

CITY OF WHITEHORSE DEVELOPMENT GUIDELINES

LOT GRADING GUIDELINES FOR SIMPLE DEVELOPMENTS



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I. PURPOSE

This guideline has been created with the intent to:

- Provide rationale for why proper grading is important;
- Describe the City's lot grading review process for *Simple Developments*;
- Outline the City's criteria for design of lot grading on all *Simple Developments* within the city;
- Provide supplemental information on lot grading concepts and terminology.

2. DEFINITIONS

Drainage Pattern: The *drainage pattern* is the pattern by which your lot sheds water. For information on standard *drainage patterns*, refer to Section 5 of this document or Part 4 of the *Servicing Standards Manual* for standard lot grading details.

Final Grading: The *final grading* stage of the grading process includes completion of grading work on site and installation of landscaping and final surface treatments as indicated in the *Lot Grading Plan*.

Lot Grading: Lot grading is the shaping and grading of the land to direct surface water towards an intended point of discharge in a manner that mitigates the risk of damage to surrounding structures.

Lot Grading Certificate: A *Lot Grading Certificate* is a plan representing the existing surface elevations and surface grades of a lot and is used to confirm that a development has proceeded in accordance with the accepted *Lot Grading Plan*. A *Lot Grading Certificate* is prepared and duly signed and certified by a registered surveyor or professional engineer. Refer to Appendix A for an example *Lot Grading Certificate*.

Lot Grading Plan: A *Lot Grading Plan* is a plan that complies with requirements set out in the Lot Grading Guidelines and establishes the grading design for the property along with the relationship between the design and:

- Proposed contiguous development; and
- Surrounding existing development.

Refer to Appendices A, B and C for *Lot Grading Plan* examples.

Positive Drainage: Positive drainage is provision of a continuous downward slope away from structures and other design features that should not be subject to standing water.

Rough Grading: The *rough grading* stage of the grading process includes the shaping and grading of the native soil, including backfilling the foundation (where applicable), prior to placement of topsoil, landscaping or final surface treatments indicated on the *Lot Grading Plan*.

Simple Developments: *Simple Developments* are private residential developments consisting of Single Detached, Duplex and Townhouse Developments where each unit is located on a separate fee-simple lot.

Subdivision Grading Plan: The *Subdivision Grading Plan* is provided to the City by the subdivision developer and indicates the final design grades for all lots within a new subdivision. All lots within the subdivision are to be graded to match design elevations indicated on the *Subdivision Grading Plan*.

Swale: A swale is a shaped depression sloped to direct surface drainage to an intended point of discharge.

3. WHAT IS LOT GRADING? WHY IS IT IMPORTANT?

Lot grading is the shaping and grading of the land to direct surface water towards an intended point of discharge in a manner that mitigates the risk of damage to surrounding structures. Lot grading should generally direct water away from structures and toward public property.

Poor lot grading has the potential to result in costly property damage such as foundation issues and flooding. It can also become the source of conflict between neighbours.

The developer is responsible for properly designing and carrying out lot grading in a manner that will not result in negative impacts.

The property owner is responsible to ensure lot grading is maintained and not altered. Ensuring that lot grading is maintained is the best defense against the negative effects of poor drainage. It is important that property owners consider the impact of landscaping improvements on the *drainage pattern* of their lot and adjacent properties.

Engineering Services does not have a mandate to resolve disputes between private property owners but can offer information and suggest methods for addressing issues caused by poor lot grading.

4. LOT GRADING REVIEW PROCESS FOR SIMPLE DEVELOPMENTS

The lot grading review process consists of:

1. Submission of *Lot Grading Plan*;
2. Confirmation of sub-floor elevation or top of slab elevation during construction; and
3. If requested by a Development Officer, submission of *Lot Grading Certificate* to ensure lot grading has been carried out in accordance with the *Lot Grading Plan*.

4.1.1. SUBMISSION OF LOT GRADING PLAN

As a requirement to obtain a Development Permit for a private development within the city, a developer is required to provide a *Lot Grading Plan* for review and acceptance and is responsible for ensuring all required information is present on the submitted plan.

