



DEVELOPMENT HANDBOOK

VILLAGE OF GERMANTOWN INFRASTRUCTURE STANDARDS

Approved by:

Public Works & Highway Committee – September 4, 2024

Village Board – September 16, 2024

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1 CONSTRUCTION PLAN REQUIREMENTS

1.1 GENERAL SPECIFICATIONS

1.1.1 Sheet Requirements

1.1.1.1 Plans submitted for approval shall be on "D" size paper, 24-inches x 36-inches. The only exception is the master grading plan. The master grading plan shall not exceed a size of 30-inches x 36-inches and shall show the entire development if possible. If additional sheets are required match lines shall be used. Plans may be submitted electronically on a flash drive or through a file sharing program and/or on 11-inch x 17-inch paper if approved by Director of Public Works. If submitted electronically, the drawings shall be a .pdf file type.

1.1.1.2 Plans shall be drawn to a recognized Engineering scale, i.e.: 1" = 40' or 1" = 50' horizontal and 1" = 4', 1" = 5' vertical.

1.1.1.3 Plans shall use local datum (NVDG 1988 datum) in establishing benchmarks and elevations.

1.1.1.4 Title blocks are required on each plan page and shall include all of the following fields:

1.1.1.4.1 Consulting Firm and Contact Information

1.1.1.4.2 Drawn By

1.1.1.4.3 Designed By

1.1.1.4.4 Checked By

1.1.1.4.5 Date

1.1.1.4.6 Scale

1.1.1.4.7 Revision History

1.1.1.4.8 Project Name

1.1.1.4.9 Project Location

1.1.1.4.10 Plan Sheet Type

1.1.1.4.11 Sheet Number

1.1.1.5 Stationing shall be at 100-foot intervals from South to North or West to East and shall be indicated on plan and profiles. Every 100-foot station shall be noted.

1.1.1.6 Each set of plans, drawings, documents, specifications, and reports shall be signed, dated, and stamped by a registered Professional Engineer in the State of Wisconsin, according to the Wisconsin Administrative Code Chapter A-E 2(4). The design Engineer shall bear the responsibility for the coordination of submitting all development plans for review. Any plans that are submitted without a professional seal will be rejected.

- 1.1.1.7 A cover sheet is required for the plan set. The cover sheet shall include a 1" =200' scale drawing of the project area that shows the locations of the proposed improvements. Plan sheets shall be indexed on this 200-scale system plan. NAD83 and NAVD88 are to be used.
- 1.1.1.8 Each cover sheet shall show the locations, elevations, and descriptions of the project benchmarks as established by the project surveyor. The cover sheet shall also show a location map with township, range, and section labeled.
- 1.1.1.9 Profile view shall be located below the plan view on plan/profile drawings and the two views should be in alignment vertically.
- 1.1.1.10 Each plan sheet shall show a north arrow. North direction shall be to the top or to the right of the sheet and indicated by a north arrow.
- 1.1.1.11 A legend shall be included in the plan set to designate line types.
- 1.1.1.12 Four (4) sets of all preliminary plans and specifications shall be submitted for initial review and corrections. Plans and support documents (i.e. stormwater management report, maintenance agreement, etc.) requiring state approval from MMSD and DNR, shall be processed through the Village. After Village review and approval, the documents will be sent to the appropriate state agencies by the Village Engineer.
- 1.1.1.13 Two full size and two half size sets of approved complete construction plans and specifications which meet all the requirements shall be submitted to the Village at least three working days prior to the preconstruction meeting. The preconstruction meeting is to be overseen by the Director of Public Works or their designee. Failure to submit plans and specs within the required time frame will result in the cancellation of the preconstruction meeting. These construction plans shall include but not be limited to the following:

1.2 PLAN REVIEW

1.2.1 Detail Sheet

- 1.2.1.1 A minimum of five (5) working days shall be required for approval of any revisions or changes to previously approved plans. The approval shall be in writing from the Village Engineer. No construction related to these proposed revisions or changes shall proceed prior to the approval of such revisions.
- 1.2.1.2 Preliminary proposed and existing grading plans (with plan view of preliminary sanitary sewer) shall be reviewed prior to all other preliminary construction plans being submitted. Complete detail and calculations for detention/retention objectives should be shown.
- 1.2.1.3 Digger's Hotline number of 1-800-242-8511 shall be noted on the plan set.
- 1.2.1.4 All requirements of the Village of Germantown Municipal Code, the DNR, and MMSD shall be met.

1.2.1.5 A construction estimate including materials, quantities, and cost will be included with the plans for water, sanitary, roadway, storm water, and grading.

1.2.1.6 A copy of the approved plans shall be submitted to the Village on CD in AutoCAD v2020.

1.2.2 Plan View

1.2.2.1 Lot, block, street, property, $\frac{1}{4}$ section, and easement line shall be shown.

1.2.2.2 Lot and block numbers, subdivision name, and existing physical features shall be shown.

1.2.2.3 Lot or property frontage, street width and easement dimensions shall be indicated.

1.2.2.4 Street names shall be shown.

1.2.2.5 Street centerline shall be indicated.

1.2.2.6 Match lines shall be shown to next plan sheet.

1.2.2.7 Dimensions showing offset from right-of-way and proposed roadway or easement centerline to proposed utility alignment.

1.2.3 Profile View

1.2.3.1 Elevations shall be based on the Village of Germantown datum (NAVD88) and given to the nearest 0.01 of a foot. Benchmarks used shall be indicated on the plans.

1.2.3.2 Conversion factor to Milwaukee Metropolitan Sewerage District datum shall be shown on the plans. (-580.61')

1.2.3.3 Signage Plan

1.2.3.4 Sign types, locations, and regulations to be listed and clearly stated.

1.3 MASTER GRADING & DRAINAGE PLANS

1.3.1 General

1.3.1.1 Scale of the plans shall be 1" = 100' for the master plan and 1" = 40' for the individual plan sheets.

1.3.1.2 A note shall be prominently placed on each sheet of the Master Grading Plan indicating "The Village of Germantown shall not approve any grade change in excess of 0.25 feet unless authorized to do so by the Village Engineer."

1.3.2 Plan View shall show the following:

1.3.2.1 Subdivision boundary lines and all lot lines.

1.3.2.2 Adjoining and inclusive roadways and their names.

- 1.3.2.3 Contour lines at 2-foot intervals. These contour lines shall extend at least 100 feet into adjacent parcels. Contours shall show all offsite drainage that is tributary to the site. Existing contour lines shall be dashed while proposed contour lines shall be solid, with the 10-foot increments in boldface.
- 1.3.2.4 Existing and proposed culvert locations, invert elevations, sizes, and materials on and within 200 feet of the proposed development.
- 1.3.2.5 Existing and proposed storm sewer locations, invert elevations, sizes, and materials on and within 200 feet of the proposed development, including catch basins, manholes, inlets, and BMP's.
- 1.3.2.6 Location of existing trees with Diameter at Breast Height (DABH) and type.
- 1.3.2.7 Location of proposed topsoil stockpile.
- 1.3.2.8 Proposed building pad locations and finished floor elevation for each lot, which incorporate setbacks and offsets and show finished yard grade, and exposure grade, if applicable, elevations to the nearest tenth of a foot. If it is desirable to maintain post grading/pre-building construction yard grades low, to not exceed 1.5 feet, it shall be noted prominently on plan.
- 1.3.2.9 Proposed elevations at all property corners.
- 1.3.2.10 Show all high points, low points, and overland drainage paths with elevations.
- 1.3.2.11 Notes required to sequence the construction activities (i.e. erosion and grading notes and plans which shall be done ahead of other operations on site to manage storm water runoff).
- 1.3.2.12 Specific details on all retention/detention basins, ponds, overflows, outlet structures, etc.
- 1.3.2.13 Obstructions within the project limits including but not limited to: trees, landscaping, fences, structures, light poles, etc.
- 1.3.2.14 Finished street centerline elevations shall be indicated at 100-foot stations, all intersections, cul-de-sacs, and other changes in slope. At vertical curves, elevations shall be shown at P.V.C., P.O.C., P.V.T. and at 25-foot intervals for curves 100 feet long or less. For vertical curves over 100 feet long, elevations at 50-foot intervals along the V.C., plus the P.O.C. and P.V.I.
- 1.3.2.15 Channel or swale flow-line elevations shall be indicated every 25 feet within public land or easement.
- 1.3.2.16 Arrows indicating path and direction of sheet flow shall be shown for each proposed lot.
- 1.3.2.17 Mapped wetland boundaries and 100-year floodplain shall be delineated along with setbacks.

1.3.2.18 Overflow discharge and overland flow path.

1.3.3 Grading Record Drawing

1.3.3.1 After finished grading is accomplished, a grading record drawing shall be created and submitted to verify conformance with the approved grading plan. The drawing shall consist of the following:

1.3.3.1.1 Use approved grading plan as the base sheet. Denote "record drawing" in bold letters at the top and specify the firm doing the record. Cross out the name of the design firm if different than the firm doing record drawings. Drawings should denote a Record Drawing (As-Built) Date.

1.3.3.1.2 Spot elevations in the center of all lot building pads to the nearest tenth of a foot.

1.3.3.1.3 Spot elevations at all property corners to the nearest tenth of a foot.

1.3.3.1.4 Crossroad culvert invert elevations to the nearest hundredth of a foot.

1.3.3.1.5 Flowline ditch elevations at every even station to the nearest tenth of a foot.

1.3.3.1.6 Berm elevations to the nearest tenth of a foot.

1.3.3.1.7 Spot elevations at all high and low points to the nearest tenth of a foot.

1.3.3.1.8 Verify topo lines as directed by the Village Engineer.

1.3.3.1.9 Field inlet grate elevations.

1.4 EROSION CONTROL PLAN

1.4.1 General

1.4.1.1 Plans shall conform to Chapter 17 Zoning Code, Section 17.44 Erosion Control of the Municipal Code.

1.4.1.2 Plans shall conform to The Wisconsin Stormwater Manual and the Wisconsin Construction Site Best Management Practice Handbook.

1.4.1.3 In certain instances, it is accepted to combine the grading and drainage plan with the erosion control plan, as long as all required items are discernible.

1.4.2 Plan View shall show the following:

1.4.2.1 Site boundaries and adjacent lands.

1.4.2.2 Vegetative cover and soil type.

1.4.2.3 The limits of any areas which need special stabilization techniques.

1.4.2.4 Mapped wetland boundaries, 100-year floodplain, and watercourses shall be delineated along with setbacks.

1.4.2.5 Location and dimensions of storm water drainage systems and natural drainage patterns on and immediately adjacent to the site for 200 feet.

1.4.2.6 Locations and dimensions of existing; utilities, structures, roads, highways, paving, lot lines and outlots.

1.4.3 Proposed conditions of the site shall include:

1.4.3.1 Locations and dimensions of all proposed land disturbing activities, including finished topography.

1.4.3.2 Location and dimensions of all temporary soil and dirt stockpiles with erosion control method.

1.4.3.3 Location and dimensions of all construction site sediment and erosion control measures necessary. From the WI Construction Site Handbook, best management practices include the following categories: diverting flow, managing overland flow, trapping sediment in channelized flow, establishing permanent drainageways, protecting inlet trapping sediment during site dewatering, preventing tracking, and others. Construction details should be shown on the plan.

1.4.3.4 Location, dimensions and description of all channels, pipes, structures, basins or reservoirs, or other conveyances proposed to carry runoff to the nearest adequate outlet, including applicable design assumptions and computations. The application, design discharge rate, in cubic feet per second, for each structure, pipe, channel, or conveyance. Design flow velocity for channels and outlets shall be indicated.

1.4.3.5 Areas to be sodded or seeded and mulched or otherwise, stabilized with vegetation, describing type of final vegetative cover. Type and quality of mulch and method of anchoring shall be indicated, as well as seeding mixtures, rates, lime and fertilizer application rate for temporary or permanent seeding.

1.4.3.6 Schedule of anticipated starting and completion date of each land disturbing and land developing activity including the installation of construction site control measures.

1.4.3.7 Provisions for maintenance of the construction site control measures during construction.

1.4.3.8 Completion of weekly DNR form for maintenance of erosion control as required in permit.

1.5 STORM WATER MANAGEMENT PLAN

1.5.1 General

1.5.1.1 MMSD Rules and Regulations Chapter 13 shall be followed for developments that involve an increase of one-half acre or more of impervious surface.

1.5.1.2 DNR Chapters NR 151 and NR 216 shall be followed for construction sites with 1 acre or more of land disturbance.

1.5.1.3 The Village's Storm Water Management Guidelines shall be followed for developments with > 3,000 SF of land disturbance.

1.5.2 Plan View

1.5.2.1 Highlight drainage basins and specify acres of each basin for existing and proposed conditions. Show contours to determine accuracy of constructed basin.

1.5.2.2 Show time of concentration paths including lengths and slopes.

1.5.2.3 Indicate soil groups and curve numbers.

1.5.2.4 Show detention basin volumes, high water level (HWL), overflow location and elevation. Indicate basins with a title to be referenced by details and in the report.

1.5.2.5 Provide detail of basin discharge structure, size, and materials, showing the 2-yr and 100-yr elevations and restrictions.

1.5.2.6 Existing and proposed contours in pond area at one-foot contour interval.

1.5.2.7 Flood routing for runoff greater than design capacity.

1.5.2.8 Flood stage elevation of 100-year 24 hour storm event.

1.5.2.9 Accompanying the plan shall be a signed and sealed Detailed Storm Water Management Report including a narrative, design assumptions, conclusions, calculations, and recommendations.

1.6 STORM SEWER PLANS

1.6.1 Plan View

1.6.1.1 Right-of-way and its width.

1.6.1.2 Lot lines, lot and block numbers, frontages, and house addresses.

1.6.1.3 Name of each roadway and any intersecting roadways in which the storm sewer will be located.

1.6.1.4 Edge of pavement or face and back of curb and sidewalk.

1.6.1.5 All easement limits and widths, including existing and proposed, permanent and temporary.

1.6.1.6 All proposed and existing sanitary sewer and laterals (existing-dashed, proposed-solid).

1.6.1.7 All proposed and existing water main and laterals (existing-dashed, proposed-solid).

1.6.1.8 Proposed size and diameter of manholes, catch basins, inlets, and junction boxes.

1.6.1.9 Inlets at intersections shall be located at the end of the curb and gutter radius and not in pedestrian walkways.

1.6.1.10 Dimensions showing offset from right-of-way and roadway centerline to the storm sewer. Typically, the storm sewer should be located 10 feet south or west of roadway centerline.

1.6.1.11 Length and diameter of storm sewer between structures, from center to center of manholes, and other structures shall be dimensioned.

1.6.1.12 Material and size of any existing storm sewer to be tied into.

1.6.1.13 Details of outfall or ditch inlet protection requirements such as riprap, end sections or headwalls as needed.

1.6.1.14 Additional details shall include typical manholes, catch basins, inlets, etc.

1.6.1.15 Location of sump pump collection system, field drains, and drainage tiles, as well as construction elevations and details.

1.6.1.16 All obstructions/appurtenances located within the project limits, including, but not limited to: trees, signs, utilities, fences, light poles, structures, etc.

1.6.1.17 A note shall be included that states storm sewer construction shall be according to the latest addition of the Standard Specifications for Sewer and Water construction in Wisconsin and Village of Germantown Construction Standards and Specifications. Germantown's municipal code and standard specifications supersede other standard specifications, when there are conflicting requirements.

1.6.2 Profile view

1.6.2.1 Existing and proposed surface profiles over the storm sewer.

1.6.2.2 The proposed size, material, and diameter of manholes, catch basins, inlets, culverts, and junction boxes.

1.6.2.3 Distances, slope, size, and material of storm sewer shall be labeled between structures center to center.

1.6.2.4 Rim and invert elevations at structures.

1.6.2.5 Invert of storm sewer pipe if different than structure invert elevation.

1.6.2.6 Material and size of any existing storm sewer to be tied into.

1.6.2.7 Sanitary sewer (dashed).

1.6.2.8 Water main (dashed).

1.6.2.9 Backfill material to be used shall be labeled and compacted according to designated methods as approved by the Village Engineer.

1.7 SANITARY SEWER & WATER MAIN PLANS

1.7.1 General

- 1.7.1.1 Sanitary sewer and water main may be shown on the same sheet as approved by Village Engineer.
- 1.7.1.2 Plans shall state that construction shall be according to Standard Specifications for Sewer and Water Construction in Wisconsin, and the Construction Standards and Specifications of the Village of Germantown.
- 1.7.1.3 All sanitary sewer drawings shall include a Lateral Table. The table must show all lengths of sanitary sewer laterals and confirm clearance underneath future footing elevations.

1.7.2 Plan View

- 1.7.2.1 Right-of-way and its width.
- 1.7.2.2 Lot lines, lot and block numbers, frontages, and addresses.
- 1.7.2.3 Edge of pavement or face and back of curb and sidewalk where applicable.
- 1.7.2.4 All easement limits and widths; easements shall be a minimum of 20 feet wide.
- 1.7.2.5 Proposed water main pipe material, diameter, hydrant, valve and lateral locations. (existing-dashed, proposed-solid).
- 1.7.2.6 Existing water facilities on, or adjacent to, the development. This shall include material and size of any existing water main.
- 1.7.2.7 Proposed sanitary sewer manholes, pipe slopes and center-to-center distances between manholes, pipe diameter, laterals, and rim and invert elevations. (existing-dashed, proposed-solid).
- 1.7.2.8 Existing sanitary facilities on, or adjacent to, the development. This shall include material and size of any existing sewer.
- 1.7.2.9 Sanitary sewers shall generally be located at the centerline of the street. Water mains shall be located 10 feet to the north or east of centerline of the street and shall maintain all necessary clearances as defined by standard specifications.
- 1.7.2.10 Dimensions showing offset from right-of-way to the sewer line and water line. Dimensions shall also show the separation between the sanitary sewer, water main, and other utilities.
- 1.7.2.11 Length of each sanitary sewer lateral and length of any lateral risers, as measured from the centerline of the mainline.
- 1.7.2.12 Elevations of sewer and water shall refer to flowline or invert of pipe.
- 1.7.2.13 Name of each roadway and any intersecting roadways in which the sanitary sewer will be located.
- 1.7.2.14 All manholes, valves, and hydrants should be labeled.

1.7.2.15 Proposed or existing storm sewer and appurtenances (existing-dashed, proposed-solid).

1.7.2.16 All improvements are to use roadway stationing.

1.7.2.17 All obstructions/appurtenances located within the project limits including but not limited to trees, signs, utilities, fences, light poles, structures, etc.

1.7.3 Profile View

1.7.3.1 Existing and proposed surface profiles over the sanitary sewer and water main.

1.7.3.2 The proposed label, diameter, rim and invert elevations of sanitary sewer manholes (inches) for existing and proposed.

1.7.3.3 Invert of sanitary sewer pipe if different than structure invert elevation.

1.7.3.4 Pipe material, slope and diameter of sanitary sewer between each manhole as plus or minus foot per foot.

1.7.3.5 Center-to-center distance between manholes.

1.7.3.6 The proposed water main pipe material and its diameter.

1.7.3.7 Center of hydrant nozzle, and hydrant shoe elevations shall be indicated.

1.7.3.8 Limits of gravel, spoil, and/or slurry backfill.

1.7.3.9 Proposed or existing storm sewer and appurtenances (existing-dashed, proposed-solid).

1.7.3.10 Crossings with existing or proposed underground improvements shall be drawn with the name, diameter, elevation and station indicated.

1.7.3.11 Material and size of any existing sanitary sewer and water main to be tied into.

1.7.3.12 Stationing shall be done for all appurtenances.

1.7.3.13 Areas of concrete cradle and envelope shall be dimensioned and labeled.

1.8 ROADWAY PLANS

1.8.1 General

1.8.1.1 Both typical sections and cross-sections shall be shown on the Plan and Detail sheets. Cross-sections details shall also be shown for a cul-de-sacs and t-turnarounds.

1.8.1.2 Elevations shall refer to finished centerline grade.

1.8.1.3 Plans shall state that paving construction shall be according to WIS DOT Standard Specifications for Road and Bridge Construction, latest edition. Germantown's municipal code and specifications supersede if there is any conflict.

1.8.1.4 Wisconsin Traffic Impact Analysis Guidelines

1.8.1.4.1 The Village requires developers and their engineers to use the Wisconsin Department of Transportation's (DOT's) Traffic Impact Analysis Guidelines. Traffic impacts, and how to mitigate them, are an important consideration for any community when a significant development is proposed. Public policy makers, citizens, and developers all have a stake in understanding and responding to additional demands on the transportation system. All share the common interest of a safe and efficient transportation network. A properly developed traffic impact analysis study can provide the factual basis for good decision making and facilitate the timely implementation of effective mitigation measures.

1.8.1.5 Potential Traffic Impacts

1.8.1.5.1 A traffic impact analysis (TIA) is a specialized engineering study that determines the potential traffic impacts of a proposed traffic generator and should answer the following fundamental questions:

1.8.1.5.1.1 What are the existing traffic conditions, the expected future traffic conditions without the development, and the expected future traffic conditions with the development in place?

1.8.1.5.1.2 Can the existing and planned transportation system accommodate the additional traffic generated by the planned development?

1.8.1.5.1.3 Are roadway system improvements needed to maintain an acceptable level of service (LOS) beyond those already programmed or included in the local transportation plan?

1.8.1.5.1.4 What are the recommended roadway improvements that may be necessary to accommodate the expected development traffic?

1.8.1.5.2 A TIA must be completed prior to finalizing the development design, while there is still flexibility in the development's site design.

1.8.2 Plan View

1.8.2.1 Right-of-way and its width.

1.8.2.2 Edge of pavement face and back of curb and sidewalk.

1.8.2.3 Stationing along the centerline of the roadway, including cul-de-sacs and t-turnarounds.

1.8.2.4 Stations shall be indicated by tick marks along the centerline and every 100-foot station shall be labeled.

1.8.2.5 Width of pavement flange to flange.

1.8.2.6 Lot lines, numbers, frontage lengths, and house addresses.

1.8.2.7 Name of each roadway and any adjoining roadways.

1.8.2.8 Curb radii shall be dimensioned to the back of curb. Curb radii are to be verified and approved by the Village Engineer.

1.8.2.9 Flange lines and back-of-curb lines shall be drawn.

1.8.2.10 Flange elevations shall be shown at the beginning, end, and change of slope, at all curb and gutter sections, cul-de-sacs, and warped pavement sections. Length of curve and slope shall also be shown.

1.8.2.11 Specific details of all existing roadways being connected to. Pavement, shoulders, ditches, curb alignment and grades shall be shown as needed to adequately make the transition to match existing grades.

1.8.2.12 All driveways within 500 feet of the proposed development.

1.8.2.13 All roadside ditch locations, flow line elevations at 100-foot intervals, and slope of the ditch.

1.8.2.14 All obstructions/appurtenances located within the project limits including but not limited to: trees, signs, utilities, fences, light poles, structures, etc.

1.8.3 Profile View

1.8.3.1 Existing and proposed roadway profiles along centerline of roadway, cul-de-sacs, and t-turnarounds.

1.8.3.2 Stationing and final centerline grades at all fifty- and hundred-foot stations and at all grade breaks.

1.8.3.3 Proposed grades and stationing shall be shown at each station, at intersections, at street lines extended and at 25-foot intervals, P.C., P.T., and P.I., of vertical and horizontal curves.

1.8.3.4 Slopes shall be indicated as plus or minus foot per foot.

1.9 PRELIMINARY PLAT

1.9.1 General

1.9.1.1 Two (2) copies of a preliminary plat shall be submitted with the other required preliminary plans for initial review.

1.9.1.2 Three (3) copies of an approved, recorded preliminary plat conforming to Section 236.11 (1)(a) of the Wisconsin Statutes shall be required at least one month prior to the start of any construction.

1.10 FINAL PLAT

1.10.1 General

1.10.1.1 The final plat will not be certified by the Village until conditions of the development agreement are met.

1.10.1.2 One (1) full size 24" x 36" and one (1) 8½"x11" 200 scale copy of the final plat conforming to Section 236.25 (2)(c) and (d) of the Wisconsin Statutes shall be submitted to the Village within 10 days of recording. A digital file compatible with AutoCAD in .DWG format shall also be submitted.

1.10.1.3 The AutoCAD digital plat will be mapped using the Wisconsin State Plane Coordinate System – South Zone and based on the NAD83. All construction plans and record documents will be based on this same survey requirement. The coordinates of all section and quarter section monuments are available from the Village Engineering Department.

1.11 PLAN SET SUBMITTAL SCHEDULE

1.11.1 Village of Germantown Submittals

1.11.1.1 When submitting plans to the Village for: sanitary sewer, water main, storm sewer, paving, grading, and erosion control, provide the following number of plan sets:

1.11.1.1.1 For the FIRST submittal, the plans shall go through the Village Planner and receive Village board approval. Their requirements shall be followed. Please provide four (4) copies of the plans in digital form and 24-inch x 36-inch plan sets.

