



CITY OF PEWAUKEE TECHNICAL STANDARDS

Revised 5/18/2021

THESE STANDARDS SHALL APPLY TO ALL PUBLIC AND PRIVATE PROJECTS

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CITY OF PEWAUKEE TECHNICAL STANDARDS

These standards shall apply to all public and private projects

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CITY OF PEWAUKEE TECHNICAL STANDARDS

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GOVERNING AGENCIES AND APPLICABLE CODES/GUIDELINES/REGULATIONS	
<i>(Most stringent shall apply)</i>	
ASTM International	
American Association of State and Highway Transportation Officials (AASHTO)	
American National Standard Institute (ANSI) <i>Note: ASA is now ANSI</i>	
American Water Works Association (AWWA)	
City of Pewaukee Municipal Code	Chapter 19 of the City of Pewaukee (City) Municipal Code; Section 19.03 of the City Municipal Code; Section 19.09 c. of the City Municipal Code
Standard Specifications for Sewer and Water Construction in Wisconsin (Green Book)	
State of Wisconsin Department of Transportation (WISDOT)	WISDOT Product Acceptability List (PAL) WISDOT Standard Specifications for Highway and Structure Construction
Wisconsin Department of Natural Resources (WDNR)	WDNR Conservation Practice Standards 1061, 1055 WDNR Technical Standard 1059
Wisconsin State Statutes and Administrative Code	Chapter NR 151-NR 811, Wis. Adm. Code



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 010 - GENERAL

These standards shall apply to all public and private projects

SECTION 010: GENERAL	
WORKING HOURS	<ol style="list-style-type: none"> 1) Working hours are Monday through Friday from 7:00 a.m. to 7:00 p.m. 2) No deliveries or equipment start up before 7:00 a.m. 3) Contact the City for approval for holiday, weekend and/or after-hours work.
INSPECTION	<ol style="list-style-type: none"> 1) Inspection by City or its representative is required for all utility and paving work that will ultimately be under the City's ownership. Some private work may be required to be inspected as well.
GENERAL	<ol style="list-style-type: none"> 1) Limestone screenings are <u>not</u> permitted as trench backfill. 2) Mechanically compacted granular backfill is required in paved areas and within 5 feet of the paved areas. Spoil backfill will be allowed in non-pavement areas. Slurry backfill is required in existing paved areas. 3) Stone chips shall be used for bedding and cover on all utility piping. 4) Compaction testing is required in all trenches within a public roadway. Minimum 95 percent of maximum dry density for fill depths 20 feet or less as determined by ASTM D-698 (Standard Proctor) with moisture content of -1 to +3 percent of optimum moisture content for cohesive soils and +3 to -3 percent for granular material. 5) Contractor is responsible for accuracy, fitting and protection of work before, during, and after installation. 6) Tracer wire and warning tape are required on all main line and lateral/services. See specific utility section for type and location. 7) All construction equipment must use designated roads for hauling and deliveries to and from site. 8) Contractor shall maintain 1 set of plans marked up to show actual locations and elevations of utility work on a daily basis. 9) Contractors shall maintain reasonable access for residents, emergency vehicles, garbage pick-up, mail delivery and school buses. 10) Mailboxes that are damaged or removed during construction activities must be re-installed prior to next day mail service and per Figure S. 11) Contractors shall maintain reasonable access for residents, emergency vehicles, garbage pick-up, mail delivery and school buses.

END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 020 – STORM SEWER

These standards shall apply to all public and private projects

SECTION 020: STORM SEWER	
DRAFTING	<ol style="list-style-type: none"> 1) All storm sewer submittals must include a storm sewer system plan showing: <ol style="list-style-type: none"> A. Storm sewer system - manholes, pipe, pipe lengths, inlets, outlets, elevations and numbering corresponding to the calculations provided. B. Tributary drainage areas to each inlet. C. Acreage of tributary drainage areas. D. Any other pertinent information such road right-of-way, lot lines, stationing, etc. <p>Sanitary sewer layout, water main layout, or any other irrelevant information should not appear on the system plan. The system plan shall be on a full size drawing at a scale of 1 inch equals 100 feet or less.</p> 2) North shall be to the top or left of the plan sheet and shall be clearly identified by a north arrow. 3) Plan and profile views shall be aligned by stationing whenever possible. Stationing shall be from left to right. Sheets should overlap by a minimum of 50 feet and the overlap should be clearly marked with a line. 4) Topographic lines shall have a different line type than the system lines and be shown in the background. All existing topographic lines on any system plan shall be at a 2 foot contour interval or less. All proposed topographic lines shall be at a 1 foot contour interval or less. 5) All storm sewer plans shall have the profile on the bottom of the sheet, and the plan on the top of the sheet. All utilities crossed by the storm sewer shall be shown in profile. All main line storm sewers shall be shown in profile. All non-main line storm sewers must contain all details normally shown in profile view such as notes and elevations of all other utility crossings shown. 6) All storm sewer mains shall be located south and west of the centerline of the roadway, and 10 feet from the right-of-way (i.e., behind the curb) except where the geometry of the roadway will not allow it and it affects only a small portion of the storm sewer. 7) Storm sewer plans must show: <ol style="list-style-type: none"> A. Diameter, slope, and manhole center-to-center length, pipe material, type and class. B. Concrete cradles where necessary. C. Manholes and inlets must be numbered and match the system plan. D. Easements and outlots. E. Centerline of roadway. 8) Storm sewers are only allowed to be located in right-of-ways or outlots. Easements are <u>not</u> permitted without prior approval from the City Engineer.
DESIGN	<ol style="list-style-type: none"> 1) Storm sewers shall be designed using rational method applying all the factors of a 10 year rainfall event. 2) Storm sewers and detention ponds shall be designed for the entire site, even if only a small portion is being developed at the time of the submittal. 3) The minimum coefficients to be used for the rational method are as follows:

	<u>DESCRIPTION</u>	<u>DU/AC</u>	<u>COEFFICIENT</u>
	Open space	0	0.15
	Agricultural	N/A	0.17
	Low density	0.2 – 2.2	0.23
	Medium density	2.3 – 6.9	0.32
	High density	7.0 – 17.9	0.50
	Commercial	N/A	0.72
	Industrial	N/A	0.85
	Commercial	N/A	0.72
	Industrial	N/A	0.85
	<p>4) For all grass or residential areas, inlet times shall be 10 minutes unless the street slope exceeds 2 percent, then it shall be 8 minutes. All commercial and industrial area inlet times shall be 5 minutes.</p> <p>5) The intensity for the rational method shall be calculated utilizing the attached Table 1 and Figure U. The table is based upon intensity values for Waukesha, Wisconsin from the NOAA Atlas 14 Point Precipitation Frequency Estimates (see Table 2).</p> <p>6) All storm sewer submittals must have storm sewer computation sheets showing:</p> <ul style="list-style-type: none"> A. Inlet or manhole ID B. C, I, and A for each segment C. Length, diameter, flow, necessary drop, actual drop, parts full, velocity, time in section, and total elapsed time for each segment D. Invert elevation for upstream and downstream segments <p>7) The 100 year depth of ponding elevations for storm sewer inlets in easement/outlot areas shall be included on the master grading plan.</p> <p>8) All storm sewer piping shall be sized to convey the 10 year storm event without surcharging. Overland flow paths shall be designed to direct flows for the 100 year storm event directly to the detention areas and be contained within an outlot. Drainage easements will only be allowed at the discretion of the City Engineer. Outlots for the purpose of conveying storm water above or below ground (or easements) must be at least 30 feet wide, but may be larger to accommodate the 100 year peak flow. Peak flows from the 100 year storm event flowing overland must maintain a 15 foot horizontal separation and 2 foot vertical separation from buildings. Wider outlots (or easements) may be required to obtain adequate horizontal and vertical separations.</p> <p>9) All dead low points shall have double inlets.</p> <p>10) Inlet spacing shall generally not exceed 300 feet or as measured from a high point to the inlet, unless approved by the City Engineer.</p> <p>11) Inlets at intersections must be located to catch the storm water prior to it entering the intersection. The inlet must be 5 feet from the end of the radius.</p> <p>12) All storm sewers shall have a minimum cover to the top of the pipe of 3 feet, unless otherwise approved the City Engineer.</p> <p>13) All storm sewers shall be a minimum of 12 inches in diameter.</p> <p>14) All storm sewers shall have a minimum slope of 0.005 foot/foot or a minimum velocity of 2 feet per second.</p> <p>15) All storm manholes must have a minimum 0.10 foot drop across the structure.</p> <p>16) All storm sewers shall be reinforced concrete pipe, unless otherwise approved by the City Engineer. The design engineer shall specify the size and class of storm sewer pipe.</p> <p>17) Drainage swales must have a minimum slope of 1 percent.</p>		

	<p>18) Drainage swales located outside the right-of-way (rear or side yards) must be collected in a storm sewer system after the equivalent of 2 lots. Drainage swales that drain more than 2 lots must be contained within an outlet (or easement, if allowed by City Engineer).</p>
<p>SUBMITTALS</p>	<p>1) Submit 2 sets of calculations and system plans, 3 sets of full size construction drawings and a digital submittal of the calculations, system plans and construction drawings (PDF format preferred). You must submit a digital copy of your model as well as hard copies of the input and output from the models. CADD files must be submitted for all utilities.</p> <p>2) All submittals are required to be signed, sealed and dated by a licensed Professional Engineer registered by the State of Wisconsin.</p>
<p>INSTALLATION</p>	<p>1) All inlet structures shall be precast. For adjustments, use Pro-ring or concrete rings. Full concrete rings must be used WITH FULL BED OF MORTAR AT FRAME AND BETWEEN RINGS. Pro-ring shall not be used when chimney needs to be corbelled. Entire chimney shall be either all Pro-ring or all concrete rings. Do <u>not</u> install both types of rings on one structure. Wood wedges and dry staking of adjusting rings are not acceptable. Maximum chimney height is 12 inches.</p> <p>A. In residential or low runoff areas, the inlet frame and grate must be:</p> <ul style="list-style-type: none"> i. <u>For straight face curb</u>: Neenah R-3228-K type C grate for 24"x 30" structure; R-3067 or R-3246 for 24"x 36" structure (frame will be 6 inches shorter than concrete flange). ii. <u>For roll face curb</u>: Neenah R-3501-R or R-3067 with mountable curb box type C grate for 24"x 30" and 24"x 36" structure. iii. <u>For field inlets</u>: Neenah R-2560-E2 beehive grate R-2560 series, dependent on structure size, subject to City Engineer's approval. <p>B. In industrial, commercial or high runoff areas, the inlet frame and grate must be Neenah R-3228-K type C grate.</p> <p>C. Set castings 1/2 inch below final grade.</p> <p>2) All manholes shall be a minimum of 48 inches in diameter with a Neenah R-1661 manhole frame with vented lid. All manholes larger than 48 inches must be noted on the plan and will be required to be constructed. All inlets shall be a 24"x 36" (inside dimensions) precast structure. Shop drawings may be submitted to the City Engineer for review and approval justifying the use of a smaller manhole. Approval will be at the discretion of the City Engineer and provided on a case-by-case basis.</p> <p>3) Connections to manholes/inlets/catch basins shall be made into precast section of structure using block/brick and mortar to enclose opening and back plaster interior and exterior. Dry stacking of block/brick is NOT permitted. Upstream connections to inlets/manholes located in curb and gutter shall have a 1 foot wide by 3 inch thick concrete collar installed at connection point.</p> <p>4) All open-ended pipe outlets from storm sewers shall have a grate to secure the open end of the pipe, as approved by the City Engineer.</p> <p>5) Stone chips are required for bedding and cover.</p> <p>6) All storm sewers shall have mechanically compacted granular backfill in paved areas and within 5 feet of the paved areas. Spoil backfill will be allowed in non-pavement areas. Slurry backfill is required in existing paved areas.</p> <p>7) Flow thru inlets in curb and gutter shall be constructed to 1/2 inch final grade, and all interim (low point) inlets in curb and gutter shall be constructed to allow for one full adjusting ring (minimum depth 1-3/4 inch) prior to surface paving and 5 feet of temporary curb on either side of inlet. Interim inlets shall be adjusted to final grade prior to the installation of final lift of asphalt</p>

	<p>(see Figure M).</p> <p>8) Install green direct bury rate insulated AWG 10 tracer wire along pipe and green “CAUTION STORM LINE BURIED BELOW” warning tape 2 to 3 feet below finish grade.</p> <p>9) All main line storm sewer shall include tracer wire.</p> <p>A. Tracer wire is to be direct burial rated insulated AWS 10 or 12 copper clad steel.</p> <p>B. Use direct burial rated coating (High Density Polyethylene (HDPE) or High Molecular Weight Polyethylene (HMWPE)), minimum 30 mil. Nylon coating is not acceptable (i.e., THHN and THWN).</p> <p>C. Use insulated AWG 10 or 12 copper clad steel, high strength with minimum 600 pound break load.</p> <p>D. The protective coating must be green in color.</p> <p>E. Conductivity testing (continuity) of the wire shall be performed prior to acceptance. Utility staff must witness the testing.</p> <p>F. Splices shall be Copperhead SnakeBite locking connector (LSC1230C) and/or Mainline-to-Service connector (3WB-01). Splices shall be kept to a minimum.</p> <p>G. 3/4 inch conduit shall be attached to each structure where the tracer wire is to be brought to the surface.</p> <p>H. Tracer wire boxes shall be provided at locations where tracer wire is to come to the surface or to be used as markers for bends where no structure is close enough to aid in location the storm sewer. Tracer wire boxes are to be Valvco Brand (see Figure P) or Copperhead SnakePit.</p> <p>I. In roadway, terminate tracer wire inside structure using Copperhead twist-on connector SCB-01 or SCB-01-LG. In non-pavement areas, terminate tracer wire a Valvco Brand or Copperhead SnakePit tracer wire box.</p> <p>J. Conductivity testing (continuity) will be line tracing completed by City staff with their equipment in the presence of a developer/contractor representative. Line tracing of the wire shall be performed prior to acceptance.</p> <p>10) Storm sewer and culvert crossings of the water main with less than 3 feet of separation will require insulation. The water main shall be insulated on the top and sides creating a “box” around the pipe. Contact City Engineer when the separation distance is less than 2 feet.</p> <p>11) Set manholes in roadway to 3/8 inch to 1/2 inch below final pavement grade.</p> <p>12) All other specifications not covered here are to be covered by the current Standard Specification for Sewer and Water Construction in Wisconsin and its addenda (Green Book).</p>
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END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 030 – STORM WATER MANAGEMENT

These standards shall apply to all public and private projects

SECTION 030: STORM WATER MANAGEMENT	
DRAFTING	<ol style="list-style-type: none"> 1) All submittals must include an existing conditions drainage basin map and proposed conditions drainage basin map. Each map must show the drainage basins, acreage for each basin, the T_c flow paths and labels, topography, the storm water management facility, and any other pertinent information. The system map shall be a full sized drawing at a scale of 1 inch equals 100 feet or less. 2) All existing topographic lines shall be at a 2 foot contour interval or less. All proposed topographic lines shall be at 1 foot contour interval. 3) Details of the detention/retention ponds, infiltration basins and/or bio-filtration basins shall be included in the construction drawings and submitted for review. Details shall include under drains, cross-sections, outlet pipes/structures, emergency spillways, and any other pertinent data. 4) All private wells within 200 feet of a proposed pond, infiltration basin, and/or bio-infiltration basin must be shown. 5) An Erosion Control and Storm Water Management Permit Application (see Exhibit B-1) must be filed with the City. You will be issued a Certificate of Permit Coverage (example in Exhibit B-2) from the City Engineer.
DESIGN	<ol style="list-style-type: none"> 1) Storm water management facilities shall be designed to reduce the Total Suspended Solids (TSS) load carried by runoff and to reduce the peak rate of runoff from the post-developed site. The design of the storm water management facilities shall comply with Chapter NR 151, Wis. Adm. Code, the WDNR Conservation Practice Standards, Chapter 19 of the City Municipal Code, and these Technical Standards. 2) The peak rate of runoff from the post-developed construction site shall not exceed the pre-settlement peak rate of runoff for the 1, 2, 10 and 100 year design storm events. 3) All sites which disturb 1 acre or more of land must obtain a Notice of Intent (NOI) from the WDNR. A copy of the approved NOI must be provided to the City prior to the City approving plans. In addition, the site must obtain a grading permit from the City prior to the start of construction. 4) All storm water management plans shall include an executive summary including a summary table of the pre- and post-developed acreages; pre- and post-developed 1, 2, 10, 100 year storm flow rates; and the 1, 2, 10 and 100 year discharges and elevations from the storm water management facilities. 5) Offsite drainage must be shown and analyzed. The City, at its discretion, may require the runoff from the offsite areas to be detained/treated onsite to mitigate existing drainage problems or comply with mandated water quality requirements. In addition, the City, at its discretion, may require additional analysis of the downstream conveyance system. These decisions are made by the City Engineer at the time of submittal. 6) Peak discharges shall be calculated utilizing TR-55 Runoff Curve Number methodology.

7) The pre-settlement condition is the area to be developed if it were under a “natural, undeveloped state”. This condition means the runoff from the pre-settlement landscape. Runoff curve numbers used to model pre-settlement conditions shall be as follows:

<u>HYDROLOGIC GROUP</u>	<u>CURVE NUMBER (CN)</u>
A	30
B	55
C	70
D	77

- 8) Rainfall data to be used in conjunction with TR-55 methodology will be the Atlas 14 precipitation depths for the 24 hour duration storm for Waukesha, Wisconsin (see Table 3) and the NRCS Wisconsin MSE 3 precipitation distribution.
- A. 1 year, 24 hour: 2.38 inches
 - B. 2 year, 24 hour: 2.69 inches
 - C. 10 year, 24 hour: 3.80 inches
 - D. 100 year, 24 hour: 6.17 inches
- 9) Proposed detention/retention pond(s) shall be designed as a wet pond(s). The wet pond(s) shall also serve as the sedimentation basin(s) for the site, unless otherwise approved by the City Engineer. Infiltration, bio-infiltration ponds, or similar devices will be approved upon review of the soils in accordance with the WDNR Conservation Practice Standards.
- 10) All pond outlets shall include a trash rack and anti-seep collars on the outlet pipe.
- 11) All inlets and outlets to and from the proposed storm water management facilities shall be protected from erosion (e.g., rip-rap over fabric, turf reinforcement mat, or other acceptable means).
- 12) All ponds shall be seeded and mulched/matted within 7 days of reaching final grade. Vegetation must be established within 90 days of seeding.
- 13) The developer shall be responsible for any safety issues pertaining to the pond.
- 14) All post construction sites meeting the applicability requirements of Section 19.03 of the City Municipal Code must implement one or more storm water management practices that will provide infiltration onsite. The volume to be infiltrated is based upon the proposed amount of connected imperviousness and is set forth in Section 19.09 c. of the City Municipal Code. Infiltration is required to the maximum extent practicable as determined by the City Engineer.
- 15) The 100 year water surface elevation and top of bank elevation of the proposed detention and infiltration ponds will be shown on the grading plan. There shall be 1 foot of free board provided between the 100 year water surface elevation and the crest elevation of the emergency spillway.
- 16) The emergency spillway for each facility shall be sized to convey the undetained 100 year flow to the facility. In no case shall the height of the spillway be less than 1 foot deep, unless approved by the City Engineer.
- 17) A 10 foot wide maintenance bench with a maximum top slope of 10 feet horizontal to 1 foot vertical shall be located a minimum of 1 foot above the high water elevation. The bench shall extend around the entire perimeter of the pond.

SUBMITTALS

- 1) All submittals must include 2 bound reports, 3 sets of full size plans, and a digital submittal of the report, WinSLAMM model and plans (PDF format preferred for plans and report). You must submit a digital copy of your model(s) as well as hard copies of the input and output from the model(s).

	<ul style="list-style-type: none">2) All submittals must include a storm water management maintenance agreement. See Exhibit A for the City's model agreement.3) All submittals are required to be signed, sealed and dated by a licensed Professional Engineer registered by the State of Wisconsin.4) Any discharges to wetlands, streams, rivers, or lakes may be subject to WDNR, U.S. Army Corps of Engineers, or other regulatory permits. It is the developer's responsibility to obtain all necessary WDNR permits and submit copies to the City.
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END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 040 – GRADING PLAN

These standards shall apply to all public and private projects

SECTION 040: GRADING PLAN	
GENERAL	<ol style="list-style-type: none"> 1) A detailed grading plan is necessary for all new subdivisions, land divisions, and construction of any new industrial, commercial, or multifamily building. An Interim Grading Plan is required to show the extent of grading the developer plans to do as part of the development (subdivisions and land division). A Master Grading Plan is required to show the ultimate lot grading after each individual homeowner has constructed the house and completed the finish landscaping. For new industrial, commercial, or multifamily on a single lot, the Interim and Master Grading Plans are one and the same. 2) Individual lot grading plans are required prior to construction of a house on an individual residential lot. 3) After the Interim Grading Plan has been approved and the actual grading has been completed, the developer shall submit an “as-built” plan for grading, major swales, storm water management features (e.g., ponds, bio-swales, bio-retention facilities, infiltration ponds or trenches, emergency spillways) outlots, easements, and road construction. All grades must be within 0.10 foot of the proposed grades.
PLAN STANDARDS Interim and Master Grading Plans	<ol style="list-style-type: none"> 1) Plans shall be prepared on sheets measuring 24 inches high by 36 inches wide. Larger sizes must be approved by the City Engineer. 2) Title block shall contain, at a minimum, the following information: <ul style="list-style-type: none"> • Name of development • Name and address of engineering (design) firm • Date of drawing and revisions • Scale and north arrow • Plan sheet number (# of #) • Developer’s name and address 3) Plans submitted shall include the seal, date, and signature of the licensed Professional Engineer responsible for the preparation of the construction plans which shall be shown immediately adjacent to the title block. 4) The grading plans shall be drawn at a scale of 1 inch equals 100 feet or less. The scale of details shall be such that the detail is clearly shown. 5) Benchmarks (permanent and temporary) shall be shown on the plan set. A minimum of 2 permanent benchmarks shall be required. Survey datum must be to National Geodetic Vertical Datum (NGVD) 29 or North American Vertical Datum (NAVD) 88. Datum shall be clearly referenced on the plan. 6) The plan shall show existing tree lines and any obstructions (e.g., fences, structures, power poles) within the project limits. 7) The plan shall show: <ul style="list-style-type: none"> • All proposed lot lines and lot numbers • Lot line dimensions • Outline of buildable areas for each lot • All existing and proposed roads with names • All existing buildings, structures, and foundations • All existing drainage channels and watercourses

- The 100 year floodplain limit
 - Wetlands
 - Environmental corridors
 - All existing and proposed easements
- 8) Wetland limits shall be marked with a permanent wetland marker every 50 feet.
 - 9) Existing topography of the site and all areas within 200 feet of the site shall be shown at a 1 foot contour interval using NAVD 88 or NGVD 29 datum. Existing contours shall be shown as a thin or shaded line with a readily discernable heavier line for the 5 foot contour intervals.
 - 10) Proposed grading shall be shown at a contour interval of 1 foot using NAVD 88 or NGVD 29 datum. Proposed contours shall be shown as solid medium lines with a discernable heavier line used for the 5 foot contour interval.
 - 11) The grading plan shall show proposed road(s), curb and gutter, storm sewer inlets, storm sewer manholes, culverts, valve boxes, fire hydrants, and sanitary sewer manholes as a shadow feature.
 - 12) At front setback line for each lot, show the proposed yard grade to the nearest 10th of a foot (0.1 foot) for each building. Show proposed finished elevations to the nearest 10th of a foot at all lot corners and along side lot lines adjacent to the front and back corners. Show proposed finished elevations to the nearest 10th of a foot at high and low points along any side or back lot lines and at high and low points of roads to demonstrate proposed drainage.
 - 13) The grading plan for any house that will require special design (partial or full walkouts or exposures) due to topography shall clearly show separate grades for the walkout or exposures.
 - 14) The plan shall indicate if cuts and fills will be balanced on the site. If the site is not balanced, the overage or shortage must be calculated and a haul route developed for review and approval by the City Engineer. No topsoil export will be allowed if the site is shown to need fill without the approval of the City Engineer. Topsoil may be used as fill in non-structural areas on the site.
 - 15) The plan shall include all notes required to properly sequence the construction activities.
 - 16) Erosion and Sediment Control Measures must be shown on a separate sheet following the Erosion Control Submittal requirements.
 - 17) The Interim Grading Plan shall show the proposed building pad area on each lot approximately 1.75 feet (with a tolerance of +/-0.25 foot) below the proposed finish yard grade established on the Master Grading Plan. When the proposed finish yard grade of a building includes an exposed rear lookout or walkout, they may leave the rear grade as high as the proposed finish grade to avoid water ponding on the lot. The grading contractor shall grade setback areas, as much as possible, at a straight slope between the finished lot line and the house pad.
 - 18) The right-of-way (terrace area, from the curb to the lot line in urban areas, or the ditch area from the gravel shoulder to the lot line in rural areas) shall be finished graded. Lots shall also be finished graded along all lot lines, as well as any swales that are required to be built. Five-foot wide "no touch" zones shall be established at all side and rear lot lines. These "no touch" zones shall be shown on the final plat with the intent that no subsequent builder or homeowner shall disturb these areas. If the grades within the "no touch" zone are disturbed by private utilities, the developer shall re-establish the finished grades prior to recertification. The tolerance for grading within the "no touch" zone shall be +/- 0.1 foot.

	19) Developer shall place topsoil and establish vegetation in all disturbed areas in accordance with WDNR Technical Standard 1059.
<p>PLAN STANDARDS Individual Lot Grading Plans</p>	<p>1) The plan shall show:</p> <ul style="list-style-type: none"> • Subdivision • Lot number • Scale (plan must be to scale) • North arrow • Benchmarks • Lot corner and lot line spot grades - existing • Street name • Right-of-way • Builder and contact information • Surveyor's stamp and signature <p>2) The plan shall include relevant building information such as:</p> <ul style="list-style-type: none"> • Top of foundation elevation • Top of footing elevation • Final yard grade • Garage floor elevation • Driveway slope • Basement wall height • Building outline and dimensions to the lot line • Sidewalk and driveway locations <p>3) The plan shall show encumbrances on the property such as:</p> <ul style="list-style-type: none"> • Easements • Wetlands • Environmental corridors • Floodplain <p>4) The plan shall show adjacent features such as:</p> <ul style="list-style-type: none"> • Utilities near the lot such as, but not limited to, manholes, inlets, curb stops • Lot numbers • Buildings <p>5) The plan shall include existing 1 foot contour elevations. A minimum of 25 feet beyond the lot property lines is required for lots less than 1 acre in size or those that plan to disturb within 5 feet of the property line during lot grading. Spot grades must be shown if necessary to reflect the current drainage patterns.</p> <p>6) The plan shall include proposed 1 foot contour elevations. Spot grades are required for any proposed high points, existing building corners, curb locations every 25 feet, existing drainage structures (culverts, inlets, manholes, or pipe end sections), and other relevant features.</p> <p>7) The property owner, when building a new structure, will be required to obtain a Grading/Landscaping Permit prior to the final landscaping and grading of the lot (see sample application in Exhibit C).</p>

END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 050 – EROSION CONTROL

These standards shall apply to all public and private projects

SECTION 050: EROSION CONTROL	
DRAFTING	<ol style="list-style-type: none"> 1) The erosion control plan shall be a full-size drawing at a scale of 1 inch equals 100 feet or less. 2) The erosion control plan shall include: <ul style="list-style-type: none"> • Proposed and existing site topography at contour intervals not to exceed 2 feet. Existing contours shall be screened. • The location of all proposed Best Management Practices (BMPs) for collecting, diverting, trapping and/or treating the construction site storm water runoff. • The locations of all anti-tracking devices at points of ingress and egress to the construction site. • Building envelopes, proposed improvements and other land area to be disturbed. • The location of all perimeter controls (e.g., silt fence, coir logs). • The location of temporary soil stockpile sites indicating setbacks from channelized flow, nearby water resources or environmental corridors and proposed erosion protection methods. • Locations identifying where rip-rap, erosion control matting and/or turf reinforcement matting is to be installed. • The location of any phase limits of the work to minimize the extent of the construction site exposed at any one time. 3) Detail drawings and cross-sections of the BMPs to be employed on the site to include sediment traps, diversions swales and berms, sediment basins, etc. 4) Detailed construction notes clearly explaining all necessary procedures to be followed to properly implement the plan including estimated starting date of grading, timing and sequence of construction or demolition, any construction stages or phases, utility installation, dewatering plans, refuse disposal, temporary and final site stabilization requirements and methods, inspection requirements, and the installation, use and maintenance of BMPs in the plan. Dates of the major land disturbing construction activities, temporary stabilization, and permanent stabilization corresponding to the dates input into the Soil Loss and Sediment Discharge Tool shall be included in the construction sequencing.
DESIGN	<ol style="list-style-type: none"> 1) BMPs shall comply with the WDNR Conservation Practice Standards and with WISDOT Product Acceptability List. 2) Inlet protection shall be Type D for inlets in all dead low areas and Type A for all field inlets. 3) Erosion control reinforcement mat shall be required for areas of concentrated flow (such as swales, temporary diversions, etc.), slopes exceeding 4 feet horizontal to 1 foot vertical, sediment traps, sediment basins, and detention ponds, or as required by the City Engineer. 4) Drainage swales, temporary diversions, sediment traps, sediment basins and detention ponds are required to be stabilized and fully operational prior to receiving runoff. Fully operational includes the installation of the outlet

structures (primary and emergency) for sediment traps, sediment basins and detention ponds.

- 5) All pumped effluent from dewatering operations (trench dewatering or otherwise) shall be discharged to a geotextile filter bag conforming to WDNR Conservation Practice Standard 1061. The geotextile bag shall be placed on vegetated/stabilized ground and discharge to a sediment basin or trap. Should no basin exist, the geotextile bag shall be placed on filter fabric and surrounded by a sediment bale barrier conforming to WDNR Conservation Practice Standard 1055. The filter fabric shall be brought up the sides and over the top of the hay bales and secured. Discharge shall not be allowed to flow over unprotected ground. In no case shall pumped water be diverted outside the project limits prior to sediment removal.
- 6) Soil stockpiles shall be located away from channelized flow and no closer than 25 feet from roads, ditches, lakes, streams, ponds, wetlands and/or environmental corridors, unless approved by the City Engineer. Stockpiles left inactive for 7 days or longer shall be stabilized.
- 7) Soil stockpiles shall have silt fence or other perimeter control placed on the downstream side of the stockpile.
- 8) Ditch checks shall be installed in swales, channels and diversions and be placed perpendicular to flow. Ditch checks shall be designed so that water can flow over the ditch check and not around them. The ditch check shall extend far enough so that ground level at the ends of the ditch check is higher than the low point in the top-center of the ditch check.
- 9) Silt fence shall not be placed in areas that receive concentrated flow such as ditches, swales, downstream of culverts, storm sewer outfalls or pond discharges. Silt fence shall not be placed perpendicular to contours such as along the slope of a hill. Silt fence shall be properly entrenched and staked. The ends of the silt fence shall be extended upslope to prevent water from flowing around the ends of the fence. Installations of silt fence which are greater than 1 year old will not be considered effective and will be required to be replaced.
- 10) Disturbed areas that remain inactive for greater than 14 days shall be stabilized with temporary stabilization measures such as soil treatment, temporary seeding, mulching or erosion control reinforcement matting. Inactive means that no site grading, landscaping or utility work is occurring on the site, and that precipitation events are not limiting these activities. Frozen soils do not exclude the site from this requirement.
- 11) Winter Construction Site Erosion Control
 - A. General: A project involving construction between November 1 and May 1 will require measures to stabilize the site over winter. If the construction site is not stabilized with pavement, gravel road base or 70 percent mature vegetative cover or rip-rap by November 1, then the site must be protected with over-winter stabilization practices.
 - B. Considerations: Winter excavation and earthwork activities should be limited in extent and duration to minimize potential erosion and sedimentation impacts.
 - i. Expose only as much area as necessary to complete the work and can be stabilized in 1 day prior to any rain or snow event.
 - ii. Subsequent work areas should not be exposed until the previously exposed area has been stabilized.
 - iii. All erosion and sediment control measures installed for the project should be routinely maintained, cleaned, inspected, and repaired as needed for the construction season. Temporary embankments should be fully vegetated or otherwise stabilized by accepted methods.