Upon submission of the *Lot Grading Plan* as part of a complete application for Development Permit, Engineering Services will undertake a review and will provide one of the following responses to the Development Officer:

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- Plan acceptance;
- Plan acceptance subject to minor comments; or
- Request resubmission of plan with comments, and rationale for requested revisions.

At the discretion of the Development Officer, *Lot Grading Plans* will be returned without review or comment when the plan:

- Is incomplete;
- Is illegible;
- Contains excessive errors and/or omissions; or
- Does not include required professional authentication when requested by the City.

The average turn around for *Lot Grading Plan* review for *simple developments* is approximately 5-10 working days per review submission, from date of submission depending on workload.

Issuance of a Development Permit is contingent on approval of the *Lot Grading Plan*.

Information required on all Lot Grading Plans

All relevant information pertaining to the grading of the subject lot is to be indicated on the submitted *Lot Grading Plan* including (but not limited to):

- Legal description and municipal address of the property;
- Title identifying purpose of document – *Lot Grading Plan*;
- Name and contact details of individual or company that produced the *Lot Grading Plan* complete with date the plan was prepared;
- Presented in metric units and to a standard metric scale;
- Revision table to track revision history;
- North arrow;
- Legend, including drawing scale;
- All relevant property lines and easements;
- Text identifying streets and laneways;
- Location of all building footprints on site (existing and proposed);
- Main floor elevation or top of slab elevation of all existing and proposed buildings on site;
- Location of all surface treatments on site (e.g. pavement, gravel, landscaping);
- Location of all drainage features on site (e.g. swales, ditches, retaining walls);
- Proposed finished elevations* at building corners, edge of surface treatments, and along drainage features;
- Proposed elevations* at all grade breaks;
- Proposed finished elevations* at lot corners and along lot lines where applicable;
- Proposed percent grade and direction of lot drainage;
- Location of existing street furniture (e.g. light standards, fire hydrants, electrical and telecommunications infrastructure, mailboxes etc.) in proximity to subject property;
- Location of all downspouts and design direction for discharge of roof drainage; and
- Indication of existing flow pattern on adjacent lands.

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**All elevations are to be geodetic and must be coordinated with the approved Subdivision Grading Plan (where applicable).*

All proposed elevations indicated on the *Lot Grading Plan* are to indicate top of drainage plane. For instance, decorative rock or mulch is to be installed above the design elevations indicated on the *Lot Grading Plan*.

Example *Lot Grading Plans* are available through Land and Building Services.

Additional information required on Lot Grading Plans for infill development

Infill Developments present unique challenges that require specific attention to surrounding conditions.

In most cases, a *Subdivision Grading Plan* for the area does not exist and abutting properties may not have been graded to current standards.

As a result, the *Lot Grading Plan* submitted for these types of developments will need to adequately indicate all existing conditions at the perimeter of the development including (but not limited to):

- Existing topography on subject property and all abutting properties;
- Existing spot elevations at lot corners, grade breaks, existing building corners on subject property and abutting properties,
- Floor elevations of all existing buildings located on subject property or in proximity to shared property line of subject property;
- Location of all surrounding surface features including (but not limited to) existing roadways, laneways, driveways, sidewalks, fences, trails, street lights, power poles, pedestals, mailboxes and all other surface features that may impact or be impacted by development of the subject property; and
- All additional information that is relevant to the development of the subject property.

The above information is to be collected by means of topographic survey.

The *Lot Grading Plan* for Infill Developments is required to include the seal of a professional engineer licensed to practice in the Yukon.

Information required for country residential lots

All developments on lots under 0.5 ha in Country Residential zones are subject to the lot grading review process. On lots larger than 0.5 ha, the lot grading review process may be required at the discretion of a Development Officer.

4.1.2. OTHER PERMITS

Upon receipt of a Development Permit, a developer can proceed with application for the necessary Building Permit and Street Occupancy Permit.

Once all the required permits are obtained, the applicant may start construction.

4.1.3. CONFIRMATION OF SUB FLOOR ELEVATION OR TOP OF FORMWORK (FOR SLAB ON GRADE)

As part of the Siting Survey that is carried out as part of the Building Permit Inspection process (to confirm the building location on the lot) the main floor elevation is to be confirmed as follows:

- If the building is constructed with a crawlspace or basement, the subfloor elevation is to be confirmed; or
- If the building is slab on grade construction, the top of slab is to be confirmed.

