

City of Shakopee

Design Criteria

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Sect. 1 – General

The requirements contained in this document are minimum general requirements for new construction. The City Engineer may require additional information and increase the minimum requirements on any project.

Sect. 2 – Grading

1. General. The grading and erosion control plans shall conform to the most recent editions of “Minnesota Stormwater Manual” and the City of Shakopee "**Local Surface Water Management Plan**" or as modified herein and the City's most recent Standard Detail Plates.

2. Grading and Erosion Control.

- A. The minimum allowable grade in non paved areas is 2%.
- B. No final graded slopes shall be steeper than three (3) feet horizontal to one (1) foot vertical (3:1).
- C. Driveway grades shall be less than ten (10) percent, and greater than one (1) percent. Driveway grades shall not be greater than six (6) percent within the right-of-way. Commercial and Industrial Driveway grades shall not be greater than six (6) percent for any part of the driveway.
- D. Lots shall be graded so as to provide drainage away from building locations.

3. Topsoil - Sodding and Seeding. Topsoil moved during the course of construction shall be redistributed in turf establishment areas with a minimum of six (6) inches of topsoil including subsoil

scarification to a depth of four (4) inches. Disturbed boulevard areas shall be restored in accordance with the City of Shakopee General Specifications and Standard Detail Plates for Street and Utility Construction. Additionally, sod must be installed the full easement width of all drainage swales leading to drainage structures on each lot (silt fence must be installed behind this sod).

4. Drainage. During the grading of the site, the natural drainage system shall be utilized as much as feasible for the storage and flow of runoff.

5. As-built Grading Plan. Upon completion of the grading, paving, and construction of subdivisions, a certified as-built survey of the grading shall be submitted to the City. This plan must, at minimum, show the existing locations and elevations of all street centerline and top of curb high points and low points, all lot corners, building pads, intermediate tops of curb, sidewalks, trails, sanitary sewer structures, storm sewer structures, emergency over flows, high points in non-paved areas, ponding areas and watermain. The plan shall certify that all grading and erosion control is in conformance with the approved plans and that all ponding areas are within drainage and utility easements. Two benchmarks shall be shown on the as-built grading plan. No building permits shall be issued until these certified documents have been submitted and approved by the City Engineer.

An electronic copy must be submitted in a format approved by the City Engineer.

6. Grading Permit. Grading Permits will be required, as described in Section 151.110 of the City Code. Prior to issuance of a grading permit, the applicant shall strictly adhere to the requirements set forth in Chapter 54 of the City Code.

The applicant must submit a written application for stormwater management plan approval along with the site's stormwater management plan per requirements set forth in Chapter 54 of the City Code.

The applicant must submit the appropriate wetland applications in accordance with the Minnesota Wetland Conservation Act (WCA) per requirements set forth in Chapter 54 of the City Code.

7. Tree Preservation Fence. Existing trees, which are to be saved, shall be protected with a tree preservation fence installed at the drip line of the tree(s). No grading, construction materials, or equipment will be allowed beyond this fence.

8. Plan Requirements. The following are specific requirements related to the development of grading and erosion control plans for the proposed development and adjacent land within two-hundred (200) feet unless noted otherwise:

- A. Show and label existing underground and overhead utilities.
- B. Show the location and indication of demolition or relocation of existing structures.
- C. Show lot corner elevations and benchmarks utilized.
- D. Existing contours shall be at one (1) foot or two (2) foot intervals shown with dashed lines and screened (e.g. half-toned line weight). The contours shall extend

beyond the proposed plat boundaries a minimum of two-hundred (200) feet or as necessary to completely show the limits of a drainage basin not fully contained within the proposed plat. Ten (10) foot contour intervals shall be bold.

- E.** Proposed contours shall be at one (1) foot or two (2) foot intervals shown with solid lines. Ten (10) foot contour intervals shall be bold.
- F.** Ponds, wetlands, lakes, streams or manholes shall be shown with the following:
 - 1. Show the NWL and HWL for ponds and wetlands.
 - 2. Show OHWL and DNR number if applicable.
 - 3. Ponds shall be graded with 1(v):4(h) slopes from the HWL to NWL and include a ten (10) foot bench, sloping downward from the NWL at a 1(v):10(h) slope.
 - 4. Show the delineated wetland boundary.
- G.** Show existing and proposed building footprints with proposed floor elevations.
- H.** The lowest floor elevations of affected structures adjacent to outletted ponds shall be in accordance with the City's Local Surface Water Management Plan and/or Chapter 54 of the City Code.
- I.** Show emergency overflow routes from all low points and show the high point elevation along emergency overflow routes. Show directional flow arrows. Emergency overflows shall be a minimum of one (1) foot plus the high flow elevation (minimum of 1.5-feet) below the lowest opening elevation of adjacent affected structures.
- J.** Show limits of clearing and grubbing.
- K.** For proposed retaining walls, identify top and bottom elevations of retaining wall. Retaining walls greater than four (4) feet in height shall be designed and certified by a licensed professional engineer.
- L.** Show all lot numbers, block numbers, and drainage and utility easements.

9. Haul Routes. Prior to grading and erosion control operations commencing, a drawing must be submitted outlining the proposed haul routes for the import and export of all materials to and from the site. All haul routes are subject to approval by the City Engineer.

Sect. 3 – Erosion and Sediment Control

1. Purpose. The purpose of this Section is to promote the public health, safety, property and general welfare of the citizens of the City and to conserve the soil, water and related resources and to control erosion and sedimentation caused by land disturbing activities.

2. Administration. The Building Official or the City Engineer (depending on the land disturbing activity) shall be designated as the Administrator of this Section.

3. Activities Subject to Erosion Control Measures.

- A.** Any land disturbing activity in residential, multi-family, commercial or industrial zones shall be subject to erosion control measures and require a grading permit provided that:
 - 1. An area of five-thousand (5,000) square feet or greater will be disturbed by excavation, grading, filling or other earth moving activities resulting in the loss of protective vegetation; or,
 - 2. Excavation or fill exceeding fifty (50) cubic yards; or,
 - 3. The installation of underground utilities, either public or private, resulting in more than three-hundred (300) feet of trenching or earth disturbance.
- B.** Any subdivisions that require plat approval or a certified survey map.
- C.** Agricultural lands used mainly for the production of food, general farming, livestock and poultry enterprises, nurseries, forestry, etc., are not subject to the provisions of this Section.
- D.** Any other land disturbing activity for which the City Engineer determines to have the potential for substantial erosion.

4. Erosion Control Plans.

- A.** All land disturbing activities covered by this Section shall be required to have an approved erosion control plan, per requirements set forth in Chapter 54 of the City Code, on file with the City prior to any construction starting.
- B.** The erosion control plan shall contain any such information necessary for the Building Official and the City Engineer to determine that adequate erosion and sediment control measures are proposed. As a minimum, a topographic map showing existing and proposed contours, location of any natural watercourses and drainage ways, the extent of the land disturbing activity and any erosion control measures shall be shown on the plans submitted and approved.
- C.** In addition to the plans, a narrative report summarizing the proposed erosion control measures shall be submitted. This report shall include language discussing the timing of the installation, phasing, stabilization of all structures, maintenance and eventual removal of all structures. A Storm Water Pollution Prevention Plan (SWPPP) in compliance with National Pollutant Discharge Elimination System (NPDES) requirements must also be submitted.
- D.** At a minimum, the permittee shall meet the specifications set forth below and observe the standards established in the NPDES Construction General Permit requirements.

