Residential Property
LOT GRADING GUIDELINES

City of Saskatoon

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Introduction

These Guidelines are intended to provide information for homebuilders and homeowners to help ensure proper lot grading. Lot grading refers to the shaping or sloping of land elevations to ensure that surface drainage from rain or snow melt is directed away from buildings, and instead directed towards a city street or lane and into the city's storm sewer system. Proper lot grading is essential to avoid flooding and property damage.

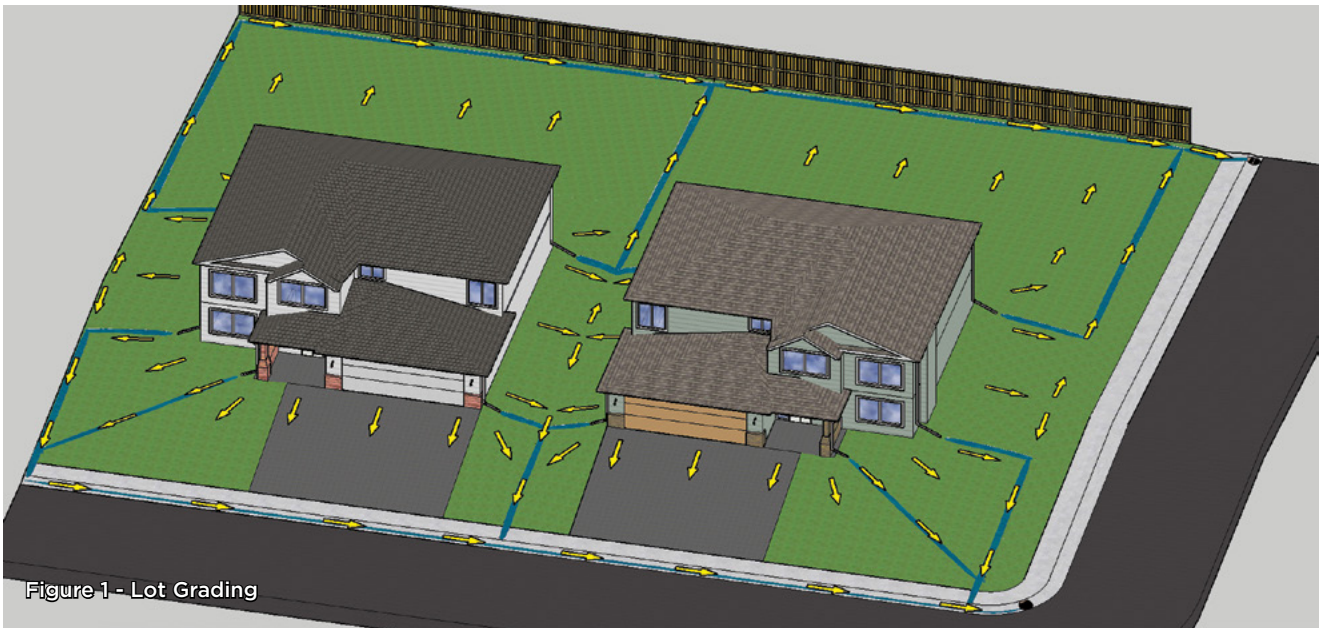


Figure 1 - Lot Grading

Disclaimer

These Guidelines are intended to be for informational purposes only. The contents of these Guidelines are general in nature, do not constitute professional advice, and should not be relied on as a substitute for professional advice. The City of Saskatoon disclaims any liability in connection with the use of the information in these Guidelines. Homebuilders and homeowners are encouraged to seek the assistance of a professional engineer, surveyor, landscape architect or contractor as required.

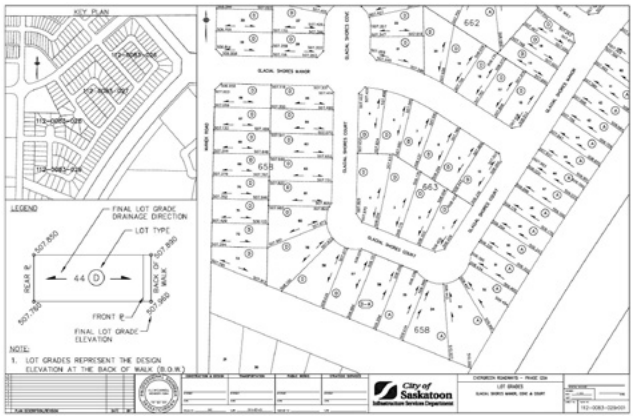
All measurement conversions are approximations.

Background

As the city of Saskatoon continues to grow, new neighbourhoods are developed to accommodate residential housing. The land development process involves designing an overall area grading plan including lots, streets and infrastructure. These plans are designed by engineers and approved by the City of Saskatoon (City). They are used by surveyors to mark elevations to guide earth moving equipment as land is shaped and sloped to ensure proper drainage. Once new areas are developed and serviced, individual lots are subdivided and sold for new home construction. Homebuilders and/or homeowners are responsible for ensuring that their lots are graded properly.

Lot Grading Plans

Lots are graded according to engineered lot grading plans, which identify the lot grading style and design elevations for the front and rear property corners. Design elevations are the final elevations for when the lot grading is completed. It is essential to establish and maintain the design elevations along shared rear and side property lines. This ensures that lot grading is consistent with the lot grading plans, otherwise flooding may occur.



Lot Grading Plan Example

Lots developed prior to 1975 do not have lot grading plans, but they do have back lanes which are designed to drain to the street or storm sewer catch basins. Lots in these areas are sloped to drain to the street and/or back lane. Lot grading plans can be accessed through the City of Saskatoon's lot drainage webpage at saskatoon.ca/lotdrainage.

Lot Drainage Styles

There are four common lot drainage styles outlined below, which incorporate the use of drainage swales to help convey surface water runoff to a city street or lane.

1. **Back to Front Drainage (Type A):** The rear property line is the highest elevation on the lot. Surface drainage is directed to side property line swales, which are sloped to drain to the front street.

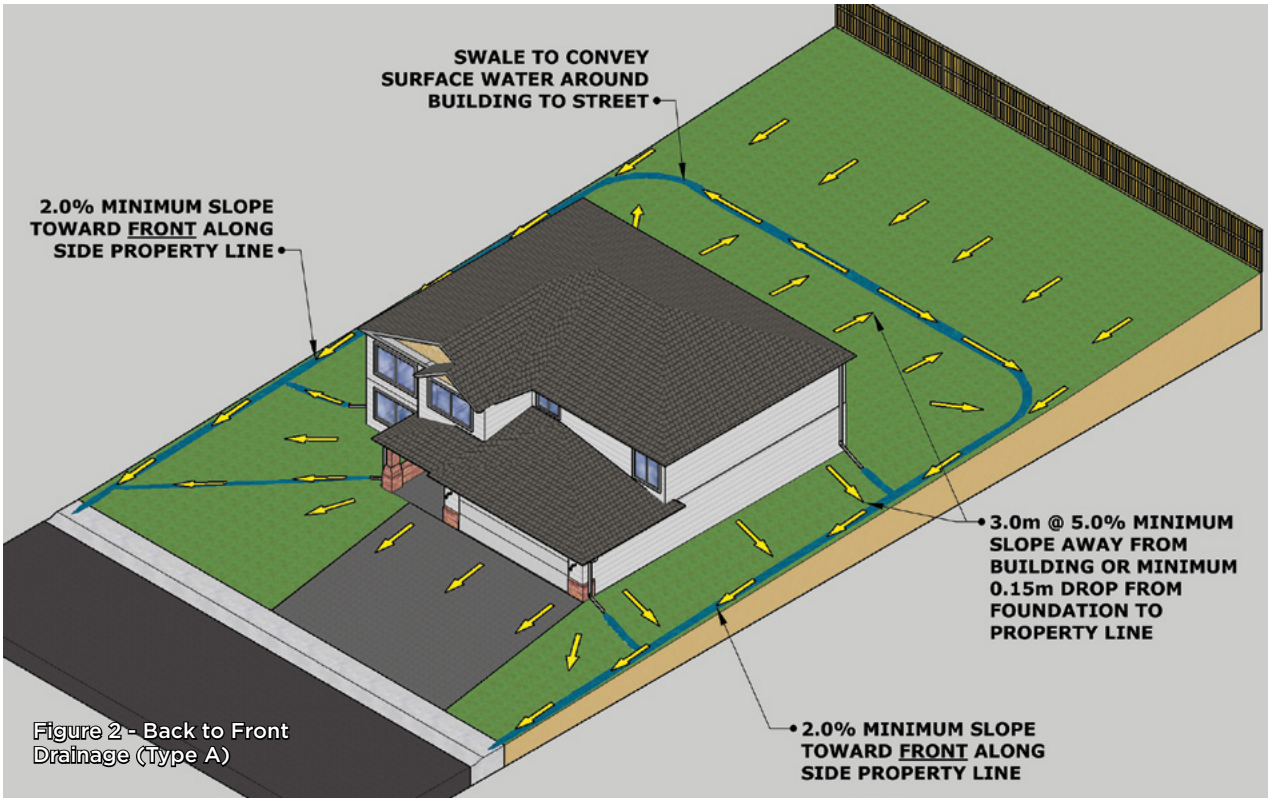


Figure 2 - Back to Front Drainage (Type A)

A swale is located in the rear yard where the forward slope of the lot meets the rearward slope of the foundation grading. This swale directs surface drainage towards the side property line swales, which are sloped to drain to the street.