The purpose of this exercise is to provide an early check that the developer is proceeding with construction in accordance with the *Lot Grading Plan*.

If the Siting Survey identifies conditions not in line with proposed lot grading, the developer is responsible for rectifying problems to ensure grading is carried out in accordance with the accepted *Lot Grading Plan*.

4.1.4. SUBMISSION OF LOT GRADING CERTIFICATE

To confirm the grading of a development, a Development Officer **may** require the property owner to produce a *Lot Grading Certificate* in the form and substance acceptable to the Development Officer.

The *Lot Grading Certificate* can be produced at *rough grading* or *final grading* stages of development.

Information required on Lot Grading Certificates

- Legal description and municipal address of the property;
- Title identifying purpose of document and specifying which stage of lot grading applies (*rough grading* or *final grading*);
- Name and contact details of individual or company that produced the certificate;
- Certification by a Canada Lands Surveyor or a professional civil engineer complete with date the as-built elevations were obtained;
- Reference to related *Lot Grading Plan*, date *Lot Grading Plan* was prepared and name of individual or company that prepared the *Lot Grading Plan*;
- Presented on 11" x 17" size sheet in metric units to standard metric scale;
- Revision table to track revision history;
- North arrow;
- Legend, including drawing scale;
- Location of all surface treatments on site (e.g. pavement, gravel, topsoil, grass);
- Location of all structures on site;
- As-built elevations* taken on the drainage plane (i.e. not on top of mulch or decorative rock) –corresponding to all elevations indicated on the accepted *Lot Grading Plan* submitted for the property;
- All design elevations* indicated on the accepted *Lot Grading Plan* (graphically differentiated from as-built elevations);
- As-built location of downspouts and direction of downspout extensions (where applicable); and
- A note indicating that the grading is subject to approval by the City.

**All elevations are to be geodetic.*

Engineering Services can potentially suggest corrective actions for rectifying grading issues on site.

4.1.5. AS-BUILT TOLERANCES

The as-built sub floor or top of slab elevation is not permitted to deviate from design elevations by more than the following tolerances:

- Maximum of +80 mm higher than design elevation; and
- Maximum of -30 mm lower than design elevation.

If a *Lot Grading Certificate* is requested by a Development Officer, the as-built elevations are to be within the following tolerances of design elevations indicated on the *Lot Grading Plan*:

If Lot Grading Certificate is produced at completion of rough grading

- As-built rough grades at the perimeter of buildings are to be between -60 mm to -140 mm from final design grade as indicated on the *Lot Grading Plan*.
- As-built rough grades at property lines to be maximum -140 mm from final design grade as indicated on the *Lot Grading Plan*.
- As-built rough grades at back of sidewalk to match back of sidewalk elevation (refer to requirements for backfill at back of sidewalk included in this document).

If Lot Grading Certificate is produced at completion of final grading

- As-built final grade is to be between -40 mm to +40 mm from the final design grade as indicated on the *Lot Grading Plan*.

Note that all resulting % grades are to fall within minimum grades indicated in this document.

5. TYPICAL DRAINAGE PATTERNS

There are four typical lot drainage patterns (or types) for Simple Development located within a new subdivision in the City.

All *Lot Grading Plans* are to adhere to one of the following:

- Type A – Rear to Front Drainage, Less than 6% Overall Lot Slope;
- Type B – Rear to Front Drainage Type B, Greater than 6% Overall Lot Slope;
- Type D – Split Drainage, Less than 6% Overall Lot Slope; and
- Type W – Steep Split Drainage, Greater than 6% Overall Lot Slope.

Typical details for each lot drainage type are located in Section 4 of the *Servicing Standards Manual*.

Simple development of an infill nature is to adhere generally to one of the typical drainage patterns while matching into existing conditions at the perimeter of the site.

A split *drainage pattern* is to be adhered to where a lane or public right-of-way is located at both the front and back of the lot.

In situations where the drainage design incorporates a shared swale along multiple rear property lines, an easement is required to facilitate maintenance of the shared swale.

