



Plan Review and Standards

Minnesota Rules, part 4720.0010, states that prior to the installation, alteration, or extension of any water supply infrastructure, plans and specifications must be submitted to the Minnesota Department of Health (MDH) for review and approval. Review of these projects is necessary to:

- Protect public health.
- Verify that the design complies with Minnesota Rules and standards of the MDH.
- Allow changes to be made before the project is constructed, which is typically less expensive than making changes after construction is completed.

STANDARDS

- Recommended Standards for Water Works (Great Lakes Upper Mississippi River Board 10 State Standards)
- American Water Works Association (AWWA) Standards
- City Engineers Association of Minnesota Standard Utility Specifications (CEAM)
- Minnesota Plumbing Code (Minnesota Rules, Chapter 4714)
- Minnesota Rules Regarding Wells and Borings (Minnesota Rules, Chapter 4725)
- Minnesota Water Supply Regulations (Minnesota Rules, Chapter 4720)
- National Sanitation Foundation (NSF) Listings for Standards 60 and 61

SUBMITTING PLANS

For projects on municipal systems, the plans and specifications need to be signed and submitted by an engineer registered in the state of Minnesota. For projects on non-municipal or noncommunity systems, the plans may instead be signed and submitted by a licensed contractor who is performing the work. However, contractors are not allowed to design installations for other contractors. MDH is currently not able to accept full submissions of plans and specifications electronically. Minor modifications to plans or addendums may be submitted electronically as e-mail attachments. Plan sheets must be sized to 11 x 17-inch paper is preferred. Plans and specifications submission must be accompanied by the Completed Plan Review Fee Sheet and a check made payable to “Minnesota Department of Health.”



- Two copies for wells, pumphouses, booster stations, storage tanks, chemical feed systems, and treatment plants.
- One copy for watermain projects.
- Two copies for all Drinking Water Revolving Fund (DWRF) projects, including watermains.

One plan review fee is required for each type of project proposed in the plans and specifications.

MDH REVIEW TIMEFRAME

Watermain projects typically take 2-3 weeks for the review to be completed and the report issued. Other projects may take 3-6 weeks to be completed since the plan review process for these types of projects is much more involved. If corrections to the plans need to be made and a request for additional information is sent, review of the project will not be completed until revised plans are received that satisfy all of the required changes. No construction shall begin until the plans and specifications have been reviewed and approved by MDH.

WATERMAINS

Submittal for watermain plans and specifications review must include:

- Plan view drawings that show the watermain, proposed and/or existing sewer (sanitary and storm), services, buildings, wells, and surface water (ponds, lakes, rivers, etc). The plan view drawings should be shown using a scale of not more than 50 feet to the inch.
- Profile view drawings that show the proposed ground surface elevations, watermain, proposed and/or existing sewer (sanitary and storm), sewer crossings, surface water, groundwater, etc. The profile view drawings should be shown using a scale of not more than 10 feet to the inch.
- Material specifications for watermain pipe (ductile iron, PVC, HDPE), joints, valves, hydrants, and joint restraints.
- Installation procedure specifications for the watermain, including disinfection and pressure testing procedures.
- Blocking or restraints of all tees, bends, and hydrants.
- A statement of estimated quantities or bid schedule that includes the proposed lineal feet for each size of watermain and pipe material.



The watermain specifications must be submitted to MDH to be reviewed. A copy of a city's specifications may also be submitted to be kept on file for reference. The submission of project specifications is not required if the watermain will be installed using materials and procedures that are in strict accordance with a system's specifications that we have on file and must be explicitly stated on the plans.

Projects that involve the following do not require plan review:

- Replacement of a short section of watermain (typically less than 100 lineal feet)
- Replacement of hydrants or valves
- Installation of a service line where the line does not provide distribution system looping or serve a fire hydrant

EXAMPLES OF WATERMAIN STANDARDS

A minimum of 10 feet measured horizontally between the outer surfaces of watermain and sewer pipes is required. There are no exceptions to this separation for sewer forcemain.

Anywhere local conditions (rock excavation, buildings, etc.) prevent 10 feet of separation, the watermain may be laid closer to gravity sewer if one of the following conditions is met:

- The bottom of the watermain is laid at least 18 inches above the top of the sewer on a separate shelf.
- The sewer is constructed of materials and with joints that are equivalent to watermain standards of construction and is pressure tested to assure water tightness prior to backfilling.