2. **Front to Back Drainage (Type C):** The front property line is the highest elevation on the lot. Surface drainage is directed to side property line swales, which are sloped to drain to the rear property line.

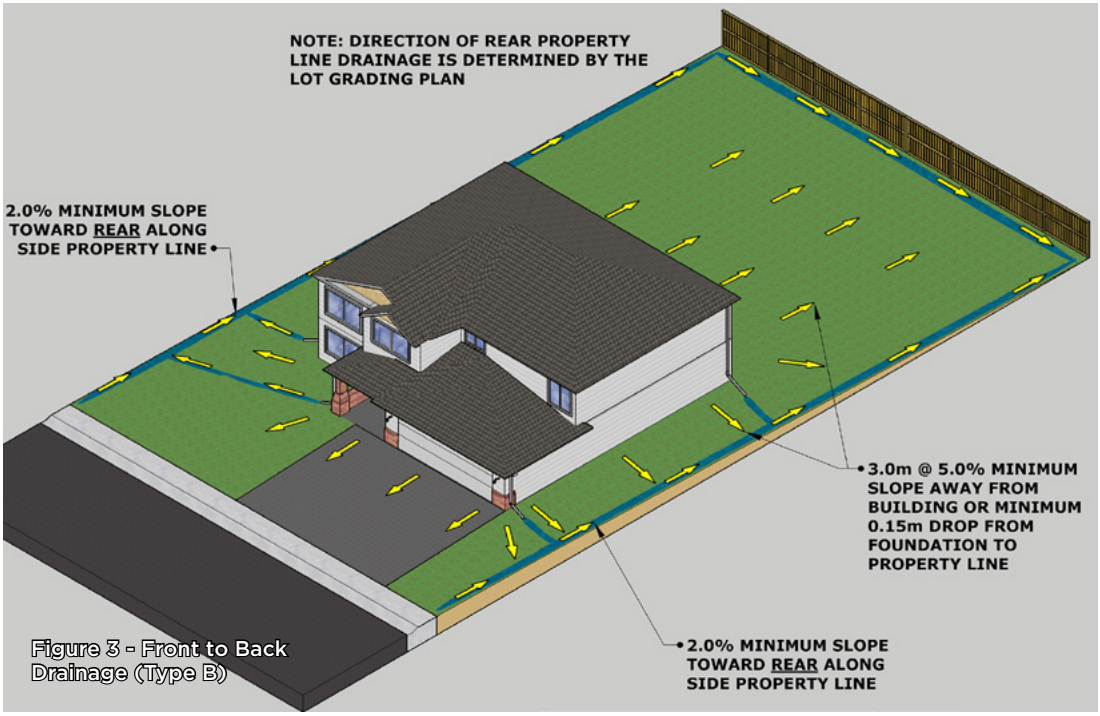


Figure 3 - Front to Back Drainage (Type B)

3. **Split Drainage (Type D):** The midpoint is the highest elevation on the lot. Surface drainage is directed to the street and to the rear property line.

   Swales are located along the side property lines, which are sloped to drain to the front street and the rear property line from the midpoint of the lot.

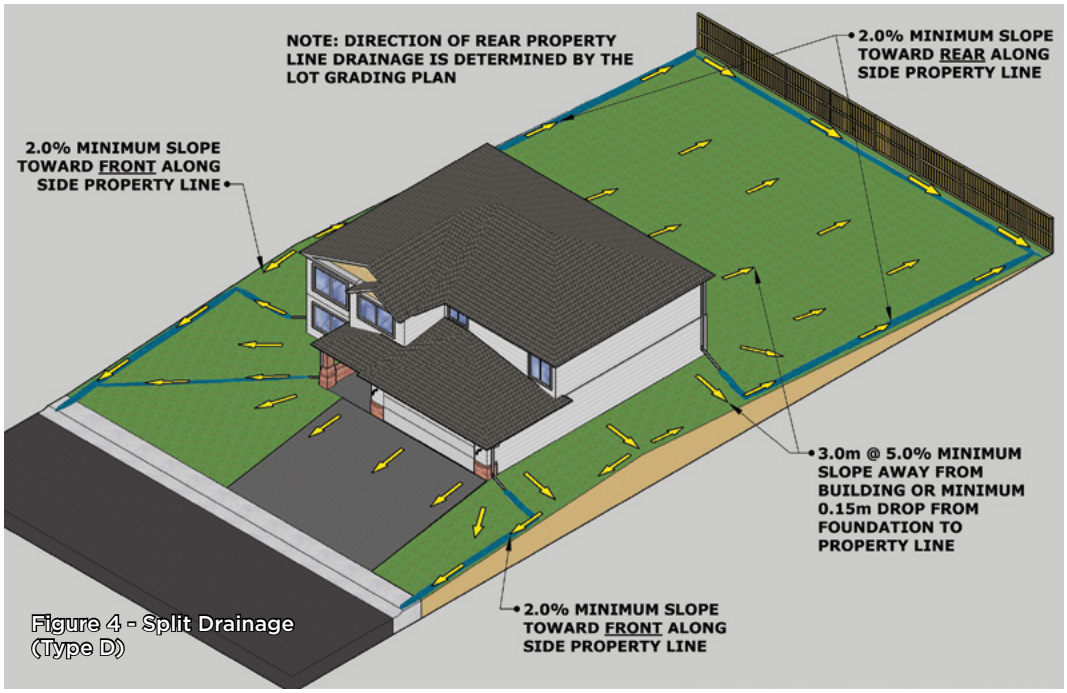


Figure 4 - Split Drainage (Type D)

4. **Walkout Basement (Type E):** The front of the building is the highest elevation on the lot. Surface drainage is directed to the street and to the rear property line.

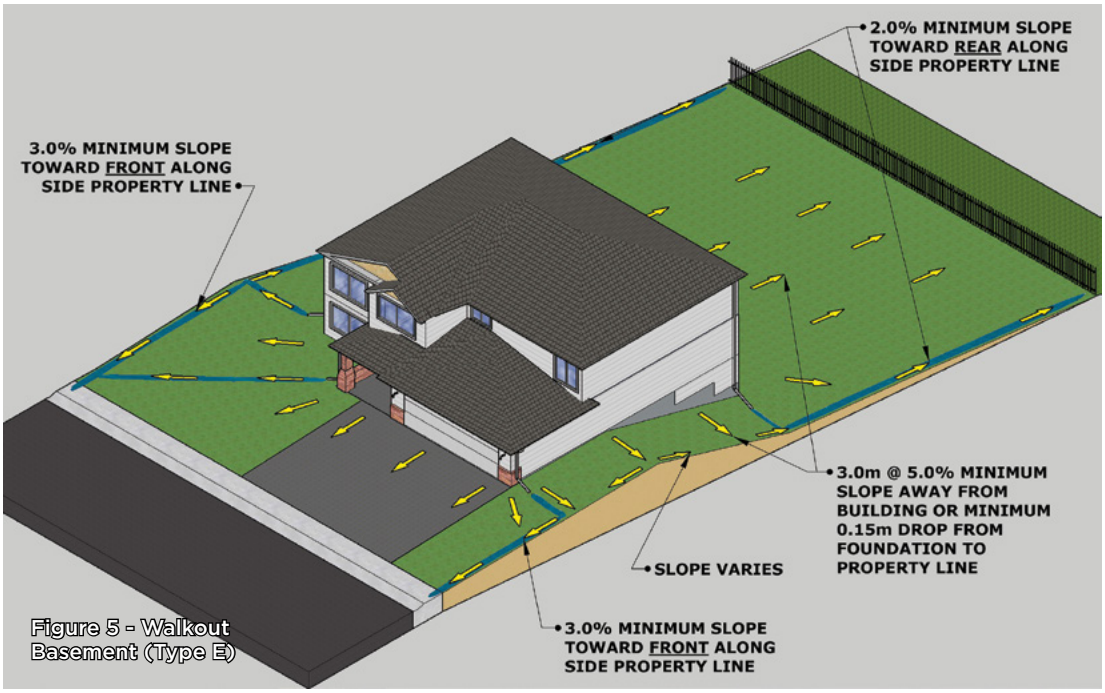


Figure 5 - Walkout Basement (Type E)

Lot grading styles can be accessed through the City of Saskatoon's lot drainage webpage at saskatoon.ca/lotdrainage.