- C. Maintenance Requirements:
- i. Maintenance measures should occur throughout construction, including the over-winter period. After each rainfall, snowstorm or period of thawing and runoff, the construction site contractor should conduct an inspection of all erosion control measures and perform repairs as needed to ensure their continuing function.
 - ii. For any area stabilized by temporary or permanent seeding prior to November 1, the contractor should conduct an inspection in the spring to ascertain the condition of vegetative cover and repair any damaged areas or bare spots and reseed as required to achieve an established vegetative cover (at least 70 percent area vegetated with healthy, vigorous growth).
- D. Specifications: To adequately provide sediment and erosion control during cold weather and early spring runoff, the following stabilization techniques shall be employed during the period from November 1 to May 1:
- i. The area of exposed, unstabilized soil should be limited to only what is required to perform the work. The exposed area should be protected against erosion by methods described in this section prior to any thaw or runoff producing conditions.
 - ii. Stabilization as follows should be completed within 7 days of establishing final grade or that will otherwise exist for more than 14 days:
 - a) All proposed vegetated areas having a slope less than 15 percent which do not exhibit a minimum 70 percent vegetative growth by November 1, or which is disturbed after November 1, should be dormant seeded at a rate 3 times higher than specified for permanent seed and covered with 2 to 3 tons of hay or straw mulch per acre with either anchored netting or an approved tackifier from the WISDOT Product Acceptability List. An erosion control blanket or Type A soil stabilizer from the WISDOT Product Acceptability List may be used in lieu of mulch and netting or mulch and tackifier.
 - b) All proposed vegetated areas having a slope greater than 15 percent which do not exhibit a minimum of 70 percent vegetative growth by November 1 or which are disturbed after November 1, should be dormant seeded at a rate 3 times higher than specified for permanent seed and covered with a properly installed and anchored erosion control blanket.
 - iii. All stone covered slopes must be constructed and stabilized by November 1.
 - iv. Installation of anchored hay or straw mulch should not occur over snow greater than 1 inch in depth.
 - v. All mulch applied during winter should be anchored with netting or tackifier from WISDOT Product Acceptability List.
 - vi. Stockpiles of soil materials should be seeded and mulched for over-winter protection with hay or straw at 2 to 3 tons per acre. Mulching should be done within 24 hours of stockpiling and re-established prior to any rainfall or snowfall. No soil stockpile should be located within 25 feet of any wetland or other water resource area. Soil stabilizer Type A or erosion control blanket may be used in lieu of mulch.
 - vii. Frozen materials should be stockpiled separately and in a location that is away from any area needing to be protected. Stockpiles of frozen material can melt in the spring and become unworkable and difficult to transport due to high moisture content in the soil.

	<ul style="list-style-type: none"> viii. Installation of erosion control blankets should not occur over snow of greater than 1 inch in depth or over frozen ground. ix. All grass-lined ditches and channels should be constructed and stabilized by October 15. All ditches or swales which do not exhibit a minimum 70 percent vegetative growth by November 1, or which are disturbed after November 1, should be stabilized with temporary stone and filter fabric or temporary seed and erosion control blankets appropriate to the design flow conditions. x. All stone-lined ditches and channels must be constructed and stabilized by November 1. xi. Sediment barriers that are installed during frozen conditions should conform to Conservation Practice Standard 1071 V.C.1.c anchored in place and in full contact with the ground surface. Silt fence and hay bales should not be installed when frozen ground conditions prevent proper embedment of these barriers. xii. After December 1, incomplete road or parking areas where active construction of the road or parking area has ceased for the winter season should be protected with a 3 inch layer of sand and gravel with a gradation conforming to Table 37 of the Standard Specifications for Sewer and Water Construction in Wisconsin.
SUBMITTALS	<ul style="list-style-type: none"> 1) Submit 2 sets of calculations, 3 sets of full size construction drawings, and a digital submittal of the calculations, system plans and construction drawings (PDF format preferred). 2) All submittals are required to be signed, sealed and dated by a licensed Professional Engineer registered by the State of Wisconsin. 3) An Erosion Control and Storm Water Management Permit Application (see Exhibit B-1) must be filed with the City. You will be issued a Certificate of Permit Coverage (example in Exhibit B-3) from the City Engineer.

END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 060 – SANITARY SEWER

These standards shall apply to all public and private projects

SECTION 060: SANITARY SEWER	
DRAFTING	<ol style="list-style-type: none"> 1) A system plan showing only the sanitary sewer system shall be submitted. The system plan shall be a full size drawing with a scale of 1 inch equals 100 feet or less. It shall include at a minimum: <ul style="list-style-type: none"> • Pipe numbering • Pipe lengths, size, pipe type, and slopes • Manhole numbering • Manhole elevations and inverts • Lateral locations 2) The plan and profile sheets shall be full size. The plan view shall be on the top of the sheet and the profile shall be on the bottom of the sheet. 3) Pipe diameter, manhole or fitting center-to-center length, and lateral spacing must be dimensioned. 4) Flow line elevations must be shown at manholes, fittings, and breaks in grade. Elevations must be based on NGVD 29 or NAVD 88 datum. The reference datum shall be clearly defined on the plans. 5) Slope must be indicated in percentage to the nearest 0.01 foot. 6) Pipe material, strength and diameter must be labeled. 7) Elevation of manhole rim must be indicated. 8) Areas of gravel, spoil, or slurry backfill must be dimensioned and labeled. 9) Manholes must be numbered to correspond with plan view. 10) Crossings with existing or proposed underground improvements must be shown with the name of the utility, diameter (top or bottom of pipe), elevation and station indicated. 11) Existing street centerline grade, proposed utility grades, and the proposed grade over the sanitary sewer must be shown, as well as existing grades of proposed utility. 12) The existing or proposed first floor elevation of the building to be served must be shown on the plan. 13) When plans are continued on an additional sheet, plan view must overlap by a minimum of 50 feet with the overlap shown with a bold vertical line (match line).
DESIGN	<ol style="list-style-type: none"> 1) The sanitary sewers shall be designed for the entire site, even if only a small portion of the site is being developed at the time of submittal. The minimum size of the sanitary sewer main is 8 inch. 2) The minimum depth of the sewer for buildings with basements shall be 11 feet; for buildings without basements, the minimum depth shall be 9 feet, unless otherwise approved by the City Engineer. Risers shall be required when the sanitary sewer main is more than 14 feet deep to the top of pipe. Risers must be brought up to a depth of 12 feet (minimum) or other suitable depth (with approval) at the lot line to service existing or proposed basement elevation. 3) The maximum amount of drop between the invert of an incoming sanitary sewer main and the bench of the manhole is 6 inches. A drop greater than 6 inches requires an outside drop. Inside drops will <u>not</u> be allowed.

	<ol style="list-style-type: none"> 4) All sanitary sewer mains shall be located on the centerline of the roadway, except where the geometry of the roadway will not allow it and it is approved by the City Engineer. 5) Sanitary sewer flow calculations may be required for review by the City Engineer or designated staff. These calculations shall include the design flow used to size each leg of the sewer capacity of the sanitary sewer, design velocity, peaking factor applied, design assumptions, and all calculations used to determine class of pipe. The City may, at its discretion, require a larger size diameter pipe to accommodate future sanitary sewer flows. 6) Minimum grade of 8 inch diameter sanitary sewers shall be at 0.45 percent. All other sizes must meet the minimum grades as outlined in the Standard Specifications for Sewer and Water Construction in Wisconsin to achieve self-cleansing velocities. 7) Six-inch diameter sanitary sewer laterals shall be designed between 1.0 percent (1/8 inch per foot) minimum and 4.0 percent (1/2 inch per foot) maximum slope between the mainline sewer and the building pad. Addition of risers will be required if slope exceeds the maximum allowable slope from house to the mainline sewer. (See Riser Detail Figure A.) All risers must be shown on the plans. 8) A minimum of 0.10 of a foot drop must be designed into all manholes. All manholes with greater than 30 degree deflection must have a minimum drop of 0.25 feet. 9) Sanitary sewers located outside the right-of-way must be contained within an outlot. Utility outlots (easements, upon approval from the City Engineer) must be at least 20 feet wide for 1 utility line with a depth of 10 feet or less. An additional 10 feet (minimum) of width must be added for each additional utility line. Additional widths, as approved by the City Engineer, will be required for utilities deeper than 10 feet. Easements, if allowed, must not overlap building envelopes and be deed restricted to not allow any hardscape, landscape, or other items that will impede access or future maintenance of the system.
<p>INSTALLATION</p>	<ol style="list-style-type: none"> 1) All manholes shall be a minimum of 48 inches in diameter unless otherwise noted. Frame and lids shall be Neenah R-1661, with no vent holes and a solid gasket. 2) Internal/external manhole seals shall be on every manhole. (See Figures R-1 and R-2.) 3) All manholes shall be set to 3/8 to 1/2 inch below final pavement grade. 4) Manholes will be ramped with a 10 foot radius of asphalt paving when binder is placed and surface asphalt will not be placed for more than 3 weeks. The ramp will be milled off prior to final paving. (See Figure O.) 5) Manhole barrel joint(s) gasket material (EZ-Stik) shall be placed at each joint. All manhole joints shall be wrapped with MacWrap. 6) When starting an installation, a plug shall be installed in the farthest downstream location of new sanitary system and be maintained by the contractor. The plug will remain in place until the new system has been accepted by the City Engineer and Utility Manager. 7) All connections to an existing sanitary sewer manhole for a sanitary sewer extension and laterals shall have a clay or bentonite dam installed at the connection point. Additional clay dams may be required by the City Engineer or Utility Manager. The clay or bentonite dam must be a minimum of 3 feet above the top of the sewer pipe or to the seasonal high groundwater table, whichever is greater, a minimum of 4 inches below the bottom of the bedding stone, and the width of the trench.

- 8) The maximum height from top step to finish grade (top of cover) is 31 inches. If height is greater than 31 inches an additional barrel section shall be installed in manhole.
- 9) Manhole base(s) shall have an integral flow line and bench. If it does not, a concrete flow line and bench shall be installed in the base of manhole.
- 10) For integral manhole bases terminate pipe at precast lip, and for non-integral manhole bases at inside wall of manhole. Remove top section of pipe even with bench and fill void between pipe and flowline.
- 11) Sanitary sewer connections to existing manhole(s) shall be cored when no stub has been provided. Pipe to manhole connections shall be made by means of an approved watertight seal (i.e., Kor-N-Seal or A Lok).
- 12) Sanitary mains between 8 inches and 15 inches in diameter and less than 18 feet deep shall be PVC SDR 35. Sanitary mains between 18 to 25 feet deep shall be PVC AWWA C900 or C905 SDR 18. Other materials for proposed sanitary mains are allowed only with the approval of the City Engineer.
- 13) The same size, type, and material of sanitary sewer pipe must be used from manhole to manhole.
- 14) All sanitary sewers and laterals are to have tracer wire installed along the pipe.
- 15) Tracer wire is to be direct burial rated insulated AWG 10 or 12 copper clad steel.
 - Direct burial rated coating (High Density Polyethylene (HDPE) or High Molecular Weight Polyethylene (HMWPE)), minimum 30 mil. Nylon coating is not acceptable (i.e., THHN and THWN).
 - Insulated AWG 10 or 12 copper clad steel, high strength with minimum 600 pound break load.
 - The protective coating must be green in color.
 - Splices (not in manholes) Copperhead SnakeBite locking connector (LSC1230C) and/or Mainline-to-Service connector (3WB-01). Splices shall be kept to a minimum.
 - Splices in manholes must follow File No. 24B.
 - At manholes, bring tracer wire up along outside of structure and terminate inside manhole between top of precast cone and concrete or approved composite adjusting rings leaving a length of approximately 1 foot above rim. Terminate tracer wire inside structure using Copperhead twist-on connector SCB-01 or SCB-01-LG.
 - For laterals, bring tracer wire to surface at lot line with a spool (minimum 3 feet) of tracer wire for future connection.
 - If tracer wire boxes are required, they shall be Valvco Brand or Copperhead SnakePit (see Figure P) and located as required by the City Engineer.
 - Conductivity testing (continuity) will be line tracing completed by City staff with their equipment in the presence of a developer/contractor representative. Line tracing of the wire shall be performed prior to acceptance.
- 16) All sanitary sewers and laterals are to be bedded with stone chips per SWS 8.43.2(a), and backfilled with mechanically compacted granular backfill per SWS 8.43.4 in paved areas/shoulders and within 5 feet of the paved areas. Spoil backfill will be allowed in non-pavement and non-shouldered areas. Slurry backfilled required in existing paved areas.
- 17) All lateral connections shall be capped with a push-on gasket and be perpendicular to the main line. Any lateral or riser within a 25 foot radius of a well shall be either ductile iron or pressure rated PVC pipe SDR-26 or stronger. All laterals shall be installed with test tee unless otherwise directed by the City

	<p>Engineer. All laterals shall be 6 inch minimum. All laterals will terminate at the lot line with a hardwood marker board extending above ground. Marker boards must be the same depth as the lateral and extend a minimum of 2 feet above ground grade. If using 2 or more pieces to make the marker board, they must be connected to make 1 board.</p> <p>18) For flexible risers attached to flexible mains, follow Figure A for risers greater than 6 feet high or mains greater than 14 feet deep.</p> <p>19) All sanitary sewers and laterals shall have warning tape placed in the trench between 4 and 5 feet below finished grade.</p> <p>20) All non-residential buildings are required to have a sampling manhole constructed at the lot line. A 6 inch minimum lateral size is required. An internal/external seal and MacWrap is required. See SWS File No. 23 or Figure C for a detail drawing. There shall be a 10 foot radius, level area around the sampling manhole. Landscaping is prohibited within the 10 foot radius, level area.</p> <p>21) Dry stacking of adjusting rings and wood wedges are <u>not</u> acceptable. Frame adjustment shall be made with full concrete adjusting rings with a full bed of mortar at the frame and between the rings. If concrete rings are used, they must be mortared together. Composite rings, as approved by the City Engineer, must be placed in accordance with the manufacturer's recommendations.</p> <p>22) Sanitary sewers shall be air pressure and deflection tested. Sanitary manholes shall be vacuum tested.</p> <p>23) All sanitary sewer mains shall be televised immediately following completion and 1 year after completion of the system and a maximum 60 days prior to surface asphalt paving.</p> <p>24) All other specifications not covered here are to be covered by the latest edition of the Standard Specifications for Sewer and Water Construction in Wisconsin and its addenda. (Green Book).</p>
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END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 070 – WATER MAIN

These standards shall apply to all public and private projects

SECTION 070: WATER MAIN	
DRAFTING	<ol style="list-style-type: none"> 1) A system plan showing only the water main system shall be submitted. The system plan shall be a full size drawing at a scale of 1 inch equals 100 feet or less and shall include at a minimum: <ul style="list-style-type: none"> • Pipe length, size, type, grade breaks, and slope • Valves, hydrants, bends • Valve and hydrant numbers • Water services • Lot lines, easements, and right-of-way 2) The plan and profile drawings shall be submitted on a full size sheet with the plan view on the top portion of the sheet and the profile on the bottom portion of the sheet. 3) All water mains shall be located north and east of the centerline of the roadway except where the geometry of the roadway will not allow it and it will affect only a short distance of the water main, as approved by the City Engineer.
DESIGN – General	<ol style="list-style-type: none"> 1) The water main shall be sized to serve the entire development even if only a small portion is being developed at the time of submittal. This is to ensure adequate sizing throughout the development. 2) Water services shall be installed to the lot line and terminate with a curb stop. 3) Valves are to be spaced no greater than 600 feet in single family residential developments and 400 feet in multifamily or commercial/industrial developments. 4) Valves shall be provided on all mains at each intersection unless otherwise approved by the City Engineer. All valves shall be aligned with the right-of-way of the intersecting street. 5) A hydrant shall be provided at all dead end lines. An air release may only be used upon approval of the City Engineering, and shall be 2 inches or larger. 6) All water main and services are to be bedded with bedding chips and backfilled with mechanically compacted, granular backfill per the Standard Specifications, unless otherwise approved by the City Engineer. 7) All water mains are to be 8 inch minimum size. The City, at its discretion, may require the water main to be upsized to accommodate future service or looping requirements. 8) All hydrants shall be located on the same side of the roadway as the water main and 4 feet from the back of the curb to the front of the 4-1/2 inch nozzle nut. Hydrants are <u>not</u> allowed in islands or cul-de-sac islands. 9) Hydrants shall have a spacing no greater than 500 feet in single family residential developments and 400 feet in multifamily or commercial/industrial developments. Hydrants shall be located within 150 feet (a linear accessible distance) of every building in a multifamily or commercial/industrial development. 10) An Eclipse Model No. 88 sampling station with an extreme cold climate protection package (see Figures B-1, B-2, and B-3) shall include a 3/8 inch vent tube that shall be installed within the development. This station shall be

	<p>installed at the location designated on the approved plans. This station must include a curb stop shut-off valve.</p> <p>11) Efforts should be made to design the water services so that the water service will not lay less than 3 feet to the left of the sanitary lateral.</p> <p>12) Check valves may be required by the City Engineer or Utility Manager when a private looping main is installed. If required, the check valve shall be installed in a 48 inch diameter manhole(s) located at the right-of-way connection(s) to existing water main. For additional details see NR811.09(1)(a).</p>
DESIGN – Pipe Material	<p>1) All pipe used for water main shall be ductile iron, AWWA thickness Class 52 or Class 150 PVC pressure pipe.</p> <p>2) PVC pipe shall meet the requirements of AWWA C900, have an SDR of 18 or less, and have integral bell and spigot joints with an elastomeric seal.</p> <p>3) Ductile iron pipe shall have a cement lining and shall be equal to Clow Super Bell-Tite gasket joint pipe with Style C rubber gaskets. Standard mechanical joint cast iron fittings shall be used as per ANSI C111/AWWA A21.11-07.</p>
DESIGN – Valves	<p>1) All valves 12 inches or less shall be Resilient Seated Gate Valves (AWWA C-509), M&H Valve Company 4067-01, Kennedy 4571, Clow F-6100, Mueller 2362 or Waterous 2500. All underground trim (nuts, bolts, etc.) for valves shall be stainless steel.</p> <p>2) All valves 16 inches or larger shall be Butterfly valves (AWWA C-504), M&H 450, Pratt Groundhog HP250, Clow Style 2810 (F5365), or K-Flo 506 (formerly Keystone).</p> <p>3) All valves shall have non-rising stems, mechanical joint ends, turn left to open, and have a 2 inch square operating nut, unless otherwise directed in writing by the City Engineer.</p>
DESIGN – Hydrants	<p>1) All hydrants shall be Clow F2500, Waterous WB-67 Pacer, or Mueller Centurion.</p> <p>2) Hydrants shall have a mechanical joint connection; turn left to open.</p> <p>3) Hydrants shall have a minimum 6 foot-6 inch trench depth, and shall have a depth sufficient to be installed in accordance with the plans.</p> <p>4) All hydrant leads shall be either ductile iron or PVC AWWA Class 150 pressure pipe SDR 18 or less. Ductile iron leads shall be wrapped with polyethylene film.</p> <p>5) Hydrants shall be painted red and marked with red and white spring loaded fiberglass hydrant markers. Hydrants shall be break-flange type. The break-flange must be placed at finish grade.</p> <p>6) Hydrants shall have a 5-1/4 inch main valve opening, shall have a National standard two 2-1/2 inch hose nozzles, and a 4-1/2 inch pumper nozzle.</p>
DESIGN – Water Services	<p>1) All services from the main to the lot line shall have the following:</p> <p>A. <u>Service</u>: Polyethylene (HDPE) SDR 9, minimum size is 1-1/4 inch.</p> <p>B. <u>Corporation stops</u>: Mueller B-25008, Ford FB1000, or A.Y. McDonald 4701-BQ. All corporation stops must withstand 150 PSI pressure test, use compression fittings with stainless steel stiffeners and NO-lead compliant.</p> <p>C. <u>Service saddles</u>: Required for corporation stops 1-1/4 inch x 1-1/4 inch.</p> <p>D. <u>Curb box</u>: Mueller H-10300, Ford EM 2-65-56, or A. Y. McDonald 5614. All curb boxes shall be “screw-on” style.</p> <p>E. <u>Curb stop</u>: Mueller 300 ball valve, Ford B44-M, or A. Y. McDonald 6104-Q.</p> <p>All curb stops must withstand 150 PSI pressure test, use compression fittings with stainless steel stiffeners and be NO-lead compliant. Include a 6 inch pigtail with stainless steel stiffener at connection to curb stop.</p>

FOLLOW WATER MAIN INSTALLATION SEQUENCE AT END OF THIS SECTION – NO EXCEPTIONS!

- 1) **No connection shall be made to the existing water system until the following requirements are met:** The contractor shall make a connection to the main when the safe sample is obtained; all services have been installed and pressure tested (150 psi for two hours). The contractor will then start a new gap in the main before continuing to install pipe beyond the length that has been safe water tested and pressure tested.
- 2) **Connections will be required when the following conditions are met:** Water main installation up to 2,000 feet and/or 30 days of inactivity of water main installation, whichever occurs first.
- 3) The contractor is required to contact the Water Utility at **(262) 691-0804** prior to preparing to sample. The contractor is required to fill and flush the new main. The Water Utility staff will collect the sample and send it to the approved lab. No samples will be taken after 2:30 p.m.
- 4) The contractor **MUST** notify the Water Utility **48 HOURS IN ADVANCE** of the following operations to schedule a date and time. If a 48 hour notice is not given, the Water Utility will not guarantee the following operations can take place. The contractor must call by 8:00 a.m. of the scheduled day to confirm the time.
 - Water main filling
 - Water main wet connections
 - Water main “live taps”
 - Water main flushing
 - Water main “safe” water testing

(not including services 2 inch or smaller)

CALL THE WATER UTILITY OFFICE AT (262) 691-0804.

If no one answers, leave a voice mail message at extension 6025. Also press 0 and leave a message with the receptionist.

- 5) All Utility staff time required beyond normal work hours will be billed back to the contractor at the overtime rate.
- 6) All water main and services are to be bedded and covered with stone chips per SWS 8.43.2(a), and backfilled with mechanically compacted granular backfill per SWS 8.43.4 in paved areas/shoulders and within 5 feet of the paved/shoulder areas. Spoil backfill will be allowed in non-pavement and non-shouldered areas. Slurry backfill required in existing paved areas.
- 7) The sampling station shall be installed 10 feet past the hydrant in the direction of the traffic flow and 3 feet behind the hydrant (7 feet from the back of curb). (See Figures B-1 thru B-3 for more information.)
- 8) Chlorination tablets shall be glued to the inside of the pipe per SWS 4.3.12. Chlorination powders or other loose material are not allowed.
- 9) All buried fittings shall be accurately located by the contractor. The contractor will work with the assistance of the City’s site representative to accurately install a location marker. The locating marker shall be a wooden 2 inch x 4 inch or other agreed upon marker placed precisely over the fitting after backfilling and compaction operations are completed. At the completion of the water main and water lateral installations for the project (or as otherwise agreed upon), the contractor will be responsible for contacting the City representative and requesting the collection of the GPS data. The locating marker is the responsibility of the contractor and must be protected from removal or disturbance until a City representative collects the location of the marker using a GPS. If the locating marker is lost or damaged, the contractor shall excavate and expose the fitting to allow for accurate relocating. The cost of relocating

	<p>the marker including the excavating shall be the sole responsibility of the contractor.</p> <p>10) All other specifications not covered here are to be covered by the current Standard Specifications for Sewer and Water Construction in Wisconsin and its addenda (the green book).</p>
<p>INSTALLATION - Pipe</p>	<ol style="list-style-type: none"> 1) All ductile iron water main, fittings, curb boxes and hydrants shall be wrapped in polyethylene film material in conformance with the Standard Specifications. Polyethylene wrap shall conform to Section 8.21.0 and be installed accordingly. 2) All water mains will have buttresses installed at all bends, thrust points or any other appropriate place. The buttress shall be poured concrete and installed per the requirements in the Standard Specifications (Green Book File No. 44). 3) Marker boards shall be placed at all bends and fittings and shall be maintained by the contractor until Engineering Division field crews locate them by GPS. If marker boards are damaged or lost, the contractor will be fully responsible for uncovering and relocating the bend or fitting. 4) Anchor tees or elbows may be mechanical joint fittings. Mechanical joints shall be made with Cor-Blue nuts and bolts which conform to C-111, AWWA specifications. All non-stainless steel anchor fittings or rods shall be sprayed or coated with a rubberized or tar based sealant to prevent corrosion. 5) The minimum cover for water main shall be 6 feet to the top of the pipe. Proposed water main with less than 6 feet of cover must be approved by the City Engineer prior to installation. Insulation is required for water main with less than 6 feet of cover. (See Figure Q.)
<p>INSTALLATION - Valves</p>	<ol style="list-style-type: none"> 1) A valve box adaptor shall be used to prevent settling or shifting of valve boxes. (See Figure D.) 2) All valves shall have non-rising stems, mechanical joint ends, turn left to open, and have 2 inch square operating nut, unless otherwise directed in writing by the City Engineer. 3) All valves shall have stainless steel bolts. 4) A valve extension stem may be required on the operating nut if depth is 10 feet or more below finished grade, as determined by the Utility Manager. The extension shall bring the top within 10 feet of the finished grade. 5) Valves which are 16 inch or less shall be placed in valve boxes. Valve boxes shall be equal to Tyler 6860, Sigma VB630DD, or Star VB DHD DW, three-piece assembly size DD with cover marked "water". PVC valve boxes are not acceptable.
<p>INSTALLATION - Hydrants</p>	<ol style="list-style-type: none"> 1) Hydrants shall be attached to a hydrant tee by means of a Clow F1217 anchoring tee or equal. All hydrants shall include a 6 inch shutoff valve. Valves shall meet the valve specification listed above. 2) Hydrants shall be marked with red and white spring-loaded fiberglass hydrant markers. 3) Hydrants shall have a distance from the ground line to the center of the nozzle of 18 inch to 24 inch inclusive. 4) All hydrants shall be thrust blocked. A poured concrete buttress shall be installed ensuring that no concrete plugs the weep hole. Please refer to Standard Specifications File No. 38 (Green Book). 5) Hydrant assemblies shall be wrapped in polyethylene film. 6) Three-quarter inch conduit is to be attached to each hydrant and hydrant barrel where the tracer wire is brought to the surface (see Figure E) and terminated in a Valvco Brand box (see Figure P) attached to the base of hydrant.

<p>INSTALLATION - Water Services</p>	<ol style="list-style-type: none"> 1) All saddles shall be blue (black if Romac) coated and have 2 stainless steel bans. 2) Tapping of the main is only allowed after a safe water sample has passed bacteriological testing. 3) Dry tapping of water main is <u>not</u> allowed. 4) Tracer wire for services shall be brought to surface at curb box. 5) Include a maximum 6 inches of pigtail after curb stop with stainless steel stiffeners at the house side of curb stop. 6) Insulation required on water services whenever depth of cover is less than 6 feet and/or passes within 2 feet of an underground structure which may experience freezing temperatures. (See Figure Q) Modified Standard Specification 5.5.20.
<p>INSTALLATION - Tracer Wire and Warning Tape</p>	<ol style="list-style-type: none"> 1) Tracer wire is to be: <ol style="list-style-type: none"> A. Along the main and laterals. B. Direct burial rated coating (High Density Polyethylene (HDPE) or High Molecular Weight Polyethylene (HMWPE)), minimum 30 mil. Nylon coating is not acceptable (i.e., THHN and THWN). C. Insulated AWG 10 or 12 copper clad steel, high strength with minimum 600 pound break load. D. The protective coating must be blue in color. 2) Splices (buried): Copper SnakeBite locking connector (LSC1230C) and/or Mainline to Service connector (3WB-01). Techniques must be approved by the Utility Manager. Splices shall be kept to a minimum. 3) Warning Tape shall be blue reading "CAUTION WATER LINE BURIED BELOW" and be installed in the trench for main line and laterals 2 to 3 feet below finish grade. 4) If tracer wire boxes are required, they shall be Valvco Brand or Copperhead SnakePit (see Figure P) and located as required by the City Engineer. 5) Conductivity testing (continuity) will be line tracing completed by City staff with their equipment in the presence of a developer/contractor representative. Line tracing of the wire shall be performed prior to acceptance.
<p>INSTALLATION - Testing</p>	<ol style="list-style-type: none"> 1) Tapping tee with gate valve shall be tested at 150 psi for 1 hour prior to tapping existing water main. 2) Water main shall be tested at 150 psi for 2 hours after water services are installed for acceptance testing. No leakage is allowed.

END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 070 – WATER MAIN INSTALLATION SEQUENCE

These standards shall apply to all public and private projects

SECTION 070: WATER MAIN INSTALLATION SEQUENCE	
NOTIFICATION	<p>The contractor MUST notify the Water Utility 48 HOURS IN ADVANCE of the following operations to schedule a date and time. If a 48 hour notice is not given, the Water Utility will <u>not</u> guarantee the following operations can take place. The contractor must call by 8:00 a.m. on the day of the scheduled activity to confirm the time.</p> <ul style="list-style-type: none"> • Water main filling • Water main wet connections • Water main “live taps” • Water main “live taps” 4 inch+ (Saddles must be pressure tested minimum 150 psi for 1 hour.) • Water main flushing • Water main “safe” water testing <p>(Not including services 2 inch or smaller.)</p> <p>CALL THE WATER UTILITY OFFICE AT (262) 691-0804.</p> <p>If no one answers, leave a voice mail message at extension 6025. Also press 0 and leave a message with the receptionist.</p>
GENERAL	<p>WATER MAIN MUST BE CAPPED AT WATER MAIN TAP/CONNECTION AND EVERY 2,000 FOOT INTERVAL.</p> <p>WATER MAIN MUST BE FILLED AND SAFE WATER TESTED PRIOR TO FILLING AND FLUSHING ANY ADDITIONAL 2,000 FOOT PIPE SEGMENTS.</p> <ol style="list-style-type: none"> 1) Install water main; must leave a gap at the existing main. 2) Fill water main. (Pressure test the water main. Contractor option.) 3) Obtain a safe water sample. 4) Tap services. Taps must be made under system pressure. 5) Pressure test main. 6) Make wet connection to existing water main. 7) Connections will also be required when the following conditions are met: Water main installation up to 2,000 feet and/or 30 days of inactivity of water main installation, whichever comes first. <p>Contractor will be charged for the following:</p> <ol style="list-style-type: none"> 1) Water used for flushing and sampling mains. 2) Water lab charges and Utility staff sampling. 3) Utility staff time required beyond the normal work hours.

