

SECTION 01 11 00	GENERAL INSTRUCTIONS	No. of Pages 6
SECTION 01 29 83	PAYMENT FOR LABORATORY SERVICES	No. of Pages 2
SECTION 01 32 16.06	CONSTRUCTION PROJECT SCHEDULE - CRITICAL PATH METHOD	No. of Pages 7
SECTION 01 33 00	SUBMITTAL PROCEDURES	No. of Pages 3
SECTION 01 35 29.06	HEALTH & SAFETY REQUIREMENTS	No. of Pages 4
SECTION 01 35 43	ENVIRONMENTAL PROCEDURES	No. of Pages 8
SECTION 01 45 00	QUALITY CONTROL	No. of Pages 2
SECTION 01 55 26	TRAFFIC CONTROL	No. of Pages 2
SECTION 01 61 00	COMMON PRODUCT REQUIREMENTS	No. of Pages 4
SECTION 31 11 00	CLEARING AND GRUBBING	No. of Pages 3
SECTION 31 14 13	SOIL STRIPPING AND STOCKPILING	No. of Pages 2
SECTION 31 22 13	ROUGH GRADING	No. of Pages 2
SECTION 31 23 16.26	ROCK REMOVAL	No. of Pages 4
SECTION 31 23 33.01	EXCAVATING, TRENCHING & BACKFILLING	No. of Pages 6
SECTION 31 32 19.01	GEOTEXTILES	No. of Pages 3
SECTION 31 37 00	RIP-RAP	No. of Pages 2
SECTION 32 11 16.01	GRANULAR SUB-BASE	No. of Pages 3
SECTION 32 11 23	AGGREGATE BASE COURSES	No. of Pages 2
SECTION 33 42 13	PIPE CULVERTS	No. of Pages 3
SECTION 35 42 19	PRESERVATION OF WETLANDS & WATERCOURSES	No. of Pages 2

APPENDIX A - GEOTECHNICAL REPORT

APPENDIX B - CPA BMP CLEARING AND GRUBBING

LIST OF DRAWINGS

## AINLEY COVER PAGE

DRAWING # 100	LEGEND & ABBREVIATIONS
DRAWING # 101	HORIZONTAL ALIGNMENT
DRAWING # 200	REMOVALS & ENVIRONMENTAL MITIGATION STA 0+000 TO 0+500
DRAWING # 201	REMOVALS & ENVIRONMENTAL MITIGATION STA 0+500 TO 1+012
DRAWING # 202	ENVIRONMENTAL MITIGATION DETAILS
DRAWING # 300	NEW CONSTRUCTION STA 0+000 TO 0+250
DRAWING # 301	NEW CONSTRUCTION STA 0+250 TO 0+500
DRAWING # 302	NEW CONSTRUCTION STA 0+500 TO 0+750
DRAWING # 303	NEW CONSTRUCTION STA 0+750 TO 1+012
DRAWING # 400	TYPICAL SECTIONS
DRAWING # 401	DETAILS
DRAWING # 500	CROSS SECTIONS
DRAWING # 501	CROSS SECTIONS
DRAWING # 502	CROSS SECTIONS
DRAWING # 503	CROSS SECTIONS
DRAWING # 504	CROSS SECTIONS
DRAWING # 505	CROSS SECTIONS
DRAWING # 506	CROSS SECTIONS
DRAWING # 507	CROSS SECTIONS

**R.076951.170**

**PCA.TSW.HALIBURTON**

**TABLE OF CONTENTS**

**SECTION 00 01 10**

**LITTLE BROS.LAKE**

**PAGE 2**

**DAM ACCESS ROAD**

**2019-07-23**

DRAWING # 508

CROSS SECTIONS

DRAWING # 509

CROSS SECTIONS

DRAWING # 510

CROSS SECTIONS

DRAWING # 511

CROSS SECTIONS

DRAWING # 512

CROSS SECTIONS

**END OF SECTION**

**1 GENERAL****1.01 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises the construction of a new 1.12km single lane 2 way gravel access road to Little Brother Lake (Mud Lake) Dam, located within the Trent-Severn Waterways watershed in the Haliburton region. The land, existing access road/trail, dam are owned and operated by the Ontario Waterways Unit of the Parks Canada Agency. The site is located in the Township of Algonquin Highlands. Road will be owned and maintained by PCA. To be used for both heavy construction vehicle access to dam site and for periodic access by TSW Operations and Maintenance team
- .2 Work includes, environmental procedures, installing a temporary dewatering system (cofferdam) and dewatering of low lying areas where water has accumulated clearing and grubbing, soil stripping, rough grading, rock removal, excavating trenching and backfilling, geotextiles, rip-rap, granular sub-base and base, pipe culverts and complete general clean-up to the satisfaction of the Departmental Representative.

**1.02 CONTRACT METHOD**

- .1 Construct Work under a unit price and balance of project construction contract.

**1.03 ACCESS TO THE SITE**

- .1 The site is accessed from County Road 13 via Little Hawk Road in the. The Civic address is 1169.
- .2 For the portion of the access by public roads, make all arrangements, obtain any required permits and confine activities to such routes and load limits as the authorities having jurisdiction may require.
- .3 Secure the work area and equipment in an approved manner and prevent public access to any areas where construction activities occur and construction material is stored.
- .4 Restore the access and work areas to the original condition upon completion of the work as approved by Departmental Representative, at the contractor's expense, except where noted otherwise.

**1.04 TIME OF COMPLETION**

- .1 Commence work in accordance with notification of acceptance of offer and complete the work within the dates outlined in the contract. Refer to Contract documents for additional information.

**1.05 WORK BY OTHERS**

- .1 Parks Canada Agency has previously completed some of the close-cut clearing.

**1.06 WORK SEQUENCE**

- .1 Construct Work in stages to accommodate Owner's intermittent use of premises during construction.

**1.07 CONTRACTOR USE OF PREMISES**

- .1 Unrestricted use of site until Substantial Performance.

## 1.08 EXISTING SERVICES

- .1 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing. No known services were identified for the geotechnical drilling request for locates.

## 1.09 MINIMUM STANDARDS

- .1 Materials shall be new and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, ASTM, applicable Provincial and Municipal codes, and all other national and international standards. In the case of conflict or discrepancy the most stringent requirement shall apply.

## 1.10 ABBREVIATIONS

- .1 Abbreviations used are:
  - .1 ASTM - American Society for Testing and Materials.
  - .2 ACI - American Concrete Institute.
  - .3 ANSI - American National Standards Institute.
  - .4 CSA - Canadian Standards Association.
  - .5 CWB - Canadian Welding Bureau.
  - .6 CPM - Critical Path Method.
  - .7 CGSB - Canadian General Standards Board.
  - .8 CAN2, CAN3 - national standards of Canada published by CGSB.
  - .9 GC - General Conditions.
  - .10 MNR - Ministry of Natural Resources
  - .11 MOE - Ministry of the Environment.
  - .12 OPSS - Ontario Provincial Standard Specifications
  - .13 PCA - Parks Canada Agency.
  - .14 PWGSC - Public Works and Government Services Canada.
  - .15 TSW - Trent Severn Waterway
  - .16 MTO - Ministry of Transportation of Ontario

## 1.11 DEFINITIONS

- .1 Unless the context clearly indicates otherwise, the following definitions apply:
  - .1 Waterway - the Trent Severn Waterway.
  - .2 Plans and/or Specifications:
- .2 Plans - the drawings listed in the "List of Drawings".
- .3 Specification - the subject matter listed in the "Table of Contents", addenda to the specification, and all relative written communications sent by the Departmental Representative to the Contractor in connection with the work.



**1.12 EXAMINATIONS**

- .1 Examine site conditions likely to affect work and be familiar and conversant with existing conditions.
- .2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.

**1.13 CLEAN UP**

- .1 Clean and tidy the premises on a daily basis, do not permit the accumulation of debris, trash and/or garbage.
- .2 Rubbish, debris and garbage from all construction activities is to be removed off site on a weekly basis.
- .3 At the completion of the work remove all surplus materials, tools, plant, rubbish and debris and dispose of them in an approved manner off PCA property.
- .4 Clean-up work area as work progresses. At the end of each work period, and more often if ordered by the Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.
- .5 Upon completion remove temporary protection and surplus materials. Make good defects noted at this stage.
- .6 Clean areas under contract to a condition at least equal to that previously existing and to approval of Departmental Representative.

**1.14 TAXES**

- .1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

**1.15 FEES PERMITS & CERTIFICATES**

- .1 Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

**1.16 FIELD QUALITY CONTROL**

- .1 Carry out Work using qualified licensed workers or apprentices in accordance with Provincial Act respecting manpower, vocational training and qualification.
- .2 Permit employees registered in the Ontario apprenticeship program to perform specific tasks only if under direct supervision of qualified licensed workers.
- .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

**1.17 HAZARDOUS MATERIALS**

- .1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources Development Canada, Labour Program.

### 1.18 TEMPORARY UTILITIES

- .1 Provide telephone, power and water to fulfill the requirements of construction.

### 1.19 REMOVED MATERIALS

- .1 Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from site.

### 1.20 PROTECTION

- .1 Protect finished work against damage until take-over.
- .2 Protect the work from damage by flooding and/or other adverse climatic conditions during construction.
- .3 Protect against the spread of dust and dirt beyond the work areas.
- .4 Protect operatives and other users of site from all hazards.

### 1.21 MAKE GOOD

- .1 Repair, replace and refinish, to the Departmental Representative's approval, existing surfaces and items damaged in connection with the work, at the contractor's expense.
- .2 The repaired, replaced and refinished items to be at least equal to those that existed immediately before damage occurred.

### 1.22 SIGNS AND SAFETY DEVICES

- .1 Provide common-use signs and safety devices related to traffic control, information, instruction, use of equipment, public safety devices, etc., or by the use of commonly-understood graphic symbols to the Departmental Representative's approval.
- .2 No advertising will be permitted on this project.

### 1.23 TEMPORARY FACILITIES

- .1 Provide and maintain suitable storage facilities, of type and location approved by the Departmental Representative.
- .2 Observe and enforce all construction safety measures required by authorities having jurisdiction.
- .3 Provide and maintain all necessary enclosures, guards, guardrails, hoardings, barricades, warning signs and similar items.
- .4 Provide sufficient chemical toilet conveniences in a sanitary condition for use of all persons at the site in a location approved by the Departmental Representative.
- .5 Protect the work and storage area from public access at all times.

### 1.24 CONTRACT DOCUMENTS

- .1 Drawings and specifications are complementary, items shown or mentioned in one and not in the other are deemed to be included in the contract work.
- .2 The Contractor will be responsible for printing/duplicating any required drawings or specifications for:
  - .1 Suppliers;

- .2 Sub-contractors;
- .3 On-Site drawings & specifications;
- .4 Project Record drawings.

#### 1.25 TESTING LABORATORY SERVICES

- .1 The Departmental Representative will appoint and pay for costs of inspection and testing services.
- .2 Provide safe working areas and assist with testing procedures, including provisions for materials or services and co-ordination, as required by testing agency and as authorized by Departmental Representative.

#### 1.26 LAY OUT OF THE WORK

- .1 The Contractor will be responsible for all layout and control survey work, and checking plan dimensions against field measurements.
- .2 Lay out the work according to the elevations and dimensions shown on the plans and verified in the field, or determined in the field.
- .3 Notify the Departmental Representative immediately of any discrepancies between field measurements and dimensions shown on the plans.
- .4 Be responsible for rectification of errors resulting from failure to verify dimensions, elevations and other pertinent data shown on the plans.

#### 1.27 COST BREAKDOWN

- .1 Before submitting first progress claim submit breakdown of Contract Amount in detail as directed by Departmental Representative and aggregating the Contract Amount. After approval by Departmental Representative cost breakdown will be used as the basis for payment.

#### 1.28 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Notice of Project
  - .12 Other documents as specified.

R.076951.170

PCA.TSW.HALIBURTON

GENERAL INSTRUCTIONS

SECTION 01 11 00

LITTLE BROS.LAKE

PAGE 6

DAM ACCESS ROAD

2019-07-23

## 2 PRODUCTS

### 2.01 NOT USED

- .1 Not used.

## 3 EXECUTION

### 3.01 CONSTRAINTS

- .1 Bird Nesting. During the period April 15<sup>th</sup> to August 15th tree clearing will not be permitted.
- .2 Blasting. The contractor shall provide a blasting plan a minimum of two (2) weeks prior to activity and once accepted shall inform the Departmental Representative at least one (1) week prior to scheduled blasting.
- .3 Erosion Protection. The contractor shall apply erosion protection measures to grubbed and stripped areas exposed longer than one (1) week.

END OF SECTION

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 45 00 Quality Control.

Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under section 01 45 00.

### **1.02 APPOINTMENT AND PAYMENT**

- .1 Departmental Representative will appoint and pay for services of testing laboratory except as follows:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.

Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

### **1.03 CONTRACTOR'S RESPONSIBILITIES**

- .1 Provide labour, equipment and facilities to:
- .2 Provide access to Work for inspection and testing.
- .3 Facilitate inspections and tests.
- .4 Make good Work disturbed by inspection and test.
- .5 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Departmental Representative at minimum 48 hours sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested and testing is not being done on site, deliver representative samples in required quantity to testing laboratory.

Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

## **3 EXECUTION**

### **3.01 NOT USED**

- .1 Not Used.

R.076951.170

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PAYMENT PROCEDURES FOR TESTING LABORATORY SERVICES

PCA.TSW.HALIBURTON

SECTION 01 29 83

LITTLE BROS.LAKE

PAGE 2

DAM ACCESS ROAD

2019-07-23

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END OF SECTION

## 1 GENERAL

### 1.01 REFERENCE STANDARDS

- .1 Project Management Institute (PMI Standards)

A Guide to the Project Management Body of Knowledge (PMBOK Guide), Practice Standard for Scheduling.

### 1.02 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.
- .3 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.
- .4 Cash Flow: projection of progress payment requests based on cash loaded construction schedule.
- .5 Completion Milestones: they are firstly Substantial Completion and secondly Final Certificate.
- .6 Constraint: applicable restriction or limitation, either internal or external to project, that will affect performance of Project. Factors that affect activities can be scheduled.
- .7 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.
- .8 Critical Activity: any activity on a critical path.
- .1 Most commonly determined by using critical path method.
- .9 Critical Path: sequence of activities that determines duration of Project. Generally, it is the longest path through Project.
- .1 Usually defined as those activities with float less than or equal to specified value, often zero.
- .10 Critical Path Method (CPM): network analysis technique used to determine the amount of scheduling flexibility (amount of float) on various logical network paths in Project schedule network, and to determine the minimum total Project duration.
- .11 Data Date: date through which project status and progress were last determined and reported for analyses, such as scheduling and performance measurements.
- .12 Duration: total number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element.
- .1 Usually expressed as workdays or work weeks.
- .13 Early Finish Date: in critical path method, earliest possible point in

time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints.

- .1 Early finish dates can change as Project progresses and changes are made to Project plan.
- .14 Early Start Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints.
  - .1 Early start dates can change as Project progresses and changes are made to Project Plan.
- .15 Finish Date: point in time associated with activity's completion.
  - .1 Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.
- .16 Float: amount of time that activity may be delayed from its early start without delaying Project finish date.
  - .1 This resource is available to both [PWGSC] and Contractor.
- .17 Impact Analysis: schedule analysis technique that adds a modeled delay to an accepted construction schedule to determined possible outcome of that delay on project completion.
- .18 Lag: modification of logical relationship that directs delay in successor activity.
- .19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).
- .20 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).
- .21 Lead: modification of logical relationship that allows acceleration of successor task.
- .22 Logic Diagram: see Project network diagram.
- .23 Master Schedule: summary-level schedule that identifies major deliverable; work breakdowns structure and key milestones.
- .24 Milestone: significant point or event in Project, usually completion of major deliverable.
- .25 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.
- .26 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.
- .27 Project Control System: fully computerized system utilizing commercially available software packages.
- .28 Project Network Diagram: schematic display of logical relationships of Project activities.
  - .1 Always drawn from left to right to reflect Project chronology.
- .29 Project Plan: formal, approved document used to guide both Project



execution and Project control.

- .1 Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines.
- .2 Project plan may be summary or detailed.
- .30 Project Planning: development and maintenance of Project Plan.
- .31 Project Planning, Monitoring and Control System: overall system operated to enable monitoring of Project Work in relation to established milestones.
- .32 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.
- .33 Quantified days duration: working days based on 5 day work week, discounting statutory holidays.
- .34 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
- .35 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.

Work Breakdown Structure (WBS): deliverable-oriented hierarchical decomposition of Work to be executed by contractor to accomplish project objectives and create required deliverables. It organizes and defines total scope of Project. Each descending level represents an increasingly detailed definition of Project Work. WBS is decomposed into Work packages.

### 1.03 ADMINISTRATIVE REQUIREMENTS

- .1 Project Meeting:
  - .1 Meet with Departmental Representative within 5 working days of Award of Contract date, to establish Work requirements and approach to project construction operations.
  - .2 Participate in regular project progress meetings with Departmental Representative specifically intended to discuss update of detailed schedule and contract changes.
- .2 Scheduling:
  - .1 Planning: ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.
  - .2 Ensure project schedule efficiencies through monitoring of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
  - .3 Monitor sufficiently often so that causes of delays can immediately be identified and removed.
  - .4 Limit activity durations to maximum of ten (10) working days to

allow for progress reporting.

.3 Project monitoring and reporting:

- .1 Keep team aware of changes to schedule, and possible consequences as project progresses.
- .2 Use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.
- .3 Begin narrative reporting with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

.4 Critical Path Method (CPM) Requirements:

- .1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.
- .2 Revise Master Schedule and Detail Schedule deemed impractical by Departmental Representative and resubmit for approval.
- .3 Change to Contract Duration:
  - .1 Acceptance of Master Schedule and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract.
  - .2 Duration of Contract may only be changed through bilateral Agreement.
- .4 Consider Master Schedule and Detail Schedule deemed practical by Departmental Representative showing Work completed in less than specified Contract duration, to have float.
- .5 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated.
  - .1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.
- .6 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.
  - .1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.
- .7 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
- .8 Allow for the obtaining of Regulatory permits and other agency approvals

#### 1.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within five (5) working days of award Project Control System for planning, scheduling, monitoring and reporting of project progress.

Include costs for execution, preparation and reproduction of schedule submittals in bid documents.

### 1.05 QUALITY ASSURANCE

Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate.

### 1.06 WORK BREAKDOWN STRUCTURE (WBS)

- .1 Prepare construction Work Breakdown Structure (WBS) within five (5) working days of Award of Contract date. Develop WBS through at least five levels: project, stage, element, sub-element and work package.

### 1.07 DETAIL SCHEDULE

- .1 Provide detailed project schedule (CPM logic diagram) within five (5) working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities but not limited to:
  - .1 Shop drawings.
  - .2 Samples.
  - .3 Approvals.
  - .4 Site works.
  - .5 Acceptance.
  - .6 Submission of Site Specific Health & Safety Plan.
  - .7 Submission of Site Specific Environmental Plan (EMP)
    - .1 Contractor will not be permitted to mobilize on-site until EMP has been approved and accepted by Departmental Representative. Allow five days for review by departmental representative.
  - .8 Submission of Site Layout Plan.
  - .9 Bi-Weekly Project Meetings.
  - .10 Environmental Management Plan including approval by Parks Canada. Bi-weekly Environmental inspections.
- .2 Clearly show sequence and interdependence of construction activities and indicate:
  - .1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
- .3 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.
- .4 The contractors schedule shall include float for reasonable weather delays.
- .5 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form

"Critical Path". Increased number of critical activities is seen as indication of increased risk.

The contractors schedule shall include float for reasonable weather delays. Reasonable weather delays will be defined as the previous 10 year average.

#### 1.08 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE

- .1 Prior to commencement of work allow five (5) work days for review by Departmental Representative of proposed construction Detail Schedule.
- .2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within five (5) work days.
- .3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.
- .4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

#### 1.09 COMPLIANCE WITH DETAIL SCHEDULE

- .1 Comply with reviewed Detail Schedule.
- .2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after written receipt of approval by Departmental Representative.
- .3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
  - .1 Corrective measures may include:
    - .1 Increase of personnel on site for effected activities or work package.
    - .2 Increase in materials and equipment.
- .4 Submit to Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:
  - .1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.
  - .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.
  - .3 Other supporting evidence requested by Departmental Representative.
  - .4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.
- .5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full

without jeopardizing earned float.

- .1 Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.

Construction delays affecting project schedule will not constitute justification for extension of contract completion date.

## 1.10 PROGRESS MONITORING AND REPORTING

- .1 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
- .2 Perform Detail Schedule update monthly with status dated on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.
- .3 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
- .4 Submit to Departmental Representative copies of updated Detail Schedule.
- .5 Requirements for monthly progress monitoring and reporting are basis for progress payment request.
- .6 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
  - .1 Description of progress made.
  - .2 Pending items.
  - .3 Status of Contract completion date and milestones.
  - .4 Current and anticipated problem areas, potential delays and corrective measures.
  - .5 Weather Delays.

Review of progress and status of Critical Path activities.

## 2 PRODUCTS

### 2.01 NOT USED

Not used.

## 3 EXECUTION

### 3.01 NOT USED

- .1 Not used.

END OF SECTION

R.076951.170

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CONSTRUCTION PROGRESS SCHEDULE - CRITICAL PATH METHOD (CPM)	
PCA.TSW.HALIBURTON	SECT 01 32 16.06
LITTLE BROS.LAKE	PAGE 8
DAM ACCESS ROAD	2019-07-23

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**1 GENERAL****1.01 ADMINISTRATIVE**

- .1 This Section specifies general requirements and procedures for Contractor submittal of shop drawings, product data, samples, etc. to the Departmental Representative for review. Additional specific requirements for submittals are also provided in other individual sections of these Specifications.
- .2 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .3 Do not proceed with Work affected by submittal until review is complete.
- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .5 Where items or information is not produced in SI Metric units converted values are acceptable.
- .6 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .7 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8 Verify field measurements and affected adjacent Work are co-ordinated.
- .9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .11 Make any and all changes in submittals which the Departmental Representative may require consistent with the Contract Documents and resubmit as directed by the Departmental Representative.
- .12 Notify the Departmental Representative, in writing, when resubmitting any revisions other than those requested by the Departmental Representative.
- .13 Keep one reviewed copy of each submission on site.

**1.02 PRODUCT DATA**

- .1 Submit 1 electronic copy in PDF format of product data sheets or brochures for requirements requested in specification Sections
- .2 Submit 1 electronic copy in PDF format of sieve analysis and test reports for requirements requested in specification Sections.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within 1 year of date of contract award for

project.

- .3 Submit 1 electronic copy of manufacturer's instructions for requirements requested in specification Sections.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .4 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, 1 copy will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .5 The review of shop drawings is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.
  - .3 Allow five working days for Departmental Representative's review of each submission.
  - .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
  - .5 Submittals shall include:
    - .1 Date and revision dates.
    - .2 Project title and number.
    - .3 Name and address of:
      - .1 Subcontractor.
      - .2 Supplier.
      - .3 Manufacturer.