Lot Grading

Lot grading is accomplished in four stages: area grading, rough grading, final grading and landscaping.

Area Grading

Area grading is the responsibility of the land developer and it involves designing an overall area grading plan including lots, streets and infrastructure. Area grading includes the stripping of organic topsoil, which is piled on site and saved to be placed on new lots during the final grading stage. The exposed clay subsoil is shaped and sloped. Once all infrastructure is constructed, lots are subdivided and sold for new home construction. Once the lots are sold, the new property owners are responsible for ensuring that their lot is graded properly.

Rough Grading

Rough grading is the responsibility of the homebuilder or homeowner. It includes backfilling the basement excavation with clay soil from the excavation and ensuring a positive slope away from the foundation walls. It also includes shaping and sloping the lot to conform to the lot grading style and rear property line design elevations indicated on the lot grading plan. When rough grading is complete, the lot should be a minimum of 100 mm (four inches) lower than the final design elevations.


Rough Grading

Final Grading

Final grading is the responsibility of the homebuilder or homeowner and it includes shaping and sloping 100 mm (four inches) of topsoil on top of the rough grade to conform to the lot grading style, and the final design elevations indicated on the lot grading plan to prepare the lot for landscaping. More than 100 mm (four inches) of topsoil to facilitate better lawn and plant growth may be used at the discretion of the homebuilder or homeowner.


Final Grading

Landscaping

Landscaping is the responsibility of the homebuilder or homeowner and it includes enhancing the appearance of the lot by seeding or sodding the lawn, planting trees or shrubs, creating gardens, constructing patios and placing crushed rock, wood chips or other porous decorative material. The lot slope grade and elevations must be maintained during landscaping to ensure proper drainage. The grade must be established to final grade before placing the decorative material as surface water can flow through these materials. Special consideration is required for the location of sheds and raised landscaping features such as flower or shrub beds, garden areas, trees, patios, sandboxes and play structures. Adding these features along rear and side property lines is not recommended as they may impede drainage along the lots drainage paths. It is recommended that all sheds and landscaping features be a minimum 300 mm (1 ft) away from any property line to accommodate drainage along the property line.


Landscaping

Lot Grading Requirements

Minimum Slope from Foundation Walls

A sloped surface is required to effectively drain water away from the foundation walls, including areas under steps and decks.

See next page for the minimum grade recommendations adjacent to a foundation.

Soft Surface (including pervious gravel, clay, topsoil, sod, crushed rock or woodchips)

- Area 3 m (10 ft) or greater around foundation - minimum five percent or 15 cm (six inch) drop slope
- For side yard less than 3 m (10 ft) wide - minimum 15 cm (six inch) drop slope

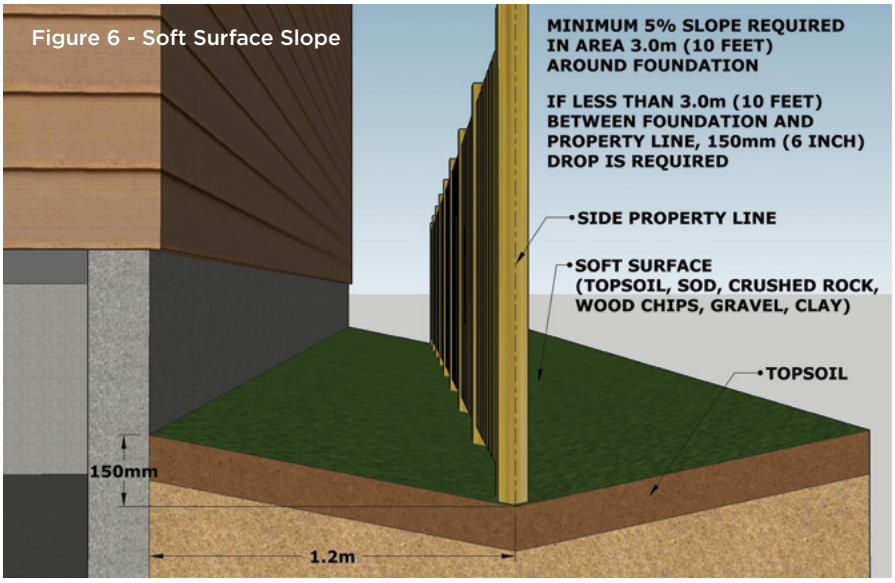


Figure 6 - Soft Surface Slope

Hard Surface (including impervious concrete, asphalt or brick pavers)

- Area 3 m (10 ft) or greater around foundation - minimum 0.75 percent or 2.5 cm (one inch) drop slope
- For side yard less than 3 m (10 ft) wide – minimum 2.5 cm (one inch) drop slope

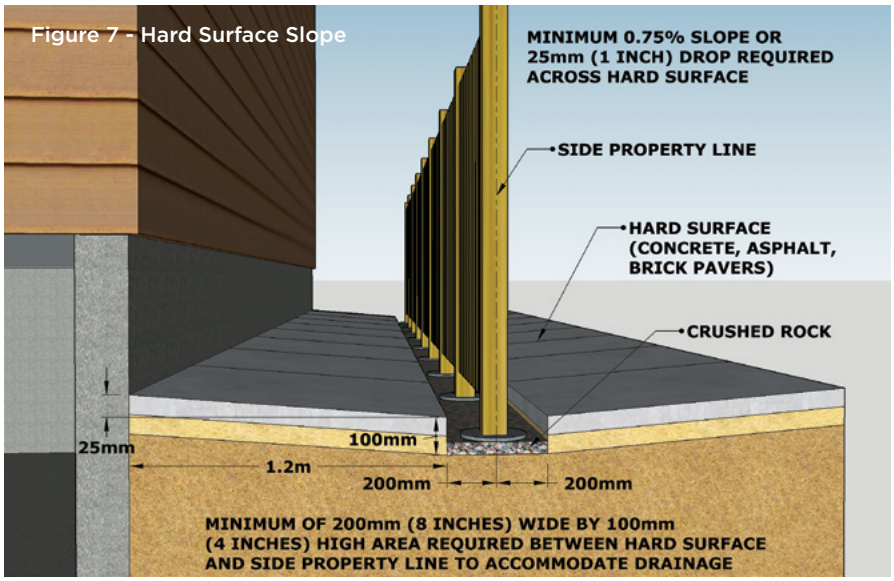


Figure 7 - Hard Surface Slope

Drainage Swales

Drainage swales are shallow, sloped, linear depressions which convey surface water runoff towards a city street or lane, and are constructed along rear and side property lines.

- Side property line swales should have a minimum two percent slope for grass, clay or decorative rock surface, or 0.75 percent for a hard surface such as concrete, asphalt or pavers
- Shared drainage swales are located between adjacent properties along the shared property line
- Shared drainage swales should be a minimum of 30 cm (12 inches) in width with a minimum of 15 cm (six inches) on each side of the shared property line
- Rear property line swales must be sloped to match the rear property line design elevations indicated on the lot grading plan
- Internal side property line swales are located where a shared swale cannot be constructed due to elevation differences between properties or inadequate grading around foundation walls on the adjacent property. See Figure 8 – Retaining Walls for an illustrative view of internal side property line swales.


Shared Drainage Swale

- Internal rear yard swales are constructed where the forward slope of the lot meets the rearward slope of the foundation grading, or where the forward slope of the lot away from a detached garage meets the rearward slope of the foundation grading (these swales help to drain the back yard towards the side yard swales which are sloped to drain towards the street or lane)
- If decorative rocks are used in the bottom of a swale the grade of the clay or topsoil at the bottom of the swale must be at final grade, as drainage water will flow at the bottom of the rock

Concrete Swales

Some lots have concrete swales that were constructed by the developer located along side or rear property lines to facilitate drainage to the street or the storm sewer catch basin. Rear property line concrete swales are located in utility easements located along the rear property line. It is the homebuilder's or homeowner's responsibility to ensure that concrete drainage swales are not damaged during construction and are not buried or impeded in any way.