END OF SECTION



**Department of Public Works
Water and Sewer Utility**
 W240N3065 Pewaukee Road • Pewaukee, WI 53072
 Phone: (262) 691-0804 • Fax: (262) 691-5720
 Email: publicworks@pewaukee.wi.us

NEW CONSTRUCTION SITE HYDRANT USE PERMIT

Company (print): _____ **Phone: (_____)** _____

Contact Person (print): _____ **Phone: (_____)** _____

Billing Address: _____
 House # _____ Street Name _____ City _____ State _____ Zip _____

PERMIT FEES:	Description of Fee	Charge	Total
	Seasonal Use Charge (When used 6 weeks or more)	\$100.00	\$ _____
	Minimum Charge (When used less than 6 weeks)	\$18.72	\$ _____
	Service Charge (Does not apply for Seasonal Use)	\$24.91	\$ _____
	Wrench Deposit (Per Season) ID#: _____	\$20.60	\$ _____
	Reducer Deposit (Per Season) ID#: _____	\$56.65	\$ _____
	TOTAL PERMIT FEES DUE:		\$ _____

Number of Permit Copies Requested: _____ (No additional charge for permit copies)

Signature of Applicant: _____ **Date:** _____
 Required

**Permit required under City of Pewaukee Municipal Code, Chapter 16 Municipal Water and Wellhead Protection*

ADDITIONAL REQUIRED INFORMATION

Work Site Address: _____
 General Contractor: _____ Contact Name: _____
 Property Owner/Business Name: _____
 Contact Number: (_____) _____ Email: _____

FOR OFFICE USE ONLY

DPW OFFICE
 Permit approved by: _____ Date: _____
 Hydrant Meter #: _____ Read Start: _____ Read End: _____ Total: _____
 Hydrant wrench returned by (name): _____ Date returned: _____
 Reducer returned by (name): _____ Date returned: _____

ACCOUNTING OFFICE
 AMOUNT PAID: \$ _____ Cash Check Receipt # _____
 Payment received by: _____ Date: _____

SEE OTHER SIDE FOR HYDRANT USE INSTRUCTIONS



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 080 – MISCELLANEOUS

These standards shall apply to all public and private projects

SECTION 080: MISCELLANEOUS	
DIRECTIONALLY DRILLED PIPE	<ol style="list-style-type: none"> 1) Pipe shall be high density polyethylene (HDPE) PE 4710 DR 11 DIPS. 2) Fittings shall match pipe and join by electrofusion or butt fuse. Adaptors shall be molded mechanical restrained or joint adaptor with stainless steel internal stiffener and ductile iron or stainless steel back-up ring with Cor-Ten hardware or per manufacturer's recommendation. 3) Tracer wire shall be HDD CCS PE45 or greater. 4) A Boring Contingency Plan shall be submitted for response to spill or inadvertent release of drilling fluid (frac-out) must be submitted. 5) Conductivity testing (continuity) will be line tracing completed by City staff with their equipment in the presence of a developer/contractor representative. Line tracing of the wire shall be performed prior to acceptance.
CASING PIPE	<ol style="list-style-type: none"> 1) Pipe shall be high density polyethylene (HDPE) PE 4710 DR 11 DIPS or PVC C900 DR 18 with lock tight joint or equivalent. 2) Tracer wire shall be HDD CCS PE45 or greater. 3) Fittings shall match pipe or per manufacturer's recommendation. 4) Conductivity testing (continuity) will be line tracing completed by City staff with their equipment in the presence of a developer/contractor representative. Line tracing of the wire shall be performed prior to acceptance.
FORCE MAIN	<ol style="list-style-type: none"> 1) Pipe shall be high density polyethylene (HDPE) PE 3408/3608 or PVC C900 DR 18. 2) Fittings shall match pipe or per manufacturer's recommendation. 3) All force mains shall be bedded with stone chips per SWS 8.43.2(a) and backfilled with mechanically compacted granular backfill per SWS 8.43.4 in paved areas and within 5 feet of the paved/shoulder areas. Spoil backfill will be allowed in non-pavement/shoulder areas. Slurry backfilled required in existing paved areas. 4) All force mains and laterals shall have warning tape placed in the trench between 4 and 5 feet below finished grade. 5) All force mains and laterals are to have tracer wire installed along pipe. At vent pipe (air release), bring tracer wire up along the structure and terminate inside in locator boxes. For laterals, bring tracer wire to surface at lot line. 6) Conductivity testing (continuity) will be line tracing completed by City staff with their equipment in the presence of a developer/contractor representative. Line tracing of the wire shall be performed prior to acceptance.

END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 090 – ROADWAY AND PAVING

These standards shall apply to all public and private projects

SECTION 090: ROADWAY AND PAVING	
DRAFTING	<ol style="list-style-type: none"> 1) The roadway shall be 28 feet wide from back of curb to back of curb, or 30 feet edge of shoulder to edge of shoulder for residential roads. Commercial roads shall be 34 feet back of curb to back of curb (see Figures G and H). 2) The concrete curb and gutter shall be 30 inch mountable for residential roads. In rural developments, the shoulder shall be 36 inches wide. In commercial developments, the curb and gutter shall be 30 inch vertical face (see Figure F). The islands of the cul-de-sacs will be standard vertical face curb (reject curb will only be allowed when approved by the City Engineer). 3) The right-of-way for urban residential developments shall be 60 feet. For rural residential developments the right-of-way shall be 66 feet. Commercial developments shall have a 60-foot right-of-way. Additional right-of-way may be required as determined by the City Engineer. 4) All cul-de-sacs and courts will be in conformance with the City standards (see Figures I thru L). 5) The City standard cross-section must be shown and dimensioned on the plan view or on a detail sheet. 6) Flange lines and back-of-curb lines must be shown. 7) Flange elevations must be indicated at all curved curb and gutter sections, cul-de-sacs, and warped pavement sections from beginning to end and not farther apart than 25 feet. 8) All radii at intersections and cul-de-sacs must be labeled. The minimum radius for an intersection return for two intersecting residential streets shall be 20 feet measured from the back of curb. Larger radii will be required for other street classifications. 9) The minimum street grade shall be 0.50 percent. 10) Vertical curves must be provided for all grade breaks greater than 1 percent. 11) Curb and gutter must have a minimum slope of 0.50 percent around intersection radii. 12) The crown line must be maintained on “through” street. 13) Warped pavement sections to be used only with the City Engineer’s approval. 14) Acceleration/deceleration and bypass lanes are required for any new roads connecting to an existing roadway as required by the City Engineer. The minimum length of the acceleration lane is 100 feet. The minimum length of the deceleration lane is 150 feet. Minimum length of a bypass lane is 250 feet plus the tapers. Additional lengths may be required by the City Engineer. 15) A temporary turn-around (see Figure T) is required at the end of a street that will be extended in the future.
DESIGN – HMA Pavement	<ol style="list-style-type: none"> 1) The asphalt shall be placed in 2 lifts. The residential binder course shall be 3.25 inches thick. The surface course shall be 1.75 inches thick. The final centerline crown shall be 2.0 percent. The surface course shall be set 0.25 inches above the curb flange elevation (see Figures G and H). 2) The asphalt pavement shall be as follows: <ol style="list-style-type: none"> A. Residential Roads – State Specification 460 and:

	<ul style="list-style-type: none"> i. Binder 3 LT 58-28 S (19mm E-0.3) ii. Surface 5 LT 58-28 S (9.5mm E-0.3) <p>B. Arterial Roads – State Specification 460 and:</p> <ul style="list-style-type: none"> i. Binder 3 LT 58-28 S (19 mm E-1) ii. Surface 5 LT 58-28 S (9.5mm E-1) <p>C. Commercial Roads – State Specification 460 and:</p> <ul style="list-style-type: none"> i. Binder 3 LT 58-28 S (19 mm E-1) ii. Surface 4 LT 58-28 S (12.5 mm E-1) <p>3) The contractor shall submit, for the City’s verification, an asphaltic mix design meeting all necessary criteria. The asphaltic mix design shall consist of aggregate gradation, aggregate blend percentages, Job Mix Formula (JMF), recommended asphalt content, recommended plant mix temperature range and shall be signed by a licensed Professional Engineer.</p>
DESIGN – Concrete Pavement (including driveways and curb and gutter)	<ul style="list-style-type: none"> 1) Stone base shall consist of 8 inches of crushed limestone Traffic Bond (TB) and conform to the following: 5 inch base layer of 1-1/4 inch TB and 3 inch surface layer of 3/4 inch TB, and shall be constructed in accordance with the latest edition of the WisDOT Standards Specifications, Section 211. 2) Concrete pavement shall be constructed in accordance with the latest edition of the WisDOT Standards Specifications, Sections 415 and 501. 3) Concrete shall be air entrained, Grade A or A-FA, using Portland cement and aggregates in accordance with the latest edition of the WisDOT Standard Specifications, Section 501. The use of calcium chloride is <u>not</u> acceptable. 4) Concrete curb and gutter shall be constructed in accordance with the latest edition of the WisDOT Standards Specifications, Sections 501 and 601. 5) The concrete pavement shall be as follows: <ul style="list-style-type: none"> A. Minimum concrete content, 6.0 sacks per cubic yard or WisDOT 501.3.2.2 B. Compressive strength after 28 days cured: 3,500 psi C. Maximum amount of water per bag of cement: 6.0 gallons D. Size of course aggregates required: No. 1 plus No. 2. E. Air content: 4.5 percent - 7.5 percent F. Slump <ul style="list-style-type: none"> i. Pavement: maximum 3 inches ii. Curb and gutter: slip-form 2.5 inches; non-slip form maximum 4 inches iii. Driveway approach: maximum 4 inches iv. Testing shall conform to ASTM C143 standard slump cone field test procedure. 6) Dowel and joint locations in street pavement to be determined for each project.
INSTALLATION	<ul style="list-style-type: none"> 1) Flow-thru inlets in curb and gutter shall be constructed to 1/2 inch final grade. All interim (low point) inlets in curb and gutter shall be constructed to allow for one full adjusting ring (minimum depth 1-3/4 inch) prior to surface paving and 5 feet of temporary curb on either side of inlet (see Figure M). Interim inlets shall be adjusted to final grade prior to the installation of the final lift of asphalt. 2) Adjust all manholes and valve boxes to 3/8 inch to 1/2 inch below final pavement grade. 3) The curb shall be ramped with 3 feet of asphalt when binder is placed. This ramp must be milled out prior to the final lift of asphalt (see Figure N). 4) A proof roll is required on the subgrade and the stone base with a fully-loaded quad axle dump truck. Areas exhibiting a deflection greater than 1/2 inch shall be reconstructed by removing a minimum of 1 foot existing material or until stable soil is encountered, whichever is greater; install geotextile Tensar TX

160 and a minimum of 8 inches, 3 inch TB, and 4 inches, 1-1/4 inch TB. Contact the City for any depths greater than 2 feet.

- 5) **Additional proof rolls may be required by the City Engineer or designated representative if site conditions change (e.g., rain) prior to paving.**
- 6) The stone base course shall consist of 10 inches of crushed limestone TB and conform to the following: 5 inch base layer of 1-1/4 inch TB, and 5 inch surface layer of 3/4 inch TB. Each layer shall be rolled and compacted in accordance with the WISDOT Specifications (see Figure H).
- 7) The stone base course shall consist of 8 inches of crushed limestone TB for concrete paving and conform to the following: a 5 inch base layer of 1-1/4 inch TB and a 3 inch surface layer of 3/4 inch TB. Each layer shall be rolled and compacted in accordance with the WisDOT Specifications (see Figure H).
- 8) Concrete thickness of 7 inches for street pavement.
- 9) Contractor must submit asphalt and concrete mix designs and receive the approval of the Engineering Division prior to paving.
- 10) A pre-pour/paving meeting must be scheduled with the Engineering Division prior to paving.
- 11) **No asphalt binder pavement shall be placed: After the Wednesday before Thanksgiving Day; when the air temperature is below 35 degrees Fahrenheit; on frozen base; or during rain events unless specifically directed by the City Engineer.** The base is considered to be frozen when the surface temperature of the base is at or below 32 degrees Fahrenheit as measured by the City's field representative with an infrared temperature gauge.
No asphalt surface pavement shall be placed: After October 15; when the temperature is below 55 degrees Fahrenheit; or during rain events, unless specifically directed by the City Engineer.
- 12) All streets shall be tacked with CSS-1 oil at the rate of 0.05 to 0.15 gallons per square yard prior to paving in accordance with State Specification 455.3.2. Tack must be applied between each layer of asphaltic concrete, unless otherwise approved by the City Engineer. The tack must be allowed to cure before paving.
- 13) Delivered binder course shall have a minimum temperature of 225 degrees Fahrenheit. Delivered surface course shall have a minimum temperature of 250 degrees Fahrenheit.
- 14) Asphaltic concrete paving shall follow State Specifications 450, 460, and 465, unless otherwise noted within these Technical Standards or in a contract specification of the project. The maximum variations are 1/8 inch across a 5 foot straight edge, thickness within 1/4 inch of design, and finish elevation within 1/4 inch of design.
- 15) The City requires all pavements be tested by nuclear density testing. The contractor shall provide the testing and a copy of the results to the City Engineer. Density tests must be taken 1 foot from the centerline of the roadway, 1 foot from the edge of pavement, and the center of the driving lane every 300 feet per lane per linear foot of asphalt placed. Density tests should not be located within 10 feet of a manhole structure. The first test location shall be selected to test the density of the first 40 tons placed for each lane for each layer.
- 16) Compaction of the binder and surface courses shall be in accordance with the WISDOT Specifications Section 460.3.3, except as follows: The minimum acceptable density of the surface course shall be 93 percent and the minimum acceptable density of the binder shall be 91.5 percent. The disincentive pay reduction for HMA Pavement Density is:

Percent Lot Density Below Specified Minimum	Payment Factor (Percent of Contract Price)
From 00 to 0.5 inclusive	98
From 0.6 to 1.0 inclusive	95
From 1.1 to 1.5 inclusive	91
From 1.6 to 2.0 inclusive	85
More than 2.0	Remove and replace lot

- 17) Asphalt driveway replacement shall consist of a minimum 3 inch (one lift) of surface course. Where the existing driveway thickness exceeds the minimum, the contractor shall match existing thickness.
- 18) Asphalt load ticket shall contain the following information:
- A. Date
 - B. Time
 - C. Name of asphalt plant or other supplier
 - D. Project location
 - E. Truck number
 - F. Mix design number
 - G. Mix type including the gradation, traffic, binder, and designation codes
 - H. Gross, net and tare weights
 - I. Load count
 - J. Cumulative tonnage
 - K. Load count
 - L. Ticket number
- 19) For concrete forms, use wood or metal forms straight and with sufficient strength to resist springing, tipping, or other displacement during depositing and consolidating the concrete. Use surfaced planks for wood forms at least 2 inch nominal thickness stock, except for sharply curved sections. Use metal forms of Engineer approved section. Use forms that are the full depth of the required curb and gutter.
- 20) For concrete consolidation, use hand-operated single spud internal vibrators capable of consolidating concrete pavement adjacent to forms, joints, or fixtures. Ensure that vibrators produce a minimum of 7,000 impulses per minute.
- 21) Concrete which has not been discharged from the truck within 1-1/2 hours or 300 drum turns after mixing shall be rejected.
- 22) Concrete which meets or exceeds a temperature of 90 degrees Fahrenheit shall be rejected.
- 23) Concrete curb and gutter shall be jointed every 10 feet, with a felt joint every 200-250 feet, at all radii, and within 5 feet of an inlet.
- 24) Curb and gutter shall not be placed: When the air temperature is below 35 degrees Fahrenheit; on frozen base; or during rain events. The base is considered to be frozen when a surface temperature of the base is at or below 32 degrees Fahrenheit, as measured by the City's field representative with an infrared temperature gauge.
- 25) When the air temperature is expected to drop below freezing, the contractor shall cover the surface of the concrete with straw or hay to a sufficient depth to prevent freezing. Such protection shall be furnished for at least 5 days after the concrete has been poured or until opening strength has been reached. Other

- methods of protection from freezing may be used when approved by the City Engineer.
- A. 22 to <28 F single layer of polyethylene.
 - B. 17 to <22 F double layer of polyethylene.
 - C. <17 F 6 inches of loose, dry straw or hay between 2 layers of polyethylene.
- 26) **Two #4 dowels are required to be drilled into existing concrete curb and gutter when replacing curb on either side of a new section except near inlets.**
- 27) Concrete driveways shall have a minimum thickness of 6 inches and include wire mesh reinforcement. Where the driveway thickness exceeds the minimum, the contractor shall match existing thickness. Use High Early Strength (HES) concrete as directed by the City Engineer.
- 28) Curing compound is required on all new concrete.
- 29) Concrete load ticket shall contain the following information:
- A. Date
 - B. Name of ready mix concrete plant or other supplier
 - C. Project location
 - D. Truck number
 - E. Type (Standard, A.E. or H.E.S.)
 - F. Brand of cement used in batch
 - G. Cement content in bags per cubic yard of concrete
 - H. Aggregate size
 - I. A.E. admixture, if used
 - J. % Fly ash, if used
 - K. Other admixtures (Only with prior approval of the City Engineer)
 - L. Batch out time
 - M. Arrival time at job site
 - N. Time truck finished unloading
 - O. Total amount of water added after batching (in gallons)
- 30) Concrete curb must have a minimum 7 days to cure prior to any work being completed adjacent to the curb including, but not limited to, placement of backfill, topsoil, or paving. If the cure time is less than 7 days, a concrete cylinder break is required, and it must show a minimum strength of 3,000 psi. Curbs must be backfilled after a minimum 7 days for standard concrete (3 days for High Early Strength) and prior to paving.
- 31) Temporary pavement striping is required on all binder pavement the same day it was paved. Follow State Specification 649 with reflectorized paint or tape.
- 32) Pavement striping is required within 24 hours of surface paving. Follow State Specification 646 with Epoxy paint and 646.2.3 with glass beads. Temporary pavement striping should be placed on the binder paving if surface paving will not occur within 24 hours. Signs must be posted notifying the traveling public that there is "NO CENTER STRIPE" or similar.
- 33) All other specifications not covered here are to be covered by the latest edition of the WISDOT Transportation Standard Specifications for Road and Bridge Construction and its addenda.

END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 100 – LANDSCAPING AND RESTORATION

These standards shall apply to all public and private projects

SECTION 100: LANDSCAPING AND RESTORATION	
GENERAL	<ol style="list-style-type: none"> 1) Topsoil must be mechanically screened and free of roots, sticks, branches, and stones greater than 1/2 inch in diameter. 2) Permanent turf grass seed shall be Deluxe 50 seed mix by Reinders, Inc., (2343 Pewaukee Road, Waukesha, WI 53188, Phone: 262-524-0200), or approved equal. Permanent seeding may be placed between March 15 and October 1, or when soil temperatures are consistently above 53 degrees Fahrenheit. Documentation of the PLS (Pure Live Seed) testing, percentages of purity, germination, and weed, source, species, and mix composition are required. 3) No-mow lawn seed shall be “No Mow” lawn mix from Prairie Nursery, (P.O. Box 306, Westfield, WI 53964, Phone: 800-476-9453), or approved equal. No-mow seeding may be placed between March 15 and October 1, or when soil temperatures are consistently above 53 degrees Fahrenheit. Documentation of the PLS (Pure Live Seed) testing, percentages of purity, germination, and weed, source, species, and mix composition are required. 4) Temporary cover crop seed shall follow WDNR Technical Standard 1059. Temporary seed is required when seeding occurs after October 1 and before March 15. 5) Dormant seed shall be the same as the permanent turf grass seed. Dormant seeding shall occur when seed is placed between November 15 and December 15, or when soil temperatures are consistently below 53 degrees Fahrenheit. Do <u>not</u> seed on snow. 6) Turf grass fertilizer must be granular or liquid, phosphorous-free (unless soil test shows a need to add phosphorous), and at least 50 percent of nitrogen content in organic, slow-release form. 7) Mulch shall be weed-free straw or hay. 8) Hydromulch shall be a hydraulically applied bonded fiber matrix. 9) Erosion control mats shall follow WDNR Technical Standard 1052 and 1053.
INSTALLATION	<ol style="list-style-type: none"> 1) Topsoil shall be a minimum of 4 inches thick, placed in a relatively dry state during dry weather, and finished graded within plus-or-minus 1/2 inch. <ol style="list-style-type: none"> A. Scarify subgrade to 6 inches depth. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones in excess of 1/2 inch in size. B. Fine grade topsoil eliminating rough or low areas. C. Remove stone, roots, and branches exceeding 3/4 inch sieve, and foreign material, and clods that cannot be broken down while spreading. D. Lightly compact placed topsoil. 2) Turf grass seeding shall be completed after soil has been disked, harrowed, dragged, and raked to form a level and loose seed bed. <ol style="list-style-type: none"> A. Broadcast seed uniformly by hand or with combination seeder-cultipacker machine such as Brillion or Truax. If by hand, press seed into surface with cultipacker or roller to maximum 1/4 inch depth.

	<p>B. Turf Grass sowing rate is 4.5 pounds per 1,000 square feet. Dormant seeding shall be double the rate. Temporary cover crop should follow the WDNR Technical Standard.</p> <p>3) Fertilizer shall be applied at 7 pounds per 1,000 square feet and shall be uniformly applied in conjunction with final topsoil preparation before seeding.</p> <p>4) Mulch shall be placed within 2 days after completing seeding.</p> <p>5) Erosion Mats are required on slopes greater than 4H:1V or as designed by City Engineer.</p> <p>6) Water seeded areas as follows:</p> <p>A. 1-1/2 inches water on first day after seeding and fertilizing.</p> <p>B. 1/2 inch water every other day until complete germination. Natural rain events may substitute for watering, but perform additional watering on rain event days to achieve stipulated water amounts.</p> <p>7) Lawn areas shall receive at least two 2-inch mowings before acceptance.</p> <p>8) Reseed areas that show inadequate catch and bare spots exceeding 1 square foot. Any damage from erosion, gullies, washouts, traffic, or other causes shall require filling with topsoil, tamping, re-fertilizing, and reseeding.</p>
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END OF SECTION



CITY OF PEWAUKEE TECHNICAL STANDARDS

SECTION 110 – DRAIN TILE

These standards shall apply to all public and private projects

SECTION 110: DRAIN TILE

GENERAL

- 1) Fabric wrapped Perforated Polyvinyl Chloride Pipe conforming to AASHTO M278, or fabric wrapped Perforated High Density Polyethylene (HDPE) smooth interior conforming to AASHTO M252.
- 2) Follow WISDOT Specification 612.
- 3) Reinforced concrete casing pipe required for drain tile under driveways. Follow SWS 6.2.3.
- 4) Install per line and grade shown on plans.
- 5) Backfill per SWS 3.2.6i.

END OF SECTION

Exhibit A

Page 1 of 26

STORM WATER MANAGEMENT PRACTICES MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 20____, by and between (Insert Full Name of Owner) _____ hereinafter called the "Owner", and the City of Pewaukee, hereinafter called the "City".

WITNESSETH:

WHEREAS, the Owner is the owner of the following described lands situated in the City of Pewaukee, County of Waukesha County, State of Wisconsin, to-wit:

(Insert legal description)

hereinafter called the "Property".

WHEREAS, the Owner is developing the property; and

WHEREAS, the Site Plan/Subdivision Plan known as _____ (Name of Plan-Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the City, provides for on-site storm water management practices within the confines of the Property; and

WHEREAS, the City and the Owner, its successors and assigns, including any homeowners association, agree that the health, safety and welfare of the residents of the City of Pewaukee, require that on-site storm water management practices as defined in Chapter 19 of the Pewaukee Municipal Code be constructed and maintained on the Property; and

WHEREAS, the City requires that on-site storm water management practices as shown on the Plan be constructed and adequately maintained by the Owner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site storm water management practices shall be constructed by the Owner, its successors and assigns, including any homeowners association, in accordance with the plans and specifications indicated in the Plan and applicable statutes, ordinances and rules. The storm water management practices shall serve the drainage area designated in the Plan.
2. The Owner, its successors and assigns including but not limited to any homeowners association, shall regularly inspect the storm water management practices and specifically the function of the approved storm water management system as often as conditions require, but in any event at least once each year. The standard Operation and Maintenance Report attached to this agreement as

Exhibit A

Exhibit D and by this reference made a part hereof shall be used for the purpose of the regular inspections of the storm water management practices. The Owner, its successors and assigns shall keep the Operation and Maintenance Reports from past inspections as well as a log of maintenance activity indicating the date and type of maintenance completed. The Reports and maintenance log shall be made available to the City for review. The purpose of the inspections is to assure safe and proper functioning of the facilities. The inspections shall cover all facilities including but not limited to berms, outlet structures, pond areas and access roads. Deficiencies shall be noted in the Operation and Maintenance Report.

3. The Owner, its successors and assigns, including any homeowners association, shall adequately maintain the storm water management practices, including but not limited to all pipes and channels built to convey storm water to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the storm water. Adequate maintenance is herein defined as keeping the storm water management facilities in good working condition so that these facilities are performing to their design functions and are in accordance with the Operations and Maintenance Standards attached to this agreement as Exhibit D and by this reference made a part hereof.
4. The Owner, its successors and assigns, including any homeowners association, hereby grant permission to the City, its authorized agents and employees, to enter upon the Property and to inspect the storm water management practices whenever the City deems necessary. The purpose of inspection is to investigate reported deficiencies and/or to respond to citizen complaints. The City shall provide the Owner, its successors and assigns, including any homeowners association, copies of the inspection findings and a directive to commence with the repairs if necessary. Corrective actions shall be taken within a reasonable time frame as established by the City Engineer.
5. If the Owner, its successors and assigns, including any homeowners association, fails to maintain the storm water management practices in good working condition, consistent with the terms of the approved plans and specifications approved by the City and does not perform the required corrective actions and inspections in the specified time, the City may:
 - a. Issue a citation to the Owner, its successors and assigns. Each day that the violation exists shall constitute a separate offense, and shall be considered a continuing violation.
 - b. Perform the corrective actions identified in the inspection report and assess the Owner, its successors and assigns for the cost of such work. The cost of such work may be specially assessed against the property pursuant to Wisconsin Statutes Section 66.0703. If the facilities are located on an outlot owned collectively by a homeowners association, the City may assess each

Exhibit A

member of the homeowners association according to the ownership interest in the facilities located on the property. This provision shall not be construed to allow the City to erect any structure of permanent nature on the land of the Owner outside of the easement for the storm water management practices, and in no event shall this Agreement be construed to impose any such obligation on the City.

6. The Owner, its successors and assigns, including any homeowners association, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the storm water management practices (including sediment removal) is outlined on the approved plans, the schedule will be followed. The minimum amount of maintenance on the storm water management practices shall be in accordance with the Maintenance Standards (Exhibit D).
7. In the event the City pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Owner, its successors and assigns, including any homeowners association, shall reimburse the City upon demand, within thirty (30) days of receipt for all actual costs incurred by the City hereunder.
8. This Agreement imposes no liability of any kind whatsoever on the City, its officers, agents and employees, and the owner agrees to indemnify and hold the City harmless as and against any and all claims, actions, causes of action, demands, including attorney fees which the City may incur as a result of the failure of the storm water management system and/or actions taken or not taken by the City to enforce the terms of this agreement including, but not limited to, the performance of maintenance activities.
9. This Agreement shall be attached as an exhibit to any document which creates a homeowners association that is responsible for maintenance of the storm water management practices and be recorded at the Waukesha County Register of Deeds, and shall constitute covenant running with the land, and shall be binding on the Owner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association. The owner shall provide the City with a copy of any document which creates a homeowners association that is responsible for the storm water management practices.
10. Notwithstanding anything in this Agreement to the contrary, in the event the Owner, or the Owner's successors and assigns, sell or otherwise transfer ownership in the Property, the Owner and the Owners successors and assigns, are hereby released from any and all liabilities and obligations under the terms of this Agreement.

Exhibit A

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WITNESS the following signatures and seals:

Company/Corporation/Partnership Name (Seal)

(Type Name), (Type Title)

STATE OF WISCONSIN)
)ss.
COUNTY OF WAUKESHA)

Personally came before me this ___ day of _____, _____, the above named _____, to me known to be the person who executed the foregoing instrument and acknowledged the same.

Notary Public, State of Wisconsin
My Commission Expires: _____

Exhibit A

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Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcel(s) affected by this Agreement. For a larger scale view of the referenced document, contact the Waukesha County Register of Deeds office.

Project Identifier: _____

Date of Recording: _____

Map Produced By: _____

Legal Description: _____

(Insert reduced size map of development with storm water areas to be maintained by this agreement shaded.)

Exhibit A

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Exhibit B - Location Map Storm Water Management Practices Covered by this Agreement

The storm water management practices covered by this Agreement are depicted in the reduced copy of the construction plans, as shown below. The practices include _____

All of the noted storm water management practices are located _____,
as noted in Exhibit A.

Subdivision Name: _____

Storm water Practices: _____

Location of Practices: _____

Owners: _____

(Insert reduced size location map of all storm water practices identified that are required to be maintained in accordance with this agreement.)

Exhibit A

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Exhibit C Minimum Storm Water Practice Maintenance Requirements

This exhibit explains the basic function of each of the storm water practices listed in Exhibit B and prescribes the maintenance requirements beyond the minimum requirements in Exhibit D to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions in perpetuity. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this particular site. Access to the storm water practices for maintenance vehicles is shown in Exhibit B. Any failure of a storm water practice that is caused by a lack of maintenance will subject the Responsible Party to enforcement of the provisions of this Agreement by the City of Pewaukee.

(Insert description of all practices and their intended functions. This includes a description of the drainage area, a list of best management practices maintenance requirements, and detailed construction drawings showing all critical components and their planned elevations.).

Exhibit A

Exhibit D Minimum Operation and Maintenance Requirements

WET DETENTION POND OPERATION AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Mowing

1. Side slopes, embankments, and emergency spillways that are not rock lined which have been planted with turf grasses should be mowed at least twice a year to prevent woody growth and control noxious weeds.
2. Adjacent to the residential areas, more frequent mowing, typically once a week during a normal growing season, is recommended for aesthetic and allergy control purposes.
3. Native grasses should be mowed to a height of 6" in mid to late summer or after they have achieved a height of 1-1/2 feet during the first growing season. Further mowing in subsequent growing seasons will not be required
4. If possible, the native grass area should be burned off every three to four years in the spring of the year. Check local burning regulations as permits may be required.
5. If burning of the native grass areas is not possible, a 5 to 8" mowing every 3 to 4 years, may suffice as a substitute management technique. The mowed area should be raked and performed in the spring.

B. Inspections

1. Inspections of the ponds shall be completed on a quarterly basis or after significant rainfall events.
2. The inspections should be completed during wet weather conditions to determine if the ponds are functioning properly.
3. Inspection priorities shall be as follows:
 - a. Inspect the embankments for subsidence, erosion, cracking and tree growth.
 - b. Inspect the condition of the emergency spillway and overland flow path.

Exhibit A

- c. Inspect the pond for accumulation of sediment.
 - d. Inspect the outlet control structure for clogs, debris and material failures.
 - e. Inspect upstream and downstream channels from an erosion perspective.
 - f. Inspect any modifications that may have been done to the ponds following their initial construction.
 - g. Inspect the side slopes of the pond for erosion, slumping, cracking or woody plant materials.
4. As-built plans shall accompany the person responsible for the pond inspections.
 5. Documentation of the inspections should be completed and filed. Documentation should include at a minimum:
 - a. Inspectors name, affiliation and professional credentials if applicable.
 - b. Date, time and weather conditions.
 - c. Approximate rainfall total over a 24 hour period if applicable.
 - d. Existing embankment, outlet and inlet conveyance systems and vegetation condition.
 - e. Sediment depth at the outlet control structure and at a minimum one other location.
 - f. Identification of potential structural failures and repair needs
 - g. Other pond conditions such as vegetation growth, algae growth and emergency spillway conditions.
 - h. Repair recommendations.
- C. Debris and Litter Removal.
1. Debris and litter removal from the pond surface shall be completed at least once a month.

Exhibit A

2. Particular attention should be paid to debris accumulating around the riser pipe to prevent potential clogging.

D. Erosion Control.

1. The pond side slopes, embankments and emergency spillways may suffer from periodic slumpage and erosion.
2. Corrective measures shall include re-grading, filling and re-vegetation of the eroded or slumping areas.
3. Rip rap at the pond outlet and emergency spillways should be inspected for displacement or undermining. Repairs shall be made upon discovery.

E. Nuisance Control.

1. Biological control of algae and mosquitoes is preferred over chemical control. Consultation with local WDNR officials is recommended prior to the introduction of any biological control.
2. Maintaining the native grass perimeter will aide in the control of geese.
3. Mechanical controls should be used when feasible.

II. NON-ROUTINE MAINTENANCE

A. Structural Repairs and Replacement.

1. The outlets of the pond have been constructed utilizing concrete pipe. The estimate life of these structures is 75 to 100 years. Annual inspection of the structures will disclose any potential structural problems. If structural problems appear, repair or replace the outlet.
2. Excessive or chronic drawdown of the ponds may cause leaks or seepage through the embankments. Excessive drawdown should be avoided and thus corrective measures for leakage and seepage can be avoided.

B. Sediment Removal

1. A sediment clean out cycle of 10 to 15 years is recommended. Sediment removal may be necessary prior to 10 years if there is a substantial amount of land disturbance occurring within the contributory watershed. Annual inspections shall be made to insure that the design depth of the permanent water pool is maintained.

Exhibit A

2. Sediment removed from the ponds shall be hauled to an upland area, spread and stabilized with vegetative material or disposed of in accordance with Chapter NR 528 of the Wisconsin Administrative Code.
3. It is recommended that the sediment be tested to determine if land filling is necessary. Contact the local DNR prior to sediment sampling and testing to insure compliance with State standards and regulations.
4. Surveyed depths of the sediment storage area and permanent pool elevations shall be made immediately following the construction of the ponds and recorded on the as-built plans. Annual inspections shall include measure downs to determine sediment elevations in relation to the permanent pool elevation.

III. RESPONSIBLE PARTY & FINANCIAL FUNDING

- A. The responsible party for the operation, inspection and maintenance of the wet ponds shall be the _____.
- B. It is recommended that the _____ establish a perpetual maintenance fund to insure that the ponds are properly inspected, maintained and repaired.