Storm sewer is also considered a contamination source, and must meet the sewer separation requirements.



A minimum cover of 5 feet must be provided over the pipe for underwater crossings. In addition, if the water course where the watermain crosses is greater than 15 feet in width, the following conditions must be met:

- Valves shall be provided at both ends of the water crossing and must be easily accessible and not subject to flooding.
- Permanent taps or other provisions that allow the connection of a small meter must be made to determine leakage and obtain water samples on each side of the valve closes to the supply side.
- The watermain shall be of special construction with flexible, watertight joints or restrained joints.

WELLS

Submittal for a community water supply plan review must include:

- The legal description of the proposed well location including the township, range, section, and quarter numbers.
- A site plan that shows the proposed location of the well, grading, property lines, septic tanks, drainfields, buried sewer lines, chemical storage areas (if applicable), and other sources of possible contamination. The site plan should show everything within 150 feet of the well using a scale of not more than 50 feet to the inch.
- A well profile plan showing the proposed well construction including depths, casings, grouting material, pitless unit, wellhead construction, and venting provisions.
- A log of all anticipated geological formations that will be encountered.
- Procedures for the construction, testing, development, and disinfection of the well.
- Material specifications for the casing, screen, grout, gravel pack, wellhead completion, etc.
- Make, model, and capacity of the well pump, motor, and pitless unit.
- Documentation proving that the system owner either owns or legally controls all land within a 50-foot radius of the proposed well location.
- Completed Preliminary Wellhead Protection Area Worksheet.



Other requirements of the project owner prior to MDH granting approval for construction of a new community water supply:

An on-site inspection of the proposed well location must be conducted by a representative of MDH. The site inspection will be arranged as part of the well construction plan review.

A Well Construction Preliminary Assessment, a requirement of the Minnesota Department of Natural Resources (DNR) before construction of a new well that will pump more than 10,000 gallons per day or 1 million gallons per year.

A Water Supply Plan approved and implemented by the Minnesota Department of Natural Resources for systems serving a population of 1,000 or greater.

Activities that require a plan review:

- Adding or removing casing or screen below the frost line
- Installing or removing a pitless unit or adaptor
- Altering the depth of a well
- Replacing a pump with a different type that requires modifications to the wellhead. For example, removing a vertical turbine pump, and replacing it with a submersible pump

In regard to proposals that are unable to meet the requirements of Minnesota Rules, Chapter 4725, a Variance Request Application must be filled out and submitted to the MDH Section of Well Management. The variance must be reviewed and approved by the MDH prior to the construction of the well.



PUMPHOUSE

Submittal for pumphouse plans and specifications review must include:

- A site plan showing the building outline, utility locations, grading, and well location(s).
- A floor plan showing piping and appurtenances with sizes labeled, treatment equipment, chemical injection points, and sample taps.
- An elevation drawing of the building.
- A detailed diagram for each chemical feed system.
- A list of chemicals used for treatment and/or maintenance, including manufacturer names and trade names.
- Chemical feed rates and size of rotameters.
- Provisions for chemical spill/leak containment for all chemicals.
- Mechanical plans showing equipment for plumbing, ventilation, heating and air conditioning, and dehumidification.
- Plumbing floor plans and riser diagrams showing all water supply and waste piping with sizes labeled, floor drains, venting, cleanouts, fixtures, water heater, valves, etc.
- Specifications for all equipment and materials, including manufacturer names and model numbers.

EXAMPLES OF PUMPHOUSE STANDARDS

Since Minnesota Rules, Chapter 4725 does not allow sewer pipe to be located within 50 feet of a water supply well, building waste from a pumphouse with a well cannot be within 50 feet of a well and directly connected to a sanitary sewer system. However, clear water drainage from floor drains may discharge to a buried gravel pocket that is located at least 20 feet away from the well. If anything other than clear water drainage is generated, then another method of discharge or disposal must be provided.

A raw water sample tap must be provided. If the pumphouse has a chemical feed system, the raw water sample tap shall be installed prior to any chemical injection points and an additional sample tap shall be provided downstream from the injection points.