1.11.1.1.2 For each SUBSEQUENT submittal after approval by Village Board, two (2) copies of each plan set.

1.11.1.1.3 For the FINAL submittal, two (2) copies of each plan set.

1.11.1.2 The Village shall be copied on all correspondence to and from governing agencies including MMSD, DNR, Army Corps of Engineers (ACOE).

1.11.2 Sanitary Sewer Plan Submittal to MMSD/DNR

1.11.2.1 Sanitary Sewer submittals shall follow the requirements of NR 110 and all other chapters, along with MMSD Chapter 2. Projects eligible for DNR 'Fast-Track' – as designated on DNR's website. This information is located on Form 3400-160.

1.11.2.2 Any additional data or documents required by MMSD or DNR shall be furnished by the consulting Engineer.

1.11.3 Water main Plan Submittal to DNR

1.11.3.1 Water Main Extensions shall follow the requirements of NR 811 and all other applicable chapters.

1.11.3.1.1 One copy of the cover letter/Village approval letter.

1.11.3.1.2 One set of plans and specifications.

1.11.3.1.3 Form 3400-105 Acknowledgement of Receipt by DNR

1.11.3.1.4 Form 3300-66 Water Main Submittal Checklist

1.11.3.2 Any additional data or documents required by MMSD or DNR shall be furnished by the consulting Engineer.

1.11.4 Storm Sewer Submittal to MMSD

1.11.4.1 Storm Sewer shall follow the requirements of Chapter 2.

1.11.4.1.1 One copy of the cover letter/Village approval letter.

1.11.4.1.2 One copy of the plans and specifications.

1.11.4.1.3 One copy of the relevant system plan

1.11.4.1.4 One copy of the design computations.

1.11.5 Storm Water Management Plan Submittal to MMSD/DNR

1.11.5.1 An electronic copy of the Storm Water Management Plan shall be submitted to MMSD via Sharepoint and shall follow the requirements of Chapter 13 and the Surface Water and Storm Water Rules.

1.11.5.2 Construction activities that disturb more than 1 acre of land shall apply for an NOI and an NOT from the DNR and shall follow the requirements of NR 216 and NR 151.

1.11.5.3 Chapter 30 permits and Water Quality permits shall be obtained as required. ACOE permits for work in wetlands shall also be obtained.

2 WATER SYSTEM

All labor and material shall be governed by requirements of the latest edition and all amendments thereto of the Standard Specifications for Sewer and Water Construction in Wisconsin (SWS), Public Service Commission (PSC) Rules, and Wisconsin Department of Natural Resources (WDNR) Regulations, unless otherwise specified in this document, whichever is more restrictive. All products specified in this section shall be manufactured domestically.

2.1 SPECIFICATIONS

2.1.1 Water Main Pipe

2.1.1.1 MATERIALS

2.1.1.1.1 All pipe used for water main shall comply with SWS and the following:

2.1.1.1.1.1 6" PVC – Hydrant leads

2.1.1.1.1.2 8" PVC or Fusible PVC C-900 and/or C90/RJIB Certa-Lok

2.1.1.1.1.3 12" PVC or Fusible PVC C-900 and/or C90/RJIB Certa-Lok

2.1.1.1.1.4 16" PVC or Fusible PVC C-900 and/or C90/RJIB Certa-Lok

2.1.1.1.1.5 Sizing of private mains requires approval by the Village Engineer.

2.1.1.1.2 PVC or PVCO water main for sizes 4" through 16" diameter, excepting service laterals shall conform to the outer diameter (OD) of Ductile Iron pipe and be AWWA C-900 or AWWA C-909, Class 150 or 200, DR-18 or -14. Shall conform to Standard Specifications Ch. 4.6.0 and 8.20.0. All pipe shall be furnished with Push-On type integral elastomeric bell-spigot joints. USA manufactured products only.

2.1.1.1.3 Fire and Combination Fire/Water service lines from the connection at the main to the backflow prevention device connection, shall be:

2.1.1.1.3.1 PVC/PVCO for sizes 3" through 12" diameters only, conforming to the OD of Ductile Iron pipe, AWWA C-900 or AWWA C-909, Class 200, DR-14

2.1.1.1.3.2 All pipe shall be furnished with Push-On type integral elastomeric bell-spigot joints.

2.1.1.2 DESIGN STANDARDS

2.1.1.2.1 Main sizes (Minimum).

2.1.1.2.1.1 Residential: 8" minimum

2.1.1.2.1.2 Multifamily and commercial: 12" subject to Village Engineer approval.

2.1.1.2.1.3 Industrial: 12" subject to Village Engineer approval.

2.1.1.2.2 Watermain Location

2.1.1.2.2.1 In streets & easements: 10 feet from sanitary sewer; north and east.

2.1.1.2.3 Watermain Bury Depth/Pipe Design Cover

2.1.1.2.3.1 Turf – 6.5 feet (below final grade);

2.1.1.2.3.2 Paved Areas - 7 feet minimum

2.1.1.2.3.3 Special situations (i.e.: ditches, etc.)- 5 feet minimum cover with insulation.

2.1.1.2.3.4 Under 4 feet of cover water main shall be offset to achieve 6 foot cover.

2.1.1.2.4 Tracer wire installation is required on all water mains, branches, and services.

2.1.2 Water Services

2.1.2.1 MATERIALS

2.1.2.1.1 Sizes thru 2" diameter shall be of one manufacturer only, as follows:

2.1.2.1.1.1 Service Lines

2.1.2.1.1.2 PVC

2.1.2.1.1.3 250 psi pressure rated, SDR-9,

2.1.2.1.1.4 Copper tube size, ASTM D-2737, NSF 14, AWWA C-901

2.1.2.1.2 With tracer wire run to the building, terminate in same type and manor as hydrant detail

2.1.2.1.3 There shall be no joints between the corporation valve and curb stop and no joint between the curb stop and meter horn valve.

2.1.2.1.4 Laying length of PVC lines shall afford enough slack to allow for thermal contraction of the plastic and in such manner as to avoid placing it under any undue tension.

2.1.2.1.5 All curb stop boxes shall be wrapped with polyethylene.

2.1.2.1.6 Fittings

2.1.2.1.6.1 Terminal couplings on PVC services shall be made with a pressure tight joint with a Buna-N beveled gasket, and stainless-steel insert sleeve equal to Ford 50-series, and compression fitting which includes a grooved clamp equal to:

2.1.2.1.7 Valves

2.1.2.1.7.1 Corporation (Ball) Valves: Mueller B-25008N; Ford FB1000-Q-NL; A.Y. McDonald 74701BQ.

2.1.2.1.7.2 Curb (Ball) Valves: Mueller B-25155N; Ford B44-Q-NL; A.Y. McDonald 76104T.

2.1.2.1.7.3 Curb Boxes: (Minn. Pattern) Mueller H-10300 and H-10302; Ford E.M. 2-65-56/57 and 2-70-56/57; A.Y. McDonald 5614/15.

2.1.2.1.8 Sizes 3" diameter and larger shall be as follows for Service Lines, Valves, and Fittings:

2.1.2.1.8.1 Connection to Main: Anchoring tee with service line valve anchored to the main branch tee or tapping sleeve and reducing fitting, when appropriate.

2.1.2.1.8.2 Lines: Per "Water Main – Materials" section.

2.1.2.1.8.3 (Curb) Valves: Per "Valves – Materials" section.

2.1.2.1.8.4 Valve Boxes: Per "Valve Boxes – Materials" section.

2.1.2.1.8.5 Fittings: Per "Fittings – Materials" section.

2.1.2.1.9 All stop boxes and service valves shall be exposed, plumb, clean, and operable, when initially installed during new construction, as well as during rehabilitation or repaving projects.

2.1.2.2 DESIGN STANDARDS

2.1.2.2.1 Location, as you face the property, shall be to the left of the sanitary sewer lateral. Each habitable building shall have its own unshared service connection to the main.

2.1.2.2.2 On new construction, curb stop shall not be located within 5 feet of the driveway.

2.1.2.2.3 Water services shall have a trench check dam installed on the property side of the curb stop. See Specification 2.1.3 and Detail Figure 20.

2.1.2.2.4 Pipe design cover:

2.1.2.2.4.1 Turf (Ultimate grade) - 6 feet minimum

2.1.2.2.4.2 Paved areas - 7 feet minimum

2.1.2.2.4.3 Special Situation (i.e.: ditches, etc.) - 5 feet minimum cover with insulation

2.1.2.2.4.4 Under 4 feet of cover water main shall be offset to achieve 6-foot cover.

2.1.2.2.5 Following sizes are minimums, larger sizes may be required based upon fixture units and point of service pressure:

TABLE 1				
Type	Distance (building to main)	No. Of Units		Size
Single Family	<55'			1 ¼" ID
	>55'			1 ½" ID
Two Family	<55'			1 ½" ID
	>55'			2" ID
Multi-Family		<=4		2" ID

		<=8		4" ID
		<=12		4" ID
		<=24		6" ID
		<=48		8" ID
Commercial				2" ID
Industrial				2" ID

2.1.2.2.6 Laterals 2" diameter and smaller may be installed in common trench with the sanitary sewer; Place the shut off at the (future) ROW or easement line.

2.1.2.2.7 Laterals greater than 2" diameter shall be installed a minimum of 8.0 feet away from sanitary or storm laterals; place the shut off at the water main connection tee.

2.1.2.2.8 Generally, PVC service lines shall be installed in accordance with SWS Chapters 5.1.0, 5.2.0 and 5.5.0, and File Nos. 50 & 51, and the following requirements:

2.1.2.2.9 PVC service pipe 1¼" diameter and smaller shall be installed with NO coupling or joint from the corporation stop to the curb stop valves, and the run from the curb stop valve to the meter horn.

2.1.2.2.10 PVC service pipe 1½" and 2" diameter shall be installed with NO coupling or joint from the corporation stop to the curb stop valve, and the run from the curb stop to the meter horn. In the event of a run greater than 55 ft., then the shortest pipe length shall be 20 ft.

2.1.2.2.11 Existing laterals not used in a development shall be abandoned at the main when a development, land division or building razing occurs. See Section 2.2 regarding Abandonment.

2.1.2.2.12 When an existing water service is stubbed to a parcel and is deemed not functional, it will be abandoned, per Section 2.2, and a new service line shall be installed.

2.1.2.2.13 When laterals greater than 2" diameter is existing and the new construction connects to lateral, it will be at the discretion of the Village to allow the connection or abandon at the main and reinstall a new lateral paid for by the property owner. See section 2.2.1.1

2.1.3 Trench Check Dam

2.1.3.1 Materials

2.1.3.1.1 Clay material shall have no organic matter and shall be compacted to 95% standard proctor, or;

2.1.3.1.2 Pre-approved equals such as AquaBlok®, slurry, and others.

2.1.3.2 Design Standards

2.1.3.2.1 A trench check dam shall be installed on all water services.

2.1.3.2.2 For water main pipe, if groundwater is present, a trench check dam shall be installed on all Water Main Pipe or as directed by the Village Engineer.

2.1.3.2.3 The check dam shall be located on the property side of the curb stop.

2.1.3.2.4 Install check dam with bentonite chips 2 feet across the full width of the trench and 4 feet above pipe crown.

2.1.4 Valves

2.1.4.1 Materials

2.1.4.1.1 All valves shall be Resilient type. Acceptable valves are:

2.1.4.1.2 Butterfly Valves - for 16" and larger diameters, conforming to AWWA C504-94, stems sealed by at least two O-Rings, and worm gear operators for 2" square valve key operation from above, turn left (CCW) to open. Install with operating nut on North or East side of water main. Acceptable valves include:

2.1.4.1.2.1 M&H 4500

2.1.4.1.2.2 Kennedy

2.1.4.1.2.3 Pratt Groundhog

2.1.4.1.2.4 Mueller LineSeal III-321-20 or XP-5227-20, or

2.1.4.1.2.5 Pre-approved equal

2.1.4.1.3 RW Gate Valves – For 12" and smaller diameters, conforming to AWWA C-509-94, 250 psi rated, non-rising stems sealed with two O-rings, MJ ends (or MJ-F), turn left (CCW) to open, 2" square operating nut. Acceptable valves include:

2.1.4.1.3.1 Kennedy R/W – 4571

2.1.4.1.3.2 Mueller R/W A-2361 or 2362

2.1.4.1.3.3 Pre-approved equal

2.1.4.1.4 All exposed and non-epoxy coated bolts and nuts on hydrants and valves shall be stainless steel; T-Bolts shall be Cor-Blue or have a fluoropolymer coating as pre-approved by the Village Engineer.

2.1.4.1.5 All valves shall be furnished with interior and exterior epoxy coatings per AWWA C-550-90. All valves not installed in vaults or manholes shall be installed per SWS File No. 37 and shall be wrapped with polyethylene per Section 2.1.10 of these Specifications.

2.1.4.2 Design Standards

2.1.4.2.1 Valve Locations

2.1.4.2.1.1 On all legs of branch lines: Mega-lugged to watermain

2.1.4.2.2 Maximum spacing between valves:

2.1.4.2.2.1 At each intersection

2.1.4.2.2.2 Every 800 feet

2.1.4.2.2.3 Not greater than 24 residential equivalent units (i.e.: 24 SF units; 3 – 8 Family Units)

2.1.5 Valve Boxes

2.1.5.1 Materials

2.1.5.1.1 Valve boxes shall be cast iron, manufactured in the USA, and shall properly accommodate the selected valves. Acceptable manufacturers are:

2.1.5.1.1.1 Tyler Series 6860 US Domestic

2.1.5.1.1.2 Pre-approved equal

2.1.5.1.2 Valve and enclosure type:

Size	Box	Type	Manhole Vault
4"	YES	RW-GV	
6"	YES	RW-GV	
8"	YES	RW-GV	(Special Circumstances)
12"	YES	RW-GV	(Special Circumstances)
16"	YES**	RW-BV	(6 Foot Diameter Option**)

2.1.5.1.3 A valve box #6 base adaptor by Adapter, Inc., or pre-approved equal, shall be furnished as part of the complete valve box for direct-bury gate & butterfly valves.

2.1.5.1.4 Top sections of valve boxes shall be whole factory lengths. Breaking of the top section to shorten its length is not acceptable.

2.1.5.1.5 Screw-in risers are acceptable and preferred. Slip in risers may be used with prior approval.

2.1.5.1.6 Valve box cover shall be a 5-1/4" "MWW" drop in lid with the word "Water" stamped on the top surface.

2.1.5.1.7 All valve boxes shall be wrapped with polyethylene per Section 2.1.10 of these Specifications.

2.1.5.1.8 All valve boxes shall be installed straight and plumb when initially installed during new construction, as well as during rehabilitation or repaving projects. The top of the valve box shall be set flush with pavement grade to avoid damage from snowplows and streets cleaning equipment.

2.1.5.1.9 Valve boxes shall be operable, cleaned and free of debris after installation, after rehabilitation or repaving projects or after any work done by non-Utilities and Streets Department personnel.

2.1.5.1.10 Adjustment to road boxes can be made using slip type, screw insert type and/or slip rings to accommodate a 5 ¼" lid. Smaller than 5 ¼" will not be allowed. The contractor will make Final alignment to the valve box after binder and before the final lift of asphalt.

2.1.6 Valve Vaults

2.1.6.1 Materials

2.1.6.1.1 When designated on the plans or required by the Village Engineer, valve vaults/manholes shall be installed in accordance with this Section.

2.1.6.1.2 All manholes shall be pre-cast concrete with integral base and reinforced concrete flat slab top or approved equal.

2.1.6.1.3 All pre-cast manhole barrel joints shall be made with preformed butyl rubber gasket material (i.e. "Easy Stik" or equal).

2.1.6.1.4 All manhole steps shall comply with SWS Section 8.40.1.A or B.

2.1.6.1.5 All pre-cast manhole barrel sections shall be rotated to align all manhole steps vertically in the manhole.

2.1.6.1.6 All manhole lids shall be equal to Neenah R-1900-D with gasketed lid.

2.1.6.1.7 All frame/casting adjusting rings shall be reinforced concrete rings having 36" I.D. The minimum height for a chimney section shall be the height associated with the proper placement of one 2" adjusting ring. The maximum height of adjusting rings above the cone as measured from the slab top is 16". If more than 16" of adjusting rings are needed to set the casting to finished grade, then an additional barrel section shall be installed on the manhole. Paving rings which have an adjustable diameter is not allowed.

2.1.6.1.8 All chimney joints, including the frame-chimney joint, and all barrel & cone section lifting holes shall be sealed with a premixed, non-metallic, high-strength, non-shrink cementitious grout such as Pennegrout by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621.

2.1.6.1.9 Waterproofing mastic shall be placed over all lift holes and exterior of manhole chimneys that are approved to remain raised above existing grade. Trowelable grade mastic, Tremco 60 or approved equal, shall be applied to a minimum 50 mil WFT.

2.1.6.1.10 An external sealing wrap shall be placed at all joints between pre-cast manhole sections. The external sealing wrap shall meet, or exceed, the requirements of ASTM C-877, Type II. External joint seals shall be MacWrap, as manufactured by Mar-Mac Manufacturing Co. Inc. or pre-approved equal.

2.1.6.1.11 Coal-tar epoxy coating (two coats @ 8.0 mils DFT each) shall be applied to the exterior of ALL manholes in accordance with SWS 8.7.0. Alternate waterproofing materials and application may be pre-approved by the Village Engineer.

2.1.6.1.12 Pipe-Manhole Connection device shall be Kor-N-Seal boot with stainless steel Snap-In banding rings or pre-approved equal.

2.1.6.2 Sample Station

2.1.6.2.1 Eclipses #88SS SMPL STN 7'-0" Extreme Cold

2.1.6.2.2 Installed with its own water curb stop and curb box

2.1.7 Hydrants

2.1.7.1 Materials

2.1.7.1.1 Acceptable manufacturers are:

2.1.7.1.1.1 Kennedy Guardian K-81 UL/FM

2.1.7.1.1.2 Mueller A-403 Super Centurion

2.1.7.1.1.3 Mueller Super Centurion UL/FM

2.1.7.1.1.4 Pre-approved equal

2.1.7.1.2 All hydrants shall be provided as follows:

2.1.7.1.2.1 MJ connection

2.1.7.1.2.2 Turn left to open

2.1.7.1.2.3 Depth of bury 6.5'

2.1.7.1.2.4 Painted Brite Hydrant Red (5 mil DFT)

2.1.7.1.2.5 Break flange (traffic) type

2.1.7.1.2.6 5.25" main valve opening

2.1.7.1.2.7 Two 2.5" hose nozzles

2.1.7.1.2.8 One 4.5" pumper nozzle

2.1.7.1.2.9 One 4' long fiberglass, red reflective tape and white reflective tape with spring hydrant marker. Part #35000W (R&W)-10501

2.1.7.1.3 If during installation and construction the Village deems the coating has been compromised, it will be sandblasted and repainted per section 2.1.7.1.9 at the contractor's expense.

2.1.7.1.4 Hydrant leads shall be six (6) inch, C900.

2.1.7.1.5 Tapping saddle will be an all stainless-steel Smith Blair 663 with a stainless steel Hymax H-304 MJ outlet or Romac SST-MJ stainless steel MJ outlet or equal use core-10 blue bolts. Poly wrap fitting, valves. With Valve box-Tyler only - #6860/MWW lid, Adaptor Inc. #6 base adaptor.

2.1.7.1.6 All fasteners will be stainless steel on all valves and hydrants and on all MJ fittings will be, Cor-Blue T-bolts Birmingham Fastener or equal.

2.1.7.1.7 Contractor shall provide for a 6.5' burial depth for all hydrant leads shown on plans. If a water main burial depth is greater than 6.5', Contractor shall install fitting(s) to raise the hydrant lead to meet the required burial depth.

2.1.7.1.8 Hydrants that are not placed in service shall have a "Not in Service" tag attached to the pumper nozzle and baggy wrapped and tapped.

2.1.7.1.9 Preparation for painting – Sandblast to 100% clean white metal from ground level up to top of hydrant. Dispose of spent materials. Fully enclose hydrant during blasting, priming, and painting. Air dryer shall be used to prevent moisture in the air supply.

2.1.7.1.10 Primer-Devoe 224 high build epoxy primer (or Engineer-approved equal) to a thickness of 4-8 mils (1 mil = 25.4 millimeters).

2.1.7.1.11 Topcoat – Devoe 379UVA urethane epoxy (or Engineer-approved equal) with a minimum thickness of 4 mils. All hydrants shall be fully enclosed during blasting, priming, and painting.

2.1.7.2 Design Standards

2.1.7.2.1 Location

2.1.7.2.1.1 Maximum spacing: 400-ft. diameter from center of hydrant to center of hydrant. If different spacing is required, verify differing condition with Village Engineer and Fire Chief.

2.1.7.2.1.2 At all high points in distribution system.

2.1.7.2.1.3 At intersections, far end of cul-de-sac at lot line extended, and mid-block at lot line extended, where practical. In the event a hydrant location conflicts with a valve location at an intersection, the hydrant tee shall be located 6 feet away from the main valve.

2.1.7.2.1.4 Rural: 3 feet off Right-of-Way. Provide 5-ft. deep x 10-ft. wide hydrant easement.

2.1.7.2.1.5 Urban: 4 feet behind back of curb line.

2.1.7.2.1.6 Side paths, recreation trails and other pedestrian ways: Minimum separation distance from edge of pathway to closest physical feature of the hydrant shall be 18".

2.1.7.2.2 Design Height

2.1.7.2.2.1 Pumper Nozzle shall be above the surrounding final grade by 18 to 24 inches.

2.1.7.2.3 Design Cover

2.1.7.2.3.1 6.5 feet minimum bury depth

2.1.7.2.4 Branch pipe design cover

2.1.7.2.4.1 In Turf: 6.5 feet (Ultimate grade)

2.1.7.2.4.2 In Paved Areas: 7 feet minimum

2.1.7.2.4.3 Special situations (i.e. ditches, etc.): 5 feet minimum cover with insulation

2.1.7.2.4.4 Under 4 feet of cover water main shall be offset to achieve 6 foot cover.

2.1.7.2.5 Break flange shall be at grade or not greater than 6 inches above grade.

2.1.7.2.6 Branch tee shall be Anchor T with gate valve at the tee.

2.1.7.2.7 An asphalt service drive with culvert shall be installed in all ditch crossings greater than 2 feet deep or that have transverse slopes greater than 4H:1V.

2.1.7.2.7.1 The service drive shall be 10 feet wide and extend to 2 feet behind the hydrant. The drive shall be constructed with 10 feet wide by 6 inches deep of No. 2 open graded base course and 10 feet wide by 3 inch depth of asphalt.

2.1.7.2.7.2 Culverts shall be hydraulically sized for each location consistent with Section 4 of the Development Handbook.

2.1.8 Fittings

2.1.8.1 Materials

2.1.8.1.1 All pipe fittings used for water main shall comply with SWS and be manufactured in the USA.

2.1.8.1.2 All fittings shall be Ductile Iron and be Class 350 or greater, conforming to the current ANSI/AWWA C-153/A21.53.

2.1.8.1.3 Fittings shall have a cement mortar lining on the interior in accordance with current (USA Domestic Only) ANSI/AWWA C-104/A21.4.

2.1.8.1.4 Fittings and accessories shall be furnished with mechanical-type joints with lugged retainer glands in accordance with current (USA Domestic Only) ANSI/AWWA C111/A21.11.

2.1.8.1.5 All nuts and bolts shall be stainless steel on hydrants and valves. All T-Bolts shall be Cor-Blue.

2.1.8.1.6 All tees and fittings shall be anchored with restraints or pre-approved equal.

2.1.8.1.7 Angle Fittings shall be as follows:

2.1.8.1.7.1 All 90° bends: Full body, long radius, anchored, and mega-lugged or buttressed.

2.1.8.1.7.2 Other Angle Fittings: Short body acceptable; anchored and buttressed.

2.1.8.1.8 Acceptable manufacturers of Ductile Iron pipe fitting include the following:

2.1.8.1.8.1 American Cast Iron Pipe Co.

2.1.8.1.8.2 Tyler Union

2.1.8.1.8.3 Water Main Couplers

2.1.8.1.8.4 Hymax 4"-16"

2.1.8.1.8.5 Romac 4"-12"

2.1.8.1.8.6 Or approved equal

2.1.8.1.9 Acceptable restraints include the following:

2.1.8.1.9.1 EBAA Mega-Lug

2.1.8.1.9.2 Romac Roma Grip

2.1.8.1.9.3 Stainless steel rodding with stainless steel star bolts

2.1.8.1.9.4 Or approved equal

2.1.8.2 Design Standards

2.1.8.2.1 All fittings shall be wrapped with polyethylene per Section 2.1.10 of the Development Handbook.

2.1.9 Water Metering Requirements

2.1.9.1 Design Standards

2.1.9.1.1 Refer to Village of Germantown Code Chapter 13.37 for general requirements.

2.1.9.1.2 Two-Family units shall require a split service lateral into the building in accordance with Standard Detail Figure No. 19.