IV. ADDITIONAL CONSIDERATIONS TO IMPROVE POND WATER QUALITY AND REDUCE MAINTENANCE COSTS.

- A. General.
 1. Improper disposal of yard wastes will affect the water quality of the wet ponds and may cause clogging of the outlet structure.
 2. Improper fertilizer and pesticide application will affect the water quality of the wet ponds and add to algae growth.
 3. Excess lawn watering will affect the water quality of the ponds due to increased water runoff that may contain fertilizers and pesticides.
- B. Yard Care
 1. It is recommended to consider routine yard care maintenance that is practical and environmentally sound.
 2. Refer to the U.W. Extension's "Rethinking Yard Care" for additional information.

Exhibit A

C. Leaves and Yard Trimmings.

1. It is recommended that leaves and yard trimmings be properly disposed of.
2. Refer to the U.W. Extension's "Managing Leaves and Yard Trimmings" for further information.

D. Lawn and Garden Fertilizers.

1. It is recommended to control fertilizer applications on lawn and gardens so as not to be detrimental to the water quality of the ponds. Recall the City of Pewaukee has a phosphorus ban on all lawns unless it is utilized for starting a new lawn or a soils test shows a deficiency.
2. Refer to the U.W. Extension's "Lawn and Garden Fertilizers" for further information.

E. Lawn and Garden Pesticides.

1. Lawn and garden pesticides may pollute surface and ground water.
2. Refer to the U.W. Extension's "Lawn and Garden Pesticides" for further information.

F. Lawn Watering.

1. Excess lawn watering will wash pollutants into the wet ponds. Recall the City of Pewaukee has lawn water regulations that must be followed if you opt to water your lawn.
2. Refer to the U.W. Extension's "Lawn Watering" for further information.

G. Lawn Weed Control.

1. Proper turf management will lower the amount of the chemicals that may runoff into the wet ponds during rain events.
2. Refer to the U.W. Extension's "Lawn Weed Control" for further information.

Exhibit A

INFILTRATION TRENCHES OPERATION AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Inspection

1. Inspection should occur several times in the first few months of operation and then quarterly thereafter.
2. Inspect after significant rainfall events
3. Surface ponding exceeding a 72 hour period may indicate a clogged system.
4. Water levels in the observation well should be checked and recorded over several days to determine if the system is operating effectively.
5. Inspect pre-treatment areas quarterly. Sump pits may require cleaning, two to three times per year. Other pre-treatment facilities should be inspected quarterly for sediment accumulation and cleaning. Sediment may also build up in the top foot of the trench. Inspect by digging a small hole down to the filter fabric. Remove accumulated sediment if necessary and restore.

B. Buffer Maintenance

1. Inspect the vegetated buffer strips quarterly.
2. The vegetative buffer should have a vigorous and dense growth habit.
3. Bare spots, eroded areas, and areas damaged by road salts should be repaired and reseeded.
4. Grass should not be mowed shorter than 5". Mower clippings should be removed and disposed of properly to avoid clogging the trench.

C. Woody Plant Maintenance

1. Adjacent trees should be trimmed if their drip line extends over the surface of the trench so that the leaves do not clog the trench.
2. Pioneer trees should be removed to avoid root invasion into the trench.

Exhibit A

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II. NON-ROUTINE MAINTENANCE

A. Surface Clogging

1. Surface clogging typically occurs in the top foot of the trench.
2. Remove the top layer of stone down to the filter fabric. Remove and replace the clogged filter fabric. Reinstall the stone.

B. Clogging of the underground trench.

1. This condition will require the entire removal and replacement of the trench material and filter fabric.
2. The subsoil will require tilling and the layers of trench material be reinstalled following the subsoil tilling.

Exhibit A

INFILTRATION BASIN OPERATION AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Inspection

1. Performance of the infiltration basin should be inspected monthly and after every major storm event, following the initial construction to evaluate if the basin is draining within the design time limits.
2. If performance does not meet the design goals, complete repairs to the facility to meet the design requirements.
3. Following the initial year of monthly inspections, quarterly inspections of the facility should be made. Inspect the facility for:
 - a. Differential settlement
 - b. Cracking
 - c. Erosion
 - d. Leakage
 - e. Tree and woody plant growth on the embankments
 - f. Condition of the inlets and outlets and level spreaders
 - g. Sediment accumulation
 - h. Vigor and density of vegetation on the floor of the basin and buffer strips
 - i. Standing water in over 50% of the basin for more 3 days

B. Mowing – Native Vegetation

1. During establishment of vegetation, the first mowing shall occur once it reaches a height of 10 to 12 inches.
2. Control woody plant invasion by mowing or routine burning once a year. The vegetation height shall be 5 to 6 inches after mowing.
3. If burning cannot be accommodated, mow once per year in the fall after November 1st.

Exhibit A

4. Remove trash and debris at the time of mowing.

C. Burning

1. Shall be begin the second year, if it can be accommodated.
2. Shall occur in the early Spring prior to May 1st or in the late fall after November 1st.
3. Shall be done two consecutive years and then up to 3 years can pass before the next burning.
4. Under no circumstances shall burning occur every other year.

C. Erosion Control

1. Inspect quarterly for erosion. Inspection after major storm events for erosion problems is also recommended if practical.
2. Repair all eroded areas immediately. Temporary erosion controls may be necessary to facilitate repairs.

D. Tilling

1. If the basin is located on marginally permeable soils, annual or semi-annual tilling may be needed to maintain infiltration capacity.
2. Tilled areas should be immediately re-vegetated to prevent erosion.

E. Pre-Treatment Systems

1. Maintenance of the pre-treatment system should include sediment removal, oil and grease skimming, and grass filter strip maintenance.
2. Inspect the structural elements of the pre-treatment system and repair if needed.

II. NON-ROUTINE MAINTENANCE

A. Structural Maintenance

1. Inspect pipe systems quarterly.
2. Remove and replace pipe systems that have eroded or rusted.

Exhibit A

3. Earthen structures should be inspected annually. Erosion should be repaired immediately upon discovery.

B. Restoration of Infiltration Capacity

1. Over time the original infiltration capacity of the basin will be diminished.
2. Deep tilling can be done to restore the infiltration capacity of the basin. The basin will be drained and the soils dried to a depth of 8 inches.
3. The top 2 to 3 inches of topsoil, chisel plowing, and adding topsoil and compost can be done.
4. The basin must be restored with native plantings.

Exhibit A

BIORETENTION OPERATIONS AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Inspection

1. Performance of the bioretention basin should be inspected monthly and after every major storm event, following the initial construction to evaluate if the basin is draining within the design time limits.
 - a. Water plants should be watered as necessary the first year to establish plants.
2. If performance does not meet the design goals, complete repairs to the facility to meet the design requirements.
3. Following the initial year of monthly inspections, quarterly inspections of the facility should be made. Inspect the facility for:
 - a. Differential settlement
 - b. Cracking
 - c. Erosion
 - d. Leakage
 - e. Tree and woody plant growth on the embankments and plant health
 - f. Condition of the inlets and outlets and level spreaders
 - g. Sediment accumulation
 - h. Vigor and density of vegetation on the floor of the basin and buffer strips
 - i. pH testing of the soil
 - j. Observation wells and/or under drains

B. Mowing – Native Vegetation

1. During establishment of vegetation, the first mowing shall occur once it reaches a height of 10 to 12 inches.

Exhibit A

2. Control woody plant invasion by mowing once a year. The vegetation height shall be 5 to 6 inches after mowing.
3. Mow once per year in the fall after November 1st.
4. Remove trash and debris at the time of mowing.

C. Erosion Control

1. Inspect quarterly for erosion. Inspection after major storm events for erosion problems is also recommended if practical.
2. Repair all eroded areas immediately. Temporary erosion controls may be necessary to facilitate repairs.

D. Tilling

1. If the basin is located on marginally permeable soils, annual or semi-annual tilling may be needed to maintain infiltration capacity.
2. Tilled areas should be immediately re-vegetated to prevent erosion.

E. Pre-Treatment Systems

1. Maintenance of the pre-treatment system should include sediment removal, oil and grease skimming, and grass filter strip maintenance.
2. Inspect the structural elements of the pre-treatment system and repair if needed.

F. Mulch

1. Re-mulch void areas as needed.
2. Add additional mulch once per year.

II. NON-ROUTINE MAINTENANCE

A. Structural Maintenance

1. Inspect pipe systems quarterly.
2. Remove and replace pipe systems that have eroded or rusted.

Exhibit A

3. Earthen structures should be inspected annually. Erosion should be repaired immediately upon discovery.

B. Restoration of Infiltration Capacity

1. Over time the original infiltration capacity of the basin will be diminished.
2. Deep tilling can be done to restore the infiltration capacity of the basin. The basin will be drained and the soils dried to a depth of 8 inches.
3. The top 2 to 3 inches of topsoil, chisel plowing, and adding topsoil and compost can be done.
4. The basin must be restored with native plantings.

C. Watering

1. Water plants need to be watered as necessary during the first growing season.
2. After the first growing season, water as necessary during dry periods.

Exhibit A

VEGETATED FILTER STRIPS OPERATION AND MAINTENANCE

I. INSPECTION

- A. Inspect quarterly and after every major storm event.
- B. Inspect for erosion, accumulation of sediment, diversions and short circuiting, standing water and the accumulation of litter.

II. MAINTENANCE

- A. Do not mow vegetation to a height lower than the design flow depth.
- B. Minimize the use of fertilizers and pesticides.
- C. Do not use heavy equipment to mow. Mowing should occur during dry periods to avoid compaction.
- D. Repair and reseed eroded areas immediately upon discovery.

Exhibit A

GRASSED SWALES OPERATION AND MAINTENANCE

I. INSPECTION

- A. Inspection should occur seasonally and after major rainfall events.
- B. Inspect for sediment deposition, check dam bypassing, erosion and litter.
- C. Nuisance conditions such as woody plant growth and mosquito breeding areas should also be identified and removed.

II. MAINTENANCE

- A. Mow only to maintain the vegetation at a height greater than the design flow depth.
- B. Maintain the vegetated liner in a vigorous condition.
- C. Depending on the vegetative material, mowing may be infrequent or unnecessary.
- D. Remove woody plants that may invade the swale.
- E. If the swale is damaged by road salts, remove the damaged area and replant with salt tolerant grasses.
- F. Discourage deposition of leaf litter and grass clippings by informing, typically by signage, local residents of the swales purpose.

Exhibit A

STORM SEWER SYSTEM OPERATIONS AND MAINTENANCE

I. INSPECTION

A. Frequency

- a. Inspect catch basins, inlets and manholes at least once per year.
- b. Inspect storm sewer end sections at least twice per year and after major rainfall events.

B. Inspection

a. Catch Basins, Inlets and Manholes

- i. Inspect for sediment deposition in the bottom of structures.
- ii. Check frames and lids for cracks and wear such as rocking lids or lids moved by traffic and for shifted frames.
- iii. Check chimneys for cracked mortar, cracked lift rings and spalling.
- iv. Check for leaks at joints.
- v. Check surrounding areas for pollutants such as leaks from dumpsters, minor spills and oil dumping.

b. Storm Sewer End sections

- i. Observe for obstructions, accumulation of sediment and trash, undermining and joint separation.
- ii. Inspect end treatment for settlement, scour and displaced armoring.

II. STANDARD MAINTENANCE

A. Catch Basins, Inlets and Manholes

- a. Repair any deterioration threatening structural integrity immediately.
- b. Replace worn or cracked frames and lids. Frames that have shifted should be re-centered and re-set on the structure.

Exhibit A

- c. Repair any spalled or cracked mortar. Cracked rings should be repaired or replaced.
- d. Repair leaking joints.
- e. Clean manhole and storm inlet inverts of deposited material. Catch basins should be cleaned before the sump is 40 percent full.
- f. Remove potential sources of contamination away from catch basins, inlets and manholes.

B. Storm Sewer End sections

- a. End sections should be free flowing; trash, debris and obstructions should be removed to prevent backups.
- b. End sections which have separated from the storm sewer pipe shall be reset on firm bedding and reconnected to the existing storm sewer pipe. Restrain joints if necessary.
- c. Scour areas shall be repaired immediately. Replace missing soil with clean fill and replace/install end treatment. Missing armoring will require additional stone, typically one class larger.
- d. Excessive material deposited at the storm sewer outfall is indicative of: a disturbed area upstream draining to the system or a potential failure of a system component. Disturbed areas draining to the system should be stabilized immediately or diverted to drain to a BMP. Potential system failures require non-standard maintenance.

III. NON-STANDARD MAINTENANCE

A. Non-standard maintenance includes inspection, repair or replacement of buried structures.

- a. Televising of buried structures (pipes) should occur when excessive material is found within the system or at an outfall with no apparent source area visible at the surface, or the system experiences frequent backups.
- b. Follow the recommendations for the repair and/or replacement of system components televised by a firm specializing in this work.

Exhibit A

CULVERTS OPERATION AND MAINTENANCE

I. INSPECTION

- A. Culverts should be inspected twice a year and after heavy rainfall.
- B. Inspect for sediment deposition, scour at the ends of pipe, accumulations of trash and obstructions.

II. MAINTENANCE

- A. Scour areas should be repaired with clean fill and replacement of end treatment (rip rap, TRM, etc.). Scour areas with no end treatment should be stabilized with topsoil, seed and erosion control mat at a minimum.
- B. Sediment deposits, trash and obstructions should be removed from the pipe ends.
- C. Material deposited within the pipe should be promptly removed to maintain the conveyance capacity of the pipe.

Exhibit B-1



EROSION CONTROL AND STORM WATER MANAGEMENT PERMIT APPLICATION

Department of Public Works

W240N3065 Pewaukee Road DPW Main Office: (262)691-0804
Pewaukee, WI 53072 Fax: (262) 691-5729

Site Information

Site Name: _____
Site Address: _____
Town: _____ Range: _____ Section: _____ ¼ Section: _____
Plat Name: _____
Certified Survey Map: _____
Lot No.: _____
Gross Disturbed Area: _____ square feet or _____ acres
Total New Impervious Area (includes gravel): _____ square feet or _____ acres
Total Redevelopment Impervious Area (includes gravel): _____ square feet or _____ acres
Construction Start Date Anticipated: _____
Stabilized Site Date Anticipated: _____
Application Fee: \$50

Applicant Information (Landowner)

Name: _____ Company: _____
Mailing Address: _____
City: _____ State: _____ Zip Code: _____-_____
Daytime Phone: (____) ____-____ Cell Phone: (____) ____-____ Fax: (____) ____-____
Email Address: _____

If the box is checked below, I hereby authorize the contact(s) identified to serve as my representative(s).

I have reviewed and understand Chapter 19 of the City of Pewaukee Ordinances regarding erosion control and storm water management and I shall implement the plan for this project as approved by the City.
I further understand by submitting this application, the designated personnel of the City of Pewaukee may enter the subject site to obtain information necessary to administer the ordinance.

Signature of Applicant: _____ Date: _____

Engineer Contact Information

Authorized as application representative.

Name: _____ Company: _____
Mailing Address: _____
City: _____ State: _____ Zip Code: _____-_____
Daytime Phone: (____) ____-____ Cell Phone: (____) ____-____ Fax: (____) ____-____
Email Address: _____

CITY OFFICE USE ONLY

Name of Project: _____
Date of Receipt: _____
Erosion Control Plan Approved: _____ Plans Dated: _____
Storm Water Management Plan Approved: _____ Plans Dated: _____
Maintenance Agreement Executed: _____
Conditions of Approval: _____

Professional Services Review Fee: _____ Deposit Required: _____
Approving Authority: _____ Date: _____



CERTIFICATE OF PERMIT COVERAGE

POST-CONSTRUCTION STORM WATER MANAGEMENT PERMIT

This permit certifies that the landowner has complied with the submittal requirements and demonstrated compliance with the performance standards of Chapter 19 of the City of Pewaukee Municipal Code. The landowner is hereby authorized construct and complete the storm water management practices in accordance with the approved plans and Chapter 19 of the Municipal Code. The landowner must have the completed storm water management practice installations certified “as built” by a licensed professional engineer and pass a final inspection by the City Engineer.

City of Pewaukee Permit No.:
Site Name:
Site Location:

Additional Information:

Landowner:
Landowner’s Contact Person:
Contact Telephone Number:
Permit Start Date:

Permit Authorized by: _____



CERTIFICATE OF PERMIT COVERAGE

CONSTRUCTION SITE EROSION CONTROL PERMIT

This permit certifies that the landowner has complied with the submittal requirements and demonstrated compliance with the performance standards of Chapter 19 of the City of Pewaukee Municipal Code. The landowner is hereby authorized to undertake land disturbing construction activity at this site. The landowner must implement and maintain erosion control practices to limit sediment-contaminated runoff to waters of the state in accordance Chapter 19 of the Municipal Code and Chapter NR 216 of the Wis. Adm. Code.

City of Pewaukee Permit No.:
Site Name:
Site Location:

Additional Information:

Landowner:
Landowner's Contact Person:
Contact Telephone Number:
Permit Start Date:

Permit Authorized by: _____

Exhibit C

W240 N3065 Pewaukee Road Phone – 262-691-0804 Fax – 262-691-5729 *NOTE*: All Highlighted Areas must be completed	GRADING / LANDSCAPING PERMIT APPLICATION CITY OF PEWAUKEE	Permit No.
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Building Site Address:		Tax Key #
Owner's Name:	Mailing Address	Tel.
	Email Address	Cell#
Landscape Contractor Name:	Mailing Address	Tel.
	Email Address	Cell#
Subdivision Name	Lot No.	Block No.

1. Prior to final grading of parcel applicant shall return Grading / Landscaping Permit Application to City of Pewaukee Engineering Department at which time applicant will be issued a copy of the Approved Final Grading Plan and Permit.
2. Applicants Signature will be required at the Application and Issuance of the Approved Grading Plan for verification of acceptance.

I agree to comply with all applicable codes, statutes and ordinances and with the conditions of this permit; understand that the issuance of the permit creates no legal liability, express or implied, on the state or municipality; and certify that all the above information is accurate. If one acre or more of soil will be disturbed, I understand that this project is subject to ch. NR 151 and chapter 19 regarding additional erosion control and stormwater management. I expressly grant the City Engineer or Engineers authorized agent, permission to enter the premises for which this permit is sought at all reasonable hours and for any proper purpose to inspect the work which is being done.

I vouch that I am or will be an owner-occupant of this dwelling for which I am applying for a Grading / Landscaping permit without a Dwelling Contractor Financial Responsibility Certification and have read the cautionary statement regarding contractor responsibility . No refunds issued after work has begun. By applying for this permit, you are authorizing City personnel to inspect this property within the scope of their duties.

APPLICANTS SIGNATURE _____	DATE SIGNED _____/_____/_____
-----------------------------------	---

APPROVAL CONDITIONS	This permit is issued pursuant to the following conditions. Failure to comply may result in suspension or revocation of this permit or other penalty. <input type="checkbox"/> See below for conditions of approval.
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1. Inspection of Final Grading by Authorized City of Pewaukee Personnel will be required prior to any seeding / sodding of subject Property. Notification of this inspection must be made a minimum of 48 hours in advance of required inspection time at 262-691-0804.
2. In the event that subject property fails to pass inspection. Applicant will have six (6) months from time of failed inspection to rectify grading problems. After six (6) months time if applicant has failed to rectify grading problems and have property re-inspected Erosion / Grading Bond will be forfeited.
3. A copy of the Approved Grading Plan is attached and must be followed. Any changes must be submitted in writing with a Revised Grading Plan and approved by the City Engineer.

Permit Received by & Conditions of Approval Understood:

Name _____ Date _____

PERMIT ISSUED BY: NAME _____	DATE: _____/_____/_____	
--	-----------------------------------	--

Minimum Operation and Maintenance Requirements

WET DETENTION POND OPERATION AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Mowing

1. Side slopes, embankments, and emergency spillways that are not rock lined which have been planted with turf grasses should be mowed at least twice a year to prevent woody growth and control noxious weeds.
2. Adjacent to the residential areas, more frequent mowing, typically once a week during a normal growing season, is recommended for aesthetic and allergy control purposes.
3. Native grasses should be mowed to a height of 6" in mid to late summer or after they have achieved a height of 1-1/2 feet during the first growing season. Further mowing in subsequent growing seasons will not be required
4. If possible, the native grass area should be burned off every three to four years in the spring of the year. Check local burning regulations as permits may be required.
5. If burning of the native grass areas is not possible, a 5 to 8" mowing every 3 to 4 years, may suffice as a substitute management technique. The mowed area should be raked and performed in the spring.

B. Inspections

1. Inspections of the ponds shall be completed on a quarterly basis or after significant rainfall events.
2. The inspections should be completed during wet weather conditions to determine if the ponds are functioning properly.
3. Inspection priorities shall be as follows:
 - a. Inspect the embankments for subsidence, erosion, cracking and tree growth.
 - b. Inspect the condition of the emergency spillway and overland flow path.

Exhibit D

- c. Inspect the pond for accumulation of sediment.
 - d. Inspect the outlet control structure for clogs, debris and material failures.
 - e. Inspect upstream and downstream channels from an erosion perspective.
 - f. Inspect any modifications that may have been done to the ponds following their initial construction.
 - g. Inspect the side slopes of the pond for erosion, slumping, cracking or woody plant materials.
4. As-built plans shall accompany the person responsible for the pond inspections.
 5. Documentation of the inspections should be completed and filed. Documentation should include at a minimum:
 - a. Inspectors name, affiliation and professional credentials if applicable.
 - b. Date, time and weather conditions.
 - c. Approximate rainfall total over a 24 hour period if applicable.
 - d. Existing embankment, outlet and inlet conveyance systems and vegetation condition.
 - e. Sediment depth at the outlet control structure and at a minimum one other location.
 - f. Identification of potential structural failures and repair needs
 - g. Other pond conditions such as vegetation growth, algae growth and emergency spillway conditions.
 - h. Repair recommendations.
- C. Debris and Litter Removal.
1. Debris and litter removal from the pond surface shall be completed at least once a month.
 2. Particular attention should be paid to debris accumulating around the riser pipe to prevent potential clogging.

Exhibit D

D. Erosion Control.

1. The pond side slopes, embankments and emergency spillways may suffer from periodic slumpage and erosion.
2. Corrective measures shall include re-grading, filling and re-vegetation of the eroded or slumping areas.
3. Rip rap at the pond outlet and emergency spillways should be inspected for displacement or undermining. Repairs shall be made upon discovery.

E. Nuisance Control.

1. Biological control of algae and mosquitoes is preferred over chemical control. Consultation with local WDNR officials is recommended prior to the introduction of any biological control.
2. Maintaining the native grass perimeter will aide in the control of geese.
3. Mechanical controls should be used when feasible.

II. NON-ROUTINE MAINTENANCE

A. Structural Repairs and Replacement.

1. The outlets of the pond have been constructed utilizing concrete pipe. The estimate life of these structures is 75 to 100 years. Annual inspection of the structures will disclose any potential structural problems. If structural problems appear, repair or replace the outlet.
2. Excessive or chronic drawdown of the ponds may cause leaks or seepage through the embankments. Excessive drawdown should be avoided and thus corrective measures for leakage and seepage can be avoided.

B. Sediment Removal

1. A sediment clean out cycle of 10 to 15 years is recommended. Sediment removal may be necessary prior to 10 years if there is a substantial amount of land disturbance occurring within the contributory watershed. Annual inspections shall be made to insure that the design depth of the permanent water pool is maintained.
2. Sediment removed from the ponds shall be hauled to an upland area, spread and stabilized with vegetative material or disposed of in accordance with Chapter NR 528 of the Wisconsin Administrative Code.

Exhibit D

3. It is recommended that the sediment be tested to determine if land filling is necessary. Contact the local DNR prior to sediment sampling and testing to insure compliance with State standards and regulations.
4. Surveyed depths of the sediment storage area and permanent pool elevations shall be made immediately following the construction of the ponds and recorded on the as-built plans. Annual inspections shall include measure downs to determine sediment elevations in relation to the permanent pool elevation.

III. RESPONSIBLE PARTY & FINANCIAL FUNDING

- A. The responsible party for the operation, inspection and maintenance of the wet ponds shall be the _____.
- B. It is recommended that the _____ establish a perpetual maintenance fund to insure that the ponds are properly inspected, maintained and repaired.

IV. ADDITIONAL CONSIDERATIONS TO IMPROVE POND WATER QUALITY AND REDUCE MAINTENANCE COSTS.

- A. General.
 1. Improper disposal of yard wastes will affect the water quality of the wet ponds and may cause clogging of the outlet structure.
 2. Improper fertilizer and pesticide application will affect the water quality of the wet ponds and add to algae growth.
 3. Excess lawn watering will affect the water quality of the ponds due to increased water runoff that may contain fertilizers and pesticides.
- B. Yard Care
 1. It is recommended to consider routine yard care maintenance that is practical and environmentally sound.
 2. Refer to the U.W. Extension's "Rethinking Yard Care" for additional information.

Exhibit D

C. Leaves and Yard Trimmings.

1. It is recommended that leaves and yard trimmings be properly disposed of.
2. Refer to the U.W. Extension's "Managing Leaves and Yard Trimmings" for further information.

D. Lawn and Garden Fertilizers.

1. It is recommended to control fertilizer applications on lawn and gardens so as not to be detrimental to the water quality of the ponds. Recall the City of Pewaukee has a phosphorus ban on all lawns unless it is utilized for starting a new lawn or a soils test shows a deficiency.
2. Refer to the U.W. Extension's "Lawn and Garden Fertilizers" for further information.

E. Lawn and Garden Pesticides.

1. Lawn and garden pesticides may pollute surface and ground water.
2. Refer to the U.W. Extension's "Lawn and Garden Pesticides" for further information.

F. Lawn Watering.

1. Excess lawn watering will wash pollutants into the wet ponds. Recall the City of Pewaukee has lawn water regulations that must be followed if you opt to water your lawn.
2. Refer to the U.W. Extension's "Lawn Watering" for further information.

G. Lawn Weed Control.

1. Proper turf management will lower the amount of the chemicals that may runoff into the wet ponds during rain events.
2. Refer to the U.W. Extension's "Lawn Weed Control" for further information.

Exhibit D

INFILTRATION TRENCHES OPERATION AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Inspection

1. Inspection should occur several times in the first few months of operation and then quarterly thereafter.
2. Inspect after significant rainfall events
3. Surface ponding exceeding a 72 hour period may indicate a clogged system.
4. Water levels in the observation well should be checked and recorded over several days to determine if the system is operating effectively.
5. Inspect pre-treatment areas quarterly. Sump pits may require cleaning, two to three times per year. Other pre-treatment facilities should be inspected quarterly for sediment accumulation and cleaning. Sediment may also build up in the top foot of the trench. Inspect by digging a small hole down to the filter fabric. Remove accumulated sediment if necessary and restore.

B. Buffer Maintenance

1. Inspect the vegetated buffer strips quarterly.
2. The vegetative buffer should have a vigorous and dense growth habit.
3. Bare spots, eroded areas, and areas damaged by road salts should be repaired and reseeded.
4. Grass should not be mowed shorter than 5". Mower clippings should be removed and disposed of properly to avoid clogging the trench.

C. Woody Plant Maintenance

1. Adjacent trees should be trimmed if their drip line extends over the surface of the trench so that the leaves do not clog the trench.
2. Pioneer trees should be removed to avoid root invasion into the trench.

Exhibit D

Page 7 of 18

II. NON-ROUTINE MAINTENANCE

A. Surface Clogging

1. Surface clogging typically occurs in the top foot of the trench.
2. Remove the top layer of stone down to the filter fabric. Remove and replace the clogged filter fabric. Reinstall the stone.

B. Clogging of the underground trench.

1. This condition will require the entire removal and replacement of the trench material and filter fabric.
2. The subsoil will require tilling and the layers of trench material be reinstalled following the subsoil tilling.

Exhibit D

INFILTRATION BASIN OPERATION AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Inspection

1. Performance of the infiltration basin should be inspected monthly and after every major storm event, following the initial construction to evaluate if the basin is draining within the design time limits.
2. If performance does not meet the design goals, complete repairs to the facility to meet the design requirements.
3. Following the initial year of monthly inspections, quarterly inspections of the facility should be made. Inspect the facility for:
 - a. Differential settlement
 - b. Cracking
 - c. Erosion
 - d. Leakage
 - e. Tree and woody plant growth on the embankments
 - f. Condition of the inlets and outlets and level spreaders
 - g. Sediment accumulation
 - h. Vigor and density of vegetation on the floor of the basin and buffer strips
 - i. Standing water in over 50% of the basin for more 3 days

B. Mowing – Native Vegetation

1. During establishment of vegetation, the first mowing shall occur once it reaches a height of 10 to 12 inches.
2. Control woody plant invasion by mowing or routine burning once a year. The vegetation height shall be 5 to 6 inches after mowing.
3. If burning cannot be accommodated, mow once per year in the fall after November 1st.

Exhibit D

4. Remove trash and debris at the time of mowing.

C. Burning

1. Shall be begin the second year, if it can be accommodated.
2. Shall occur in the early Spring prior to May 1st or in the late fall after November 1st.
3. Shall be done two consecutive years and then up to 3 years can pass before the next burning.
4. Under no circumstances shall burning occur every other year.

C. Erosion Control

1. Inspect quarterly for erosion. Inspection after major storm events for erosion problems is also recommended if practical.
2. Repair all eroded areas immediately. Temporary erosion controls may be necessary to facilitate repairs.

D. Tilling

1. If the basin is located on marginally permeable soils, annual or semi-annual tilling may be needed to maintain infiltration capacity.
2. Tilled areas should be immediately re-vegetated to prevent erosion.

E. Pre-Treatment Systems

1. Maintenance of the pre-treatment system should include sediment removal, oil and grease skimming, and grass filter strip maintenance.
2. Inspect the structural elements of the pre-treatment system and repair if needed.

II. NON-ROUTINE MAINTENANCE

A. Structural Maintenance

1. Inspect pipe systems quarterly.
2. Remove and replace pipe systems that have eroded or rusted.

Exhibit D

3. Earthen structures should be inspected annually. Erosion should be repaired immediately upon discovery.

B. Restoration of Infiltration Capacity

1. Over time the original infiltration capacity of the basin will be diminished.
2. Deep tilling can be done to restore the infiltration capacity of the basin. The basin will be drained and the soils dried to a depth of 8 inches.
3. The top 2 to 3 inches of topsoil, chisel plowing, and adding topsoil and compost can be done.
4. The basin must be restored with native plantings.

Exhibit D

BIORETENTION OPERATIONS AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Inspection

1. Performance of the bioretention basin should be inspected monthly and after every major storm event, following the initial construction to evaluate if the basin is draining within the design time limits.
 - a. Water plants should be watered as necessary the first year to establish plants.
2. If performance does not meet the design goals, complete repairs to the facility to meet the design requirements.
3. Following the initial year of monthly inspections, quarterly inspections of the facility should be made. Inspect the facility for:
 - a. Differential settlement
 - b. Cracking
 - c. Erosion
 - d. Leakage
 - e. Tree and woody plant growth on the embankments and plant health
 - f. Condition of the inlets and outlets and level spreaders
 - g. Sediment accumulation
 - h. Vigor and density of vegetation on the floor of the basin and buffer strips
 - i. pH testing of the soil
 - j. Observation wells and/or under drains

B. Mowing – Native Vegetation

1. During establishment of vegetation, the first mowing shall occur once it reaches a height of 10 to 12 inches.

Exhibit D

2. Control woody plant invasion by mowing once a year. The vegetation height shall be 5 to 6 inches after mowing.
3. Mow once per year in the fall after November 1st.
4. Remove trash and debris at the time of mowing.

C. Erosion Control

1. Inspect quarterly for erosion. Inspection after major storm events for erosion problems is also recommended if practical.
2. Repair all eroded areas immediately. Temporary erosion controls may be necessary to facilitate repairs.

D. Tilling

1. If the basin is located on marginally permeable soils, annual or semi-annual tilling may be needed to maintain infiltration capacity.
2. Tilled areas should be immediately re-vegetated to prevent erosion.

E. Pre-Treatment Systems

1. Maintenance of the pre-treatment system should include sediment removal, oil and grease skimming, and grass filter strip maintenance.
2. Inspect the structural elements of the pre-treatment system and repair if needed.