1. Soil Stabilization: Soil stabilization shall be completed in a time period as specified by the NPDES construction general permit and the city's general specifications and standards. The City of Shakopee may require the site to be reseeded or a nonvegetative option employed.
2. Seeding: Seeding shall be in accordance with seeding specifications. All seeded areas shall be fertilized and hydro-mulched or mulched and disc anchored as necessary for seed retention.
3. Soil Stockpiles: Soil stockpiles which shall be inactive for a period of fourteen (14) or more days must be stabilized or covered at the end of each workday. Stockpiles shall include perimeter sediment controls and must not be placed in natural buffers or surface waters, including stormwater conveyances.
4. Ninety Percent Coverage: The entire site must be stabilized at a ninety percent (90%) coverage, using a heavy mulch layer or another method that does not require germination to control erosion, at the close of the construction season.
5. Site Development Sediment Controls: Site development sediment controls practices shall include those identified in the City's general specifications including, but not limited to:
 - a. Settling basins, sediment traps, or tanks.
 - b. Protection for adjacent properties by the use of a vegetated buffer strip in combination with perimeter controls.
 - c. Perimeter control including machine sliced silt fence or other city approved BMP, which shall be in place before, during and after grading of the site. Fencing shall be removed only after seventy percent (70%) stabilization.
 - d. Areas designated as a temporary construction staging area.
6. Temporary sediment basins: For sites that have more than ten (10) acres of disturbed soil that drains to a common location (or, five (5) or more acres for special or impaired waters), one or more temporary sediment basins shall be constructed. Use of temporary basins is encouraged when construction projects will impact steep slopes or when highly erodible soils are present. The basin shall provide treatment to the runoff before it leaves the construction site or enters surface waters. The temporary sediment basins must be designed and constructed as follows:
 - a. Provide live storage for a calculated volume of runoff from a two (2)-year, 24-hour storm from each acre drained to the basin. All basins shall provide at least 1,800 cubic feet of live storage from each acre drained or more.
 - b. For basins where the above calculation has not been performed, a temporary sediment basin providing 3,600 cubic feet of live storage from each acre drained to the basin shall be provided for the entire drainage area of the temporary basin.
 - c. The outlet structure must be designed to withdraw water from the surface in order to minimize the discharge of pollutants.
 - d. The basin outlet shall be designed to prevent short-circuiting and the discharge of floating debris.
 - e. Ensure the basin can be completely drawn down to conduct maintenance activities.

- f. Include energy dissipation on the outlet of the basin and a stabilized emergency overflow to prevent failure of pond integrity.
 - g. Be located outside of surface waters or any buffer zone, and be designed to avoid draining water from wetlands unless appropriate approval from the U.S. Army Corps of Engineers and the Minnesota Department of Natural Resources is obtained.
 - h. If installation of a temporary sediment basin is infeasible, equivalent sediment controls such as smaller sediment basins, and/or sediment traps, silt fences, vegetative buffer strips, or any appropriate combination of measures are required for all down-slope boundaries of the construction area and for side-slope boundaries where appropriate. Determination of infeasibility shall be documented in the erosion and sediment control plan.
7. Individual Construction Site Sediment Controls: Individual construction site sediment controls shall include:
 - a. Rock construction entrance (driveway);
 - b. Perimeter controls including silt fence in place before, during and after grading of the site. Fencing shall be removed only after proper turf establishment.
 8. Waterway and Watercourse Protection: Waterway and watercourse protection requirements shall include stabilization of the watercourse channel before, during and after any in-channel work consistent with the City's general specifications.
 - a. A temporary stream crossing must be installed and approved by the local government unit and regulating agency if a wet watercourse will be crossed regularly during construction.
 - b. The watercourse channel shall be stabilized before, during, and within 24 hours after any in-channel work.
 - c. No in-water work shall be allowed in Public Waters during the MnDNR's work exclusion dates.
 - d. Prior to placement of any equipment into any waters, all equipment must be free of aquatic plants and non-native animals.
 - e. All on-site stormwater conveyance channels designed according to the criteria outlined in this document. Stabilization adequate to prevent erosion located at the outlets of all pipes and paved channels is required.
 9. Site Dewatering: Site dewatering shall be conducted pursuant to the City's general specifications document. Water pumped from the site shall be treated by temporary sediment basins, grit chambers, sand filters, or other controls as appropriate to ensure adequate treatment is obtained and that nuisance conditions will not result from the discharge. Discharges from the site shall not be released in a manner that causes erosion, scour, sedimentation or flooding of the site, receiving channels or wetlands.
 10. Waste and Material Disposal: All waste and unused building materials (including garbage, debris, cleaning wastes, wastewater, toxic materials or hazardous materials) shall be properly disposed of off-site and not allowed to be carried by runoff into a receiving channel or storm sewer system.

- a. Solid waste: All unused building materials and waste (including, but not limited to: collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, etc.) must be disposed of accordingly and shall comply with disposal requirements set forth by the MPCA.
 - b. Hazardous/toxic waste: Paint, gasoline, oil and any hazardous materials must be properly stored, including secondary containment, to prevent spills, leaks or other discharges. Access to the storage areas must be restricted to prevent vandalism. Storage and disposal of hazardous or toxic substance must be in compliance with the requirements set forth by the MPCA.
 - c. Liquid waste: All other non-stormwater discharges (including, but not limited to, concrete truck washout, vehicle washing or maintenance spills) produced during the construction activity shall not be discharged to any surface waters.
 - d. External washing of equipment and vehicles: All external washing activities shall be limited to a designated area of the site. All runoff must be contained and wastes from external washing activities must be disposed of properly. No engine degreasing shall be allowed on the site.
 - e. Wastes generated by concrete and other washout operations: All liquid and solid wastes generated by any concrete or other washout operations must be contained in a leak proof facility or impermeable liner. Concrete waste must not come into contact with the ground. Concrete waste must be disposed of properly and in compliance with applicable MPCA regulations.
11. Drain Inlet Protection: All storm drain inlets shall be protected during construction until all sources with potential for discharging to the inlet have been stabilized. Inlet protection measures must meet the City's standards and specifications.
 12. Energy Dissipation: Pipe outlets must have temporary or permanent energy dissipation within 24 hours of connection to a surface water.
 13. Tracking: Vehicle tracking BMPs (including, but not limited to: rock pads, mud mats, slash mulch, concrete or steel wash racks, vehicle wash systems, or similar systems) must be installed to minimize track out of sediment from the construction site. If vehicle tracking BMPs are not actively preventing sediment from being tracked into the street, the applicant must immediately utilize street sweeping to contain sediment within the project perimeter; then, the applicant must implement additional BMPs to prevent tracking.
 14. Final Stabilization: Final stabilization is not complete until the following criteria are met:
 - a. All land disturbing activities must be finished and all soils shall be stabilized by a uniform perennial vegetative cover with a density of 70 percent or greater of its expected final growth density over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions.
 - b. The permanent stormwater management system is constructed, meets all of the required design parameters and is operating as designed.

- c. All temporary synthetic and structural erosion prevention and sediment control BMPs (such as silt fence) have been removed. BMPs designed to decompose on site may be left in place.
- d. For residential construction only, individual lots are considered finally stabilized if the structure(s) are finished and temporary erosion protection and down gradient perimeter control has been completed and the residence has been sold to the homeowner.
- e. For construction projects on agricultural land the disturbed land has been returned to its preconstruction agricultural use.

5. Performance Standards.

A. General Standards. In general, this Section does not require the use of any particular type of structure to control erosion and sedimentation. The City Engineer or Building Official shall evaluate the proposed measures to determine if they follow current accepted design criteria and engineering standards.

- 1. The smallest practical area of land shall be exposed at any given time during development.
- 2. Exposed soil shall be seeded and mulched in accordance with NPDES Permit requirements.
- 3. All development shall conform to the natural limitations presented by the topography and soil as to create the best potential for preventing soil erosion.
- 4. Erosion control measures shall be coordinated with the different stages of development. Appropriate control measures shall be installed prior to development to control erosion.
- 5. The natural vegetation and plant covering shall be retained whenever possible. Temporary vegetation, mulching or other cover shall be used to protect critical areas and permanent vegetation shall be installed as soon as practical.

B. Standards - Stormwater Runoff Erosion.

- 1. The natural drainage system shall be used when and wherever is feasible for storage and flow of runoff. Stormwater drainage shall be discharged to retention basins or other treatment facilities. Temporary storage area or retention ponds shall be considered to reduce peak flows, erosion damage and construction costs. If the drainage area is over five acres, a sediment basin shall be utilized.
- 2. Silt fence shall be utilized to control erosion and prevent sedimentation from leaving the construction site. These structures shall be properly installed according to the MnDOT Standard Specifications and Plans.
- 3. If needed, sod shall be laid in strips at intervals necessary to prevent erosion and at right angles to the direction of drainage.
- 4. At existing storm sewer inlets, temporary sedimentation traps must be used to prevent erosion from entering the storm sewer system, and downstream water bodies.