6. LOT GRADING DESIGN CRITERIA

Lot Grading Plans will be reviewed individually with consideration given to the specific conditions of each development. However, all lot grading designs are required to incorporate the following general design requirements:

6.1.1. GRADING AT PERIMETER OF BUILDINGS

Where possible, a minimum elevation drop of 100 mm is required from design main floor elevation to elevation on grade at exterior of building.

Positive drainage is to be provided away from the perimeter of all existing and proposed buildings, including areas under steps, decks and patios.

The standard preferred grade for soft surface / landscaping is 10% for the first 1.5 m from the perimeter of the building.

Where achievable, side yards are to be graded to provide a minimum drop of 150 mm from grade at building to grade at property line.

6.1.2. ROOF DRAINAGE

Downspouts are to direct roof drainage away from all buildings and towards the street and/or rear yard. Under no circumstances are downspouts to direct run-off onto neighbouring properties.

Downspouts must have an elbow with an extension to convey surface run-off away from the building foundation.

6.1.3. MINIMUM SITE GRADES

Notwithstanding minimum grades noted within this document, no proposed grade is to be:

- Less than 2.0% at perimeter of all buildings; and
- Less than 0.5% anywhere on the subject property.

6.1.4. NEIGHBOURING PROPERTIES

In all instances, grading is to be designed in a manner that does not convey surface drainage to neighbouring properties.

6.1.5. DRIVEWAY GRADES

Driveways are to be designed to achieve a minimum 2.0% grade and maximum 6% grade. Steeper grades will be reviewed and considered where it can be demonstrated that it is difficult to achieve the maximum 6% grade.

6.1.6. BACKFILL AT BACK OF SIDEWALK OR PAVED LANES

To reduce water infiltration into the granular base of concrete walks and paved lanes, non-granular material must be placed to be level with the top of sidewalk or laneway surface in a manner that prevents ponding of surface drainage. At *rough grading* stage, this can be in the form of compacted native material. At *final grading* stage, this would be in the form of the final design surface.

6.1.7. RETAINING WALLS

Installation of a retaining wall is required when the following conditions occur:

- Substantial elevation differences between properties;
- A solution is required to address unintended grading problems due to non-compliant construction; and
- A retaining wall is incorporated into the landscaping design for the development.

It is not acceptable to use common property fences as retaining structures.

When a retaining wall that exceeds 1.0 m in height is incorporated in the lot grading design, the City requires that the developer submit:

- A construction detail complete with the seal of a professional engineer licensed to practice in the Yukon; or
- Product information for a pre-engineered system.

Note that installation of a pre-engineered retaining wall system is to be in strict accordance with manufacturer's instructions.



6.1.8. SWALES

Shared swales and internal swales are accepted methods for conveying site drainage to a designated location, particularly along narrow side-yards and shared property boundaries.

The minimum longitudinal grade for a drainage swale is:

- 1.5% for soft surfaces; and
- 0.75% for hard surfaces.

Swale grades are to be consistent between design elevations indicated on the *Lot Grading Plan* and are to be free from obstructions or low areas.

Refer to examples on page 10.

Shared Swales

Shared 'property line' swales are located along shared property lines and are commonly used in subdivision designs to direct runoff toward roadways, lanes or right of ways at the rear and/or front of properties.

The properties on either side of the shared swale are to be graded to allow positive drainage away from building perimeters to the property line.

It is essential that the grading design for shared swales is functional for both properties.

Internal Swales

Internal 'side-lot' swales are to be built in locations where a shared swale cannot be constructed without negatively impacting the neighbouring property.

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Internal Rear-Yard Swales

Internal 'rear-yard' swales are to be located in backyard areas of lots that are designed to adhere to a rear to front *drainage pattern*.

A rear-yard swale is created where the rear to front design grades meet the required positive grade from building footprints. Typically, drainage is directed to shared or internal swales in the side yard area.

Swale Examples



7. ADDITIONAL RESOURCES

For more information on the City of Whitehorse permitting process visit the Land and Building Services webpage at: <https://www.whitehorse.ca/business-in-whitehorse/zoning/>

To access the City of Whitehorse Servicing Standards Manual, visit the Engineering Services webpage at: <https://www.whitehorse.ca/business-in-whitehorse/zoning/engineering-standards/>

To access the City of Whitehorse Zoning Bylaw, visit: <https://www.whitehorse.ca/wp-content/uploads/2022/06/2012-20-Zoning-Bylaw-2012-20.pdf>

If you have questions about the content of the Lot Grading Guidelines, please contact Engineering Services at 668-8305.