F. Mulch

1. Re-mulch void areas as needed.
2. Add additional mulch once per year.

II. NON-ROUTINE MAINTENANCE

A. Structural Maintenance

1. Inspect pipe systems quarterly.
2. Remove and replace pipe systems that have eroded or rusted.

Exhibit D

3. Earthen structures should be inspected annually. Erosion should be repaired immediately upon discovery.

B. Restoration of Infiltration Capacity

1. Over time the original infiltration capacity of the basin will be diminished.
2. Deep tilling can be done to restore the infiltration capacity of the basin. The basin will be drained and the soils dried to a depth of 8 inches.
3. The top 2 to 3 inches of topsoil, chisel plowing, and adding topsoil and compost can be done.
4. The basin must be restored with native plantings.

C. Watering

1. Water plants need to be watered as necessary during the first growing season.
2. After the first growing season, water as necessary during dry periods.

Exhibit D

VEGETATED FILTER STRIPS OPERATION AND MAINTENANCE

I. INSPECTION

- A. Inspect quarterly and after every major storm event.
- B. Inspect for erosion, accumulation of sediment, diversions and short circuiting, standing water and the accumulation of litter.

II. MAINTENANCE

- A. Do not mow vegetation to a height lower than the design flow depth.
- B. Minimize the use of fertilizers and pesticides.
- C. Do not use heavy equipment to mow. Mowing should occur during dry periods to avoid compaction.
- D. Repair and reseed eroded areas immediately upon discovery.

Exhibit D

GRASSED SWALES OPERATION AND MAINTENANCE

I. INSPECTION

- A. Inspection should occur seasonally and after major rainfall events.
- B. Inspect for sediment deposition, check dam bypassing, erosion and litter.
- C. Nuisance conditions such as woody plant growth and mosquito breeding areas should also be identified and removed.

II. MAINTENANCE

- A. Mow only to maintain the vegetation at a height greater than the design flow depth.
- B. Maintain the vegetated liner in a vigorous condition.
- C. Depending on the vegetative material, mowing may be infrequent or unnecessary.
- D. Remove woody plants that may invade the swale.
- E. If the swale is damaged by road salts, remove the damaged area and replant with salt tolerant grasses.
- F. Discourage deposition of leaf litter and grass clippings by informing, typically by signage, local residents of the swales purpose.

Exhibit D

STORM SEWER SYSTEM OPERATIONS AND MAINTENANCE

I. INSPECTION

A. Frequency

- a. Inspect catch basins, inlets and manholes at least once per year.
- b. Inspect storm sewer end sections at least twice per year and after major rainfall events.

B. Inspection

a. Catch Basins, Inlets and Manholes

- i. Inspect for sediment deposition in the bottom of structures.
- ii. Check frames and lids for cracks and wear such as rocking lids or lids moved by traffic and for shifted frames.
- iii. Check chimneys for cracked mortar, cracked lift rings and spalling.
- iv. Check for leaks at joints.
- v. Check surrounding areas for pollutants such as leaks from dumpsters, minor spills and oil dumping.

b. Storm Sewer End sections

- i. Observe for obstructions, accumulation of sediment and trash, undermining and joint separation.
- ii. Inspect end treatment for settlement, scour and displaced armoring.

II. STANDARD MAINTENANCE

A. Catch Basins, Inlets and Manholes

- a. Repair any deterioration threatening structural integrity immediately.
- b. Replace worn or cracked frames and lids. Frames that have shifted should be re-centered and re-set on the structure.

Exhibit D

- c. Repair any spalled or cracked mortar. Cracked rings should be repaired or replaced.
- d. Repair leaking joints.
- e. Clean manhole and storm inlet inverts of deposited material. Catch basins should be cleaned before the sump is 40 percent full.
- f. Remove potential sources of contamination away from catch basins, inlets and manholes.

B. Storm Sewer End sections

- a. End sections should be free flowing; trash, debris and obstructions should be removed to prevent backups.
- b. End sections which have separated from the storm sewer pipe shall be reset on firm bedding and reconnected to the existing storm sewer pipe. Restrain joints if necessary.
- c. Scour areas shall be repaired immediately. Replace missing soil with clean fill and replace/install end treatment. Missing armoring will require additional stone, typically one class larger.
- d. Excessive material deposited at the storm sewer outfall is indicative of: a disturbed area upstream draining to the system or a potential failure of a system component. Disturbed areas draining to the system should be stabilized immediately or diverted to drain to a BMP. Potential system failures require non-standard maintenance.

III. NON-STANDARD MAINTENANCE

A. Non-standard maintenance includes inspection, repair or replacement of buried structures.

- a. Televising of buried structures (pipes) should occur when excessive material is found within the system or at an outfall with no apparent source area visible at the surface, or the system experiences frequent backups.
- b. Follow the recommendations for the repair and/or replacement of system components televised by a firm specializing in this work.

Exhibit D

CULVERTS OPERATION AND MAINTENANCE

I. INSPECTION

- A. Culverts should be inspected twice a year and after heavy rainfall.
- B. Inspect for sediment deposition, scour at the ends of pipe, accumulations of trash and obstructions.

II. MAINTENANCE

- A. Scour areas should be repaired with clean fill and replacement of end treatment (rip rap, TRM, etc.). Scour areas with no end treatment should be stabilized with topsoil, seed and erosion control mat at a minimum.
- B. Sediment deposits, trash and obstructions should be removed from the pipe ends.
- C. Material deposited within the pipe should be promptly removed to maintain the conveyance capacity of the pipe.

Exhibit E

Minimum Operation and Maintenance Requirements Developments without a Wet Detention Pond

GENERAL REQUIREMENTS AND RECOMMENDATIONS

I. GENERAL REQUIREMENTS

A. Inspections

1. As-built plans shall accompany the person responsible for the inspections of the sites BMP's.
2. Documentation of the inspections should be completed and filed. Documentation should include at a minimum:
 - a. Inspectors name, affiliation and professional credentials if applicable.
 - b. Date, time and weather conditions.
 - c. Approximate rainfall total over a 24 hour period if applicable.
 - d. An assessment of the condition of the device, outlet and inlet conveyance systems, sediment build up, vegetation condition and condition of tributary drainage area.
 - e. Sediment depth at the outlet control structure and at a minimum one other location.
 - f. Identification of potential structural failures and repair needs
 - g. Maintenance and repair recommendations of the BMP's and/or tributary drainage area.

B. Responsible Party and Financial Funding

1. The responsible party(s) for the operation, inspection and maintenance of the sites BMP's shall be the _____.
2. It is recommended that the _____ establish a perpetual maintenance fund to insure that the BMP's are properly inspected, maintained and repaired.

Exhibit E

II. ADDITIONAL RECOMMENDATIONS TO IMPROVE WATER QUALITY AND REDUCE MAINTENANCE COSTS.

A. General.

1. Improper disposal of yard wastes will affect the water quality of the storm water runoff leaving the site or entering a storm water management facility.
2. Improper fertilizer and pesticide application will affect the water quality of storm water runoff leaving the site and add to algae growth in receiving waters.
3. Excess lawn watering will affect the water quality in receiving waters due to increased water runoff that may contain fertilizers and pesticides.

B. Yard Care

1. It is recommended to consider routine yard care maintenance that is practical and environmentally sound.
2. Refer to the U.W. Extension's "Rethinking Yard Care" for additional information.

C. Leaves and Yard Trimmings.

1. It is recommended that leaves and yard trimmings be properly disposed of.
2. Refer to the U.W. Extension's "Managing Leaves and Yard Trimmings" for further information.

D. Lawn and Garden Fertilizers.

1. It is recommended to control fertilizer applications on lawn and gardens so as not to be detrimental to the water quality of receiving waters. Recall the City of Pewaukee has a phosphorus ban on all lawns unless it is utilized for starting a new lawn or a soils test shows a deficiency.
2. Refer to the U.W. Extension's "Lawn and Garden Fertilizers" for further information.

E. Lawn and Garden Pesticides.

1. Lawn and garden pesticides may pollute surface and ground water.

Exhibit E

2. Refer to the U.W. Extension's "Lawn and Garden Pesticides" for further information.

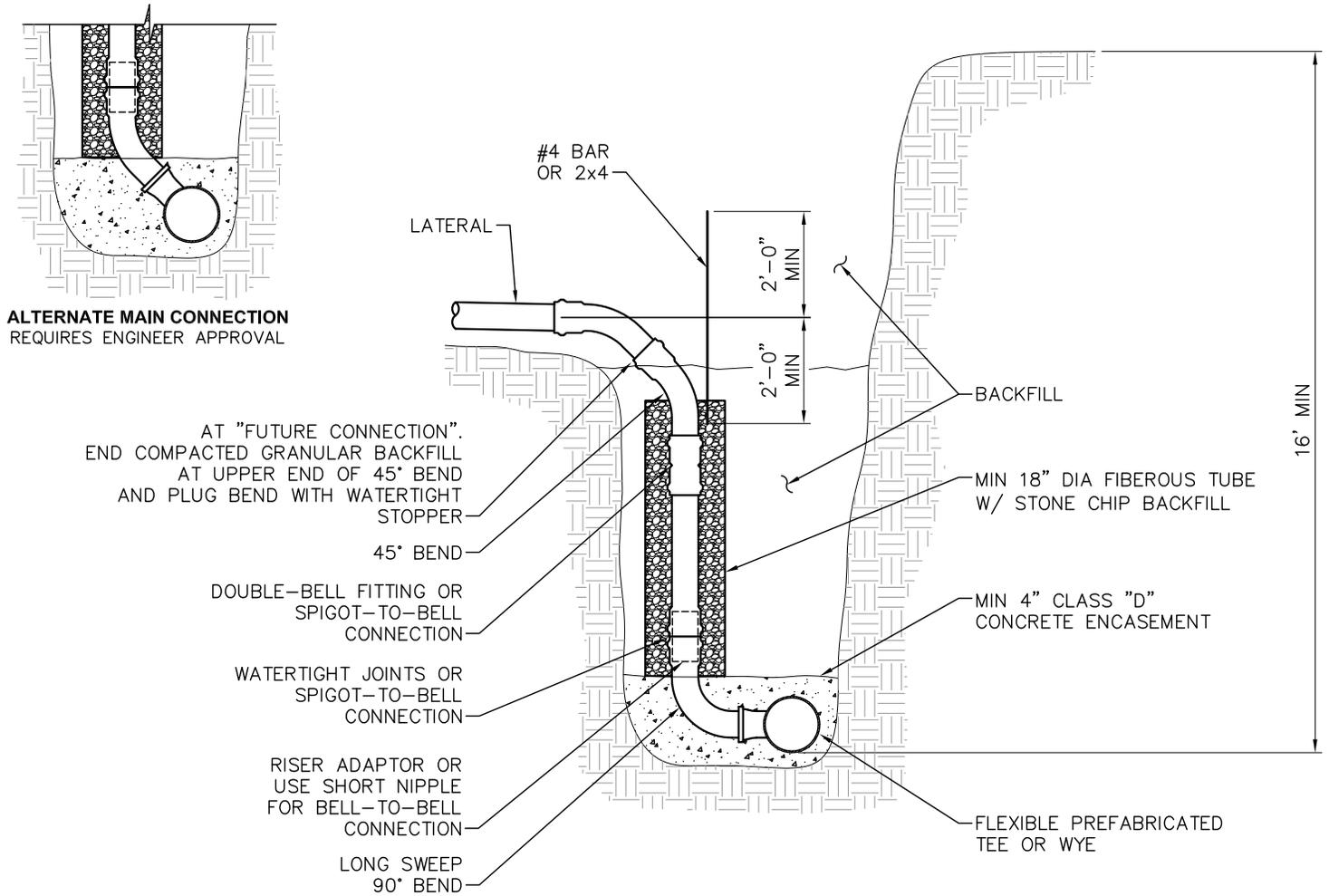
F. Lawn Watering.

1. Excess lawn watering will wash pollutants into storm water management facilities and receiving waters. Recall the City of Pewaukee has lawn water regulations that must be followed if you opt to water your lawn.
2. Refer to the U.W. Extension's "Lawn Watering" for further information.

G. Lawn Weed Control.

1. Proper turf management will lower the amount of the chemicals that may runoff into storm water management facilities and receiving waters during rain events.
2. Refer to the U.W. Extension's "Lawn Weed Control" for further information.

Figure A



FOLLOW THIS FOR RISERS GREATER THAN 6 FT HIGH OR
MAINS GREATER THAN 16 FT DEEP

FLEXIBLE RISER TO FLEXIBLE SEWER MAIN

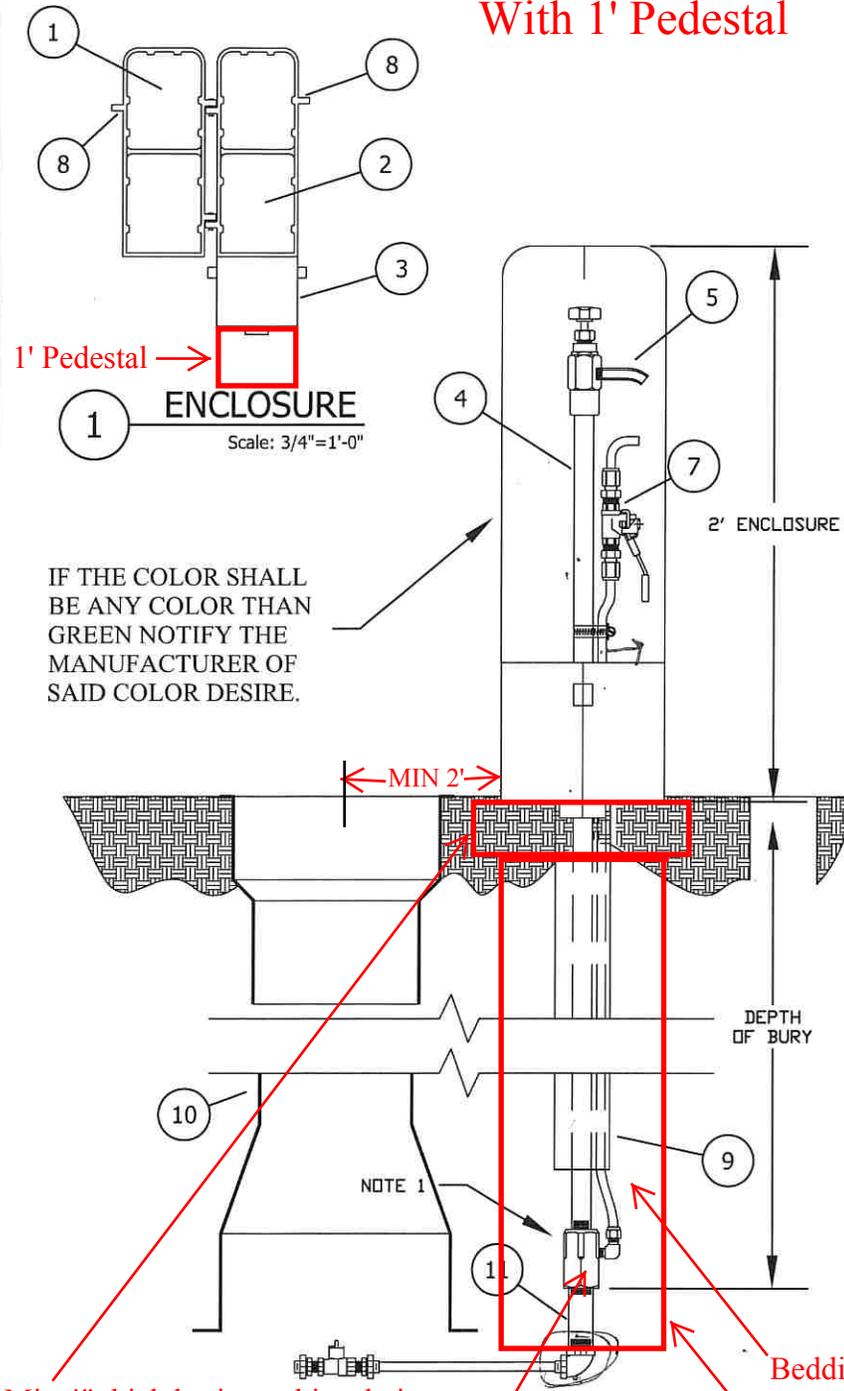
NO SCALE

Figure B - 1

#88-SS-XC SAMPLING STATION
(EXTREME COLD CLIMATE) SPEC SHEET

With 1' Pedestal

ITEM	ITEM / DESCRIPTION	NOTES
1	88 FRONT DOOR (COVER A)	
2	88 REAR DOOR (COVER B)	
3	88 BASE	2 PIECES
4	1/2" S.S. WATERWAY	
5	BLOW OFF & SAMPLING BIBB	
6	3/8" S.S. TUBING	
7	BALL VALVE	
8	LOCKING HOLE	
9	PVC PIPE <i>Install flush with base</i>	
10	VALVE BOX	BY OTHERS
11	3/4" S.S. NIPPLE	BY OTHERS



SAMPLING STATION SHALL BE _____' BURY,
WITH A 3/4" FIP INLET, AND 7/16"
UNTHREADED BLOW OFF AND SAMPLING
BIBB.

STATION SHALL BE ENCLOSED IN A
LOCKABLE, NON-REMOVABLE ALUMINUM
BOX WITH HINGED OPENINGS.

WHEN OPEN, THE STATION SHALL REQUIRE
NO KEY FOR OPERATION, AND ALL WATER
FLOW SHALL PASS THRU AN ALL STAINLESS
STEEL WATERWAY.

ALL WORKING PARTS SHALL BE OF
STAINLESS STEEL AND SERVICABLE FROM
ABOVE GROUND WITH NO DIGGING OR
REPLACEMENT NEEDED.

A STAINLESS STEEL BALL VALVE WILL BE
LOCATED BELOW THE SAMPLING BIBB
USING A 3/8" S.S. TUBING TO ALLOW
PUMPING OF ANY WATER REMAINING
INSIDE THE STATION TO INSURE
NON-FREEZING.

THE STATION SHALL BE MODEL #88-SS-XC
AS MANUFACTURED BY THE KUPFERLE
FOUNDRY, ST. LOUIS MO. 63102 OR
APPROVED EQUAL.

#88-SS-XC SAMPLING STATION TO BE
INSTALLED AT THE FOLLOWING
LOCATIONS:

Bedding stone backfill

Min 4" thick horizontal insulation
extended 3" beyond base

Poly wrap all fittings

NOTES: 4" thick vertical insulation (all sides)
depth varies

1.) IN CORROSIVE SOILS THE BURIED PIPE SHOULD BE PREPPED
FOR ADDITIONAL RESISTANCE TO CORROSION. KUPFERLE
RECOMMENDS SPRAYING ALL UNDERGROUND PIPING AND
FITTINGS WITH BITUMINOUS SPRAY TAR, ALLOWING PROPER
TIME TO DRY, AND THEN WRAPPING THE PARTS

DD/MM/YY	ISSUED FOR REFERENCE
DATE	STATUS / REVISION

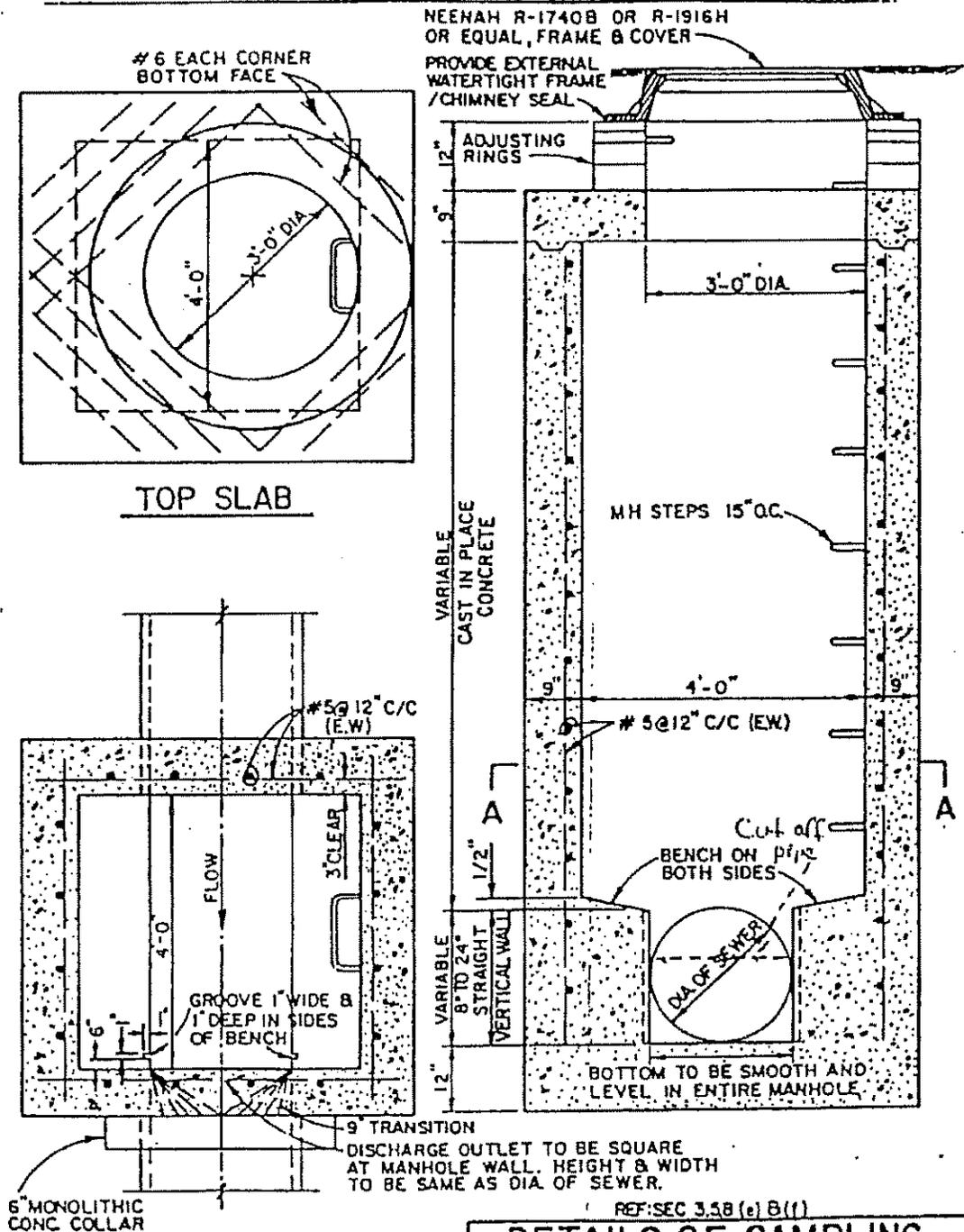
DRAWN
DCL
APPROVED
DCL
DATE
10/31/14
SCALE
1-1/2"=1'



2511 NORTH 9TH STREET
ST. LOUIS, MO 63102
1-800-231-3990
FAX 314-231-2820
www.hydrants.com

Figure C

SAMPLING MANHOLES ARE REQUIRED FOR ALL
NON-RESIDENTIAL USERS



4'-0" ID PRECAST MAY BE SUBSTITUTED FOR SAMPLING MH'S ON BUILDING LATERAL
4'-0" ID MONOLITHIC MAY BE SUBSTITUTED FOR GAUGING MH'S ON MUNICIPAL SEWERS.

DETAILS OF SAMPLING & GAUGING MANHOLES
FOR SEWER SIZES FROM 8" TO 24" DIAMETER
NOT TO SCALE
AUG 1987
FILE NO. 23

Figure D

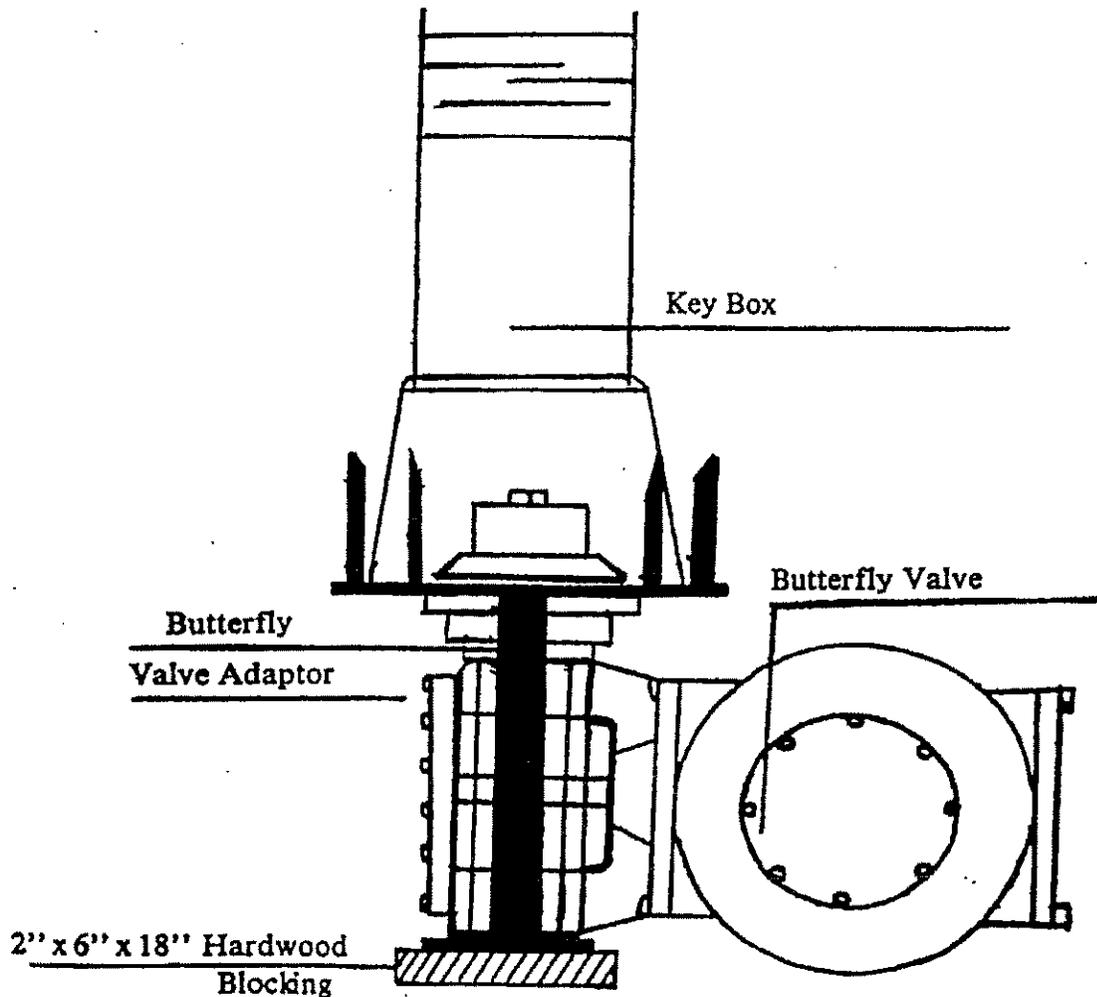
ADAPTOR INC. or Equal

BUTTERFLY VALVE ADAPTOR

The Butterfly Valve Adaptor is a new and proven way to hold center the Key Box on the Butterfly Valve.

This will eliminate any problems with settling, shifting or an improper Key Box set.

Manufactured for all types and sizes of Butterfly Valves.



PATENT NUMBER 4,556,081

ADAPTOR INC.

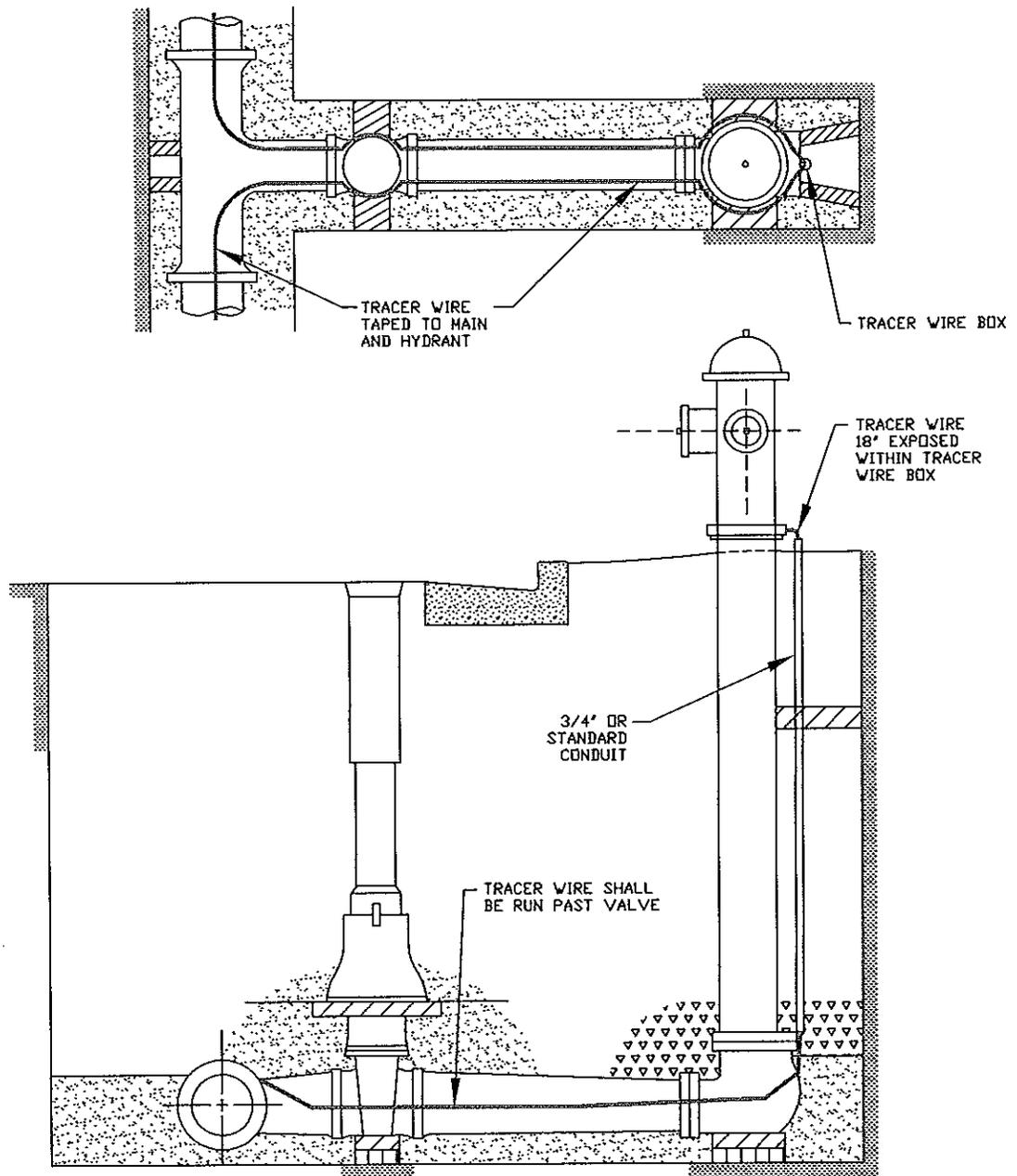
3642 E. American Ave.