5. Adequate provision shall be made to prevent the tracking or dropping of dirt or other materials from the site onto any street by the use of rock construction entrances.

C. Exposed Slopes. The following control measures shall be taken to control erosion during construction:

1. No exposed slope shall be steeper in grade than three (3) feet horizontal to one (1) foot vertical.
2. Exposed slopes steeper in grade than ten (10) feet horizontal to one (1) foot vertical shall be contour plowed to minimize direct runoff of water.
3. At the foot of each exposed slope, a channel and berm shall be constructed to control runoff. The channeled water shall be diverted to a sedimentation basin (debris basin, silt basin or silt trap) before being allowed to enter the natural drainage system.
4. Along the top of each exposed slope, a berm shall be constructed to prevent runoff from flowing over the edge of the slope. Where runoff collecting behind said berm cannot be diverted elsewhere and must be directed down the slope, appropriate measures shall be taken to prevent erosion. Such measures shall consist of either an asphalt paved flow apron and drop chute laid down the slope or a flexible slope drain. At the base of the slope drain or flood apron, a gravel energy dissipater shall be installed to prevent erosion at the discharge end.
5. Exposed slopes shall be protected by whatever means will effectively prevent erosion considering the degree of slope, soils materials, and expected length of exposure. Slope protection shall consist of mulch, sheets of plastic, burlap or jute netting, sod blankets, fast growing grasses or temporary seeding of annual grasses. Mulch consists of hay, straw, wood chips, corn stalks, bark or other protective material. Mulch shall be anchored to slopes with liquid asphalt, stakes, and netting or shall be worked into the soil to provide additional slope stability.
6. Control measures, other than those specifically stated above may be used in place of the above measures if it can be demonstrated that they will effectively protect exposed slopes.

D. Dust Control Measures.

1. Temporary mulching or seeding shall be applied to open soil to minimize dust.
2. Barriers such as snow fences, commercial wind fences and similar materials shall be used to control air currents and blowing soil if the City Engineer determines it is necessary.
3. The exposed soil shall be watered to control dust, with frequency of watering repeated as necessary.
4. Permanent vegetation shall be established in accordance with NPDES Permit requirements.

6. Maintenance of Erosion Control Measures.

- A. The owner or developer shall be responsible for maintaining all erosion control structures in a condition that will ensure continuous functioning of those devices. If, after the installation of the erosion control structure and BMPs, the City Engineer determines that additional measures are needed, they shall be installed at the expense of the owner.
- B. Any erosion or sediment that runs off or blows off the site onto adjoining properties, City streets, storm sewers, etc., shall be the responsibility of the owner or developer for clean up and restoration. If the owner fails to properly clean up or restore all areas affected by erosion the City will hire a contractor to complete the work and bill the owner for the expenses associated with the clean-up.

7. Technical Reference. The City officially designates the "Protecting Water Quality in Urban Areas" prepared by the Minnesota Pollution Control Agency as the technical reference for this Section. This reference will be used to ensure the proper placement and installation of any proposed erosion control structures.

8. Security. The owner or developer shall submit to the City either cash or a certified letter of credit in accordance with current City requirements to guarantee the faithful execution of the grading and erosion control plan. This security shall be in the amount of one-hundred twenty-five (125) percent of the costs for grading, the construction of all erosion control devices and site restoration or \$1,000/disturbed acre, whichever is higher, including the costs of City construction observation and administration (as approved by the City Engineer). The City is authorized to draw against this security in the event the grading and erosion control plan is not followed.

9. Unlawful Acts. It is unlawful for any person, either by the owner or the occupant of premises, to violate, neglect or refuse to comply with the requirements of this Section. In addition, if the Building Official or the City Engineer determines that adequate erosion control measures are not being followed and there is little cooperation on the part of the owner to do so, a "stop work" order may be issued to all work on the site until such times as adequate measures are implemented.

Sect. 4 – Storm Sewer

1. Design Criteria.

- A. The design criteria, policies, and objectives shall be those described in the City's "Local Surface Water Management Plan". No existing ditch, stream, wetland, pond, drain or drainage canal shall be deepened, widened, filled, re-routed or filled without approval from the City Council.
- B. Storm sewer shall be designed to have a minimum full flow velocity of three (3) feet/second unless otherwise approved by the City Engineer.
- C. Storm sewer structures exceeding four (4) feet in depth shall have a minimum diameter of forty-eight (48) inches.

2. Pond Slopes. Pond slopes below the HWL shall not be steeper than four (4) feet horizontal to one (1) foot vertical. All ponds shall have a bench at the normal water level. This bench shall be a minimum of ten (10) feet wide and the slope of this bench shall not be steeper than ten (10) feet horizontal to one (1) foot vertical.

3. Plan Requirements. A Stormwater Management Plan, along with supporting documentation, must be prepared and submitted that meets City drainage standards. Outlined below, please find a listing of information to be submitted:

- A.** Drainage reports and studies shall include an overall drainage plan. The information listed below, if not shown on the drawings, shall be included in the report. The use of appropriate forms and design aids is recommended.
1. Runoff rate and ponding calculations for the site for the two (2) year, ten (10) year and one-hundred (100) year rainfall events and the one-hundred (100) -year, ten (10) day snow melt event. These computations should be provided for both the existing and future conditions, or as necessary to demonstrate compliance with the City's Local Surface Water Management Plan. Computations shall identify the critical duration of the rainfall events.
 2. Open channel flow calculations/computations.
 3. Storm sewer and storm inlet flow calculations for the ten (10) year rainfall event.
 4. Culvert design flow calculations for the ten (10) year and one-hundred (100) year rainfall events.
 5. Summation of all design variables used and design assumptions made.
 6. Soil classification reports and depth of underground water table throughout the study area when detention or retention ponds are used.
 7. The boundary and designation of all tributary drainage areas and the area of each in acres.
 8. The designation and location of each design point referred to in the calculations.
 9. The reference source and a copy of all other monographs or design aids used in the calculations.
- B.** The preliminary drainage report shall be approved by the City Engineer prior to Engineering approval of any Preliminary Plat or Preliminary P.U.D. The study will consist of calculations, comments and descriptions and an area map in digital PDF format. Calculations shall include the two (2) year, ten (10) year, and one-hundred (100) year rainfall events and the one-hundred (100) year, ten (10) day snow melt event calculations of all tributary areas to the development, all collection points within the development and all points discharging from the development. The map shall be a topographic map of both the development and all areas tributary to the development. The map shall show the total acreage and anticipated runoff rates at all points noted in the calculations. In addition, the map shall show the proposed location of all drainage facilities to be located within the development and their relationship to existing facilities in adjacent developments. Any scale from 1" = 50' to 1" = 400' may be used to limit the drawing to one sheet.