2.1.9.1.3 Multi-Family Condominium buildings (4 livable units and over): A water metering room shall be required at the water service entrance location. Each water meter room shall be designed to meet the requirements of the Germantown Water Utility, including an outside doorway. An entry key shall be provided to the Germantown Water Utility. An individual meter required for each unit.

2.1.9.1.4 Multi-Tenant Commercial and Industrial buildings: A water metering room shall be required at the water service entrance location. Each meter room shall be designed to meet the requirements of the Germantown Water Utility, including an outside

doorway. All commercial and industrial buildings shall have ball valves installed on the inlet, outlet, and bypass for water meters. An entry key shall be provided to the Germantown Water Utility. An individual meter required for each unit.

2.1.9.1.5 The water meter room shall:

2.1.9.1.5.1 Be large enough to allow work on the water meters. The size of the meter room would vary depending on the meter size(s) and number of meters going into the building. The Utility Department shall approve the size of the meter room.

2.1.9.1.5.2 Be unobstructed by water softeners, vacuum cleaners, garbage cans, electric service, phone services, etc.

2.1.9.1.5.3 Not be used for cleaning supply storage or storage area.

2.1.9.1.5.4 Have adequate heating and lighting

2.1.9.1.5.5 Have a floor drain

2.1.9.1.5.6 The size of the water meter shall be on the plan to make sure the room is big enough to house the entire meter.

2.1.9.1.5.7 Not installed in a ceiling

2.1.9.1.5.8 Minimum 2'-3' off the floor

2.1.9.1.5.9 If meter is installed in a cabinet, minimum 2'x2' removable opening.

2.1.9.1.6 At the meter setting:

2.1.9.1.6.1 1"-2" valves will be all brass USA made only, full port ball valves and brass nipples, 600psi rated Nibco T-585-70 or equal.

2.1.9.1.6.2 A by-pass will be installed on meters 1 ½" and larger.

2.1.9.1.6.3 Bypass pipe to match the diameter of the through pipe.

2.1.9.1.6.4 Bypass pipe to have its own separate shut off valve.

2.1.9.1.7 All gate valves used for branch piping at the meter setting inlet, outlet, and bypass piping 3" and greater will be AWWA resilient wedge epoxy coated C509, NRS (non-rising stem). MJ connection and flanged face at the meter, all stainless-steel bolts and washers-install anti-corrosive agent on threads.

2.1.9.1.8 Irrigation and/or Sprinkler Meter:

2.1.9.1.8.1 A sprinkler or deduct meter is required.

2.1.9.1.8.2 A sprinkler meter is installed parallel to the main meter (New construction).

2.1.9.1.8.3 A deduct meter is installed after the main meter (Existing).

2.1.10 Polyethylene Wrap

2.1.10.1 Materials

2.1.10.1.1 Polyethylene film materials shall comply with SWS Chapter 8.21.0.

2.1.10.1.2 Wrap all ductile iron pipes, valves, fittings, and valve boxes with polyethylene film. When wrapping valve boxes, only wrap the bell portion and the bottom of the first section.

2.1.11 Tracer Wire

2.1.11.1 Materials

2.1.11.1.1 Open Cut tracer wire will be Copperhead #1230-HS-30mil

2.1.11.1.2 Directional Drilling/Boring tracer wire will be Copperhead SoloShot @1245-EHS

2.1.11.1.3 Pipe Bursting tracer wire will be Copperhead SoloShot Extreme – 7x7 stranded, HDPE coated

2.1.11.1.4 Terminate single wire at the back side of each hydrant inside 3” x 4’ PVC pipe with a threaded cap. If no hydrant is available, install wire(s) inside a separate Tyler #6860 top section set on bricks road box location field verified. All wires will have a minimum of 2’ of slack.

2.1.11.1.5 All mainline tracer wires shall be interconnected in intersections, at mainline tees, and mainline crosses.

2.1.11.2 Design Standards

2.1.11.2.1 Tracer Wire is required on ALL mains and services.

2.1.11.3 Installation

2.1.11.3.1 Open cut-Tracer wire will be Copperhead #1230-HS-30mil.

2.1.11.3.2 Directional drilling/boring-Copperhead SoloShot#1245-EHS

2.1.11.3.3 Pipe bursting-Copperhead SoloShot Extreme-7x7 stranded, HDPE Coated

2.1.11.3.4 Terminate wire at the back side of each hydrant inside 3” x 4’ PVC pipe with a FNPT x Spigot PVC DWV clean-out adapter with plug and threaded cap

2.1.11.3.5 If no hydrant is available install wire/s inside a separate Tyler top section set on brick #6860

2.1.11.3.6 Road box location field verified. All wires will have a minimum of 2’ slack.

2.1.11.3.7 All mainline tracer wires shall be interconnected in intersections, at mainline tees and mainline crosses

2.1.11.3.8 Tracer wire splicing and connecting to existing tracer wires will use a Copperhead 3-Way Twist lock waterproof connector for 30mil for direct bury-Part #LSC1230B-CTR25. And at the hydrant lead use a “Service lateral lug” connector Part #3WB-01

2.1.11.3.9 At the termination points install ground rod Copperhead #ANO-12. Connect the red wire to the blue tracer wire inside the 3" tube with a double wire lug connector.

2.1.11.3.10 If no hydrant is available install wire inside a separate Tyler full gate valve box top section set on brick #6860 road box location field verified

2.1.11.3.11 Install tracer wire from main to the building using "Copperhead" 1230-HS-Blue wire connect the new tracer wire to existing wire at the main using a Copperhead lockable waterproof connector for direct bury.

2.1.11.3.12 Service Laterals-Terminate tracer wire by building using Copperhead ANO-12 termination rod, connect the red termination wire to the blue tracer wire using a standard wire nut sized for this wire and install the two wires in a 3" X 4' long PCV tube with thread cap. The exposed end needs to be a minimum of 6"-12" visible after finished grade.

2.1.11.3.13 If tracer wire does not exist at the main, install the wire with the service and terminate wire at the main using a Copperhead ANO-12 termination rod. Splice the red wire with the blue wire using a Copperhead lockable waterproof connector for direct bury.

2.1.11.3.14 Proper stripping of HDPE coating will be made using an approved electrical stripping tool, NOT a pocketknife.

2.1.11.3.15 Service Lateral private property-Connect the red wire from the grounding rod and the blue tracer wire using a Copperhead waterproof connector-no ANO-12 termination is needed at the building.

2.1.11.3.16 Install tracer wire in a 3" X 4' long PVC tube with thread cap. The exposed end needs to be a minimum of 6"-12" visible after finished grade.

2.1.11.3.17 Testing-All new tracer wire installation shall be located using a low frequency line tracing equipment, witnessed by the inspector/owner/engineer. This verification shall be performed after rough grading and before finished grade and asphalt.

2.1.12 Tapping

2.1.12.1 Materials

2.1.12.1.1 Service saddles shall be used on all corporation valve sizes larger than 1", subject to specific pipe manufacturer restrictions for the pipe to be tapped. Saddles shall be all 304 stainless, double bolt saddle. Acceptable product for service sizes through 2" corps include, 360 full circumference:

2.1.12.1.1.1 Romac SS1

2.1.12.1.1.2 Smith-Blair 264

2.1.12.1.1.3 Power Seal 3131AS

2.1.12.1.1.4 Hymax Tapped Clamp

2.1.12.1.1.5 Pre-approved equal

2.1.12.1.2 Tapping sleeves that have a flanged outlet shall be used when tapping all existing pipe in service for branch lines 3" and larger in size. The body shall be 304 stainless steel, have a minimum of 1/3 of the interior surface fully lined with a raised "donut" area around the branch opening, and a test port. All bolts, washers, and nuts shall be stainless steel. Acceptable tapping sleeves include:

2.1.12.1.2.1 Hymax Tap

2.1.12.1.2.2 Romac Series SST with 204 stainless steel MJ outlet

2.1.12.1.2.3 Smith-Blair 663 with stainless steel outlet

2.1.12.1.2.4 Ford

2.1.12.1.2.5 Pre-approved equal

2.1.12.2 Design Standards

2.1.12.2.1 Locations of all taps, tapping devices, or fittings/valves for ALL water pipes shall be in accordance with the following:

2.1.12.2.2 The minimum distance from the beginning/end of the Bell or MJ of a water pipe fitting or another tap shall be:

2.1.12.2.2.1 Corporation direct tap = 2 feet

2.1.12.2.2.2 Corporation Tapping Saddle (Up to 2" size) = not less than 2 feet

2.1.12.2.2.3 Branch Tapping Sleeve = not less than 4 feet.

2.1.12.3 Installation

2.1.12.3.1 Activation of tap can only be authorized by the Water Utility after passing pressure tests and safe water tests. A Utility representative shall be present on-site during tapping and sleeve work and any connection(s) to existing main(s). Two working days advance notice before making the connection is required by the Water Utility.

2.1.12.3.2 All taps to water mains shall be made under full system pressure, with the main full of water. No taps may be made on an inactive or non-pressurized main.

2.1.12.3.3 All curb stops shall be installed under full system pressure prior to hydrostatic testing for acceptance of installation.

2.1.12.3.4 When tapping, thoroughly clean and inspect the pipe surface. Wet the pipe surface with a soap/water solution prior to placing a saddle, sleeve or repair clamp. Confirm that the main OD falls within the tapping device's OD range. Ensure that

the tapping device is properly aligned to connect with the branch pipe. Ensure that the tapered ends of the gasket are smooth, not folded or rolled in any manner.

2.1.12.3.5 The saddle, sleeve or repair clamp shall be installed and all bolts finger-tightened for uniform gap. Tighten all bolts working from the ends to the center using torque wrenches in accordance with manufacturers specifications. After approximately 10 minutes to allow the gasket to fully compress, all bolts shall be re-tightened to manufacturer's specifications. Make sure the tapping device and tapping machine are fully supported and all cutting edges sharpened. Teflon tape or Teflon pipe dope shall be used on the corporation stop and all other pipe threads.

2.1.12.3.6 If the tapping device is for 3" or larger branch line, the sleeve shall have a test port and be tested at 100 psi for 5 minutes by the Contractor BEFORE the actual tap proceeds. A Water Utility representative shall witness the tapping device installation, pressure test and tapping procedure.

2.1.12.3.7 All taps to existing and new mains shall be "live" or "wet" taps, utilizing a tapping machine with appropriate cutting tools and sharp cutting heads. All tap cut-outs shall be given to the Construction Inspector or Water Utility representative witnessing the tap.

2.1.12.3.8 No taps will be permitted to begin after 1:00 P.M. Additionally, pre-approval by the Water Utility is required for tapping on a Friday or preceding a holiday.

2.1.12.3.9 Two business days prior notice to Water Utility is required to be given prior to installation of new taps on existing mains.

2.1.12.3.10 Notice shall also be given to the Superintendent of Water Utility (Department of Public Works 262-253-7780) for new taps on existing mains.

2.1.13 Bedding, Cover, & Backfill

2.1.13.1 Materials

2.1.13.1.1 Pipe bedding: In accordance with SWS, Section 8.43.2: 3/8" limestone chips for PVC/PVCO pipe. No. 1 clean stone shall be placed within a 5 foot radius of valves and valve boxes.

2.1.13.1.2 Cover Material: In accordance with SWS, Sections 8.42.2 & 8.42.3: 12" above top of pipe. No stone, rock, or other similar material with a sieve size greater than 3/8" shall be permitted. Sand and gravel are prohibited.

2.1.13.1.3 Granular Backfill: In accordance with SWS, Section 8.43.4, Table 39 Graded **Aggregates**, 1 1/2" graded limestone. In spot construction in trench lengths less than 50' Granular Backfill shall be crushed limestone per SWS, Section 8.43.6.

2.1.13.1.4 Spoil Backfill: In accordance with SWS, Section 8.43.5. No stone, rock or other similar material with a sieve size greater than 3-inches shall be permitted within 2.0 ft. above or beside the pipe. For HDPE service lines, the sieve size shall not be greater than 1/4" within 2.0 ft. above or beside the pipe.

2.1.13.1.5 Slurry Backfill: Aggregate slurry in accordance with SWS, Section 8.43.8, or in accordance with a street opening permit, when issued. In special cases, Village Engineer may require Sand Slurry consisting of 50 pounds of flyash and a ½ bag of Portland cement per cubic yard of mix.

2.1.13.2 Design Standards

2.1.13.2.1 Mechanically compact all trench backfill per Section 2.6.14(b) of SWS. Conform to 95% standard proctor density tested at the Contractor's expense.

2.1.13.2.1.1 Initial lift – 2 feet maximum

2.1.13.2.1.2 Subsequent lifts – 1.5 feet maximum

2.1.13.2.2 Backfill in accordance with all street opening permit(s); generally, this will be slurry aggregate. All areas not within 5 ft. of paved surface (and above a 45-degree intercept line) may receive suitable spoil backfill as provided herein. Prohibited: Debris, frozen material, large clods or stones, organic material, blast rock, stones larger than 6", sand. Contractor shall haul away and dispose of these materials at Contractor's expense.

2.1.14 Caps & Plugs

2.1.14.1 Materials

2.1.14.1.1 Acceptable caps and plugs include:

2.1.14.1.1.1 Clow F-1155, F1159, and F1165 solid cap or Pre-approved equal

2.1.14.1.1.2 Poured buttresses shall be used

2.1.14.1.1.3 Mega-lugs or pre-approved equals shall also be used when appropriate

2.1.15 Casing/Carrier Pipe

2.1.15.1 Materials

2.1.15.1.1 Installation of water lines within casings shall be accomplished by using Stainless Steel Casing Spacers installed in accordance with the manufacturers recommendations. Spacers shall be:

2.1.15.1.1.1 Style CCS by Cascade Waterworks Mfg. Co. of Yorkville, IL

2.1.15.1.1.2 Model 4810 by PowerSeal Pipeline Products of Wichita Falls, TX

2.1.15.1.1.3 Pre-approved equal

2.1.15.1.2 End seals, installed on both ends of each casing, shall be:

2.1.15.1.2.1 Cascade Style CCES

2.1.15.1.2.2 PowerSeal 4810ES

2.1.15.1.2.3 Pre-approved equal

2.1.15.1.3 Water mains within the casing shall be installed with mechanical joints and mega-lugs or pre-approved equal

2.1.15.2 Design Standards

2.1.15.2.1 Casing watermain shall be used for all plastic pipe crossing a right-of-way and for all arterial crossings.

2.2 ABANDONMENT

2.2.1 General

2.2.1.1 All existing water mains and service lines that will not be used in new construction or re-used for reconstruction of existing building sites shall be abandoned at the main, unless approved by the Village Engineer or Water Utility.

2.2.1.2 A representative from the Village Engineering Department or Water Utility shall be present to witness the abandonment.

2.2.1.3 All excavations within public rights-of-way shall require Village and/or County Permits.

2.2.1.4 Excavations within 5 ft. of and under paved surfaces shall be backfilled with Slurry Aggregate per the SWS to within 1.0 ft. of surface, followed by appropriate street restoration and not less than 3-inches of binder and 2-inches of wearing surface bituminous pavements.

2.2.1.5 In special circumstances, when approved in writing by the Village Engineer, water service lines may be temporarily made inactive at the right-of-way or easement boundary. The service shut-off valve shall be turned off and the pipe plugged or capped at the property line. Water services not abandoned at the main shall meet the following conditions:

2.2.1.5.1 As part of the demolition permit, a certified check or Letter of Credit, in the amount of \$5,000 per lateral, shall be submitted to the Village Engineer to guarantee the permanent abandonment of the service at the main is completed in a timely manner.

2.2.1.5.2 Any service line that is not abandoned at the main shall be subject to separate "availability" or "ready to serve" charges in the interim period until properly abandoned.

2.2.1.5.3 Water lines made inactive in this manner shall be marked with a marker post placed 1 ft. from the end of the pipe and extending from the pipe to 3 ft. above the ground surface and painted a blue color.

2.2.1.5.4 The location of the terminal pipe locations shall be surveyed or otherwise "tied" to permanent objects that will remain undisturbed at the site, with an as-built drawing provided to the Village Engineer and Utility Department for record purposes.

2.2.2 Water Services

2.2.2.1 All water services 2" diameter and smaller shall be abandoned at the street main by Turning off the main, remove the corp. and install a Hymax, Smith Blair 261 or equal stainless-steel repair clamp.

2.2.2.2 The remaining service line may be left in place, but the valve box/curb stop shall be removed. Backfill of gate valve box shall consist of stone and/or slurry.

2.2.2.3 The completed work shall be double wrapped with polyethylene per SWS, Chapter 6.21.0.

2.2.2.4 For water service lines larger than 2" diameter, the abandonment procedure would consist of:

2.2.2.4.1 Removal of the service shut-off valve (if at the main), plus 2 - 3 ft. of service pipe at the street main branch fitting. If a blind flange cannot be installed on the T, and the Village deems the fittings are defective the main will be shut down. Cut and remove that section of pipe fittings. Install new pipe with two water main couplers and wrap with baggy.

2.2.2.4.2 Installation of a gasketed blind flange or MJ plug at the branch fitting, as appropriate.

2.2.2.5 All bolts and gaskets shall comply with these standards.

2.2.2.6 In the event that the shut-off valve is not at the street main branch fitting, then 2 - 3 ft of the service pipe shall be removed and a gasketed blind flange or plug installed onto the branch fitting at the main.

2.2.2.7 The valve box/curb stop shall be removed.

2.3 INSPECTION

2.3.1 Submittals & Samples

2.3.1.1 Material samples shall be taken as provided in SWS 8.1.0 and the Contract Documents.

2.3.1.2 All materials delivered to the Work Site shall have legible markings in accordance with ANSI, ASTM, AWWA and SWS 8.3.0.

2.3.1.3 All materials of each type or use shall be from a single manufacturer for the entire Contract.

2.3.1.4 Prior to the start of work, the Contractor shall submit six sets of the following for approval:

2.3.1.4.1 Letter of Certification and representative test reports by manufacturer for all pipe delivered to the Work Site for EACH material item furnished.

2.3.1.4.2 Representative test reports for EACH material item furnished to the Work Site.

2.3.1.4.3 Installation manuals for all mechanical equipment furnished to the Work Site.

2.3.1.4.4 Generally, installation shall be in accordance with SWS and as modified by these Specifications.

2.3.1.4.5 All material specifications to be delivered as a .PDF filetype.

2.3.2 Disinfecting

2.3.2.1 No chlorination or flushing between safe samples.

2.3.2.2 Use only calcium hypochlorite tablets affixed to the top interior wall of the pipe (no powder) to disinfect pipelines and service/fire lines in accordance with SWS, Section 4.3.12. The Contractor will collect samples of the chlorinated water for safe water testing. Contractor shall supply all labor assistance to flush mains and to take sample(s). The Water Utility will provide chain of custody bags that will be sealed with the sample onsite.

2.3.2.3 The samples will be taken to a State Certified lab, the water will not be turned back on for new main construction, new development, or new facilities until the Water Utility receives the sample test results.

2.3.2.4 Water wasted to surface may not contain any substances in concentrations that adversely affect the water as determined by the Wisconsin Administrative Code, NR 105 and 106. For chlorine, no total residual chlorine may be measured in the water being discharged to a surface water greater than ambient total chlorine residual in system water supply (typically 0.5 mg/L). Advise the Water Utility and Village Engineer of proposed discharge schedule to arrange DNR-required chlorine residual measurements for main flushing water.

2.3.3 Acceptance Testing

2.3.3.1 General

2.3.3.1.1 Pressure and leakage testing shall include all installed system components, such as mains, branches, services and fire protection taps to terminus of all lines to be installed under the Contract.

2.3.3.1.2 Two (2) business days' notice to the Engineering Department (262-250-4721) and Water Utility shall be required.

2.3.3.1.3 Water for filling, testing and flushing for safe sampling of watermain will be supplied only by permission of the Water Utility via permit. All water that is used for filling new mains, pressure testing, flushing of mains, trench flushing, and safe sampling etc., will be witnessed by an inspector or Utility employee. Water used will be charged at the current rate.

2.3.3.2 Tests

2.3.3.2.1 Prior to pre-punch list work, tracer wires shall be tested by Contractor prior to Village accepting the work. The Utility Department has the option to spot check the continuity of the tracer wires.

2.3.3.2.2 Pressure and leakage tests shall be performed in accordance with SWS and under the jurisdiction of the Engineering Project Inspector and Water Utility.

2.3.3.2.3 Pressure Test: After the test connections are made and the main filled with water, the test section shall be subjected to water pressure normal to the area. After examination of exposed parts of the system, the test pressure will be increase to 150 psi on the main at the lowest elevation. The main shall be examined and if any defects are found, the Contractor shall immediately make the necessary repairs at his own expense. The pressure test shall be repeated until no defects can be found. The duration of the final pressure test shall be one hour. The pipe shall pass if the final pressure is within 5% of the test pressure for 1 hour. If it is found unnecessary to add water during the duration of the pressure test, the leakage test may be waived at the direction of the Inspector/engineer or Water Utility. If waived by the Inspector and Water Utility, a combination leak/pressure test will be performed.

2.3.3.2.3.1 For HDPE pipe, test duration to be less than 8 hours. If testing is not completed for any reason, de-pressurize and allow to “relax” for 8 hours before resuming test.

2.3.3.2.3.2 PVC Pipe: Conform to Standard Specifications Ch. 4.15.0

2.3.3.2.3.3 Test shall include a Bac-T safe sample.

2.3.3.2.4 Leakage Test: The leakage test, if required, shall be conducted after satisfactory completion of the pressure test. The test section shall be subjected to approximately 100 psi gauge pressure at the point of highest elevation of the main under test. The duration of the leakage test shall be two hours unless otherwise specified. Should any test section fails to meet the leakage test, the Contractor shall immediately make the necessary repairs at his own expense. The duration of the final leakage test shall be one continuous hour.

2.3.3.2.5 Fire and Combination water/fire service lines shall be tested at 200 psi for 2.0 hours.

2.3.3.2.6 Contractor is responsible for taking samples, witnessed by the Village or onsite inspector and samples put in a sealed chain of custody bag provided by the Village.

2.3.3.2.6.1 No first sample will be taken on a Friday, weekend, or adjacent to a holiday.

2.3.3.2.6.2 Bacteriological Testing: Conform to Standard Specifications Ch. 4.16.0 and NR 811.07. Contractor shall provide analysis results to Village Engineering Dept in PDF form. If the bacteriological test fails, conform to Standard Specifications Ch. 4.16.3 to re-chlorinate the main.

2.3.3.2.6.3 No Bac-T sample will be accepted if the sample is not taken from a smooth bore sample tap upstream from the discharge flowing pipe. Samples from a hose spigot will not be accepted.

2.3.3.2.7 Tracer Wire Connectivity: All new tracer wire installation shall be located using a low frequency line tracing equipment, witness by the inspector/owner/engineer. This verification shall be performed after rough grading and before finished grade and asphalt.

2.4 OTHER REQUIREMENTS

2.4.1 General

2.4.1.1 Contractor shall be responsible for Digger's Hotline locates, site safety, resident access, traffic control, erosion & sediment control, and protection of existing facilities, features and structures at all times

2.4.1.2 At end of each day and during breaks, Contractor shall install waterproof, leak-proof plugs.

2.4.1.3 At the end of each day, open excavations shall not exceed 25 ft. in length.

2.4.1.4 All lateral trenches shall be backfilled at end of day.

2.4.1.5 At end of each day, contractor shall erect barricades with flashers and snow fencing surrounding excavations.

2.4.1.6 Mainline Installation: Conform to Standard Specifications Ch. 4.3.0 Sawcut Exist Pavements: Wheel-mounting saw required. Sawcut full depth.

2.4.1.7 List of Standard Village Details

2.4.1.7.1 HDPE Hydrant Branch

2.4.1.7.2 Standard Hydrant Bollard

2.4.1.7.3 Relocate Water Main HDPE Pipe

2.4.1.7.4 Relocated Existing Water Main PVC Pipe Only

2.4.1.7.5 HDPE Joint Restraint

2.4.1.7.6 Water Main Reconnection

2.4.1.7.7 Water Main Service Lateral Schematic

2.4.1.7.8 Tracer Wire Construction Layout

2.4.1.7.9 Sample Station Detail

2.4.1.7.10 Meter Sizes/Laying Lengths and Charges

2.4.1.7.11 Bulk Water Purchasing Process and Charges

3 SANITARY SEWER SYSTEM

All labor and material shall be governed by requirements of the Milwaukee Metropolitan Sewerage District (MMSD) and the latest edition and all amendments thereto of the Standard Specifications for Sewer and Water Construction in Wisconsin (SWS), Public Service Commission (PSC) Rules and Wisconsin Department of Natural Resources (WDNR) Regulations, WisDOT Standard Specifications for Highway and Structural Construction, Chapter DSPS 382, and Village of Germantown Municipal Code unless otherwise specified in these Specifications, whichever is more restrictive.