Oak Creek, WI 53154

(414) 764-6733

Fax (414) 764-1494

Figure E

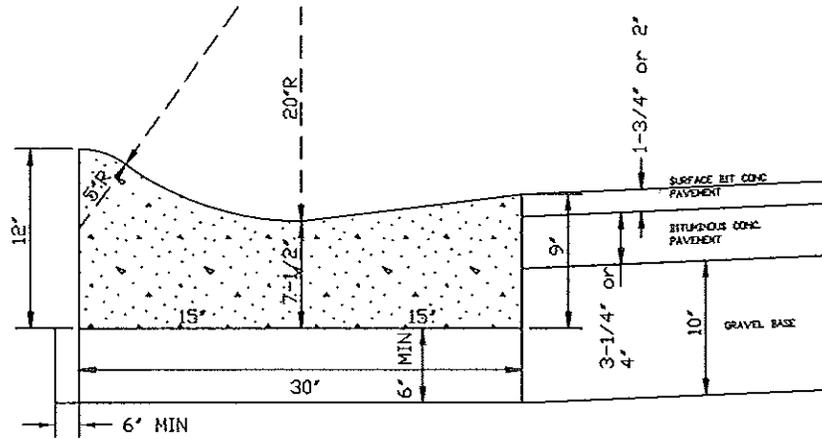


TRACER WIRE DETAIL

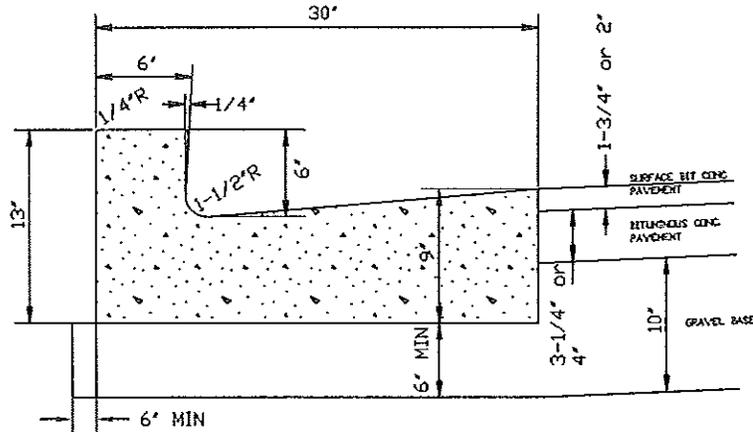
CITY OF PEWAUKEE		
SCALE: 1"=3'	SEPTEMBER 2016	DRAWN BY: JJF

Figure F

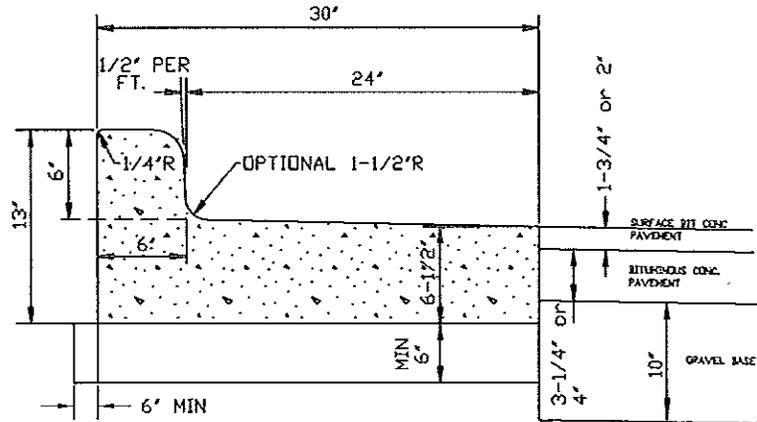
TYPICAL MOUNTABLE CURB AND GUTTER SECTION



TYPICAL CURB AND GUTTER SECTION



TYPICAL REVERSE PAN CURB AND GUTTER AT ISLAND (WHEN APPROVED)



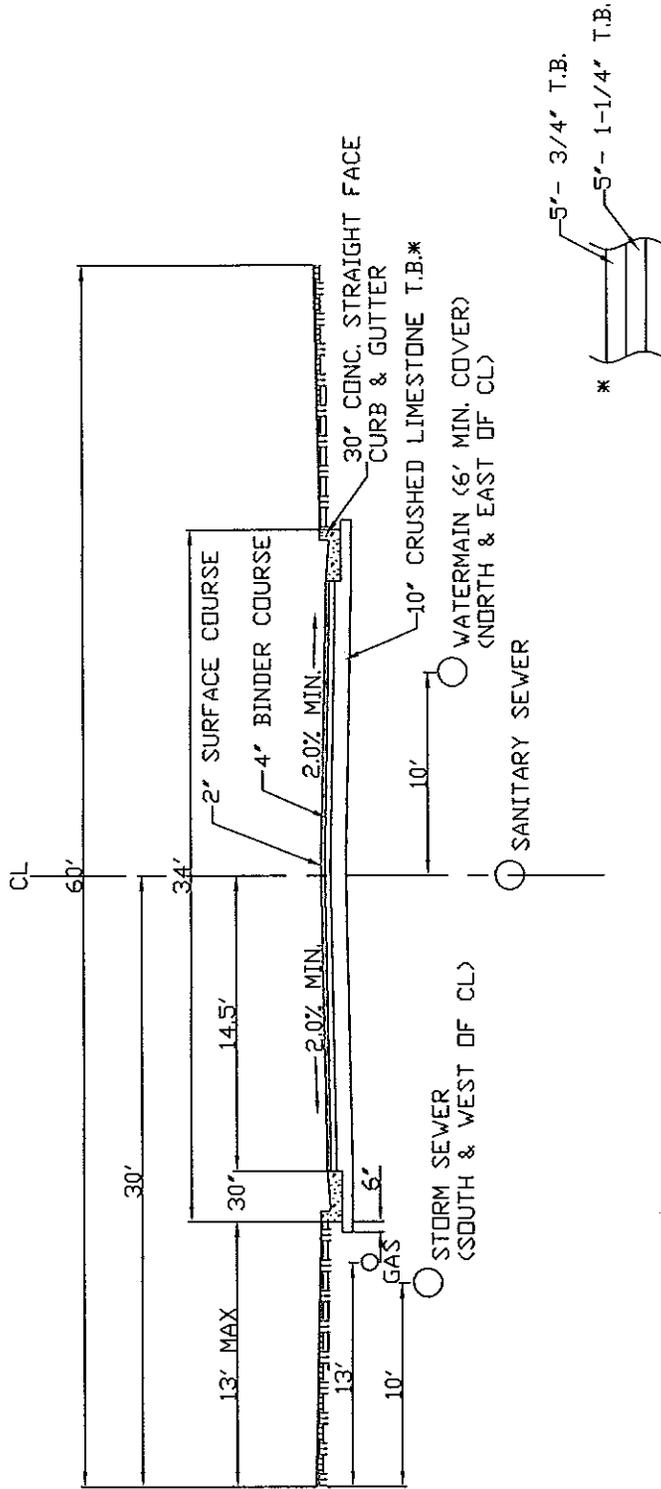
CITY OF PEWAUKEE

SCALE: 1"=1'

SEPTEMBER 2016

DRAWN BY: JJF

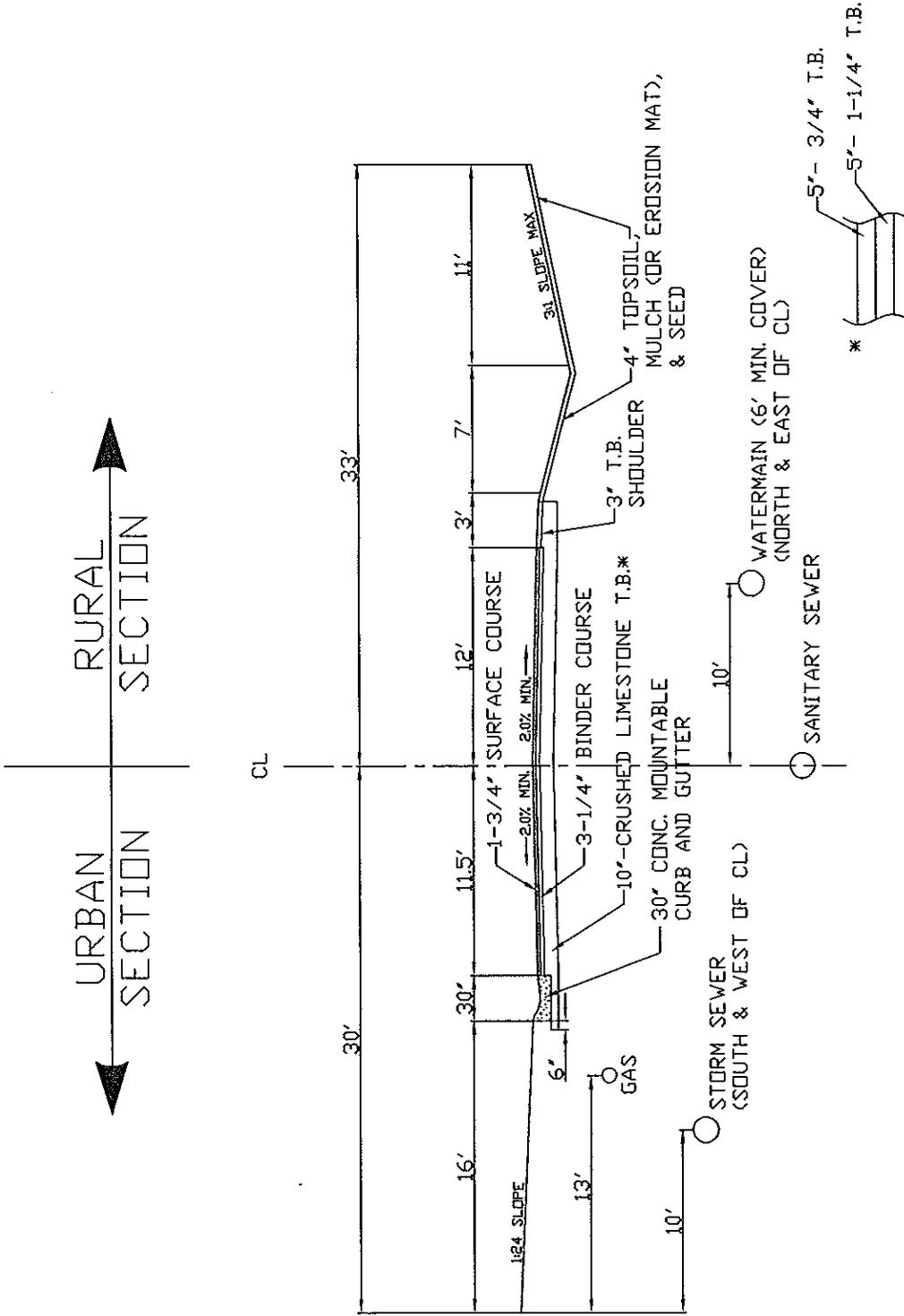
Figure G



URBAN COMMERCIAL STREET CROSS-SECTION
AND UTILITY LOCATIONS

CITY OF PEWAUKEE	
SCALE: 1"=10'	SEPTEMBER 2016
DRAWN BY: JJF	

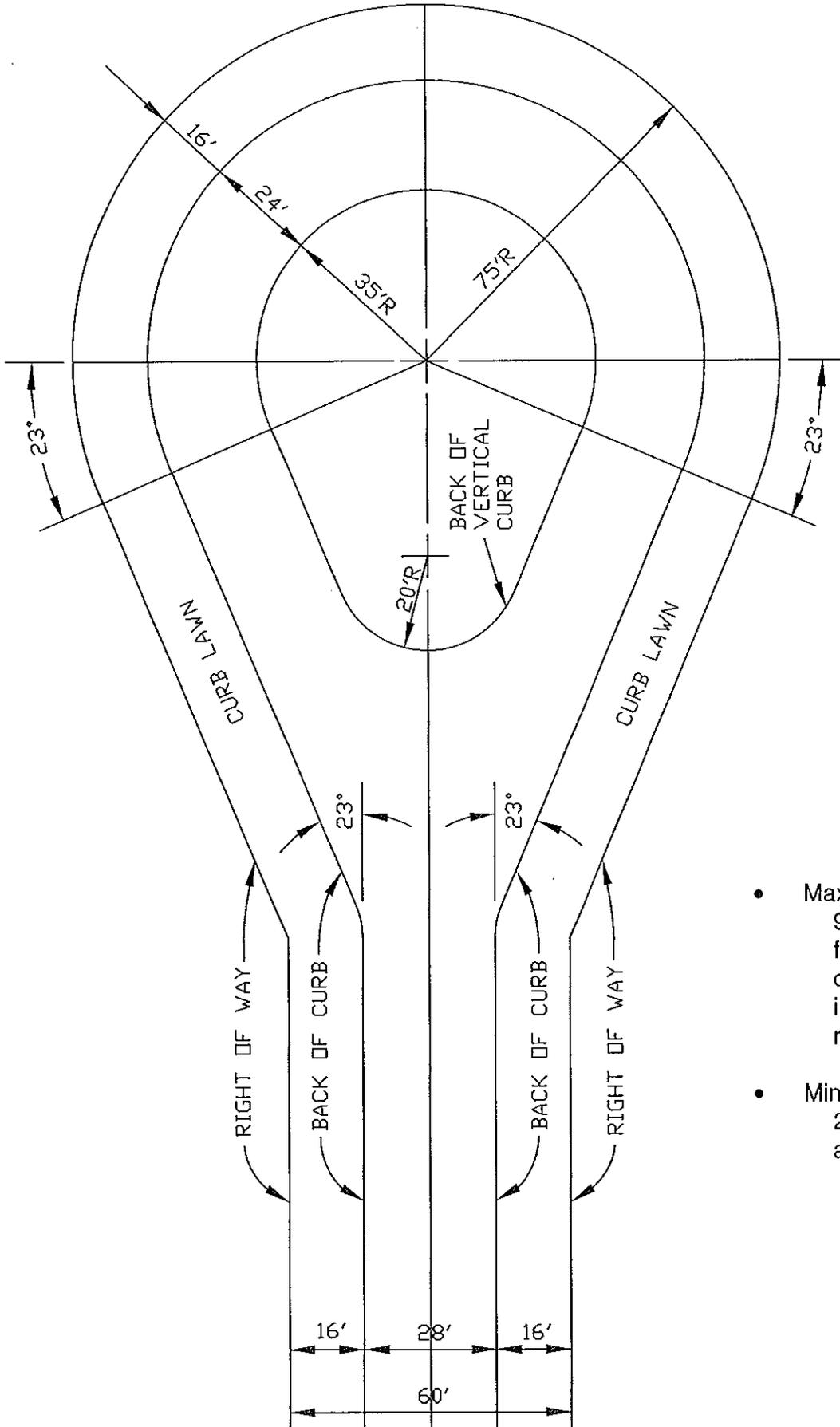
Figure H



URBAN AND RURAL RESIDENTIAL STREET
CROSS-SECTION AND UTILITY LOCATIONS

CITY OF PEWAUKEE		
SCALE: 1"=10'	SEPTEMBER 2016	DRAWN BY: JJF

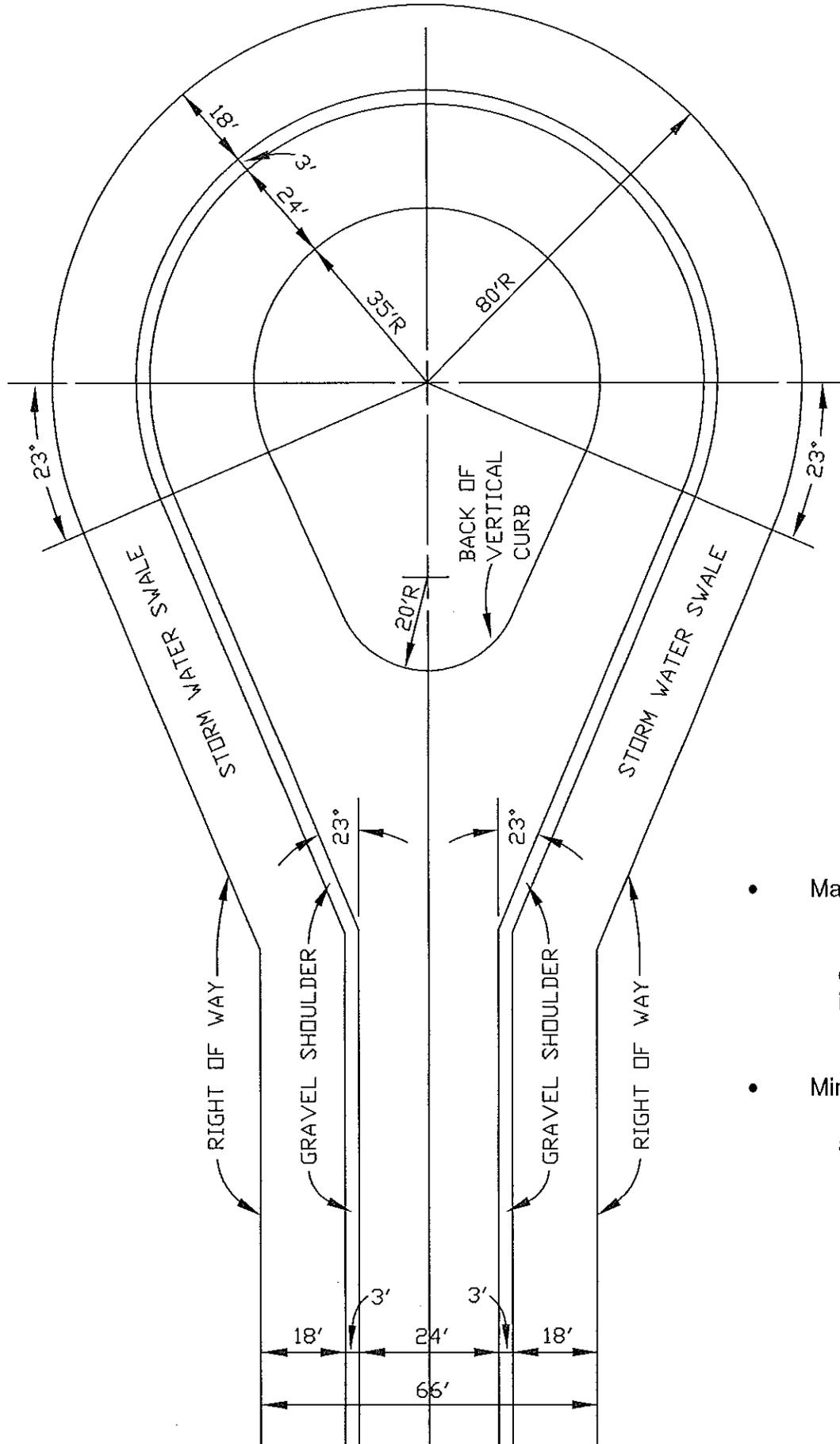
Figure I



CITY OF PEWAUKEE		
STANDARD URBAN CUL-DE-SAC		
SCALE: 1"=30'	SEPTEMBER 2016	DRAWN BY: JJF

- Maximum length = 900' measured from center of cul-de-sac to intersecting street right-of-way.
- Minimum length = 250' measured as above.

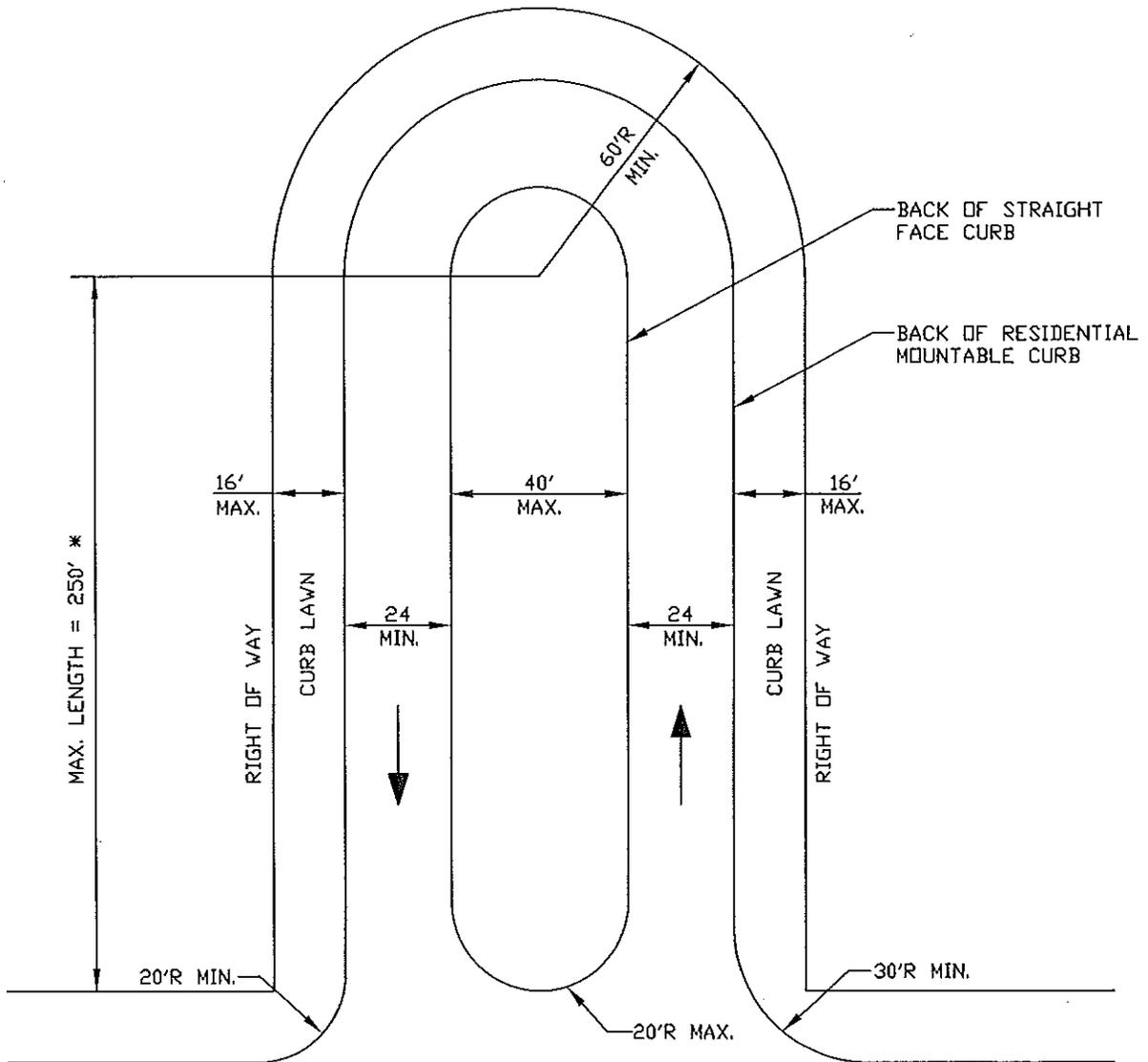
Figure J



CITY OF PEWAUKEE		
STANDARD RURAL CUL-DE-SAC		
SCALE: 1"=30'	SEPTEMBER 2016	DRAWN BY: JJF

- Maximum length = 900' measured from center of cul-de-sac to intersecting street right-of-way.
- Minimum length = 250' measured as above.

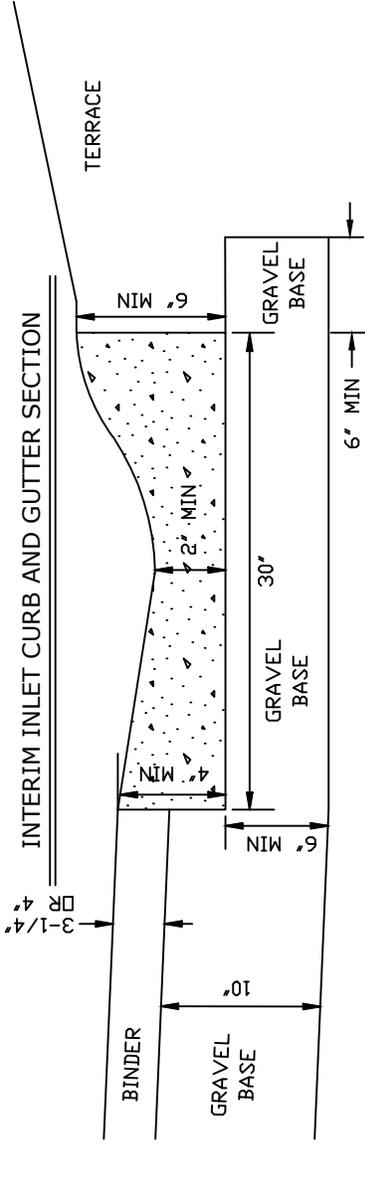
Figure L



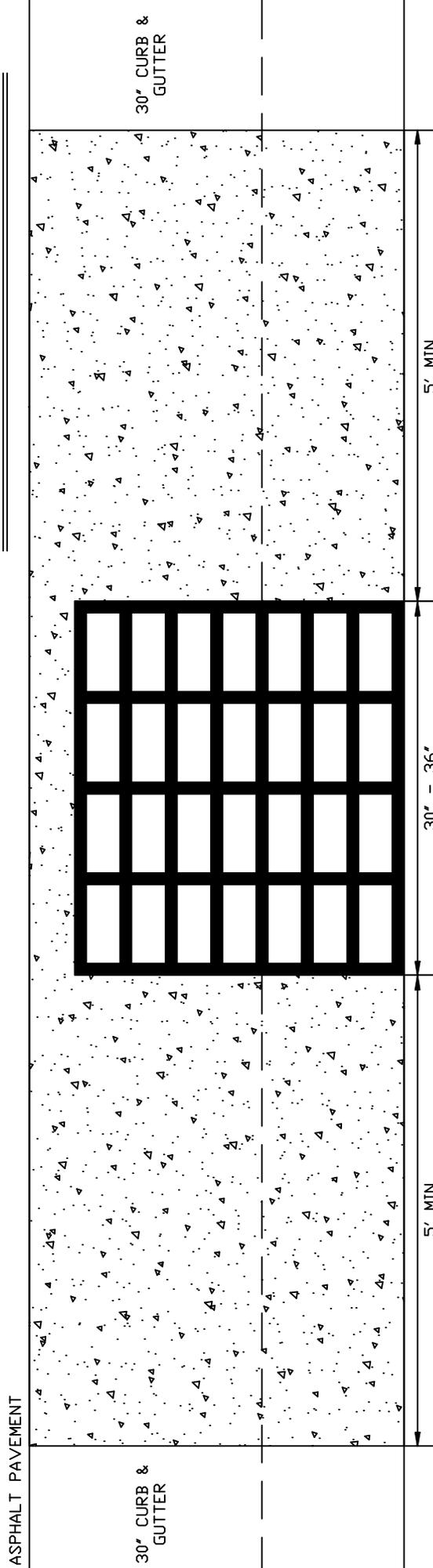
* MEDIAN MUST BE BROKEN IF OVER 175' IN LENGTH.

CITY OF PEWAUKEE		
STANDARD RESIDENTIAL COURT		
SCALE: 1"=40'	SEPTEMBER 2016	DRAWN BY: JJF

Figure M



INTERIM INLET CURB AND GUTTER SECTION



FINAL INLET CURB AND GUTTER SECTION

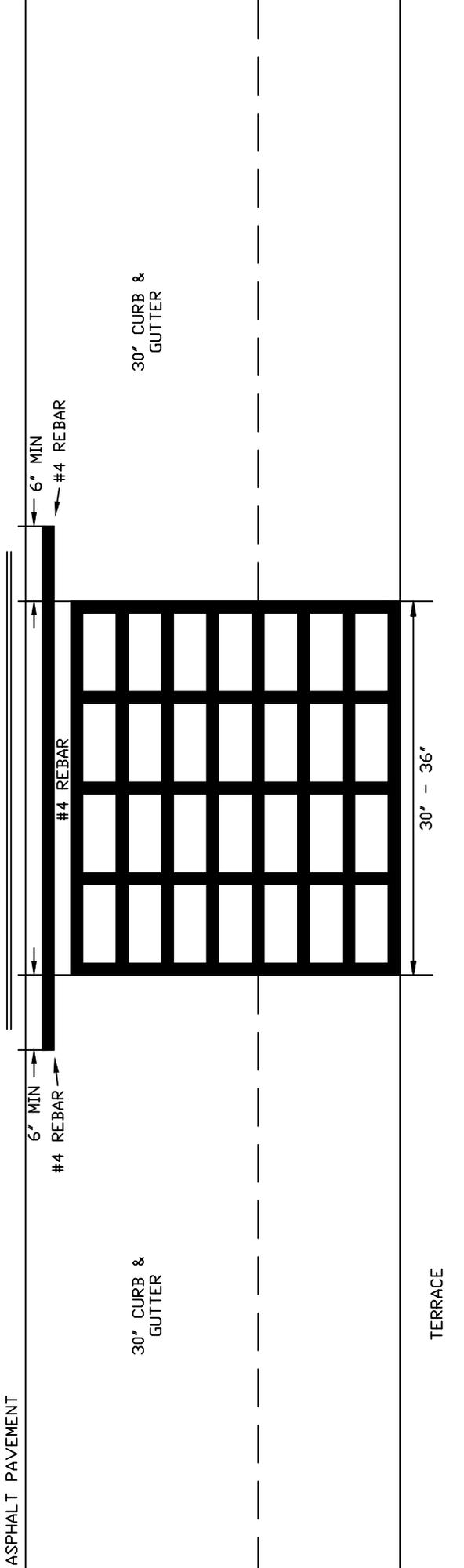
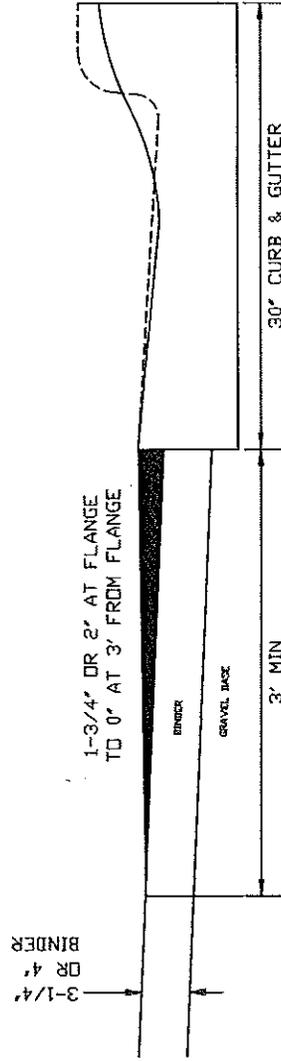
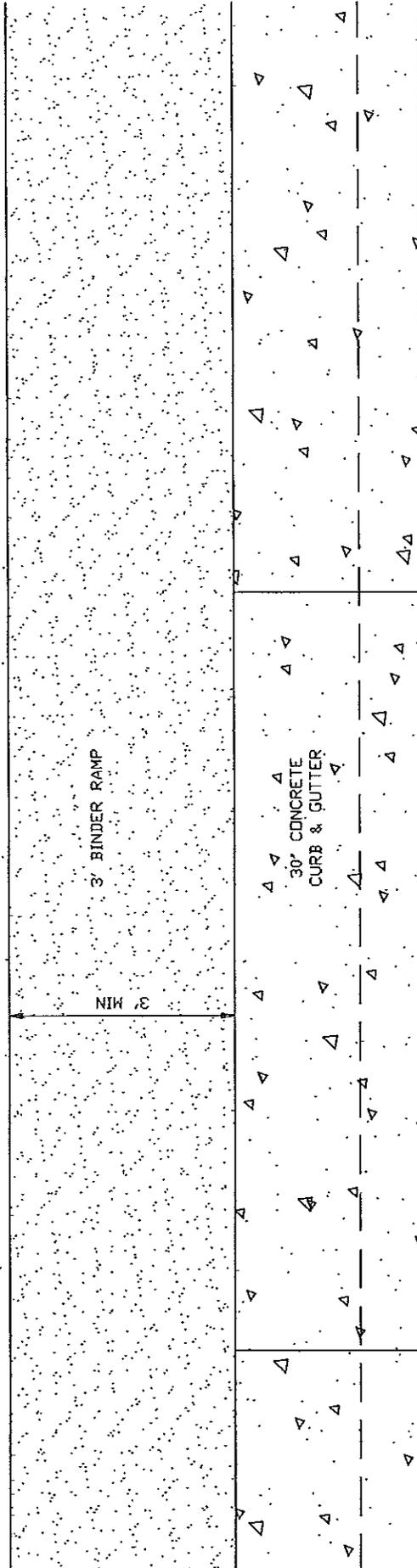


Figure N

CURB RAMP DETAIL

BINDER ASPHALT



CITY OF PEWAUKEE

SCALE: 1"=1'

SEPTEMBER 2016

DRAWN BY: JJF

MANHOLE RAMP DETAIL

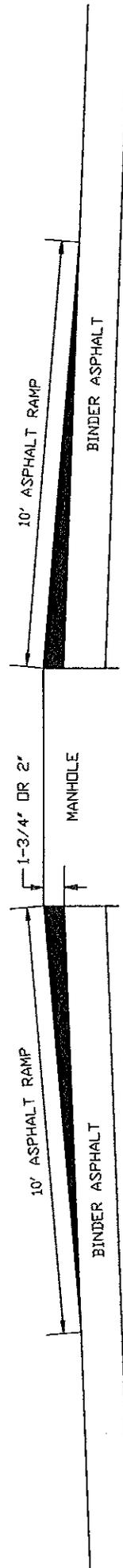
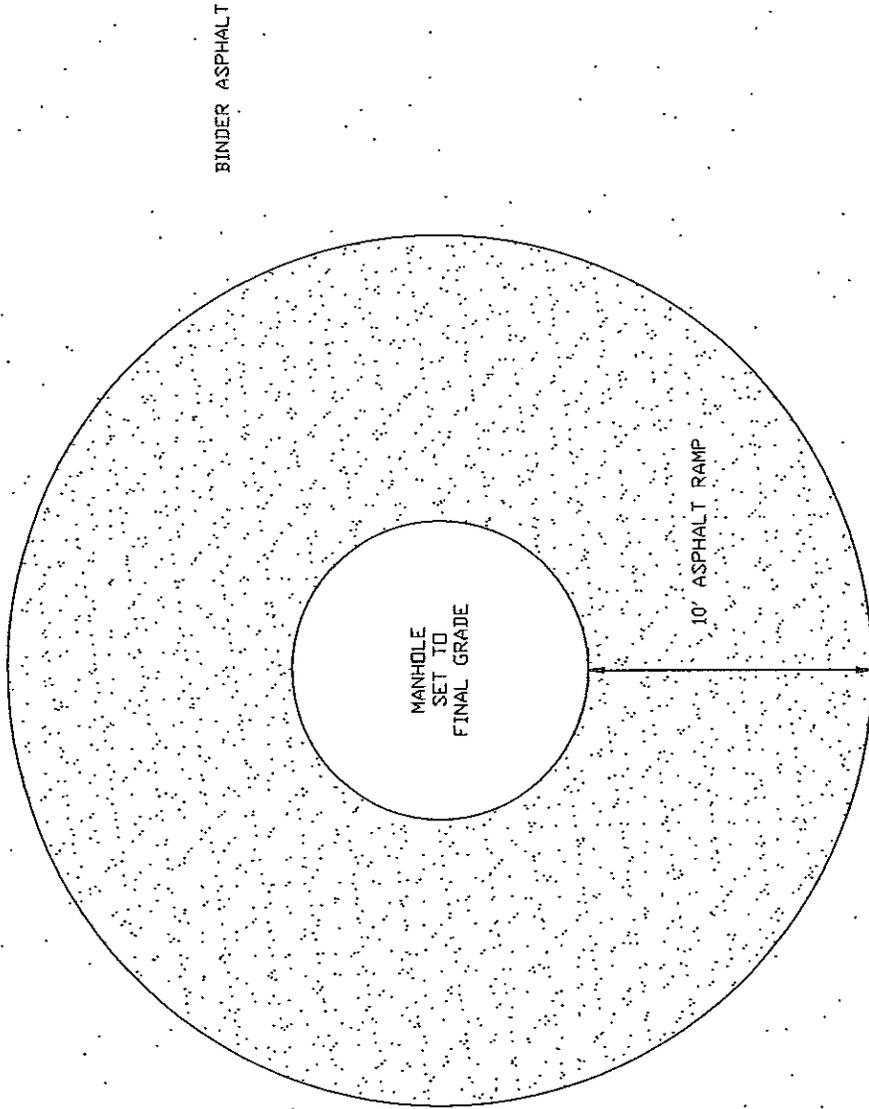


Figure O

CITY OF PEWAUKEE

SCALE: 1"=1' SEPTEMBER 2016 DRAWN BY: JJF

Figure P

Valvco

Tracer Wire Access Box Specification and Submittal

Tracer wire shall be terminated at each end in a flush mount access box. Access Box shall have a cast iron lid that can be locked and opened with a standard pentagon head key wrench. Tracer wires shall be stripped and attached to stainless steel screws mounted to the underside of the lid. Sufficient slack shall be left in wire length so cover can be lifted with wire intact. Tracer wire access box shall be located directly in front of fire hydrants or where indicated on drawings and be set to grade. Tracer wire access box shall be of domestic manufacture and be equal to Valvco TWAB.