- C.** A final drainage report shall be submitted and approved in conjunction with construction drawings. The study shall include calculations and a drainage map of the development in digital PDF format. Calculations shall address all aspects of runoff, retention, detention, channel flow, or other appropriate information that is necessary for the design of the drainage system. The drainage map shall be prepared on the overall grading plan for the development. It shall illustrate the drainage patterns in the development as well as the location of all drainage facilities within the development. The map shall also show the runoff rates and acreage tributary to all collection points within the development. When intersections serve as collector points, the flow in each curb line must be noted. This drawing may use scales from 1" = 50' to 1" = 200', in order to limit the drawing to one sheet. When more than one sheet is used a scale of 1" = 200' shall be utilized.
- D.** An overall drainage plan of the study area, including all areas outside of the study area, which contributes runoff to the study area and all downstream areas, which will be effected, by runoff from the study area, must be submitted. Drainage area plans shall be submitted showing the effects of the two (2) year, ten (10) year and one (100) year rainfall events and the one-hundred (100) year, ten (10) day snow melt event.
- E.** The following methods shall be used to verify the adequacy of designs submitted for approval: The method used shall be approved by the City Engineer.
1. Rational method for storm sewer design computations and peak discharge rates from a single isolated watershed.
 2. Urban Hydrology for Small Wetlands Technical Release No. 55 and Technical Release No. 20 published by Soil Conservation Service, U.S. Department of Agriculture.
 3. HEC-1, HEC-2, or HEC-RAS.
 4. Minnesota Hydrology Guide published by Soil Conservation Service, U.S. Department of Agriculture.
 5. Stormwater treatment ponds designed to NURP standards.
- F.** The following criteria shall be utilized in the analysis of the drainage system.
1. Runoff analysis shall be based upon proposed land use, and shall take into consideration all contributing runoff from areas outside of the study area.
 2. The analysis of storm runoff from existing developed areas lying outside of the study area shall be based upon present land use and topographic features.
 3. All undeveloped land lying outside of the study area shall be considered as fully developed based upon the most probable anticipated future land use. Provided, however, that whenever the future land use of a specific undeveloped area cannot be accurately predicted, the average runoff coefficient to be used in said area shall not be less than 0.60 for the Rational Method runoff coefficient or an approved equivalent value for any other method.

4. The probable future flow pattern in undeveloped areas shall be based on existing natural topographic features (existing slopes, drainage ways, etc.) and shall conform to the Local Surface Water Management Plan.
 5. Average land slopes in both developed and undeveloped area may be used in computing runoff. However, for areas in which drainage patterns and slopes are established, these shall be utilized.
 6. Flows and velocities which may occur at a design point when the upstream area is fully developed shall be considered. Drainage facilities shall be so designed such that increased flows and velocities will not cause erosion damage.
 7. The use of on-site detention and natural drainage ways is recommended and encouraged whenever possible. The changing of natural drainage way locations will not be approved unless such change is shown to be without unreasonable hazard and liability, substantiated by thorough analysis and investigation.
 8. The planning and design of drainage systems shall be such that problems are not transferred from one location to another. Outfall points shall be designed in such a manner that will not create flooding hazards downstream.
- G.** The rainfall intensities to be used in the computation of runoff shall be obtained from the Intensity - Duration - Frequency Curves for the Shakopee area in accordance with Atlas 14 data and shall be based upon a two (2) year, ten (10) year and one-hundred (100) year return frequency.
- H.** All lateral storm sewer facilities shall be designed to accommodate a ten (10) year rainfall event. The initial ten (10) year storm shall be conveyed without surcharging the system. Low points on streets shall be designed with an acceptable emergency overflow route.
- I.** Storm sewer pipe for all public systems and connection to public systems shall be reinforced concrete pipe (RCP), unless otherwise approved by the City Engineer.
- J.** Connections to existing manholes or catch basins shall be core drilled.
- K.** Driveway culverts in rural areas shall be at least eighteen (18) inches in diameter. Plastic pipe is prohibited.
- L.** All storm sewer shall be at least fifteen (15) inches in diameter.
- M.** When a smaller sewer joins a larger one, the invert of the larger sewer should be lowered to maintain the same energy gradient. An acceptable method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.
- N.** Storm sewer placed in non-paved areas must be placed on property corners and property lines when possible. The storm sewer lines for backyard inlets must be directed to the streets along side-yard property lines and avoid using rear-yard property line alignments where feasible.

O. Catch basins in non-paved areas must be placed so as to minimize standing water. The spacing and locations are subject to the approval of the City Engineer.

P. *Stormwater management requirements for permanent facilities.*

1. An applicant shall install or construct, on or for the proposed land disturbing or development activity, all stormwater management facilities necessary to meet the criteria of the city's Local Surface Water Management Plan, Design Criteria, and the NPDES Construction General Permit. No private stormwater facilities will be approved by the city unless a maintenance plan and maintenance agreement are provided that defines who will conduct the maintenance, the type of maintenance, and intervals of the maintenance. In the alternative, or in partial fulfillment of this requirement and upon approval of the City Engineer, an applicant may make an in-kind or monetary contribution to the development and maintenance of regional stormwater management facilities designed to serve multiple land disturbing and development activities undertaken by 1 or more persons, including the applicant.
2. Proposed Stormwater Management Plans shall incorporate volume control, water quality control, and rate control as the basis for stormwater management in the proposed development plan on sites without restrictions. All proposed projects shall be in conformance with the City of Shakopee's Local Surface Water Management Plan, Design Criteria, and the most current requirements of the Minnesota Pollution Control Agency (MPCA) Municipal Separate Storm Sewer Systems (MS4) Permit, as applicable, meeting the more restrictive criteria.
 - a. Volume Control
 - i. New Development. For new linear projects and for developments, stormwater runoff volumes will be controlled and the post-construction runoff volumes shall be retained on site for 1.0 inches of runoff from all impervious surfaces.
 - ii. Redevelopment. For existing linear projects and redevelopment projects, stormwater runoff volumes will be controlled and the post-construction runoff volume shall be retained on site for 1.0 inches of runoff from the new impervious surfaces created by the project. There shall be a net reduction from the pre-project conditions (on an annual average basis) of:
 - 1) Stormwater discharge volume, unless precluded by the stormwater management limitations as defined by the Minnesota Pollution Control Agency MS4 Permit, as amended, and the limitations defined in this ordinance.
 - a) Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the Agency.
 - b) Where vehicle fueling and maintenance occur.

- c) With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock.
 - d) Where high levels of contaminants in soil or groundwater will be mobilized by the infiltrating stormwater.
 - 2) Stormwater discharges of Total Suspended Solids (TSS).
 - 3) Stormwater discharges of Total Phosphorus (TP).
- b. Water Quality Control. For New Development and Redevelopment, the water quality control standard shall be considered satisfied if the volume control standard has been satisfied. In the event that it is infeasible to meet the volume control standard due to contaminated soils, site constraints, etc., the proposed plan will need to maintain the TSS and TP loading; and for redevelopment the goal is to reduce the TSS and TP loadings (Non-Permit method – alternative method with little to no additional modeling required). Methods for meeting these requirements in the decreasing order of preference:
 - i. Credits and site design practices to minimize the creation of connected impervious surfaces are used to the extent practical.
 - ii. Underdrains to promote filtration instead of infiltration.
 - iii. Off-site infiltration.
 - iv. On-site wet detention with permanent pool volume below the normal outlet that is greater than or equal to the runoff from a 2.5 inch, 24-hour storm over the entire contributing drainage area, assuming full development.
- c. Rate Control. Rate control measures are required on New Development and Redevelopment projects to meet the water quantity criteria of the latest city’s Local Surface Water Management Plan.

Q. *Pond design standards.* Stormwater detention facilities constructed in the city shall be designed according to standards established by the Engineering Division, and identified as follows:

1. A permanent pool (dead storage) volume below the principal spillway (normal outlet) which shall be greater than or equal to the runoff from a 2-1/2 inch rainfall over the entire contributing drainage area assuming full development;
2. A permanent pool average depth (basin volume/basin area) of 4 to 10 feet;
3. An emergency overflow (emergency outlet) adequate to control the 1% frequency/critical duration rainfall event;
4. Basin side slopes below the 100-year high water level should be no steeper than 4:1, and preferable flatter. A basin shelf with a minimum width of 10 feet and 1 foot deep below the normal water level is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long-term maintenance;
5. To prevent short-circuiting, the distance between major inlets and the normal outlet shall be maximized;

6. A flood pool (live storage) volume above the principal spillway shall be adequate so that the peak discharge rates meet the requirements of the city's Local Surface Water Management Plan;
7. Pond outlets may not be smaller than the minimum size indicated in the city's Local Surface Water Management Plan;
8. Consideration for aesthetics and wildlife habitat should be included in the design of the pond;
9. A skimming device must be provided to deter floatable pollutants from discharging out of pond;
10. Design of stormwater facilities shall accommodate the 100-year critical event (100- year, 24-hour storm event or 10-day snowmelt event). This includes lakes, ponds, and their outlets; and
11. Pond normal water level elevations shall be established above the ordinary high water level of adjacent public waters, except where topography of the site, floodplain mitigation activities, or other design considerations are determined to be unfavorable for these conditions to occur. This determination shall be performed by the applicant's engineer and approved by the City Engineer.