3.1 SPECIFICATIONS

3.1.1 Sanitary Sewer Main and Laterals

3.1.1.1 Materials

3.1.1.1.1 All pipe used for sanitary and private main interceptor sewers shall be:

3.1.1.1.1.1 PVC (solid wall) SWS Section 8.10.0, ASTM D3034, SDR-26, SDR-30

3.1.1.1.1.2 PVC (solid wall, green in color for in-ground identification) SWS Section 8.20.0, AWWA C-900 or C-905

3.1.1.1.1.3 Or Engineer approved equal

3.1.1.2 Design Standards

3.1.1.2.1 Design flow coefficients as determined by the Village Engineer, subject to the following:

3.1.1.2.1.1 Residential/Multi-Family (Per MMSD Flow Allocation Worksheet)

Base Sanitary Flow	102 gpcd
Max Daily	1,269 gpcd
Residential densities are to be determined per MMSD Annual Cost Recovery Manual	

3.1.1.2.1.2 Industrial & Institutional Areas (Per MMSD Flow Allocation Worksheet):

Base Sanitary Flow	1,500 gpd/Acre
Max Daily	3,250 gpd/Acre

3.1.1.2.1.3 Large Commercial (Per MMSD Flow Allocation Worksheet):

Base Sanitary Flow	2,250 gpd/Acre
Max Daily	4,000 gpcd/Acre

3.1.1.2.2 Design flows and peaking factors are to be referenced to MMSD Rules and Regulations and as determined by the Village Engineer. Design objectives shall result in elimination, to the greatest extent possible, of all infiltration and inflow.

3.1.1.2.3 Minimum Main and Lateral Sizes:

Residential	8" main / 6" Lateral
Industrial/Commercial/Multi-Family & PUD	8" main / 6" Lateral
Shall accommodate future tributary areas as directed by the Village Engineer	

3.1.1.2.4 Minimum Slopes:

Pipe Size	Minimum Slopes
8"	0.40% (Dead end reach 0.60%)
10"	0.28% (Dead end reach 0.40%)
12"	0.22%
15"	0.15%
18"	0.12%
21"	0.10%
24"	0.08%
Other Sizes	Per Engineering Services Division

3.1.1.2.5 Complete sewer design calculations and sewer system plans are required with construction plan submittals.

3.1.1.2.6 Conceptual sewer system plans are required for proposed developments located within the Ultimate MMSD Service Area even if sanitary sewer currently is not available. A determination is needed at the conceptual stage that future gravity sewer systems will work when needed.

3.1.1.2.7 Center of manhole shall coincide with street centerline, and center of main shall be within 5 feet of centerline on curvilinear street segments.

3.1.1.2.8 Invert shall not be less than:

Distance below the centerline grade of the street	Road ROW Width
11.0 Feet	60/66 FT
12.0 Feet	80 FT
13.0 Feet	>80 FT and Cul-De Sacs

3.1.1.2.9 Minimum sewer depth shall be 8 feet from finished grade to top of pipe under exceptional circumstances and approval of Village Engineer. Sewer depths shall provide gravity flow for basement floor drains and plumbing fixtures. "Hung" services are prohibited. Grinder pumps may be considered by Village Engineer.

3.1.1.2.10 Pipe with cover depth of greater than 20 feet shall have the pipe material approved by the Village Engineer and shall be designed conforming to Standard Specification Ch. 5.3.12 and Table 12.

3.1.1.2.11 All sewer pipes shall be laid in accordance with SWS, Chapter 3.2.0

3.1.1.2.12 All connections to manholes shall be in accordance with SWS, Section 3.5.7. Connections to manholes with preformed troughs in the bench shall be made in accordance with the procedure described in Section 3.1.7.3.5.

3.1.1.2.13 All sewer pipes shall terminate with top of pipe flush to the inside wall of the manhole. All annular spaces shall be filled with a cementitious filler to prevent the breakage of the pipe while cleaning.

3.1.2 Sanitary Force Main

3.1.2.1 MATERIALS

3.1.2.1.1 All pipe used for sanitary force (pressure) mains shall be:

3.1.2.1.2 PVC (solid wall) SWS 8.51.2, AWWA C-900 or C-905

3.1.2.1.3 PVCO AWWA C-909, Class 150

3.1.2.1.4 High density black Polyethylene Force Main Pipe SWS 8.51.3, ASTM F-714; or Green Stripe

3.1.2.1.5 Fusible PVC C-900

3.1.2.1.6 Linked PVC C-900

3.1.2.2 All pipe shall conform to Ductile Iron Pipe OD.

3.1.2.3 Valves shall be:

3.1.2.3.1 Dezurik Series 100 Eccentric Valves cast iron epoxy-coated body, hard rubber-lined, MJ,

3.1.2.3.2 Low friction Buna-vee packing, neoprene plug facing, ABG6H6 actuator, with stainless steel bolts, and plug valve adaptor bracket with valve box

3.1.2.3.3 Alternatives shall be pre-approved by the Village Engineer.

3.1.2.4 DESIGN STANDARDS

3.1.2.4.1 Minimum design depth shall have 8 feet of cover.

3.1.2.4.2 Buried tracer location wire is required above the force main.

3.1.2.4.3 Maximum spacing of location boxes: 300 feet or as directed by the Village Engineer.

3.1.2.4.4 Velocity/Size:

3.1.2.4.4.1 Hazen-Williams formula "C" value of 120.

3.1.2.4.4.2 Velocity 2.0 – 6.0 fps for lowest energy pumping cost, as approved by the Village Engineer.

3.1.2.4.5 High/Low Points:

3.1.2.4.5.1 Air relief valve sizing calculations shall be submitted with Plans. A.R.I to be used.

3.1.2.4.5.2 Clean-outs shall be installed at designated points.

3.1.2.4.5.3 6-ft. diameter manhole enclosures shall be installed.

3.1.2.4.6 HDPE Connections & Fittings: Joined by heated butt fusion for HDPE. Conform to ASTM D2657 and manufacturer specifications. Internal/external beads shall not be removed.

3.1.2.4.7 HDPE Main & branch joints: Joined by electrofusion conforming to manufacturer specifications. Internal/external beads shall not be removed.

3.1.2.4.8 PVC water class pipe. 4" thru 12" dia. = Class 150-DR18 conforming to AWWA C-900, conforming to standard specifications Ch. 4.6.0 and 8.20.01.

3.1.2.4.8.1 Fittings = ductile iron conforming to Standard Specification 8.22.0.

3.1.2.4.8.2 4" thru 12" dia. = Class 250 mechanical joints

3.1.2.4.8.3 Nuts & Bolts = Cor-Blue

3.1.2.4.8.4 Mechanical joint retainer glands = Mega-Lug; Buttresses also required.

3.1.2.4.8.5 Tees, crosses, bends, offsets, and other fittings shall conform to Standard Specification CH. 8.22.0. Acceptable supplier shall be Tyler or equal.

3.1.2.4.8.6 Triple wrap all ductile iron fittings with polyethylene. Conform to Standard Specifications Ch. 4.4.4 and 8.21.0

3.1.2.5 Warning Tape

3.1.2.5.1 Terra Tape Standard 250 manufactured by Reef Industries, Inc., Shieldtec manufactured by Empire Level Manufacturing Corp., Milwaukee, WI, (or Engineer approved equal). Tape shall read "Caution – Sanitary Line Buried Below". Tape shall be green and 3" wide. Install over the cover material.

3.1.3 Tracer Wire

3.1.3.1 Materials

3.1.3.1.1 Tracer wire for sanitary laterals shall be "Copperhead" 1230-HS-Green wire.

3.1.3.1.2 Tracer wire for force main shall be "Copperhead" 1230-HJS-Green wire.

3.1.3.1.3 Tracer wire for directional drilling/boring shall be "Copperhead" #1245-EHS.

3.1.3.1.4 Tracer wire for pipe bursting shall be "Copperhead" Soloshot Extreme – 7x7 Stranded, HDPE coated.

3.1.3.1.5 Connectors for open cut laterals shall be a Snakebite Twistlock or direct bury lug connector.

3.1.3.1.6 Termination of lateral tracer wire at main shall be a ground rod “Copperhead” @ANO-12. Connect the red wire to green wire using Twist Lock or buried lug connector.

3.1.3.2 Design Standards

3.1.3.2.1 Tracer wire shall be required on all force mains.

3.1.3.2.2 Tracer wire shall be required on all laterals.

3.1.3.2.3 Tracer wire shall be required on all directionally drilled pipe.

3.1.3.3 Installation

3.1.3.3.1 Contractor shall verify during backfilling of cover material that the tracer wire has remained on top of the lateral.

3.1.3.3.2 Connections with the tracer wire shall require approval by Wastewater Superintendent.

3.1.3.3.3 Lateral tracer wire shall be terminated at start-end points. At the main use a ground rod and at ROW run to surface with a minimum of 2 feet of wire wrapped around marking post.

3.1.3.3.4 A 1½” diameter PVC sch. 40 pipe with screw cap to be used at termination point when extended to dwelling. A 1.5-ft. pigtail of excess tracer wire shall stick out of the top of the pipe.

3.1.3.4 Testing

3.1.3.4.1 All tracer wire shall be tested prior to acceptance by Village Engineer. Testing by using a radio frequency locator.

3.1.4 Bedding, Cover, and Backfill

3.1.4.1 MATERIALS

3.1.4.1.1 Pipe Bedding/Cover: In accordance with SWS, as follows –

3.1.4.1.1.1 Flexible wall pipe shall be Class “B” up to 12” above top of pipe; 3/8”-5/8” limestone chips.

3.1.4.1.1.2 Rigid wall pipe with diameters equal to or less than 21” shall have 3/8”-5/8” limestone chips up to 12” above top of pipe.

3.1.4.1.1.3 Rigid wall pipe with diameters greater than 21” shall have ¾” limestone chips up to 12” above top of pipe.

3.1.4.1.1.4 Ductile Iron pipe shall be Class B to 12” above top of pipe, torpedo sand.

3.1.4.1.1.5 Fittings/Valves shall be Class B to 12” above top of pipe, torpedo sand.

3.1.4.1.2 Cover Material: In accordance with SWS, Section 8.43.3. No stone, rock or other similar material with a sieve size greater than 1" shall be permitted.

3.1.4.1.3 Granular Backfill: In accordance with SWS, Section 8.43.4. No stone, rock or other similar material with a sieve size greater than 3" shall be permitted. Granular backfill shall be crushed recycled concrete or crushed limestone per SWS, Section 8.43.6.

3.1.4.1.4 Spoil Backfill: In accordance with SWS, Section 8.43.5. No stone, rock or other similar material with a sieve size greater than 3" shall be permitted within 2.0 ft. above the pipe. Not allowed under pavement or stone walkways.

3.1.4.1.5 Slurry Backfill: Aggregate slurry in accordance with SWS, Section 8.43.8 and requirements of Village Engineer, or in accordance with street opening permit, when issued. In special cases, Village Engineer may direct the use of Sand Slurry consisting of 50 pounds of fly ash and a ½ bag of Portland cement per cubic yard of mix.

3.1.4.1.6 Prohibited: Debris, frozen materials, large clods or stones, organic material, black rock (uncrushed), stones/rocks larger than 3", and sand. Contractor shall haul away and dispose of these materials at contractors expense.

3.1.4.2 DESIGN STANDARDS

3.1.4.2.1 Backfill in accordance with all street opening permit(s), generally will be slurry aggregate. All areas greater than 5 ft. from a paved surface (and above a 45-degree intercept line) may receive suitable spoil backfill as provided herein.

3.1.4.3 INSTALLATION

3.1.4.3.1 Care shall be taken by the Contractor when backfilling to prevent any movement of the pipe from proper alignment and grade. Contractor is responsible for determining that the finished sewer remains at the required elevation and grade.

3.1.4.3.2 Mechanically compact all trench backfill to a minimum 95% standard Proctor density per SWS, Section 2.6.14(b). The initial lift to be compacted shall have a 2 ft. loose thickness. Each subsequent lift to be compacted shall have a maximum 18" loose thickness. Contractor shall place smaller lifts if the required compaction cannot be achieved.

3.1.5 Sanitary Manholes

3.1.5.1 MATERIALS

3.1.5.1.1 All sanitary manholes shall be pre-cast concrete conforming to Standard Specifications Ch. 8.39.0 and File No. 12

3.1.5.1.2 All sanitary manholes shall have a wall thickness of 5" minimum.

3.1.5.1.3 The manholes shall be sized as follows:

Downstream Pipe Size	Minimum Manhole I.D.
8-24"	48"
30-42"	60"
>42"	72"
Sampling Manholes	48" (No flat decks allowed)

3.1.5.1.4 All sanitary and sampling manhole cone sections shall be eccentric. Concentric cones are prohibited.

3.1.5.1.5 All manholes shall have spray epoxy coating:

3.1.5.1.6 MH Exterior: 2 coats (black) of Ameron International, Amercoat 78 HB at 8-10 mils. each.

3.1.5.1.7 MH Interior: 2 coats (white) of Permite PCS-9043 Type II Permox pipe glaze at 20 mils. each.

3.1.5.1.8 Coatings shall be applied by suppliers at the plant.

3.1.5.1.9 All joint seals shall consist of one of the following:

3.1.5.1.9.1 Kentseal butyl rubber sealant

3.1.5.1.9.2 Or Engineer approved equal

3.1.5.1.10 External joint seals shall consist of following:

3.1.5.1.10.1 MacWrap External Joint Sealers by MarMac Manufacturing

3.1.5.1.10.2 Or Engineer approved equal

3.1.5.1.11 External for MH w/ Precast Outside Drop: EZ-Wrap by Press Seal Gasket Corp. primed with EZ-Stick No. 4 Primer

3.1.5.1.11.1 Extruded butyl adhesive tape bonded to the concrete.

3.1.5.1.12 Chimneys shall use HDPE or EPP 5000 Series rings meeting ASTM D4976 or ASTM D3575. Precast concrete rings are not allowed.

3.1.5.1.13 Chimneys shall have a minimum height of 2" and a maximum height of 16".

3.1.5.1.14 HDPE Rings in pavements:

3.1.5.1.14.1 Drill two ½" diameter holes 180o apart on mandatory 2" thick EPP ring (Cretex part number 40-27GF-200). Drill into corbelled section of the manhole, ring shall be drilled prior to placing on manhole.

3.1.5.1.14.2 Apply 2 beads of M-1 adhesive 1/2"x1/2" in a continuous circle on corbal. Install drilled EPP ring and anchor

3.1.5.1.14.3 with a 4" Rawl Power Bolt utilizing a 2" diameter fender washer. Tighten until bolt head is flush with the top of the 2" ring.

- 3.1.5.1.14.4 Install ¼" Ladtech topper ring set in M-1 Adhesive as described above.
- 3.1.5.1.14.5 Dry stack chimney to proper height, including solid HDPE topper ring. Pay special attention to slope and use appropriate slope rings.
- 3.1.5.1.14.6 Once desired height and slope are achieved, mark rings to align desired stacking order and placement.
- 3.1.5.1.14.7 Apply bead of caulk around lip of adjusting ring and re-stack rings. Apply 2 beads of caulk on topper ring, one towards the outside and one towards the inside. Topper ring does not have a locking lip so be cautious ring does not slip during seal installation.
- 3.1.5.1.14.8 Install seal per manufactures specifications.
- 3.1.5.1.15 Adhesives: M-1 (Chem-Link Corp.) used on EPP rings. Gun grade butyl rubber adhesive sealant on HDPE rings.
- 3.1.5.1.16 Seals to have order-to-fit Adapter internal/external with rubber sleeve sealing exterior from frame to corbel.
- 3.1.5.1.17 PE wrap to be installed using double 6 -mil polyethylene wrap from top of frame to 84" min. depth.
- 3.1.5.1.18 EPP Rings in turf to adhere to following:
- 3.1.5.1.18.1 Drill two ½" diameter holes 180° apart on mandatory 2" thick EPP ring (Cretex part number 40-27G-200). Drill into corbelled section of the manhole, ring shall be drilled prior to placing on manhole.
- 3.1.5.1.18.2 Apply 2 beads of M-1 adhesive 1/2"x1/2" on corbal. Install drilled EPP ring and anchor with a 4" Rawl Power Bolt utilizing a 2" diameter fender washer. Tighten until bolt head is flush with the top of the 2" ring.
- 3.1.5.1.18.3 Dry stack chimney to proper height, including solid Grade Finish ring. Pay special attention to slope and use appropriate slope rings.
- 3.1.5.1.18.4 Once desired height and slope are achieved, mark rings to align desired stacking order and placement.
- 3.1.5.1.18.5 Apply 2 beads of M-1 in keyway area of adjusting rings and re-stack rings.
- 3.1.5.1.18.6 Adjusting rings will be lag bolted in 4" height increments with a ½" x 5" steel wood lag bolt and 2" fender washer with bolts alternating 180° apart with each 4" rise in height
- 3.1.5.1.18.7 Install seal per manufacturer's specifications.
- 3.1.5.1.19 For frames in pavement, use Neenah R-1661 frame with solid gasketed lid and 2 concealed pick holes. Conform to Standard Specifications Ch. 3.5.0 For frames in turf, use: Neenah R-1661 bolt-down frame w/ solid gasketed lid and 2 concealed

pick holes. Conform to Standard Specifications Ch. 3.5.0. Bolts coated with anti-seize compound. Frames to be anchored to chimney with 1/2" dia. steel wood lag bolts extending 6" into chimney or to a depth that is practical for the chimney height and sealed with Permatex Ultra Series black, blue or grey silicone adhesive.

3.1.5.1.20 Pavement Ring required to be Neenah R-1979 Series Ref. #1661-7158.

3.1.5.1.21 Pavement ring elevations as follows:

3.1.5.1.21.1 Top of frame equal to binder grade less ¼"

3.1.5.1.21.2 2" Paving rings used for surface lift adjustment.

3.1.5.1.22 Grout, if approved by Village Engineer and Utility Superintendent, can be acrylamide or polyurethane grout for manhole repair/rehabilitation.

3.1.5.2 DESIGN STANDARDS

3.1.5.2.1 Maximum manhole spacing for 15" diameter or less DIPS mainline = 400'.

3.1.5.2.2 Maximum manhole spacing for > 15" diameter DIPS mainline shall conform to NR 110.13(3)(b).

3.1.5.2.3 Manholes shall connect 2 pipes having differing diameter.

3.1.5.2.4 Minimum elevation difference between influent and effluent pipes in manholes = 0.1'.

3.1.5.2.5 Maximum elevation difference between influent and effluent pipes without outside drop in manholes = 2.0'.

3.1.5.2.6 Lift holes: Exterior lift holes only (interior lift holes are prohibited).

3.1.5.2.7 Full benches are prohibited. Conform to Standard Specifications Ch. 3.5.4© and File No. 13. w/e full benches and with long radii.

3.1.5.2.8 Outside drops to conform to Standard Specifications Ch. 3.5.8 and Fil No. 19/20

3.1.5.2.9 One full-length of pipe shall precede the tee connecting the manhole and the drop segment.

3.1.5.2.10 Elevation for top of frame shall be equal to binder grade less ¼". 2" Paving ring required for surface lift adjustment.

3.1.5.2.11 Connections shall be cored. Cutting or breaking is prohibited.

3.1.5.2.12 Bulkheads for future connections are prohibited.

3.1.5.2.13 Manhole steps shall conform to Standard Specifications Ch. 2.5.4(g) and 8.40.0, and File #15 and #12. Steps in chimney are prohibited.

3.1.5.2.14 Sampling manholes are required at all commercial laterals and shall conform to Village of Germantown standard detail.

3.1.5.2.15 Sampling manholes to be minimum 48" diameter. No flat deck allowed.

3.1.5.2.16 Minimum elevation difference between influent and effluent pipes in manholes = 0.1'.

3.1.5.2.17 Manhole installations to be inspected by Village Engineer or Wastewater Utility.

3.1.6 Sanitary Sewer Laterals

3.1.6.1 MATERIALS

3.1.6.1.1 All pipe used for sanitary laterals shall be:

3.1.6.1.2 PVC (solid wall) SWS 8.10.0, ASTM D-3034, SDR-35 or 26

3.1.6.1.3 PVC (solid wall) SWS, Section 8.20.0, AWWA C-900 or C-905

3.1.6.1.4 Risers shall be as required by the plans in accordance with these standards or as pre-approved by the Village Engineer.

3.1.6.1.5 Risers (shall be tees): Minimum depth below road centerline shall be per Section or 5 feet below basement, whichever is greater. Sewer depth to be greater than 14 feet for riser. (Per SWS File Nos: 10A, 10B, 10C, 10D, & 10E).

3.1.6.1.6 Tracer wire required on laterals. See section 3.1.3 for specifications.

3.1.6.2 DESIGN STANDARDS

3.1.6.2.1 Sites are allowed one (1) sanitary lateral connection. In special circumstances, additional laterals may be allowed with the written permission of the Village Engineer and the Wastewater Superintendent and with approval of the State.

3.1.6.2.2 Minimum size shall be 6" diameter.

3.1.6.2.3 Slope at ¼" per foot. Under exceptional conditions, the Village Engineer may permit minimum slope = 1/8" per foot in ROW/easement.

3.1.6.2.4 All connections to existing mains and manholes shall be in accordance with Section 3.1.5.

3.1.6.2.5 Lateral connections to manholes shall not be made unless pre-approved by the Wastewater Superintendent. Connections to manholes in new construction shall not be above the outlet sewer crown and have a smooth paved channel constructed to convey lateral waste to main outlet channel.

3.1.6.2.6 Laterals may not connect to manholes except in cul-de-sacs (permanent end of line). In cul-de-sacs, special manhole detail and construction of benches and lateral pipe connections are required.

3.1.6.2.7 If it is deemed necessary to install a lateral to an existing manhole, and the manhole has to be cored and booted to accept this lateral, this manhole shall be vacuum tested according to the SWS.

3.1.6.2.8 Existing laterals not used in a development shall be abandoned at the main when a development, land division or building razing occurs. See Section 3.2.

3.1.6.2.9 Each habitable building shall have a separate lateral connection to the sewer main.

3.1.6.2.10 Sanitary laterals shall have a trench check dam installed at the property line. See Specification 3.1.4.

3.1.7 Lateral Connections

3.1.7.1 Connection of New Sanitary Laterals to Existing Mains shall be as follows based on existing main material:

3.1.7.1.1 ABS - Truss Pipe

3.1.7.1.1.1 Location - not closer than 36" to an existing joint or fitting.

3.1.7.1.1.2 Hole - Core drill or saw-cut with appropriate cutting tools. Deliver "cut-out" to Construction Inspector or Utility Department representative.

3.1.7.1.1.3 Insert Tee only allowed connection. With exception on 8" only, a wye shall be used.

3.1.7.1.2 Concrete Pipe

3.1.7.1.2.1 Location - not closer than 24" to an existing joint or fitting.

3.1.7.1.2.2 Hole - Core with appropriate cutting tools. Deliver "cut-out" to Construction Inspector or Utility Department representative.

3.1.7.1.2.3 Insert Tee only allowed connection. With exception on 8" only, a wye shall be used.

3.1.7.1.3 PVC Pipe

3.1.7.1.3.1 Location - Not closer than 36" to an existing joint or fitting.

3.1.7.1.3.2 Hole - Core drill or saw-cut with appropriate cutting tools. Deliver "cut-out" to Construction Inspector or Utility Department representative.

3.1.7.1.3.3 Inserta Tee on 10" and greater pipe and manufactured wye on 8" pipe and below shall be used, with repair coupling. Fernco coupling will not be allowed.

3.1.7.1.4 Vitrified Clay Pipe

3.1.7.1.4.1 Location - not closer than 24" to an existing joint or fitting.

3.1.7.1.4.2 8" wye shall be installed for connection device with PVC pipe up and down with Fernco Strong Back connection device.

3.1.7.2 Due to increasing incidents with plugs being left in sewer lines, the Village of Germantown Utility Department is requiring Contractors use a mechanical plug only.

This shall be performed and documented by the Germantown Utility personnel. The Germantown Utility shall be notified when a plug is to be removed.

3.1.7.3 Prior to applying curing material on the concrete, the face of the curb shall be “branded” with a “S” designating the location(s) of sanitary laterals. Physical placement of the branding shall be reasonably accurate in a vertical plane above the respective lateral.

3.1.7.4 Connection of New Sanitary Laterals to Existing Sanitary Manholes will only be allowed on a case-by-case basis and when pre-approved by the Director of Public Works or their designee, and shall be subject to following requirements:

3.1.7.4.1 Location: Invert of new lateral may be permitted a maximum of 12” above spring line of outlet sewer, or use outside drop inlet per SWS for main sewers;

3.1.7.4.2 Connection Device: Kor-N-Seal boot or pre-approved equal with stainless steel snap-in ring.

3.1.7.4.3 Any lateral that is connected into a manhole shall have a smooth concrete bench/channel placed to convey lateral waste flow into mainline channel.