Concrete Swale

Retaining Walls

Lot grading with substantial grade difference along a side or rear property line will require a retaining wall to hold the higher grade and prevent erosion. All measures should be taken to match grade with neighbouring properties along shared property lines to avoid retaining walls. If it is not possible to match grade, then a retaining wall is recommended. Retaining walls should:

- Be constructed of wood, concrete, masonry, stone, plastic or steel
- Be 50 mm (two inches) higher than the adjacent grade
- Be designed by a structural engineer if taller than 0.6 m (two feet)
- Have drainage swales to prevent drainage onto adjacent properties

Fences are not retaining walls and should not be used to retain a higher grade. They may begin to lean over time from the pressure of holding back the higher grade and may rot prematurely. A fence may be integrated with a retaining wall by constructing the fence on top of the retaining wall.

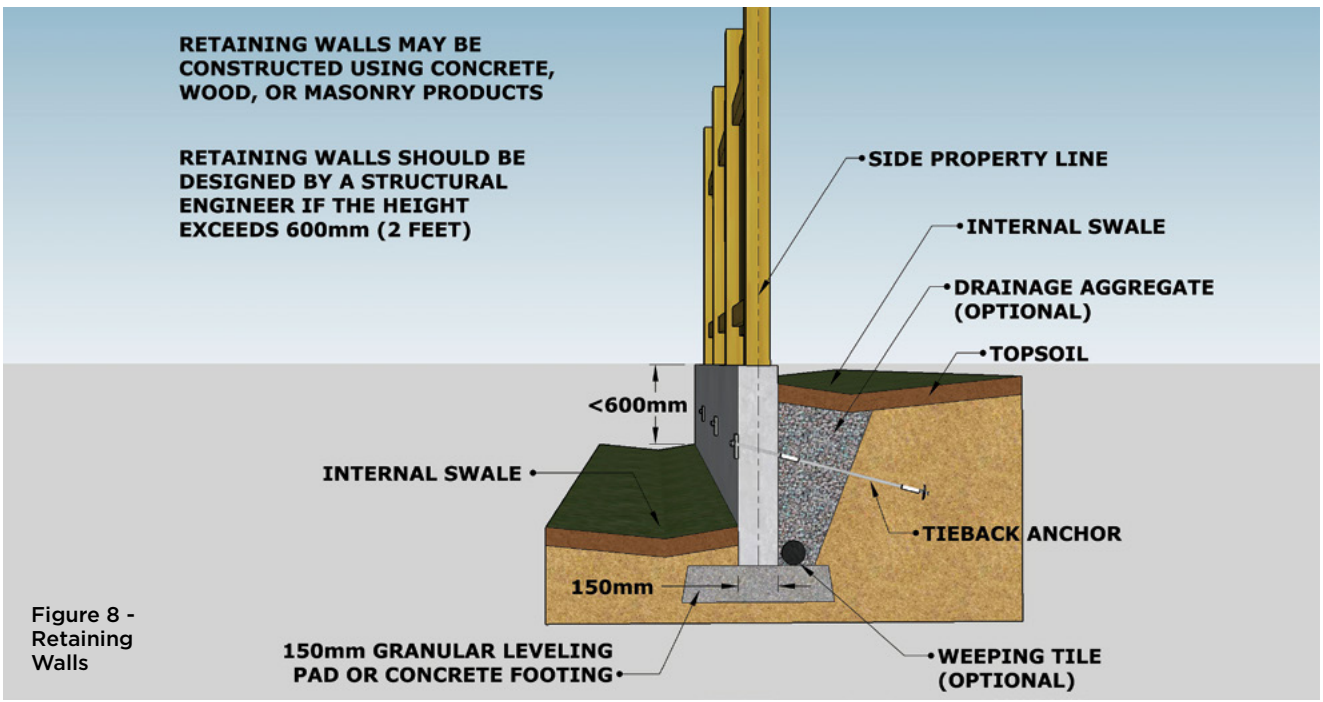


Figure 8 - Retaining Walls

Window Wells

Window wells are required when basement windows are below finished grade at the basement foundation. Window wells should be installed so that the top of the window well is 50 mm (two inches) above the finished grade and the base of the window well is 200 mm (eight inches) below the bottom of the window. A layer of crushed rock, 50 mm (two inches) in depth, should cover the base of the well to accommodate drainage into a vertical weeping tile, which connects the base of the well to the foundation drainage system. Window wells should be sealed to the foundation to avoid seepage.

The need for window wells can be avoided by designing foundation elevations which accommodate basement windows that are above grade.

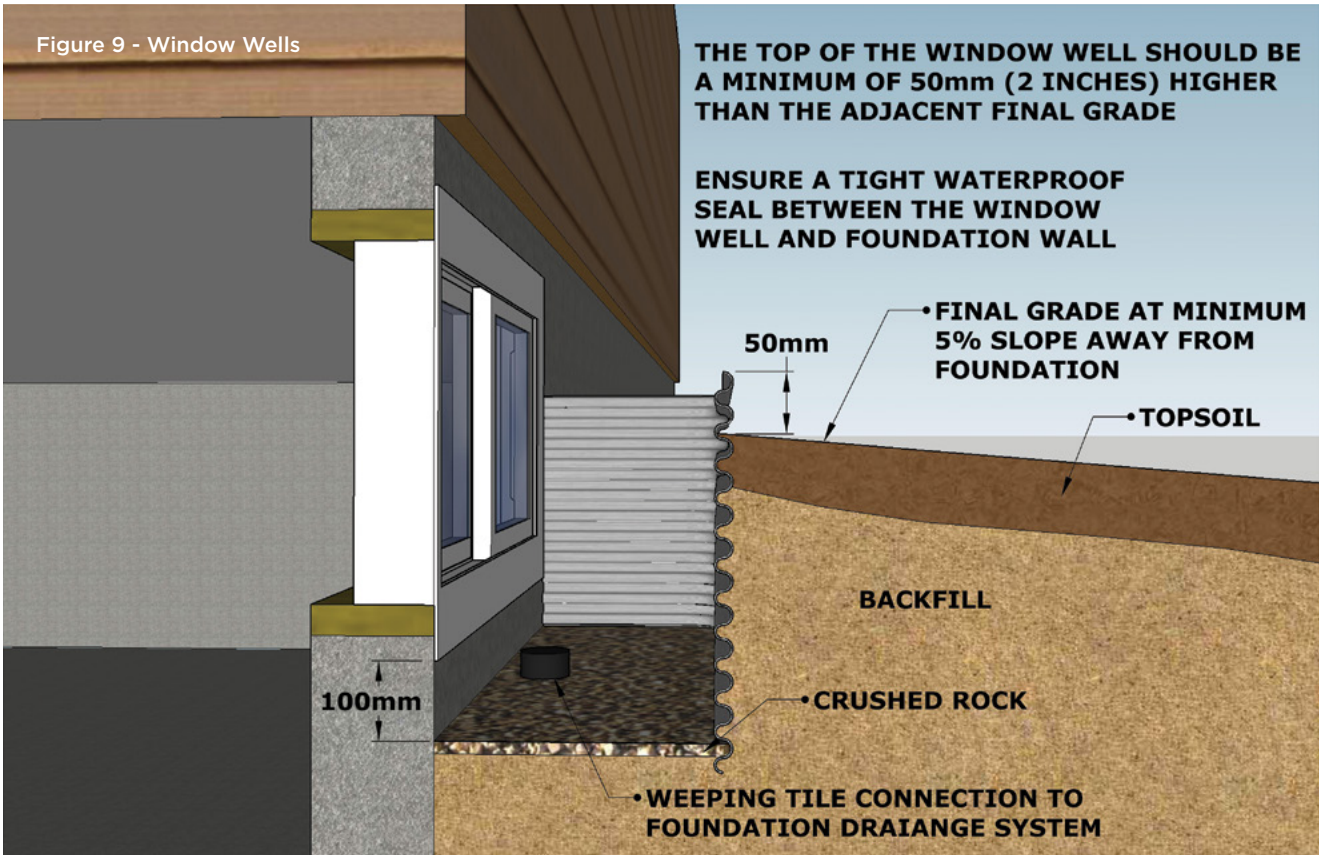


Figure 9 - Window Wells

Downspouts

Roof drainage is an important part of lot drainage. House or garage roofs are required to drain into eavestroughs located along the edge of the roof. The eavestroughs drain into downspouts which discharge rain water and snowmelt from the roof to the ground. A functional roof drainage system protects the building's roof, siding and foundation from water damage and helps prevent flooding of the home's basement. It is the homebuilder's or homeowner's responsibility to ensure proper eavestroughs and downspouts to ensure that roof drainage does not adversely impact their property or their neighbour's property. When planning downspout locations and the direction of discharge, consideration must be given to lot drainage styles and neighbouring properties. It is recommended that homebuilders and homeowners consult with their neighbours to determine downspout locations and direction of discharge.

