SCHEDULE "I"

LOT GRADING STANDARDS

1. INTENT

The intention of preparing an acceptable Lot Grading Plan is to provide confidence to the City, Approving Officer, Developers and builders that the lots created are suitable for Development and promote environmental protection, slope stability and sensitive integration within the surrounding established landscape.

A Lot Grading Plan shall be designed to avoid:

- drainage issues,
- lot and access instability,
- slope instability,
- incompatible lot grading and building form,
- incompatibility between the setting of MBE's and invert elevations of the gravity drainage and sanitary sewer connections.
- impacts to environmentally sensitive areas, trees and/or Streamside Protection and Enhancement Areas
- issues during the Building Permit stage i.e. changing drainage grading that impacts other lands, excavations or blasting activities that impact adjacent lots,
- disjointed integration of Development on steeper slopes with existing features and topography, to the greatest extent possible.

2. LOT GRADING OBJECTIVES

(a) Follow the Development Permit guidelines as contained in the OCP.

(b) Develop each lot to ensure building sites can accommodate the intended Development.

(c) Develop each lot to accommodate the anticipated building forms so that the builder will not be required to manipulate the Developer's lot grading.

(d) Meet the existing grade of adjacent lands.

(e) Ensure that rainwater or snowmelt runoff is contained and directed within each lot to a swale draining to a lawn basin that is connected to the city storm sewer system or is directed to an on-site infiltration facility. Sheet drainage of the front yard may be directed to the street.

(f) Ensure that lot drainage does not adversely impact adjacent lots, create slope instability or impact Streamside Protection and Enhancement Areas, trees to be retained and/or environmentally sensitive areas.

(g) Minimize large cut and fills for the creation of building envelopes and driveways.

(h) Minimize retaining walls**.** In situations where retaining walls cannot be avoided, the size of retaining walls shall be reduced so that long-term maintenance is not a hazardous or difficult, and that the visual and physical impact on neighboring lands is considered. Access to the wall for inspection and maintenance activities must be considered.

(i) Minimize street frontage elevation differences between lots to less than 1.2 meters.

(j) Preserve natural features that can be incorporated into the lot layouts and/or the road network. Minimize the disturbance of natural vegetation and conserve the natural vegetation on slopes.

(k) Preserve view corridors where feasible and create visually attractive Developments. Create visually attractive Developments through the appropriate selection of materials and landscape elements.

(l) Enhance environmental protection by reducing erosion and sedimentation and by implementing Erosion and Sediment Control.

(m) Coordinate the grading of each lot with consideration for tree preservation, replanting and on-lot planting requirements.

3. DESIGN OF LOT GRADING

(a) Rainwater runoff is to be collected within the lot and directed to an approved storm sewer system or an onsite infiltration facility;

(b) Swales shall be graded at a minimum of 2% and maximum of 5%. Minimum width of a drainage swale to be 1.0 meters;

(c) Swale depth to be a minimum of 150 mm and not to exceed 300 mm;

(d) Swales to be lined with turf on a minimum of 150 mm Growing Medium or clear crushed rock up to the high water mark, erosion blanket or approved alternate where velocities exceed 0.6 m/s at the discretion of the Engineer;

(e) Lot grading swales shall be used to protect adjacent downstream properties from overland sheet flow from uphill lands.

(f) Swales across two or more lots are not permitted;

(g) Driveway grades shall not exceed 15% unless approved by the Engineer;

(h) Lot drainage shall not impact adjacent lots;

(i) The design elevation of the MBE shall be 150 mm above the Hydraulic Grade Line (HGL) of the Major Flow or centerline of abutting road if designed to convey the Major Flow on the surface;

(j) Where required by the Engineer, the Developer shall provide a report prepared by a Consulting Engineer experienced with geohydrology in steep terrain or in bedrock to assess the impact of groundwater movement on slope stability, lot grading or building Development;

(k) The Engineer reserves the right to request additional information or review if the provided information is not sufficiently specific to allow a thorough understanding of the lot grading impacts on the existing topography and intended Development of the land, and

(l) Refer to the City's website at www.abbotsford.ca for the drafting standards and legend for Lot Grading Plans.

4. IMPLEMENTATION

(a) Development Permit Applications

Development Permits are required in certain areas of the City prior to any Development activities including tree cutting, grubbing, clearing, preliminary site grading (bulk grading), re-contouring and Subdivision. Any grading at the Development Permit stage shall be compatible with the proposed final lot grading. The Developer and their Consulting Engineer shall review aspects of lot grading and submit plans accordingly.

(b) Subdivisions

i. The Preliminary Layout Approval (PLA) shall require lot grading designs as a condition of Subdivision Approval.

ii. The first design submission package from the Consulting Engineer shall include lot grading designs.

iii. A Subdivision shall not reach Substantial Completion until lot grading is substantially completed and a Record Drawing submitted and accepted by the Engineer.

(c) Building Permit Applications

i. All Building Permit applications shall be reviewed in conjunction with the lot grading control established at subdivision stage. Final lot grading by the builder shall be submitted and accepted prior to issuance of a Building Permit.

ii. Where no lot grading design plans exist, the Developer or builder shall submit lot grading designs and drawings in conjunction with the application.

iii. Occupancy shall not be approved until the lot grading is completed and accepted by the Engineer.

iv. A lot grading certification shall be required from the Consulting Engineer certifying that the parcel, as graded, complies with the Developer's Lot Grading Plan and Rainwater Management Plan.

5. LOT GRADING PLAN SUBMISSIONS FOR URBAN SUBDIVISIONS

Lot Grading Plans to show:

(a) Drawings to be at a scale of 1:500;

(b) A topographic survey at 1.0 meter contours by a registered BCLS;

(c) Existing and proposed elevations at all lot corners, along property lines at 6 meter intervals, grade breaks and at the corners of the building envelope;

(d) Spot elevations at significant topographic breaks including top and toe of slopes;

(e) Minimum building elevation (MBE) and garage pad elevation (GPE). Establishing the MBE should give consideration to the Development of a basement level that can be served by gravity sanitary and drainage connections;

(f) Lot dimensions and lot number;

(g) Plan view of the building envelope that conforms to the Zoning Bylaw setback requirements showing finished rear yard and driveway elevations and grades.

(h) Where lot grades exceed 10% in any direction, cross section of lot in two directions, front to back and side to side, that traverses through the building envelope. Cross sections to include adjacent lots, roads, natural features, trees, SPEA's and ESA's as directed by the Engineer or Approving Officer;

(i) Geodetic elevations of gravity sanitary and storm sewer service inverts;

(j) Location of swales & direction of drainage;

(k) Location of lawn basin with rim and outgoing invert elevations;

(l) Location of retaining walls with cross sections, construction details including proposed retaining wall type/form and elevations of top and bottom of wall. Notations to indicate that the retaining wall(s) is to be built by Developer other than on side lot lines adjacent to the building envelope which are to be constructed by the builder in conformance with the Lot Grading Plan accepted by the Engineer;

(m) Location of significant natural features;

(n) Easements and Rights-of-Way;

(o) The use of software, such as Civil3D, to show lot grading in three dimensions may be required at the discretion of the Engineer. Location of all cuts and fills exceeding 1.0 meter in depth shall be shown in colour to distinguish between cuts and fills clearly and accurately.