3.1.7.4.4 Prior to applying curing material on the concrete, the face of the curb shall be “branded” with a “S” designating the location(s) of sanitary laterals. Physical placement of the branding shall be reasonably accurate in a vertical plane above the respective lateral.

3.1.8 Casing Pipe

3.1.8.1 MATERIALS

3.1.8.1.1 Installation of sewer lines and force mains within casings shall be accomplished by using Stainless Steel Casing Spacers installed in accordance with the manufacturer’s recommendations. Spacers shall be:

3.1.8.1.1.1 Cascade Style CCS; or

3.1.8.1.1.2 PowerSeal 481; or

3.1.8.1.1.3 Pre-approved equal.

3.1.8.1.2 End seals shall be installed on either end of each casing and shall be one of the following:

3.1.8.1.2.1 Cascade Style CCES; or

3.1.8.1.2.2 PowerSeal 4810 ES; or

3.1.8.1.2.3 Pre-approved equal.

3.1.8.1.3 Force main piping within the casing shall be installed with mechanical joints and mega-lugs.

3.1.9 Trench Check Dam

3.1.9.1 MATERIALS

3.1.9.1.1 Clay material shall have no organic material and shall be compacted to 95 percent standard proctor. Or;

3.1.9.1.2 Pre-approved equals such as: AquaBlok®, slurry and others.

3.1.9.2 DESIGN STANDARDS

3.1.9.2.1 Trench check dam shall be installed on all sanitary laterals.

3.1.9.2.2 The check dam shall be located at the property line.

3.1.10 Polyethylene Wrap and Corrosion Protection

3.1.10.1 MATERIALS

3.1.10.1.1 Polyethylene film materials shall comply with SWS, Section 8.21.0.

3.1.10.2 DESIGN STANDARDS

3.1.10.2.1 All metallic pipe, fittings and valves shall be wrapped and protected per SWS, Section 4.4.4 and 4.4.5.

3.1.11 Grease Interceptors

3.1.11.1 All buildings with food service preparation on-site (now or at any future time) shall be required to install, maintain, and operate an exterior or interior grease interceptor tank sized in accordance with the Department of Safety and Professional Services (DSPS). State plumbing reviews by the DSPS shall be completed before a plumbing permit will be issued. Construction of the Grease Interceptor shall, in addition to requirements of the Plumbing Code, conform to the following standards. These standards are intended to minimize the potential for groundwater infiltration and inflow or rainwater from entering the sanitary sewer system via this system component.

3.1.11.2 MATERIALS

3.1.11.2.1 Interior grease interceptors shall be constructed in a watertight manner of one of the following materials:

3.1.11.2.1.1 Precast reinforced concrete

3.1.11.2.1.2 Reinforced monolithic concrete

3.1.11.2.1.3 Coated 12-gauge steel

3.1.11.2.1.4 Fiberglass

3.1.11.2.1.5 Plastic

3.1.11.2.1.6 Other approved materials

3.1.11.2.2 Exterior grease interceptors shall be pre-cast concrete with integral base when required by the Village Engineer and shown on the Plans.

3.1.11.2.3 Exterior grease interceptors shall be equipped with water-tight locking frame and lids.

3.1.11.2.4 The exterior walls of the tank shall be coated with coal-tar epoxy per SWS, Chapter 8.49.2, (2 coats at 8 mil DFT minimum each, totaling 16 mil DFT minimum). The coating material shall be equal to:

3.1.11.2.4.1 Tnemec Series 253 H.S. Tnemec Tar; or

3.1.11.2.4.2 ICI Devoe DEVTAR 5A; or

3.1.11.2.4.3 Pre-approved equal.

3.1.11.2.5 Coating(s) shall be applied in accordance with the coating manufacturer's recommendations and preferably at the place of tank manufacture. Each manhole section shall be inspected and marked for proof of inspection prior to delivery to the project site. Alternate waterproofing materials and application may be used if pre-approved by the Village Engineer. Manhole sections that are not properly coated with coal-tar epoxy will be rejected and shall be removed from the project site.

3.1.11.2.6 All barrel joints shall have a mastic or gasket type joint seal. The exterior shall be wrapped with an additional joint seal that meets requirements of ASTM C-877, Type II, such as "Mac-Wrap" or pre-approved alternate.

3.1.11.2.7 All manhole or tank access or inspection chimneys will be HDPE or EPP adapter seal frame – R1661 – Bolt down.

3.1.11.3 DESIGN STANDARDS

3.1.11.3.1 The approach section of pipe approaching the tank shall be straight for a distance of at least 20 pipe diameters with no connections, drops, or bends.

3.1.11.3.2 There should be no grade changes, angle points, or connections at the structure.

3.1.11.3.3 In Flood Plain Areas: Tank access or inspection chimneys shall be 2.0 feet above 100-yr Flood elevations as determined via FEMA Mapping.

3.1.11.3.4 When practicable, grade earth at 5H:1V slope around manhole openings. In paved areas, slope drainage away from the manhole openings.

3.1.11.3.5 Because inlet and outlet pipe slopes are critical, the location of the exterior grease trap tank shall require prior approval of the Village Engineer for location and grades. For projects requiring prior Site Plan Approval requirements, this site element shall be included on the Site Plan Submittal(s).

3.1.12 Lift Stations

3.1.12.1 Consult with the Village Engineer and Wastewater Utility for design requirements.

3.1.13 Insulation

3.1.13.1 MATERIALS

3.1.13.1.1 Minimum of 2" thick Styrofoam plastic foam boards as manufactured by:

3.1.13.1.1.1 Upjohn; or

3.1.13.1.1.2 Dow Chemical Company, or

3.1.13.1.1.3 Pre-approved equal.

3.1.13.2 DESIGN STANDARDS

3.1.13.2.1 All sanitary sewer pipes (mains, force mains & laterals), having less than 5.0 ft. of cover material, shall be insulated.

3.2 ABANDONMENT

3.2.1 GENERAL

3.2.1.1 All existing sanitary sewer mains and service lines, that will not be used in new or re-used in reconstruction of existing building sites, shall be abandoned at the main.

3.2.1.2 Abandonment shall be witnessed by the Village Inspector or a Utility Representative.

3.2.1.3 Main and/or service abandonment at the street main shall be a condition of any site demolition permit(s) issued or in the case of duplication, service lines that will remain unused on new construction.

3.2.1.4 All excavations within public rights-of-way shall require Village and/or County Permits.

3.2.1.5 Excavations within 5 ft. of and under paved surfaces shall be backfilled with Slurry Aggregate per the SWS to within 1.5 ft. of surface, followed by appropriate street restoration and not less than 3-inch of binder and 2-inch of wearing surface bituminous pavements.

3.2.1.6 In special circumstances, when approved in writing by the Village Engineer and the Utility Superintendent, sanitary sewer service lines may be temporarily made inactive at the right-of-way or easement boundary. Sanitary sewer lines shall be plugged or capped to be made watertight at the property line. Sewer service lines not abandoned at the main shall meet the following conditions:

3.2.1.6.1 As part of the demolition permit, a certified check or Letter of Credit, in the amount of \$5,000 per lateral, shall be submitted to the Village Engineer to guarantee the permanent abandonment of the service at the main is completed in a timely manner.

3.2.1.6.2 Any service line that is not abandoned at the main shall be subject to separate “availability” or “ready to serve” charges in the interim period until properly abandoned.

3.2.1.6.3 Sanitary lines made inactive in this manner shall be marked with a marker post placed 1 ft. from the end of the pipe and extending from the pipe to 3 ft. above the ground surface and painted a brilliant green color.

3.2.1.6.4 The location of the terminal pipe locations shall be surveyed or otherwise “tied” to permanent objects that will remain undisturbed at the site, with an as-built drawing provided to the Village Engineer and Wastewater Utility for record purposes.

3.2.2 SANITARY SEWER

3.2.2.1 All sanitary lines shall be abandoned at the street main fitting by disconnecting and removing 2 - 3 ft. of pipe and installing a water-tight cap or plug at the main fitting and on the abandoned line.

3.2.2.1.1 For Poly Vinyl Chloride (PVC) gasketed fittings, a Spigot Plug shall be installed.

3.2.2.1.2 A cured in-place plug will be allowed to abandon services deemed by the Utility to be 100% effective.

3.2.2.1.3 For PVC solvent weld or glued joint fittings, a gasketed Cap shall be installed on an undisturbed and undamaged max. 1.0 ft. spool piece.

3.2.2.1.4 For Concrete, Vitrified Clay, ABS/Truss, DIP or CIP (NOT soil pipe), a PVC Spigot Plug shall be installed using the appropriate Fernco Strong Back coupling onto an undisturbed and undamaged max. 1.0 ft. spool piece.

3.2.2.1.5 All Cast Iron Soil Pipe shall be removed and ONE of the above procedures used.

3.2.2.1.6 If connection to the main is via a “break-in”, then an appropriate length of main shall be cut and removed, with an identical length of PVC SDR 35 or 28 installed using appropriate couplings.

3.2.2.1.7 “Buffalo type” saddles are not acceptable for concrete and PVC pipe materials. Use of solvent weld or glued caps or plugs will not be acceptable.

3.2.2.2 Sanitary or other special manholes or structures that are part of an abandoned system shall also be abandoned by removing the casting, chimney and cone or corbel sections, followed by plugging the outlet and inlet pipe(s) with non-shrink cementitious grout.

3.2.2.3 The manhole barrel shall be filled with crushed stone compacted to 95% minimum standard Proctor density.

3.2.2.4 The property owner shall be responsible for proper disposal of all manhole components removed. All waste materials shall be removed from pipelines and structures before abandonment.

4 STORM SEWER SYSTEM

All labor and material provided under this contract shall be governed by the latest edition and all amendments thereto of the Standard Specifications for Sewer and Water Construction in Wisconsin (SWS) and State of Wisconsin Department of Transportation Standard Specifications for Road and Bridge Construction, unless otherwise specified in these Specifications, whichever is more restrictive. A full-time inspector is required to be at the project site to observe pipe unloading, inspect construction materials, and observe and document the construction of storm sewers and laterals. THESE STANDARDS SHALL APPLY TO ALL PUBLIC STORM SEWERS. Any and all modifications to these Specifications shall be approved by the Village Engineer.

Design shall follow SWS Specifications, Milwaukee Metropolitan Sewerage District (MMSD) Rules, Village of Germantown Municipal Code Chapter 27 and be designed in accordance with the NOAA Atlas 14. For private property in new development, if Department of Commerce procedures are used, the designer shall verify that off-site flows meet all of the requirements of the Rational Method or TR-55 Method. Design shall also conform to the following:

4.1 SPECIFICATIONS

4.1.1 STORM SEWER PIPE

4.1.1.1 MATERIALS

4.1.1.1.1 All storm sewers shall be constructed with a minimum Class III reinforced concrete pipe per SWS, Section 8.6.0 or as approved by Village Engineer:

4.1.1.1.2 Reinforced Concrete Pipe – ASTM C76

4.1.1.1.3 Horizontal Elliptical Reinforced Concrete Pipe – ASTM C507.

4.1.1.1.4 Joints for concrete storm sewer pipe shall have rubber gaskets conforming to SWS, Section 8.41.2.

4.1.1.2 DESIGN STANDARDS

4.1.1.2.1 Minimum size: 12"

4.1.1.2.2 Location:

4.1.1.2.2.1 In streets and easements: 10 feet west or south of the sanitary sewer.

4.1.1.2.3 Pipe cover:

4.1.1.2.3.1 3 feet minimum from finish design grade to outside top of storm sewer.

4.1.1.2.4 Storm sewers with diameters greater than 24" equivalent, daylighting in ditches shall have safety grates, meeting design standards, installed at the upstream and downstream ends.

4.1.1.2.5 Mainline and conveyance storm sewer design storm: 25-yr.; Storm sewers may not be surcharged in a 25-yr. or less design storm condition. Surge condition is defined as to the crown of pipe (full pipe flow - no pressure).

4.1.1.2.6 Minimum slope shall be 0.2% and achieve minimum velocity = 2.0 feet per second when pipe is flowing half-full. Village Engineer may waive the 0.2% minimum slope for runs of pipe longer than 400 feet. Village Engineer may limit maximum velocities.

4.1.1.2.7 Complete sewer design calculations are required with submittals, including Drainage Areas Map.

4.1.1.2.8 Storm sewer shall be required in public Rights-of-Way in new developments where the depth of proposed ditches exceed 3 feet as measured from the edge of pavement.

4.1.2 STORM LATERALS (From main to lot line)

4.1.2.1 MATERIALS

4.1.2.1.1 Unless otherwise specified, all pipe used for storm laterals shall be:

4.1.2.1.1.1 Class III concrete sewer pipe; or

4.1.2.1.1.2 PVC (SDR 26) pipe

4.1.2.2 DESIGN STANDARDS

4.1.2.2.1 Minimum size in ROW/easement areas shall be 6" diameter.

4.1.2.2.2 The minimum slope on laterals shall be 1/8" per foot.

4.1.2.2.3 The maximum slope on laterals shall be 1/2" per foot.

4.1.2.2.4 Minimum cover for storm sewer laterals in paved areas shall be 12" as measured from the top of the pipe to the top of the subgrade.

4.1.2.2.5 A clay dam across the trench shall be constructed adjacent to pavement low points with all storm sewer laterals.

4.1.2.2.6 Connection of laterals to storm sewer shall be subject to following:

4.1.2.2.6.1 Location of invert of new lateral may be permitted a maximum of 12" above spring line of outlet sewer or use outside drop inlet per SWS for main sewers.

4.1.2.2.6.2 Hole - Core drill only. Deliver "cut-out" to the Construction Inspector.

4.1.2.2.6.3 Connection Device - Kor-N-Seal boot, or pre-approved equal with stainless steel snap-in ring.

4.1.2.2.6.4 Any lateral that is connected into a manhole shall have a smooth concrete bench/channel placed to convey lateral flow into the storm sewer.

4.1.2.2.7 Storm sewer lateral lines shall be designed to receive the storm water runoff from window wells, footing drains and sump pumps.

4.1.2.2.8 In areas with storm sewer, a storm sewer lateral shall be provided for each lot or building. The Village Engineer may waive this requirement for lots that are adjacent to and drain to adjacent public drainage easements, wetlands or waters of the State.

4.1.2.2.9 Sump discharges for all buildings shall be located at the front of building (facing street). Village Engineer may waive this requirement for lots that are adjacent to and drain directly to public drainage easements, wetlands or waters of the State.

4.1.2.2.10 Storm laterals shall be located to the right of sanitary sewer lateral when looking from the street.

4.1.2.2.11 Covers installed on lateral cleanouts shall not be bolted to the cleanout pipe.

4.1.3 CULVERTS

4.1.3.1 MATERIALS

4.1.3.1.1 Culverts shall be manufactured and installed in accordance with the requirements of the Standard Specifications for Highway and Bridge Construction in Wisconsin.

4.1.3.1.2 Damaged or rusted culvert pipes shall not be reused.

4.1.3.2 DESIGN STANDARDS

4.1.3.2.1 Culverts located in a Primary Storm Water Management System (PSMS) shall provide at least the 100-year level of protection for capacity and road overtopping.

4.1.3.2.2 Culverts located in a minor storm water management system shall be designed to safely convey surface water runoff from a 10-year storm event. Culverts may not be surcharged in a 10-year or less design storm condition. SurchARGE condition is defined as to the crown of pipe (full pipe flow – no pressure).

4.1.3.2.3 Minimum size shall be 12" diameter for driveways and 15" for roadway cross culverts.

4.1.3.2.4 Minimum culvert lengths:

< 24" diameter	20 feet
24" – 30" diameter	22 feet
36" – 42" diameter	24 feet
48" and larger diameters	26 feet

4.1.3.2.5 Culverts less than 24 feet in length shall consist of one piece of pipe.

4.1.3.2.6 All crossroad culverts shall be designed to provide a minimum of 12 inches of cover to the top of the pipe at the edge of the finished pavement of the road.

4.1.4 FLARED END SECTIONS

4.1.4.1 MATERIALS

4.1.4.1.1 The end sections shall be manufactured and installed in accordance with the requirements of the WisDOT Standard Specifications, Section 521 or Section 522 as applicable.

4.1.4.2 DESIGN STANDARDS

4.1.4.2.1 In areas with greater than 35 miles per hour, flared end sections shall be required to be installed on the ends of driveway culvert.

4.1.5 DITCHES

4.1.5.1 DESIGN STANDARDS

4.1.5.1.1 Slopes.

4.1.5.1.2 Grassed Invert

4.1.5.1.2.1 1½% minimum

4.1.5.1.2.2 4% maximum

4.1.5.1.3 Concrete Invert:

4.1.5.1.3.1 Greater than 4% or less than 1½%.

4.1.5.1.3.2 10 % maximum, 0.7% minimum.

4.1.5.1.3.3 Invert shall be placed on a minimum of 3" of crushed aggregate base course.

4.1.5.1.3.4 Place sod within the initial 1½ feet of ditch side slopes adjacent to the concrete invert.

4.1.5.1.3.5 2-ft. minimum width, v-bottom

4.1.5.1.3.6 V-bottom formed by 4H:1V sloped top surface

4.1.5.1.3.7 Minimum concrete thickness: 6"

4.1.5.1.4 Alternative methods may be used after approval of the Village Engineer is obtained.

4.1.5.1.5 Fore slope: 4H:1V maximum.

4.1.5.1.6 Backslope: 4H:1V maximum.

4.1.5.1.7 The minimum ditch depth shall be 12" below the shoulder point at roadway high points. Other ditch locations shall have a minimum depth of 20" below the shoulder point and be graded to accommodate a properly sized driveway culvert.

4.1.5.1.8 Adopt and administer the WDNR Technical Standards 1053, 1058, and 1059 for erosion control. All roadside ditches shall be covered with a minimum of 4" of topsoil, and either seeded, fertilized and matted or sodded. Sod placement shall be required on longitudinal slopes greater than 4%

4.1.5.1.9 If the back slope of a ditch extends beyond the right-of-way, drainage easements shall be required adjacent to the street right-of-way at a uniform distance from the road centerline or pipe to be buried within right-of-way as to avoid encroaching on private property, as approved by the Village Engineer.

4.1.5.1.10 Turf reinforcement may be used as a substitute for concrete invert in ditches with slopes between 4% - 5%. Village Engineer shall pre-approve turf reinforcement type.

4.1.6 STORM MANHOLE & JUNCTION CHAMBERS

4.1.6.1 MATERIALS

4.1.6.1.1 All storm manholes shall be pre-cast concrete with integral base, with pre-cast flattops (slab or deck) with an opening for the casting.

4.1.6.1.2 The manholes shall be sized as follows:

Downstream Pipe O.D.*	Minimum Manhole I.D.
27" or less	42"
28" – 30"	48"
31" – 36"	60"
37" – 42"	72"
>42"	Special Design Requiring Village Engineer Approval
*O.D. is the largest horizontal outside pipe dimension	

4.1.6.1.3 Where field conditions allow, the manhole shall be constructed with an offset cone.

4.1.6.1.4 All chimney joints, including the frame-chimney joint, and all barrel & cone section lifting holes shall be sealed with a cementitious grout with a struck joint. Grout shall be premixed, non-metallic, high-strength, non-shrink, Pennegrout. by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621. When mixed to a mortar or "plastic" consistency, the grout shall have a minimum 1-day and 28-day compressive strength of 6,000 and 9,000 psi, respectively. Dry stacking of riser rings or flat decks shall not be permitted. They shall be laid in a bed of grout as described above.

4.1.6.1.5 Steps meeting the requirements of SWS, Section 6.40.1 shall be installed in all manholes or junction chambers deeper than 4', from floor to rim.

4.1.6.1.6 Drop pipes or other energy-dissipating structures shall be provided for all sewers entering a manhole with their invert at an elevation more than 24" above the invert of the sewer leaving the manhole.

4.1.7 CATCH BASINS

4.1.7.1 MATERIALS

4.1.7.1.1 Shall consist of masonry, pre-cast or monolithic construction in accordance with Chapter 3.6.1 and File No. 25 or 26 of SWS. All catch basins shall be designed and constructed to allow easy access for maintenance and cleaning.

4.1.7.1.2 Steps meeting the requirements of SWS shall be installed in all catch basins deeper than 4', from floor to rim.

4.1.7.1.3 Size (minimum).

4.1.7.1.3.1 For mountable curb, use Neenah castings 3501 Rectangular 24" x 30" (Internal Dimensions).

4.1.7.1.3.2 For vertical face curb, use Neenah casting 3228 Rectangular 24" x 36" (Internal Dimensions).

4.1.7.1.3.3 Round 48" ID.

4.1.7.1.3.4 Manhole inlets - Allowed only in cases where an angle point in the storm sewer occurs under the curb line. (These shall be avoided whenever possible.)

4.1.7.1.4 A continuous 4" diameter perforated, corrugated polyethylene drainpipe, meeting the requirements of AASHTO Designation: M-252, shall be installed under the curb and gutters and extend 50 feet in either direction from storm water catch basins located at low points. For catch basins in other locations, the 50-ft length of drainage pipe shall be connected only to the upstream side.

4.1.7.1.5 Where underdrain pipe is specified, a 4" diameter hole shall be cored in opposite sides of each catch basin located at low points to allow the connection of 4" diameter perforated, corrugated polyethylene underdrain pipe. Catch basins located in other locations shall have a 4" diameter hole cored in the upstream side to allow the connection of 4" diameter underdrain pipe. The holes shall be cored at an elevation that is below the subgrade elevation to allow for positive drainage and proper placement of the underdrain. Village Engineer may waive underdrain requirement.

4.1.7.1.6 All chimney joints, including the frame-chimney joint, and all barrel & cone section lifting holes shall be sealed with a cementitious grout bed with a struck joint. Grout shall be premixed, non-metallic, high-strength, non-shrink, Pennegrout, by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621. When mixed to a mortar or "plastic" consistency, the grout shall have a minimum 1-day and 28-day compressive strength of 6,000 and 9,000 psi, respectively.

4.1.7.2 DESIGN STANDARDS

4.1.7.2.1 Inlet capacity design storm: 25-yr. storm event. In a 25-yr. storm event, the maximum spread of ponded storm water shall be 8 feet as measured from the face of curb.

4.1.7.2.2 Inlet capacity design storm: 50-yr. storm event for areas with no overland flow relief. In roadways, storm water ponding shall not exceed 6" on paved parking areas and 4" at the centerline in a 100-yr. storm event.

4.1.7.2.3 At low points, curb pan shall be pitched a ½ inch five feet on both sides of catch basins.

4.1.7.2.4 Where only front yard drainage flows to the curb, maximum separation or run to a catch basin is 300 feet unless in the opinion of the Village Engineer a lesser distance is required. Where the collective drainage from more than one lot discharges over the curb at a single point, a catch basin shall be required at the lot line extended

4.1.8 FIELD INLETS

4.1.8.1 MATERIALS

4.1.8.1.1 Shall consist of masonry, pre-cast or monolithic construction in accordance with Chapter 3.6.3 and File No. 28 or 29 of SWS.

4.1.8.1.2 Inlets shall be designed and constructed to allow easy access for maintenance and cleaning.

4.1.8.1.3 All chimney joints, including the frame-chimney joint, and all barrel & cone section lifting holes shall be sealed with a cementitious grout bed with a struck joint. Grout shall be premixed, non-metallic, high-strength, non-shrink, Pennegrout. by IPA Systems, or approved equal, which meets requirements of ASTM C-1-91 and C-827 as well as CRD C-588 and C-621. When mixed to a mortar or "plastic" consistency, the grout shall have a minimum 1-day and 28-day compressive strength of 6,000 and 9,000 psi, respectively.

4.1.8.2 DESIGN STANDARDS

4.1.8.2.1 Inlet capacity design storm: 25-yr. storm event. In a 25-yr. storm event, the maximum spread of ponded storm water shall be 8 feet as measured from the face of curb.

4.1.8.2.2 Inlet capacity design storm: 50-yr. storm event for areas with no overland flow relief. In roadways, storm water ponding shall not exceed 6" on paved parking areas and 4" at the centerline in a 100-yr. storm event.

4.1.9 ROAD UNDERDRAINS

4.1.9.1 MATERIALS

4.1.9.1.1 Underdrain systems shall be installed under curb and gutters to collect water and convey it to catch basins.

4.1.9.1.2 The underdrain system shall be constructed with:

4.1.9.1.2.1 4" diameter perforated, corrugated polyethylene drainage pipe meeting the requirements of AASHTO Designation: M-252.

4.1.9.1.2.2 Pipe perforations may be holes or slots and may be in 3 or 4 lines spaced around the circumference of the pipe at 120° or 90° respectively.

4.1.9.1.3 The trench shall be backfilled with open graded ¾" crushed stone.

4.1.9.1.4 Geotextile fabric, as specified in Section 612.2.8 of the Standard Specifications, shall be used to line the underdrain trench before the drainage pipe is installed and backfilled. Enough fabric shall be provided as to cover the sides and bottom of the trench and overlap across the top of the trench by a minimum of 4 inches.