### 1.03 SAMPLES

- .1 Submit for review samples in as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to the job site.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.



- 
- .5 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

#### 1.04 SUBMISSIONS

- .1 Submit product data sheets for culverts, geotextiles and granular sieve analysis.

#### 1.05 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

#### 1.06 FEES, PERMITS AND CERTIFICATIONS

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay all fees and obtain all certificates and permits required.
- .3 Furnish certificates and permits.

END OF SECTION

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

Section 01 33 00 Submittal Procedures.

### **1.02 REFERENCE STANDARDS**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 WHMIS 2015.
- .3 Province of Ontario
  - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended, National Fire Code of Canada (NFC) 2010 and O. Reg. 213/91 as amended.
- .4 Workplace Safety and Insurance Act 1997.

### **1.03 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 5 Business days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operations found in work plan.
  - .3 Measures and controls to be implemented to control risks.
- .3 Contractor's and Sub-contractors' Safety Communication Plan.
- .4 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.
- .5 Company Health and Safety Policy.
- .6 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative monthly.
- .7 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .8 Submit copies of incident and accident reports.
- .9 Submit WHMIS MSDS - Material Safety Data Sheets.
- .10 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .11 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

- .12 Submit names of personnel and alternates responsible for site safety and health.
- .13 Submit records of Contractor's Health and Safety meetings weekly.
- .14 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
- .15 Submit Workplace Safety and Insurance Board (WSIB) - Experience Rating Report.

#### **1.04 FILING OF NOTICE**

- .1 File Notice of Project and Notice for Tunnels, Shafts, Caissons, and Cofferdams with Provincial authorities prior to beginning of Work.  
Keep Notice of Project posted on site at all times.

#### **1.05 SAFETY ASSESSMENT**

- .1 Perform site specific safety hazard assessment related to project. Known hazards include:
  - .1 Fall hazard from steep terrain.
  - .2 Slipping hazards on rock terrain when wet.
  - .3 Wild animal interactions.
  - .4 Vehicle traffic on County Road 13.
  - .5 Electrocution (overhead power lines, power tools).
  - .6 Remote Site.
  - .7 Adverse weather
  - .8 Working near heavy machinery.
  - .9 Equipment that will be used on site.
- .2 If the Departmental Representative suspects a defect or accident risk they may at any time order immediate shutdown of equipment and require proof of certification.

#### **1.06 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

#### **1.07 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.
- .3 Complete Parks Canada Attestation and Proof of Compliance with Occupational Health and Safety (OHS) Form.

## **1.08 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

## **1.09 COMPLIANCE REQUIREMENTS**

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

## **1.10 UNFORSEEN HAZARDS**

1. When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

## **1.11 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.
  - .1 Contractor's Safety Policy.
  - .2 Constructor's Name.
  - .3 Notice of Project.
  - .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
  - .5 Ministry of Labour Orders and reports.
  - .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
  - .7 Address and phone number of nearest Ministry of Labour office.
  - .8 Material Safety Data Sheets.
  - .9 Written emergency Response Plan.
  - .10 Site Specific Safety Plan.
  - .11 Valid certificate of first aider on duty.
  - .12 WSIB "In Case of Injury At Work" poster.
  - .13 Location of toilet and cleanup facilities.

.14 Workplace Safety and Insurance Board for Ontario-Regulation 1101.

.15 Ministry of Labour Regulations for the Province of Ontario.

.2 Comply with Provincial general posting requirements.

#### **1.12 CORRECTION OF NON-COMPLIANCE**

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

#### **1.13 BLASTING**

.1 Blasting or other use of explosives is permitted.

.2 Do blasting operations in accordance with Section 31 23 16.26 - Rock Removal.

#### **1.14 POWDER ACTUATED DEVICES**

.1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

#### **1.15 WORK STOPPAGE**

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

.2 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop work for health and safety considerations.

### **2 PRODUCTS**

#### **2.01 NOT USED**

.1 Not used.

### **3 EXECUTION**

#### **3.01 NOT USED**

.1 Not used.

**END OF SECTION**

**1.0 PAYMENT PROCEDURES**

- .1 Measurement for Payment shall be included in the Contractors Balance of Project Tender line item.

**2.1 DESCRIPTION**

- .1 This Section describes the requirements for the protection of the environment that apply to the Work. These requirements apply to all Sections of this Specification, without limiting the conditions and approvals imposed by statute.
- .2 Control Work to provide effective environmental, waterbody, and fish habitat protection. Departmental Representative will monitor environmental protection measures and will identify whenever such protection is found to be ineffective. The Departmental Representative will inform the Parks Canada Environmental Authority of any changes to project plans and/or scheduling.
- .3 The contractor shall convene a pre-construction meeting to identify all concerns/mitigation measures to all staff working on the project, and to ensure that all on-site personnel are aware of, and comply with mitigation measures.

**2.2 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Management Plan (EMP) for review and approval by Departmental Representative. The Environmental Management Plan is to present a comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .3 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .4 Environmental Management Plan to include:
  - .1 Names of persons responsible for ensuring adherence to Environmental Management Plan.
  - .2 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
  - .3 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
  - .4 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
  - .5 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

- .6 Demonstrate procedures for avoiding disturbance/harm to wildlife.
- .7 Upon approval of the Environmental Management Plan, a permit signed by Parks Canada's Ontario Waterways Director will be issued to authorize the project work.
- .6 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
- .7 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .8 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing and clean-up water.

## 2.3 DEFINITIONS

- .1 "Deleterious Material" - any substance that, if added to a waterbody, could degrade water quality or impact fish, fish habitat and aquatic wildlife. This includes, but is not limited to:
  - .1 Concrete dust.
  - .2 Soils (clay, silt, sand).
  - .3 Oil, diesel, or gasoline.
  - .4 Chipped or fresh concrete and admixtures.
  - .5 Alkali water resulting from fresh concrete or cementitious grout.
  - .6 Salt.
  - .7 Solvents.
- .2 "Dripline" - means the location on the ground surface directly beneath a theoretical line described by the tips of the outermost branches of the trees.
- .3 "Barrier" - means fence consisting of approved material, supported by steel posts and being a minimum of 1.8 m high, without breaks or unsupported sections.
- .4 "Environmental Pollution and Damage": presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and /or historically.
- .5 "Environmental Protection": prevention/control of pollution and habitat or environmental disruption during construction.

## 2.4 EXPLOSIVES

- .1 Use of explosives to be completed in accordance with Federal, Provincial, and Municipal laws and regulations for storage, handling, and detonation

of these materials, as well as any additional mitigation measures outlined within this document.

## **2.5 FIRES**

- .1 Do not burn rubbish or light other fires on site.

## **2.6 TURBIDITY AND DRAINAGE WATER CONTROL**

- .1 Prior to commencement of work, install sediment and erosion control measures, such as rock or straw bale flow checks, silt fences, drainage swales, or other methods necessary to prevent silt or sediment from entering the watercourse.
  - .1 Do not pump water directly into the waterway. Send all discharge to a settling pond or filtration area before being released into the waterway.
- .2 Control disposal or runoff of water containing other harmful substances in accordance with local authority requirements.
- .3 Sediment, debris and erosion control measures must be inspected daily to ensure that they are functioning properly and are maintained and upgraded as required.
- .4 If the sediment, debris or erosion control measures are not functioning properly, no further work will be permitted until the sediment/erosion problem has been rectified.
- .5 Minimize changes to the ground surface that affect its infiltration and runoff characteristics.
- .6 Following completion of work, and prior to removal of sediment and erosion control measures all disturbed surfaces and shorelines shall be stabilized and re-vegetated with native species only, as soon as possible.
- .7 Remove accumulated sediments prior to removing erosion control measures.
- .8 Sediment, debris and erosion control measures must be left in place for the duration of the project. Removal will be permitted only after written approval from the Departmental Representative.

## **2.7 WORK ADJACENT TO/WITHIN WATERWAYS**

- .1 Do not release any Deleterious Material into waterway.
- .2 Do not use salt as a deicer near water. In areas where ice is a safety concern, the use of sand will be permitted, but it must not be allowed to enter the water.
- .3 Ensure all equipment and temporary access structures such as scaffolding placed in waterbodies is free of earth material, and excess, lose or leaking fuel, lubricants, coolant and other deleterious material that could enter the waterbody.
- .4 Do not use waterway beds for borrow material.
- .5 Do not dump excavated fill, waste material or debris in waterways.
- .6 Stockpile excavated or fill materials must be stored and stabilized away from the water. Runoff from the excavated or fill material must be contained from entering the waterway.



- .7 No in-water work permitted between April 1 - July 15 to protect warm water fish species.
- .8 Measures to avoid harm to fish and fish habitat are to be implemented per Fisheries and Oceans Canada's Measures to Avoid Causing Harm to Fish and Fish Habitat. Additional measures to avoid harm to fish shall be implemented as follows:
  - .1 Construction work will be completed "in the dry" and natural flows will be maintained downstream of the culvert at Stn 0+230 at all times during construction. The existing culvert invert elevation at this location will be maintained so as to maintain the function of the wetland and prevent draining.
  - .2 Protection of fish and fish habitat during rock removal shall be according to Fisheries and Oceans Canada's Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters.
  - .3 Should conditions at the work site indicate that there are unforeseen negative impact to fish or their habitat associated with the construction activities, all work shall cease until the problem has been corrected and EA staff have been consulted. Contact phone numbers will be provided at the construction pre commencement meeting.

## 2.8 SEDIMENT, DUST, AND EROSION PROTECTION

- .1 Before starting work that will create dust or debris, (such as improvements to access, grading, excavation, material stockpiling backfilling, etc.), install effective mitigation techniques for sediment, dust, debris and erosion control to the satisfaction of Departmental Representative. Maintain these protective measures at all times, including shut down periods.
- .2 Provide a silt fence barrier in all areas where, due to construction activities, silt or debris may enter the water. This includes, but is not limited to, a silt barrier installed around staging and work areas.
- .3 Maintain a standby supply of pre-fabricated silt fence barrier, or an equivalent ready-to-install sediment control device.
- .4 Excavation to cease during periods of heavy rainfall, unless runoff is contained from entering waterway.
- .5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .6 Avoid activity during excessively wet weather conditions; monitor forecasts for heavy rainfall watches and warnings.

## 2.9 PLANT AND TREE PROTECTION

- .1 Limit clearing, grubbing, and tree-branch removal to areas of work or access indicated.
- .2 Provide Barrier around trees which may be affected by the work, including staging areas, as specified elsewhere. Barrier to be constructed per the Barrier for Tree protection specified elsewhere. Maintain Barriers in good repair throughout the duration Work. Remove these upon completion of Work.
- .3 Damage to trees as a result of Contractor's operations:
  - .1 Broken branches 25 mm or greater in diameter: cut back cleanly at the break, or to within 10 mm of their base, if a substantial portion of the branch is damaged. Departmental Representative will direct.

- .2 Exposed roots 25 mm or larger: cut back cleanly to the soil surface within five calendar days of exposure.
- .3 Damaged bark: neatly trim back to uninjured bark, without causing further injury, within five calendar days of damage.
- .4 Trees to be completely removed shall be delineated by Departmental Representative on site. Refer to Section 31 11 00 - Clearing and Grubbing for details.
- .5 Reduce soil displacement and compaction by using heavy machinery in designated areas and on existing vehicle paths.
- .6 Avoid using heavy machinery on saturated ground.
- .7 Use equipment of low bearing weight and low psi tires wherever possible.
- .8 Minimize stripping of topsoil and vegetation.

## **2.10 OPERATION AND MAINTENANCE OF EQUIPMENT**

- .1 Provide drip trays to prevent the discharge of oil, grease, antifreeze, or any other materials into the ground.
- .2 Equipment and heavy machinery used to meet or exceed all applicable emission requirements.
- .3 Leave machinery running only while in actual use, except where extreme temperatures prohibit shutting machinery down.
- .4 All vehicle/equipment maintenance and refueling must be conducted over impermeable/absorbent material situated at a designated site that is located at least 30 m away from the nearest water body. In the case of fuel heaters that will be located nearer than 30 m from the water, a large drip pan to contain any leakage from heater or refueling operations. Absorbent material must also be placed at the bottom of drip pan for added measure.

## **2.11 REMOVED MATERIALS**

- .1 Unless otherwise specified, materials designated for removal become the Contractor's property. Remove these from site.

## **2.12 HAZARDOUS MATERIALS**

- .1 Place materials defined as hazardous or toxic waste in designated containers.
- .2 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources Development Canada, Labour Program.
- .3 Store Hazardous Materials in secure areas on impermeable pads, provide berms if necessary.

## **2.13 CLEAN UP**

- .1 Clean up work area as work progresses. At the end of each work period, and more often if ordered by the Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.
- .2 Permit no undue amounts of debris, trash or garbage to accumulate.
- .3 Do not bury rubbish on site.

- .4 Separate and recycle all materials that can be recycled.
- .5 Dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner by taking them to a special designated waste facility. Do not dump these into waterways, storm, or sanitary sewers.
- .6 Waste generated will be disposed according to regulations (i.e. O. Reg 102/94 and O. Reg. 558/00, R.R.O. 1990, 347).
- .7 Ensure all emptied containers are sealed and stored safely for disposal away from children.
- .8 Spills:
  - .1 Report all spills immediately to the Departmental Representative and to the Ontario Spills Action Centre (Telephone No. 1-800-268-6060).
  - .2 Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal.
  - .3 Be responsible for all costs of cleaning up any spills to the satisfaction of the Departmental Representative.
  - .4 Must have an environmental emergency response plan in place and a spill kit readily available.
  - .5 In the event of a spill, remediation will be conducted immediately. Contain and clean up in accordance with Federal regulatory requirements and to the satisfaction of Parks Canada. Documentation of remediation, testing and results will be provided to Departmental Representative.
- .9 Remove all temporary protection and surplus materials, tools, plant, rubbish and debris and dispose of them in an approved manner off Crown property at the completion date of the work.
- .10 Clean areas under contract to a condition at least equal to that previously existing and to approval of Departmental Representative.

## 2.14 WILDLIFE AND SPECIES AT RISK (SAR)

- .1 Should any suspected species at risk - snakes or turtles and/or eggs be encountered during construction - project staging, implementation or demobilization - work would halt immediately and Parks Environmental Assessment Staff would be notified. The species must not be harmed or harassed. Stand back and allow the animal to leave the site. If the species does not leave or cannot leave the site, the contractor must immediately stop the works and contact the Departmental Representative and PCA's Environmental Assessment Officer immediately. Additional measures to avoid impacts may be required before work can restart. Contact phone numbers will be provided at the construction pre commencement meeting.
- .2 On a daily basis, an inspection or "sweep" of the work area shall be performed prior to commencement of project works and activities to ensure wildlife are not present in the work area (include in site checklist).
- .3 Field information regarding incidental encounters with wildlife (non-SAR wildlife) shall be compiled and reported on a daily basis.

- .4 For incidental encounters, the following information should be recorded in the field:
  - a. Locations, dates and time of day where the species were encountered;
  - b. Names of species encountered;
  - c. Photographs of the species, if taken;
  - d. Condition of animal.
- .5 If injured/dead wildlife are encountered report to Departmental Representative immediately. PCA may require retrieval and storage on ice of carcass for laboratory testing.
- .6 All vehicles and equipment used by project personnel will follow any construction zone speed limits to reduce the risk of hitting wildlife, as enforced by the site supervisor.
- .7 Work areas will be kept clean and free of potential hazards to wildlife such as wire, cable, tubing, plastic, antifreeze or other materials that wildlife may eat or become entangled in.
- .8 Waste will be stored, handled, and transported in accordance with the Waste Management Plan, including storage of all solid waste in sealed, bear-proof containers.
- .9 Feeding of wildlife is prohibited.

## **2.15 TRANSPORTING WASTE MATERIALS**

- .1 All waste subject to Regulation 558 of the Ontario Environmental Protection Act must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved by the Ontario Ministry of the Environment to accept that waste.
- .2 Be responsible for obtaining all Waste Generator Numbers, permits, manifests, and all other paperwork necessary to comply.

## **2.16 AIR QUALITY AND NOISE CONTROL**

- .1 Minimize the noise levels from construction activities by using proper muffling devices, in addition to appropriate timing and location of these activities to reduce or minimize the effect of noise on nearby residents, recreationists, and wildlife.
- .2 Monitor and mitigate public complaints by keeping a record of complaints and addressing any issues raised by the public.
- .3 Comply with local by-laws.
- .4 The Departmental Representative or a Parks Canada Environmental Assessment Officer may stop a vehicle if they believe the vehicle is emitting excessive exhaust smoke or suspect that emission control equipment has been tampered with or removed.

## **2.17 CULTURAL AND HERITAGE REMAINS**

- .1 Should any cultural resource be encountered, work shall cease and the Departmental Representative should be contacted immediately for guidelines on how to proceed.
- .2 A Parks Canada or Parks Canada appointed archaeologist shall provide

direction to the Departmental Representative.

## 2.18 WORK RESTRICTION PERIODS

- .1 To avoid impacts to migratory breeding birds, clearing and grubbing of vegetation should be avoided during the period when migratory birds may be nesting. If clearing and grubbing is required during this period, then the area should be cleared of nests by a qualified avian biologist prior to the activity being undertaken.

## 2.19 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial, or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Management Plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
  - .1 Take action only after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

## 2.20 INVASIVE SPECIES

- .1 To reduce the risk of introducing invasive species, all equipment must be thoroughly cleaned prior to coming to the site. Any machinery that appears to have not been cleaned will not be permitted on site. For additional information or guidance on how to properly clean equipment, see the Clean Equipment Protocol for Industry developed by the Ontario Invasive Plant Council and found here:  
<http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol-June2016-D3-WEB-1.pdf>
- .2 Mud, dirt and vegetation should be cleaned from clothing and footwear prior to entering the work site, and prior to leaving the work site.
- .3 Move only weed/contaminate-free materials into non-infested areas. Moving materials from one infested location to another within a particular zone may not cause contamination, but moving materials from infested to non-infested areas could lead to the introduction and spread of invasive plants.
- .4 Should an invasive species be encountered (or at least suspected), a photo and report of the specimen should be sent to Parks Canada's EA staff.

END OF SECTION

## **1 GENERAL**

### **1.01 INSPECTION**

- .1 Contractor is responsible for Quality Control (QC) of the work.
- .2 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative.
- .4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .5 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

### **1.02 INDEPENDENT INSPECTION AGENCIES**

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

### **1.03 ACCESS TO WORK**

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

### **1.04 PROCEDURES**

- .1 Notify Departmental Representative 2 days in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

### **1.05 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of

defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

- .2 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

#### 1.06 REPORTS

- .1 Submit 2 copies of Contractor QC inspection and test reports to Departmental Representative.
- .2 The Contractor will be provided copies of the Departmental Representative's test reports.

END OF SECTION

## 1 PAYMENT PROCEDURES

- .1 Measurement for Payment shall be included in the Contractors Balance of Project line item.

## 2 REFERENCES

### 2.01 MINISTRY OF TRANSPORTATION, ONTARIO MTO)

- .1 Ontario Traffic Manual, Book 7: Temporary Conditions 2014.

### 2.02 PROTECTION OF PUBLIC TRAFFIC

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2 When working on travelled way:
  - .1 Place equipment in position to minimize interference and hazard to travelling public.
  - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
  - .3 Do not leave equipment on travelled way overnight.
- .3 Provide and maintain road access and egress to property fronting along Work under Contract.
- .4 Submit to Departmental Representative and authorities having jurisdiction for review.

### 2.03 INFORMATIONAL AND WARNING DEVICES

- .1 Provide and maintain signs, and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices to Ontario Traffic Manual, Book 7: Temporary Conditions.
- .3 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Departmental Representative.
- .4 Continually maintain traffic control devices in use:
  - .1 Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
  - .2 Remove or cover signs which do not apply to conditions existing from day to day.

### 2.04 CONTROL OF PUBLIC TRAFFIC ON LITTLE HAWK ROAD

- .1 Provide competent flag personnel, trained in accordance with, and properly equipped to Ontario Traffic Manual, Book 7: Temporary Conditions Work Area Traffic Control Manual for situations as follows:
  - .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
  - .2 When it is necessary to institute one-way traffic system through



construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

- .3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
- .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
- .5 For emergency protection when other traffic control devices are not readily available.
- .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
- .7 At each end of restricted sections where pilot cars are required.
- .8 Delays to public traffic due to contractor's operators: 5 minutes maximum.

### 3 PRODUCTS

#### 3.01 NOT USED

- .1 Not Used.

### 4 EXECUTION

- 4.01** Within five (5) days of award the contractor shall submit to the Departmental Representative a Traffic Management Plan for review and approval by The County of Haliburton and the Departmental Representative.

**END OF SECTION**

## **1 GENERAL**

### **1.01 REFERENCES**

- .1 Within text of each specifications section, reference may be made to reference standards. Where standards have been updated the most recent update shall apply.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be born by Contractor in event of non-conformance.

### **1.02 QUALITY**

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions

### **1.03 AVAILABILITY**

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

#### 1.04 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .6 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .7 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

#### 1.05 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

#### 1.06 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

#### 1.07 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

### 1.08 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

### 1.09 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

### 1.10 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

### 1.11 FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
  - .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
  - .3 Bolts may not project more than one diameter beyond nuts.
  - .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

## 2 PRODUCTS

### 2.01 NOT USED

- .1 Not Used.

## 3 EXECUTION

### 3.01 NOT USED

- .1 Not Used.

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PCA.TSW.HALIBURTON	COMMON PRODUCT REQUIREMENTS	SECTION 01 61 00
LITTLE BROS. LAKE		PAGE 4
DAM ACCESS ROAD		2019-07-23

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END OF SECTION

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 34 11 Cleaning.
- .2 Section 01 35 29.06 Health & Safety Requirements.
- .3 Section 01 35 43 Environmental Procedures.

### **1.02 REFERENCES**

- .1 OPSS 180 Management of Excess Materials.
- .2 OPSS 201 Construction Specification for Clearing, Close Cut Clearing, Grubbing & the Removal of Surface Boulders.
- .3 OPSS 805 Construction Specification for Temporary Erosion/Sediment Control Measures.

### **1.02 MEASUREMENT PROCEDURES**

- .1 Measure following items:
  - .1 Close cut clearing.
  - .2 Grubbing.
  - .3 Mulching.
- .2 Unit price payments will be made for:
  - .1 Close cut clearing and underbrush in hectares within limits as indicated. Measurement for payment will be payment in hectares. Width and length dimensions shall be as measured in the field and approved by the Departmental Representative.
  - .2 Grubbing in hectares within limits as indicated. Measurement for payment will be payment in hectares. Width and length dimensions shall be as measured in the field and approved by the Departmental Representative.
  - .3 Mulching. Measurement for payment will be in square meters, 50 to 75 mm depth.