8. APPENDIX A – INFILL DEVELOPMENT LOT GRADING PLAN EXAMPLE

Infill Development - Lot Grading Plan Example



This example applies to re-development on existing lots, residential developments located in already developed areas and commercial developments.

This information is intended as a general guide only. For questions, please contact the City of Whitehorse Engineering Services Department at 668-8305

Drainage plan must show:

- Lot information including Lot Number, CLSR Plan number, Property Lines and Easements.
- Footprints of all buildings on the property.
- Existing elevations on grade at corners of lot, grade breaks, along road shoulders, paths, lanes and existing buildings located near property line.
- Location of existing street furniture within proximity of property, including but not limited to, electrical pedestals, hydrants, and mailboxes.
- Spot elevations and drainage arrows indicating existing drainage pattern of adjacent properties.
- Proposed and/or existing Main Floor Elevation and Garage Slab Elevation (if applicable) for all buildings on site.
- Proposed elevations on grade at lot corners and along shared property lines (if altered from existing).
- Proposed elevations on grade at building corners, edge of surface treatments, along swale inverts, along retaining walls and at grade breaks.
- Drainage arrows indicating direction of drainage complete with calculated % grade.
- Surface treatments throughout property including, but not limited to, paving, gravel and grass.
- Drainage features such as swales, ditches and retaining walls.
- Location, size and material of underground service connections.
- Location of connection point from new services to existing services (where applicable).
- Location of cc's.
- Seal of Professional Engineer licensed to practise in the Yukon.

Design requirements:

Minimum drops in elevation:

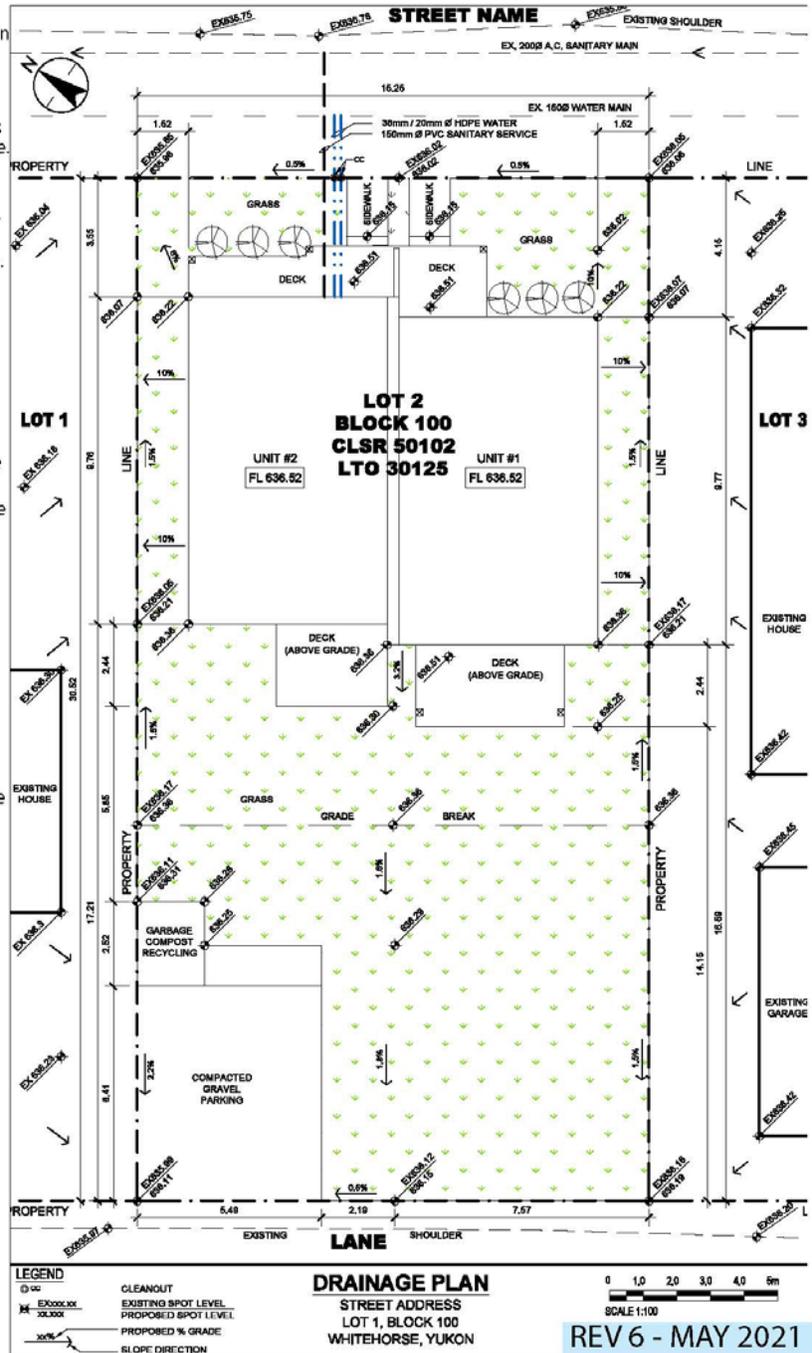
- Minimum 100mm drop in elevation from main floor elevation to elevation at grade outside of building (with exception to area fronting garage).
- Where achievable, min.150mm drop in elevation from grade at building to grade at property line or invert of swale.