(p) Reference to applicable geotechnical reports and recommendations;

(q) Reference benchmark identification, location and geodetic elevation;

(r) Location of onsite infiltration facility, if applicable, with elevation of inlet(s), top and base;

(s) Top of curb or sidewalk elevation adjacent to front lot line;

(t) Side yard swales shall be shown;

(u) Streams, ditches, Streamside Protection and Enhancement Areas, and other environmentally sensitive areas. Survey to include high water mark and top of bank of streams and ditches, as delineated by a Qualified Environmental Professional. All such features shall be protected by Developer installed physical barriers as may be required by a Development Permit.

(v) All trees proposed to be retained, both on and off-site, along with their Tree Protection Zones. All retained trees shall be protected by Developer installed physical barriers as may be required by a Development Permit.

(w) Lot Grading Plan is to be sealed by the Consulting Engineer;

6. LOT GRADING PLAN SUBMISSIONS FOR BUILDING PERMITS

Plans shall be in a recognized metric scale and shall include:

(a) The proposed finished grade at the foundation wall on the perimeter of the proposed building;

(b) Drainage swales, direction of flow, location of lawn basin including inlet and outlet elevations and the drainage piping to the drainage inspection chamber at the property line;

(c) Where required, show the location and elevations of onsite infiltration facilities as prepared by the Consulting Engineer;

(d) Invert elevations of the inspection chambers for the sanitary and drainage service connections;

(e) The Record Drawing showing finished grades at all lot corners, grade breaks and at corners of the building;

(f) The proposed location and slope of the driveway from the gutter line, or back of sidewalk, to the GPE elevation;

(g) Elevation of top of curb adjacent to the front property line;

(h) Existing and proposed retaining walls, including walls for landscaping purposes, with elevations of the proposed finished top and bottom of the wall;

(i) MBE and GPE;

(j) Location of significant natural features;

(k) Easements and Rights-of-Way;

(l) Streams, ditches, Streamside Protection and Enhancement Areas, and other environmentally sensitive areas. Survey to include high water mark and top of bank of streams and ditches, as delineated by a Qualified Environmental Professional. All such features shall be protected by Developer installed physical barriers as may be required by a Development Permit.

(m) All trees proposed to be retained, both on and off-site, along with their Tree Protection Zones. All retained trees shall be protected by Developer installed physical barriers as may be required by a Development Permit.

(n) Legal description, civic address and reference benchmark; and

(o) Geotechnical reports for cuts and fills greater than 1.0 meters in depth and slopes greater than 20%.

In addition, where building permit applications are for rural properties, the Lot Grading Plan must show sufficient existing topographical information and the proposed grading works. Existing surface drainage courses shall not be blocked nor shall the proposed grading works direct surface runoff onto adjacent lands.

7. RETAINING WALLS

(a) Retaining walls shall be designed with reference to Engineers and Geoscientists of BC Professional Practice Guidelines on Retaining Walls.

(b) Retaining wall heights shall comply with the appropriate guidelines found in the OCP;

(c) The height of terraced retaining walls should be consistent with the natural grade of the existing slope above and below the retaining wall;

(d) Where stepped retaining walls are required, a minimum horizontal step of 1.5 meters shall be provided for landscaping, maintenance and access purposes;

(e) Where a retaining wall abuts a common property line or roadway, a fence, handrail or guardrail shall be constructed to a height suitable for the protection of human activity;

(f) All retaining walls over 1.2 meters in height shall be designed by a professional engineer. A building permit shall be obtained for the wall construction;

(g) Tie backs, where included in the design and construction of a retaining wall, shall be kept within the subject property being developed;

(h) Retaining walls that are not approved include:
   i. Concrete lock block style, where facing public rights-of-way or lands;
   ii. Wood walls, preserved or otherwise;

(i) A Restrictive Covenant shall be registered on title to notify future lot owners of their maintenance and repair responsibilities. The Restrictive Covenant shall prohibit the property owner from repairing or modifying the retaining wall without a report being prepared by a qualified geotechnical and structural engineer and submitted to the Engineer for acceptance. Also, no physical changes to the retaining wall are permitted;

(j) Register a reciprocal access easement between parcels sharing a contiguous retaining wall; and

(k) The Developer shall design and construct retaining walls that are contiguous over two or more properties.

8. CHANGES TO LOT GRADING PLANS AFTER SUBSTANTIAL COMPLETION

Change requests to the Record Drawings of the lot grading are not accepted by the City at the time of a building permit application unless a significant hardship is created by extenuating circumstances. Where circumstances allow for a change request to the Lot Grading Plan, the building permit applicant shall preferably retain the Consulting Engineer

who prepared the Lot Grading Plans. Alternatively, a professional civil engineer may be engaged. A revised Lot Grading Plan, prepared by the Consulting Engineer, shall be accompanied by an impact statement letter addressed to the City of Abbotsford's Senior Manager, Development Engineering for review of acceptability. The impact statement shall provide assurances that the revised grading plan will still function in the context of the originally approved grading plan for the surrounding lands.

9. CERTIFICATION OF LOT RE-GRADING

After the re-grading of a lot, a Record Drawing of the Lot Grading Plan shall be prepared based on a survey conducted under the direct supervision of the Consulting Engineer or a registered BCLS. The Record Drawings shall show ground elevations at all Parcel corners, all corners of the building envelope, back of curb or sidewalk, and any changes in grade across the Parcel. The MBE, GPE, inverts of gravity service connections, lawn basins, manholes and swales and any other feature that may affect the construction of a building on the Parcel shall be identified. Uniform grades between Parcel corners shall be to a tolerance of plus or minus 150 mm.
Where retaining walls are constructed in accordance with the accepted re-grading plan, the horizontal locations and top and bottom of wall elevations are required. A revised Lot Grading Plan shall be submitted which is signed and sealed by a professional engineer. Where a registered BCLS conducts the survey, the Surveyor shall note their name on the plan.