Downspouts must be:

- No higher than 0.6 m (two feet) from the ground
- Extended at least 2 m (six feet) from any foundation
- Extended no closer than 3 m (10 feet) from any property line
- Discharged onto drainage swales which drain to the street or rear property line
- Not directed onto neighbouring properties or parks
- Discharged onto a permeable surface such as a lawn or garden area
- Discharged to an area that will not adversely affect their property or any neighbouring property

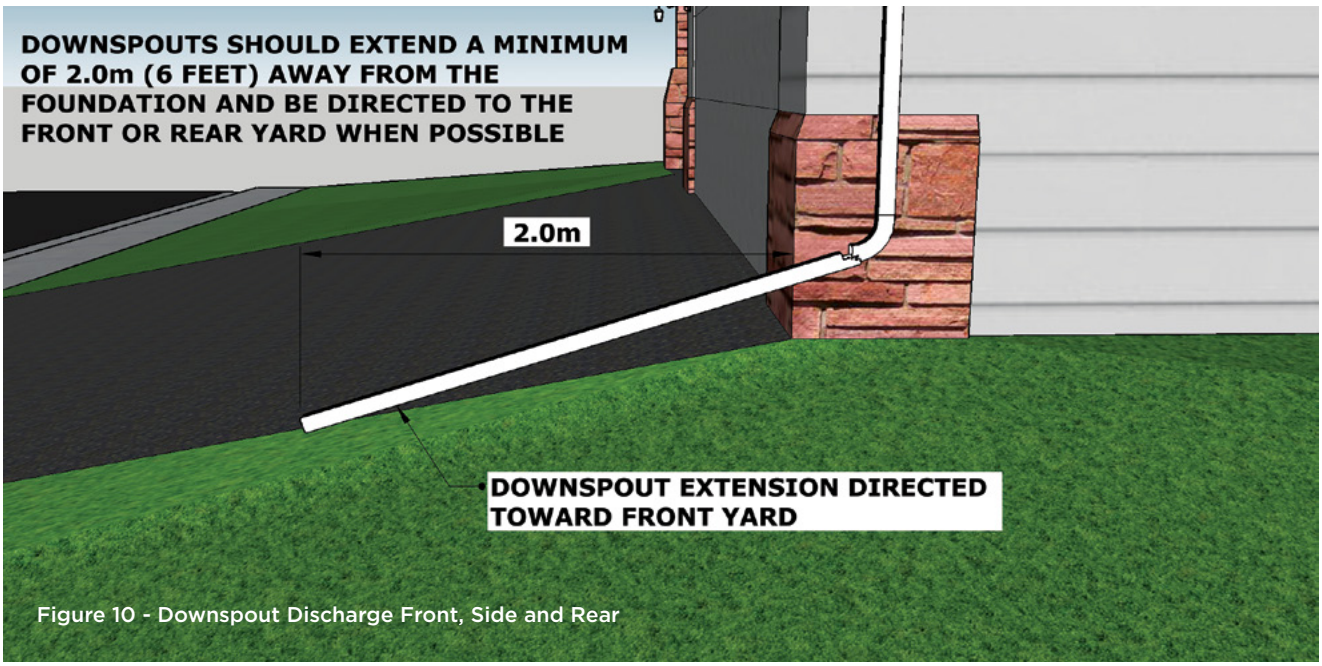


Figure 10 - Downspout Discharge Front, Side and Rear

Foundation Drainage Sump Discharge

Foundation drainage consists of a weeping tile perforated pipe, which surrounds the basement footings and collects subsurface ground water which discharges into a sump pit located in the basement. A sump pump is used to pump the collected ground water from the sump pit and discharge it to the ground surface of the lot. It is the homebuilder's or homeowner's responsibility to ensure proper foundation drainage and sump pit installation, including sump pump maintenance. Sump discharge locations

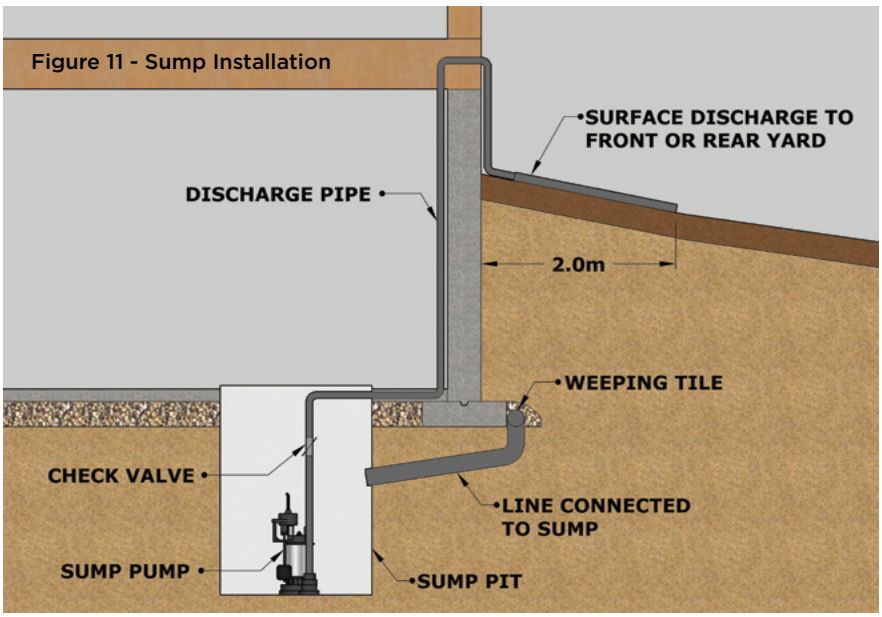


Figure 11 - Sump Installation

must be on the front or back of the home and not in a side yard. When planning sump discharge locations and direction of discharge, consideration must be given to the drainage style of the lot. For example, it is recommended to discharge in front of the home when the lot drainage style is back to front (Type A). It is recommended that homebuilders and homeowners consult with their neighbours to determine discharge locations and the direction of discharge to help avoid adverse impacts to their
property or their neighbour's property.

Sump discharge guidelines follow below:

- Extend at least 2 m (six feet) away from any foundation
- Are located no closer than 3 m (10 feet) from any property line
- Are not directed onto neighbouring properties, city sidewalks, walkways, streets, back lanes or parks
- Discharged onto a permeable surface such as a lawn or garden area
- Discharged to an area that will not adversely affect their property or any neighbouring property