R. *Infiltration design standards.* Best management practices to manage infiltration will be required to the maximum extent practical.

1. Volume control BMPs must be incorporated into the project design to minimize the creation of new impervious surface and reduce the existing impervious surfaces, minimize the amount of directly connected impervious surface, preserve and improve the infiltration capacity of the soil, and limit increases in runoff volume exiting the site to the extent feasible considering site-specific conditions.
2. When using infiltration for volume reduction, runoff must be infiltrated within 48 hours using accepted BMPs for infiltration, such as infiltration trenches, rainwater gardens, infiltration benches or infiltration basins. A site investigation must be conducted confirming adequate infiltration parameters. For surface infiltration BMPs, the maximum infiltration depth is 1.5-ft. A post construction percolation test must be performed on each infiltration BMP and must demonstrate that the constructed infiltration rate meets or exceeds the design infiltration rate prior to the acceptance by the city.
3. The maximum extent practical required may be less if the City Engineer determines that 1 or more of the following conditions apply. If 1 or more of the following conditions apply, the City Engineer shall quantify the amount of infiltration that will be deemed as the maximum extent practical for the site:
 - a. The infiltration characteristics of soils on the site are not favorable for the infiltration of stormwater;
 - b. The site's drainage course is to regional infiltration or detention facilities controlled by the city that reduce runoff volumes;
 - c. The development of the site does not increase the site's impervious areas; or

- d. Other site conditions that make the infiltration of stormwater impractical as determined by the City Engineer.
4. Infiltration will be prohibited where the infiltration BMP will be constructed in any of the following areas:
 - a. Where documented past, present, or anticipated future land uses have resulted in or may result in contamination coming in contact with stormwater runoff.
 - b. With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock.
 - c. Where vehicle fueling and maintenance occur.
 - d. Where industrial facilities are not authorized to infiltrate industrial stormwater under and NPDES/SDS Industrial Stormwater Permit issued by the MPCA.
5. Infiltration will be restricted and subject to additional City review where the infiltration BMP will be constructed in any of the following areas:
 - a. Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features.
 - b. Where Drinking Water Supply Management Areas are present, as defined by Minn. R. 4720.51000, subp.13, unless precluded by a local unit of government with an MS4 permit.
 - c. Soils are predominately Hydrologic Soil Group D (clay) soils.
 - d. Soil infiltration rates are more than 8.3 inches per hour unless soils are amended to slow the infiltration rate below 8.3 inches per hour.
 - e. Stormwater runoff shall be treated in a stormwater pond or by other means prior to entering an infiltration facility; or
6. The minimum infiltration requirements for any region of the city will be the requirements of the watershed district or watershed management organization policies that govern that region. These policies may be met through the use of regional or downstream systems prior to discharge of runoff to waters of the state.
7. Infiltration systems must not be excavated to final grade until the contributing drainage area has been constructed and fully stabilized. When the infiltration feature is excavated to final grade, rigorous erosion prevention and sediment control BMPs must be implemented to keep sediment and runoff completely away from the infiltration area.
8. To prevent clogging of the infiltration system, a pretreatment device must be used to settle particles before the stormwater discharges into the infiltrations system. A skimmer and baffle system must be included in the design. A simple sump manhole will not be allowed.
9. Areas of permanent pools tend to lose infiltration capacity over time and will not be acceptable as an infiltration practice.
10. Per Ordinance Section 54.15 Stormwater Management Plan Approval and Implementation Standards, the infiltration system must provide a water quality volume (calculated as an instantaneous volume) of one (1) inch of runoff (or one (1) inch minus the volume of stormwater treated by another system on the site) from the new impervious surfaces created by the project.

11. The applicant must ensure filtration systems with less than three (3) feet of separation from seasonally saturated soils or from bedrock are constructed with an impermeable liner.
12. A minimum maintenance access of twelve (12) feet is required.

S. Mitigation.

1. Where construction projects cannot meet volume, TSS, or TP reduction requirements for new development or redevelopment projects on the site of original construction, all methods must be exhausted prior to considering alternative methods and/or locations where volume and treatment standards can be achieved. If the city has determined that all methods have been exhausted, the permittee will be required to identify alternative locations where the standards can be achieved or alternative methods in the following order of preference:
 - a. Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
 - b. Locations within the same Department of Natural Resource (DNR) catchment area as the original construction activity.
 - c. Locations in the next adjacent DNR catchment area up-stream.
 - d. Locations anywhere within the City of Shakopee.
 - e. Biofiltration.
2. In addition, mitigation projects must also meet the following criteria:
 - a. Mitigation projects shall involve the establishment new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP.
 - b. Previously required routine maintenance of structural stormwater BMPs cannot be considered mitigation.
 - c. Mitigation projects must be finished within 24 months after the original construction activity begins.
 - d. A maintenance agreement specifying the responsible party for long-term maintenance shall be identified.

Sect. 5 – Sanitary Sewer

1. General. The minimum diameter for public sanitary sewer mains shall be eight (8) inches. Sanitary sewer design must account for the study area and all areas outside the study area which would naturally drain through the study area. Natural drainage areas will be established by using the Comprehensive Sewer Plan and Local Surface Water Management Plan adopted by the City. In no case shall the design velocity be less than 2.2 feet per second or more than ten (10) feet per second as computed by Manning's formula for flow in open channels (Manning's shall be 0.013 for purposes of design).

2. Design Criteria. Sanitary sewers shall be designed and constructed in accordance with the most current edition of Recommended Standards for Sewage Works; a report of Committee of the Great Lakes - Upper Mississippi River Board of State Sanitary Engineers.

3. Plan Requirements and Design Guidelines. The following are specific requirements related to the design of sanitary sewer and sanitary sewer services:

- A. The sanitary sewer alignment shall follow the centerline of the street where practical.
- B. The maximum spacing between manholes is four-hundred (400) unless approved otherwise.
- C. All manholes at intersections shall be located at centerline/centerline.
- D. Manholes are required on the terminus end of all stubs if the line will be active.
- E. Connections to existing sanitary sewer manholes shall be core-drilled and fitted with a watertight boot.
- F. Inside drop manholes are not allowed.
- G. The minimum depth of a sanitary sewer manhole is nine (9) feet unless otherwise approved by the City Engineer.
- H. Changing of pipe material between manholes is not permitted except at outside drops.
- I. Sanitary sewer services shall be a minimum four (4) inch diameter PVC (SDR 26).
- J. Sanitary sewer services shall not be connected to a manhole unless otherwise approved.
- K. The minimum depth of the sanitary sewer service at the easement line shall be nine (9) feet unless otherwise approved.
- L. Sanitary sewer pipe shall be PVC SDR 35 (0 - 18' deep) and PVC SDR 26 (18'-26') deep. Alternate pipe materials for sanitary sewer deeper than twenty-six (26) feet will be required as determined by the City Engineer.
- M. Rerounding of pipe is not allowed unless previously approved by the City Engineer.
- N. The contractor shall stamp the curb at the service locations per the city's standard detail and install a marker post at the end of each sanitary sewer service. The developer shall provide GPS coordinates of each marker post and GPS coordinates of each sanitary sewer service wye. Final record drawings and service tie-cards submitted to the City shall have a table identifying each sanitary sewer service with the aforementioned GPS coordinates.

Sect. 6 – Utilities

1. Public Water. Where a connection to the Public Water System is presently available at or reasonably near the boundary of the subdivision, water distribution facilities, including fire hydrants, shall be installed to serve all properties within the subdivision and shall be in accordance with policies of the Shakopee Public Utilities Commission. Public Water systems shall be designed and constructed in accordance with the standards and policies of the Shakopee Public Utility Commission.

2. Other Utilities. Electric service, phone service, and cable television installations to residential structures shall be underground from the main line to the residential structure except where extreme conditions prohibit and a variance from this requirement is authorized by the Planning Commission upon advice of the Utilities Commission. Provisions shall also be made for underground connections of street lights as required from main lines to the street line installation.