10. LEGAL DOCUMENTATION

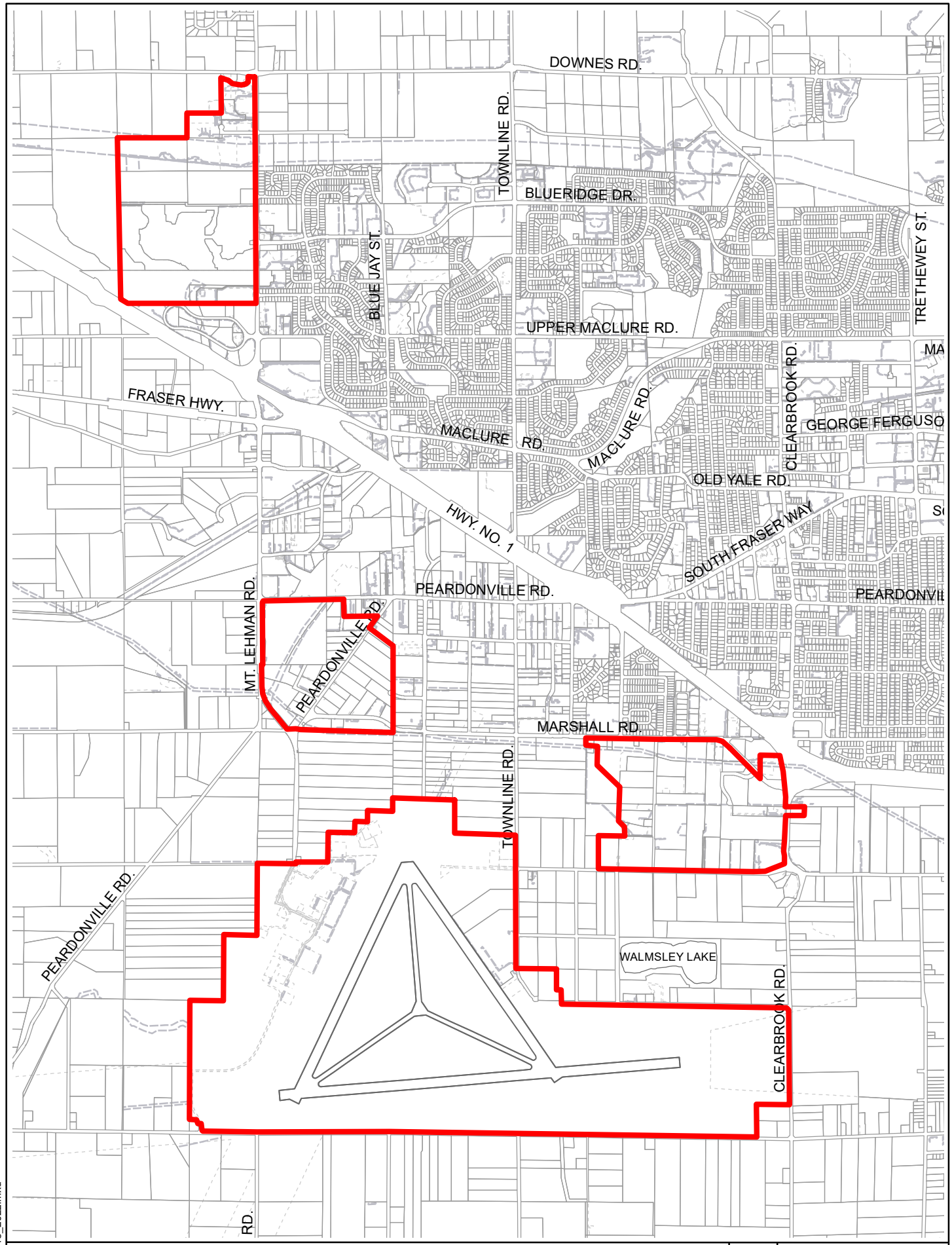
(a) Covenants may be required which shall be registered against all titles of the land where the final slopes are greater than 20%.

(b) The covenant shall prevent further re-grading, re-contouring, retaining wall construction, installation or alteration of the lot grading without the approval of the Engineer.

SCHEDULE “J”

CITY IN THE COUNTRY PLAN (CICP) LANDS

City in the Country Plan (CICP) Lands D-1018



ABBOTSFORD

City in the Country (CICP) Lands

N

Schedule J

D-1018

Scale 1:30,000

Plot Date 5/18/2022

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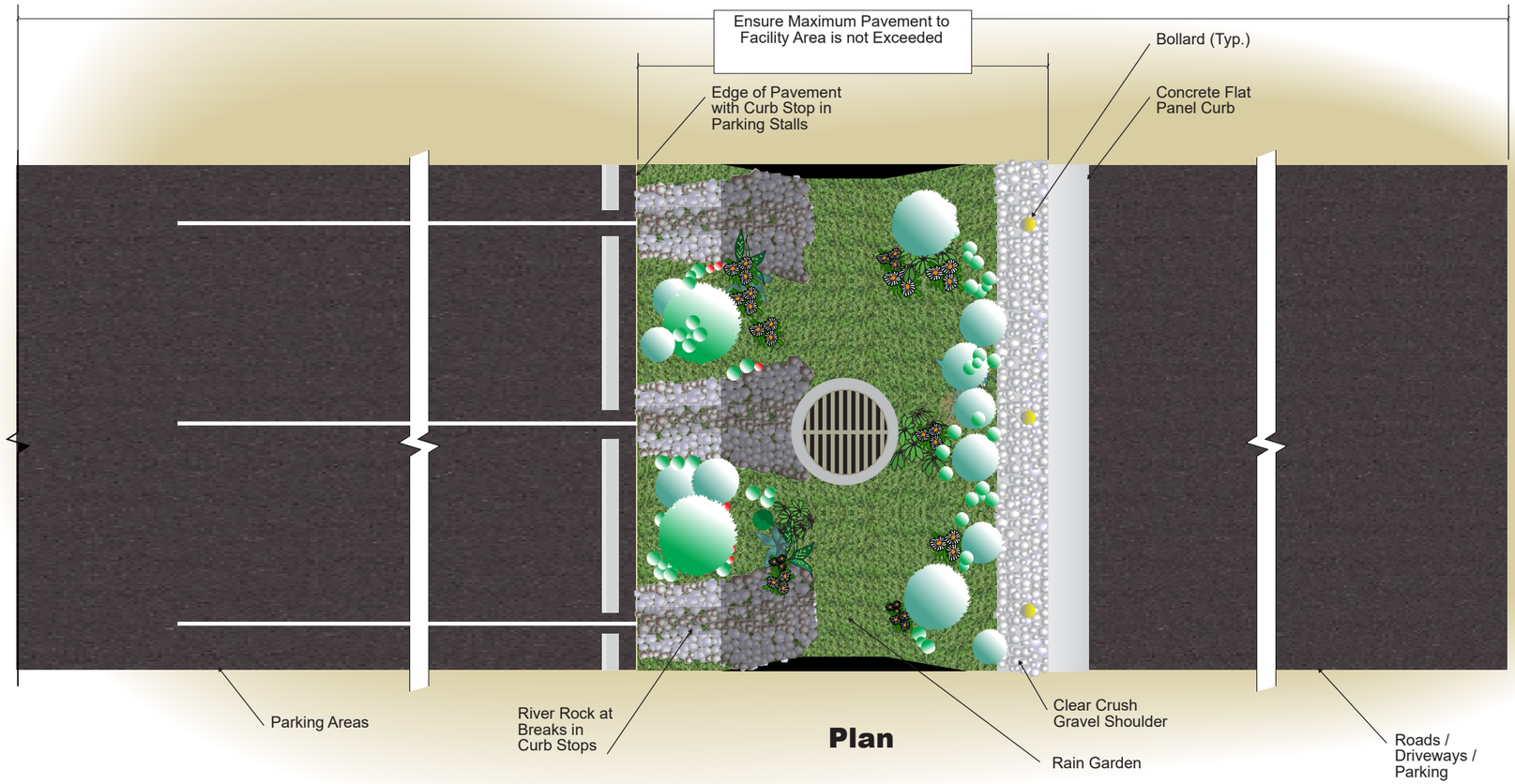
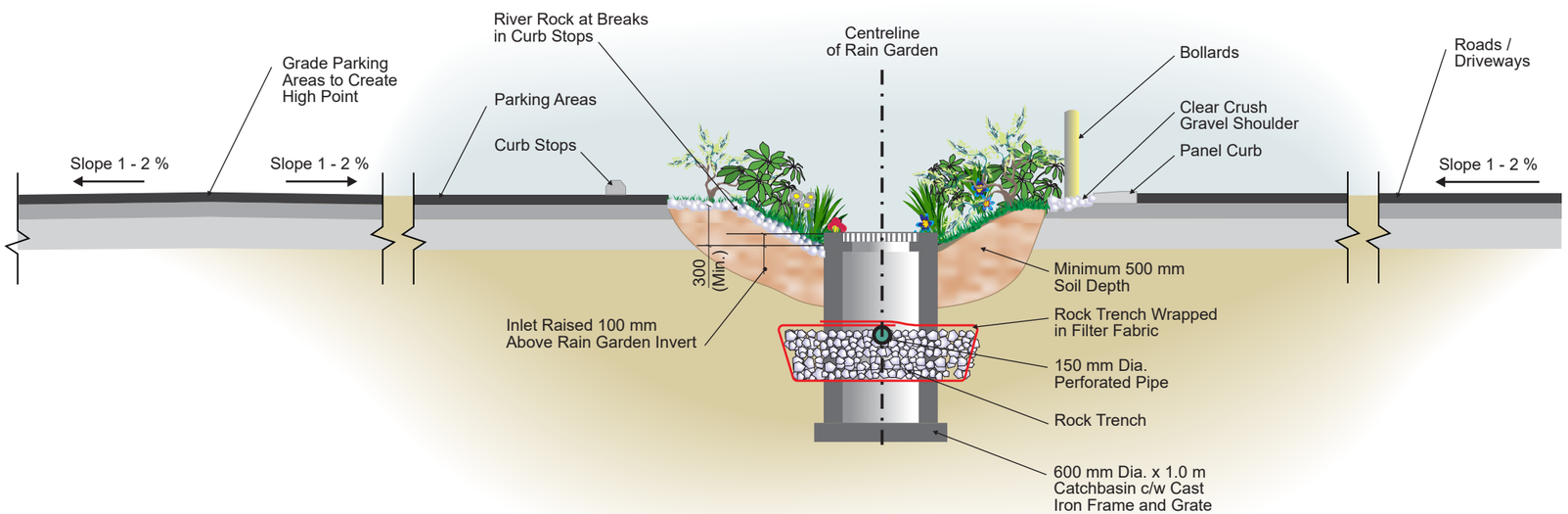
SCHEDULE “K”