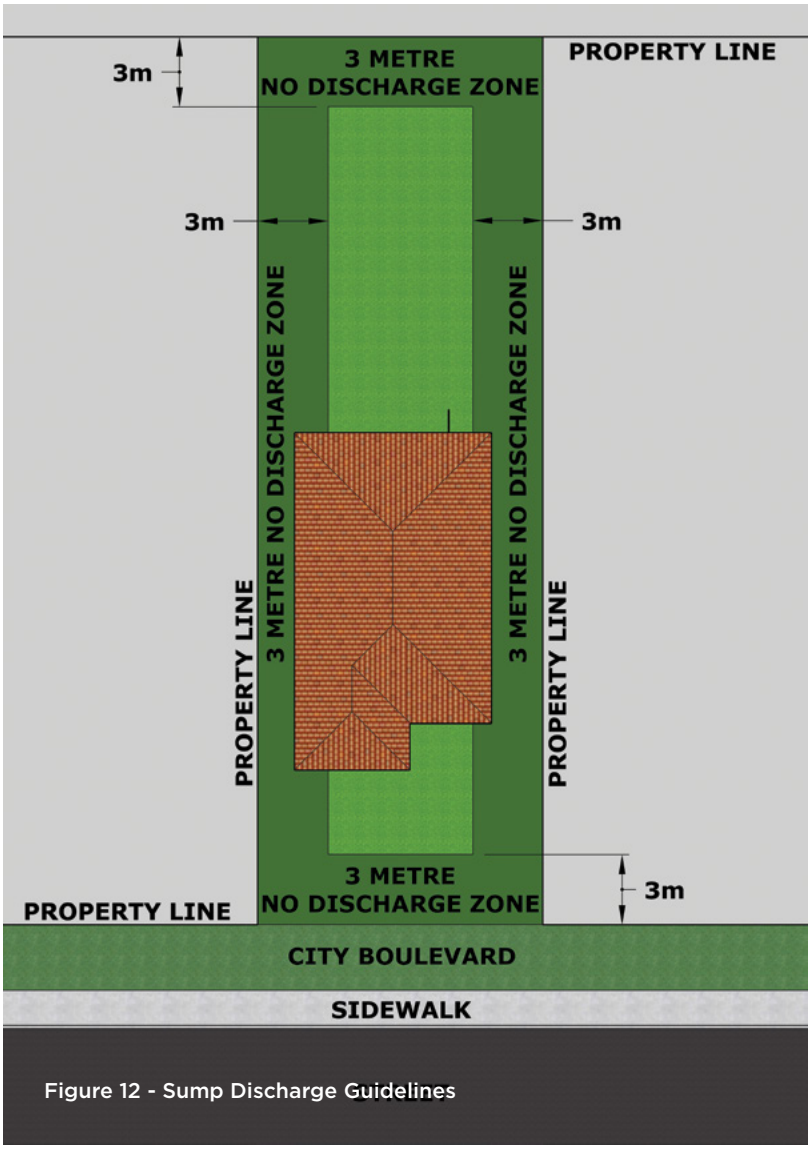


Figure 12 - Sump Discharge Guidelines

Splash Pads

Splash pads are concrete or plastic pads which are placed on the ground surface adjacent to the basement foundation to extend roof drainage or sump discharge away from the foundation to prevent basement flooding. Splash pads can be used instead of downspout or sump discharge extensions as a more permanent point of discharge.

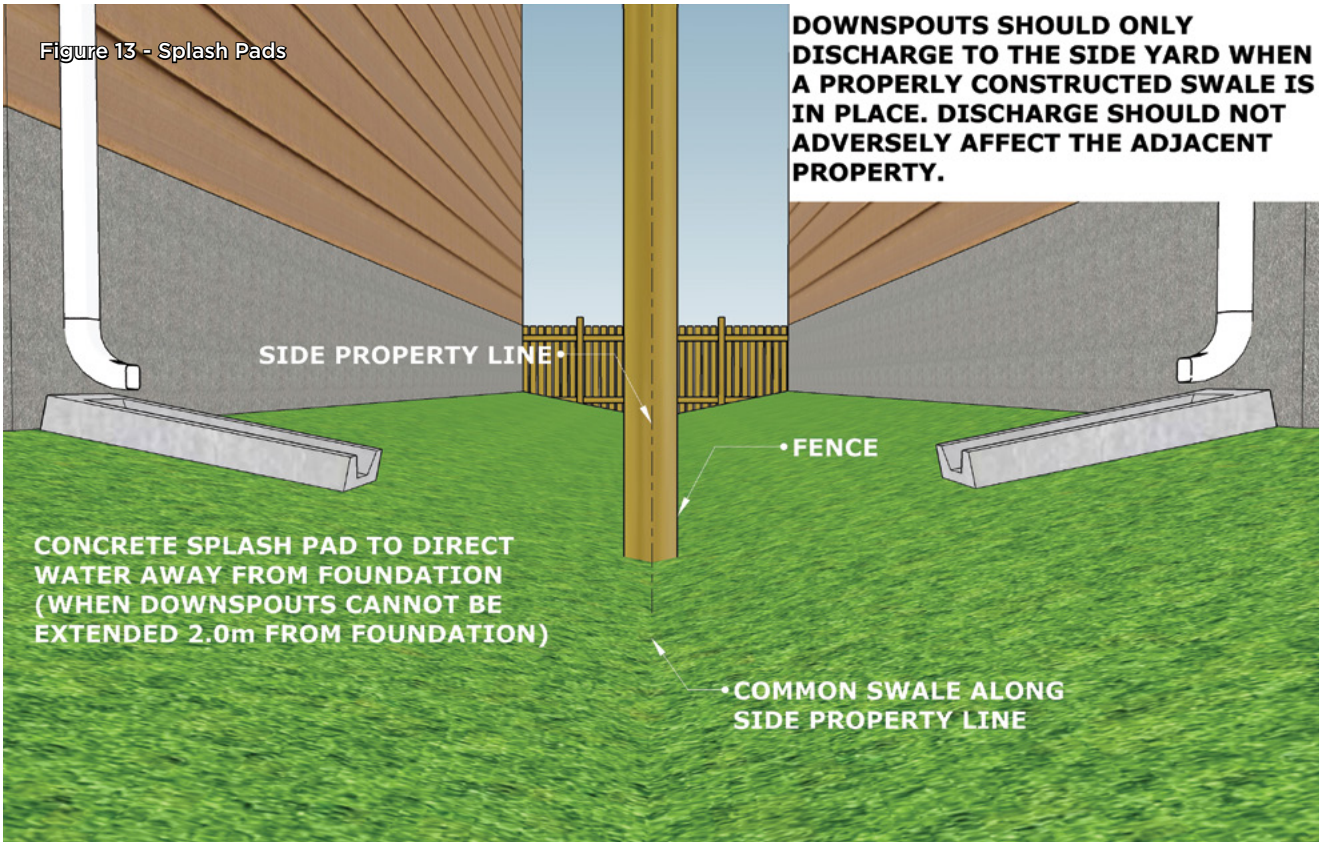


Figure 13 - Splash Pads

Buried Drainage Systems

Buried drainage systems consist of extending roof downspouts or sump discharge through a buried weeping tile pipe to discharge towards the front or rear property line. Extending buried drainage systems into a city park, lane, street, walkway or onto neighbouring property is not permitted. Buried drainage systems are not recommended as during winter and spring they can become blocked by frozen ice. Over time, they can become plugged with silt or organics, requiring maintenance. If homebuilders or homeowners wish to have a buried drainage system, it is recommended that the buried weeping tile be trenched into the bottom of a surface drainage swale so that proper drainage can be maintained on the surface if the buried system fails. Roof downspouts and sump discharges should be disconnected from the buried system and re-directed to the surface during the winter and spring months to avoid freeze-up.