### **1.03 DEFINITIONS**

- .1 Close-cut clearing consists of cutting off standing trees, brush, underbrush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and mulching for redistribution on the project site.
- .2 Grubbing consists of excavation and disposal of stumps and roots to not less than specified depth below existing ground surface.
- .3 Mulch - Bark and wood chips varying in size from 25mm to 75mm in diameter and 25mm to 125mm in length.

### **1.04 QUALITY ASSURANCE**

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

## **1.05 STORAGE AND PROTECTION**

- .1 Prevent damage to sediment control, trees, natural features, bench marks, water courses, root systems of trees which are to remain.
- .1 Repair damaged items to approval of Departmental Representative.
- .2 Protect trees in the staging area to OPSD 220.010 If damaged, replace as directed by Departmental Representative.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Bituminous based paint of standard manufacture specially formulated for tree wounds.
- .2 Soil Material for Fill:
  - .1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
  - .2 Remove and store soil material for reuse.

## **3 EXECUTION**

### **3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings.
- .2 Inspect on a daily basis, and repair / maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .4 Trees should be felled away from standing timber.
- .5 Salvage merchantable timber from right-of-way clearing.
- .6 If erosion and sediment control measures are not functioning properly, no further work shall occur until the sediment and/or erosion problem is addressed to the satisfaction of Parks Canada.

### **3.02 PREPARATION**

- .1 Inspect site and verify with Departmental Representative, trees in the staging areas designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
  - .1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.

### **3.03 CLOSE CUT CLEARING**

- .1 Close cut clearing to within 100 mm of ground surface.

- .2 Parks Canada Best Management Practices (BMP) shall also be adhered to.
- .3 Only cut trees using tools designed for tree cutting activities (e.g. chainsaw, brush saw).
- .4 Prune limbs close to the tree trunk. For a clean cut, make a shallow undercut first, then follow with the top cut. This prevents the limb from peeling bark off the tree as it falls. Do not use an axe for pruning.

### 3.04 GRUBBING

- .1 Remove and dispose of roots, matted roots, and stumps from indicated grubbing areas.
- .2 Grub out stumps, roots, rock fragments and boulders less than 0.25 cubic meters (cu.m) to not less than 200 mm below ground surface.
- .3 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

### 3.05 REMOVAL AND DISPOSAL

- .1 Stumps and roots shall disposed of off-site.
- .2 Limbs and branches shall be chipped into mulch.
- .3 Trees greater than 300 mm diameter shall be cut in maximum 3.0 meter length and stockpiled on site for firewood.
- .4 After mulching spread cleared and grubbed vegetative material on site at Stations 0+410 to 0+750, within earth ditching as detailed and as directed by Departmental Representative. Depth of mulching to be 50mm to 75mm.

### 3.06 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for natural restoration to approval of Departmental Representative.

END OF SECTION



## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 43 Environmental Procedures.

### **1.02 MEASUREMENT PROCEDURES**

- .1 Topsoil:
  - .1 Approximately 2,970 cubic meters of in-situ or banked topsoil will be stripped. 2700 cubic meters (cu.m) will be disposed of off- site. The balance will be stockpiled for re-use. Measurement for payment will be payment in cubic meters calculated from cross sections taken in area of excavation from original location. Width and length dimensions for excavation shall be as indicated on the contract drawings.
- .2 Common Excavation:
  - .1 Approximately 3,215 cubic meters of in-situ or banked earth excavation will be stripped. This material will be either stockpiled for re-use or placed as earth fill as per the design. Measurement for payment will be payment in cubic meters calculated from cross sections taken in area of excavation from original location. Width and length dimensions for excavation shall be as indicated on the contract drawings. Of the 3,215 cubic meter total approximately 3100 cubic meters will be disposed of offsite.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

## **3 EXECUTION**

### **3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings
- .2 Inspect on a daily basis, and repair / maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.02 STRIPPING OF TOPSOIL**

- .1 Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .2 Handle topsoil only when it is dry and warm.
- .3 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation off site.
- .4 Remove brush from targeted area by non-chemical means and dispose

of off site.

- .5 Strip topsoil to depths as directed by Departmental Representative.
  - .1 Avoid mixing topsoil with subsoil.
- .6 Pile topsoil in berms in locations as directed by Departmental Representative.
- .1 Stockpile height not to exceed 2.0 m.
- .7 Dispose of unused topsoil off-site.
- .8 Protect stockpiles from contamination and compaction.

### 3.03 PREPARATION OF GRADE

- .1 Verify that grades are correct and notify Departmental Representative if discrepancies occur. Do not begin work until instructed by Departmental Representative.
  - .1 Grade area only when soil is dry to lessen soil compaction.
  - .2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

### 3.04 PLACING OF TOPSOIL

- .1 Place topsoil only after Departmental Representative has accepted subgrade.
- .2 Spread topsoil during dry conditions in uniform layers not exceeding 150mm, over unfrozen subgrade free of standing water.

### 3.05 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

## 1 GENERAL

### 1.01 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 Excavating, Trenching & Backfilling.

### 1.02 PRICE AND PAYMENT PROCEDURES

- .1 Stripping and stockpiling of topsoil and disposal of surplus topsoil shall be measured in cubic meters (cu.m).
- .2 Measurement Procedures:
  - Excavated materials will be measured in cubic meters in their original location.
  - .1 Common excavation quantities measured will be actual volume removed within following limits:
    - .1 Width for trench excavation as indicated on the contract drawings.
    - .2 Length as indicated on the contract drawings or as approved by the Departmental Representative.
    - .3 Depth from ground elevation immediately prior to excavation, to elevation as indicated.

### 1.03 REFERENCES

- .1 ASTM International
  - .1 ASTM D 698-[07e1], Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/cu.m).

### 1.04 EXISTING CONDITIONS

- .1 Examine subsurface investigation report which is bound into specification following Section 33 42 13.
- .2 Known underground and surface utility lines and buried objects are as indicated on site plan.
- .3 Refer to dewatering in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### 1.05 PROTECTION

- .1 Protect existing trees which are to remain as shown on the contract drawings.
- .2 Protect existing trees per contract documents.
- .3 Maintain access roads to prevent accumulation of construction related debris on roads.
- .4 Protect legal iron bars, bench marks, surface or underground utility lines which are to remain. If damaged, restore to original or better condition unless directed otherwise.

## 2 PRODUCTS

### 2.01 MATERIALS

- .1 Fill material: Rock and Common Excavation in accordance with of Section 31 23 33.01 - Excavating, Trenching and Backfilling.

- .2 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Departmental Representative.

### **3 EXECUTION**

#### **3.01 STRIPPING OF TOPSOIL**

- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Departmental Representative.
- .2 Commence topsoil stripping of areas after area has been cleared of brush and removed from site.
- .3 Strip topsoil to depths as indicated.
- .4 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.
- .5 Unused or surplus topsoil will be disposed of offsite.

#### **3.02 GRADING**

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Grade ditches to depth as indicated.
- .3 Compact filled and disturbed areas to maximum dry density to ASTM D 698, as follows:
  - .1 85% under landscaped areas.
  - .2 95% under granular areas.
- .4 Minimize soil disturbance within branch spread of trees or shrubs to remain.

#### **3.03 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning. Upon completion remove surplus materials, rubbish, tools and equipment.

**END OF SECTION**

**1 GENERAL****1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 29 Health & Safety Requirements.

**1.01 PRICE AND PAYMENT PROCEDURES**

- .1 Measurement Procedures:
  - .1 Quantities will be measured in cubic meters, taken from cross section showing actual or original rock surface, except that minimum depth of rock required to be excavated to be considered as 300 mm. Width to neat line and length of rock dimensions shall be calculated utilizing the contract drawing dimension(s). No payment will be made for over breakage.
  - .2 Rock excavation identified as shatter shall be paid at a factor of 0.35 since the remaining volume of shatter is to be left in place.

**1.02 REFERENCES**

- .1 OPSS 202 Construction Specification for Rock Removal.
- .2 OPSS 206 Rock Grading

**1.03 DEFINITIONS**

- .1 Rock: any solid material in excess of 0.25 cubic meters (cu m) and which cannot be removed by means of heavy duty mechanical excavating equipment with 1.15 cubic meter bucket. Frozen material not classified as rock.
- .2 PPV: peak particle velocity. . The maximum of the three ground vibration velocities measured in the vertical, longitudinal and transverse directions. Velocity units are expressed in meter per sec.
- .3 Air-overpressure: temporary changes in ambient air pressure caused by blasting. Air=pressure is expressed in units of psi or dB or dBL (Linear decibel scale). Measurements for blasting are made with microphones having a flat frequency response for over-pressure in the 2 to 200 Hz range.
- .4 Controlled Blasting: means cushion blasting, line drilling, and pre-shearing as defined in OPSS 206.
- .5 Trim Blasting: a Blasting technique involving the drilling of a single row of closely-spaced holes along the excavation limits, loading them with light, well-distributed charges, completely stemmed and simultaneously firing the charges.
- .6 Blaster-in-Charge: The single designated and licensed person with complete responsibility and total authority over all decisions involving safe handling, use and on-site security of explosives.
- .7 Charge-per-Delay: For vibration control, any charges firing within any 8-millisecond time period are considered to have a cumulative effect on vibration and air-overpressure effects. Therefore, the

charge-per-delay (W) is the sum of the weight of all charges firing within any 8-millisecond time period. For example, if two 100-lb. charges fire at 100 ms and one 115-lb charge fires at 105 ms, the charge per delay would be 315 lbs.

- .8 Primary Initiation: The method whereby the blaster initiates the blast(s) from a remote and safe location. Primary initiation systems use non-electric shock-tubes to convey firing energy from the point of initiation to blast locations.
- .9 Production Holes: Blast holes in the main body of the rock mass being removed by drilling and blasting.
- .10 Stemming: Crushed stone, tamped clay or other inert earth material placed in the unloaded collar area of blastholes for the purpose of confining explosive charges and limiting rock movement and air-overpressure (noise). Drill cuttings generated from potential NOA containing materials shall not be used as stemming.
- .11 Subdrilling: The portion of the blasthole that is drilled below or beyond the desired excavation depth or limit. Subdrilling is generally required to prevent the occurrence of high or tight areas of rock between blastholes.
- .12 Wall Control Blasting: means blasting using one of the techniques of either cushion blasting, pre-shearing, smooth wall blasting, or line drilling. Wall control blasting is to produce maintenance free Rock face with a minimum of blast induced fractures; generally it is characterized by noticeable drill hole traces over the majority of the Rock face.

#### 1.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Blasting Submittals: submit for approval, written proposal of operations for removal of rock by blasting to Departmental Representative and local authorities. Handling, transportation and storage of explosives shall be in accordance with the Transport Canada Transportation of Dangerous Goods Act. Standards and guidelines for hazardous materials.
  - .1 Indicate proposed method of carrying out work types and quantities of explosives to be used, loading charts and drill hole patterns, type of caps, blasting techniques, blast protection measures for items such as flying rock, vibration, dust and noise control. Include details on protective measures, time of blasting and other pertinent details.
  - .2 Submit complete and accurate records to the Departmental Representative at the end of each shift of blasting operations.
- .4 Qualification Statements:
  - .1 Retain licensed explosives expert to program and supervise blasting work, and to determine precautions, preparation and operations techniques.
  - .2 Submit documentation verifying explosives expert's qualifications.

#### 1.05 QUALITY ASSURANCE

- .1 Blasting Survey and Monitoring:

- .1 Within 500 meters of any blasting the Contractor and the Departmental Representative will visit property holders of adjacent buildings and structures to determine existing conditions and describe blasting and seismic recording operations and obtain their permission for setting up seismographs.
- .2 A pre-blast inspection report including photographs for all adjacent buildings and structures will be signed by all 3 parties. The Departmental Representative, the Contractor and the home owner. Signed copies of the pre-blast inspection will also be left with the home-owner.
- .3 Any damage to structures or horizontal infrastructure such as asphalt driveways or concrete sidewalks that did not exist prior to blasting but does exist post blasting, will be repaired as directed by the Departmental Representative.
- .2 Blasting and Vibration Control:
  - .1 Do not blast within 30 m of a building and where damage would result.
  - .2 Reduce ground vibrations to avoid damage to structures or remaining rock mass.
  - .3 In general, vibration from blasting shall not exceed 10 mm/s at the structure. Notwithstanding the seismic monitoring should the post blast survey show damage that did not exist during the pre-blast survey the contractor will be held responsible for all damage(s).

## 2 PRODUCTS

### 2.01 MATERIALS

- .1 Not used.

## 3 EXECUTION

### 3.01 ROCK REMOVAL

- .1 Co-ordinate this Section with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Remove rock to alignments, profiles, and cross sections as indicated.
- .3 Explosive blasting is permitted. Do blasting operations in accordance with local and provincial codes.
- .4 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.
- .5 Excavate rock to horizontal surfaces with slope not to exceed 10%.

- .6 Excavate trenches to lines and grades to minimum of 150 mm below pipe invert indicated.
- .7 Cut trenches to widths as indicated.
- .8 Use pre-shearing, cushion blasting or other smooth wall drilling and blasting techniques.
- .9 Remove boulders and fragments which may slide or roll into excavated areas.
- .10 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### 3.02 ROCK REUSE

- .1 Rock Reuse:
  - .1 Blasted rock to be reused as sub-base as indicated.

### 3.03 PROTECTION

- .1 Prevent damage to surroundings and injury to persons. Utilize sound warnings and display signs when blasting to take place.

END OF SECTION



## 1 GENERAL

### 1.01 RELATED REQUIREMENTS

- .1 Section 31 11 00 Clearing And Grubbing.

### 1.02 MEASUREMENT PROCEDURES

- .1 Excavated materials will be measured in cubic meters (cu.m) in their original location.
  - .1 Common excavation quantities measured will be actual volume removed within following limits:
    - .1 Width for trench excavation as indicated on the contract drawings.
    - .2 Length of trench as indicated on the contract drawings or as approved by the Departmental Representative.
    - .3 Depth from ground elevation immediately prior to excavation, to elevation as indicated.
  - .2 Rock quantities measured will be actual volume removed within following limits:
    - .1 Width for trench excavation as indicated on the contract drawings.
    - .2 Depth from rock surface elevations immediately prior to excavation, to elevation as indicated.
    - .3 Where design elevation is less than 300 mm below original rock surface, depth will be considered to be 300 mm below original rock surface.
    - .4 Volume of individual boulders and rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.
- .2 Cofferdams and de-watering of excavation will not be measured separately for payment. Payment to be included in the Balance of Project.
- .3 Backfilling to authorized excavation limits will be measured in tonnes for each type of material specified.
- .4 Approximately 270 cubic meters of existing banked topsoil will be placed and spread. Measurement for payment of the excavation and stockpiling of the topsoil will be in cubic meters calculated from cross sections taken in the area of excavation. Measurement for payment of the topsoil placement and spreading will be in cubic meters calculated from cross sections of the stockpile.
- .5 The surplus topsoil, approximately 2,700 cubic meters of insitu or banked topsoil will be stockpiled on site as directed by the Departmental Representative. Measurement for payment will be in cubic meters calculated from cross sections taken in area of excavation from original location.

### 1.03 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)

- .1 ASTM C 117-[17], Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C 136-[M-14], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D 422-63[2002], Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D 698-[12e2], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu.ft) (600 kN-m/cu.m).
- .5 ASTM D 1557-[12e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu.ft) (2,700 kN-m/cu.m).
- .6 ASTM D 4318-[17e1], Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .7 OPSS Muni 1010 Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

#### 1.04 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
  - .1 Rock: solid material in excess of 1.00 cubic meter and which cannot be removed by means of heavy duty mechanical excavating equipment with 1.15 cu.m bucket. Frozen material not classified as rock.
  - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
  - .3 Topsoil:
    - .1 Existing material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
    - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 75 millimeters in any dimension.
- .2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .4 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .5 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10

when tested to ASTM D 4318, and gradation within limits specified when tested to [ASTM D 422] [and] [ASTM C 136]: Sieve sizes to [CAN/CGSB-8.1] [CAN/CGSB-8.2].

.2 Table:

<u>Sieve Designation</u>	<u>% Passing</u>
2.00 mm	[100]
0.10 mm	[45 - 100]
0.02 mm	[10 - 80]
0.005 mm	[0 - 45]

.3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

## 1.05 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit to Departmental Representative written notice at least seven (7) days prior to excavation work, to ensure cross sections are taken.
- .2 Submit to Departmental Representative written notice when bottom of excavation is reached.
- .3 Inform the Departmental Representative at least four (4) weeks prior to backfilling, of proposed source of Granular(s).

## 1.06 EXISTING CONDITIONS

- .1 Examine soil report attached as Appendix A.
- .2 Buried services:
  - .1 Before commencing work verify location of buried services on and adjacent to site.
- .3 Existing buildings and surface features:
  - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
  - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
  - .3 Where required for excavation cut roots or branches utilizing best practices in accordance with Section 32 01 90.33 and or approved by the Departmental Representative.

## 2 PRODUCTS

### 2.01 MATERIALS

- .1 Granular 'A' and Granular 'B' Type I used for base and subbase materials to meet the requirements of OPSS 1010 and shall be compacted to 100% SPMDD. Granular 'B' Type I may be substituted for rock fill providing the surface of the roadway is chinked with rock fragments and spalls to form the subbase prior to placement of the base in order to minimize voids and

prevent migration of the base material into the rock fill.

- .2 Type 3 fill: selected material from excavation, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 Geotextiles: to Section 31 32 19.01 - Geotextiles.
- .4 Culverts: to Section 33 42 13 - Culverts
- .5 Rip-Rap: to Section 31 37 00 - Rip-Rap.

### **3 EXECUTION**

#### **3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings] [sediment and erosion control plan.
- .2 Inspect on a daily basis, and repair / maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### **3.03 PREPARATION/ PROTECTION**

- .1 Keep excavations clean, free of standing water, and loose soil.
- .2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

#### **3.04 STRIPPING & DISPOSAL OF SURPLUS TOPSOIL**

- .1 Begin topsoil stripping of areas after area has been cleared of brush and removed from site.
- .2 Strip topsoil to depths as indicated.
- .3 Do not mix topsoil with subsoil.
- .4 Approximately 2,970 cubic meters of insitu or banked topsoil will be stripped. 2700 cubic meters (cu.m) will be disposed of off- site. The balance will be stockpiled for re-use.
- .5 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.

#### **3.05 STOCKPILING**

- .1 Stockpile fill materials in areas designated by Departmental Representative.
- .2 Stockpile granular materials in manner to prevent segregation.
- .3 Protect fill materials from contamination.
- .4 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### 3.06 COFFERDAMS

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and the Health and Safety Act for the Province of Ontario.
- .2 Upon completion of substructure construction:
  - .1 Remove cofferdams.

### 3.07 DEWATERING

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative review details of proposed dewatering procedures.
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water in accordance with Section [01 35 43 - Environmental Procedures and in manner not detrimental to public and private property, or portion of Work completed or under construction.
  - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

### 3.08 EXCAVATION

- .1 Advise Departmental Representative at least seven (7) days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as indicated.
- .3 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench to a location acceptable to the Departmental Representative.
- .5 Dispose of surplus and unsuitable excavated material in approved location on site.
- .6 Do not obstruct flow of surface drainage or natural watercourses.
- .7 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .8 Notify Departmental Representative when bottom of excavation is reached.
- .9 Obtain Departmental Representative approval of completed excavation.
- .10 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .11 Fill under other areas with Rock Shatter or Granular B fill compacted to not less than 100% of corrected Standard Proctor maximum dry density.
- .12 Hand trim, make firm and remove loose material and debris from excavations.  
Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

- .13 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

### 3.09 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated.
- .2 Place bedding and surround material in unfrozen condition.

### 3.10 BACKFILLING

- .1 Do not proceed with backfilling operations until areas to be backfilled are free from debris, snow, ice, water and frozen ground.
- .2 Do not use backfill material which is frozen or contains ice, snow or debris.
- .3 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .4 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 0.5 m.

### 3.11 RESTORATION

- .1 Replace topsoil as indicated.
- .2 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .3 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

## **1 GENERAL**

### **1.02 MEASUREMENT AND PAYMENT**

- .1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams.

### **1.03 REFERENCES**

- .1 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1860-[November 2010], Material Specification for Geotextiles.
  - .2 OPSS 805 - Temporary Erosion and Sediment Control Measures.
- .2 ASTM D4884 -Standard Test Method for Seam Strength of Sewn Geotextiles

### **1.04 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit following samples 4 weeks prior to beginning Work.
    - .1 Minimum length of 2 m of roll width of geotextile.
    - .2 Methods of joining.
- .4 Test and Evaluation Reports:
  - .1 Submit copies of mill test data and certificate at least 3 weeks prior to start of Work.

### **1.05 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect geotextiles from direct sunlight and UV rays.
  - .3 Replace defective or damaged materials with new.

## **2 PRODUCTS**

### **2.01 MATERIAL**

- .1 Geotextile:

- .1 For Rock Flow Check Dams (per OPSS 805) Class II according to OPSS 1860. Filtration (FOS) shall be no greater than 300µm.
- .2 For Rip-Rap installation at culvert ends (per OPSS 511) Class II non-woven geotextile according to OPSS 1860 FOS of 75-150µm.
- .3 For Typical Peat Section. Mirafi HP 270 or approved equivalent.
- .4 Stitching materials. Polyester thread designed to provide seam strengths of 52.5 kN/m. Stitch densities of 3 to 6 stitches per 2.5 cm. Stitch type 401 double thread 'lock' stitch. Seam type, butterfly type SSd-2. Sewing equipment as recommended by Mirafi.

### 3 EXECUTION

#### 3.01 EXAMINATION

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

#### 3.02 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Successive strips of geotextile material shall be sewn with polyester stitching materials designed to provide seam strengths of 123 kN/m. Stitch densities of 3 to 6 stitches per 2.5 cm. Stitch type 401 double thread 'lock' stitch. Seam type, butterfly type SSd-2. Sewing equipment as recommended by Mirafi.
- .5 Prior to fill placement, the geotextile should be held in place using suitable means such as pins, piles of soil, etc. so that it does not move around during fill placement.
- .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .7 After installation, cover with overlying layer within 4 hours of placement. Tracked construction equipment should not be operated



directly upon the geotextile. A minimum fill soil thickness of 150 mm is required prior to operation of tracked vehicles over the geotextile. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geotextile.

- .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .9 Place and compact soil layers in accordance with Section [31 23 33.01 - Excavating, Trenching and Backfilling.

### **3.03 PROTECTION**

- .1 Vehicular traffic not permitted directly on geotextile.

**END OF SECTION**

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 31 32 19.01 Geotextiles.
- .2 Section 01 35 43 Environmental Procedures.
- .3 OPSS 421 Construction Specification for Pipe Culvert Installation in Open Cut.
- .4 OPSS 511 Construction Specification for Rip-Rap, Rock Protection and Granular Sheeting.
- .5 OPSS 805 Construction Specification for Temporary Sediment Control Measures.
- .6 OPSS 1004 Material Specification for Aggregate-Miscellaneous.

### **1.02 MEASUREMENT PROCEDURES**

- .1 Measure rip-rap in square metres of material placed, following the contour of the ground.