SOURCE CONTROL FIGURES

Type 1: Parking Lot Bio-Filtration Facility ..... Figure 1
Type 2: Parking Lot Bio-Filtration Facility ..... Figure 2
Type 3: Parking Lot Bio-Retention Facility..... Figure 3
Type 3: Roof Runoff Retention Facility ..... Figure 4



Plan



Section

510-048 \ 500-Drawings \ 510048Fig1.CDR

City of Abbotsford
Development Bylaw

Notes:

1. Rain garden bottom must be a minimum of 0.5 m wide, and minimum 0.3 m deep.
2. Rain gardens shall have 2:1 side slopes.
3. Rain gardens shall not have more than 15:1 impervious surface area to rain garden area ratio draining to them.
4. Space catchbasins or headwalls 100 m apart. (Max.)
5. Rain gardens are sized to treat 6-month 24-hour rainfall and rock trenches are sized to hold and infiltrate 100-year 24-hour rainfall.
6. Lot grading to provide a failsafe major flow route towards municipal major drainage system.

FOR GOOD INFILTRATION AREAS

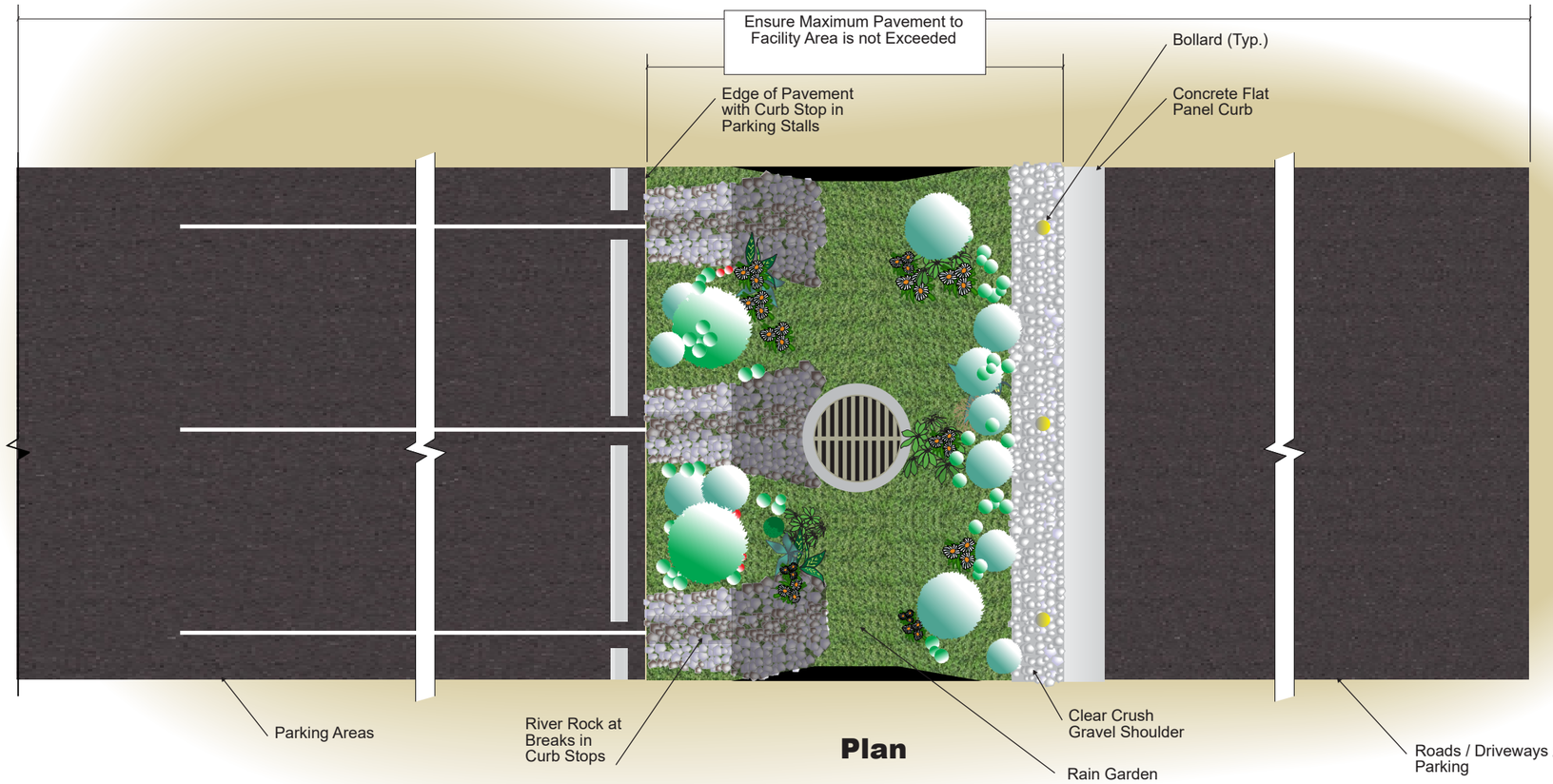
KERR WOOD LEIDAL associates limited
CONSULTING ENGINEERS