4.1.9.2 DESIGN STANDARDS

4.1.9.2.1 The 4" drainage pipe shall be laid in an 8" deep by 8" wide trench with flat bottom with square sides as shown in the Figure 7 of the Details. The trench, constructed at an elevation lower than the base course, shall extend 50 feet in either direction from a storm water catch basin located at the low point of the road, aligned with the proposed centerline of the flange of the curb and gutter. For catch basins in other locations, the 50' drainage pipe shall be connected only to the upstream side.

4.1.9.2.2 The drainage pipe shall be connected to catch basins in cored holes and grouted in-place in the cored holes. The end of drainage pipe opposite the catch basin shall be capped with a cap suitable for installing on the drainage pipe.

4.1.10 BEHIND CURB COLLECTORS

4.1.10.1 MATERIALS

4.1.10.1.1 All behind the curb collector systems shall be constructed with minimum 6" diameter PVC (SDR 35) pipe.

4.1.10.1.2 The clean out shall consist of a standard pre-cast 24" x 36" box inlet with a Neenah R-1878-B7L frame and lid as shown in Figure 15 of the Details.

4.1.10.2 DESIGN STANDARDS

4.1.10.2.1 Connected to sump pump drainage lines in lieu of storm sewer.

4.1.10.2.1.1 36" from flow line to surface.

4.1.10.2.1.2 1 % minimum grade.

4.1.10.2.1.3 300-ft. maximum run to outlet.

4.1.10.2.1.4 Maximum run of 250 feet in curvilinear street.

4.1.10.2.1.5 Maximum of 4 lots contributing area.

4.1.10.2.2 Behind the curb collector systems shall be installed 2' behind the curb at cul-de-sacs and hill crests where storm sewers are not located.

4.1.10.2.3 The collector pipe shall be connected to the nearest catch basin.

4.1.10.2.4 A clean out shall be installed at the upstream end of the collector system.

4.1.10.2.5 Sump lines for lots not served by the storm sewer shall be connected to the PVC collector pipe by a wye or tee fitting.

4.1.10.2.6 Tracer wire installation is required on all behind the curb collector pipe.

4.1.11 FRAMES, GRATES AND LIDS

4.1.11.1 MATERIALS

4.1.11.1.1 Vertical curb catch basin frames and grates shall be

4.1.11.1.1.1 Neenah R-3228-K, (with Rectangular 24" x 36" structure).

4.1.11.1.1.2 or equal as pre-approved by the Village Engineer.

4.1.11.1.2 Driveway frame and grate shall be 3290-A.

4.1.11.1.2.1 Mountable curb catch basin frames and grates shall be:

4.1.11.1.2.2 Neenah R-3501-R, (with Rectangular 24" x 30" structure).

4.1.11.1.2.3 or equal as pre-approved by the Village Engineer. (Add a flat frame and grate for driveway curb head reductions)

4.1.11.1.3 Field inlet frames and grates shall be:

4.1.11.1.3.1 Neenah R-3210-A, (with 35" x 35" structure).

4.1.11.1.3.2 or equal as pre-approved by the Village Engineer.

4.1.11.1.3.3 A Neenah R-2561 series beehive frame and grate shall be used where required by the Village (with 30" OD structure).

4.1.11.1.4 Manhole frames and grates in field inlet applications shall be:

4.1.11.1.4.1 Neenah R-2577-1, or

4.1.11.1.4.2 equal as pre-approved by the Village Engineer.

4.1.11.1.5 Manhole frames and lids in pavement applications shall be:

4.1.11.1.5.1 Neenah R-1661, or

4.1.11.1.5.2 equal as pre-approved by the Village Engineer.

4.1.11.1.6 Covers shall have machined bearing surface and will be permitted to have eight (8) vent holes.

4.1.11.1.7 A pipe grate with maximum opening size of 6" shall be installed on storm sewer inlets 18" or larger. Grate shall be hot-dipped galvanized after fabrication or be constructed of corrosion resistant material approved by Village Engineer.

4.1.12 FRAME ADJUSTMENTS

4.1.12.1 MATERIALS

4.1.12.1.1 All frame/casting adjusting rings for manholes, catch basins and inlets shall be:

4.1.12.1.2 Pro-Ring™ by Cretex, or

4.1.12.1.3 approved equal

4.1.12.1.4 The minimum for a chimney section shall be the height associated with the proper placement of one 2" adjusting ring. The maximum height of adjusting rings above the cone or slab top is 16 inches as measured from the top of cone or slab top. If more than 16 inches of adjusting rings are needed to set the casting to finished grade, then an additional barrel section shall be installed on the manhole.

4.1.12.1.5 The minimum thickness of individual pre-cast concrete adjusting rings shall be a nominal 2". The maximum thickness shall be a nominal 4".

4.1.13 SUMP PUMPS, DOWN SPOUTS, AND ROOF DRAINS

4.1.13.1 DESIGN STANDARDS

4.1.13.1.1 Sump pumps shall be connected to a storm sewer system if one exists adjacent to the lot.

4.1.13.1.2 Down spouts and roof drains, if not buried, may be connected to a sump collector. If buried, they shall be connected to sump collector.

4.1.13.1.3 If storm sewer is not provided or if a rural roadway section exists, then sump pumps shall be installed to receive and discharge ground water from footing drains.

4.1.13.1.4 Sump pumps, down spouts and roof drains shall discharge on the ground to the front of the lot so that:

4.1.13.1.4.1 Adjoining properties are not adversely affected.

4.1.13.1.4.2 If no drainage easement exists along a side or rear lot line, the discharge point within the site, shall be at least 10' from the lot line.

4.1.13.1.4.3 If a public open drainage easement exists adjacent to any lot, the discharge point for down spouts and/or roof drains shall be discharged directly into the easement.

4.1.14 BEDDING/COVER/BACKFILL

4.1.14.1 MATERIALS

4.1.14.1.1 Pipe Bedding/Cover: In accordance with SWS as follows -

4.1.14.1.1.1 Flexible wall pipe shall be Class "B" up to 12" above the top of pipe; 3/8" limestone chips.

4.1.14.1.1.2 Rigid wall pipe with diameters equal to or less than 21" shall have 3/8" limestone chips up to 6" above the top of pipe.

4.1.14.1.1.3 Rigid wall pipe with diameters greater than 21" shall have 3/4" limestone chips up to 6" above the top of pipe.

4.1.14.1.2 Cover Material: In accordance with SWS, Section 8.43.3. No stone, rock or other similar material with a sieve size greater than 1" shall be permitted.

4.1.14.1.3 Granular Backfill: In accordance with SWS, Section 8.43.4. No stone, rock or other similar material with a sieve size greater than 3" shall be permitted. Granular material shall be crushed limestone.

4.1.14.1.4 Spoil Backfill: In accordance with SWS, Section 8.43.5. No stone, rock or other similar material with a sieve size greater than 3-inches shall be permitted. In areas where excavated material(s) are determined to be not acceptable, in the judgement of the Village Engineer, then imported backfill material meeting the requirements of SWS will be required.

4.1.14.1.5 Slurry Backfill: Aggregate slurry in accordance with SWS, Section 8.43.8 and requirements of the Village Engineer, or in accordance with street opening permit, when issued. In special cases, the Village Engineer may direct the use of Sand Slurry consisting of 50 pounds of fly ash and a 1/2 bag of Portland cement per cubic yard of mix.

4.1.14.2 DESIGN STANDARDS

4.1.14.2.1 Backfill in accordance with all street opening permit(s), generally this will be aggregate slurry. All areas greater than 5 ft from a paved surface (and above a 45-degree intercept line) may receive suitable spoil backfill as provided herein.

4.1.14.3 INSTALLATION

4.1.14.3.1 Care shall be taken by the Contractor when backfilling to prevent any movement of the pipe from proper alignment and grade. Contractor is responsible for determining that the finished sewer remains at the required elevation and grade.

4.1.14.3.2 Mechanically compact all trench backfill per SWS, Section 2.614(b). The initial lift to be compacted shall have a 2' loose thickness. Each subsequent lift to be compacted shall have a maximum 18" loose thickness. Contractor shall place thinner lifts if the required compaction cannot be achieved.

4.1.15 PIPE TO MANHOLE CONNECTIONS

4.1.15.1 MATERIALS

4.1.15.1.1 In accordance with SWS, Section 3.5.7, except as modified below:

4.1.15.1.2 Amend the last sentence of Section 3.5.7(a) by adding the following: “using boots or cast-in-place cementitious material.”

4.1.15.1.3 Delete the last paragraph of Section 3.5.7 (c) & replace with: “To maintain seal flexibility, the annular space between the pipe and manhole wall shall be plugged with flexible butyl rubber gasket material prior to pouring the manhole invert and bench in accordance with SWS, Section 6.41.6. When connecting pipe to existing pre-cast concrete manholes, core hole in manhole wall prior to installing pipe to manhole seal.”

4.2 INSPECTION

4.2.1 SUBMITTALS AND SAMPLES

4.2.1.1 All materials and installations shall conform to SWS and are subject to the Village Engineer’s approval. All materials of each type or use shall be from a single manufacturer. Contractor shall submit for approval six (6) sets of material specifications, certification and testing results by manufacturer on EACH material item required on the Project.

4.2.2 ACCEPTANCE TESTING

4.2.2.1 General

4.2.2.1.1 Installation shall be in accordance with SWS, and these specifications.

4.2.2.1.2 All storm sewer pipe shall be laid uniformly to line and grade. Noticeable variation from true alignment and grade will be considered, by the Village, sufficient cause for rejection of the work. Care should be taken to ensure that the entering pipe is forced tightly against the last pipe laid.

4.2.2.1.3 Storm sewer, storm sewer inlets, storm sewer catch basins, and lateral alignment shall be uniform in line and grade as measured from the inlet to the outlet of the pipe section. Vertical misalignment of greater than $\frac{3}{4}$ ” in a single pipe section or a crest in the pipe grade extending for more (longer) than one-and-one-half (1-1/2) sections of pipe shall be cause for rejection and correction by the Contractor at no cost to the Village.

4.2.2.1.4 Manhole barrel joint(s) gasket material (“E-Z-Stik”) shall be placed on the vertical slope of each joint and shall be of the size necessary to fill the annular space of the joint. Lifting holes shall be grouted with Pennegrout and struck smooth on the interior and exterior surfaces. Chimney joints shall be grouted with Pennegrout. The grout shall extend the full width of each grade ring and each joint shall be struck-off vertically, even with the inside and outside chimney surfaces.

- 4.2.2.1.5 Rim elevations for manholes located in paved areas shall be set $3/8'' - 1/2''$ below the asphalt binder grade elevation. Ramping of manholes will not be allowed.
- 4.2.2.1.6 Final adjustments to raise rim elevations to $1/2''$ below the grades shown on the final paving plans shall be made by installing adjusting rings as needed just prior to placement of the final lift of the pavement (surface course).
- 4.2.2.1.7 Catch basins shall be initially constructed to approximate $3/4''$ below binder grade prior to the curb and gutter construction. When curb and gutter is constructed, the concrete curb and gutter shall be stopped 5 feet on either side of the inlet. At intersections, catch basins are to be constructed 5 feet from the end of radii (to side of inlet). Temporary curb and gutter in the 5-foot gap on either side of the inlet shall be constructed with asphalt transitioning from the final grades of the concrete curb and gutter to the grade of the grate set at binder grade.
- 4.2.2.1.8 At the time of placement of the final surface course of pavement, the temporary asphaltic curb and gutter shall be removed, and the inlet frame shall be set to final grade by adding one 2" adjusting ring and applying Type "M" mortar per SWS, Section 6.37.1. The concrete curb and gutter shall be completed. No wood shims shall be left in place. With this method, tuck pointing beneath the frame should not be required.
- 4.2.2.1.9 Any catch basin out of horizontal alignment by more than 2 inches shall be reconstructed to match the curb and gutter.
- 4.2.2.1.10 Contractor shall furnish and place a temporary 2" x 6" stake at the end of each storm lateral.
- 4.2.2.1.11 Existing field tiles shall be connected to a storm sewer or have a positive outfall provided.
- 4.2.2.1.12 All storm sewers shall be free from debris, sedimentation, or garbage prior to Village acceptance.
- 4.2.2.1.13 Downspout cleanouts and catch basins shall be inspected by the Village prior to acceptance by the Village.

4.1 INSPECTION

When starting an installation, the farthest downstream location of the new sanitary sewer system shall have a plug installed and maintained by the utility Contractor. That plug shall not be removed until the system has been accepted by the Wastewater Utility Village Engineer and deemed operational by the Village and/or the Utility Department.

4.1.1 SUBMITTALS AND SAMPLES

4.1.1.1 All materials of each type or use shall be from a single manufacturer. Contractor shall submit for approval six (6) sets of material specifications, certification and testing results by manufacturer on EACH material item required on the Project.

4.1.2 ACCEPTANCE TESTING

4.1.2.1 General

4.1.2.1.1 Deflection and Leakage tests in accordance with SWS and under supervision of the Engineering Project Inspector and the Wastewater Utility.

4.1.2.1.2 All sewer pipes shall be laid uniformly to line and grade. Noticeable variation from true alignment and grade will be considered to be sufficient cause for rejection of the work by the Village. Care should be taken to ensure that the entering pipe is forced tightly against the last pipe laid.

4.1.2.1.3 Sanitary main and lateral alignment shall be uniform in line and grade as measured from the inlet to the outlet of the pipe section. Vertical misalignment of greater than $\frac{3}{4}$ " in a single pipe section or a sag in the pipe grade extending for more (longer) than one-and-one-half (1.5) sections of pipe shall be cause for rejection. Any correction by the Contractor shall be at no cost to the Village or Utility.

4.1.2.1.4 Two (2) business days' notice is required to be given to the Village's Inspector and the Wastewater Utility.

4.1.2.1.5 All water that is used for construction purposes will be charged at the current rates for such use. A PERMIT IS REQUIRED FROM THE WATER UTILITY PRIOR TO ANY WATER USE.

4.1.2.2 Tests

4.1.2.2.1 Deflection testing for flexible mains shall be at the 95% of specified minimum I.D.

4.1.2.2.2 Leakage testing shall include all installed system components, such as mains, branches, laterals, risers and taps to the terminus of lines installed. For each foot that the test section is below ground water level, the test pressure shall be increased by 0.43 PSI for each foot that the average ground water height for the test section is above the spring line. In absence of recorded data on ground water table above pipe invert, it shall be assumed to begin at six (6) feet below finished

manhole grade. Therefore, the minimum increase in test pressure shall be 6.6 psi and the maximum test pressure shall be 10.0 psi.

4.1.2.2.3 Sanitary Manholes shall be vacuum tested for leakage in accordance with standard test methods outlined in ASTM C-1244-93 or current edition, and minimum test time periods of:

42" & 48" dia. Manholes	60 sec.
60" dia. Manholes	75 sec.
72" dia. & greater Manholes	90 sec.

4.1.2.2.4 Interior manhole walls to be vacuum tested shall be dry. As required by MMSD, sanitary manholes shall be vacuum tested from the lid down to the invert. If a vacuum test fails, all remedial sealing is to be done on the exterior of the manhole prior to re-testing following proper curing time. Manholes receiving repairs shall be vacuum tested again after repairs are completed.

4.1.2.2.5 As an alternative, sanitary manholes may be vacuum tested from the top of the cone to the invert provided that the frame/cone internal seal and extension, if installed, are water tested during installation as required by MMSD. Reports summarizing the vacuum testing shall be submitted to the Utility Department.

4.1.2.2.6 Follow hydrostatic testing procedures outlined in SWS, Section 4.15, at 100 psi and no leakage.

4.1.2.2.7 Testing of both internal and external seals shall be with a gallon of dyed water behind the seal for a period of 1 minute without any leakage through the bottom clamp.

4.1.2.2.8 Prior to pre-punch list work, tracer wires shall be tested by Contractor prior to Village accepting the work. The Utilities Department has the option to spot check the continuity of the tracer wires.

4.1.2.2.9 As part of the pre-punch list work, Contractor required to notify when CCTV is ready to start. CCTV will be completed by the Village Wastewater Utility at no cost to Contractor.

4.1.3 CLEANING

4.1.3.1 Cleaning Precautions

4.1.3.1.1 During the cleaning process, a mechanical plug of appropriate size will be installed at the furthest downstream manhole, and all efforts shall be made to keep foreign materials and water from adjoining sewer systems.

4.1.3.1.2 Contractor shall clean all sanitary sewer line sections between manholes using high-velocity jet, or mechanically powered equipment. All dirt, sand, rocks, and other solid or semi-solid material resulting from the construction of the system shall be removed before acceptance.

4.1.3.2 Contractor shall be required to repair all visible damage and leaks in the mains.

4.1.3.3 This procedure is in addition to any testing required by SWS and/or MMSD.

4.1.3.4 Acceptance of sewer line cleaning and construction will be made upon the successful completion of the CCTV inspection by the Village, and to the satisfaction of the Wastewater Utility. If the CCTV inspection shows the cleaning to be unsatisfactory, the Contractor shall be required to re-clean and re-inspect the sewer line until the cleaning is shown to be satisfactory. Second inspection by CCTV due to dirt in pipe will be charged to Contractor.

4.1.4 CCTV – Private Interceptor Sewers

4.1.4.1.1 Contractor will perform CCTV after construction is complete. A copy of the CCTV video and report shall be provided to the Wastewater Utility.

4.1.4.1.2 Color videotape recordings of the data shall be made by the Contractor. Copies of each videotape, in USB digital format (USB flashdrives) or approved media, shall be provided to the Wastewater Utility. PipeTech Compatible P.A.C.P. codes are required.

4.1.4.1.3 A set of system map Plan Sheets shall be included with all CCTV report books.

5 ROAD SYSTEM

5.1 GEOMETRICS

5.1.1 RIGHT-OF-WAY WIDTHS

Type	Minimum ROW Width (feet)
Local Street	60
Service Alley	30
Manufacturing and Industrial	80
Collectors and Arterials	Per adopted County Highway Width Map and/or Official Village Map

Per tables 2 & 2A of Chapter 18 of the Village of Germantown Municipal Code

5.1.2 PAVEMENT WIDTHS

5.1.2.1 Pavement widths are measured from edge of pavement to edge of pavement.

Standard Urban Residential Section Using Curb & Gutter (Face of curb to face of curb)	30 Feet
Standard Rural Residential Section With Open Ditches (Face of curb to face of curb)	24 Feet
Standard Commercial or Industrial Section	40 Feet

Per tables 2 & 2A of Chapter 18 of the Village of Germantown Municipal Code

5.1.3 BOULEVARD SECTIONS

5.1.3.1 Entrance

5.1.3.1.1 Minimum pavement width (flange to flange of curb and gutter) shall be 16 feet for a single lane.

5.1.3.1.2 Minimum pavement width (flange to flange of curb and gutter) shall be 24 feet for a double lane.

5.1.3.2 Exits

5.1.3.2.1 Minimum pavement width (flange to flange of curb and gutter) shall be 24 feet (double lane).

5.1.3.2.2 Minimum median width shall be 20 feet back of curb to back of curb.

5.1.3.2.3 Median length shall be adequate for queuing, but generally shall not extend beyond the first side street.

5.1.4 CUL-DE-SACS

5.1.4.1 Local streets open at one end only shall end with a cul-de-sac.

5.1.4.2 No less than 3 parcels and no more than 15 parcels may be served by a cul-de-sac.
Block length between intersections shall not exceed 1,500 feet nor be less than 500

feet. Block length is measured from the center line of the right-of-way to the center line of the right-of-way of the two cross streets.

5.1.4.3 Residential:

5.1.4.3.1 All pavement widths for a standard residential cul-de-sac shall have a minimum bulb radius of 42 feet as measured from the center of the cul-de-sac to the edge of pavement.

5.1.4.3.2 The minimum bulb radius for the Right-of-Way shall be 66 feet as measured from the center of the cul-de-sac.

5.1.4.4 Commercial or Industrial:

5.1.4.4.1 All pavement widths for a standard commercial or industrial cul-de-sac shall have a 48-ft. radius measured from the center of the cul-de-sac to the face of curb.

5.1.4.4.2 The minimum radius for the Right-of-Way shall be 66 feet.

5.1.4.5 Central planting islands are acceptable in the middle of the cul-de-sac.

5.1.4.5.1 Minimum pavement width (edge of pavement to edge of pavement for rural cross-section or flange to flange for curb and gutter) shall be 16 feet for a single lane.

5.1.4.5.2 Plantings should be installed outside of the 5' clear zone for snow plowing.

5.1.5 CLOSE/LOOP STREET

5.1.5.1 The close or loop street, may be used in lieu of a short cul-de-sac, and shall be designed as two parallel lanes, 16-ft. wide lanes separated by a central planting strip or bio-retention area having a minimum width of 50 feet.

5.1.5.2 Maximum length for a close or loop street shall be 1,200 feet.

5.1.6 STREET GRADES

Type	Max Grade
Arterial	4%
Collector	7%
Local	10%

5.1.6.1 Urban roadway sections shall have a minimum of 0.7% centerline profile gradient.

5.1.7 CROSS SLOPE

5.1.7.1 All roadway sections (urban or rural) shall have a crown, with a cross slope of 3% from the pavement centerline to the edge of pavement.

5.1.8 HORIZONTAL CURVES

5.1.8.1 Minimum horizontal curve requirements, per WDOT Geometric Design of Highways and Streets, Current Edition including all updates.

5.1.8.2 Compound Curves

5.1.8.2.1 Compound curves are only allowed on roads with a posted speed limit of 25 mph or less.

5.1.8.2.2 A minimum horizontal curve radius of 250 feet is required along the roadway centerline.

5.1.8.2.3 A horizontal curve radius of 200 feet may be accepted when a 100' long tangent length is provided between curves.

5.1.9 VERTICAL CURVES

5.1.9.1 Maintain "K" Values per AASHTO Geometric Design of Highways and Streets, Current Edition including all updates.

5.1.10 SIGHT DISTANCE

5.1.10.1 For minimum sight distance requirements at intersections and driveways, refer to AASHTO Geometric Design of Highways and Streets, Current Edition including all updates.

5.1.11 INTERSECTION RADII

5.1.11.1 Internal to development for minor streets (measured from the edge of pavement/flange line):

5.1.11.1.1 Residential and multi-family: 25 feet

5.1.11.1.2 Commercial and industrial: 42 feet

5.1.11.1.3 Intersection radii at side roads, shall be as approved by the Village Engineer.

5.1.12 ACCELERATION/DECELERATIONS/BYPASS LANES

5.1.12.1 Any roadway intersecting with a collector or arterial street projected to have more than 100 ADT shall require Acceleration/Decelerations/Bypass Lanes per Detail Figure No. 4.

5.1.13 TRANSITIONS

5.1.13.1 Transitions areas, such as lane additions, bypass lanes, traffic shifting lanes, and areas between existing pavement and new pavement sections with varying widths, shall be transitioned based on speed and road type.

5.2 SPECIFICATIONS

5.2.1 SUBGRADE

5.2.1.1 DESIGN STANDARDS

5.2.1.1.1 Soil borings to a minimum depth of 10 feet below finish grade shall be taken every 50-500 feet along the proposed centerline of the roadway. A site map showing the location of the borings along with laboratory soils classifications for each boring shall be submitted to the Village Engineer.

5.2.1.1.2 Should the geotechnical data submitted to the Village not be sufficient to satisfy the Village Engineer, the Developer shall grant the Village with a right of entry to obtain the required data. Costs associated with obtaining the required data shall be at the Developer's sole expense.

5.2.1.2 INSTALLATION

5.2.1.2.1 The subgrade shall be proof rolled, checked for proper grade and approved by the Village Engineer or designee before crushed stone base and, if necessary geotextile fabric, is to be applied. Proof rolls are to be witnessed by a designated Village representative.

5.2.1.2.2 All earth fills under roadways shall be placed in 12" maximum lifts and a Proof Roll shall be witnessed by the Village Inspector or designated Village representative.

5.2.1.2.3 All soft spots located as a result of proof rolling with a fully loaded tri-axle truck approved by Village Engineer or designee shall be undercut and filled in a manner agreed upon by the Contractor and the Village Engineer.

5.2.1.2.4 All repaired soft spots shall be re-proof rolled after subgrade elevation has been re-established. Process shall be repeated until the project passes proof roll.

5.2.1.2.5 In unstable soil conditions, undercutting in excess of 3 feet shall be backfilled with 3" breaker run or other materials as approved in writing by the Village Engineer. 1-1/4 inch select crushed aggregate may also be used.

5.2.1.2.6 If open graded material is used, drainage at the bottom of the undercut is required by use of a French drain or perforated pipe bedded in crushed stone, where grades allow. In many situations, dense graded coarse TB shall be used to eliminate water that would be trapped if clear stone was used.