A small utility plan that includes a coordinated layout of other utilities must be provided with all new roadway and development projects. Where telephone, electric and/or gas service lines are to be placed underground, conduits or cables shall be placed within easements or dedicated public ways, in such a manner so as not to conflict with other underground services, and in locations as approved by the City Engineer. All drainage and other underground utility installations that traverse privately owned property shall be protected by easements.

Sect. 7 – Street Lights

1. Design Criteria. The subdivider shall provide for installation of street lighting and operation for a period of three (3) years as prescribed by the Utilities Manager. Street lighting shall be designed and constructed in accordance with the standards and policies of the Shakopee Public Utility Commission and the City of Shakopee.

Sect. 8 – Streets

1. General.

- A.** The arrangement of thoroughfares and collector streets shall conform as nearly as possible to the Comprehensive Plan. Except for cul-de-sacs, streets normally shall connect with streets already dedicated in adjoining or adjacent subdivisions, or provide for future connections to adjoining unsubdivided tracts, or shall be a reasonable projection of streets in the nearest subdivided tracts. The arrangement of thoroughfares and collector streets shall be considered in their relation to the reasonable circulation of traffic, to topographic conditions, to runoff of stormwater, to public convenience and safety, and in their appropriate relation to the proposed uses of the area to be served.
- B.** Where the plat to be submitted includes only part of the tract owned or intended for development by the subdivider, a tentative plan of a proposed future street system for

the unsubdivided portion shall be prepared and submitted by the subdivider at the same scale as set forth herein.

- C. When a tract is subdivided into larger than normal building lots or parcels, such lots or parcels shall be so arranged so as to permit the logical location and openings of future streets and appropriate resubdivision, with provision for adequate utility connections for such resubdivision.

2. Street Width and Right-of-Way Width.

- A. Two-way right-of-way widths and pavement widths (back to back of curb) shall conform to the City’s adopted Transportation Plan, with the exception of the local roads. The local road width shall be as follows or as determined by the City Engineer:

<u>Classification</u>	<u>Right-of-Way</u>	<u>Roadway</u>
Local (anticipated traffic of 200 or less cars per day)	60 Feet	33 Feet
Local (more than 200 cars per day)	66 Feet	37 Feet

- B. All one-way right-of-way widths and pavement widths (back to back of curb) shall conform to the following minimum dimensions:

<u>Classification</u>	<u>Right-of-Way</u>	<u>Roadway</u>
Local	45 Feet	25 Feet
Collector Streets	60 Feet	30 Feet
Arterial Streets	60 Feet	30 Feet

3. Streets.

- A. Public Streets and alleys shall be designed and constructed in accordance with the General Specifications and Standard Detail Plates. All street and alley construction shall be inspected by the City Engineering Department.
- B. The full width of the right-of-way of each street and alley dedicated in the plat shall be graded. The width shall comply with the surface provisions of this Chapter and Class 5 MN/DOT aggregate or other suitable base shall be required as prescribed by the City Engineer.
- C. All streets shall be surfaced with a bituminous surface or portland cement concrete.
- D. Except where justified by special conditions, such as the continuation of an existing alley in the same block, alleys will not be approved in residential districts. Dead end alleys shall be avoided, whenever possible, but if unavoidable, such dead end alleys must provide adequate turnaround facilities at the closed end.

- E. Concrete curb and gutter may be required as a part of the required street surface improvement and shall thus be designed for installation along both sides of all roadways in accordance with the standards of the City.
- F. Rural roadway sections, that do not include concrete curb and gutter, shall consist of roadside ditches and five (5) foot gravel shoulders.

4. Grades.

- A. All center line gradients shall be at least 0.5 percent and shall not exceed the following:

<u>Classifications</u>	<u>Gradient Percent</u>
Arterial Streets	5
Collector Streets	6
Local Streets	7
Marginal Access Streets	7
Alleys	8

The grades at intersecting state-aid streets shall not be greater than 1.0% for 50’ on either side of the state-aid street, and not greater than 2.0% for an additional 50’. The grades at intersecting arterial streets shall not be greater than 2.0% for 200’ on either side of the intersection. On local streets, the grade shall not be greater than 3.0% for 100’ on either side of the intersection. The more important street at an intersection, as determined by the City Engineer, shall govern the through grade.

5. Street Jogs. Street jogs (intersections less than 330 feet apart) must be approved by the City Engineer.

6. Local Streets. Local streets shall be so aligned that their use by through traffic will be discouraged. Dead end streets are prohibited, but cul-de-sacs will be permitted where topography or other conditions justify their use.

7. Cul-de-sacs. Maximum length of cul-de-sac streets shall be one-thousand (1,000) feet for rural service areas and seven-hundred fifty (750) feet for urban service areas measured along the center line from the intersection of origin to end of right-of-way. Cul-de-sacs shall have a dedicated right-of-way with a minimum radius of sixty (60) feet, and shall be paved with a minimum radius of forty-six (46) feet (to back of curb). Lot lines abutting cul-de-sacs shall be radial except in extreme cases where special permission may be granted otherwise.

8. Temporary Cul-de-sacs. In new subdivisions where a future public street will connect to a temporary street stub, a temporary cul-de-sac will be required. The maximum length of temporary cul-de-sac streets shall be seven-hundred fifty (750) feet for both rural service and urban service areas, measured along the center line from the intersection of origin to end of pavement. The minimum paved surface diameter shall be seventy (72) feet, without curb and gutter. A temporary cul-de-sac will not be required for street stubs that serve less than three (3) lots.

9. Service Roads. Where a subdivision abuts or contains an existing or planned service road or a railroad right-of-way, the Council may require a street approximately parallel to and on each side of such right-of-way for adequate protection of residential properties and to afford separation of through and local traffic. Such marginal access streets shall be located at a distance from the major thoroughfares of railroad right-of-way suitable for the appropriate use of the intervening land, as for park purposes in residential districts, or for commercial or industrial purposes in appropriate districts. Such distances shall also be determined with due regard for the requirements of approach grades and future grade separations.

10. Half Streets. Half streets shall be prohibited, except where essential to the reasonable development of the subdivision in conformity with the other requirements of these regulations; and except where the Council finds it will be practicable to require the dedication of the other half when the adjoining property is subdivided. Wherever there is a half street adjacent to a tract to be subdivided, the other half of the street shall be platted within such tract.

11. Surface. All street surfaces shall be designed and constructed in accordance with the standard specifications and shall provide a warranty bond before being accepted by the City for maintenance. Curb and gutter or shoulder and bituminous surfacing shall be constructed at the same time.

12. Reserve Strips. Reserve strips controlling access to streets shall be prohibited.

13. Hardship to Owners of Adjoining Property Avoided. The street arrangement shall not be such as to cause hardship to owners of adjoining property in platting their own land and providing convenient access to it.

14. Access to Arterial and Collector Roadways. In the case where a proposed plat is adjacent to an arterial or collector road, the applicant shall not direct vehicle or pedestrian access from individual lots to such roadways. The subdivider will be required to provide access to all lots via public streets. Spacing of these public streets shall meet the requirements of the City's adopted Transportation Plan.

15. Platting of Small Tracts. In the platting of small tracts of land fronting arterial roadways where there is no convenient access to existing entrances and where access from such plat would be closer than 1/4 mile from an existing access point, a service road forty (40) feet wide shall be dedicated across the tract. As the neighboring land is platted and developed, and access becomes possible to the service road, direct access to the thoroughfares shall be prohibited.

16. Deflections/Horizontal Curves. When connecting street lines deflect from each other at any one point by more than ten (10) degrees, they shall be connected by a curve with a radius of not less than one-hundred twenty (120) feet. Depending on grades and projected traffic volumes the City Engineer may require a larger radius. This minimum curve radius does not apply to intersecting street lines (full street intersections) or to street lines connected at "T" intersections. Collector street horizontal centerline curves shall meet State Aid Standards.