Not to Scale
Dimensions in (mm)

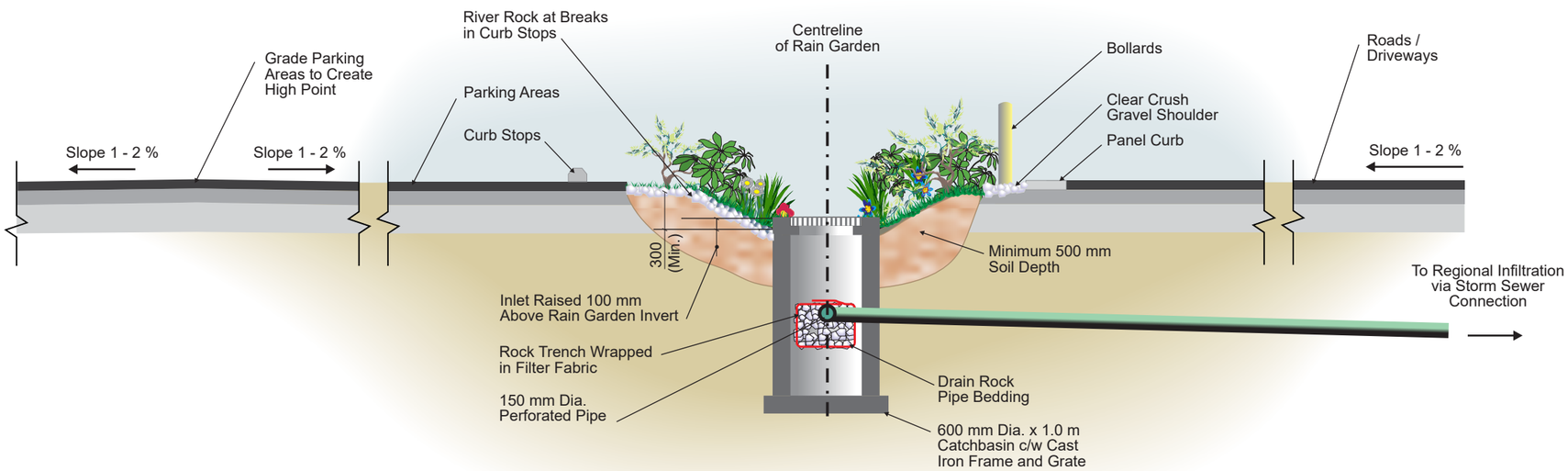
Project No.	Date
510-048	September 2010

Type 1: Parking Lot Bio-Infiltration Facility

Figure 1



Plan



Section

510-048 \ 500-Drawings \ 510048Fig2.CDR

City of Abbotsford
Development Bylaw

Notes:

1. Rain garden bottom must be a minimum of 0.5 m wide, and minimum 0.3 m deep.
2. Rain gardens shall have 2:1 side slopes.
3. Rain gardens shall not have more than 15:1 impervious surface area to rain garden area ratio draining to them.
4. Space catchbasins or headwalls 100 m apart. (Max.)
5. Rain gardens are sized to treat 6-month 24-hour rainfall and rock trenches are sized to hold and infiltrate 100-year 24-hour rainfall.
6. Lot grading to provide a failsafe major flow route towards municipal major drainage system.

FOR GOOD INFILTRATION AREAS

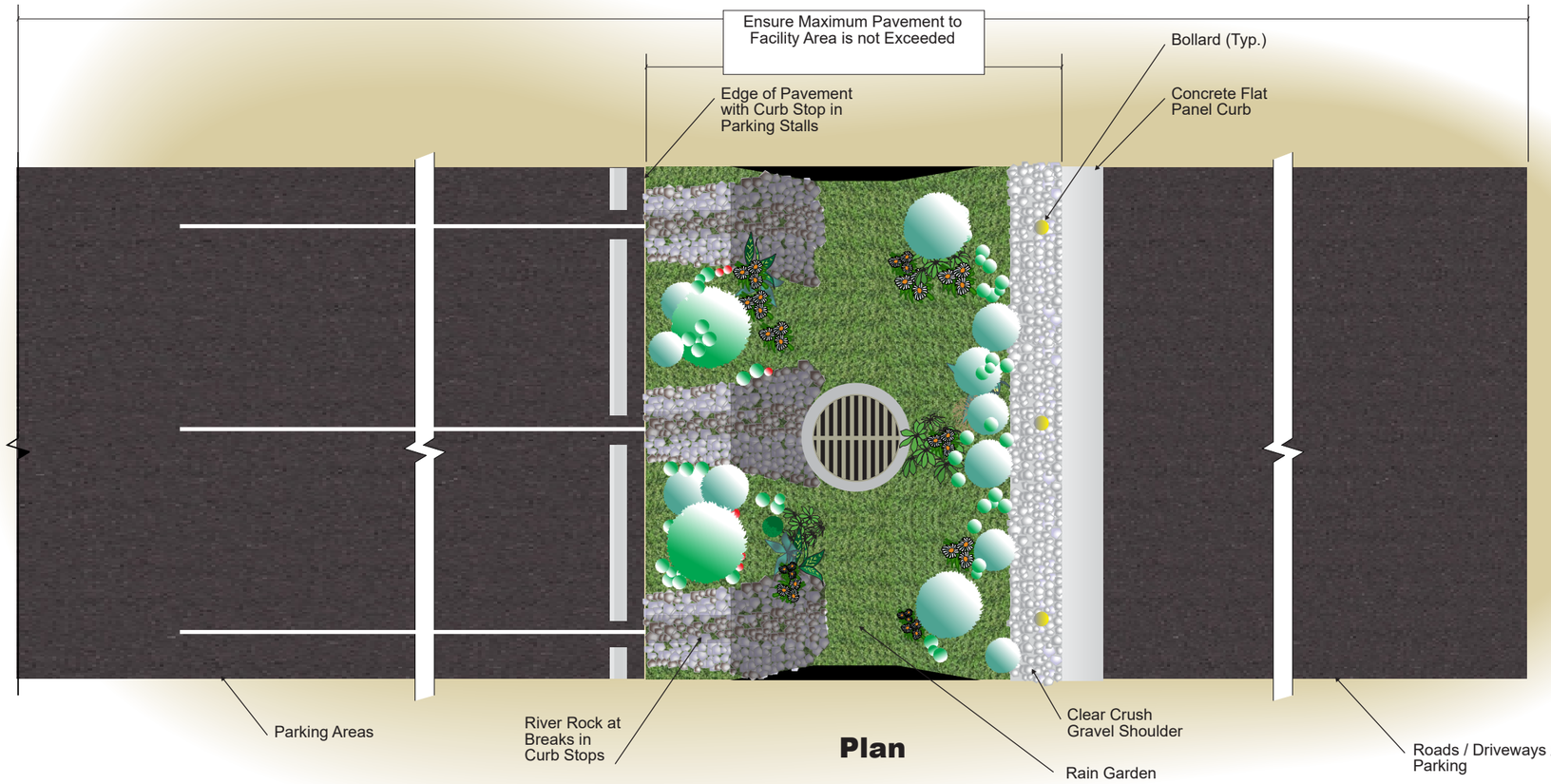
KERR WOOD LEIDAL associates limited
CONSULTING ENGINEERS