## **2 PRODUCTS**

### **2.01 STONE**

- .1 For rock flow check dam to OPSS 805. Rock for rock flow check dams shall be according to the requirements for rip-rap according to OPSS 1004, R-10 gradation.
- .2 For Rip-Rap installation at culvert ends to OPSS 511. Rip-rap shall be according to OPSS 1004, R-50 gradation.

### **2.02 GEOTEXTILE FILTER**

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

## **3 EXECUTION**

### **3.01 PLACING**

- .1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable existing material and compact to provide firm bed.
- .3 Place geotextile on prepared surface in accordance with Section [31 32 19.01 - Geotextiles] and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .4 Place rip-rap to thickness and details as indicated. Placement shall be controlled to ensure that a uniform and continuous cover results.
- .5 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.
- .6 Hand placing:
  - .1 Use larger stones for lower courses and as headers for subsequent courses.
  - .2 Stagger vertical joints and fill voids with rock spalls or

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PCA.TSW.HALIBURTON

RIP-RAP

SECTION 31 37 00

LITTLE BROS.LAKE

PAGE 2

DAM ACCESS ROAD

2019-07-23

cobbles.

- .3 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

## **1 GENERAL**

### **1.01 MEASUREMENT AND PAYMENT**

- .1 Measure imported granular B Type 1 sub-base in tonnes of material incorporated into Work and accepted by Departmental Representative. The contract unit price shall include delivery, placement, compaction and all other items associated including but not limited to proof rolling of existing base and the addition of water for compaction.
- .2 Measure Rock Embankment in cubic meters of material incorporated into Work and accepted in writing by Departmental Representative. The contract unit price shall include placement, compaction and all other items associated with placement of same, including proof rolling of existing base.
- .2 Measure excavation of base, sub-base and sub-grade materials to correct deficiencies in sub-grade discovered during proof rolling as common excavation under Section 31 23 33.01 - Excavating Trenching & Backfilling.

### **1.02 REFERENCES**

- .1 OPSS MUNI 1010.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Imported Granular sub-base material: to OPSS MUNI 1010.
- .2 Rock Fill: surplus material from on-site blasting. Rock fragments shall not exceed a maximum of one meter (1.0 m) in any dimension.

## **3 EXECUTION**

### **3.01 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections are acceptable for granular sub-base installation in accordance with manufacturer's written instructions.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.02 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

### 3.03 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Begin spreading sub-base material on crown line or high side of one-way slope.
- .6 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
  - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .10 Remove and replace portion of layer in which material has become segregated during spreading.
- .11 Each rock fill layer shall be compacted with a tractor bulldozer. The minimum number of complete passes shall be 6 and the maximum number of passes shall be 8. A complete pass shall be defined as 100% coverage of the layer surface. The maximum speed of the equipment during each pass shall be 3.2 km/h

### 3.04 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 100% standard proctor maximum dry density.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### 3.05 PROOF ROLLING

- .1 Proof roll the earth excavated areas utilizing a sheeps foot. Minimum length of the pegs on the sheeps foot drum to be 150mm.

- .2 Where proof rolling reveals areas of defective subgrade:
  - .1 Remove subgrade material to depth and extent as directed by Departmental Representative.
  - .2 Backfill excavated subgrade with sub-base material and compact in accordance with this section.
  - .3 Replace sub-base material and compact.
  - .4 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

### 3.06 SITE TOLERANCES

- .1 Finished Granular B Type 1 sub-base surface to be within +/-10 mm of elevation as indicated but not uniformly high or low.
- .2 The surface of the substituted Granular B rock fill must be chinked with rock fragments and spalls to form the subbase prior to placement of the base in order to minimize voids and prevent migration of the base material into the rock fill.

### 3.07 PROTECTION

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed.

END OF SECTION

## **1 GENERAL**

### **1.01 MEASUREMENT AND PAYMENT**

- .1 Measure granular A base in tonnes of material incorporated into Work and accepted in writing by Departmental Representative. The contract unit price shall include supply, delivery, placement, compaction and all other items associated including but not limited to water.

### **1.02 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

### **1.03 REFERENCES**

- .1 OPSS MUNI 1010 Material Specification For Aggregates

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Granular base:
  - .1 Crushed stone or gravel to OPSS MUNI 1010.

## **3 EXECUTION**

### **3.01 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

### **3.02 PLACEMENT AND INSTALLATION**

- .1 Place granular base after sub-base surface is inspected and approved in writing by Departmental Representative.
- .2 Placing:
  - .1 Construct granular base to depth and grade in areas indicated.
  - .2 Ensure no frozen material is placed.
  - .3 Place material only on clean unfrozen surface, free from snow and ice.
  - .4 Begin spreading base material on crown line or on high side of one-way slope.
  - .5 Place material using methods which do not lead to segregation or degradation of aggregate.
  - .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

- .7 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment:
  - .1 Ensure compaction equipment is capable of obtaining required material densities.
- .4 Compacting:
  - .1 Compact to density not less than 100% standard proctor maximum dry density.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### 3.03 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

END OF SECTION



## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 31 23 33.01 Excavating Trenching & Backfill.
- .2 SECTION 31 23 16.26 Rock Removal.

### **1.02 MEASUREMENT AND PAYMENT**

- .1 Removal and disposal of the existing culverts shall be included in the Contractor's Balance of Project item.
- .2 Measure excavation for culverts in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Measure supply and installation of pipe culvert including excavation and backfill in meters in place for each size, type and class of pipe.
- .4 Cost of supply and installation will include any necessary dewatering prior to placement.
- .5 Prior to mobilization the successful contractor will be required to contact the County of Haliburton and submit a \$500.00 damage deposit for the installation of the new culvert adjacent to County Road 13. The Departmental Representative will provide the contractor the name and address of the county contact. Upon successful project completion the \$500.00 damage deposit will be refunded. The counties initial \$300.00 permit application fee has been previously submitted by the Departmental Representative. The \$500 damage deposit must be shown on the contractor's cost breakdown.

### **1.03 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.04 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

## **2 PRODUCTS**

### **2.01 CORRUGATED STEEL PIPE**

- .1 Corrugated steel pipe: to CAN/CSA-G401.

### **2.02 GRANULAR BEDDING AND BACKFILL**

- .1 Granular bedding and backfill material to Section 32 11 23 - Aggregate Base Course Materials.

## **3 EXECUTION**

### **3.01 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pipe culvert installation in accordance with manufacturer's

written instructions.

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### 3.02 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
- .2 Inspect on a daily basis, and repair / maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

### 3.03 TRENCHING

- .1 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### 3.04 BEDDING

- .1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.
- .2 Place 150 mm minimum thickness of approved granular material on bottom of excavation and compact to 100% standard proctor maximum dry density.
- .3 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding, free from sags or high points.
- .4 Place bedding in unfrozen condition.

### 3.05 LAYING CORRUGATED STEEL PIPE CULVERTS

- .1 Begin pipe placing at downstream end.
- .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.

### 3.06 JOINTS: CORRUGATED STEEL CULVERTS

- .1 Corrugated steel pipe:
- .2 Match corrugations or indentations of coupler with pipe sections before tightening.
- .3 Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.
- .4 Insert and tighten bolts.
- .5 Repair spots where damage has occurred to spelter coating by applying two coats of asphalt paint approved in writing by Departmental Representative.

### 3.07 BACKFILLING

- .1 Backfill around and over culverts as indicated.

- .2 Place granular backfill material, in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
- .3 Compact each layer to 95% corrected maximum dry density taking special care to obtain required density under haunches.
- .4 Protect installed culvert with minimum 600 mm cover of compacted fill before heavy equipment is permitted to cross.
  - .1 During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.
- .5 Place backfill in unfrozen condition.

**END OF SECTION**

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 01 35 43 Environmental Procedures.

### **1.02 MEASUREMENT AND PAYMENT**

- .1 Preservation of watercourses and wetlands will not be measured separately. Payment to be included in the balance of project.

### **1.03 ENVIRONMENTAL REQUIREMENTS**

- .1 Operation of construction equipment in water is prohibited.
- .2 Do not use waterway beds for borrow material.
- .3 Dumping excavated fill, waste material, or debris in watercourse or wetland is prohibited.
- .4 Protection of fish and fish habitat shall be completed as specified in section 01 35 43.

### **1.04 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals to be completed as specified in the Environmental Management Plan.

## **2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

## **3 EXECUTION**

### **3.01 EXISTING CONDITIONS**

- .1 Maintain existing flow pattern in natural watercourse systems.
- .2 In natural systems maintain existing riffle pool and step pool patterns.
- .3 In wetland systems, unless otherwise approved by the Departmental Representative, maintain existing hydrological conditions.

### **3.02 SITE CLEARING AND PLANT PROTECTION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, as specified elsewhere.
  - .2 Inspect on a daily basis, and repair / maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
  - .2 Minimize disturbance to vegetated buffer zones and protect trees and

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PCA.TSW.HALIBURTON	PRESERVATION OF WATER	SECTION 35 42 19
LITTLE BROS. LAKE	COURSES AND WETLANDS	PAGE 2
DAM ACCESS ROAD		2019-07-23

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plants on site and adjacent properties as specified elsewhere.

- .3 Complete clearing and grubbing of vegetation as specified in Section 31 11 00.
- .4 Maintain temporary erosion and pollution control features installed under this contract.

### 3.03 DRAINAGE

- .1 Pumping water containing suspended materials into watercourse is prohibited.

### 3.04 SITE RESTORATION

- .1 Plant vegetation natural to area, suitable for application without requirement for fertilizers, pesticides and other chemicals.
- .2 Seed mix to be provided by Departmental Representative.

END OF SECTION

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PCA.TSW.HALIBURTON

APPENDIX A

LITTLE BROS.LAKE

PAGE 1

DAM ACCESS ROAD

2018-02-28

APPENDIX A - GEOTECHNCIAL REPORT

END OF SECTION

January 15, 2018

AG File No. 15550-2

Public Works Government Canada  
4900 Yonge Street, 12<sup>th</sup> Floor  
Toronto, Ontario  
M2N 6A6

Att: **Luc Beriault, Project Manager**

Ref: **Little Brother Dam Access Road – Final Geotechnical Report  
Project No. R.076951065**

Dear Luc:

Further to your request, we are pleased to present you with the Final Geotechnical Investigation Report for the above noted assignment. Please find attached to this cover letter the following:

- One (1) hard copy of the Final Geotechnical Investigation Report
- One (1) digital PDF copy of the Final Geotechnical Investigation Report

We trust the attached information meets your needs and please do not hesitate to contact our office should you have any questions or concerns.

Yours very truly,  
**AINLEY GRAHAM & ASSOCIATES LIMITED**



Lois-Ann Hayes, P.Eng.  
Branch Manager



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Kingston, Ontario  
K7M 8N2  
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## **FINAL GEOTECHNICAL REPORT**

**Little Brother Dam Access Road  
R.076951065**

**1169 Road 13,  
Algonquin Highlands,  
Ontario**

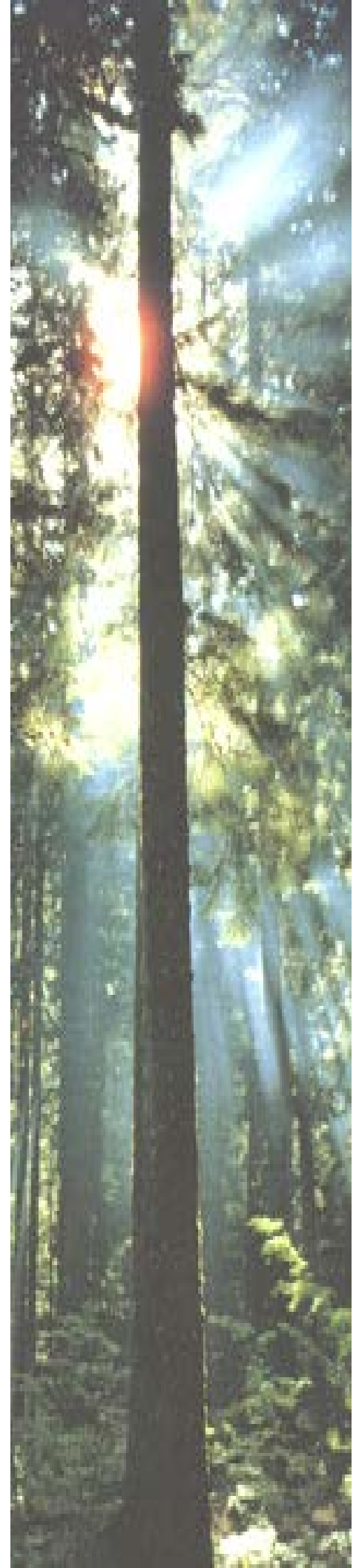
**Public Works Government Canada**

**A/G Project 15550-2  
January, 2018**

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**Submitted To:**

Public Works Government Canada  
4900 Yonge Street, 12<sup>th</sup> Floor  
Toronto, Ontario  
M2N 6A6





## TABLE OF CONTENTS

	<u>PAGE NO.</u>
<b>1.0 INTRODUCTION .....</b>	<b>1</b>
<b>2.0 SITE DESCRIPTION .....</b>	<b>1</b>
<b>3.0 FIELDWORK / METHODOLOGY .....</b>	<b>1</b>
<b>4.0 RESULTS OF THE INVESTIGATION.....</b>	<b>2</b>
<b>4.1 Sub-Surface Conditions .....</b>	<b>2</b>
<b>4.1.1 Topsoil.....</b>	<b>2</b>
<b>4.1.2 Sand .....</b>	<b>2</b>
<b>4.1.3 Sand and Silt .....</b>	<b>3</b>
<b>4.1.4 Peat .....</b>	<b>3</b>
<b>4.1.5 Bedrock.....</b>	<b>3</b>
<b>4.1.6 Groundwater.....</b>	<b>3</b>
<b>5.0 DISCUSSION AND RECOMMENDATIONS.....</b>	<b>4</b>
<b>5.1 Pavement Design.....</b>	<b>4</b>
<b>5.2 Groundwater Control/Subsurface Drainage.....</b>	<b>5</b>
<b>5.3 Excavations.....</b>	<b>5</b>
<b>5.4 Suitability of Material.....</b>	<b>6</b>
<b>5.5 Trenches .....</b>	<b>6</b>
<b>5.6 Site Inspections.....</b>	<b>6</b>
<b>6.0 CLOSURE .....</b>	<b>6</b>

## **FIGURES**

Figure No. 1 - Site and Borehole Location Plan

## **APPENDICES**

Appendix A - Borehole Logs

Appendix B - Grain Size Distribution Results

## **1.0 INTRODUCTION**

Ainley Group (Ainley) was retained by Public Works Government Services Canada (PWGSC), to carry out geotechnical consulting services in support of the design and upgrade to the current access road to support future rehabilitation works at the Little Brother Dam location.

The objectives of the geotechnical assignment were:

- To secure soils and groundwater information/data along the current access road that could affect the design, including the effects that the soil and groundwater may have on construction procedures.
- To determine the physical properties of the soil along the current access road.
- To prepare a geotechnical report addressing the requirements set out in the Project Description, based on the information obtained during the geotechnical site investigation and laboratory analysis completed.

## **2.0 SITE DESCRIPTION**

The subject site is located at 1169 Road 13, Algonquin Highlands, Ontario and is bound by Little Hawk Lake to the north, Road 13 to the south and neighboring residential properties to both the east and west. The existing access road is infrequently maintained and is used for light duty vehicles for maintenance and operational use of the dam. The road is also used as a snowmobile trail in the winter. There are several corrugated steel culverts throughout the access road to assist with site drainage ranging in size from 150 mm to 400 mm.

The site is heavily treed with steep varying elevations with bedrock exposed at times. Drainage for the overall site appears to be towards the south in the direction of Halls Lake with a shallow creek running along the west side of the property from the Little Brother Dam to Halls Lake. During the site investigation ponding water was noted crossing the roadway at Station 0+060 and beside the roadway at multiple other locations.

## **3.0 FIELDWORK / METHODOLOGY**

The fieldwork for the investigation was conducted in accordance with the Project Description. The field program consisted of the advancement of thirty-five (35) boreholes (BH Nos. 1 to 35) to investigate sub-surface conditions. Borehole Nos. BH1 to BH17 and BH32 to BH35 were completed along the existing access road with BH18 to BH31 completed along the newly proposed alignment. Prior to commencing the geotechnical investigation program, Ainley contacted local utility companies in order to obtain clearances for all underground services in the immediate area of the proposed field program.

The borehole program was completed on October 31 and November 1, 2017. All drilling was completed under the constant supervision of a qualified member of Ainley's geotechnical team.

A Site and Borehole Location Plan showing borehole location is attached to this report as **Figure No. 1**.

The boreholes were advanced at approximately 50 m spacing along the existing alignment and approximately 25 m along the proposed alignment. Boreholes were advanced to depths ranging from 0.1 m to 2.7 m below existing ground surface. The boreholes were advanced by means of a track-mounted CME-55 drill rig equipped for soil sampling.

The location and ground surface elevations at each respective borehole location were surveyed using a Sokkia SRX3 Robotic Total Station with real time sub-centimeter accuracy, and referenced to the MTM Geodetic Coordinate system.

## **4.0 RESULTS OF THE INVESTIGATION**

### **4.1 Sub-Surface Conditions**

Full details of the subsurface conditions encountered at the borehole locations are presented on the individual borehole logs included in **Appendix A**. It is emphasized however, that the soil types, their sequence, thickness and physical properties may vary between test locations and samples both vertically and horizontally.

Representative samples of the subsoil materials encountered within the boreholes were collected and returned to our office for further visual review by an engineer having experience with soil classification and identification. A total of ten (10) samples were selected and submitted to SNC Lavalin in Kingston, Ontario for gradation analysis and moisture content determination. Copies of the Grain Size Distribution results are included in **Appendix B**.

The subsoil conditions encountered throughout the site generally consisted of the following:

#### **4.1.1 Topsoil**

A surficial layer of topsoil consisting of sandy silt, trace of clay and rootlets was encountered in all the boreholes completed along the newly proposed alignment, BH18 to BH31. Topsoil was not encountered in any of the remaining boreholes. The topsoil layer thickness was found to range between 0.1 m to 1.0 m.

#### **4.1.2 Sand**

A surficial layer of sand with varying amounts of silt, gravel and cobbles was encountered in all boreholes completed along the existing trail alignment, BH1 to BH17 and BH32 to BH35. The sand with varying amounts of silt, gravel and cobbles was found to be in a loose state of consistency, but becoming compact with depth, at the time of the field investigation. This sand layer extended to depths ranging from 0.45 to 1.2 m below existing site grades with an average thickness of approximately 0.78 m.

Three (3) representative samples of the sand with varying amounts of silt, gravel and cobbles was submitted for gradation and moisture content determination. The percentage of material passing the 4.75 mm and 75  $\mu$ m sieves was found to range from 54.5 to 98.6 and 6.9 to 30.2 respectively. The moisture content was found to range from 6.4 to 17.3% at the time of the site investigation. The material is slightly fine in accordance OPSS 1010 in regards to Select Subgrade specification.

#### **4.1.3 Sand and Silt**

A layer of sand and silt with varying amounts of gravel and clay was encountered in all boreholes with exception to BH1 to BH5, BH8, BH14, BH15 and BH18. The sand and silt with varying amounts of gravel and clay material was encountered immediately underlying the peat layer in BH6 and BH7, and immediately underlying the topsoil layer in BH19 to BH22, BH26 to BH31, and immediately underlying the sand layer in BH9 to BH13, BH16, BH17, BH32 to BH35. The sand and silt with varying amounts of gravel and clay was found to be in a compact state of consistency at the time of the field investigation except in BH19 and BH30 where it was loose. The sand fill extended to depths ranging from 0.75 m to 2.7 m below existing site grades with an average thickness of approximately 0.52 m.

Seven (7) representative samples of the sand and silt with varying amounts of gravel and clay were submitted for gradation and moisture content determination. The material was generally found to have a Low Susceptibility to Frost Heaving (LSFH) with exception to the soils encountered in BH7, BH26 and BH35. The soil material within these three boreholes was found to have a Medium Susceptibility to Frost Heaving (MSFH). The moisture contents were found to range from 7.3 - 28.1 % at the time of the site investigation.

#### **4.1.4 Peat**

A layer of peat was found underlying the sand with varying amounts of silt, gravel and cobble material within BH5, BH6 and BH7. The peat was encountered at a depth of 0.62 m to 1.2 m below existing site grades. The peat thickness was found to range between 0.32 m to 1.0 m. The sand and silt with varying amounts of clay and gravel layer was found directly beneath the peat layer.

#### **4.1.5 Bedrock**

Refusal to advance the soils equipment on the inferred bedrock surface was encountered within all boreholes with exception to BH5, BH10 and BH35 at depths (elevations) ranging from surface to 2.7 m (334.74 masl to 365.86 masl) below existing grade.

#### **4.1.6 Groundwater**

Groundwater infiltration was encountered at the time of the field investigation within all boreholes except BH1, BH8, BH10, BH14, BH15, BH16, BH18, BH25, BH29, BH31, BH32 at depths (elevations) ranging from surface to 1.2 m below existing site grades (334.89 m to 365.96 m).

## 5.0 DISCUSSION AND RECOMMENDATIONS

It is our understanding based on the Design Brief provided with the SOW that the purpose of the geotechnical investigation and report is to provide analysis and recommendations of the subsoil conditions, engineering soil properties and roadway structure to assist with the design of the 2000 m access road.

Based on the subsoil and groundwater conditions encountered at the test locations and considering them to be generally representative of the subsoil and groundwater conditions across the subject site, the following recommendations and comments are offered to advance the design and construction.

### 5.1 Pavement Design

Based on the existing soil conditions and the results of testing on the subsoil material, it is recommended that the following pavement structures be applied to the proposed access road and staging areas:

#### In Earth

150 mm	Granular 'A', over
300 mm	Granular 'B' Type I, over
	Acceptable Rock or Earth Fill

#### In Rock

150 mm	Granular 'A', over
300 mm	Rock Shatter

It should be noted however that the recommended pavement structure is based on all topsoil, organic and unsuitable materials being removed to reveal the underlying sand with silt subgrade and/or bedrock surface. It is recommended that the subgrade material be proof rolled prior to placement of the granular subbase to reveal any loose areas. Any areas exhibiting rutting or appreciable deflection should be excavated and replaced with suitable fill material compacted to a minimum of 95% SPMDD.

Where peat was encountered (Station 0+220± to Station 0+275±) it is recommended that the pavement structure consist of the following:

150 mm	Granular 'A', over
300 mm	Granular 'B' Type I, over
	Existing sand with silt subgrade

Prior to placing the Granular 'B' Type I it is recommended that the existing sand with silt subgrade be overlaid with a geotextile from Station 0+200± to Station 0+280± in accordance

with the manufacturers specifications. It is recommended that a Mirafi HP270 or equivalent be placed.

