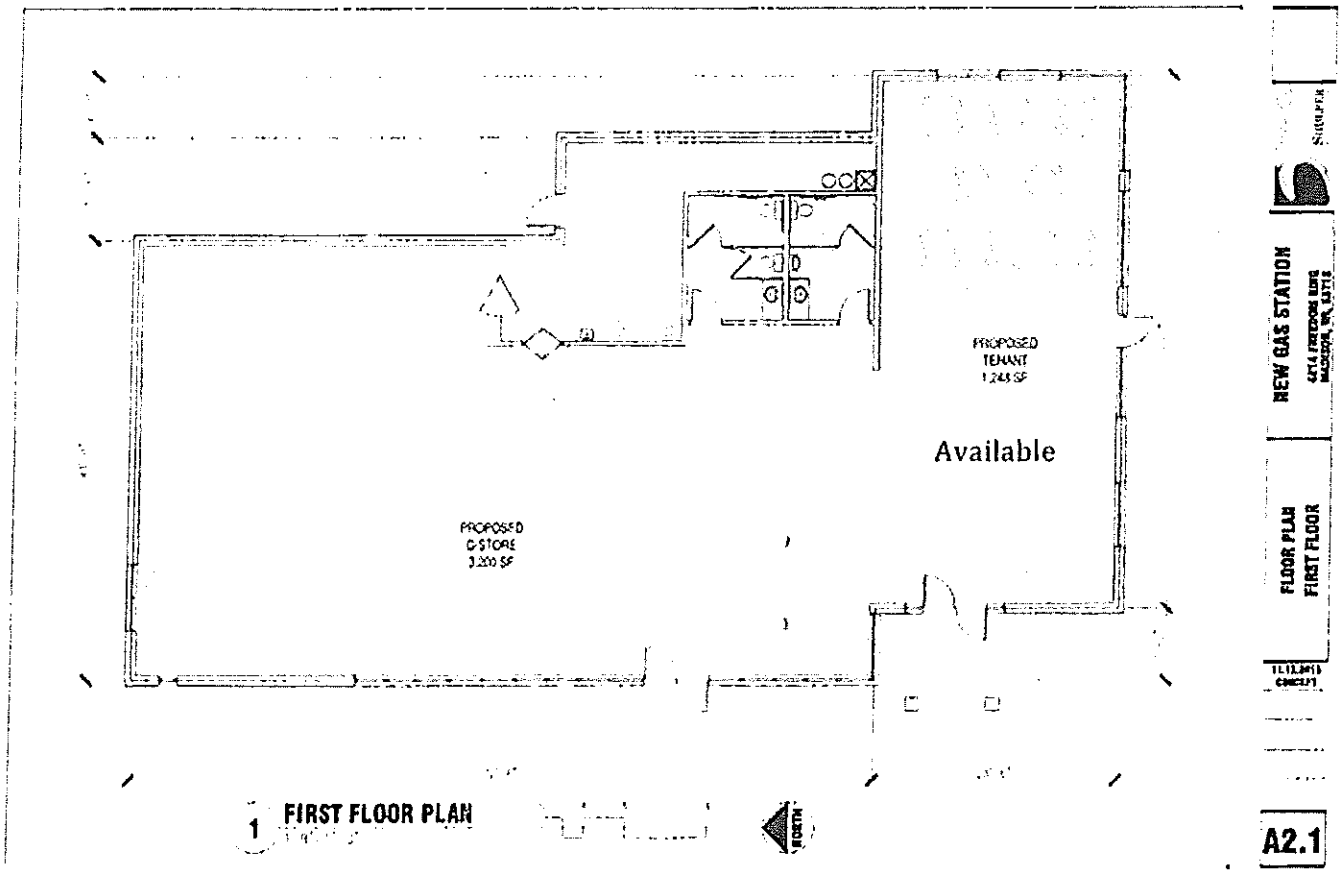
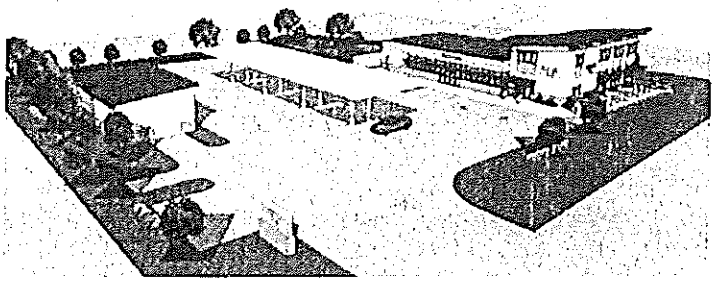
RETAIL SPACE FOR LEASE

NW OF SIGGLEKOW & FREEDOM RING, MCFARLAND, WI





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