Not to Scale
Dimensions in (mm)

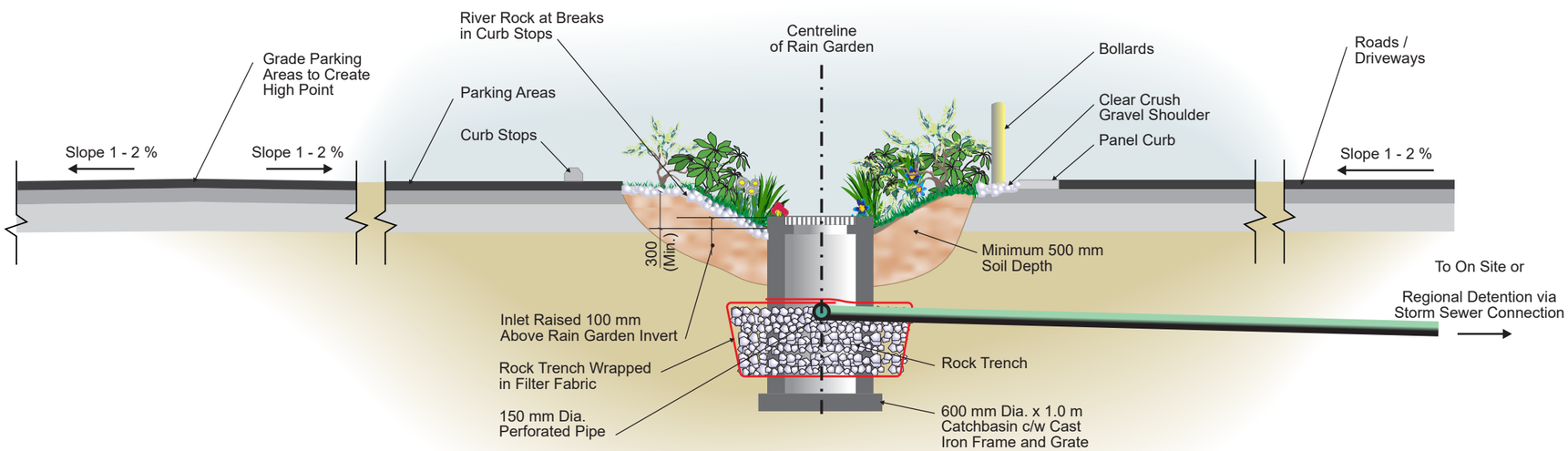
Project No.	Date
510-048	September 2010

Type 2: Parking Lot Bio-Filtration Facility

Figure 2



Plan



Section

City of Abbotsford
Development Bylaw

Notes:

1. Rain garden bottom must be a minimum of 0.5 m wide, and minimum 0.3 m deep.
2. Rain gardens shall have 2:1 side slopes.
3. Rain gardens shall not have more than 15:1 impervious surface area to rain garden area ratio draining to them.
4. Space catchbasins or headwalls 100 m apart. (Max.)
5. Rain gardens and rock trenches are sized to treat and capture 6-month 24-hour rainfall. Runoff from larger events to overflow to storm sewer and be conveyed to regional facilities.
6. Lot grading to provide a failsafe major flow route towards municipal major drainage system.

FOR GOOD INFILTRATION AREAS

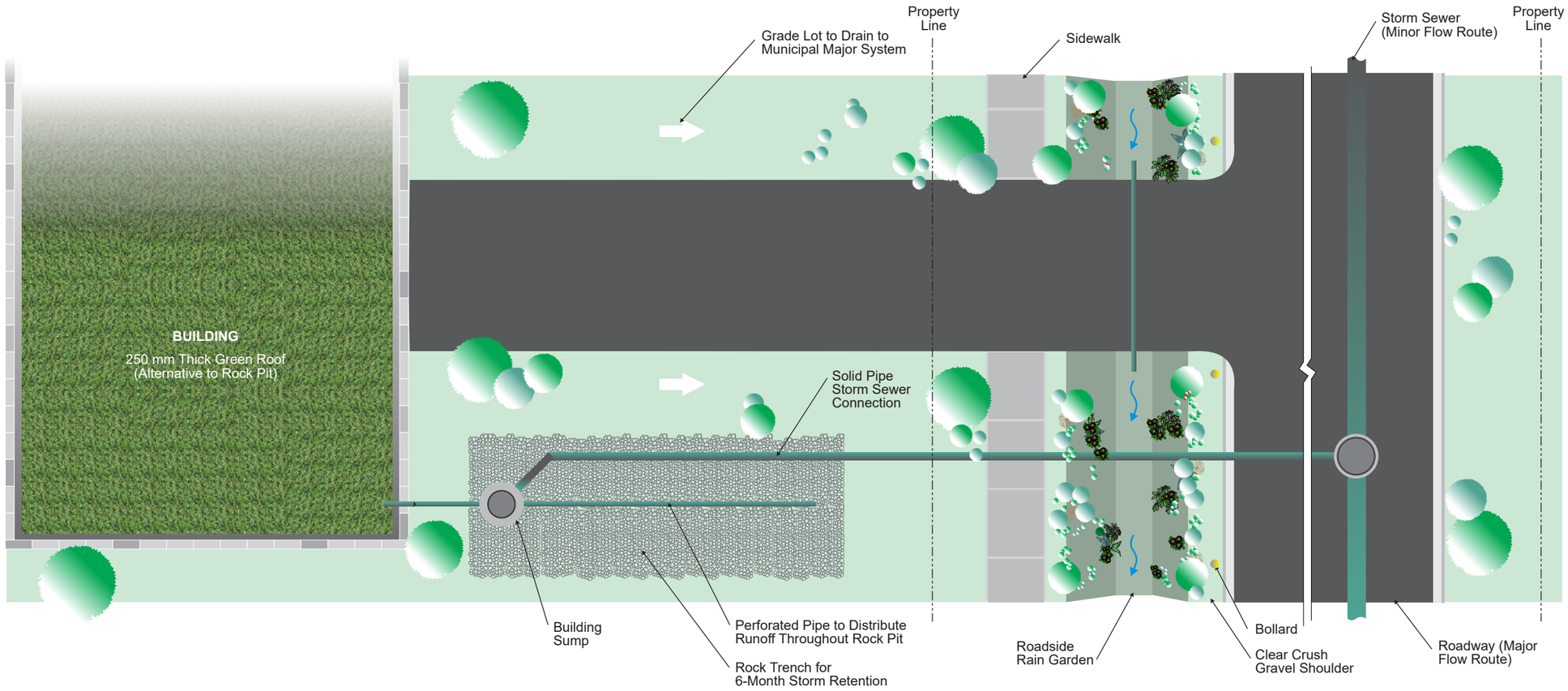
KERR WOOD LEIDAL associates limited
CONSULTING ENGINEERS