If used for sequestration, polyphosphate must be injected at least 5 lineal feet of pipe upstream of any chlorine injection point. However, the polyphosphate should be injected as far upstream from the chlorine feed point as possible to ensure sufficient mixing.



BOOSTER STATIONS

Submittal of booster station plans and specifications must include:

- A site plan showing the building location, utilities, grading, and bypass line.
- A floor plan showing the booster pumps, piping and appurtenances with sizes labeled, pressure gauges, a flow meter, and sample taps.
- Make, model, and capacity of pumps.
- Specifications for all equipment and materials, including manufacturer names.

EXAMPLES OF BOOSTER STATION STANDARDS

The pump station must be located above grade so it is not subject to flooding and is easily accessible.

Any booster pumping station must have at least two pumps, and the peak demand required from the booster station must be satisfied with the largest pump out of service.

Control equipment must have:

- An automatic shutoff or low pressure controller must prevent the pressure in the suction line from dropping below 20 pounds per square inch (psi) under all operating conditions.
- A normal working inlet pressure of at least 35 psi shall be maintained.
- Prevention of excessive cycling of the pumps.

STORAGE TANKS

Types of tanks regulated as finished water storage tanks:

- Water towers
- Standpipes
- Ground reservoirs
- Clearwells
- Backwash reclaim tanks



Submittal of storage tank plans and specifications must include:

- Capacity of the tank.
- A site plan showing the tank location, utilities, and grading.
- A profile view drawing of the tank showing overflow piping, inlet/outlet piping, access hatches, vent, and dimensions.
- A plan view drawing of the tank roof showing access hatches and vent.
- Detail drawings of access hatches, vent design, and overflow discharge.
- Specifications for an NSF Standard 61 listed interior tank coating if the tank is to be painted.
- Procedures for the tank construction and disinfection.
- Geotechnical information including any groundwater levels for below grade reservoirs.

EXAMPLES OF STORAGE TANK STANDARDS

A minimum of 50 feet measured horizontally is required between any part of a below grade tank and the outer surface of the sewer pipe. If this separation cannot be met for gravity sewer, the MDH may allow the tank to be located no less than 20 feet from the sewer if it is constructed using watermain quality pipe and pressure tested without leakage.

Requirements for roof access hatches include:

- At least two access hatches must be provided to the tank interior located above the high water level, where space permits. The vent does not count as an access hatch.
- For elevated storage tanks, the top of the hatch must extend 4-6 inches above the tank surface.
- For ground storage tanks, the top of the hatch must extend 24-36 inches above the top of the tank or surrounding grade, whichever is higher.
- The hatch cover must be hinged, lockable, solid, and watertight. It must overlap the framed opening and extend down around the frame by at least 2 inches.

A mixer within a storage tank must be NSF Standard 61 certified.



CHEMICAL FEED SYSTEMS

Submittal of chemical feed system plans and specifications must include:

- A floor plan of the existing facility showing existing piping and appurtenances, proposed chemical feed equipment, and proposed chemical injection point(s).
- A statement of the intended chemical use and dose.
- Manufacturer and trade name of each NSF Standard 60 listed chemical.
- A detailed diagram for each chemical feed system, including the location of the chemical feed point.
- Provisions for chemical spill/leak containment.
- Specifications for all materials and equipment including make and model of chemical pumps, storage tank, tubing, etc.
- Calculations for chemical feed rates and sizing of rotameters.

EXAMPLES OF CHEMICAL FEED SYSTEM STANDARDS

Requirements for installing a gas chlorine system include:

- The gas chlorine equipment must be enclosed and separated from other operating areas.
- The gas chlorine room must be equipped with a ventilation system that provides at least one air exchange per minute with the intake located near the floor.
- The chlorine room doors must be equipped with panic hardware, open outward, and provided with a “Danger: Chlorine Gas” sign.
- A shatter-resistant inspection window must be installed in an interior wall of the gas chlorine room.
- Separate switches shall be located outside the gas chlorine room doors and at the inspection window for the chlorine room fan and lights. Outside switches should be protected from vandalism and have a signal light indicating fan operation.
- Pressure relief valves for the chlorine regulators must be vented to the outside atmosphere and screened.
- A continuous electronic chlorine leak detector shall be installed, equipped with both an audible alarm and a warning light.
- The gas chlorine storage must be acceptable to the local fire marshal.