Granular 'A' and Granular 'B' Type I used for base and subbase material shall meet the requirements of OPSS 1010 and shall be compacted to 100% SPMDD. Granular 'B' Type I may be substituted for rock fill providing the surface of the roadway is chinked with rock fragments and spalls to form the subbase prior to placement of the base in order to minimize voids and prevent migration of the base material into the rock fill.

Inspection by qualified geotechnical personnel should be carried out during the construction process to verify the competence of the subgrade material and to verify the compaction densities of both the subbase and base course materials.

A topsoil stripping depth of 300 mm may be assumed for this project.

## **5.2 Groundwater Control/Subsurface Drainage**

Based on the observations made during the field investigation and our knowledge of the local geologic conditions, perched groundwater infiltrations may be encountered within excavations within or near the bedrock surface, however it should be noted that groundwater levels will fluctuate seasonally and also during periods of drought and precipitation.

Development areas within the site should be graded in the early stages of construction to provide for positive runoff of all surface water. The nature of the sand and silt material encountered makes it prone to strength loss therefore, groundwater and moisture control during construction and post development is key to the workability and movement of this soil.

The pumping of groundwater may be required during excavation of the shallow overburden. Normal pumps should suffice but some sand filters may be required to prevent clogging of the pumps. The groundwater level should be controlled at all times and be kept below the excavation level during the construction period.

Excavations penetrating the bedrock formation may encounter increased groundwater flows that may result in the necessity for additional precautions and techniques.

## **5.3 Excavations**

All excavations should be carried out in accordance with the provisions in the Occupational Health and Safety Act. At the time of the field investigations the sub-soil materials encountered across the site can be classified as follows:

- The fill and native materials may be classified as Type 3 soil.

Shallow excavations into the soils and sound bedrock are considered straightforward and conventional excavation techniques and equipment appropriate. The quality of the bedrock encountered was not evaluated under the scope of this assignment and contractors should

utilize appropriate hoe-ram or large excavators suitable to the bedrock conditions encountered for shallow excavations.

#### 5.4 Suitability of Material

The fill and native materials encountered across the site are considered suitable for reuse as subgrade material below paved areas or in trenches. It is recommended that moisture contents in the soils be closely monitored when they are to be used as select subgrade fill or as a founding soil during construction. Wet soils should not be placed as backfill, subgrade fill or utilized as a founding material under any circumstances.

#### 5.5 Trenches

The construction of any proposed trenches should consist of removal of the existing overburden soils to achieve the required grades. Based on the soils information obtained from the site pipes will be installed in either fine-grained subsoil or bedrock trenches. Bedding for the pipes should consist of 150 mm Granular 'A' material. The bedding should be placed in lifts compatible with the compaction equipment used to achieve 100% SPMDD. Backfill around the pipes should consist of Granular 'A' material with a minimum cover thickness of 300 mm over the obvert of the pipe. The backfill should be compacted to 100% SPMDD.

#### 5.6 Site Inspections

It is recommended that all subgrade materials be inspected by qualified geotechnical personnel to ensure that the materials and founding elevations are consistent with the recommendations of this report. It is also recommended that the placement and compaction of all fill soils be monitored and tested by qualified geotechnical personnel to ensure that the appropriate materials and compaction densities are achieved.

#### 6.0 CLOSURE

The Limitations of Report attached, form an integral part of this report. We trust this report provides sufficient information for your present requirements in accordance with our Statement of Work. We trust this report is to your satisfaction. Should you have any questions concerning the above, please feel free to contact our office.

Sincerely,

**AINLEY GRAHAM & ASSOCIATES LIMITED**



Lois-Ann Hayes, P.Eng.  
Branch Manager





### **Limitations of Report**

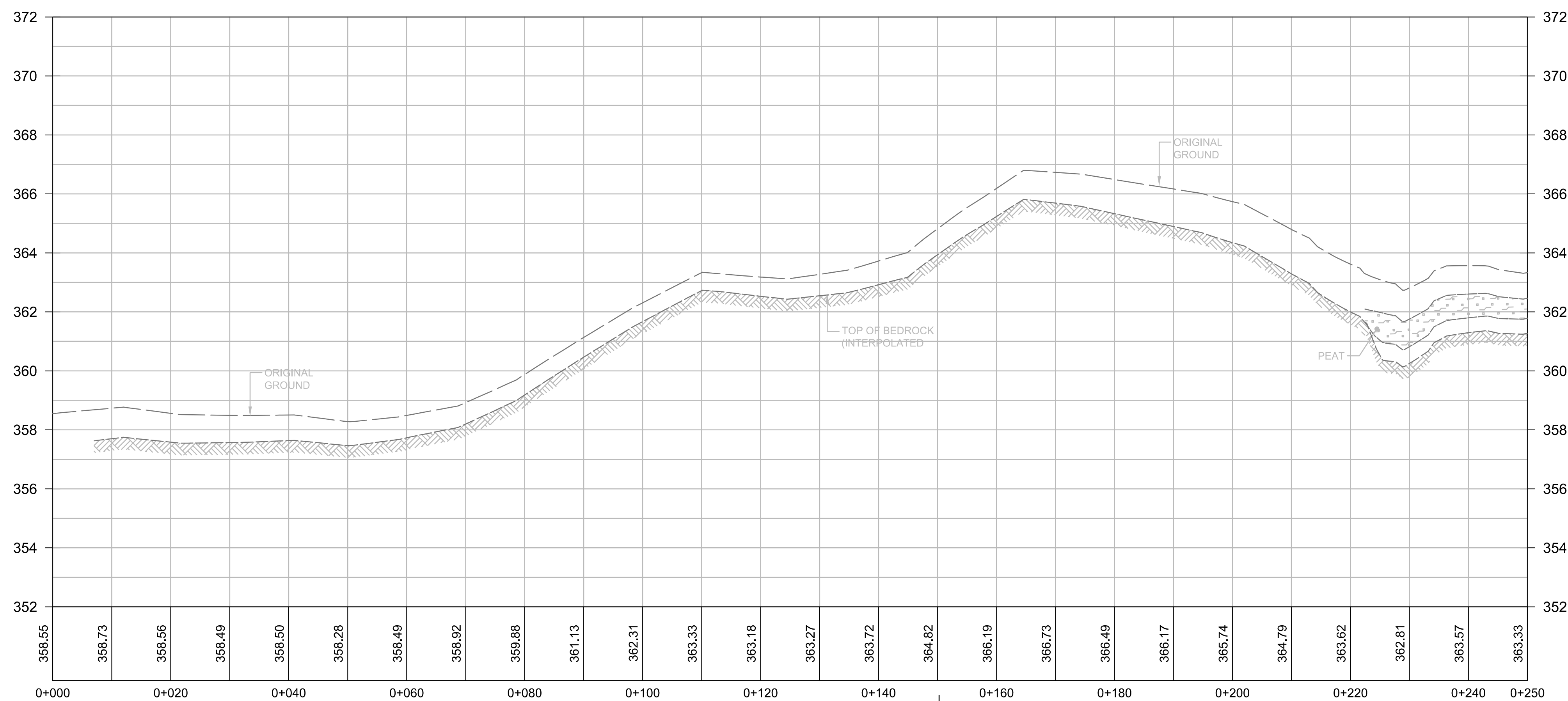
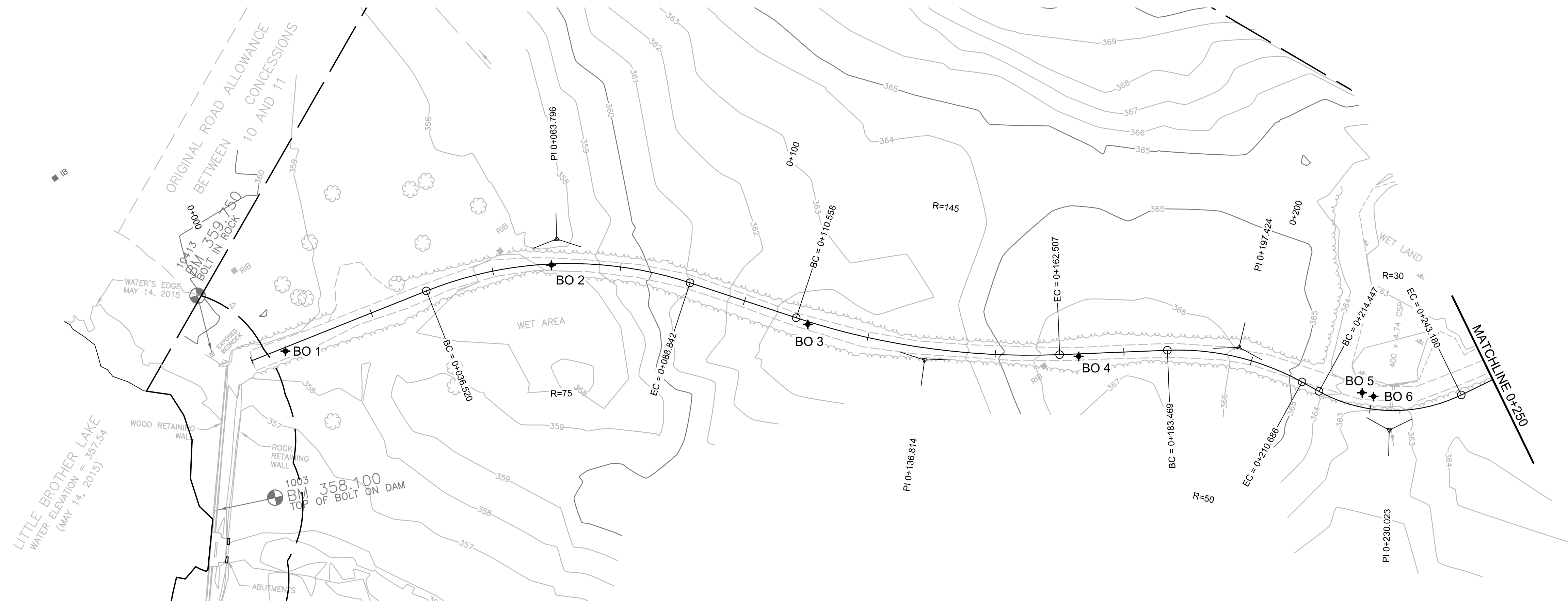
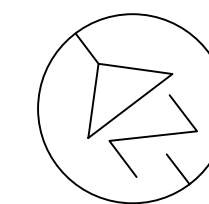
The conclusions and recommendations given in this report are based on information determined at the borehole locations. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the boreholes.

The comments made in this report are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all factors that may affect construction methods and costs. The contractors bidding on this project or undertaking the construction should therefore make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work.

This report has been prepared for design purposes, for the sole use of PWGSC. Any uses, which a Third Party makes of this report, or any reliance or decisions to be made based on it, are the responsibilities of said Third Parties. Ainley Group accepts no responsibility for damages if any, suffered by any Third Party as a result of decisions made or actions based on this report.

**Figure No. 1**

**Site and Borehole Location Plan**



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Do not scale drawings.  
Verify all dimensions and conditions on site and  
immediately notify the engineer of all discrepancies.

A	Detail No.
B	No. du détail
C	drawing no. - where detail required
	dessin no. - où détail exigé
	drawing no. - where detailed
	dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**BOREHOLE LOCATIONS  
STA. 0+000 TO 0+250**

drawn by  
dessine par  
**A.C.**

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conc par

approved by  
approuve par

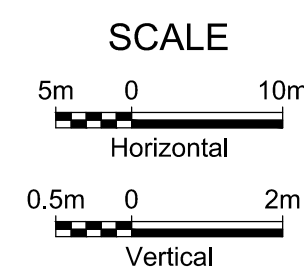
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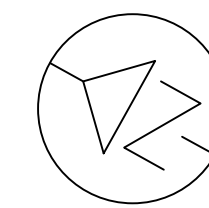
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administrateur  
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**2017/11**

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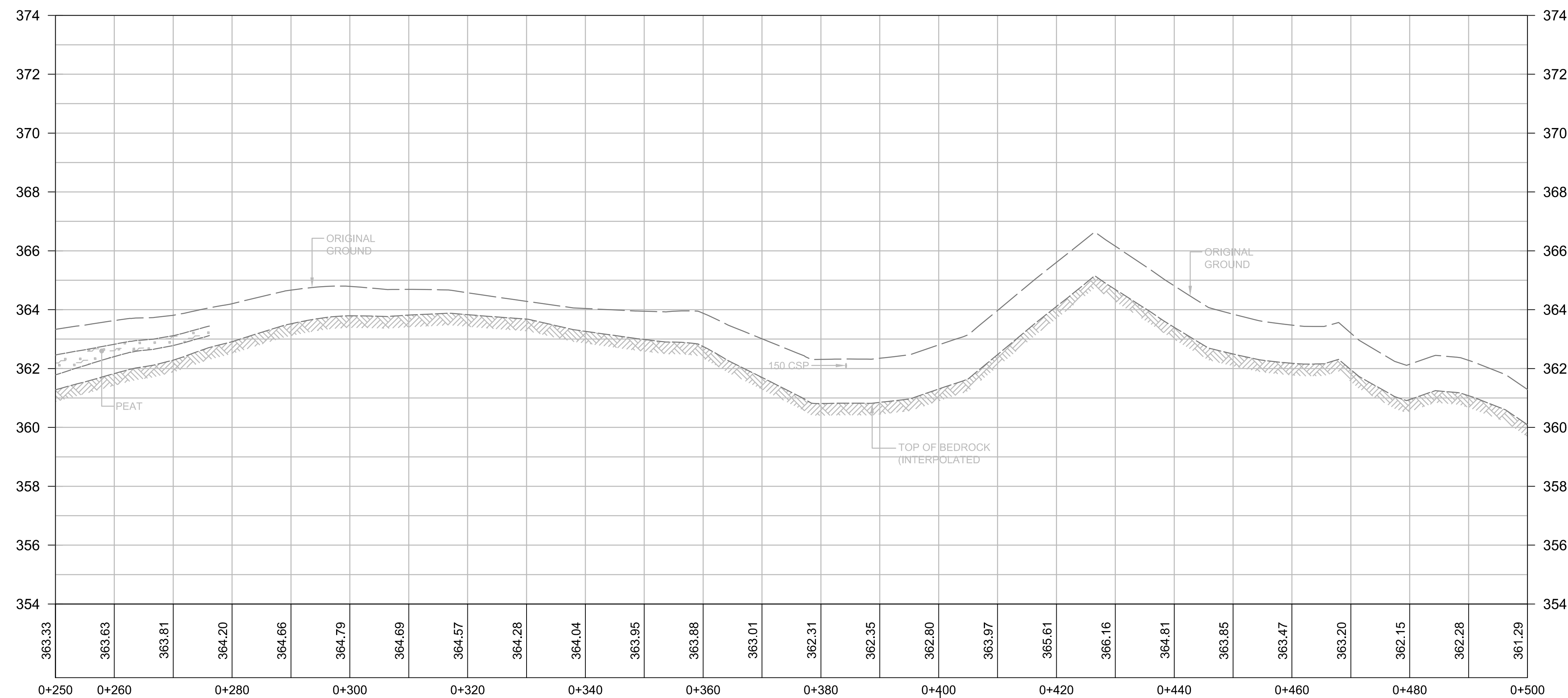
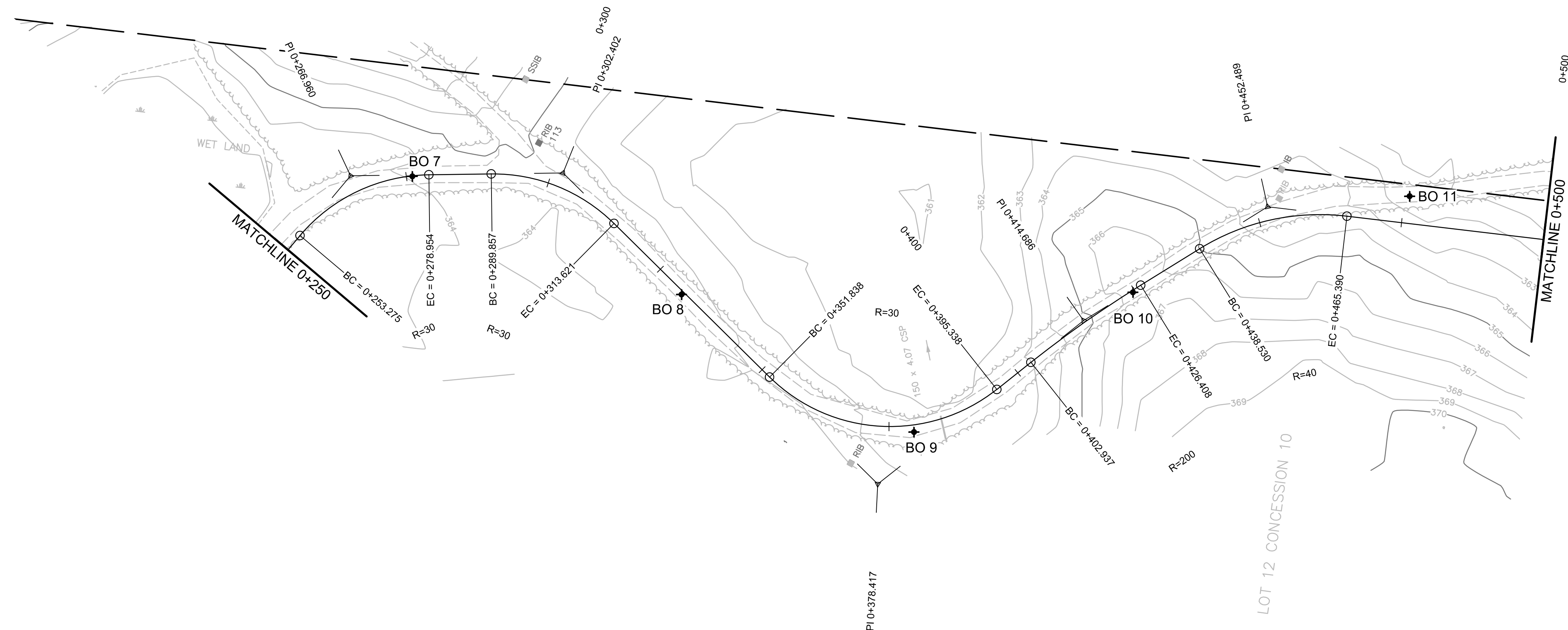
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Région de l'Ontario



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**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER DAM  
ACCESS ROAD**

drawing title  
titre du dessin

**BOREHOLE LOCATIONS  
STA. 0+250 TO 0+500**

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dessiné par

A.C.

designed by  
conçu par

approved by  
approuvé par

tender  
soumission

project manager  
administrateur de projets

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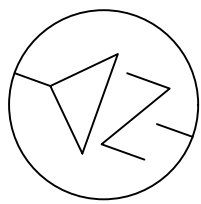
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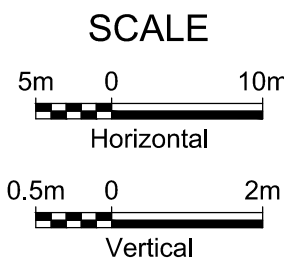
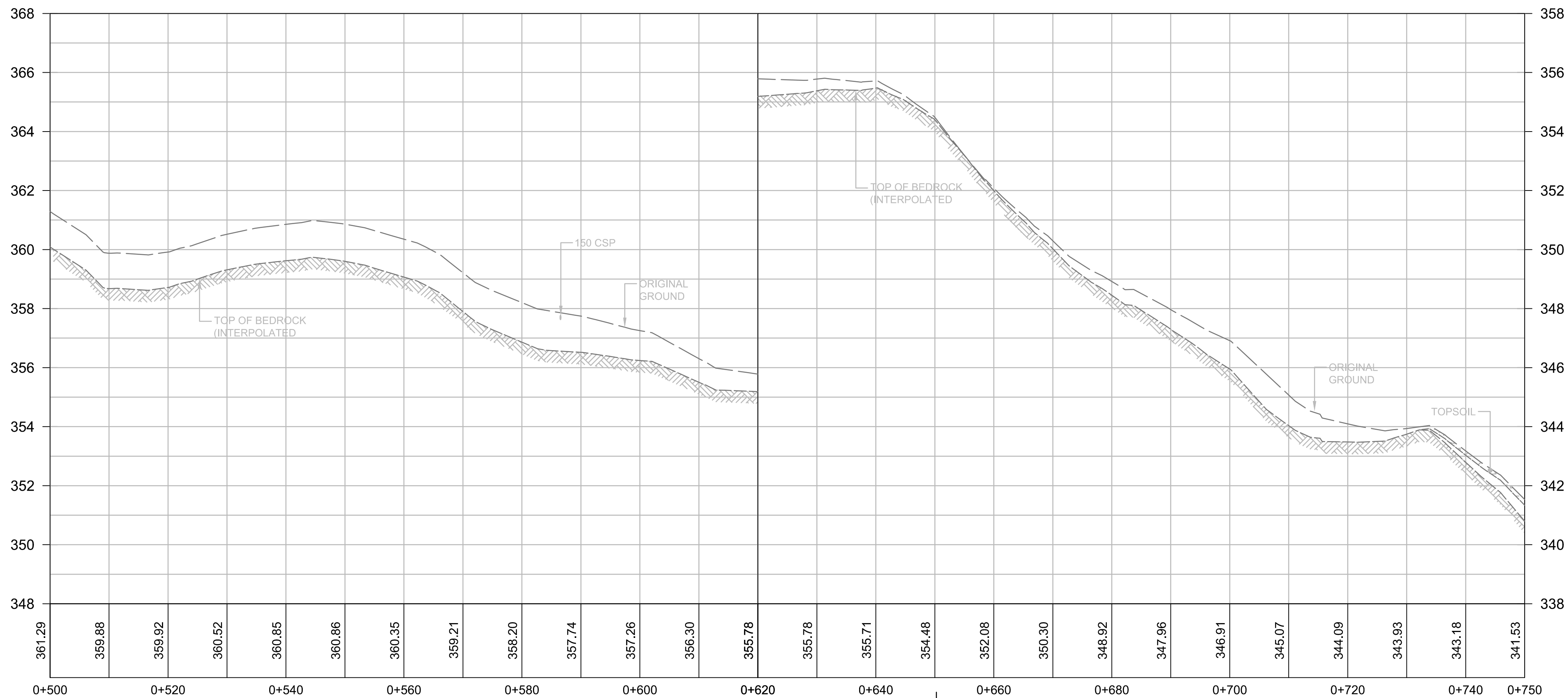
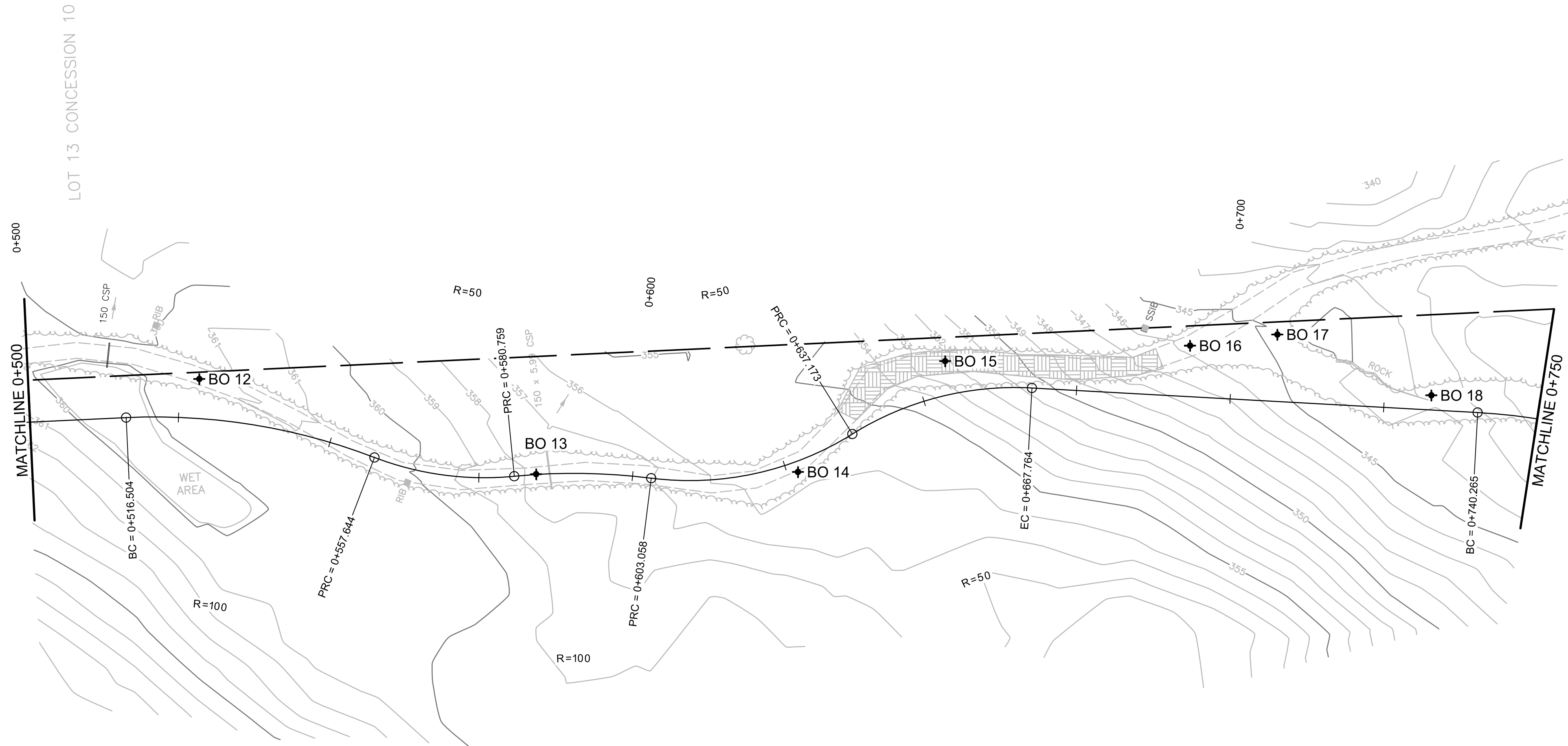
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Ontario Region  
  
Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



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**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER DAM  
ACCESS ROAD**

drawing title  
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**BOREHOLE LOCATIONS  
STA. 0+500 TO 0+750**

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**A.C.**

designed by  
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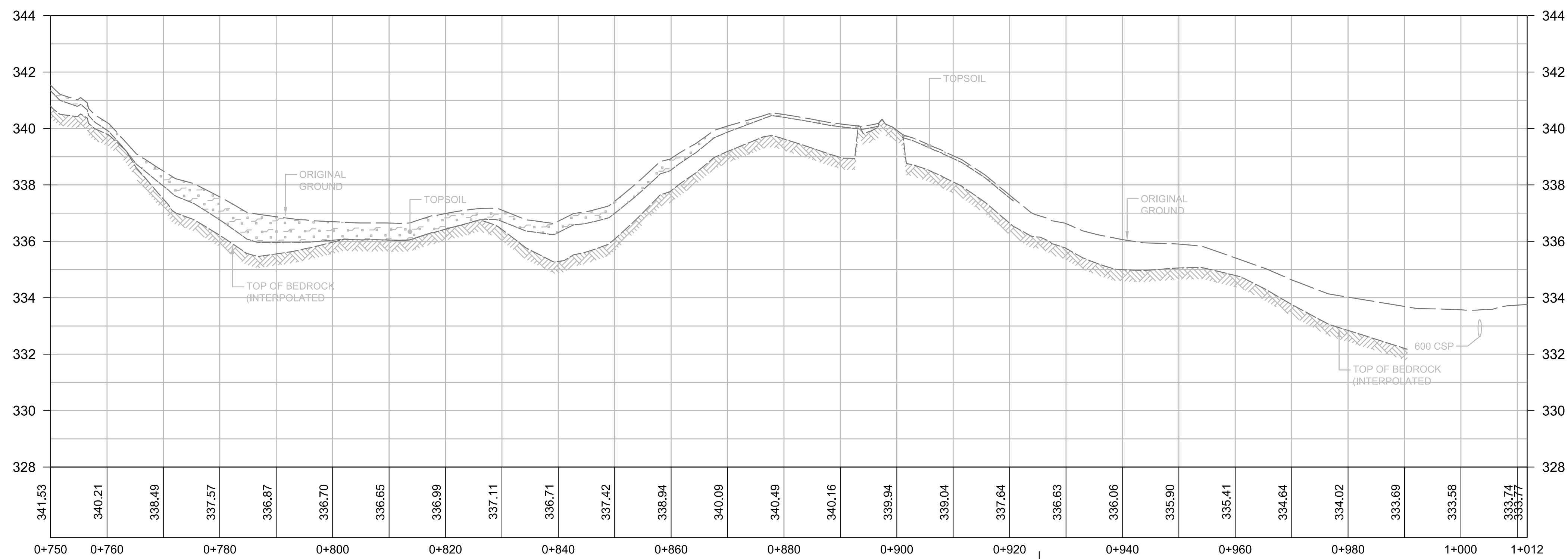
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de projets

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project title  
titre du projet  
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PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**BOREHOLE LOCATIONS  
STA. 0+750 TO 1+012**

drawn by  
dessiné par  
**A.C.**

designed by  
conçue par

approved by  
approuvé par

tender  
soumission

project manager  
administrateur  
de projets

project date  
date du projet  
**2017/11**

project no.  
no. du projet  
**R0.76951.065**

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**4**

SCALE

5m 0 10m  
Horizontal

0.5m 0 2m  
Vertical

**Appendix A**  
**Borehole Logs**





**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## Log of Borehole: BH1

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 358.82

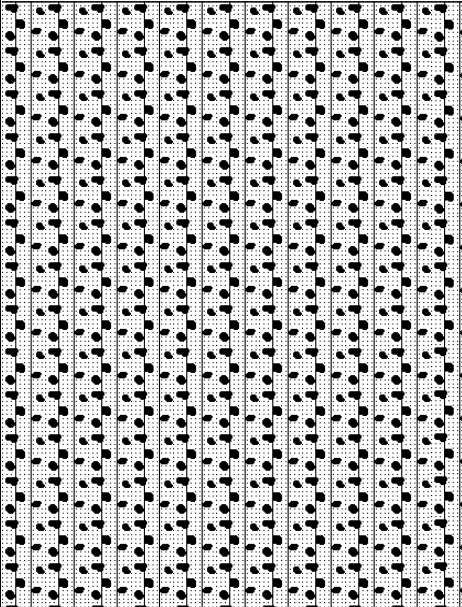
**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676216.6 E 4999946.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+006.8 0.7 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown. % Passing JC001 4.75 mm = 83.2 75 um = 26.4 Moisture Content = 9.0 %	JC001	G		
1	1.05	<b>End of Borehole at 1.05 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1





**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## Log of Borehole: BH2

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 358.54

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 357.94

**Location:** 676267.9 E 4999928.0 N

**Depth to Water (m):** 0.6

**Location Cont:** 0+061.5 0.2 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown.				
2	0.75	<b>End of Borehole at 0.75 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.6 m below existing site grades during the borehole investigation.				
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH3**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 363.34

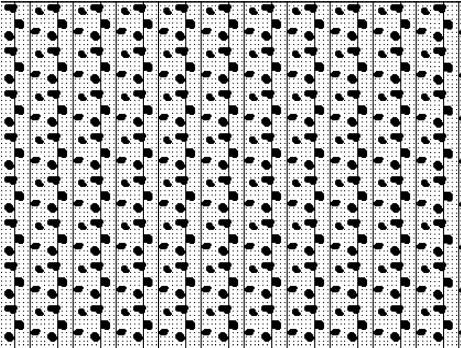

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 362.74

**Location:** 676300.7 E 4999889.0 N

**Depth to Water (m):** 0.6

**Location Cont:** 0+113.1 0.5 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown.	JC002	G		
2	0.60	<b>End of Borehole at 0.60 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.6 m below existing site grades during the borehole investigation.			▼	
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH4**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 366.85

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 365.95

**Location:** 676339.0 E 4999853.0 N

**Depth to Water (m):** 0.9

**Location Cont:** 0+116.2 0.5 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.40 m, brown.				
2						
3						
4	1.00	<b>End of Borehole at 1.00 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.9 m below existing site grades during the borehole investigation.				
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH5**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 363.51

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 362.51

**Location:** 676378.6 E 4999814.0 N

**Depth to Water (m):** 1.0

**Location Cont:** 0+222.8 2.8 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.60 m, brown.				
2						
3						
4	1.20	<b>Peat</b>				
5						
6	1.65	<b>End of Borehole at 1.65 m below existing site grades upon refusal on Cobbles.</b> Note: Groundwater infiltration was encountered at 1.0 m below existing site grades during the borehole investigation.				
7						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH6**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 363.41

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 362.51

**Location:** 676380.0 E 4999812.0 N

**Depth to Water (m):** 0.9

**Location Cont:** 0+225.3 2.5 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.60 m, brown.				
2						
3						
4	1.10	<b>Peat</b>				
5						
6						
7	2.10	<b>Silt and Sand</b> Silt and sand, trace of clay and gravel, compact, grey.				
8						
9	2.70	<b>End of Borehole at 2.7 m below existing site grades upon inferred Bedrock.</b> Note: Groundwater infiltration was encountered at 0.9 m below existing site grades during the borehole investigation.				
10						
11						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH7**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 363.99

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 363.09

**Location:** 676422.2 E 4999788.0 N

**Depth to Water (m):** 0.9

**Location Cont:** 0+276.1 0.1 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose, brown.				
2	0.62	<b>Peat</b>				
3	0.94	<b>Sand and Silt</b> Sand and silt, trace of clay, compact, brown. % Passing JC003 4.75 mm = 100.0 75 um = 51.0 5 um = 11.0 MSFH 2 um = 5.0 Moisture Content = 24.6%	JC003	G		
4	1.35	<b>End of Borehole at 1.35 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.9 m below existing site grades during the borehole investigation.				
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH8**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 364.23

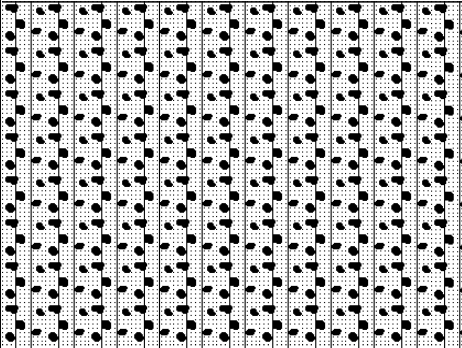
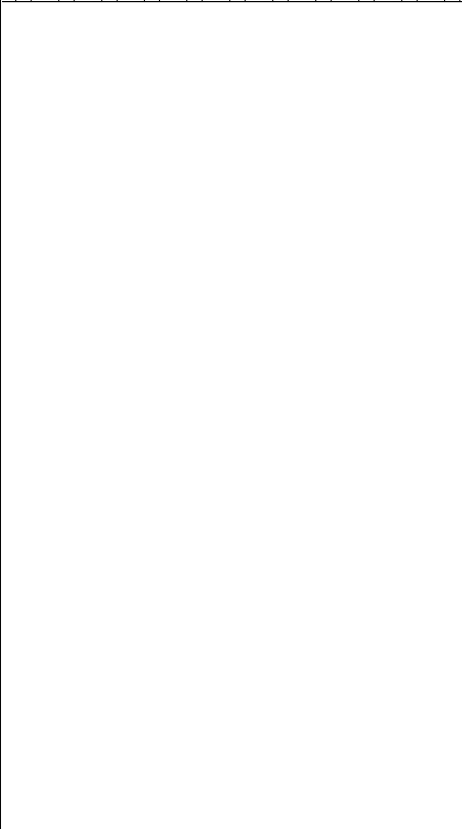
**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676427.1 E 4999736.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+330.7 0.5 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown.				
2	0.60	<b>End of Borehole at 0.6 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH9**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 362.34

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 361.14

**Location:** 676425.9 E 4999689.0 N

**Depth to Water (m):** 1.2

**Location Cont:** 0+379.2 1.2 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles and wood, loose becoming compact at 0.40 m, brown.				
2	0.65					
3		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, compact, brown.				
4	1.20				▼	
5	1.50	<b>Sand and Silt</b> Sand and silt, trace of clay, compact, brown.				
6		<b>End of Borehole at 1.5 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.20 m below existing site grades during the borehole investigation.				

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1





**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## Log of Borehole: BH10

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 366.41

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676465.9 E 4999668.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+424.6 0.3 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose, brown.				
2	0.60					
3		<b>Silty Sand</b> Silty sand, trace of gravel, compact, grey. % Passing JC004 4.75 mm = 93.5 75 um = 30.1 Moisture Content = 9.5%	JC004	G		
4						
5	1.50					
6		<b>End of Borehole at 1.5 m below existing site grades.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
7						
8						
9						
10						
11						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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**Project No.:** R.076951065

## **Log of Borehole: BH11**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 361.57

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 360.37

**Location:** 676504.1 E 4999634.0 N

**Depth to Water (m):** 1.2

**Location Cont:** 0+475.9 4.7 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose, brown.				
2						
3	1.00	<b>Sand and Gravel</b> Sand and gravel, trace of silt and cobbles, compact, red.			▼	
4	1.20	<b>End of Borehole at 1.20 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.0 m below existing site grades during the borehole investigation.				
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1

Project No.: R.076951065

## Log of Borehole: BH12

Project: Little Brother Dam Access Rd Ground Elevation (masl): 360.59

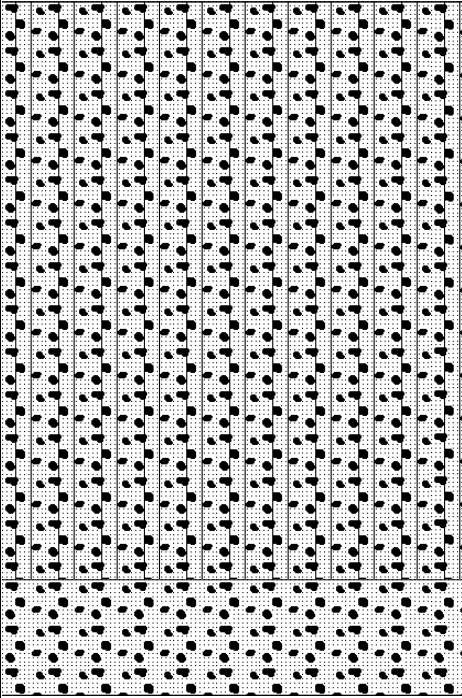
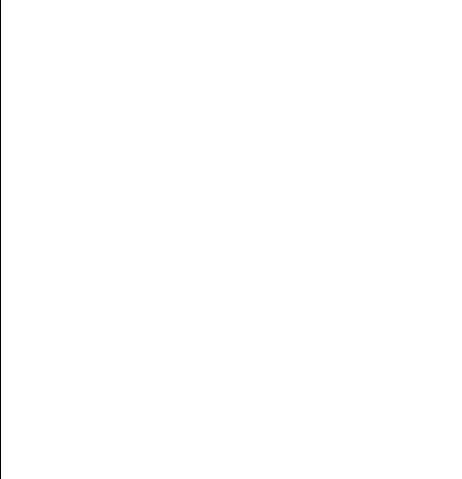
Client: PWGSC/Parks Canada

Water Elevation (masl): 359.59

Location: 676525.0 E 4999585.0 N

Depth to Water (m): 1.0

Location Cont: 0+528.0 6.4 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose, brown.				
2						
3	1.00	<b>Sand and Gravel</b> Sand and gravel, trace of silt and cobbles, compact, red.				
4	1.20	<b>End of Borehole at 1.20 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.0 m below existing site grades during the borehole investigation.				
5						
6						

Drilled By: G.E.T Drilling Ltd.

Project Engineer: Lois-Ann Hayes, P.Eng

Drill Method: Track Mounted CME 55

Project Technician: Joshua Charlton

Drill Date: October 31 - November 1, 2017

Sheet: 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH13**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 357.87

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 356.77

**Location:** 676528.9 E 4999528.0 N

**Depth to Water (m):** 1.1

**Location Cont:** 0+584.3 0.1 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand with Silt</b> Sand with silt, some gravel, trace of cobbles, loose, brown.				
2						
3						
4	1.10	<b>Sand and Gravel</b> Sand and gravel, trace of silt and cobbles, compact, red.	JC005	G		
5	1.35	<b>End of Borehole at 1.35 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.10 m below site grades during the borehole investigation.				
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH14**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 355.88

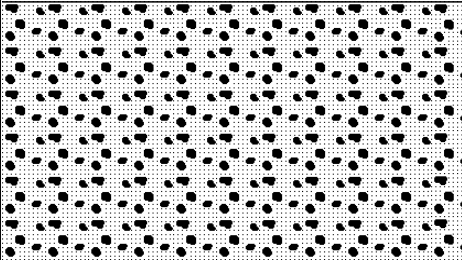
**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676543.6 E 4999489.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+626.7 1.7 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1	0.45	<b>Sand and Gravel</b> Sand and gravel, trace of cobbles, loose, brown. % Passing JC006 4.75 mm = 54.5 75 um = 6.9 Moisture Content = 6.4%	JC006	G		
2		<b>End of Borehole at 0.45 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH15**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 351.97

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676568.6 E 4999472.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+654.7 5.5 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Bedrock at surface. Borehole not completed.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
2						
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH16**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 345.70

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676584.4 E 4999436.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+693.0 8.3 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1	0.50	<b>Sand and Gravel</b> Sand and gravel, trace of cobbles, loose, brown.				
2	0.75	<b>Silty Sand</b> Silty sand, some gravel, loose, brown.				
3		<b>End of Borehole at 0.75 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## Log of Borehole: BH17

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 344.89

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 343.99

**Location:** 676590.9 E 4999423.0 N

**Depth to Water (m):** 0.9

**Location Cont:** 0+707.1 10.9 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Sand and Gravel</b> Sand and gravel, trace of cobbles, loose, brown.				
2	0.60					
3		<b>Silty Sand</b> Silty sand, some gravel, trace of silt and cobbles, compact, brown. % Passing JC007 4.75 mm = 87.8 75 um = 32.2 Moisture Content = 17.9%	JC007	G	▼	
4	1.20					
5		<b>End of Borehole at 1.20 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.9 m below site grades during the borehole investigation.				
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1





**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH18**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 343.85

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 343.85

**Location:** 676590.0 E 4999396.0 N

**Depth to Water (m):** Surface

**Location Cont:** 0+732.6 2.4 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface			▼	
0	0.10	<b>Topsoil</b> Sandy silt, trace of clay and rootlets, loose, brown.				
1		<b>End of Borehole at 0.10 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at surface during the borehole investigation.				
2						
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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**Project No.:** R.076951065

## **Log of Borehole: BH19**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 341.37

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 341.37

**Location:** 676595.8 E 4999378.0 N

**Depth to Water (m):** Surface

**Location Cont:** 0+751.1 3.5 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface			▼	
		<b>Topsoil</b> Sandy silt, trace of clay and rootlets, loose, brown.				
0.20						
1		<b>Sand some Gravel</b> Sand some gravel and silt, trace of cobbles, loose, wet, brown.				
0.75						
3		<b>End of Borehole at 0.75 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at surface during the borehole investigation.				
1						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1

**Project No.:** R.076951065

## **Log of Borehole: BH20**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 339.94

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 339.94

**Location:** 676591.3 E 4999365.0 N

**Depth to Water (m):** Surface

**Location Cont:** 0+763.0 2.5 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface			▼	
		<b>Topsoil</b> Sandy silt, trace of clay and rootlets, loose, brown.				
1	0.30					
		<b>End of Borehole Log at 0.30 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at surface during the borehole investigation.				
2						
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
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K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH21**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 338.13

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 336.93

**Location:** 676593.0 E 4999357.0 N

**Depth to Water (m):** 1.2

**Location Cont:** 0+771.9 1.1 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
2	0.60					
3		<b>Sand</b> Sand with silt, trace of gravel, compact, brown. % Passing JC008 4.75 mm = 99.9 75 um = 24.4 Moisture Content = 28.1%	JC008	G		
4	1.20					
5		<b>End of Borehole at 1.20 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.20 m below existing site grades during the borehole investigation.				
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH22**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 336.82

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 335.82

**Location:** 676610.8 E 4999334.0 N

**Depth to Water (m):** 1.0

**Location Cont:** 0+802.2 3.4 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
2						
3						
4	1.00	<b>Sand</b> Sand with silt, trace of gravel, compact, brown.			▼	
5	1.50	<b>End of Borehole at 1.50 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.00 m below existing site grades during the borehole investigation.				
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1

Project No.: R.076951065

## Log of Borehole: BH23

Project: Little Brother Dam Access Rd Ground Elevation (masl): 337.63

Client: PWGSC/Parks Canada

Water Elevation (masl): 337.18

Location: 676623.5 E 4999322.0 N

Depth to Water (m): 0.45

Location Cont: 0+816.9 7.0 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
2	0.60	<b>End of Borehole at 0.60 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.45 m below existing site grades during the borehole investigation.				
3						
4						
5						
6						

Drilled By: G.E.T Drilling Ltd.