Not to Scale
Dimensions in (mm)

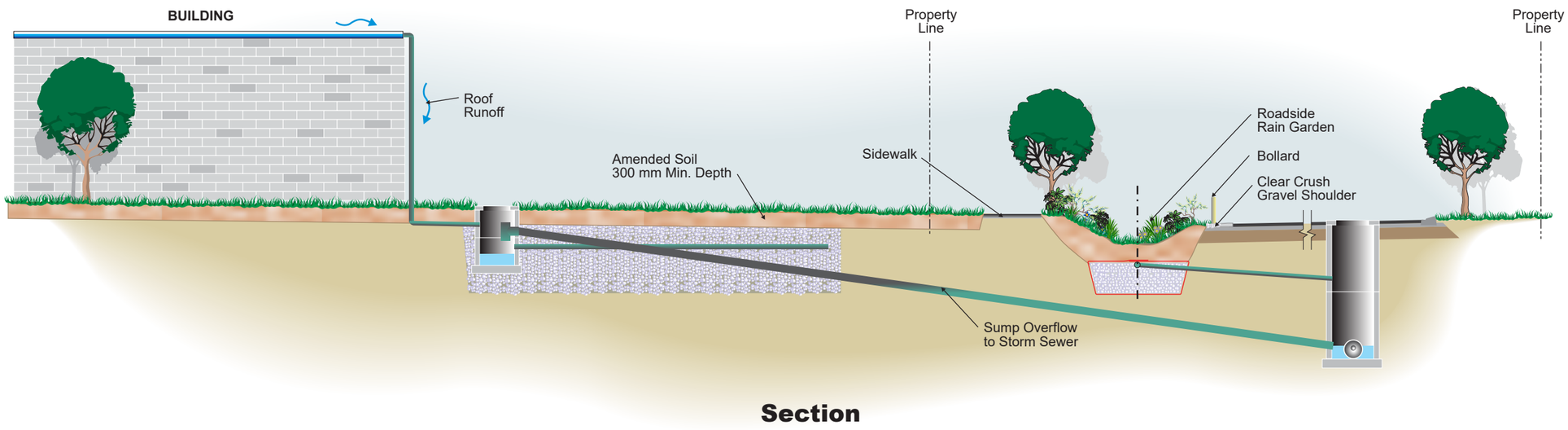
Project No.	Date
510-048	September 2010

Type 3: Parking Lot Bio-Retention Facility

Figure 3



Plan



Section

510-048 \ 500-Drawings \ 510048Fig4.CDR

City of Abbotsford
Development Bylaw

Notes:

1. Roof should be flat, and covered with pea gravel with raised outlets to promote shallow ponding and dust settling. If roofs are not covered with pea gravel, roof runoff must be discharged through a sump prior to infiltration.
2. Amended soils to be placed in all pervious areas (300 mm minimum depth).
3. Rock pit to be located at low point on lot and sized to capture 6-month 24-hour rainfall. Alternatively, a 250 mm thick green roof can be added to building to capture and treat the 6-month 24-hour event.
4. Connect roof runoff in excess of 6-month flows to municipal storm sewer via building sump overflow or onsite detention system.

Green Roof **OR**
Retention Facility

KERR WOOD LEIDAL
associates limited
CONSULTING ENGINEERS

Not to Scale
Dimensions in (mm)

Project No.	Date
510-048	September 2010

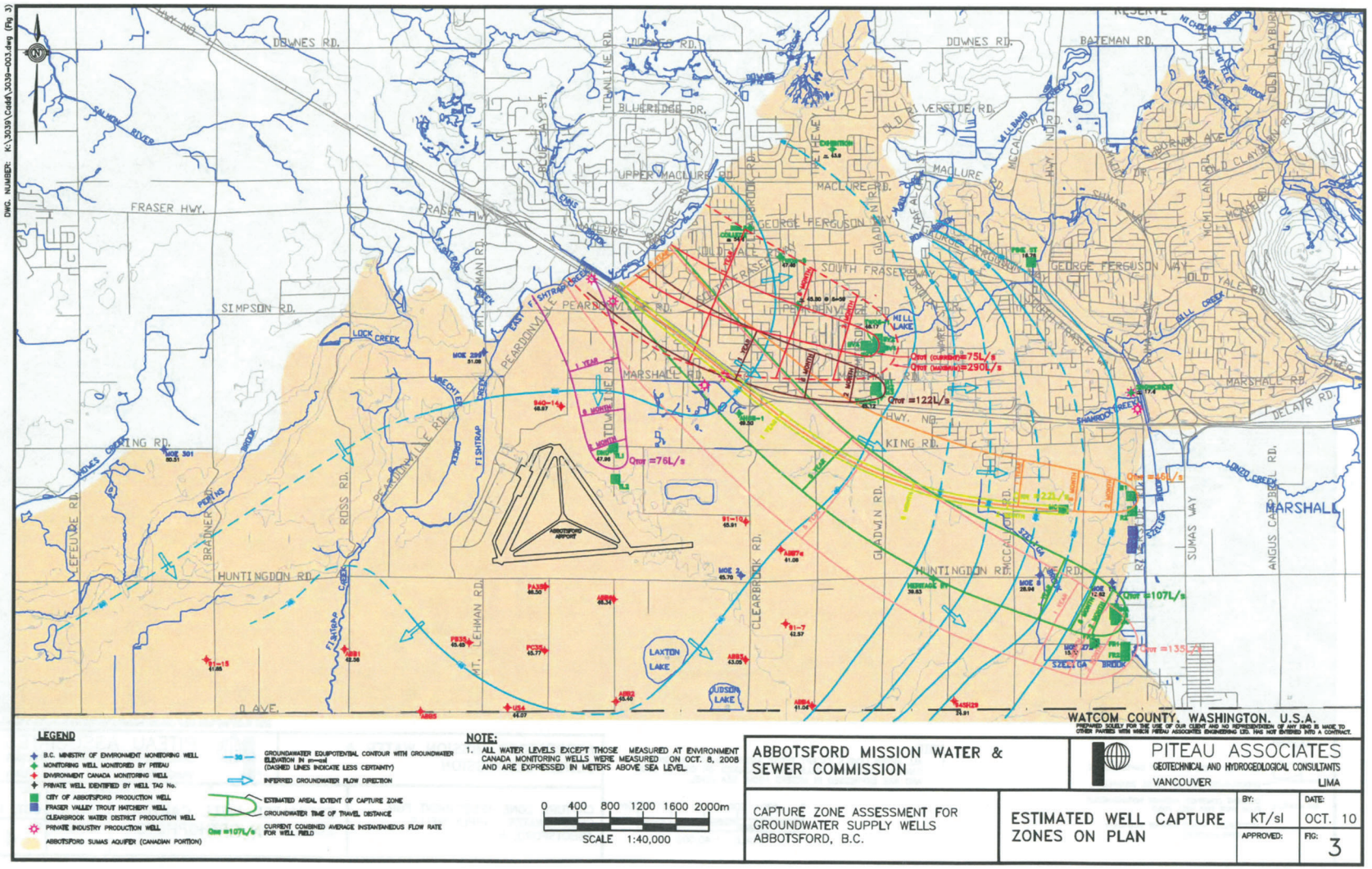
Type 3:
Roof Runoff
Retention Facility

Figure 4

SCHEDULE “L”