17. Street Vertical Curves. Vertical curves on local roads shall be designed to meet a minimum design speed of thirty (30) mph. The City Engineer will determine the design speed for arterial and collector roads. The minimum allowable curve length is fifty (50) feet unless the algebraic difference between grades within a vertical curve is less than 1.2 percent, then the allowable

minimum vertical curve length is twenty (20) feet. Collector street vertical curve designs shall meet State Aid Standards.

18. Angle of Intersections. The angle formed by the intersection of streets shall be ninety (90) degrees. Any variance will require approval by the City Engineer.

19. Size of Intersection. Intersections of more than four corners shall be prohibited.

20. Curb Return Radius. Minimum curb return radii at intersections shall conform to the following table:

Curb Return Radius (feet) at Intersections

	<u>Local (33')</u>	<u>Local (37')</u>	<u>Collector</u>	<u>Arterial</u>
Local (33' wide)	20	0		
Local (37' wide)	20	20		
Collector	25	25	25	
Arterial	30	25	25	25
Industrial	30	25	25	25

The City Engineer may require larger radii. The County Engineer will determine radii at intersections at County roads.

21. Crosspans. Double crosspans may be used at the intersection of residential streets only when necessary to prevent flooding of one side of the street. Crosspans are not allowed across collector or arterial streets. Crosspans are not allowed on streets with storm sewer systems or on other streets designated by the City Engineer.

22. Street Section Design. The street section shall be designed to meet a 9-ton design in accordance with Minnesota Department of Transportation design guidelines. It shall be accompanied by a complete soils report certified by a licensed professional engineer. The following minimum pavement thickness and aggregate thickness shall apply to all streets:

	<u>Minimum Bituminous Pavement</u>	<u>Minimum Aggregate Base</u>
Arterial Street	5"	10"
Collector Street (Residential)	4"	8"

	<u>Minimum Bituminous Pavement</u>	<u>Minimum Aggregate Base</u>
Collector Street (Commercial)	5"	10"
Collector Street (Industrial)	5"	10"
Local Street	4"	8"

All streets must be constructed with a minimum two (2) feet select granular section. When the in-situ soils exist with a subgrade soil with an “R” value of thirty (30) or lower, the two (2) feet granular section must include one-hundred (100) feet of drain tile connected to and centered on each low point catch basin.

The street section must be approved by the City Engineer and may be adjusted by the City Engineer based on the soils report.

Sect. 9 – Sidewalks and Trails

1. Sidewalks.

- A.** The sidewalks shall not be located less than one foot from the property line, nor be adjacent to the curb except as determined in commercial areas. Sidewalks in industrial areas shall be located to conform to the anticipated pedestrian flow of the development.
- B.** Sidewalks shall slope 1.5% away from the property line and the profile grades shall conform to street grades.
- C.** Planned unit development shall be subject to the location, widths, and grades set forth herein.
- D.** The subdivider shall install sidewalks on both sides of an officially designated arterial street and on one side of collector and local streets, and walkways to schools; such collector streets and walkways to be determined by the Planning Commission and approved by the Council. If the street is along a designated trail route, a bituminous trail may be required in place of the sidewalk, as determined by the Planning Commission and approved by the Council.
- E.** In blocks over nine-hundred (900) feet long, pedestrian crosswalks through the blocks, and at least ten (10) feet wide, may be required by the Council in locations deemed necessary to public health, convenience and necessity.
- F.** Curb returns and intersections where sidewalk is required shall have handicap ramps with truncated domes. Design must meet current MnDOT standards.
- G.** All sidewalk widths shall be five (5) feet, except in commercial areas where the width may be wider, as determined by the City Council.

Sect. 10 – Lots and Blocks

1. Easements.

- A.** A minimum of five (5) feet drainage and utility easement is required adjacent to all side yard lot lines.

A minimum of ten (10) feet of drainage and utility easement is required adjacent to all front lot lines, rear lot lines or lot lines adjacent to public right-of-way.

A minimum twenty (20) feet of drainage and utility easement is required centered over all utilities less than five (5) feet deep.

For utilities deeper than five (5) feet, the minimum easement width shall be calculated assuming a one (1) foot trench bottom and 1-foot (vertical) to 1.5-foot (horizontal) side slopes. For example, a utility ten (10) feet deep will require a minimum easement width of thirty (31) feet.

The City Engineer may increase easement requirements, as necessary

- B.** Where a subdivision is traversed by a water course, drainage way/swale, channel or stream, there shall be provided a stormwater easement or drainage right-of-way conforming substantially to lines of such watercourse, and such further width or construction, or both, as will be adequate for the purpose. Parallel streets or parkways may be required in connection therewith.
- C.** Drainage and utility easements shall be shown on the final plat, out to the one-hundred (100) year highwater level contour. Storm water basins and facilities shall typically be integrated into the subdivision's individual private parcels and covered by a drainage and utility easements (vs. encompassing the basin by a standalone outlet).
- D.** Access easements, for future maintenance, shall be provided for ponding areas within subdivisions.
- E.** Standalone trail easements shall be provided for the width of the trail plus an additional three (3) feet on each side of the trail (e.g. 10-ft trail would require a 16-ft easement).

2. Blocks.

- A.** Block length and width or acreage within bounding streets shall be such as to accommodate the size of residential lot required in the area by the Zoning Chapter and to provide for convenient access, circulation control and safety of street traffic.
- B.** Residential block lengths shall not exceed one-thousand three-hundred (1,300) feet. Blocks intended for commercial and industrial use must be designed as such, and the block must be of sufficient size to provide for adequate off-street parking, loading and such other facilities as are required to satisfy the requirements of the Zoning Chapter of the City Code.
- C.** A block shall be so designed as to provide two tiers of lots, unless it adjoins a railroad or major thoroughfare where it may have a single tier of lots.

3. Lot Standards.

- A.** The lot dimensions shall be such as to comply with the minimum lot areas specified in the Zoning Chapter.
- B.** Side lines of lots shall be substantially at right angles to straight street lines or radial to curved street lines.
- C.** In the subdividing of any land, due regard shall be shown for all natural features, such as tree growth, wetlands, steep slopes, watercourse, historic spots, or similar conditions, and plans adjusted to preserve those which will add attractiveness, safety and stability to the proposed development.
- D.** All remnants of lots below minimum size left over after subdividing of a larger tract must be added to adjacent lots rather than allowed to remain as unusable parcels.
- E.** Double frontage (lots with frontage on two parallel streets) or reverse frontage shall not be permitted except:
 - 1. Where lots back on an arterial or collector street, in which case vehicular and pedestrian access between the lots and arterial streets shall be prohibited. Such double frontage lots shall have an additional depth of at least twenty (20) feet in order to allow space for screen planting along the back lot line.
 - 2. Where topographic or other conditions render subdividing otherwise unreasonable, such double frontage lots shall have an additional depth of at least twenty (20) feet in order to allow space for screen planting along the back lot line.
- F.** All lots must abut their full frontage on a publicly dedicated street.
- G.** Rural service lots shall be designed in such a manner whereby septic tanks, drainfields and homes are located as to allow future subdivision of the land upon the requirement of the City Engineer where future urban service expansion is probable. The City may also require at the time of final subdivision approval that a covenant be recorded which requires the placement of future structures in accordance with approved preliminary plat design. Whenever a parcel of land is subdivided into lots containing one or more acres and there are indications that such lots may eventually be subdivided into smaller plats, the Council may require that such parcel of land be divided so as to allow for the future construction of streets and the extension of adjacent streets. Easements providing for the future opening and extension of such streets may be made a requirement of the plat.
- H.** All lots or parcels shall have direct adequate physical access for emergency vehicles along the frontage of the lot or parcel from a public roadway

4. Buffering Residential Subdivisions Adjacent to Intermediate and Principal Arterial Roads.

- A. In all residentially zoned areas determined by the Administrator to have significant noise impact within one-hundred twenty-five (125) feet of the roadway right-of-way or areas of noise impact estimated to maintain ambient decibel ratings of seventy (70) DbA or greater, one or a combination of the following design requirements shall apply:
1. Lots adjacent to the roadway right-of-way shall be sized wherein a One-hundred twenty-five (125) foot buffer strip be provided as additional setback to lot depth or width standards supplementary to the minimum lot size and setback of the zoning provisions of the applicable district. An earth berm or other acceptable barrier technique shall be constructed to abate noise impact adjacent to roadway right-of-way equal to or below the seventy (70) DbA standard accompanied by the following:
 - a. A plan showing the existing and anticipated noise levels in DbA that are or will be expected on the site and in the immediate vicinity of the site.
 - b. A description of the site plan construction techniques, architectural designs, and other measures expected to be taken to reduce ambient noise levels. Such description shall include sufficient plans and other drawings to enable the City to accurately identify the noise reduction measures expected to be taken.
- B. Responsibility for any noise mitigation measures shall be the responsibility of the developer, its successors and/or assigns. This responsibility shall be included and clearly stated in plat approval resolutions or other relevant approval documents.