TREATMENT PLANTS

Submittal of treatment plant plans and specifications must include:

- Purpose of treatment.
- Design capacity, in gallons per minute (GPM) or gallons per day (GPD), including maximum hours of operation.
- Estimated filter run times.
- Raw water contaminant concentrations (iron, manganese, organics, turbidity, hardness, nitrate/nitrite, ammonia, arsenic, radium, etc.) and removal goals.
- A site plan showing the building outline, utility locations, grading, well locations, backwash tanks, and reservoirs.
- Floor plan and section drawings showing piping and appurtenances with sizes, treatment equipment, basins, chemical injection points, and sample taps.
- A process drawing.
- A detailed diagram for each chemical feed system.
- A list of chemicals used for treatment and/or maintenance, including manufacturer names and trade names.
- Calculations for chemical feed rates and sizing of rotameters.
- Provisions for chemical spill/leak containment for all chemicals.
- Mechanical plans showing equipment for plumbing, ventilation, heating and air conditioning, and dehumidification.
- Plumbing floor plan and riser diagrams showing all water supply and waste piping, floor drains, venting, cleanouts, fixtures, water heater, valves, etc.
- Specifications for treatment unit components such as filter media, underdrain, airwash system, and backwash troughs.
- Specifications for all equipment and materials, including manufacturer names and model numbers.
- Procedures for disinfection of the plant and pressure testing of the piping.



Pilot Plant study requirements include but are not limited to:

- Use of new technology (membrane filtration, biological filtration, for example).
- Removal of a contaminant that is regulated by the Safe Drinking Water Act and exceeds the maximum contaminant level (MCL) in the raw water (arsenic, radium, etc.).

EXAMPLES OF TREATMENT PLANT STANDARDS

A raw water sample tap must be provided for each raw water source prior to any chemical feed. In addition, sample taps must be installed on the influent and effluent of each treatment unit (filters, softeners, etc.) and for the finished water. If dual media is used for filtration, it is recommended that sample taps be provided at points between the two media.

Requirements when recycling water from a backwash tank include:

- The backwash tank must be constructed in accordance with the requirements for a finished water storage tank in Part 7 of the 10 State Recommended Standards for Water Works.
- A minimum horizontal separation of 50 feet between any part of the tank and buried sewer must be provided.
- The sludge waste from the tank must discharge to the sanitary sewer through an air gap that is located at least 50 feet away from any part of the tank.
- The volume of the tank should be sized to hold water from at least 1.5 backwashes.
- The recycled volume of water must not exceed 10 percent of the total raw water flow.

Requirements for plumbing fixtures such as toilets or mop sinks in treatment plants include:

- Piping receiving waste from plumbing fixtures must not connect to floor drains located in operating areas. Two separate waste systems are required: one for sanitary waste and one for “grey water” waste from floor drains.
- Any buried sanitary waste piping that is connected to plumbing fixtures must be located at least 50 feet away from wells or below grade finished water basins.
- The sanitary waste and grey water waste must discharge separately to a sanitary manhole. The overflow rim of the manhole must be at least 12 inches below the elevation of the lowest fixture or floor drain served by either drainage system.



ADDITIONAL RESOURCES FOR STANDARDS

Community Public Water Supply Plan Review

<https://www.health.state.mn.us/communities/environment/water/planreview/community.html>

Community Public Water Systems

<https://www.health.state.mn.us/communities/environment/water/com/index.htm>

Noncommunity Public Water Systems

<https://www.health.state.mn.us/communities/environment/water/noncom/index.html>

Source Water Protection

<https://www.health.state.mn.us/communities/environment/water/swp/index.htm>

Minnesota Department of Natural Resources Water Resources

<https://www.dnr.state.mn.us/waters/index.html>

Recommended Standards for Water Works

<https://www.health.state.mn.us/communities/environment/water/tenstates/index.html>

American Water Works Association

<http://www.awwa.org>

City Engineers Association of Minnesota

<http://www.ceam.govoffice2.com>

Minnesota Plumbing Code

<https://www.revisor.mn.gov/rules/4714/>

Minnesota Rules Regarding Wells and Borings

<https://www.revisor.mn.gov/rules/4725/>

NSF International

<http://www.nsf.org>

Underwriters Laboratory

www.ul.com

Water Quality Association

<http://www.wqa.org>