Minimum and Maximum % Grades

- Minimum grade along swale invert 1.5%
- Preferred driveway grades 2%-6%

General

- Elevations indicated on the plan are to be top of drainage plane (top of native soil or hard surfacing). Decorative rock is to be installed proud of drainage plane.
- Minimum clearance of 1.5m to be provided from edge of driveway to existing street furniture.



9. APPENDIX B – RESIDENTIAL LOT IN SUBDIVISION LOT GRADING PLAN EXAMPLE

Residential Lot in Subdivision - Lot Grading Plan Example



This example applies to new single detached, duplex, and residential accessory developments located within a Subdivision.

This information is intended as a general guide only. For questions, please contact the City of Whitehorse Engineering Services Department at 668-8305

Drainage plan must show:

- Lot information including Lot Number, CLSR Plan number, Property Lines and Easements.
- Footprint of all proposed buildings on the property, including decks, patios and stairs.
- Proposed Main Floor Elevation and Garage Slab Elevation (if applicable) of all proposed buildings on site.
- Design elevations at lot corners and along property boundaries in accordance with Overall Subdivision Grading Plan. These can be provided by the City of Whitehorse upon request.
- Proposed elevations on grade at building corners, edge of surface treatments, along swale inverts, along retaining walls and at grade breaks.
- Drainage arrows indicating direction of drainage complete with calculated % grade.
- Location of existing street furniture within proximity of property, including but not limited to, electrical pedestals, hydrants, and mailboxes.
- Surface treatments throughout property including, but not limited to, paving, gravel and grass.
- Drainage features such as swales, ditches and retaining walls.
- Location, size and material of underground service connections.
- Location of connection point from new services to existing services.

Design requirements:

Minimum drops in elevation:

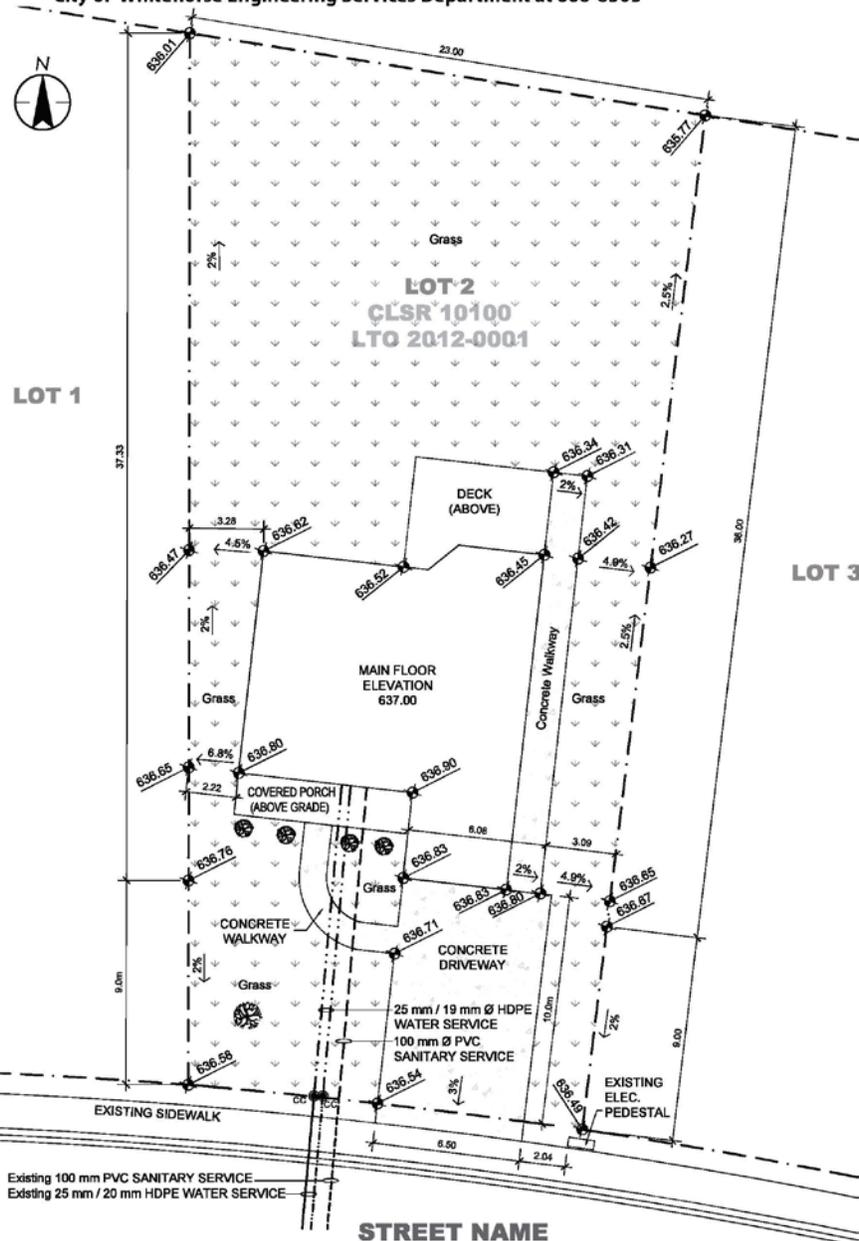
- Minimum 100mm drop in elevation from main floor elevation to elevation at grade outside of building (with exception to area fronting garage).
- Where achievable, min.150mm drop in elevation from grade at building to grade at property line or invert of swale.

Minimum and Maximum % Grades

- Minimum grade along swale invert 1.5%
- Preferred driveway grades 2%-6%

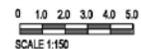
General

- Elevations indicated on the plan are to be top of drainage plane (top of native soil or hard surfacing). Decorative rock is to be installed proud of drainage plane.
- Minimum clearance of 1.5m to be provided from edge of driveway to existing street furniture.



LEGEND	
● CC	CLEANOUT
XX.XXX	DESIGN ELEVATION
XX%	PROPOSED % GRADE
→	SLOPE DIRECTION

DRAINAGE PLAN
 STREET ADDRESS
 LOT 1, BLOCK 100
 WHITEHORSE, YUKON



NOTE: DIMENSIONS ARE IN METRES U.S.C

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10. APPENDIX C – COUNTRY RESIDENTIAL LOT GRADING PLAN
 EXAMPLE

Country Residential - Lot Grading Plan Example



This example applies to new single detached and residential accessory developments located on a Country Residential Lots 0.5ha in size or less.