5.2.1.2.7 In unstable soil conditions, additional subdrains may be required as directed by the Village Inspector.

5.2.1.2.8 Method of drainage of the filled area shall be approved by the Village Inspector.

5.2.2 GEOTEXTILE FABRIC

5.2.2.1 MATERIAL

5.2.2.1.1 Geotextile fabric conforming to WisDOT Standard Specification, Section 645 shall be pre-approved by the Village Engineer prior to installation for:

5.2.2.1.1.1 subgrade separation and stabilization (Type SAS)

5.2.2.1.1.2 drainage filtration (Type DF)

5.2.2.1.1.3 subgrade reinforcement (Type SR)

5.2.2.1.1.4 under riprap (Types R & HR).

5.2.2.2 INSTALLATION

5.2.2.2.1 Geotextile fabric shall be placed on substandard subgrade in all areas that will receive crushed aggregate base course material, unless a Clear Stone Frost Barrier is to be used. Geotextile fabric is not required where Clear Stone Frost Barrier is to be used.

5.2.2.2.2 Geotextile fabric shall have a minimum 24" overlap for longitudinal seams and minimum 36" overlap for transverse seams.

5.2.2.2.3 Subsequent open cuts of the pavement requiring excavations below the subgrade of roadways having geotextile fabric in place shall be backfilled with approved slurry.

5.2.3 BASE COURSE

5.2.3.1 MATERIALS

5.2.3.1.1 The crushed aggregate base course for the roadway shall consist of dense graded base conforming to WisDOT Standard Specification Section 305.2.2.1 for 1 ¼-inch.

5.2.3.2 INSTALLATION

5.2.3.2.1 The finished base course elevation shall be a minimum of:

5.2.3.2.1.1 10" above the approved subgrade for a local roadway,

5.2.3.2.1.2 14" above the approved subgrade for a commercial or industrial roadway

5.2.3.2.2 New Construction or Reconstruction:

5.2.3.2.2.1 Bottom Layer: 3" gradation crushed interlocking limestone aggregate from a quarry source

5.2.3.2.2.2 Middle Layer: 1 ¼" gradation crushed interlocking limestone aggregate from a quarry source

5.2.3.2.2.3 Quarry Source: Quarry source shall be listed on the WisDOT Pit and Quarry Listing (latest edition) and be approved by Germantown.

5.2.3.2.2.4 Gradations shall conform to WisDOT Standard Specifications Sec. 305

5.2.3.2.3 Pulverize & Overlay: Pulverized pavement acceptable when recommended by Geotechnical Services Report, as approved by the Village Engineer.

5.2.3.2.4 The dense graded base shall be spread, shaped, compacted, and proof-rolled to produce a stabilized base which conforms to the required cross-sections.

5.2.3.2.5 Special compaction testing may be required dependent on-site conditions in accordance with 301.3.4.3 of the WisDOT Standard Specifications at the contractor's expense.

5.2.3.2.6 Surface Elevation tolerance to be +/- 1/2 inch.

5.2.3.2.7 Base course to be compacted to 95% Modified Proctor and conform to WisDOT Standard Specification 305.3.2

5.2.4 FROST BARRIER – As required by the Village Engineer

5.2.4.1 MATERIALS

5.2.4.1.1 The Frost Barrier shall be #3 Clear Stone with a minimum depth of 12" or as specified for a given project.

5.2.4.2 DESIGN STANDARDS

5.2.4.2.1 Where specified by the Village, a layer of Clear Stone Frost Barrier shall be required to prevent or minimize future frost heave damage to the roads.

5.2.5 SHOULDERS

5.2.5.1 MATERIALS

5.2.5.1.1 The aggregate for shoulder shall consist of: Crushed stone conforming to WisDOT Standard Specification Section 305.2.2.1 for ¾-inch dense graded base; or Recycled asphalt as approved by the Village Engineer.

5.2.5.2 DESIGN STANDARDS

5.2.5.2.1 For rural cross sections, a minimum 4-ft. wide shoulder shall be constructed, with recycled asphalt, along both edges of pavement.

5.2.6 ASPHALT PAVEMENT

5.2.6.1 MATERIALS

5.2.6.1.1 Asphalt pavement materials shall conform to the requirements of the Wisconsin Asphalt Pavement Association's (WAPA) latest pavement design guide.

5.2.6.1.2 Mix designs for all other classifications shall be as approved by the Village Engineer.

5.2.6.2 INSTALLATION

5.2.6.2.1 All asphalt binder courses shall be constructed on a dry, rolled and compacted crushed stone base, free of loose and foreign materials. Hand operated vibrating compactors shall be used around all manholes and valve boxes.

5.2.6.2.2 A tack coat, meeting the requirements of WisDOT Standard Specification Section 455.2.5, shall be used as a bonding agent between binder and surface courses, and the separate lifts of binder when not placed on the same day. The binder surface

shall be thoroughly cleaned and any debris removed prior to applying the tack coat. Tack coat shall be uniformly applied at a rate of 0.07 gallon per square yard with an allowable variation of +/- 0.02 gallon per square yard over the entire receiving surface. Daily application of the tack coat shall be limited to approximately that area of surface that can reasonably be expected to be paved during the same day.

5.2.6.2.3 Saw cutting

5.2.6.2.3.1 When saw cutting existing concrete or asphalt pavements, curb and gutter, driveways, or sidewalks, the saw cut shall be straight, and shall be full depth.

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

5.2.6.2.3.3 Longitudinal joints in the surface course shall at no time be placed immediately over similar joints in the binder course beneath, with the exception of the centerline. A minimum distance of 6" shall be required between the location of the joints in any given course and the location of similar joints in the course placed above it unless approved by the Village Engineer.

5.2.6.2.4 Paving shall be done in stages so that the first pass does not cool below 125° F, prior to second pass of the next lane.

5.2.6.2.5 Any asphalt paving after October 15th of any year shall be done only with special, alternate methods approved by the Germantown Village Engineer.

5.2.6.2.6 If the roadway will not receive the final lift prior to October 15th, a minimum 18" wide wedge of asphalt shall be placed against the flange line for protection.

5.2.6.2.7 On roadways with rural cross-section, the edge of the pavement shall be sloped, and no materials shall extend beyond the limits of the previous layer. Irregularities in alignment along the outside edges shall be corrected by adding or removing asphalt. Excess asphalt deposited on the existing base, binder or surface course outside the limits of the lane being laid, shall be immediately removed.

5.2.6.2.8 Prior to placement of the surface course:

5.2.6.2.8.1 All foreign matter shall be removed from the binder course surface.

5.2.6.2.8.2 On streets with curb and gutter, the 18" wide wedge of protective asphalt previously placed against the curb and gutter shall be removed by milling.

5.2.6.2.8.3 Developer/Contractor, at his sole expense, shall repair any depressions or other signs of failure in the binder course as directed by the Village Engineer.

5.2.6.2.8.4 Developer/Contractor, at his sole expense, shall repair any damaged curb and gutter as directed by the Village Engineer.

5.2.6.2.8.5 All manhole rims and water valve boxes shall be left 3/8" –1/2" below binder course and adjusted to 3/8" –1/2" below the final pavement elevation prior to

placement of surface course of asphalt. Paving rings which have an adjustable diameter are not allowed.

5.2.6.2.9 All excavations associated with manhole adjustments shall be backfilled with slurry as specified in Standard Specification for Sewer and Water Construction in Wisconsin Section 8.43.8. The slurry shall be backfilled to 6-inches below the final pavement elevation for residential, commercial, and industrial streets.

5.2.6.2.10 Asphalt pavement installation will not be permitted after October 15th unless approved by the Village Engineer.

5.2.6.2.11 Asphaltic binder course shall not be installed after October 1st, unless approved by the Village Engineer.

5.2.6.2.12 Asphaltic surface course shall be installed in the same calendar year as the binder course, unless approved by the Village Engineer.

5.2.7 CONCRETE PAVEMENT

The use of concrete pavement requires the approval of the Village Engineer.

5.2.7.1 MATERIALS

5.2.7.1.1 Portland Cement and aggregates used in all concrete mixes shall conform to WisDOT Standard Specification Section 501.

5.2.7.1.2 Aggregates used in concrete shall conform to the requirements of WisDOT Standard Specification Section 501.

5.2.7.1.3 Concrete shall be air entrained, Grade A, conforming to WisDOT Standard Specification Section 501, and in particular, meet the following requirements:

5.2.7.1.3.1 Minimum concrete content, 6.0 sacks per cubic yard;

5.2.7.1.3.2 Compressive strength after 28 days cured: 4,000 psi;

5.2.7.1.3.3 Maximum amount of water per bag of cement: 6.0 gallons;

5.2.7.1.3.4 Size of course aggregates required: No. 1 plus No. 2;

5.2.7.1.3.5 Slump: 1"-3"; and

5.2.7.1.3.6 Air content: 4.5% - 7.5%.

5.2.7.2 DESIGN STANDARD

Pavement Thickness (in)	Dowel Bar Dia. (in)	Joint Spacing (ft)
5 ½, 6, 6 ½	None	12
7, 7 ½	1	14
8, 8 ½	1 ¼	15
9, 9 ½	1 ¼	15
10 and above	1 ½	15

5.2.7.2.1 Alternative designs, such as high early, shall be as approved by the Village Engineer.

5.2.7.3 INSTALLATION

5.2.7.3.1 Contractor shall submit a mix design 10 days prior to paving and receive the approval of the Village Engineer.

5.2.7.3.2 A pre-pour meeting shall be scheduled with the Village's Engineering Department prior to paving.

5.2.7.3.3 Water used shall conform to WisDOT Specification Section 501.2.4. If Village water is used, it will be charged at the current rates for such use; a PERMIT IS REQUIRED from the Water Utility for any Village water use.

5.2.7.3.4 The consistency of the concrete shall be such that when measured by means of a 4" x 8" x 12" slump cone, the slump shall not exceed 3".

5.2.7.3.5 Test cylinders shall be required meeting AASHTO standards, stored under site conditions and then tested at Contractor expense. Testing to be performed by a licensed geotechnical consultant i.e. third party must make and test cylinders. Three test cylinders per 1,000 lineal feet shall be taken during the course of the curb and gutter operations. A testing firm, hired by the Developer, shall pick up the cylinders at the project site within 24 hours of paving, break the cylinders at the appropriate time (7, 14, and 28 days) and submit a test report to the Developer. The Developer shall submit a copy of the report to the Village Engineer or designee.

5.2.7.3.6 Concrete pavement shall be constructed in accordance with WisDOT Standards Specifications, Section 415.

5.2.7.3.7 Curing Time and Cleanup

5.2.7.3.8 Concrete pavements shall be closed to all traffic for 7 days unless otherwise directed by the Village Engineer. When directed to open the street to vehicular traffic, the Contractor shall clean the area of all forms, lumber, dirt and other debris to the satisfaction of the Village Engineer. The Contractor shall then flush and sweep the street.

5.2.7.3.9 When a concrete saw has been utilized to cut joints, the Contractor will be required to flush the pavement with water, removing all residual materials of the sawing operation, prior to opening the street to vehicular traffic.

5.2.7.3.10 Apply curing agent according to Wisconsin Concrete Paving Association (WCPA) Concrete Pavement and Flatwork Specification Guide.

5.2.7.3.11 Concrete Placement During Cold Weather (Follow WisDOT Specifications)

5.2.7.3.12 Concrete shall not be placed on a frozen subgrade. The Contractor shall remove and replace at his expense any concrete damaged by frost or freezing.

5.2.7.3.13 When placing concrete during cold weather, the water and the aggregates in the concrete mixture may be heated. When specifically allowed by the Village Engineer, the Contractor may use magnesium free calcium chloride as an admixture in the concrete. The maximum quantity to be used shall not exceed 1% of the cement content of the mix.

5.2.7.3.14 When the air temperature is expected to drop below freezing, the Contractor shall cover the surface of the concrete with straw, hay, or blankets to a sufficient depth to prevent freezing and such protection shall be furnished for at least 5 days after the concrete has been poured. Other methods of protection from freezing may be used when approved by the Village Engineer.

5.2.8 ADMIXTURES

5.2.8.1 Water Reducing

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

5.2.8.1.2 Accelerator: When specifically allowed by the Village Engineer, the Contractor may use magnesium free calcium chloride as an admixture in the concrete. The maximum quantity to be used shall not exceed 1% of the cement content of the mix.

5.2.9 CURB AND GUTTER

5.2.9.1 MATERIALS

5.2.9.1.1 All concrete curb construction shall conform to WisDOT Standard Specification, Section 601.

5.2.9.1.2 Concrete for curbs shall be air entrained, Grade A, conforming to WisDOT Standard Specification Section 501, and in particular, meet the following requirements:

5.2.9.1.2.1 Minimum concrete content: 6.0 sacks per cubic yard;

5.2.9.1.2.2 Compressive strength after 28 days cured: 4,000 psi;

5.2.9.1.2.3 Size of course aggregates required: No. 1;

5.2.9.1.2.4 Slump: 1" - 3"; and

5.2.9.1.2.5 Air content: 4.5% - 7.5%.

5.2.9.1.3 Concrete that is rejected on the work site for any reason shall not be re-tempered and used in the work without specific approval of the Village Engineer.

5.2.9.1.4 Concrete Curb and Gutter shall be a standard 6" vertical face curb and gutter type that is 30" wide (6" top curb and 24" flange), 9½" deep at the flange and 14" deep at the back of curb.

5.2.9.1.5 Concrete Curb joints to be spaced at 10 ft. intervals.

5.2.9.1.6 A V-Bottom mountable curb and gutter type that is 30" wide, 9" deep at the flange and 12" deep at the back of curb may be allowed at the discretion of the Village Engineer, on local streets only.

5.2.9.1.7 Where connection is made to existing road, dowels (longitudinally) are required. Dowels conforming to WisDOT Standard Specification Section 505.2.6, shall be installed per WisDOT Standard Specification Section 416.3.6.

5.2.9.1.8 Where connection is made to existing curb and gutter, ties (transversely) are required. Ties conforming to WisDOT Standard Specification Section 505.2.6, shall be installed per WisDOT Standard Specification Section 416.3.6.

5.2.9.2 DESIGN STANDARDS

5.2.9.2.1 Minimum curb grade: 0.7 % (along the gutter flow line).

5.2.9.3 INSTALLATION

5.2.9.3.1 Before the concrete is placed, the crushed aggregate base course under the curb and gutter shall be checked for correct elevation.

5.2.9.3.2 The concrete shall be placed in as nearly a continuous operation as possible.

5.2.9.3.3 Three test cylinders per 1,000 lineal feet shall be taken during the course of the curb and gutter operations. A testing firm, hired by the Developer, shall pick up the cylinders at the project site within 24 hours of paving, break the cylinders at the appropriate time (7, 14, and 28 days) and submit a test report to the Developer. The Developer shall submit a copy of the report to the Village Engineer or designee.

5.2.9.3.4 Prior to applying curing material on the concrete, the face of the curb shall be "branded" with a "W" designating the location(s) of water services, "S" designating the location(s) of sanitary laterals and "SS" for storm sewer laterals. Physical placement of the branding shall be reasonably accurate in a vertical plane above the respective lateral.

5.2.9.3.5 Prior to applying curing material on the concrete, the face of the curb shall be stamped with the contractor's name and year of installation. A stamp is required for each non-contiguous section of curb and gutter.

5.2.9.3.6 The concrete surface shall be sealed, once concrete has set up enough to prevent marring or dilution of surface, by spraying a uniform coating of white curing material meeting the requirements of WisDOT Standard Specification Section 415.2.4, in such a manner as to provide a continuous water-impermeable film on the entire concrete surface which includes the back of the curb and gutter.

5.2.9.3.7 Transverse contraction joints for curbs shall be cut or sawed 1/3 the depth of pavement at a maximum 10-foot intervals. One-inch expansion joints shall be provided at ends of radii, points of considerable change in grade and alignment, at intervals not to exceed 300 feet and where abutting existing curb and gutter.

5.2.9.3.8 Concrete curb and gutter shall cure a minimum of days, based on cylinder breaks, prior to backfilling and crushed stone base installation.

5.2.9.3.9 10 days after the curbs have been placed, or as determined by the 7-day cylinder breaks, and the Village has approved the concrete work, the Contractor shall immediately backfill behind the curbs to preclude any erosion or undermining.

5.2.10 ROAD UNDERDRAIN PIPE

5.2.10.1 MATERIALS

5.2.10.1.1 A continuous 4" diameter perforated, corrugated polyethylene drainpipe, meeting the requirements of AASHTO Designation: M-252, shall be installed under the curb and gutters and extend 25 feet in either direction from storm water catch basins located at low points. For catch basins in other locations, the 25-ft. drainpipe shall be connected only to the upstream side.

5.2.10.1.2 Pipe perforations may be holes or slots and may be in 3 or 4 lines spaced around the circumference of the pipe at 120° or 90° respectively. The end of the drainage pipe opposite the catch basin shall be capped with a cap suitable for installing on the drainage pipe of midstream structures.

5.2.10.1.3 Enough geotextile fabric shall be provided as to cover the sides and bottom of the trench and overlap across the top of the trench by a minimum of 4 inches or the pipe in a sock may be used, see Detail Figure No. 7.

5.2.10.1.4 The trench shall be backfilled with open graded ¾" clear stone.

5.2.10.2 INSTALLATION

5.2.10.2.1 The 4" drainage pipe shall be laid in an 8" deep by 8" wide trench with flat bottom with square sides. The trench, constructed at an elevation lower than the base course, shall be aligned with the proposed centerline of the flange of the curb and gutter. Any damaged drainpipe shall be replaced before the open graded stone is backfilled in the trench.

5.2.11 DRIVEWAYS

5.2.11.1 DESIGN STANDARDS

5.2.11.1.1 Driveway approaches are to be constructed by removing existing curb and gutter and installing poured in-place concrete. This activity requires a Driveway Approach Permit issued by the Village.

5.2.11.1.2 Driveway slopes shall not exceed 10%.

5.2.11.1.3 Driveway slopes shall not exceed 5% in all areas within 25 feet of a building.

5.2.11.1.4 For commercial, industrial and multi-family buildings, if the initial 25 feet of driveway is deemed to be an accessible passenger loading zone, the American Disabilities Act (ADA) requires accessibility routes with longitudinal slopes of not greater than 5% and cross slopes of 2% to be connected to the loading zone and the accessible building entrance.

5.2.11.1.5 AASHTO Sight Distance requirements shall be required at all driveway locations.

5.2.11.1.6 Sidewalks located behind driveway approaches should be the same thickness as the driveway.

5.2.11.2 RESIDENTIAL DRIVEWAYS

5.2.11.2.1 Only one driveway is allowed per parcel for residential developments.

5.2.11.2.2 For multi-family developments, the Plan Commission may grant one or more additional access points, based on the size of the development.

5.2.11.2.3 All residential driveways along roadways with vertical face curb and gutter and side path shall be constructed with a driveway apron.

5.2.11.2.4 Residential width at curb or shoulder = 25' max

5.2.11.3 COMMERCIAL DRIVEWAYS

5.2.11.3.1 The number of commercial driveways shall be the minimum necessary to provide reasonable access for regular traffic and emergency vehicles, while preserving operations and safety along the public roadway. Unless a Traffic Impact Analysis (TIA) shows that a single driveway cannot provide this, only one driveway access will be permitted unless one or more of the following conditions are met.

5.2.11.3.2 The continuous frontage of the parcel is over 300 feet long, in which case an additional driveway per each 300 feet or frontage may be granted by the Plan Commission. Commercial or Retail width at curb or shoulder = 45' max

5.2.11.3.3 Two one-way driveways may be permitted along frontage of at least 150 feet provided the driveways do not interfere with operations at other driveways or along the street.

5.2.11.3.4 The Plan Commission may determine additional driveways are justified due to the amount of traffic generated by the use without compromising traffic operations along the public street.

5.2.11.3.5 All commercial driveways along roadways with vertical face curb and gutter shall be constructed with a minimum of a driveway apron. Certain locations with heavy amounts of traffic will need to use a street type entrance as directed by the Village Engineer.

5.2.11.4 INSTALLATION

5.2.11.4.1 The concrete surface shall be sealed, after the concrete has set up substantially to avoid marring or damage to the concrete, with a uniform coating of curing material meeting the requirements of WisDOT Standard Specification Section 415.2.4, in such a manner as to provide a continuous water-impermeable film on the entire concrete surface. Back of flatwork must be sprayed as well.

5.2.11.4.2 Concrete driveway approaches shall be a minimum of 7" thick. Sidewalks behind driveway approaches shall be the same thickness as the driveway.

5.2.11.4.3 Asphalt driveway approaches shall be a minimum of 3" thick.

5.2.11.4.4 The modification of the curb and gutter and the construction of the driveway approach shall be done in accordance with the driveway approach permit and the construction detail.

5.2.11.4.5 Concrete curb and gutter shall not be saw cut horizontally at driveways. Reconstruction of the curb and gutter is required with pavement ties and felt.

5.2.11.4.6 Expansion joint material, ½" thick for full depth of concrete, shall be placed between the curb and gutter and the approach. Ties shall be required at the joints between existing curb and new curb.

5.2.12 PARKING LOTS

5.2.12.1 Parking lots shall be designed and constructed according to the standards in the Village of Germantown Code Section 17.45

5.2.12.2 Off street parking lots shall be designed to accommodate traffic volumes and pedestrian circulation based on the land use served. And should be situated as close to accessible building entrances as possible.

5.2.12.3 The internal circulation pattern shall be designed with 24-ft. wide driving aisles (measured from edge of pavement marking to edge of pavement marking) for two-way traffic to allow users to maneuver in an efficient & safe manner.

5.2.12.4 The use of landscaped islands & medians shall be used to provide positive guidance to motorist and establish proper driving patterns.

5.2.12.5 Sidewalks adjacent to parking stalls shall be 8 feet wide. Smaller sidewalks may be allowed with prior Village approval. Appeals may be made to the Plan Commission.

5.2.12.6 Turning radii for a single unit truck (SU Design Vehicle) shall be provided as a minimum to all portions of the lot.

5.2.12.7 Slope shall be 2% max in all directions

5.2.12.8 The van-to-regular accessible space ration should equal 1:6.

5.2.12.8.1 Stall dimensions should be as follows:

5.2.12.8.2 Stall Lengths = 20 foot min.

5.2.12.8.3 Stall Widths:

5.2.12.8.3.1 Car = 9 foot min.

5.2.12.8.3.2 Van = 11 foot min; or 8 foot min with 8 foot aisle.

5.2.12.9 Signage and pavement marking required for each stall.

5.2.12.10 Pavement:

5.2.12.10.1 General parking areas are recommended to have at least a minimum of 8-inches of crushed aggregate base course and 2-inches of 3 LT 58-28S Asphaltic Concrete and 2 inches of 4 LT 58-28S Asphaltic Concrete.

5.2.12.10.2 Areas of heavy traffic, such as loading docks, shall have at least a minimum of 10-inches of crushed aggregate base course and 4-inches of 3 LT 58-28S Asphaltic Concrete and 4 inches of 4 LT 58-28S Asphaltic Concrete. Inverted parking lots are discouraged.

5.2.13 SIDEWALK AND PATHWAYS

5.2.13.1 MATERIALS

5.2.13.1.1 Concrete for sidewalks shall be Grade A, conforming to WisDOT Standard Specifications, Section 501, meeting the following requirements:

5.2.13.1.1.1 Minimum concrete content, 6.0 sacks per cubic yard;

5.2.13.1.1.2 Compressive strength after 28 days cured: 3,500 psi;

5.2.13.1.1.3 Maximum amount of water per bag of cement: 6.0 gallons;

5.2.13.1.1.4 Size of course aggregates required: No. 1 plus No. 2;

5.2.13.1.1.5 Slump: 1"-3"; and

5.2.13.1.1.6 Air content: 4.5% - 7.5%.

5.2.13.1.2 Sidewalks are to be constructed of 5-inches of concrete over a 4-inch crushed aggregate base course.

5.2.13.1.3 Driveway crossings shall be 7-inches of concrete over a 6-inch crushed aggregate base course.

5.2.13.1.4 Pathways shall be constructed of a 4 LT 58-28S mix asphalt 3-inches thick over a 5-inch crushed aggregate base course or as directed by the Village Engineer.

5.2.13.2 DESIGN STANDARDS

5.2.13.2.1 Current and future planned side path and trail locations are identified in the Village's Comprehensive Plan. Any development that occurs on or adjacent to these locations is required to connect to, or construct its portion of the system, if not

currently in place, or provide detailed rationale and request a waiver from the Plan Commission and/or Common Council

5.2.13.2.2 Sidewalks and pathways shall be separated from the street by a minimum 6-foot wide grassy terrace with shade trees.

5.2.13.2.3 The outside edge of Sidewalks and pathways shall be located 1-foot from the right-of-way line or as directed by the Village Engineer except at intersection crossings. At intersection crossing, the proper placement shall be determined by the location of the crosswalk and as directed by the Village Engineer.

5.2.13.2.4 Widths of Sidewalks

Local Roads	5 Feet
Collectors and Arterials	6 Feet

5.2.13.2.5 Pathways shall be a minimum of 10 feet wide with 2 feet of gravel shoulder on both sides and in conformance with AASHTO's Guide for the Development of Bicycle Facilities.