Project Engineer: Lois-Ann Hayes, P.Eng

Drill Method: Track Mounted CME 55

Project Technician: Joshua Charlton

Drill Date: October 31 - November 1, 2017

Sheet: 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH24**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 337.16

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676624.2 E 4999309.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+827.5 5.1 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
2	0.60					
3		<b>End of Borehole at 0.60 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH25**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 336.63

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676616.2 E 4999296.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+841.0 0.8 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1	0.40	<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
2		<b>End of Borehole at 0.40 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1





**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## Log of Borehole: BH26

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 338.59

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 337.74

**Location:** 676616.5 E 4999279.0 N

**Depth to Water (m):** 0.85

**Location Cont:** 0+857.5 0.3 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0 ft 0 m	0.00	Ground Surface				
1	0.40	<b>Topsoil</b> Sandy silt, trace of clay, cobbles and organincs, loose, brown.	JC009	G	▼	
2		<b>Sandy Silt</b> Sandy silt, trace of clay, cobbles and organincs, loose, brown. % Passing JC009 4.75 mm = 100.0 75 um = 66.0 5 um = 14.0 MSFH 2 um = 7.0 Moisture Content = 24.6%				
3	1.20					
4	1.50	<b>Till</b> Sand with silt, some gravel, compact, brown.				
5		<b>End of Borehole at 1.5 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.85 m below existing site grades during the borehole investigation.				
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## Log of Borehole: BH27

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 340.49

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 339.39

**Location:** 676624.1 E 4999262.0 N

**Depth to Water (m):** 1.1

**Location Cont:** 0+876.3 0.4 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1	0.45	<b>Topsoil</b> Sandy silty, trace of clay cobbles and rootlets, loose, brown.				
2		<b>Till</b> Sand with silt, some gravel, compact, brown. % Passing JC010 4.75 mm = 85.3 75 um = 21.2 Moisture Content = 13.9%	JC010	G		
3						
4	1.20	<b>End of Borehole at 1.2 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.10 m below existing site grades during the borehole investigation.				
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH28**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 340.11

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 339.51

**Location:** 676632.1 E 4999250.0 N

**Depth to Water (m):** 0.6

**Location Cont:** 0+890.6 0.7 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
	0.10	<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
1		<b>Till</b> Sand with silt, some gravel, loose becoming compact at 0.6 m, brown.				
2						
	0.75	<b>End of Borehole at 0.75 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.6 m below existing site grades during the borehole investigation.				
3						
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1

Project No.: R.076951065

## Log of Borehole: BH29

Project: Little Brother Dam Access Rd Ground Elevation (masl): 339.47

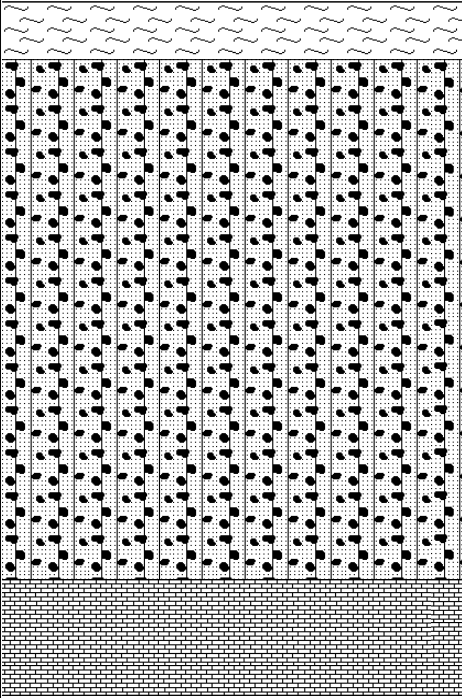
Client: PWGSC/Parks Canada

Water Elevation (masl): NA

Location: 676642.9 E 4999240.0 N

Depth to Water (m): NA

Location Cont: 0+905.5 0.4 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
	0.10	<b>Topsoil</b> Sandy silt, trace of clay cobbles and rootlets, loose, brown.				
1		<b>Till</b> Sand with silt, some gravel, loose becoming compact at 0.6 m, brown.				
3	1.00					
4	1.20	<b>Weathered Bedrock</b>				
5		<b>End of Borehole at 1.20 m below existing site grades within inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
6						

Drilled By: G.E.T Drilling Ltd.

Project Engineer: Lois-Ann Hayes, P.Eng

Drill Method: Track Mounted CME 55

Project Technician: Joshua Charlton

Drill Date: October 31 - November 1, 2017

Sheet: 1 of 1

Project No.: R.076951065

## Log of Borehole: BH30

Project: Little Brother Dam Access Rd Ground Elevation (masl): 337.43

Client: PWGSC/Parks Canada

Water Elevation (masl): NA

Location: 676652.8 E 4999229.0 N

Depth to Water (m): NA

Location Cont: 0+920.6 0.6 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
	0.10	<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
1		<b>Till</b> Sand with silt, some gravel, loose, brown.	JC011	G		
3	0.90	<b>End of Borehole at 0.90 m below existing site grades within inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
4						
5						
6						

Drilled By: G.E.T Drilling Ltd.

Project Engineer: Lois-Ann Hayes, P.Eng

Drill Method: Track Mounted CME 55

Project Technician: Joshua Charlton

Drill Date: October 31 - November 1, 2017

Sheet: 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH31**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 336.90

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676658.3 E 4999226.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+924.9 4.3 m Lt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
	0.10	<b>Topsoil</b> Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
1		<b>Till</b> Sand with silt, some gravel, loose becoming compact at 0.45 m, brown.				
2						
3						
4	1.00	<b>End of Borehole at 1.00 m below existing site grades within inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH32**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 336.08

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676657.4 E 4999211.0 N

**Depth to Water (m):** NA

**Location Cont:** 0+938.5 0.0 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1	0.50	<b>Silty Sand</b> Silty sand, trace of gravel and cobbles, loose, brown.	JC012	G		
2	0.75	<b>Silt and Sand</b> Silt and sand, trace of clay and gravel, compact, brown.	JC013	G		
3		<b>End of Borehole at 0.75 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH33**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 335.24

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 334.14

**Location:** 676662.5 E 4999190.0 N

**Depth to Water (m):** 1.1

**Location Cont:** 0+961.0 0.2 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Silty Sand</b> Silty sand, trace of gravel and cobbles, loose, brown.				
2	0.65					
3		<b>Silt and Sand</b> Silt and sand, trace of gravel and clay, compact, brown.				
4	1.10					
5		<b>End of Borehole at 1.10 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 1.10 m below site grades during the borehole investigation.				
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1





**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH34**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 333.54

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** 333.09

**Location:** 676672.8 E 4999162.0 N

**Depth to Water (m):** 0.45

**Location Cont:** 0+990.5 0.1 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Silty Sand</b> Silty sand, trace of gravel and cobbles, loose, brown.				
	0.45				▼	
2	0.60	<b>Silt and Sand</b> Silt and sand, trace of gravel and clay, compact, brown.				
3		<b>End of Borehole at 0.60 m below existing site grades upon inferred bedrock.</b> Note: Groundwater infiltration was encountered at 0.45 m below site grades during the borehole investigation.				
4						
5						
6						

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1



**Ainley Group**  
1-50 Grant Timmins Drive  
Kingston, Ontario  
K7M 8N2

**Project No.:** R.076951065

## **Log of Borehole: BH35**

**Project:** Little Brother Dam Access Rd **Ground Elevation (masl):** 333.54

**Client:** PWGSC/Parks Canada

**Water Elevation (masl):** NA

**Location:** 676672.75 E 4999161.92 N

**Depth to Water (m):** NA

**Location Cont:** 1+005 0.0 m Rt

SUBSURFACE PROFILE			SAMPLE			Symbol Log
Depth	Elevation	Description	Number	Type	Groundwater	
0	0.00	Ground Surface				
1		<b>Silty Sand</b> Silty sand, trace of gravel and cobbles, loose, brown. % Passing JC014 4.75 mm = 98.6 75 um = 30.2 Moisture Content = 17.3%	JC014	G		
2	0.60					
3		<b>Silt and Sand</b> Silt and sand, trace of gravel and clay, compact, brown. % Passing JC015 4.75 mm = 100.0 75 um = 51.0 5 um = 11.0 MSFH 2 um = 5.0 Moisture Content = 7.3 %	JC015	G		
4						
5	1.50					
6		<b>End of Borehole at 1.50 m below existing site grades.</b> Note: Groundwater infiltration was not encountered during the borehole investigation.				

**Drilled By:** G.E.T Drilling Ltd.

**Project Engineer:** Lois-Ann Hayes, P.Eng

**Drill Method:** Track Mounted CME 55

**Project Technician:** Joshua Charlton

**Drill Date:** October 31 - November 1, 2017

**Sheet:** 1 of 1

## **Appendix B**

### **Grain Size Distribution Results**

Lab # 17287

Client: Ainley

Project Name: 15550-2 Little Brother Dam

Date: October 31,2017

SAMPLE INFORMATION	SAMPLE	MASS OF SAMPLE WET & TARE (g)	MASS OF SAMPLE DRY & TARE (g)	MASS OF WATER (g)	MASS OF DRY SOIL (g)	MASS OF TARE (g)	MOISTURE CONTENT (%)
JC001	A	647.6	605.4	42.2	467.5	137.9	9.0
JC003	B	523.2	440.9	82.3	335	105.9	24.6
JC004	C	425.2	388.6	36.6	384.5	78.6	9.5
JC006	D	680.3	647.3	33	512.9	134.4	6.4
JC007	E	478.9	426.4	52.5	293.2	133.2	17.9
JC008	F	578.6	476.1	102.5	365.3	110.8	28.1
JC009	G	674.6	568.3	106.3	432.8	135.5	24.6
JC010	H	621.9	562.1	59.8	431.5	130.6	13.9
JC014	I	510.1	450.7	59.4	343.2	107.5	17.3
JC015	J	565.4	535.9	29.5	404.9	131	7.3



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1164 Clyde Court

Kingston, Ontario K7P 2E4

(613) 389-178 (613) 389-4204

## Grain Size Analysis Test Report

**Project No.:** 17-1690-20

**Project Description:** Little Brother Dam 15550-2

**Date:** Nov 20, 2017

**Project Location:**

**Contract No.:**

### SAMPLE DATA

**Material:** Subsoil

**Date Sampled:** Oct 31, 2017

**Time Sampled:**

**Sample Type:** Borehole

**Sample Location:** JC001 BH#1 0.1-0.5M

**Lot:** Sublot:

**Source:** Ainley

**Sampled By:** Client

### LAB DATA

**Lab No.:** 17287-A

**Date Tested:** Nov 20, 2017

**Specification:**

### PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

### WASH PASS 0.075mm

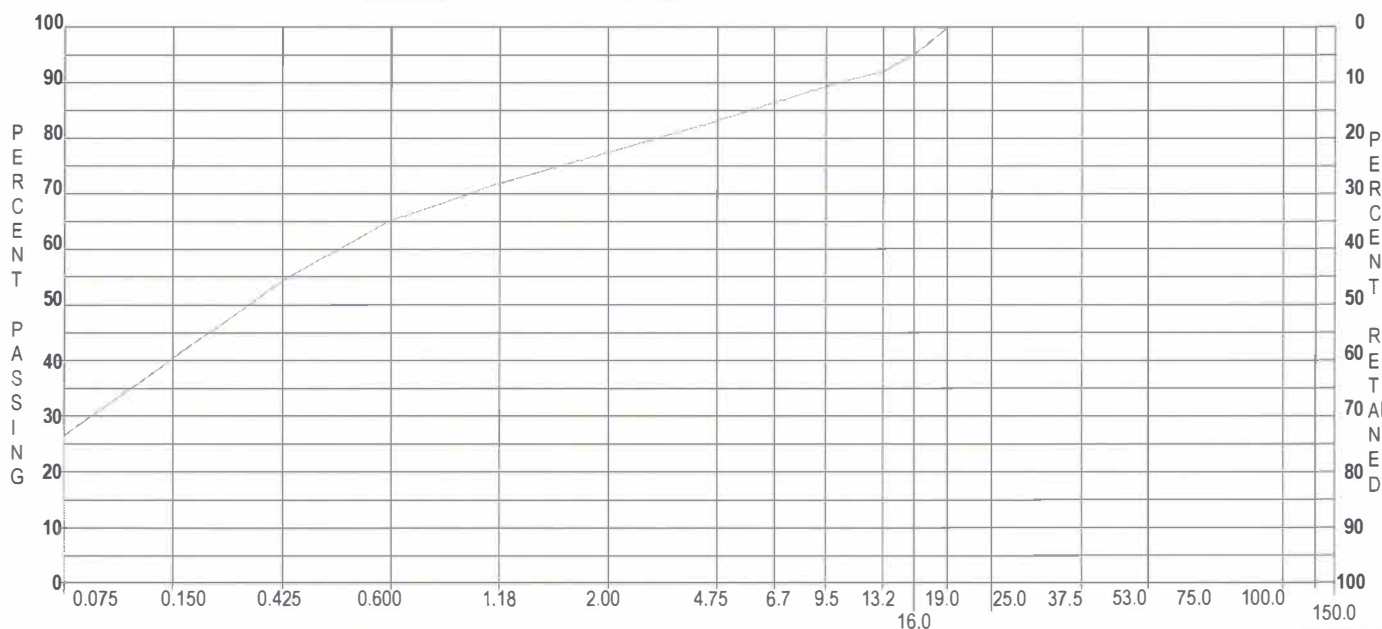
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	1.95	

**Comments:** Moisture Content is 9.0%

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5		
25.0		
19.0	100	
16.0	95.3	
13.2	92.1	
9.5	89.6	
6.7		
4.75	83.2	
2.36	78.3	
2.00		
1.18	71.9	
0.600	65.3	
0.425		
0.300	54.3	
0.150	40.4	
0.075	26.4	

\* Indicates Out of Specification

**Sample:** \_\_\_\_\_ **Specs:** \_\_\_\_\_



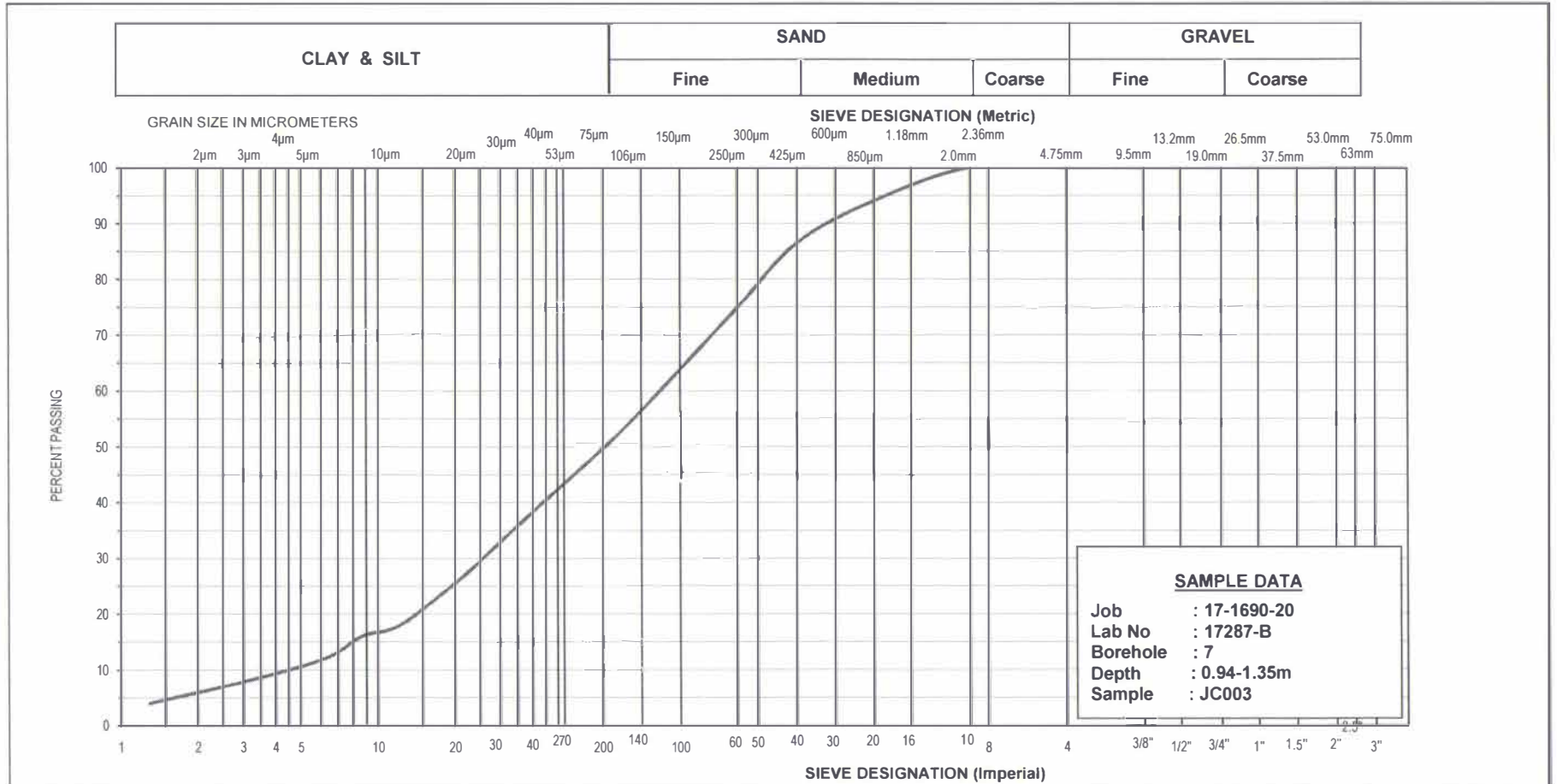
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Project Manager: Mark McClelland, C.E.T.

Infrastructure



## UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	0	0	14	37	45	5

<b>SNC-LAVALIN</b> 1164 Clyde Court Kingston, Ontario K7P 2E4	<b>GRAIN SIZE DISTRIBUTION</b>		Client: Ainley	
	<b>SILT SAND</b>  <b>Trace Clay</b>		Project: 15550-2	
			Location: Litte Brother Dam	
			Date: October 31, 2017	Moisture Content is 24.6%



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1164 Clyde Court

Kingston, Ontario K7P 2E4

(613) 389-178

(613) 389-4204

## Grain Size Analysis Test Report

**Project No.:** 17-1690-20

**Project Description:** Little Brother Dam 15550-2

**Date:** Nov 20, 2017

**Project Location:**

**Contract No.:**

### SAMPLE DATA

**Material:** Subsoil

**Date Sampled:** Oct 31, 2017

**Time Sampled:**

**Sample Type:** Borehole

**Sample Location:** JC004 BH#10 0.6-1.5M

**Lot:** Sublot:

**Source:** Ainley

**Sampled By:** Client

### LAB DATA

**Lab No.:** 17287-C

**Date Tested:** Nov 20, 2017

**Specification:**

### PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

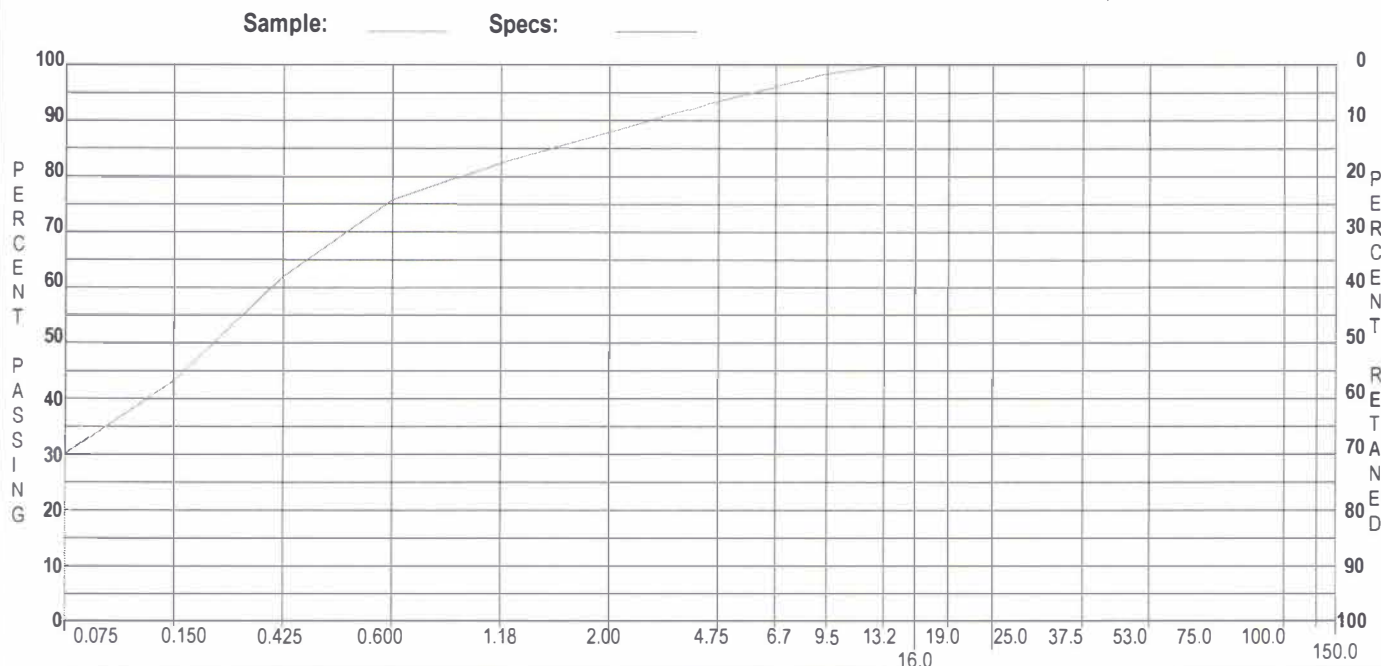
### WASH PASS 0.075mm

TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	1.45	

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5		
25.0		
19.0		
16.0		
13.2	100	
9.5	98.6	
6.7		
4.75	93.5	
2.36	88.9	
2.00		
1.18	82.4	
0.600	75.7	
0.425		
0.300	62	
0.150	43.1	
0.075	30.1	

\* Indicates Out of Specification

**Comments:** Moisture Content is 9.5%



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Project Manager: Mark McClelland, C.E.T.