Contact: Fischer, Harris & Associates for information 800-224-7579.

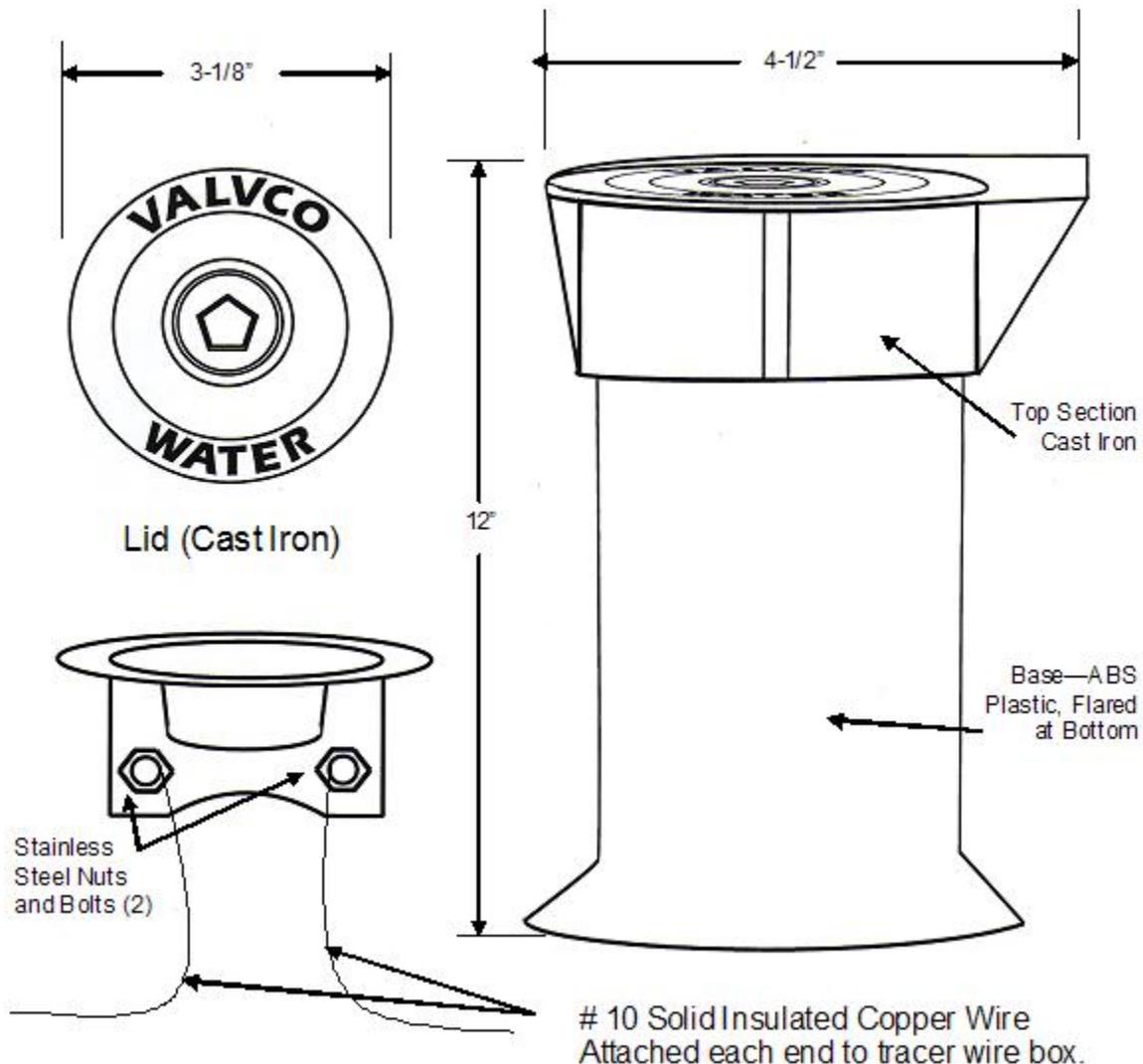
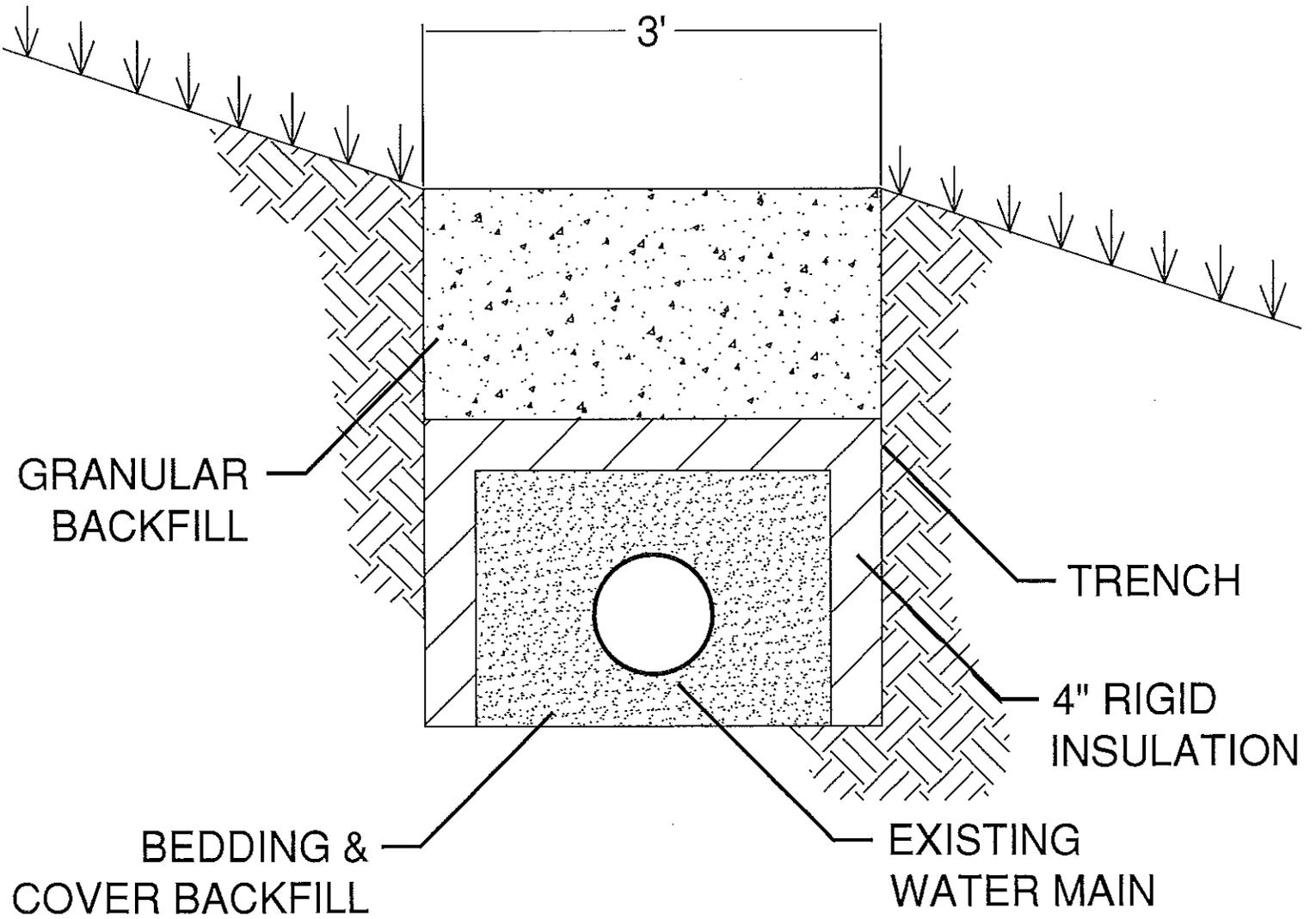


Figure Q



WATER MAIN INSULATION DETAIL



Figure R-1

2151 South 54th Street

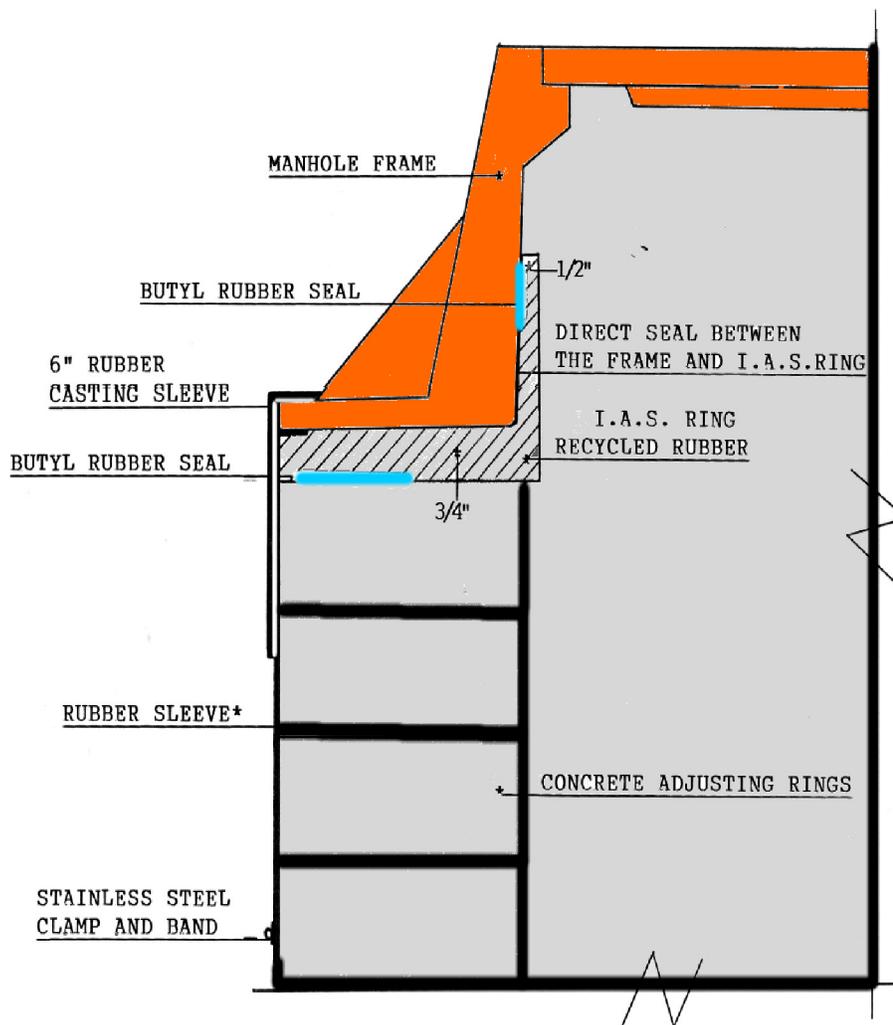
West Allis, WI. 53120

P: 414-764-6733

F: 414-764-1494

Web: www.adaptorinc.com

Internal/External Adaptor Seal Detail Specification



All sanitary manholes shall be provided with an Internal/External Adaptor Seal with a high grade EPDM rubber sleeve having a minimum of 60 mils, to seal the outside of the chimney from the manhole frame down to the cone. It shall have a 3/4" rubber ring that the external sleeve is adhered to and a 1/2" vertical lip that seals to the inside of the casting using butyl mastic. A 304 Stainless Steel band will be used to seal the bottom of the sleeve to the cone section of the manhole. The I/E.A.Seal shall be installed per Adaptor Inc. installation instructions.

Figure R-2

Installation Procedures



Internal/External Adaptor Seal I/E.A. Seal



Remove protective wrap from seal: Use **CAUTION** not to cut into seal.



I/E.A. Seal includes: Seal, S.S. band & clamp, butyl tape and casting sleeve.



Apply butyl tape to bottom of seal



Place seal on clean & dry top adjusting ring.



Align seal on outside edge of adjusting rings and press down on seal for the butyl to adhere.



Pull the rubber sleeve down the outside of the adjusting rings to the top of the corbel.



Install the S.S. band on the bottom edge of the sleeve. **NO SPECIAL TOOLS NEEDED.**



Place the casting on an angle on top of the seal, with the vertical flange of the seal on the inside wall of the casting. Push the vertical flange in from the outside.



Pull vertical flange down by white mark & remove the protective wrap from the 1" butyl tape between the vertical flange & Frame.



Pull casting sleeve down around the outside of the frame & chimney. Allow 2" to lap over the flange of the frame.

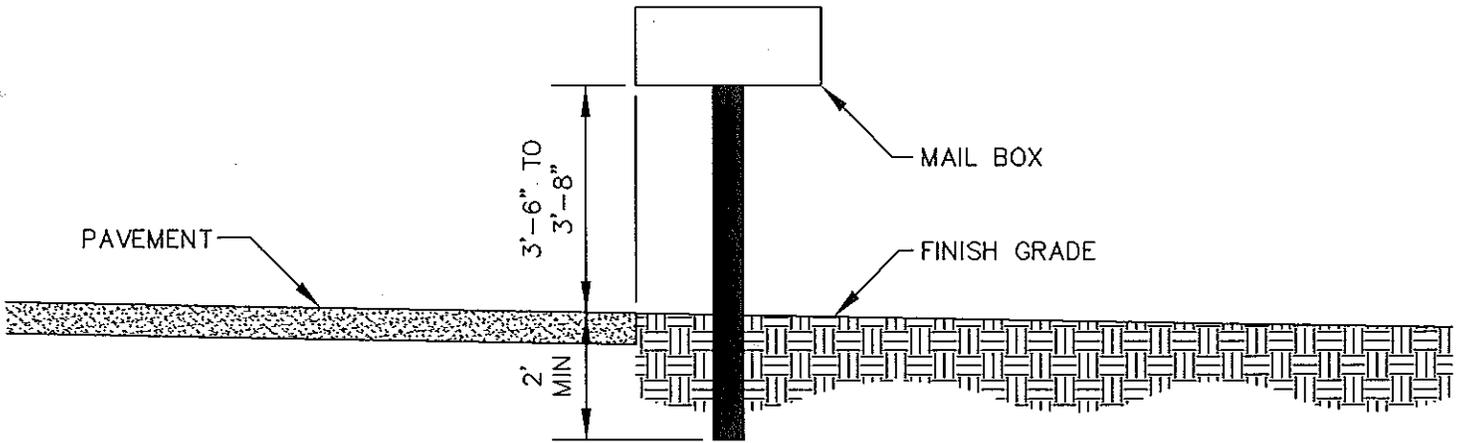


Installation Complete

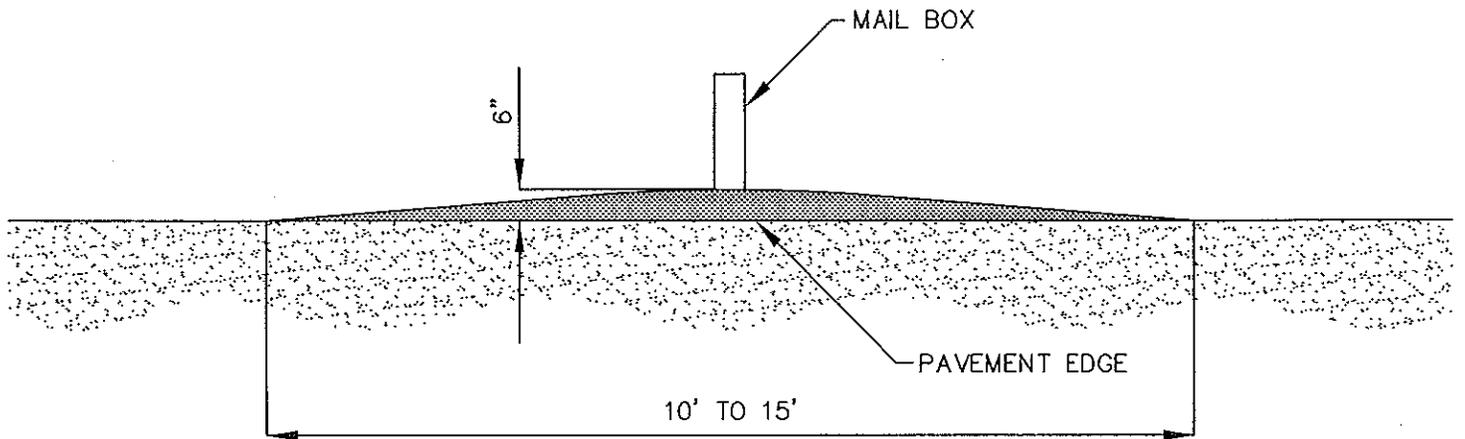
NOTE: Allow 3/4" for the I/E.A. Seal plus the height of the manhole frame for the final adjustment.

EXAMPLE: If the frame is 10" Plus 3/4" for the seal, figure 10 3/4" from finish grade to the top adjusting ring.

Figure S



ELEVATION



PLAN

TYPICAL MAIL BOX PLACEMENT DETAIL

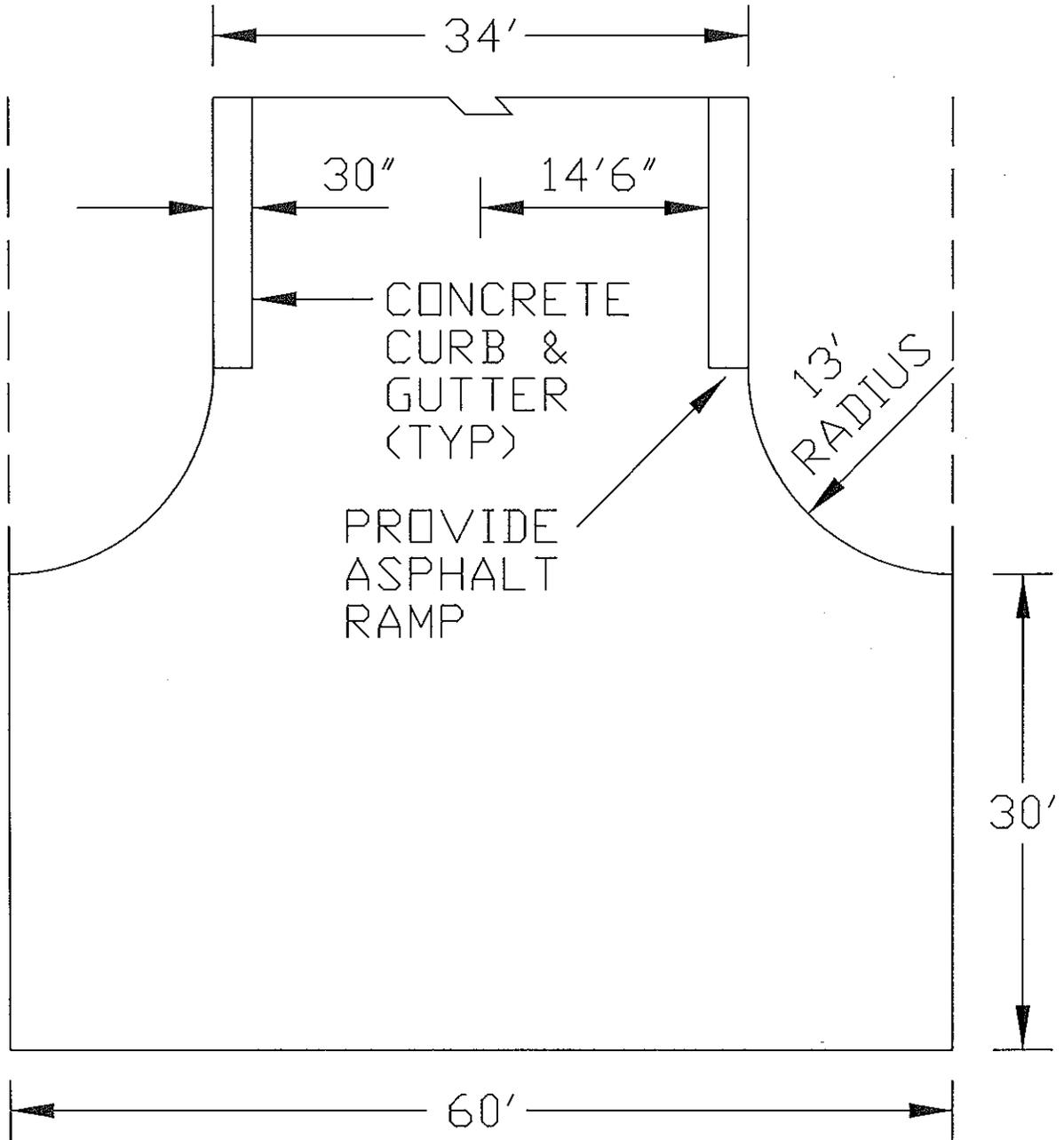
CITY OF PEWAUKEE

SCALE: 1"=3'

SEPTEMBER 2016

DRAWN BY: JJF

Figure T



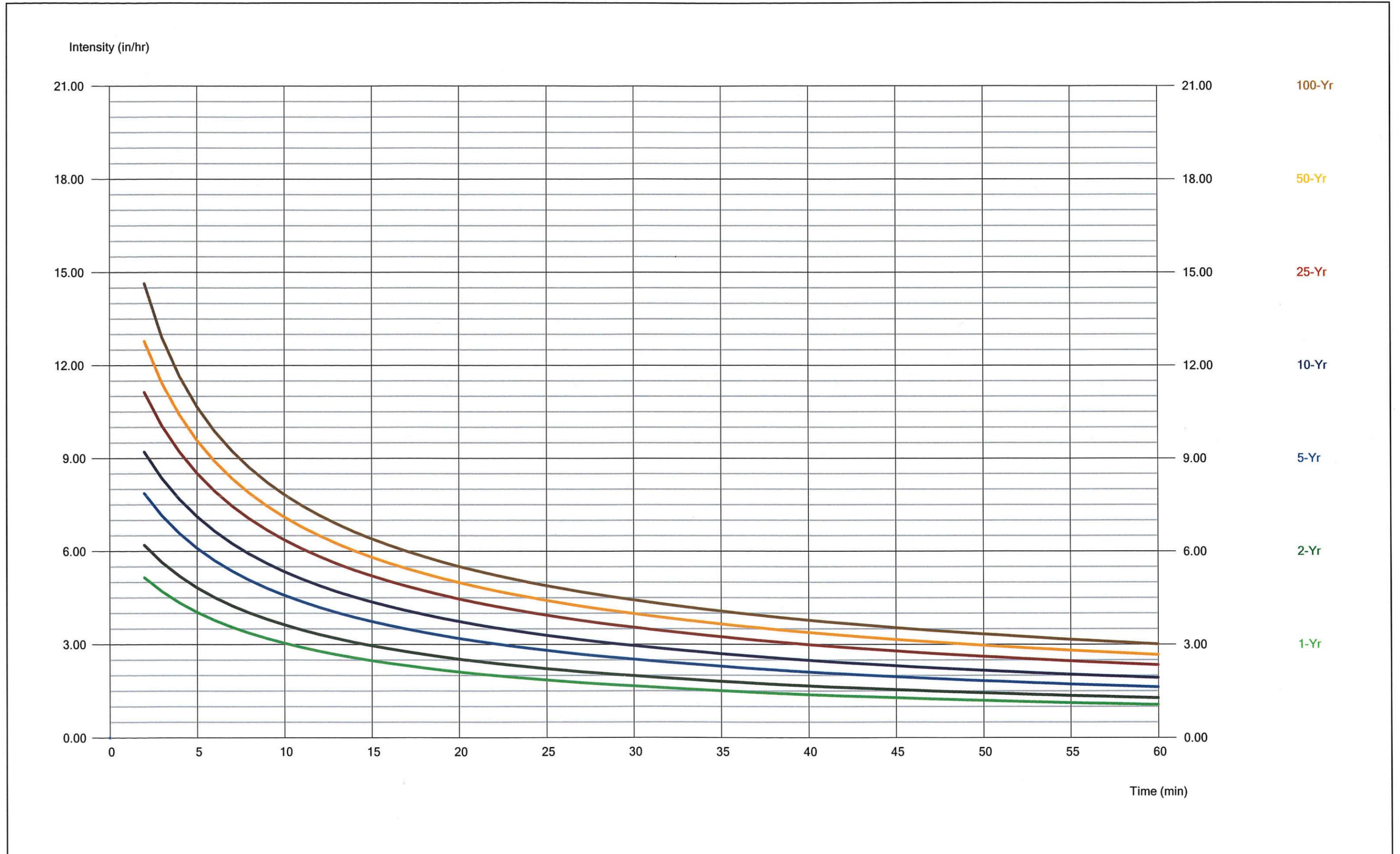
CITY OF PEWAUKEE		
MODIFIED STEVENS TEMPORARY TURNAROUND TEE		
SEPT 2016	DESIGNED BY: RJW	DRAFTER: JJF



Hydraflow IDF Curves

Figure U

IDF file: Waukesha atlas 14 idf curves.IDF





DRIVEWAY
CURB AND GUTTER

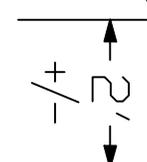
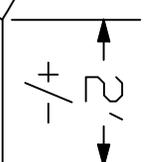
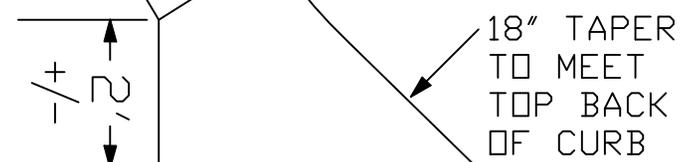
PAVED
DRIVEWAY

DRIVEWAY
CURB AND GUTTER

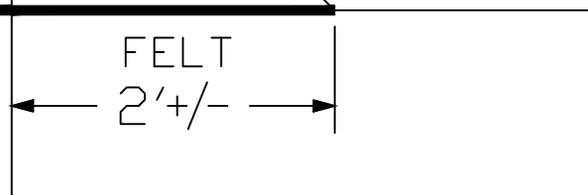
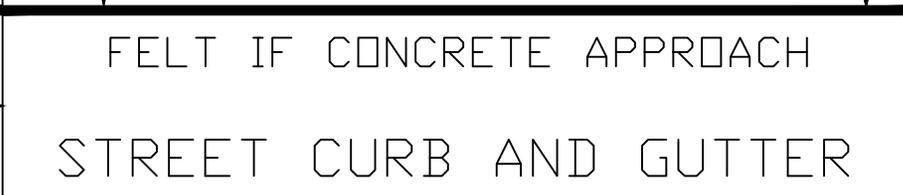
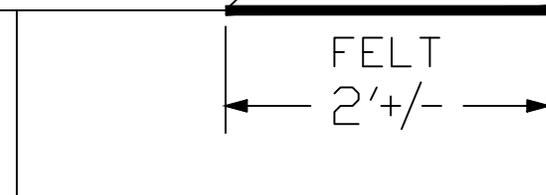


STREET WITH
VERTICAL FACE
CURB

DRIVEWAY
APPROACH



STREET WITH
ROLL FACE CURB



PAVED STREET

CITY OF PEWAUKEE		
DRIVEWAY APPROACH		
SCALE: 1"=2.5'	SEPTEMBER 2017	DRAWN BY: JJF

Figure V

Table 1

City of Pewaukee

Created: January 2016

Intensity-Duration-Frequency Relationships Based on NOAA Atlas 14

Time (minutes)	2-Year Storm Event	5-Year Storm Event	10-Year Storm Event	25-year Storm Event	50-Year Storm Event	100-Year Storm Event
5.00	4.83	6.11	7.12	8.52	9.58	10.67
5.20	4.76	6.02	7.02	8.40	9.43	10.50
5.40	4.70	5.94	6.93	8.28	9.29	10.34
5.60	4.63	5.86	6.83	8.17	9.16	10.18
5.80	4.57	5.78	6.74	8.06	9.03	10.03
6.00	4.52	5.71	6.66	7.95	8.91	9.89
6.20	4.46	5.64	6.57	7.85	8.79	9.75
6.40	4.40	5.57	6.49	7.75	8.67	9.61
6.60	4.35	5.50	6.41	7.65	8.56	9.49
6.80	4.30	5.43	6.33	7.56	8.45	9.36
7.00	4.25	5.37	6.26	7.47	8.35	9.24
7.20	4.20	5.31	6.18	7.38	8.25	9.13
7.40	4.15	5.25	6.11	7.29	8.15	9.01
7.60	4.10	5.19	6.04	7.21	8.05	8.90
7.80	4.06	5.13	5.98	7.13	7.96	8.80
8.00	4.01	5.07	5.91	7.05	7.87	8.70
8.20	3.97	5.02	5.85	6.97	7.78	8.60
8.40	3.93	4.97	5.79	6.90	7.70	8.50
8.60	3.89	4.91	5.73	6.83	7.62	8.41
8.80	3.85	4.86	5.67	6.76	7.54	8.32
9.00	3.81	4.81	5.61	6.69	7.46	8.23
9.20	3.77	4.77	5.56	6.62	7.38	8.15
9.40	3.74	4.72	5.50	6.56	7.31	8.07
9.60	3.70	4.67	5.45	6.49	7.24	7.99
9.80	3.66	4.63	5.40	6.43	7.17	7.91
10.00	3.63	4.59	5.34	6.37	7.10	7.83
10.20	3.60	4.54	5.30	6.31	7.03	7.76
10.40	3.56	4.50	5.25	6.25	6.97	7.68
10.60	3.53	4.46	5.20	6.20	6.90	7.61
10.80	3.50	4.42	5.15	6.14	6.84	7.54
11.00	3.47	4.38	5.11	6.09	6.78	7.48
11.20	3.44	4.34	5.06	6.03	6.72	7.41
11.40	3.41	4.30	5.02	5.98	6.66	7.35
11.60	3.38	4.27	4.98	5.93	6.61	7.28
11.80	3.35	4.23	4.94	5.88	6.55	7.22
12.00	3.32	4.20	4.89	5.83	6.50	7.16
12.20	3.29	4.16	4.85	5.79	6.44	7.10
12.40	3.27	4.13	4.82	5.74	6.39	7.05
12.60	3.24	4.10	4.78	5.69	6.34	6.99
12.80	3.22	4.06	4.74	5.65	6.29	6.94
13.00	3.19	4.03	4.70	5.60	6.24	6.88
13.20	3.16	4.00	4.67	5.56	6.20	6.83
13.40	3.14	3.97	4.63	5.52	6.15	6.78
13.60	3.12	3.94	4.60	5.48	6.10	6.73
13.80	3.09	3.91	4.56	5.44	6.06	6.68
14.00	3.07	3.88	4.53	5.40	6.01	6.63