Buried Drainage System

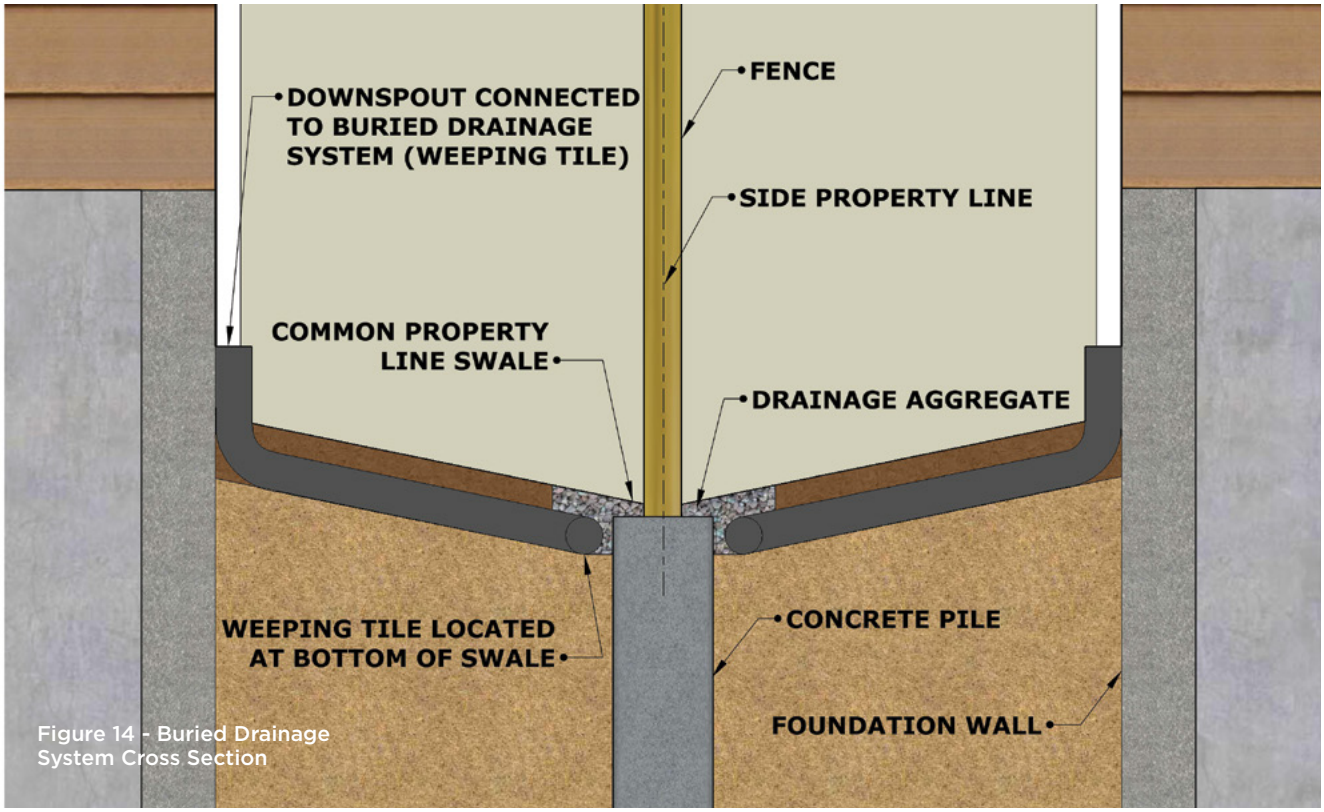


Figure 14 - Buried Drainage System Cross Section

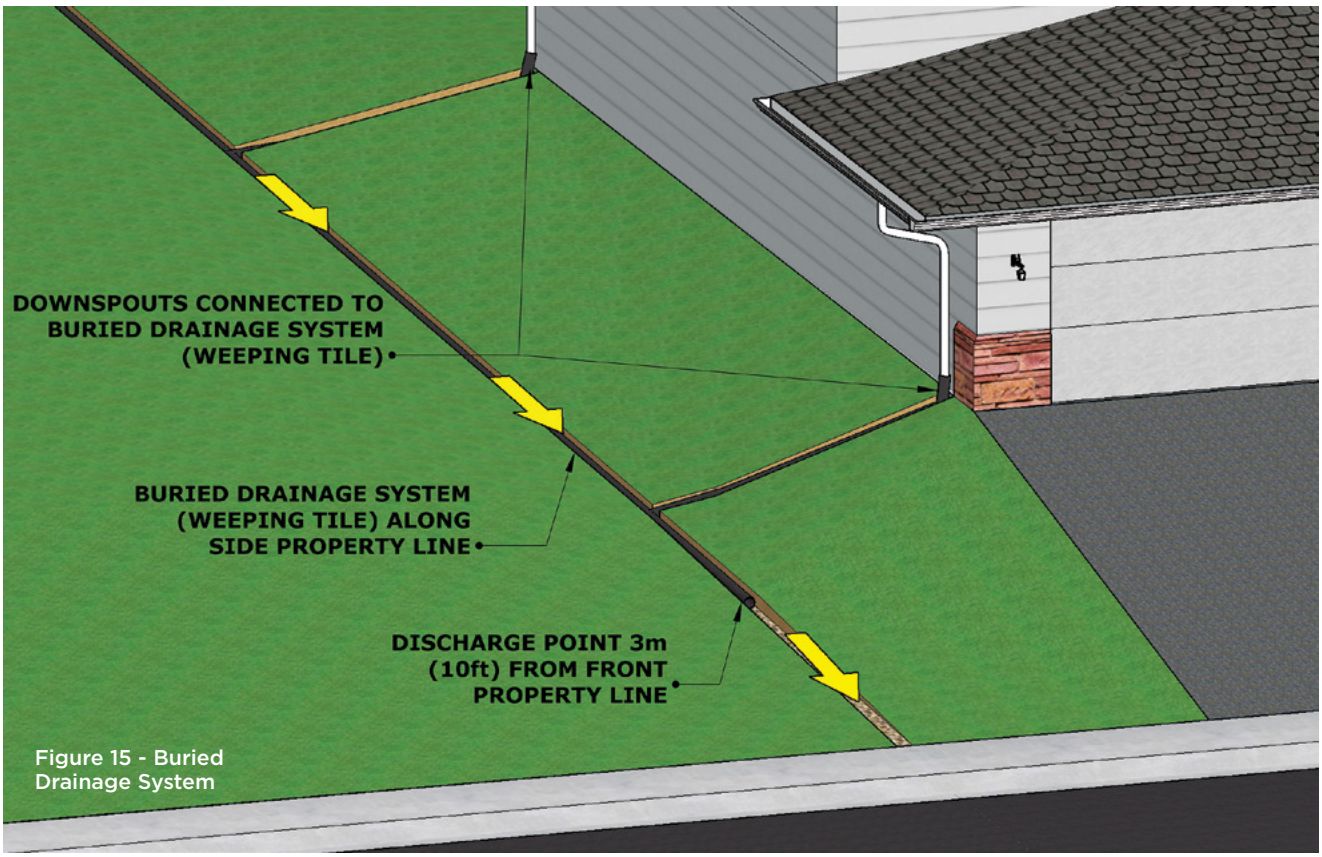


Figure 15 - Buried Drainage System

Detached Garage Grading

The detached garage pad top elevation must be a minimum 150 mm (six inches) above the back lane or sidewalk elevation to ensure positive drainage away from the building. Surface drainage must be directed towards the side property line swales and/or the city street or lane. A positive slope away from the front side of the detached garage is also required to ensure drainage from the house does not drain into the garage.

Detached Garage Grading

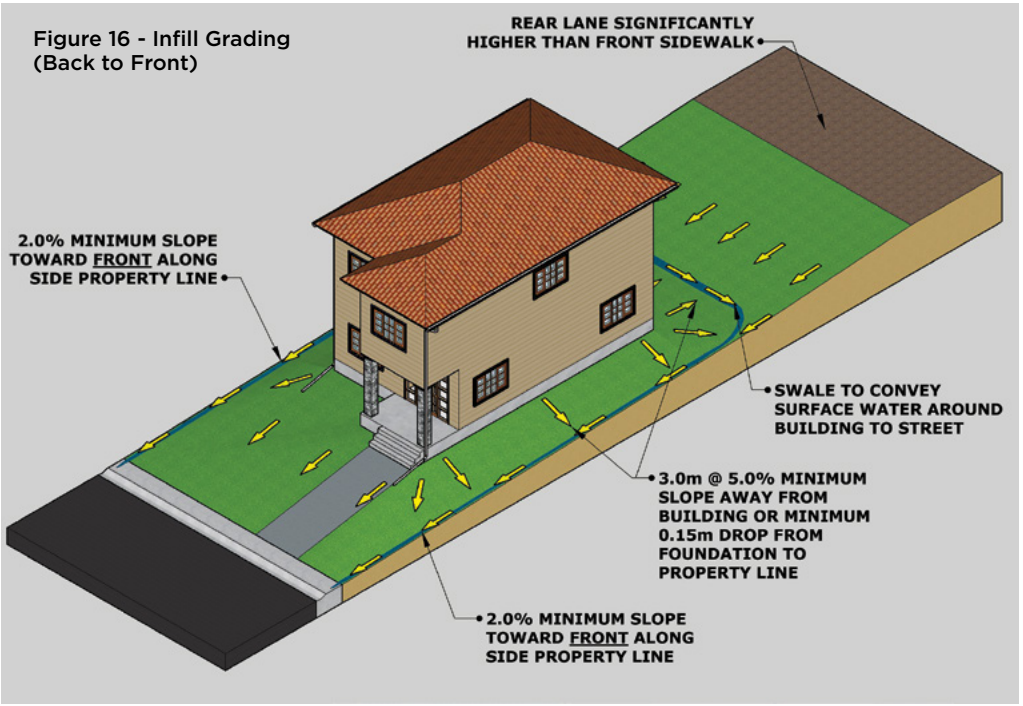
Regrading in Mature Neighbourhoods

Consulting with all adjacent neighbours is a critical step when considering any lot grade changes or downspout/sump pump location changes that affect surface drainage management between neighbouring lots. The City encourages neighbours to work together to resolve drainage problems. If grading changes are undertaken, creating or maintaining drainage swales adjacent to side and rear property lines should be considered, as well as matching the neighbouring grades. If the neighbour's grading adjacent to their foundation is not sloped properly to provide positive drainage away from their foundation, it is recommended that the neighbour consider regrading their side yard at the same time. If a shared drainage swale along the property line is not possible or if a neighbour is uncooperative, then an internal swale is recommended to ensure proper drainage.