This information is intended as a general guide only. For questions, please contact the City of Whitehorse Engineering Services Department at 668-8305

Drainage plan must show:

- Lot information: Lot Number, Block Number, CLSR and LTO Plan Numbers, Property Lines and Easements.
- Labels for adjoining Street(s)
- All existing and proposed building footprints and main floor elevations.
- All relevant existing surface features including but not limited to existing well heads, driveways, and culverts.
- Lidar contours complete with labels. These can be provided by the City of Whitehorse upon request.
- Drainage features such as swales, ditches and retaining walls.
- Surface treatments (if other than natural ground).
- Proposed elevations at building corners, and top of building pad.
- Proposed elevations along invert of swales (if applicable) and along retaining walls
- Location of proposed toe of slope where building pad matches into existing surrounding grades.
- Existing elevations or proposed elevations along Driveway (whichever applies)
- Location of septic field and well

Design requirements:

Minimum drops in elevation:

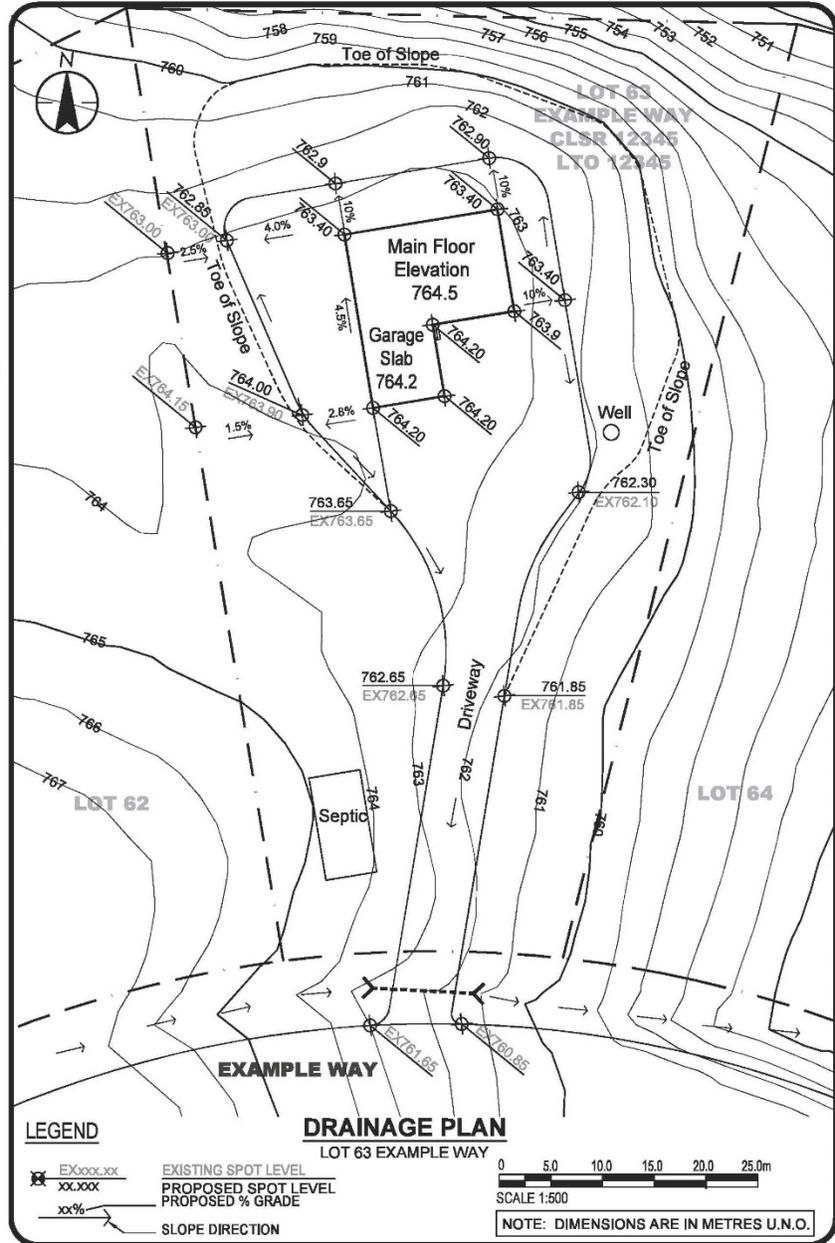
- Minimum 100mm drop in elevation from main floor elevation to elevation at grade outside of building (with exception to area fronting garage).
- Where achievable, min.150mm drop in elevation from grade at building to toe of slope or invert of swale.

Swales:

- Minimum grades of 1.5% along swale inverts
- Swales provided on uphill side of all buildings

Well and Septic

- Well and septic locations meet requirements of Yukon Government Environmental Health Services.



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II. APPENDIX D – EXAMPLE LOT GRADING CERTIFICATE