150-DAY WELL HEAD CAPTURE ZONES

Capture Zone Assessment for Groundwater Supply Wells (Piteau Associates – Figure 3) – Estimated Well Capture Zones on Plan



LEGEND

- B.C. MINISTRY OF ENVIRONMENT MONITORING WELL
- MONITORING WELL MONITORED BY PITEAU
- ENVIRONMENT CANADA MONITORING WELL
- PRIVATE WELL IDENTIFIED BY WELL TAG No.
- CITY OF ABBOTSFORD PRODUCTION WELL
- FRASER VALLEY TROUT HATCHERY WELL
- CLEARBROOK WATER DISTRICT PRODUCTION WELL
- PRIVATE INDUSTRY PRODUCTION WELL
- ABBOTSFORD SUMAS AQUIFER (CANADIAN PORTION)
- GROUNDWATER EQUIPOTENTIAL CONTOUR WITH GROUNDWATER ELEVATION IN m=msl (DASHED LINES INDICATE LESS CERTAINTY)
- INFERRED GROUNDWATER FLOW DIRECTION
- ESTIMATED AREAL EXTENT OF CAPTURE ZONE
- GROUNDWATER TIME OF TRAVEL DISTANCE
- Qmax =107L/s — CURRENT COMBINED AVERAGE INSTANTANEOUS FLOW RATE FOR WELL FIELD

NOTE:

1. ALL WATER LEVELS EXCEPT THOSE MEASURED AT ENVIRONMENT CANADA MONITORING WELLS WERE MEASURED ON OCT. 8, 2008 AND ARE EXPRESSED IN METERS ABOVE SEA LEVEL.

0 400 800 1200 1600 2000m

SCALE 1:40,000

ABBOTSFORD MISSION WATER & SEWER COMMISSION

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS
VANCOUVER LIMA

CAPTURE ZONE ASSESSMENT FOR GROUNDWATER SUPPLY WELLS ABBOTSFORD, B.C.

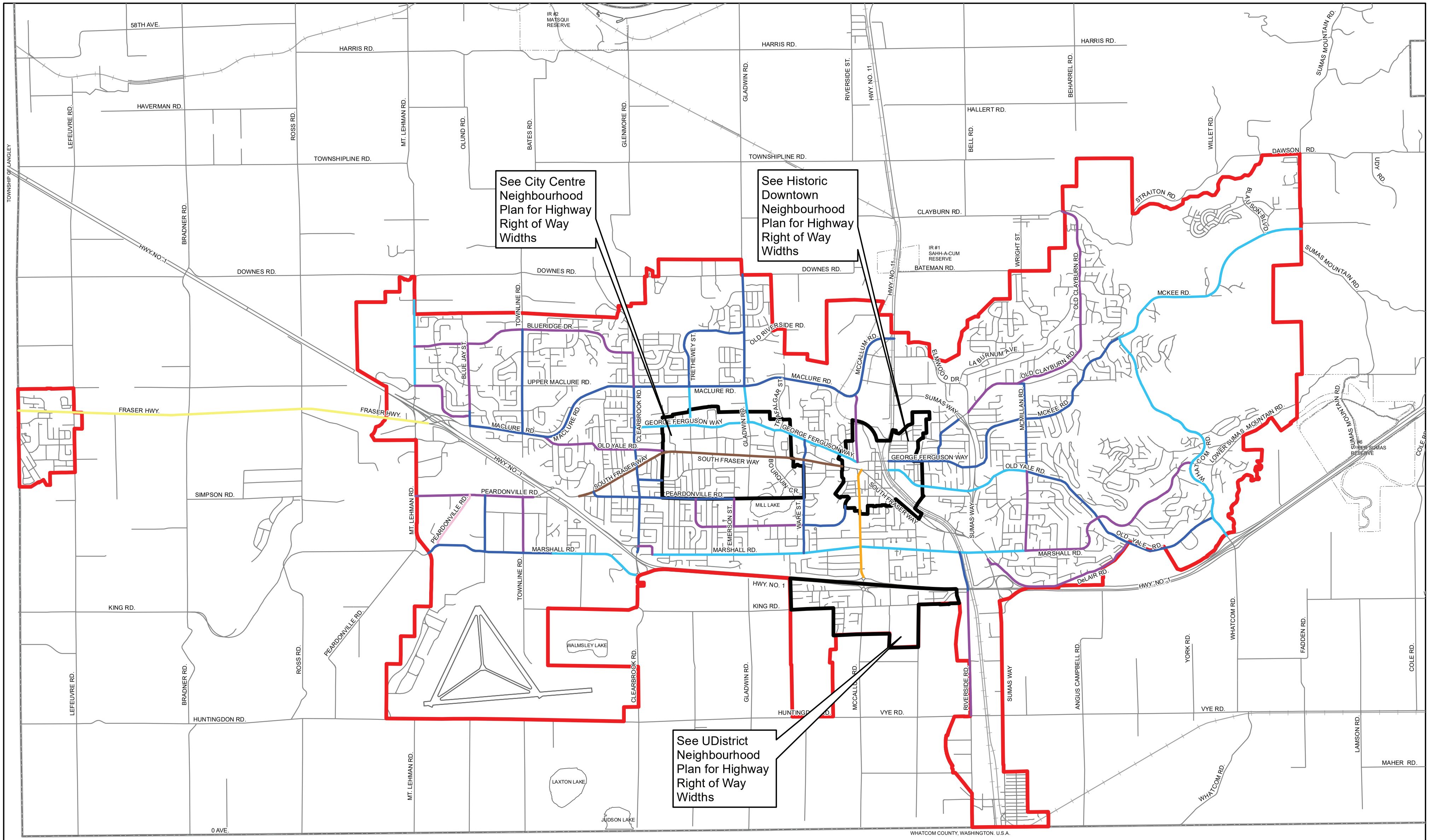
ESTIMATED WELL CAPTURE ZONES ON PLAN

BY:	DATE:
KT/sl	OCT. 10
APPROVED:	FIG: 3

SCHEDULE “M”

HIGHWAY RIGHT OF WAY WIDTH MAP

Highway Right of Way Width Map M-1210



ABBOTSFORD

Highway Right of Way Widths

ROW Width
20m
22.5m
24.5m
27m
30.6m
30m
34m
OCP Neighbourhood Boundaries
Urban Development Boundary

N

M-1210

Scale	Plot Date
1:50,000	5/25/2022

L:\Misc\M1210 - Road ROW Widths\M1210.mxd