5.2.13.2.6 Traverse grade of 2% (1/4" per foot) draining toward the road.

5.2.13.2.7 The maximum allowed longitudinal grade shall be 5%. This grade shall not be exceeded unless the road grade is of a steeper grade, in which case the longitudinal sidewalk grade shall not exceed the road grade.

5.2.13.3 INSTALLATION

5.2.13.3.1 Sidewalk shall be placed by formed methods.

5.2.13.3.2 Contraction joints shall be not less than ¼" wide and ½" deep. Contraction joint spacing shall be 5' or as directed.

5.2.13.3.3 Expansion joints shall be located at a minimum 100 ft O.C. Finished joints shall have ¼" radius. After floating, troweling, and jointing, the concrete shall be brushed with a damp bristle brush.

5.2.13.3.4 Prior to applying curing material on the concrete, the face of the sidewalk or pathway shall be stamped with the contractor's name and year of installation. A stamp is required for each non-contiguous section of sidewalk or pathway.

5.2.13.3.5 The concrete surface shall be sealed, directly after finishing operations, with a uniform coating of white curing material meeting the requirements of WisDOT Standard Specification Section 415.2.4, in such a manner as to provide a continuous water-impermeable film on the entire concrete surface.

5.3 INSPECTION

Contractor shall be responsible for the horizontal and vertical control.

5.3.1 ACCEPTANCE TESTING

5.3.1.1 Tests

- 5.3.1.1.1 The subgrade shall be inspected before the crushed stone base may be applied. This inspection is done by the Village Inspector or its contracted inspection services. An average tolerance of +/- 0.04-ft. from the approved subgrade elevation shall be allowed.
- 5.3.1.1.2 The base course shall be inspected and approved by the Village Inspector before the first layer of asphalt can be placed. An average tolerance of +/- 0.04-ft. from the approved base course thickness shall be allowed. Improvements to the base course may be required if, in the opinion of the Village Engineer, conditions for paving do not meet the standard of the Village Engineer.
- 5.3.1.1.3 A Village Inspector shall be present for the placement of all-concrete curb and gutter. This includes the inspection of the base under the curb and gutter, and a check of the alignment and grade of the curb and gutter.
- 5.3.1.1.4 Three test cylinders per 1,000 lineal feet shall be taken during the course of the curb and gutter operations. A testing firm, hired by the Developer, shall pick up the cylinders at the project site within 24 hours of paving, break the cylinders at the appropriate time (7, 14, and 28 days) and submit a test report to the Developer. The Developer shall submit a copy of the report to the Village Engineer or designee.
- 5.3.1.1.5 Curb and gutter elevations will be considered acceptable if certified elevations (by the Village Inspector) are within ¼" of design elevations.
- 5.3.1.1.6 If evidence indicates that there is standing water in the gutter flange, that portion of the curb and gutter shall be reconstructed to establish positive drainage.
- 5.3.1.1.7 A Village inspector shall be present whenever any asphalt pavement is being constructed.
- 5.3.1.1.8 Asphalt to be placed on a roadway, shall arrive at the job site at a temperature of 275° F +/- 25° F. The asphalt inspector will periodically test the temperature of the arriving trucks for the temperature of the asphalt. Any trucks not falling within the guidelines for asphalt temperatures shall be rejected. Paving shall not be done at temperatures below 40 degrees F.
- 5.3.1.1.9 Both the binder course and the surface course shall be compacted to not less than 91.5% maximum density. Contractor shall have testing done by an independent Lab unless otherwise approved.
- 5.3.1.1.10 An average tolerance of +/- 0.04-ft. for the binder thickness and +/- 0.04-ft. from the approved final pavement surface elevation shall be allowed.

5.4 STREET LIGHTING

This section covers lighting for Municipally owned streets, sidewalks, parking lots, and parks. The Municipal Lighting is comprised of Municipally owned and maintained lighting and street lighting owned and maintained by We-energies.

5.4.1 WE-ENERGIES OWNED & MAINTAINED STREET LIGHTING

5.4.1.1 This lighting system is owned and maintained by We-energies. We-energies performs the installation and maintenance on all the light poles owned by We-energies.

5.4.1.2 The LED lighting fixture and pole approved by the Village of Germantown is:

5.4.1.2.1 Pole - #20L-LEG-FG Smooth-25'-Bronze

5.4.1.2.2 LED Fixture – LED-3K-Rectangular-Low-Bronze-Class “D”

5.4.2 VILLAGE OWNED PUBLIC STREET LIGHTS

5.4.2.1 The light fixtures & poles owned and maintained by the Village of Germantown fall into several categories of application. Areas of use are for street lighting, lighting along walkways, parking lot lighting (does not include private) and Parks. The type and specific light fixtures and poles to be approved by the Village Engineer/Highway Superintendent.

5.4.2.2 Street Light Approved Materials:

5.4.2.2.1 Control Cabinet; Eagle Traffic Control Systems Model Size – M or sized to match project.

5.4.2.2.2 Concrete Pole by “Traditional Concrete, Inc Model #D715-SP-EA-3x4TO (use with Harp Lights)

5.4.2.2.3 Aluminum Pole by “hapco”. Drawing # B82525-001

5.4.2.2.4 Steel Round Light Pole by LSI; # 5RP-B5-S07G-28-S-BRZ-DGPGA

5.4.2.2.5 Harp Series Light Fixtures by “Holophane; 55w-4K-AS-3-B-5-A

5.4.2.2.6 Milwaukee Harp LighWis

5.4.2.2.7 ts by TAPCO; Model MH100 w/LED 203-100525121421

5.4.2.2.8 Roadway Luminaire by Eaton; # OVH-E20-LED-E-U-T3-AP-U-K ARM A25410 or A69771

5.4.2.2.9 Area Luminaire by Eaton; # RDG-E02-LED-E-U-T3-BZ-U-7050 ARM A25410 or A69771

5.4.2.2.10 Mirada Medium LED Area Light by LSI; # MRMLED12LSIL3UNVDIM4070CRI-BRZ

5.4.2.2.11 Pole Mounting Bracket by LSI; BKSPQMHCLR

5.4.2.2.12 LED Bollard Light by Traditional Concrete, Inc; # D303-SP-EA-10 w/CAV6-LED Light Fixture

5.4.2.2.13 Casting Lid for CMP Junction Box by Neenah Foundry # R-5900-E (Electric Lid)

5.4.2.2.14 Enclosure Box-Polymer Concrete by Quazite; (12”x12”) #PC1212BA12; LID #PC1212CA0017 (w/electric logo)

5.4.2.2.15 Enclosure Box-Polymer Concrete by Quazite; (13"x24") #PG1324BA12; LID

5.4.2.2.16 #PG1324HA00017A (w/ electric logo)

5.4.2.3 Street Lighting Cabinet

5.4.2.3.1 Cabinet may vary in size depending on project but shall be bare stainless steel and surface mounted to concrete base.

5.4.2.3.2 Concrete base shall follow Wisconsin DOT standards. Base type to match cabinet size.

5.4.2.3.3 Cabinet should be sized for expansion of system if necessary.

5.4.2.3.4 Photo control shall be in the lighting cabinet and run all lighting.

5.4.2.3.5 Cabinet shall include "Hand Off Auto" switch for testing.

5.4.2.3.6 Cabinet shall have 1 duplex outlet.

5.4.2.3.7 Cabinet shall include 1 light switched to door open/closed.

5.4.2.3.8 Cabinet shall have at least 1 pull box in proximity (within 5') for splitting wiring/circuits.

5.4.2.3.9 Cabinet shall have a minimum of 4 unused 2" conduits between concrete base and pull box for future expansion.

5.4.3 INSTALLATION

5.4.3.1 See the typical drawing in section 8.2.16 (Details) for the typical installation of the public owned streetlights. All other installations shall be approved by the Village Engineer.

5.4.4 INSPECTION/APPROVAL

5.4.4.1 An electrical permit must be obtained from the Village Building Inspection Department for the new electrical service installation and the installation of all lighting wire. Approval will include sign off by electrical inspector and Village Engineer/Highways Superintendent.

6 Project Close-Out

6.1 CONSTRUCTION INSPECTOR BINDER

6.1.1 General

6.1.1.1 Village Inspector shall provide the Village with a Construction Inspection Binder including the following documents.

6.1.1.2 Material Submittals

6.1.1.3 Inspection Reports

6.1.1.4 Test Results/Reports

6.1.1.5 Change Orders / Substitutions

6.1.1.6 Punch list

6.1.1.7 Pay Applications

6.1.1.8 Final Record Set of Construction Plans

6.1.1.9 Warranty waivers (if any)

6.2 LIEN WAIVERS

6.2.1 General

6.2.1.1 Developer shall provide the Village with all lien waivers pertaining to the Public Infrastructure prior to final acceptance by the Village.

6.3 RECORD DRAWINGS

6.3.1 GENERAL

6.3.1.1 Plans shall be prepared by the Contractor on sheets measuring 12" high by 36" wide 24 inches by 36 inches and show Plan and Profile for all sections of underground utilities. Sheets shall have minimum margins of ½ inch on all sides.

6.3.1.2 The title block shall be in the lower right corner of the as built and include at a minimum, the following information:

6.3.1.2.1 Village of Germantown or Consultants Logo

6.3.1.2.2 Location of Utility: Street or Easement

6.3.1.2.3 Record Drawing File Number (Provided by Village Engineer)

6.3.1.2.4 Inspected By

6.3.1.2.5 Date of Plan Approval

6.3.1.2.6 Name of Contractor

6.3.1.2.7 Date of Construction

6.3.1.2.8 Scale (text and line)

6.3.1.2.9 A table of quantities for all utilities shown on each sheet.

6.3.1.2.10 Signature Line for Village Engineer.

6.3.1.3 North shall be to the top or right of the sheet and shall be shown by a 2" long north arrow, clearly, shown without intrusion.

6.3.1.4 The scale of the record drawings shall be same as construction drawings, 1"=50' or 1"=40'. This shall be shown with a graphic scale and text.

6.3.1.5 The seal and signature of the professional engineer responsible for the preparation of the record drawing shall be shown immediately adjacent to the title block.

6.3.1.6 All existing lot, property, and utility easement lines in the area in which the utility is located shall be shown.

6.3.1.7 Screen any existing features, including but not limited to building corners and parking lots.

6.3.1.8 The address, lot and block numbers, and subdivision or development name shall be indicated. Addresses shall be labeled with italics. Unplatted lands and the address of any home on such lands shall be so indicated.

6.3.1.9 All street names and easements with record numbers shall be clearly shown.

6.3.1.10 Two SEWRPC reference benchmarks shall be shown on each sheet.

6.3.1.11 Plan sheets shall start and terminate at match lines and show adjacent As-Built record drawing file numbers.

6.3.1.12 Pipe invert elevations shall be clearly shown.

6.3.1.13 Screening of existing sanitary sewer, storm sewer and watermain and service locations either in screened or dashed format.

6.3.1.14 Dimensions showing offset from right-of-way and roadway or easement centerline to utility alignment.

6.3.1.15 Concurrent with the hard copy submittal. Provide complete set of records printed on record drawing paper as approved by the Village Engineer.

6.3.1.16 Provide complete set of records in PDF format.

6.3.1.17 Provide complete set of records in AutoCAD (.DWG) format on CD tied to the Wisconsin State Plane NAD 1983 Wisconsin South Grid coordinate system and profiles in NAVD 1988.

6.3.1.18 The cost of archiving the record drawings and insertion of the data into the Village's GIS System shall be the sole responsibility of the DEVELOPER.

6.3.2 SANITARY SYSTEM

6.3.2.1 A general note on each sheet giving the size, class, type, ASTM designation, and manufacturer of every main and lateral shall be shown, with material quantities clearly tabulated. Complete information on manhole frames / lids / barrel structure shall be noted. Manholes shall be ID'd with Systems Plan Number provided by Village Engineer on record drawing.

6.3.2.2 Sanitary mainline should be thickest line on plan.

6.3.2.3 The percent grade, direction of flow, and center to center length of sanitary sewer installed between manholes and laterals shall be shown.

6.3.2.4 All laterals shall have invert elevations at right-of-way lines or easement line and lengths clearly shown.

6.3.2.5 The following information shall be shown for each manhole:

6.3.2.5.1 Invert elevation of each sewer pipe

6.3.2.5.2 Rim Elevation

6.3.2.5.3 Pipe size of each sewer

6.3.2.5.4 Type of frame to chimney seal

6.3.2.6 Indicate External seals or internal chimney seals

6.3.2.7 All record drawings shall reference NVGD 1988

6.3.3 WATER SYSTEM

6.3.3.1 The size, class, type, and manufacturer of every main shall be shown. The location of the main shall be dimensioned from the centerline of the right-of-way. The center to center length of main installed between valves, fittings, and laterals shall be shown.

6.3.3.2 Water mainline shall be the thickest line on plan.

6.3.3.3 The location of all fittings (including valves, tees, crosses, reducers, air vents, bends, and lateral taps) shall be dimensioned from/to centerline of each fitting. All fittings shall be suitably labeled for identification.

6.3.3.4 Curved lines shall indicate deflected pipe (with curve data provided); lines shall be straight between fittings.

6.3.3.5 Show which side of the main the operating nut for butterfly valves is located on.

6.3.3.6 A general note on each sheet giving the brand and manufacturer (model, size, etc.) for each valve used shall be provided, with quantities of each clearly tabulated. Services shall include footage and count. Complete information on valve boxes and manhole frames / lids / barrel structure shall be noted.

6.3.3.7 All laterals shall be shown giving the length and type of material used. The manufacturer and model of tapping saddle or tee, corporation, curb stop, and box shall be given.

6.3.3.8 Contractor to include latitude, longitude and elevation of the location of all:

6.3.3.8.1 Valves, tees, crosses, reducers, air vents, bends and lateral taps.

6.3.3.8.2 The location shall be tied-in by distance to at least two permanent surface points. These can be manholes, hydrants, other valves, or other suitable points. The point used should be clearly referenced.

6.3.3.8.3 Hydrants.

6.3.3.8.4 The size and type of every hydrant shall be also shown.

6.3.3.8.5 The shutoff valve shall be tied-in to at least two permanent surface points.

6.3.3.8.6 All hydrants differing from 6.5' bury shall have the bury depth or length of extensions installed noted.

6.3.3.8.7 Elevation of each hydrant tied to the northwest nut of the top flange should be shown.

6.3.3.8.8 Provide depth of cover.

6.3.4 STORM SYSTEM

6.3.4.1 The size and type of all mains and leads shall be shown. Their location relative to the centerline of the right-of-way shall be dimensioned. The total length of sewer installed shall be shown.

6.3.4.2 The center-to-center distance between laterals and/or manholes shall be shown.

6.3.4.3 GPS coordinates, using State Plane NAD 1983 Wisconsin South coordinate system size, type and manufacturer of all manholes, catch basins, inlets, or outlet sections shall be shown. Material quantities shall be clearly tabulated.

6.3.4.4 Elevations of all rims, flow lines, catch basins, gutter inlets, and outlet sections shall be given. Invert elevations shall be given for gutter inlets, catch basins, and manholes. Elevations shall be based on the Village of Germantown datum.

6.3.4.5 The Village requires public storm sewer and/or drainage easements for any storm water conveyance system that drains public ROW areas or neighboring off-site areas.

6.3.4.6 A storm sewer running along the rear lot lines within a subdivision, specifically to drain backyards, does not warrant a public easement. The Village considers this to be a private system built for the lot owners of the subdivision and owned/maintained by the property owners.

6.3.5 ELECTRICAL SYSTEM

6.3.5.1 The size and type of all conduit and cable shall be shown. Their location relative to the centerline of the right-of-way shall be dimensioned. The total length of electrical infrastructure installed shall be shown.

6.3.5.2 The center-to-center distance between all electrical structures shall be shown.

6.3.5.3 GPS coordinates, size, type, and manufacturer of all structures shall be shown. Material quantities shall be clearly tabulated.

6.3.5.4 Elevations of all rims, pedestals, and other essential infrastructure shall be based on the Village of Germantown datum.

6.3.6 GRADING CERTIFICATION PLAN

6.3.6.1 In preparing a Certification Plan, the Developer's Design Grading Plan shall be shown as screened background.

6.3.6.2 Record drawing grades shown on lot lines shall be no less than 0.30 ft. lower than final grades shown on approved master grading plan or higher than 0.10 ft. above the final grades shown on approved master grading plan. The Developer is required to establish final grades within 5 feet of side lot lines, rear lot lines and the front right-of-way area between the front-line lot line and the back of curb in an urban setting or edge of shoulder in a rural setting. These areas shall be described as a "no-touch zone". All grades within the "no-touch zones" shall be certified by Developer's Engineer. Developer shall typically show spot grades alongside lot line at front curb, front property corners, front setback, back of house extended, any high points, and rear property corners.

6.3.6.3 The grades alongside lot lines are needed even in wooded, ungraded areas.

6.3.6.4 Existing house pad grade (elevation taken at the center and each corner of a typical 66' x 54' house, except for lots designed for rear exposure house show existing grade at front and back of typical house). House pads are to be left 1.75' below finish yard grade with a +/- 3" tolerance.

6.3.6.5 Elevations every 50 feet along developer graded swales and ditches.

6.3.6.6 Elevations every 100-ft. Station along the road alignment. Locations shall include:

6.3.6.6.1 Pavement centerline and edges

6.3.6.6.2 Edge of shoulder

6.3.6.6.3 Ditch flowline

6.3.6.6.4 Top of embankment on the backslope of the ditches.

6.3.6.7 After analyzing certified grades, Developer shall identify on plan those areas not within above tolerance. Show areas to be regraded, or areas where it may be desirable to revise the proposed grades in the Master Grading Plan.

6.3.7 STORM WATER BMP CERTIFICATION PLAN

6.3.7.1 Elevations (minimum of every 50')

6.3.7.1.1 Top of Berm

6.3.7.1.2 Top of Slope

6.3.7.1.3 Toe of Slope

6.3.7.1.4 Safety Shelf Edges

6.3.7.1.5 Bottom of BMP

6.3.7.2 Spillway-Top of Slope & Toe of Slope (detailing length, width and height)

6.3.7.3 Structure Locations and Elevations

6.3.7.3.1 Outfall (invert elevation and size)

6.3.7.3.2 Overflow structures (corners of opening) and Piping (invert elevation and size)

6.3.7.3.3 Inlet Structures (center of manhole) and Piping (invert elevation and size)

6.3.7.3.4 Outlet Structures (center of manhole) and Piping (invert elevation and size)

6.3.7.3.5 Weirs (invert elevation and size)

6.3.7.3.6 Orifice (invert elevation and size)

6.3.7.3.7 Inlet/Outlet (invert elevation and size)

6.3.8 EASEMENTS

6.3.8.1 GENERAL

6.3.8.1.1 The Developer shall prepare formal written easement documents, including exhibits and written legal description attachments for each easement and record the same with the County Register of Deeds after review and approval by the Village of Germantown for each easement (Utility, drainage, access, etc.) shown on the subdivision plat (or CSM) as a condition of Final Plat (CSM) approval.

6.3.8.1.2 All ponds are to be in platted outlots.

6.3.8.1.3 No encroachment by structures, berms, trees, shrubs, paved surfaces or changes in grade greater than 4" are allowed in easement areas without approval of the Village Engineer.

6.3.8.1.4 20-ft. wide minimum width for a single utility. The utility shall be located in the center of the final easement based on record drawing. Easement width may be increased to 50 feet based on pipe size and depth.

6.3.8.1.5 Easements with multiple utilities, the minimum separation from outside of the utility to the easement line shall not be less than 10 feet subject to approval by the Village Engineer. Add not less than 10 feet per additional utility in the easement.

6.3.8.1.6 Maximum ground slope along easements:

6.3.8.1.6.1 transverse: 25%

6.3.8.1.6.2 longitudinal: 10%.

6.3.9 STORM SYSTEM

7 Surveying Standards

7.1 GENERAL

7.1.1 General

7.1.1.1 Surveys shall conform to the provisions of Chapter 236 of the Wisconsin Statutes, A-E7 of the Wisconsin Administration Code and all applicable ordinances of the Village of Germantown.

7.2 HORIZONTAL AND VERTICAL CONTROL

7.2.1 General

7.2.1.1 Horizontal and vertical control shall be maintained throughout the entire project area from the staking of rough grading to final restoration.

7.2.1.2 Horizontal and vertical control points shall be clearly marked and protected (i.e. lath) during construction.

7.2.1.3 Second order precision shall be required for vertical control, and the following formula will be used in determining the second order of precision. $E = 0.035 \div M$; where E = error and M = length of the line in miles.

7.2.1.4 Vertical control points shall be established at least every 800 feet and within 100 feet of any improvement proposed. These control points will be established in accordance with Section 1.1.6, 1.1.7, and 1.1.8 of these Standards.

7.2.1.5 When plans are submitted for approval to the Village Engineer, the Project Engineer will also at this time submit a list of all permanent benchmarks, all temporary benchmarks, a description of their location and the basis or origin of the vertical control network and the error of closure for the entire network. This section shall be complied with before the Village of Germantown will schedule inspections.

7.2.1.6 All benchmarks shall be run in from one of the following; listed in priority order.

7.2.1.6.1 A U. S. Coastal and Geodetic survey monument.

7.2.1.6.2 A National Geodetic Survey monument.

7.2.1.6.3 A U. S. Public land survey monument and its accompanying reference benchmark.

7.2.1.6.4 Permanent benchmarks shall be set only on the following objects:

7.2.1.6.4.1 Concrete door stoops.

7.2.1.6.4.2 Concrete headwalls.

7.2.1.6.4.3 Existing permanent manhole rim (note: manhole shall not be in the general construction area, nor is it to be affected in any way by the project construction).

7.2.1.6.5 Fire hydrants on marked flange bolt.

7.2.1.6.6 Temporary benchmarks may be set in the following objects.

7.2.1.6.6.1 Power poles.

7.2.1.6.6.2 Trees 12 inches in diameter or greater.

7.2.1.6.7 The error in latitude and departure closure for horizontal traverses shall be no greater than the ratio of one in 10,000 (1:10,000).

7.3 CONSTRUCTION STAKING

7.3.1 General

7.3.1.1 Roadways shall be staked for subgrade and for final gravel grade and meet the following conditions:

7.3.1.2 Stakes shall be set along the centerline of the roadway, or approved offset.

7.3.1.3 Stakes shall be set at 50-foot intervals.

7.3.1.4 Stakes shall be set for vertical curves at a maximum of 50-foot intervals.

7.3.1.5 Stakes shall be set for horizontal curves having a degree of curve greater than 30° at a maximum of 50-foot intervals.

7.3.1.6 Stakes shall be set at points of curvature, points of tangency, and all low/high points on vertical curves.

7.3.1.7 Lath shall be set next to all roadway stakes and shall have the station labeled with indelible magic marker. Labeling shall indicate station and offsets, in addition to coordinate points.

7.3.1.8 Staking for curb and gutter will be done on a minimum three (3) foot off back of curb with cut/fill to the top of curb.

7.3.1.9 Staking for sanitary sewer/watermain shall be centerline type or on an offset as requested by the contractor and approved by the Village Engineer.

7.3.1.10 Staking for sanitary sewer/watermain shall be done every fifty (50) feet along the pipe centerline or agreed to interval between the Village and contractor.

7.3.1.11 Manholes shall have stakes at the following locations:

7.3.1.11.1 Centerline of manhole.

7.3.1.11.2 Offset (determined by contractor and approved by the Village Engineer—minimum 10-foot).

7.3.1.11.3 Straddle point.

7.3.1.12 Catch basins, and hydrants shall have an offset stake (minimum offset 5-foot).

7.4 MONUMENTS

7.4.1 General

7.4.1.1 Lot corner monuments (i.e. iron pipe, rebar) shall be pounded flush with existing ground, thus conforming with Wisconsin Statute 236.15 (1).

7.4.1.2 All 1-inch iron pipe or iron rebar to be used to monument a lot corner it shall include a plastic or aluminum survey cap on top which bears the project surveyor's state registration number. Both types of monuments are to conform to the current minimum length and weight requirements

7.4.1.3 A subdivision corner which is also a U.S. Public Land Survey corner shall be monumented using the following type of monument in the specified area:

7.4.1.4 6-inch x 6-inch concrete monument with 4-inch brass cap Monuments will be supplied by the Washington County Surveyor. The County Surveyor shall be notified in writing of any USPLSS corners that will be disturbed by construction 30 days prior to the start of construction. This is a Wisconsin Statutory requirement. Replacement monuments will then be installed by the County Surveyor and/or the Village of Germantown. This will be done at the Developer's expense.

7.5 PLATTING

7.5.1 General

7.5.1.1 Final subdivision plats will be signed by the Village once all construction has been completed and accepted, all punch list items resolved, all record drawings have been submitted and approved and all boundary markers have been set in conformance