5. Buffering Residential Dwellings Adjacent to Wetlands and Stormwater Ponds

- A. In all zoned areas where residential dwellings are adjacent to, or are within one-hundred (100) feet of a wetland or stormwater pond, the following design requirements shall apply:
1. All residential dwellings shall be at least thirty (30) feet horizontal from the one-hundred (100) year high water level of the wetland or pond. Building setbacks shall be in accordance with the latest addition of the City's Local Surface Water Management Plan.
 2. In commercial or industrial zoned areas where a stormwater pond is proposed to be within one-hundred (100) feet of a residential dwelling, a fence shall be installed along the property line separating the commercial zoned (or industrial zoned) area and the residential property.

Sect. 11 – Plan Standards

1. General Plan And Drafting Requirements.

A. Title Sheet

The title sheet shall include a project location map and an approval block for the City Engineer (approved for one year from the date of signing).

B. Overall Plan

Incorporated in the set of plans shall be an overall plan duplicating the entire project showing all proposed improvements with corresponding sheet numbers on each separate sheet and index. An approval block for Shakopee Public Utilities Commission shall be included on the overall plan sheet.

C. Standard Sheet

All drawings shall be submitted on standard sheets at standard scale.

Standard Sheet:

- Grading Plan - 11"x17"
- Street and Utility Plan - 11"x17"

Standard Scale:

- Horizontal 1" = 100'
- Vertical 1" = 10'

D. Plan

North arrow, rights-of-way and width, property lines, lot and block numbers, street names, utility lines and size, railroad track, ditches, easements and width, match lines and reference sheet numbers shall be shown on all plan sheets. All roadway improvements and utilities shall be tied to the centerline of City right-of-way, to the centerline of a City easement, to subdivision corners, to Government land corners or to Government land lines.

E. Profile

To be located directly below the plan with stationing aligned as closely as practical. Original ground (dashed) and proposed if different (solid). Profile shall locate and describe additional information required under the standards for the particular

improvement proposed. All utilities shall be shown in profile to include sanitary sewer, watermain, storm sewer and storm sewer crossings.

F. Additional Sheets

Use standard sheet requirements with appropriate scales for additional sheets required by the City Engineer and not covered by City of Shakopee Standard Detail Plates or approved Mn/DOT Standard Plates. More than one (1) sheet may be necessary. Additional sheets may include, but are not limited to, unique project details, signage and striping, landscaping, pedestrian curb ramp details, intersection elevation details, SWPPP, turn lane construction, box culvert construction, etc.

G. Benchmark

Description on each sheet, elevation, USGS NAVD 1988 datum, tie to City bench loop, description of City benchmark to which it is tied.

H. Title Block

Shall include the name of project, subdivision or planned building group or street, as applicable and type of utility or roadway and the name, address, zip, telephone of the Engineer and developer.

I. Certification

Certification signature and registration number of Professional Engineer in the State of Minnesota on each sheet.

J. Required Notes

These notes shall appear on the cover sheet. If no cover sheet, they shall be put on every sheet submitted for approval.

- All work shall be done in accordance with the City of Shakopee's General Specifications and Standard Detail Plates.
- The contractor shall install a steel marker post at the end of each sanitary sewer service. The developer shall provide GPS coordinates of each marker post and GPS coordinates of each sanitary sewer service wye. Final record drawings submitted to the City shall have a table identifying each sanitary sewer service with the aforementioned GPS coordinates.

2. Record Plan Requirements.

- A.** The Record Plans must be certified and must be submitted in AutoCAD and Adobe Acrobat PDF formats using the NAVD 1988 vertical datum on the Scott County coordinate system. Specific electronic formats and/or versions will be determined by the City Engineer. In addition to and upon completion of the project, the developer's engineer(s) of record must provide a certified letter indicating that "all

improvements have been constructed under the direct supervision of the engineer(s) of record and are certified accordingly to have been constructed to be in compliance with the approved plans and specifications.”

B. The record plans shall, at a minimum, include the following information:

- Locations and top of casting and invert elevations of all sanitary sewer and storm sewer structures and appurtenances.
- Locations and top-nut elevations for all fire hydrants.
- Locations and elevations for all gate valves.
- Revised pipe slopes, lengths and materials (if applicable).
- Revised horizontal locations of all street and utility improvements.
- Additional notes as required by the City Engineer.

C. Sanitary Sewer Services

- Provide a tie-card per city standard detail for each service and/or lot.
- GPS coordinates at the end of all sanitary services locations must be provided in a tabular format.
- Stationing of sanitary sewer wyes shall be indicated.
- All sanitary services shall be shown on the record plan with length, size, elevation, and pipe type noted. Indicate if jacked.
- If sanitary sewer wye only is constructed, it shall be noted as "Wye Only" after the stationing.
- The approximate invert elevation at the forty-five (45) degree bend of all sanitary sewer service stubs shall be shown on the plans. If deep risers are placed, the height of each shall be indicated on the plans and each shall be drawn on the profile, and the height of the risers indicated.
- All sanitary service stub locations shall be tied at the property line with at least two ties using the following priority:
 - Sanitary sewer manholes
 - Hydrants
 - Storm sewer manholes
 - Catch basins
 - Power transformers
 - Building corners

D. Water Services

- Provide a tie-card per city standard detail for each service and/or lot.
- GPS coordinates at the end of all sanitary services and curb stop locations must be provided in a tabular format.
- Stationing of water corporation cock shall be indicated.
- All water services shall be shown with length, size and pipe type noted. Indicate if jacked.

- All curb stop boxes shall be tied at the property line with at least two ties using the following priority:
 - Sanitary sewer manholes
 - Hydrants
 - Storm sewer manholes
 - Catch basins
 - Power transformers
 - Building corners

E. Watermain Fittings

All water fittings should be labeled as to size and type such as bends, ties, plugs, etc.

F. Gate Valves

All gate valves shall be tied with at least two ties using the following priority:

- Fire hydrants.
- Manholes.
- Catch basins, if curb and gutter are in.
- Buildings or other permanent structures.
- Telephone pedestals.
- Power poles, trees, other semi-permanent items.
- Stationing from hydrants, manholes, catch basins, if over one-hundred (100) feet.
- All ties should be less than two-hundred (200) feet whenever possible.

G. Fire Hydrants

All fire hydrants shall have a benchmark elevation shown for the top-nut of the fire hydrant.

H. All structures shall have the top of casting elevation and invert elevations shown.

I. Streets

Street record “as-built” plans/drawings shall include a typical street section and horizontal and vertical curve data.

J. Miscellaneous

The following information shall be shown on every sheet:

- Contractor's name
- Construction observer's name
- Project engineer's name

K. Sanitary Sewer Televising

The contractor must televise the entire sanitary sewer system and provide the City with a digital submittal of the sanitary sewer system along with a televising report and complete televising videos. The report shall include the locations of all service wyes.

L. Operations Record Plan

An Operations Record Plan must be submitted to the City and to SPUC and approved by each entity prior to issuance of building permits in addition to the model building permit. The plan must include, at a minimum, the following information:

- Information as required in Sections A, B, C, D, E and H above.
- Information as required by the SPUC Water Policy Manual.

The City Engineer may require additional information and increase the minimum requirements on any project.