Infill Development

Infill development refers to the process of developing vacant, under-used or existing sites within established neighbourhoods. Infill homebuilders and homeowners should consult with all adjacent neighbours as consideration must be given to their lot grades. It is recommended that the proposed infill grading matches the established grades along the shared property lines in order to ensure proper surface drainage management between lots. If the neighbour's grading adjacent to their foundation is not sloped properly to provide positive drainage away from their foundation, regrading their side yard should be considered at the same time. If it is not possible to match the existing grades, retaining walls with internal

Figure 16 - Infill Grading (Back to Front)



swales are recommended along property lines. When grading an infill lot, appropriate consideration on the lot drainage styles should be given, including the following:

- If the lane is higher than the street, the lot should be graded to drain from back to front
- If the street is higher than the lane, the lot should be graded to drain from front to back
- If the lane and street are at about the same elevation, the lot should be graded as a split drainage style where the high point is at the midpoint of the lot and the front yard drains to the street, while the back yard drains to the lane

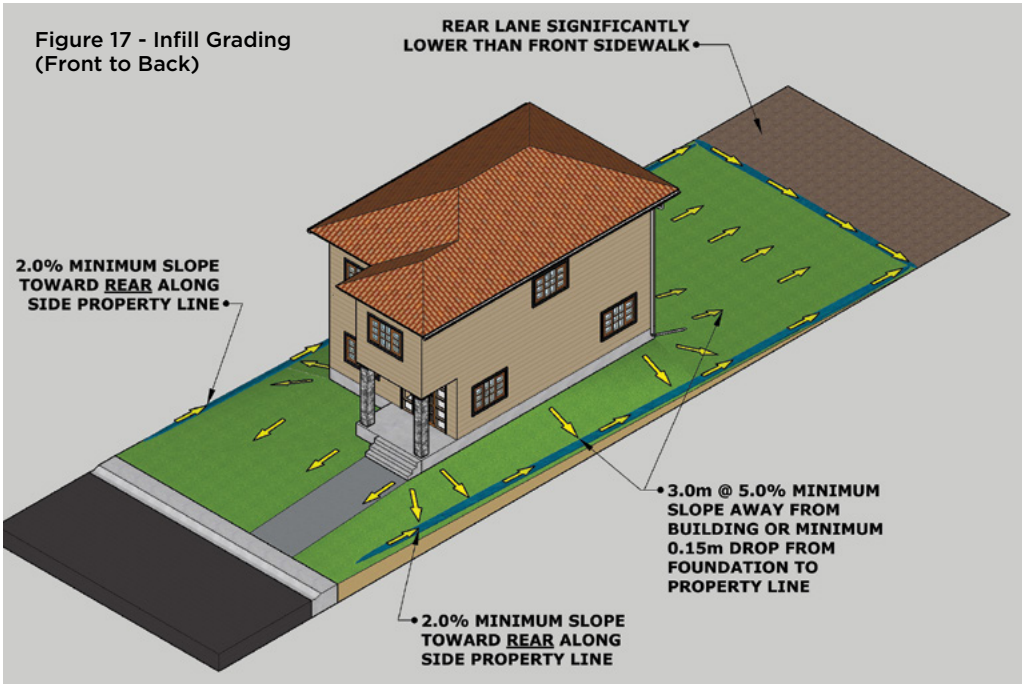


Figure 17 - Infill Grading (Front to Back)

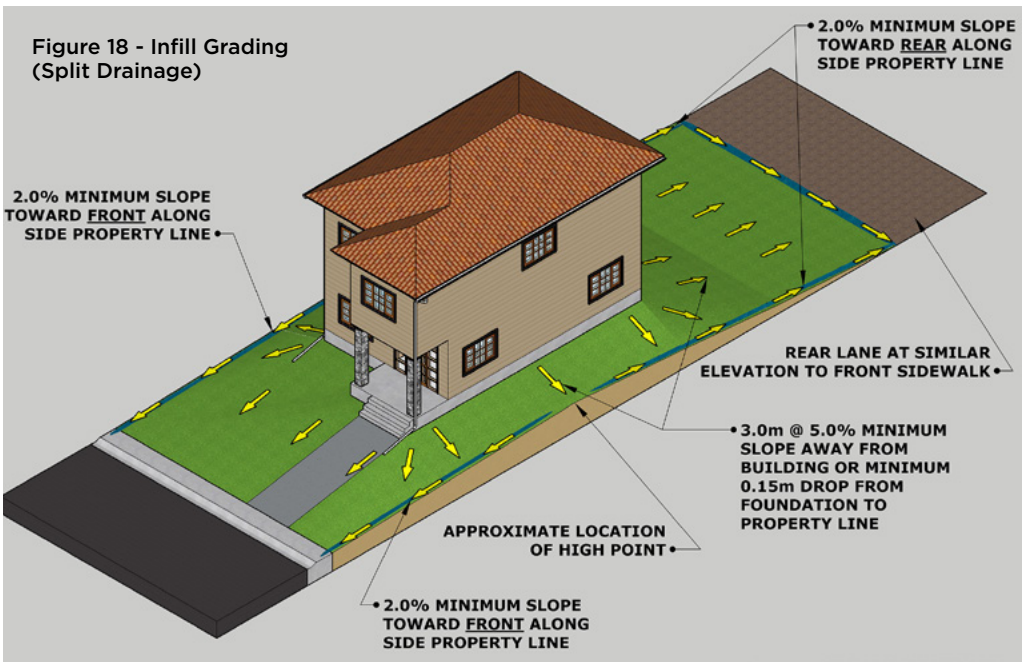


Figure 18 - Infill Grading (Split Drainage)

Lot Grading Checklist

- ✓ **Information:** Obtain lot grading plan to determine the lot drainage style and rear property line design elevations. This information can be accessed from the City's lot drainage webpage at saskatoon.ca/lotdrainage or from the lot grading information package provided by the land developer or homebuilder.

  Lots developed prior to 1975 do not have engineered lot grading plans but do have back lanes which are designed to drain to the street or storm sewer catch basins. Lots in these areas are sloped to drain to the street and or back lane.

- ✓ **Consult with neighbours:** Discuss lot grading plans, drainage styles, rear and side property line grading elevations, drainage swales, fencing, retaining walls, roof drainage downspout/ sump discharge locations and landscaping features including sidewalks, driveways and patios.

- ✓ **Design final lot grading elevations:** Prepare final lot grading design with consideration of the lot drainage style, including elevations around the building foundation, basement window/ window well elevations, rear property line swale design elevations indicated on the lot grading plan, side property line swales, internal swales, detached garage pad elevations and landscaping features. A proper lot grading design may require the assistance of a professional.

- ✓ **Survey rough grading:** The lot rough grading should be a minimum of 100 mm (four inches) below the final lot grading design elevations to allow for topsoil and sod. Design grades can be established using survey equipment to establish grade marks on stakes. Rough grading is done with the natural clay from the basement excavation. Surveying may require the assistance of a professional.

- ✓ **Rough grade lot:** Ensure the basement excavation is properly backfilled to provide a positive slope away from the foundation and grade the remainder of the lot to be a minimum of 100-mm (four inches) below the final design grade. Ensure the rear and side property lines are rough graded according to the design elevations indicated on the lot grading plan.

- ✓ **Construct hardscaping features:** Driveways, sidewalks and patios should be constructed as per the design elevations.

- ✓ **Construct fence:** Ensure the bottom of the fence is a minimum 150 mm (six inches) above the rough grade to ensure there is room for topsoil and for drainage to pass through under the fence.

- ✓ **Survey final grading:** Final design elevations can be established using survey equipment to establish grade marks on stakes. Surveying may require the assistance of a professional.

- ✓ **Final grade lot:** Spread topsoil over the lot to ensure a uniform thickness of a minimum of 100 mm (four inches) in accordance with the lot design elevations. Ensure that the rear property line swale is finished to the design elevations indicated on the lot grading plan. Ensure side property line and internal swales are graded according to lot design grades and ensure the area adjacent to the building foundation is final graded to provide a positive slope away from the foundation, as indicated in the lot grading requirements.

- ✓ **Landscape:** Seed or sod lawn, plant trees or shrubs, create gardens and place crushed rock, wood chips or other porous decorative material. The lot slope grade and elevations must be maintained during landscaping to ensure proper drainage. The grade must be sloped to final grade before placing the porous decorative material, as surface water can flow through these materials.

City of Saskatoon

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Please note that these Guidelines have been prepared for informational purposes only. Homebuilders and homeowners are encouraged to seek the assistance of a professional engineer, surveyor, landscape architect or contractor as required.

For any questions on content from these Guidelines, please contact the City's Bylaw Compliance Section:

Phone: 306-657-8766

Email: Bylaw.compliance@saskatoon.ca

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