Table 1

City of Pewaukee

Created: January 2016

Intensity-Duration-Frequency Relationships Based on NOAA Atlas 14

Time (minutes)	2-Year Storm Event	5-Year Storm Event	10-Year Storm Event	25-year Storm Event	50-Year Storm Event	100-Year Storm Event
14.20	3.05	3.85	4.49	5.36	5.97	6.58
14.40	3.02	3.82	4.46	5.32	5.93	6.54
14.60	3.00	3.80	4.43	5.28	5.89	6.49
14.80	2.98	3.77	4.40	5.24	5.84	6.44
15.00	2.96	3.74	4.37	5.21	5.80	6.40
15.20	2.94	3.72	4.34	5.17	5.76	6.36
15.40	2.92	3.69	4.31	5.14	5.73	6.31
15.60	2.90	3.67	4.28	5.10	5.69	6.27
15.80	2.88	3.64	4.25	5.07	5.65	6.23
16.00	2.86	3.62	4.22	5.04	5.61	6.19
16.20	2.84	3.59	4.19	5.00	5.58	6.15
16.40	2.82	3.57	4.17	4.97	5.54	6.11
16.60	2.80	3.54	4.14	4.94	5.51	6.08
16.80	2.78	3.52	4.11	4.91	5.47	6.04
17.00	2.77	3.50	4.09	4.88	5.44	6.00
17.20	2.75	3.48	4.06	4.85	5.40	5.96
17.40	2.73	3.45	4.04	4.82	5.37	5.93
17.60	2.71	3.43	4.01	4.79	5.34	5.89
17.80	2.70	3.41	3.99	4.76	5.31	5.86
18.00	2.68	3.39	3.96	4.73	5.28	5.82
18.20	2.66	3.37	3.94	4.70	5.24	5.79
18.40	2.65	3.35	3.91	4.67	5.21	5.76
18.60	2.63	3.33	3.89	4.65	5.18	5.73
18.80	2.62	3.31	3.87	4.62	5.15	5.69
19.00	2.60	3.29	3.85	4.59	5.13	5.66
19.20	2.59	3.27	3.82	4.57	5.10	5.63
19.40	2.57	3.25	3.80	4.54	5.07	5.60
19.60	2.56	3.23	3.78	4.51	5.04	5.57
19.80	2.54	3.22	3.76	4.49	5.01	5.54
20.00	2.53	3.20	3.74	4.47	4.99	5.51
20.20	2.51	3.18	3.72	4.44	4.96	5.48
20.40	2.50	3.16	3.70	4.42	4.93	5.45
20.60	2.48	3.14	3.68	4.39	4.91	5.42
20.80	2.47	3.13	3.66	4.37	4.88	5.40
21.00	2.46	3.11	3.64	4.35	4.86	5.37
21.20	2.44	3.09	3.62	4.32	4.83	5.34
21.40	2.43	3.08	3.60	4.30	4.81	5.32
21.60	2.42	3.06	3.58	4.28	4.78	5.29
21.80	2.41	3.04	3.56	4.26	4.76	5.26
22.00	2.39	3.03	3.54	4.24	4.73	5.24
22.20	2.38	3.01	3.53	4.21	4.71	5.21
22.40	2.37	3.00	3.51	4.19	4.69	5.19
22.60	2.36	2.98	3.49	4.17	4.67	5.16
22.80	2.34	2.97	3.47	4.15	4.64	5.14
23.00	2.33	2.95	3.46	4.13	4.62	5.12
23.20	2.32	2.94	3.44	4.11	4.60	5.09

Table 1

City of Pewaukee

Created: January 2016

Intensity-Duration-Frequency Relationships Based on NOAA Atlas 14

Time (minutes)	2-Year Storm Event	5-Year Storm Event	10-Year Storm Event	25-year Storm Event	50-Year Storm Event	100-Year Storm Event
23.40	2.31	2.92	3.42	4.09	4.58	5.07
23.60	2.30	2.91	3.40	4.07	4.56	5.04
23.80	2.29	2.89	3.39	4.05	4.53	5.02
24.00	2.27	2.88	3.37	4.03	4.51	5.00
24.20	2.26	2.87	3.36	4.01	4.49	4.98
24.40	2.25	2.85	3.34	4.00	4.47	4.96
24.60	2.24	2.84	3.32	3.98	4.45	4.93
24.80	2.23	2.83	3.31	3.96	4.43	4.91
25.00	2.22	2.81	3.29	3.94	4.41	4.89
25.20	2.21	2.80	3.28	3.92	4.39	4.87
25.40	2.20	2.79	3.26	3.91	4.37	4.85
25.60	2.19	2.77	3.25	3.89	4.36	4.83
25.80	2.18	2.76	3.23	3.87	4.34	4.81
26.00	2.17	2.75	3.22	3.85	4.32	4.79
26.20	2.16	2.74	3.21	3.84	4.30	4.77
26.40	2.15	2.72	3.19	3.82	4.28	4.75
26.60	2.14	2.71	3.18	3.80	4.26	4.73
26.80	2.13	2.70	3.16	3.79	4.25	4.71
27.00	2.12	2.69	3.15	3.77	4.23	4.69
27.20	2.11	2.68	3.14	3.76	4.21	4.67
27.40	2.10	2.66	3.12	3.74	4.19	4.65
27.60	2.09	2.65	3.11	3.72	4.18	4.64
27.80	2.08	2.64	3.10	3.71	4.16	4.62
28.00	2.07	2.63	3.08	3.69	4.14	4.60
28.20	2.07	2.62	3.07	3.68	4.13	4.58
28.40	2.06	2.61	3.06	3.66	4.11	4.56
28.60	2.05	2.60	3.04	3.65	4.09	4.55
28.80	2.04	2.59	3.03	3.63	4.08	4.53
29.00	2.03	2.57	3.02	3.62	4.06	4.51
29.20	2.02	2.56	3.01	3.61	4.05	4.50
29.40	2.01	2.55	3.00	3.59	4.03	4.48
29.60	2.01	2.54	2.98	3.58	4.02	4.46
29.80	2.00	2.53	2.97	3.56	4.00	4.45
30.00	1.99	2.52	2.96	3.55	3.98	4.43
30.20	1.98	2.51	2.95	3.54	3.97	4.41
30.40	1.97	2.50	2.94	3.52	3.96	4.40
30.60	1.97	2.49	2.93	3.51	3.94	4.38
30.80	1.96	2.48	2.91	3.50	3.93	4.37
31.00	1.95	2.47	2.90	3.48	3.91	4.35
31.20	1.94	2.46	2.89	3.47	3.90	4.34
31.40	1.93	2.45	2.88	3.46	3.88	4.32
31.60	1.93	2.44	2.87	3.44	3.87	4.31
31.80	1.92	2.44	2.86	3.43	3.86	4.29
32.00	1.91	2.43	2.85	3.42	3.84	4.28
32.20	1.90	2.42	2.84	3.41	3.83	4.26
32.40	1.90	2.41	2.83	3.39	3.81	4.25

Table 1

City of Pewaukee

Created: January 2016

Intensity-Duration-Frequency Relationships Based on NOAA Atlas 14

Time (minutes)	2-Year Storm Event	5-Year Storm Event	10-Year Storm Event	25-year Storm Event	50-Year Storm Event	100-Year Storm Event
32.60	1.89	2.40	2.82	3.38	3.80	4.23
32.80	1.88	2.39	2.81	3.37	3.79	4.22
33.00	1.88	2.38	2.80	3.36	3.78	4.20
33.20	1.87	2.37	2.79	3.35	3.76	4.19
33.40	1.86	2.36	2.78	3.33	3.75	4.18
33.60	1.86	2.35	2.77	3.32	3.74	4.16
33.80	1.85	2.35	2.76	3.31	3.72	4.15
34.00	1.84	2.34	2.75	3.30	3.71	4.14
34.20	1.83	2.33	2.74	3.29	3.70	4.12
34.40	1.83	2.32	2.73	3.28	3.69	4.11
34.60	1.82	2.31	2.72	3.26	3.67	4.10
34.80	1.82	2.30	2.71	3.25	3.66	4.08
35.00	1.81	2.30	2.70	3.24	3.65	4.07
35.20	1.80	2.29	2.69	3.23	3.64	4.06
35.40	1.80	2.28	2.68	3.22	3.63	4.04
35.60	1.79	2.27	2.67	3.21	3.62	4.03
35.80	1.78	2.26	2.66	3.20	3.60	4.02
36.00	1.78	2.26	2.65	3.19	3.59	4.01
36.20	1.77	2.25	2.64	3.18	3.58	3.99
36.40	1.76	2.24	2.63	3.17	3.57	3.98
36.60	1.76	2.23	2.63	3.16	3.56	3.97
36.80	1.75	2.23	2.62	3.15	3.55	3.96
37.00	1.75	2.22	2.61	3.14	3.54	3.95
37.20	1.74	2.21	2.60	3.13	3.52	3.93
37.40	1.74	2.20	2.59	3.12	3.51	3.92
37.60	1.73	2.20	2.58	3.11	3.50	3.91
37.80	1.72	2.19	2.57	3.10	3.49	3.90
38.00	1.72	2.18	2.57	3.09	3.48	3.89
38.20	1.71	2.18	2.56	3.08	3.47	3.88
38.40	1.71	2.17	2.55	3.07	3.46	3.87
38.60	1.70	2.16	2.54	3.06	3.45	3.85
38.80	1.70	2.15	2.53	3.05	3.44	3.84
39.00	1.69	2.15	2.53	3.04	3.43	3.83
39.20	1.68	2.14	2.52	3.03	3.42	3.82
39.40	1.68	2.13	2.51	3.02	3.41	3.81
39.60	1.67	2.13	2.50	3.01	3.40	3.80
39.80	1.67	2.12	2.49	3.00	3.39	3.79
40.00	1.66	2.11	2.49	2.99	3.38	3.78
40.20	1.66	2.11	2.48	2.99	3.37	3.77
40.40	1.65	2.10	2.47	2.98	3.36	3.76
40.60	1.65	2.09	2.46	2.97	3.35	3.75
40.80	1.64	2.09	2.46	2.96	3.34	3.74
41.00	1.64	2.08	2.45	2.95	3.33	3.73
41.20	1.63	2.07	2.44	2.94	3.32	3.72
41.40	1.63	2.07	2.44	2.93	3.31	3.71
41.60	1.62	2.06	2.43	2.93	3.30	3.70

Table 1

City of Pewaukee

Created: January 2016

Intensity-Duration-Frequency Relationships Based on NOAA Atlas 14

Time (minutes)	2-Year Storm Event	5-Year Storm Event	10-Year Storm Event	25-year Storm Event	50-Year Storm Event	100-Year Storm Event
41.80	1.62	2.06	2.42	2.92	3.30	3.69
42.00	1.61	2.05	2.41	2.91	3.29	3.68
42.20	1.61	2.04	2.41	2.90	3.28	3.67
42.40	1.60	2.04	2.40	2.89	3.27	3.66
42.60	1.60	2.03	2.39	2.88	3.26	3.65
42.80	1.59	2.03	2.39	2.88	3.25	3.64
43.00	1.59	2.02	2.38	2.87	3.24	3.63
43.20	1.58	2.01	2.37	2.86	3.23	3.62
43.40	1.58	2.01	2.37	2.85	3.22	3.61
43.60	1.57	2.00	2.36	2.84	3.22	3.60
43.80	1.57	2.00	2.35	2.84	3.21	3.59
44.00	1.57	1.99	2.35	2.83	3.20	3.58
44.20	1.56	1.99	2.34	2.82	3.19	3.57
44.40	1.56	1.98	2.33	2.81	3.18	3.57
44.60	1.55	1.97	2.33	2.80	3.17	3.56
44.80	1.55	1.97	2.32	2.80	3.17	3.55
45.00	1.54	1.96	2.31	2.79	3.16	3.54
45.20	1.54	1.96	2.31	2.78	3.15	3.53
45.40	1.53	1.95	2.30	2.77	3.14	3.52
45.60	1.53	1.95	2.29	2.77	3.13	3.51
45.80	1.53	1.94	2.29	2.76	3.12	3.50
46.00	1.52	1.94	2.28	2.75	3.12	3.50
46.20	1.52	1.93	2.28	2.75	3.11	3.49
46.40	1.51	1.92	2.27	2.74	3.10	3.48
46.60	1.51	1.92	2.26	2.73	3.09	3.47
46.80	1.50	1.91	2.26	2.72	3.09	3.46
47.00	1.50	1.91	2.25	2.72	3.08	3.45
47.20	1.50	1.90	2.24	2.71	3.07	3.45
47.40	1.49	1.90	2.24	2.70	3.06	3.44
47.60	1.49	1.89	2.23	2.70	3.06	3.43
47.80	1.48	1.89	2.23	2.69	3.05	3.42
48.00	1.48	1.88	2.22	2.68	3.04	3.41
48.20	1.48	1.88	2.22	2.68	3.03	3.41
48.40	1.47	1.87	2.21	2.67	3.03	3.40
48.60	1.47	1.87	2.20	2.66	3.02	3.39
48.80	1.46	1.86	2.20	2.66	3.01	3.38
49.00	1.46	1.86	2.19	2.65	3.00	3.37
49.20	1.46	1.85	2.19	2.64	3.00	3.37
49.40	1.45	1.85	2.18	2.64	2.99	3.36
49.60	1.45	1.84	2.18	2.63	2.98	3.35
49.80	1.45	1.84	2.17	2.62	2.98	3.34
50.00	1.44	1.84	2.17	2.62	2.97	3.34
50.20	1.44	1.83	2.16	2.61	2.96	3.33
50.40	1.43	1.83	2.15	2.60	2.95	3.32
50.60	1.43	1.82	2.15	2.60	2.95	3.31
50.80	1.43	1.82	2.14	2.59	2.94	3.31

Table 1

City of Pewaukee

Created: January 2016

Intensity-Duration-Frequency Relationships Based on NOAA Atlas 14

Time (minutes)	2-Year Storm Event	5-Year Storm Event	10-Year Storm Event	25-year Storm Event	50-Year Storm Event	100-Year Storm Event
51.00	1.42	1.81	2.14	2.59	2.93	3.30
51.20	1.42	1.81	2.13	2.58	2.93	3.29
51.40	1.42	1.80	2.13	2.57	2.92	3.28
51.60	1.41	1.80	2.12	2.57	2.91	3.28
51.80	1.41	1.79	2.12	2.56	2.91	3.27
52.00	1.41	1.79	2.11	2.55	2.90	3.26
52.20	1.40	1.79	2.11	2.55	2.89	3.26
52.40	1.40	1.78	2.10	2.54	2.89	3.25
52.60	1.39	1.78	2.10	2.54	2.88	3.24
52.80	1.39	1.77	2.09	2.53	2.87	3.24
53.00	1.39	1.77	2.09	2.53	2.87	3.23
53.20	1.38	1.76	2.08	2.52	2.86	3.22
53.40	1.38	1.76	2.08	2.51	2.86	3.21
53.60	1.38	1.76	2.07	2.51	2.85	3.21
53.80	1.37	1.75	2.07	2.50	2.84	3.20
54.00	1.37	1.75	2.06	2.50	2.84	3.19
54.20	1.37	1.74	2.06	2.49	2.83	3.19
54.40	1.36	1.74	2.05	2.48	2.82	3.18
54.60	1.36	1.73	2.05	2.48	2.82	3.17
54.80	1.36	1.73	2.04	2.47	2.81	3.17
55.00	1.35	1.73	2.04	2.47	2.81	3.16
55.20	1.35	1.72	2.03	2.46	2.80	3.15
55.40	1.35	1.72	2.03	2.46	2.79	3.15
55.60	1.34	1.71	2.03	2.45	2.79	3.14
55.80	1.34	1.71	2.02	2.45	2.78	3.14
56.00	1.34	1.71	2.02	2.44	2.78	3.13
56.20	1.34	1.70	2.01	2.44	2.77	3.12
56.40	1.33	1.70	2.01	2.43	2.77	3.12
56.60	1.33	1.69	2.00	2.43	2.76	3.11
56.80	1.33	1.69	2.00	2.42	2.75	3.10
57.00	1.32	1.69	1.99	2.41	2.75	3.10
57.20	1.32	1.68	1.99	2.41	2.74	3.09
57.40	1.32	1.68	1.98	2.40	2.74	3.09
57.60	1.31	1.68	1.98	2.40	2.73	3.08
57.80	1.31	1.67	1.98	2.39	2.73	3.07
58.00	1.31	1.67	1.97	2.39	2.72	3.07
58.20	1.31	1.66	1.97	2.38	2.71	3.06
58.40	1.30	1.66	1.96	2.38	2.71	3.06
58.60	1.30	1.66	1.96	2.37	2.70	3.05
58.80	1.30	1.65	1.95	2.37	2.70	3.04
59.00	1.29	1.65	1.95	2.36	2.69	3.04
59.20	1.29	1.65	1.95	2.36	2.69	3.03
59.40	1.29	1.64	1.94	2.35	2.68	3.03
59.60	1.28	1.64	1.94	2.35	2.68	3.02
59.80	1.28	1.64	1.93	2.34	2.67	3.02
60.00	1.28	1.63	1.93	2.34	2.67	3.01



NOAA Atlas 14, Volume 8, Version 2
 Location name: Waukesha, Wisconsin, US*
 Latitude: 43.0064°, Longitude: -88.2492°
 Elevation: 862 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh,
 Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.04 (3.28-5.00)	4.84 (3.91-5.99)	6.11 (4.93-7.56)	7.14 (5.75-8.87)	8.54 (6.67-10.8)	9.61 (7.37-12.2)	10.7 (7.96-13.7)	11.7 (8.45-15.2)	13.1 (9.14-17.2)	14.1 (9.67-18.7)
10-min	2.96 (2.40-3.67)	3.54 (2.87-4.38)	4.47 (3.61-5.54)	5.23 (4.21-6.49)	6.26 (4.88-7.87)	7.04 (5.39-8.91)	7.81 (5.83-10.0)	8.57 (6.19-11.1)	9.56 (6.70-12.6)	10.3 (7.08-13.7)
15-min	2.41 (1.95-2.98)	2.88 (2.33-3.56)	3.64 (2.94-4.50)	4.25 (3.42-5.28)	5.09 (3.97-6.40)	5.72 (4.39-7.24)	6.34 (4.74-8.13)	6.97 (5.03-9.04)	7.77 (5.44-10.2)	8.37 (5.75-11.1)
30-min	1.66 (1.34-2.05)	1.99 (1.61-2.46)	2.52 (2.04-3.13)	2.96 (2.38-3.67)	3.55 (2.77-4.46)	3.99 (3.06-5.06)	4.43 (3.31-5.68)	4.87 (3.52-6.32)	5.44 (3.81-7.16)	5.86 (4.03-7.79)
60-min	1.06 (0.862-1.32)	1.28 (1.03-1.58)	1.63 (1.32-2.02)	1.93 (1.55-2.39)	2.34 (1.84-2.97)	2.67 (2.06-3.40)	3.01 (2.25-3.87)	3.35 (2.43-4.37)	3.82 (2.68-5.04)	4.18 (2.87-5.55)
2-hr	0.650 (0.533-0.794)	0.778 (0.638-0.952)	0.997 (0.816-1.22)	1.19 (0.966-1.46)	1.46 (1.16-1.83)	1.67 (1.31-2.11)	1.90 (1.44-2.43)	2.14 (1.57-2.76)	2.46 (1.75-3.22)	2.71 (1.88-3.57)
3-hr	0.484 (0.400-0.587)	0.576 (0.476-0.699)	0.736 (0.607-0.895)	0.878 (0.721-1.07)	1.09 (0.876-1.37)	1.26 (0.993-1.59)	1.44 (1.11-1.84)	1.64 (1.21-2.12)	1.91 (1.37-2.50)	2.13 (1.49-2.79)
6-hr	0.292 (0.245-0.350)	0.340 (0.284-0.407)	0.426 (0.356-0.512)	0.507 (0.421-0.610)	0.630 (0.516-0.786)	0.735 (0.588-0.919)	0.849 (0.660-1.07)	0.973 (0.731-1.25)	1.15 (0.836-1.50)	1.30 (0.916-1.68)
12-hr	0.173 (0.147-0.205)	0.195 (0.166-0.231)	0.238 (0.201-0.282)	0.279 (0.235-0.332)	0.343 (0.286-0.424)	0.399 (0.324-0.495)	0.461 (0.363-0.578)	0.529 (0.403-0.673)	0.628 (0.462-0.810)	0.709 (0.507-0.914)
24-hr	0.099 (0.085-0.116)	0.112 (0.096-0.131)	0.136 (0.117-0.159)	0.159 (0.135-0.186)	0.194 (0.163-0.236)	0.224 (0.184-0.274)	0.257 (0.205-0.319)	0.293 (0.226-0.369)	0.346 (0.257-0.442)	0.389 (0.281-0.496)
2-day	0.055 (0.048-0.064)	0.064 (0.056-0.074)	0.079 (0.069-0.092)	0.093 (0.080-0.108)	0.114 (0.096-0.136)	0.131 (0.108-0.158)	0.149 (0.120-0.182)	0.169 (0.131-0.210)	0.197 (0.148-0.248)	0.219 (0.160-0.277)
3-day	0.041 (0.036-0.046)	0.047 (0.041-0.053)	0.057 (0.050-0.066)	0.067 (0.058-0.077)	0.081 (0.069-0.096)	0.093 (0.078-0.111)	0.106 (0.086-0.128)	0.119 (0.093-0.147)	0.139 (0.105-0.174)	0.154 (0.113-0.194)
4-day	0.033 (0.029-0.037)	0.037 (0.033-0.043)	0.046 (0.040-0.052)	0.053 (0.046-0.061)	0.064 (0.055-0.076)	0.073 (0.061-0.087)	0.083 (0.067-0.100)	0.093 (0.073-0.114)	0.108 (0.082-0.135)	0.120 (0.089-0.150)
7-day	0.022 (0.020-0.025)	0.025 (0.022-0.028)	0.030 (0.027-0.034)	0.035 (0.031-0.039)	0.041 (0.036-0.048)	0.047 (0.040-0.055)	0.053 (0.043-0.063)	0.059 (0.047-0.072)	0.068 (0.052-0.084)	0.074 (0.056-0.093)
10-day	0.018 (0.016-0.020)	0.020 (0.018-0.022)	0.024 (0.021-0.027)	0.027 (0.024-0.031)	0.032 (0.028-0.037)	0.036 (0.031-0.042)	0.040 (0.033-0.048)	0.045 (0.036-0.054)	0.051 (0.039-0.062)	0.055 (0.042-0.069)
20-day	0.012 (0.011-0.013)	0.013 (0.012-0.015)	0.016 (0.014-0.018)	0.018 (0.016-0.020)	0.021 (0.018-0.023)	0.023 (0.020-0.026)	0.025 (0.021-0.029)	0.027 (0.022-0.032)	0.030 (0.023-0.036)	0.032 (0.024-0.040)
30-day	0.010 (0.009-0.011)	0.011 (0.010-0.012)	0.013 (0.012-0.014)	0.014 (0.013-0.016)	0.016 (0.014-0.018)	0.018 (0.015-0.020)	0.019 (0.016-0.022)	0.021 (0.017-0.024)	0.023 (0.018-0.027)	0.024 (0.018-0.029)
45-day	0.008 (0.008-0.009)	0.009 (0.009-0.010)	0.011 (0.010-0.012)	0.012 (0.011-0.013)	0.013 (0.012-0.015)	0.014 (0.013-0.016)	0.015 (0.013-0.018)	0.016 (0.013-0.019)	0.017 (0.014-0.021)	0.018 (0.014-0.022)
60-day	0.007 (0.007-0.008)	0.008 (0.008-0.009)	0.009 (0.009-0.010)	0.010 (0.010-0.011)	0.012 (0.010-0.013)	0.012 (0.011-0.014)	0.013 (0.011-0.015)	0.014 (0.011-0.016)	0.015 (0.012-0.017)	0.015 (0.012-0.018)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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NOAA Atlas 14, Volume 8, Version 2 WAUKESHA

Station ID: 47-8937

Location name: Waukesha, Wisconsin, US*

Latitude: 43.0064°, Longitude: -88.2492°

Elevation:

Elevation (station metadata): 830 ft*

* source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.337 (0.273-0.417)	0.403 (0.326-0.499)	0.509 (0.411-0.630)	0.595 (0.479-0.739)	0.712 (0.556-0.896)	0.801 (0.614-1.01)	0.888 (0.663-1.14)	0.975 (0.704-1.27)	1.09 (0.762-1.43)	1.17 (0.806-1.56)
10-min	0.494 (0.400-0.611)	0.590 (0.478-0.730)	0.745 (0.602-0.923)	0.872 (0.701-1.08)	1.04 (0.814-1.31)	1.17 (0.899-1.49)	1.30 (0.971-1.67)	1.43 (1.03-1.85)	1.59 (1.12-2.10)	1.72 (1.18-2.28)
15-min	0.602 (0.488-0.745)	0.719 (0.583-0.890)	0.909 (0.734-1.13)	1.06 (0.855-1.32)	1.27 (0.992-1.60)	1.43 (1.10-1.81)	1.59 (1.18-2.03)	1.74 (1.26-2.26)	1.94 (1.36-2.56)	2.09 (1.44-2.78)
30-min	0.829 (0.672-1.03)	0.994 (0.805-1.23)	1.26 (1.02-1.56)	1.48 (1.19-1.84)	1.77 (1.38-2.23)	2.00 (1.53-2.53)	2.22 (1.65-2.84)	2.44 (1.76-3.16)	2.72 (1.90-3.58)	2.93 (2.01-3.90)
60-min	1.06 (0.862-1.32)	1.28 (1.03-1.58)	1.63 (1.32-2.02)	1.93 (1.55-2.39)	2.34 (1.84-2.97)	2.67 (2.06-3.40)	3.01 (2.25-3.87)	3.35 (2.43-4.37)	3.82 (2.68-5.04)	4.18 (2.87-5.55)
2-hr	1.30 (1.07-1.59)	1.56 (1.28-1.90)	1.99 (1.63-2.44)	2.37 (1.93-2.91)	2.91 (2.32-3.66)	3.35 (2.61-4.22)	3.80 (2.88-4.85)	4.27 (3.13-5.52)	4.92 (3.50-6.45)	5.42 (3.77-7.15)
3-hr	1.45 (1.20-1.76)	1.73 (1.43-2.10)	2.21 (1.82-2.69)	2.64 (2.16-3.22)	3.27 (2.63-4.10)	3.79 (2.98-4.77)	4.34 (3.32-5.52)	4.92 (3.64-6.35)	5.74 (4.12-7.51)	6.40 (4.47-8.39)
6-hr	1.75 (1.47-2.10)	2.03 (1.70-2.44)	2.55 (2.13-3.07)	3.04 (2.52-3.65)	3.77 (3.09-4.71)	4.40 (3.52-5.50)	5.08 (3.95-6.43)	5.83 (4.38-7.47)	6.89 (5.01-8.96)	7.76 (5.49-10.1)
12-hr	2.08 (1.77-2.47)	2.35 (2.00-2.79)	2.87 (2.43-3.40)	3.36 (2.83-3.99)	4.13 (3.44-5.11)	4.81 (3.90-5.96)	5.55 (4.38-6.97)	6.37 (4.85-8.11)	7.56 (5.57-9.76)	8.55 (6.11-11.0)
24-hr	2.38 (2.05-2.79)	2.69 (2.31-3.15)	3.26 (2.80-3.82)	3.80 (3.25-4.47)	4.65 (3.91-5.67)	5.37 (4.41-6.57)	6.17 (4.92-7.64)	7.04 (5.42-8.86)	8.30 (6.18-10.6)	9.33 (6.75-11.9)
2-day	2.66 (2.32-3.07)	3.07 (2.68-3.55)	3.81 (3.31-4.40)	4.47 (3.86-5.18)	5.46 (4.63-6.54)	6.28 (5.21-7.56)	7.16 (5.77-8.75)	8.11 (6.30-10.1)	9.44 (7.09-11.9)	10.5 (7.69-13.3)
3-day	2.92 (2.56-3.34)	3.35 (2.94-3.84)	4.12 (3.61-4.73)	4.81 (4.20-5.54)	5.85 (4.99-6.95)	6.70 (5.60-8.01)	7.61 (6.17-9.24)	8.59 (6.73-10.6)	9.97 (7.55-12.5)	11.1 (8.17-14.0)
4-day	3.15 (2.79-3.59)	3.59 (3.18-4.10)	4.38 (3.86-5.00)	5.08 (4.46-5.82)	6.14 (5.27-7.25)	7.01 (5.89-8.33)	7.94 (6.47-9.59)	8.94 (7.03-11.0)	10.3 (7.87-12.9)	11.5 (8.50-14.4)
7-day	3.72 (3.33-4.19)	4.22 (3.77-4.76)	5.08 (4.53-5.74)	5.85 (5.18-6.62)	6.97 (6.04-8.13)	7.89 (6.69-9.27)	8.86 (7.29-10.6)	9.90 (7.86-12.0)	11.3 (8.70-14.0)	12.5 (9.34-15.6)
10-day	4.23 (3.81-4.74)	4.78 (4.30-5.36)	5.72 (5.13-6.42)	6.54 (5.84-7.36)	7.72 (6.73-8.93)	8.68 (7.40-10.1)	9.68 (8.01-11.5)	10.7 (8.56-12.9)	12.2 (9.39-15.0)	13.3 (10.0-16.5)
20-day	5.79 (5.29-6.40)	6.48 (5.91-7.17)	7.62 (6.93-8.44)	8.56 (7.75-9.52)	9.88 (8.69-11.2)	10.9 (9.39-12.5)	11.9 (9.98-13.9)	13.0 (10.5-15.4)	14.4 (11.2-17.4)	15.4 (11.8-19.0)
30-day	7.17 (6.60-7.86)	7.98 (7.35-8.76)	9.30 (8.53-10.2)	10.4 (9.46-11.4)	11.8 (10.4-13.2)	12.9 (11.2-14.6)	13.9 (11.7-16.1)	15.0 (12.1-17.6)	16.3 (12.8-19.6)	17.3 (13.2-21.1)
45-day	8.98 (8.34-9.77)	9.98 (9.26-10.9)	11.5 (10.7-12.6)	12.8 (11.8-14.0)	14.4 (12.8-15.9)	15.5 (13.5-17.4)	16.6 (14.1-19.0)	17.6 (14.4-20.6)	18.9 (14.9-22.5)	19.7 (15.2-24.0)
60-day	10.6 (9.87-11.4)	11.7 (11.0-12.7)	13.6 (12.6-14.7)	14.9 (13.8-16.3)	16.7 (14.9-18.4)	17.9 (15.7-20.0)	19.0 (16.2-21.6)	20.1 (16.4-23.2)	21.2 (16.8-25.1)	22.0 (17.0-26.6)

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