Infrastructure







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Kingston, Ontario K7P 2E4

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## Grain Size Analysis Test Report

**Project No.:** 17-1690-20

**Project Description:** Little Brother Dam 15550-2

**Date:** Nov 20, 2017

**Project Location:**

**Contract No.:**

### SAMPLE DATA

**Material:** Subsoil

**Date Sampled:** Oct 31, 2017

**Time Sampled:**

**Sample Type:** Borehole

**Sample Location:** JC006 BH#14 0-0.45

**Lot:** Sublot:

**Source:** Ainley

**Sampled By:** Client

### LAB DATA

**Lab No.:** 17287-D

**Date Tested:** Nov 20, 2017

**Specification:**

### PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

### WASH PASS 0.075mm

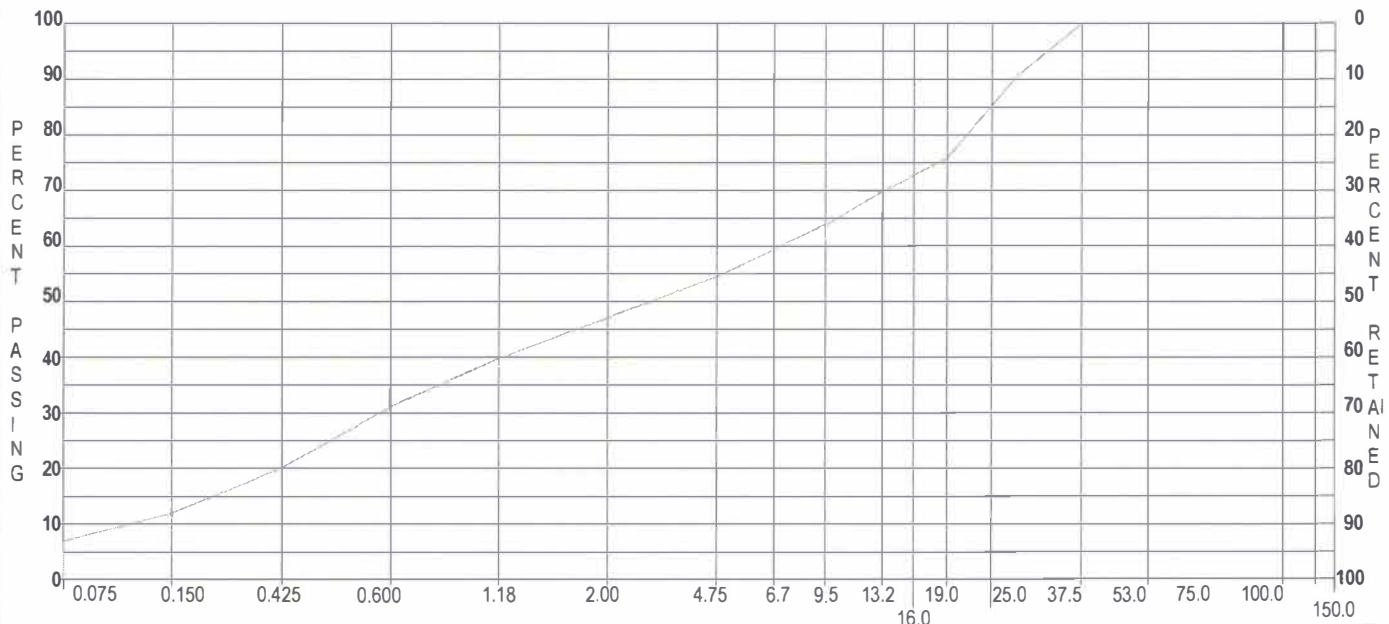
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	4.03	

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5	100	
26.5	90.7	
25.0		
19.0	75.9	
16.0	72.8	
13.2	69.9	
9.5	64.1	
6.7		
4.75	54.5	
2.36	48	
2.00		
1.18	39.7	
0.600	31	
0.425		
0.300	20.1	
0.150	11.9	
0.075	6.9	

\* Indicates Out of Specification

**Comments:** Moisture Content is 6.4%

**Sample:** \_\_\_\_\_ **Specs:** \_\_\_\_\_



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**Project Manager:** Mark McClelland, C.E.T.

Infrastructure







**SNC • LAVALIN**

SNC-Lavalin GEM Ontario Inc.

1164 Clyde Court

Kingston, Ontario K7P 2E4

(613) 389-178

(613) 389-4204

## Grain Size Analysis Test Report

Project No.: 17-1690-20 Project Description: Little Brother Dam 15550-2

Date: Nov 20, 2017

Project Location:

Contract No.:

### SAMPLE DATA

Material: Subsoil  
Date Sampled: Oct 31, 2017  
Time Sampled:  
Sample Type: Borehole  
Sample Location: JC007 BH#17 0.6-1.2M  
Lot: Sublot:  
Source: Ainley  
Sampled By: Client

### LAB DATA

Lab No.: 17287-E Date Tested: Nov 20, 2017

Specification:

### PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

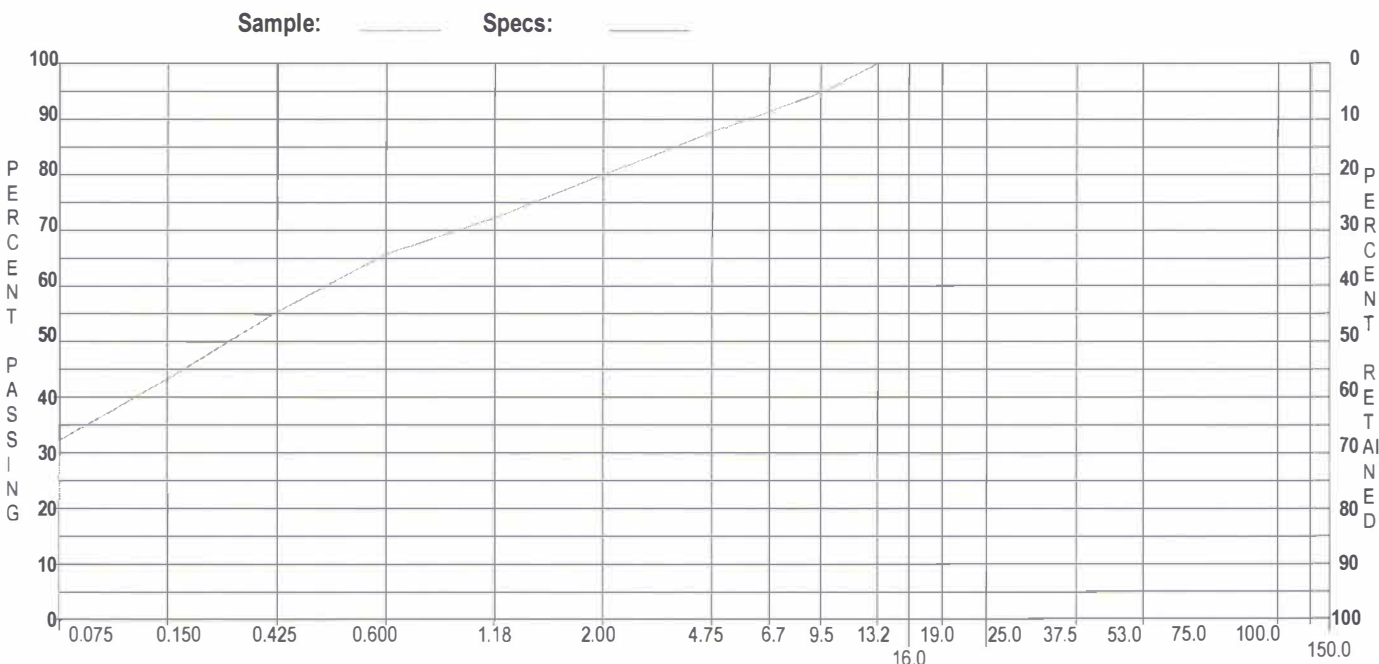
### WASH PASS 0.075mm

TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	1.80	

Comments: Moisture Content is 17.9%

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5		
25.0		
19.0		
16.0		
13.2	100	
9.5	95.1	
6.7		
4.75	87.8	
2.36	80	
2.00		
1.18	72.3	
0.600	65.8	
0.425		
0.300	55.4	
0.150	43.3	
0.075	32.2	

\* Indicates Out of Specification



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Project Manager: Mark McClelland, C.E.T.

Infrastructure





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1164 Clyde Court

Kingston, Ontario K7P 2E4

(613) 389-178

(613) 389-4204

## Grain Size Analysis Test Report

**Project No.:** 17-1690-20 **Project Description:** Little Brother Dam 15550-2

**Date:** Nov 20, 2017

**Project Location:**

**Contract No.:**

### SAMPLE DATA

**Material:** Subsoil

**Date Sampled:** Oct 31, 2017

**Time Sampled:**

**Sample Type:** Borehole

**Sample Location:** JC008 BH#21 0.6-1.2M

**Lot:** Sublot:

**Source:** Ainley

**Sampled By:** Client

### LAB DATA

**Lab No.:** 17287-F

**Date Tested:** Nov 20, 2017

**Specification:**

### PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

### WASH PASS 0.075mm

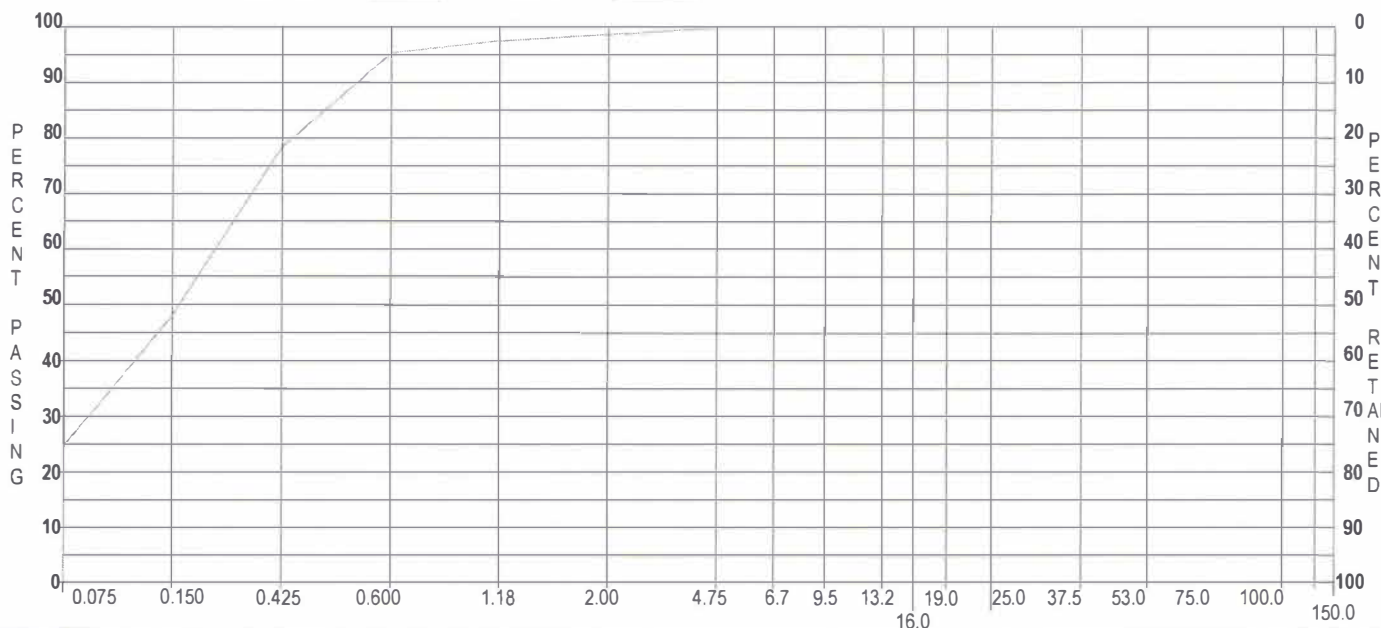
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	0.81	

**Comments:** Moisture Content is 28.1%

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5		
25.0		
19.0		
16.0		
13.2		
9.5	100	
6.7		
4.75	99.9	
2.36	99.8	
2.00		
1.18	97.5	
0.600	95.3	
0.425		
0.300	78.5	
0.150	48.1	
0.075	24.4	

\* Indicates Out of Specification

**Sample:** \_\_\_\_\_ **Specs:** \_\_\_\_\_



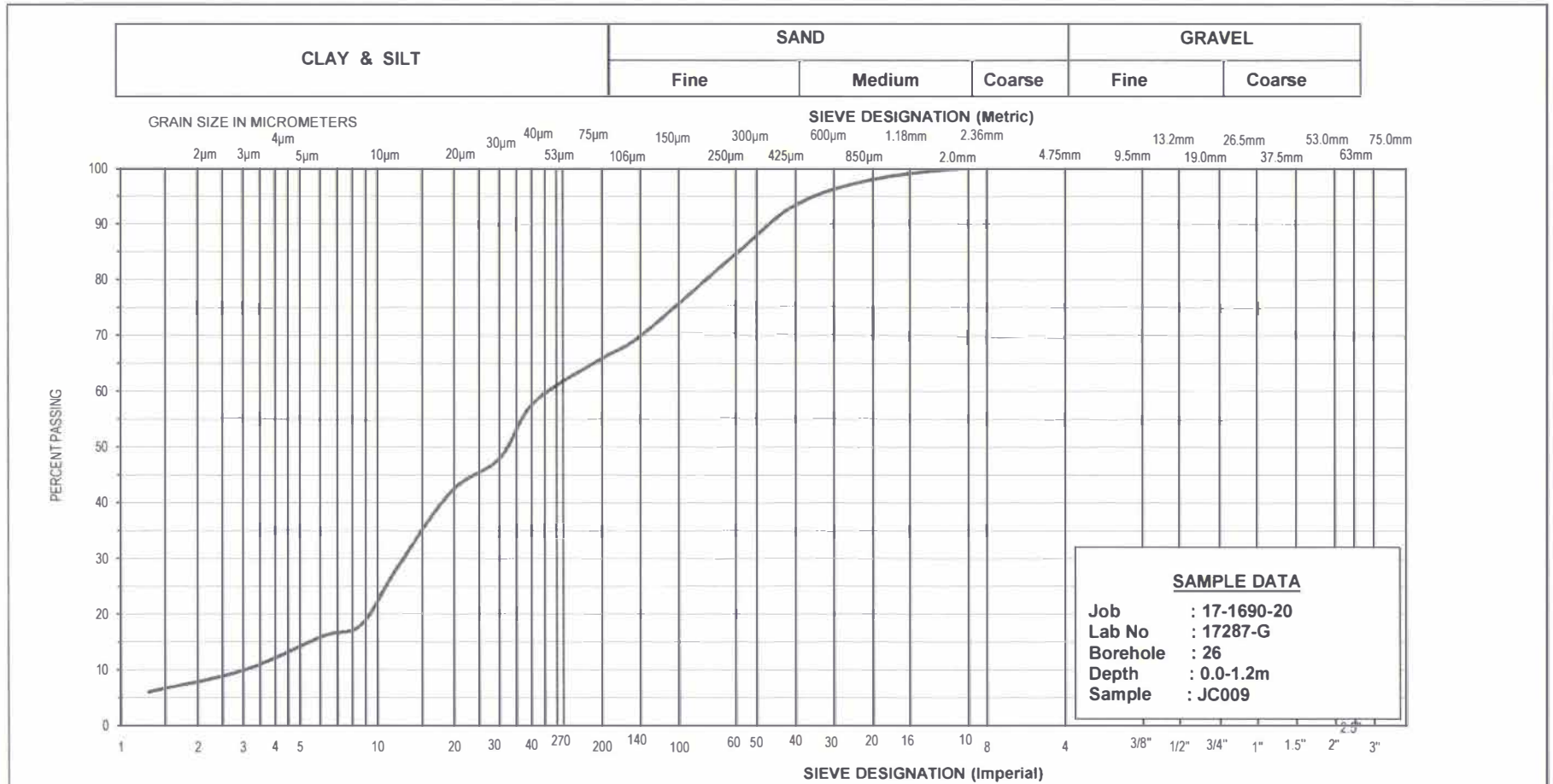
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**Project Manager:** Mark McClelland, C.E.T.

Infrastructure



## UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	0	0	7	28	59	7

<b>SNC-LAVALIN</b> 1164 Clyde Court Kingston, Ontario K7P 2E4	<b>GRAIN SIZE DISTRIBUTION</b>		Client: Ainley	
	<b>SANDY SILT</b>		Project: 15550-2	
	<b>Trace Clay</b>		Location: Litte Brother Dam	
			Date: October 31, 2017	Moisture Content is 24.6%



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Kingston, Ontario K7P 2E4

(613) 389-178

(613) 389-4204

## Grain Size Analysis Test Report

**Project No.:** 17-1690-20 **Project Description:** Little Brother Dam 15550-2

**Date:** Nov 20, 2017

**Project Location:**

**Contract No.:**

### SAMPLE DATA

**Material:** Subsoil

**Date Sampled:** Oct 31, 2017

**Time Sampled:**

**Sample Type:** Borehole

**Sample Location:** JC010 BH#27 0.45-1.2M

**Lot:** **Sublot:**

**Source:** Ainley

**Sampled By:** Client

### LAB DATA

**Lab No.:** 17287-H

**Date Tested:** Nov 20, 2017

**Specification:**

### PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

### WASH PASS 0.075mm

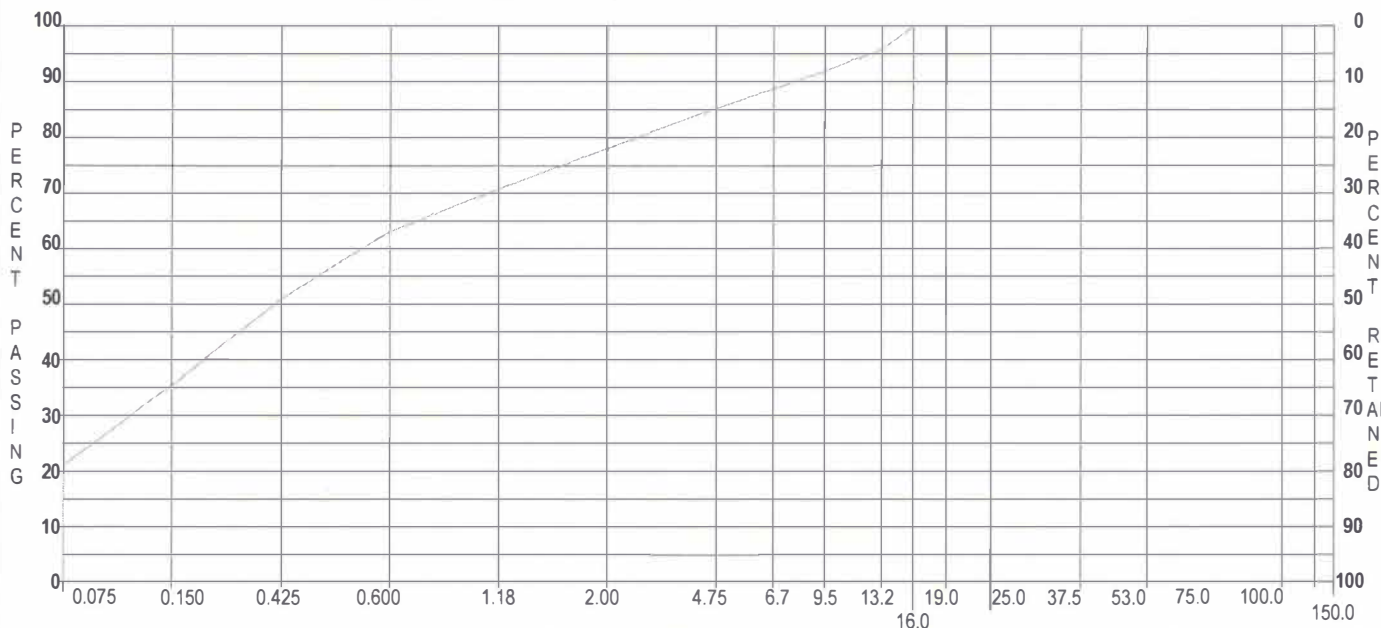
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	2.02	

**Comments:** Moisture Content is 13.9%

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5		
25.0		
19.0		
16.0	100	
13.2	95.9	
9.5	92.2	
6.7		
4.75	85.3	
2.36	79.1	
2.00		
1.18	70.8	
0.600	63.2	
0.425		
0.300	50.9	
0.150	35.4	
0.075	21.2	

\* Indicates Out of Specification

**Sample:** **Specs:**



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**Project Manager:** Mark McClelland, C.E.T.

Infrastructure





**SNC • LAVALIN**

**SNC-Lavalin GEM Ontario Inc.**

1164 Clyde Court

Kingston, Ontario K7P 2E4

(613) 389-178 (613) 389-4204

## Grain Size Analysis Test Report

**Project No.:** 17-1690-20 **Project Description:** Little Brother Dam 15550-2

**Date:** Nov 20, 2017

**Project Location:**

**Contract No.:**

### SAMPLE DATA

**Material:** Subsoil  
**Date Sampled:** Oct 31, 2017  
**Time Sampled:**  
**Sample Type:** Borehole  
**Sample Location:** JC014 BH#35 0.0-0.6M  
**Lot:** **Sublot:**  
**Source:** Ainley  
**Sampled By:** Client

### LAB DATA

**Lab No.:** 17287-I **Date Tested:** Nov 20, 2017

**Specification:**

### PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

### WASH PASS 0.075mm

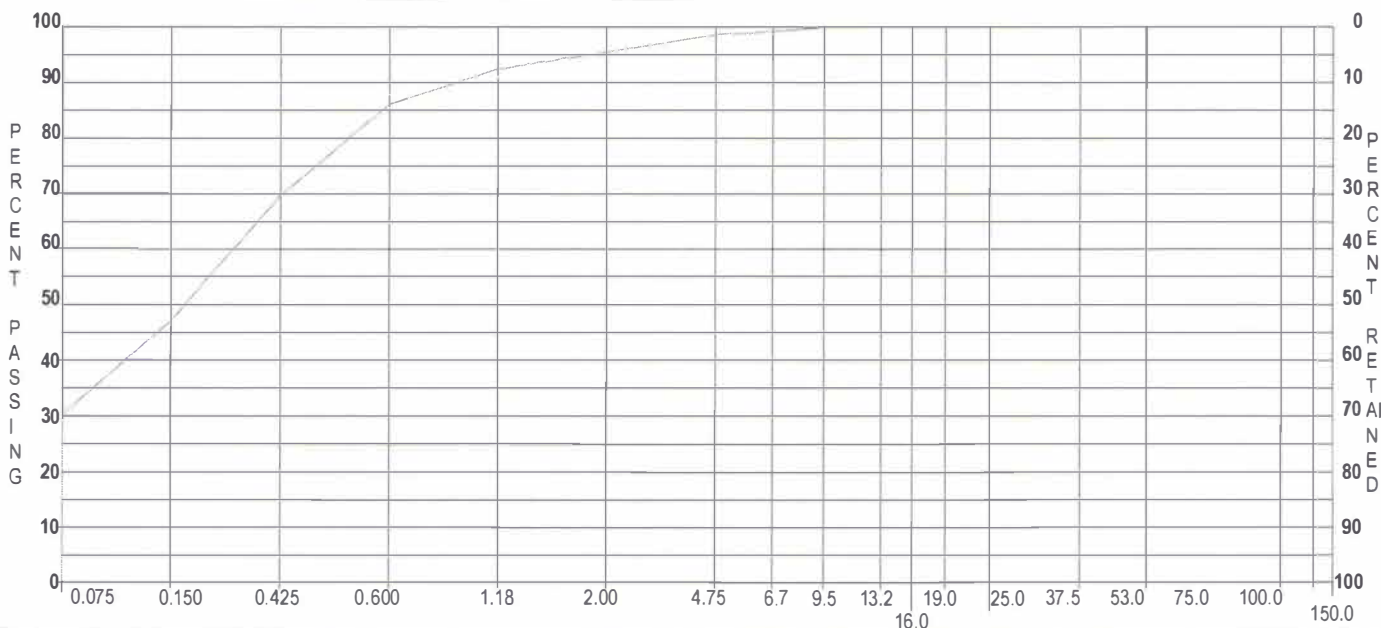
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	1.06	

**Comments:** Moisture Content is 17.3%

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5		
25.0		
19.0		
16.0		
13.2		
9.5	100	
6.7		
4.75	98.6	
2.36	96.4	
2.00		
1.18	92.5	
0.600	86.2	
0.425		
0.300	69.7	
0.150	47.1	
0.075	30.2	

\* Indicates Out of Specification

**Sample:** **Specs:**



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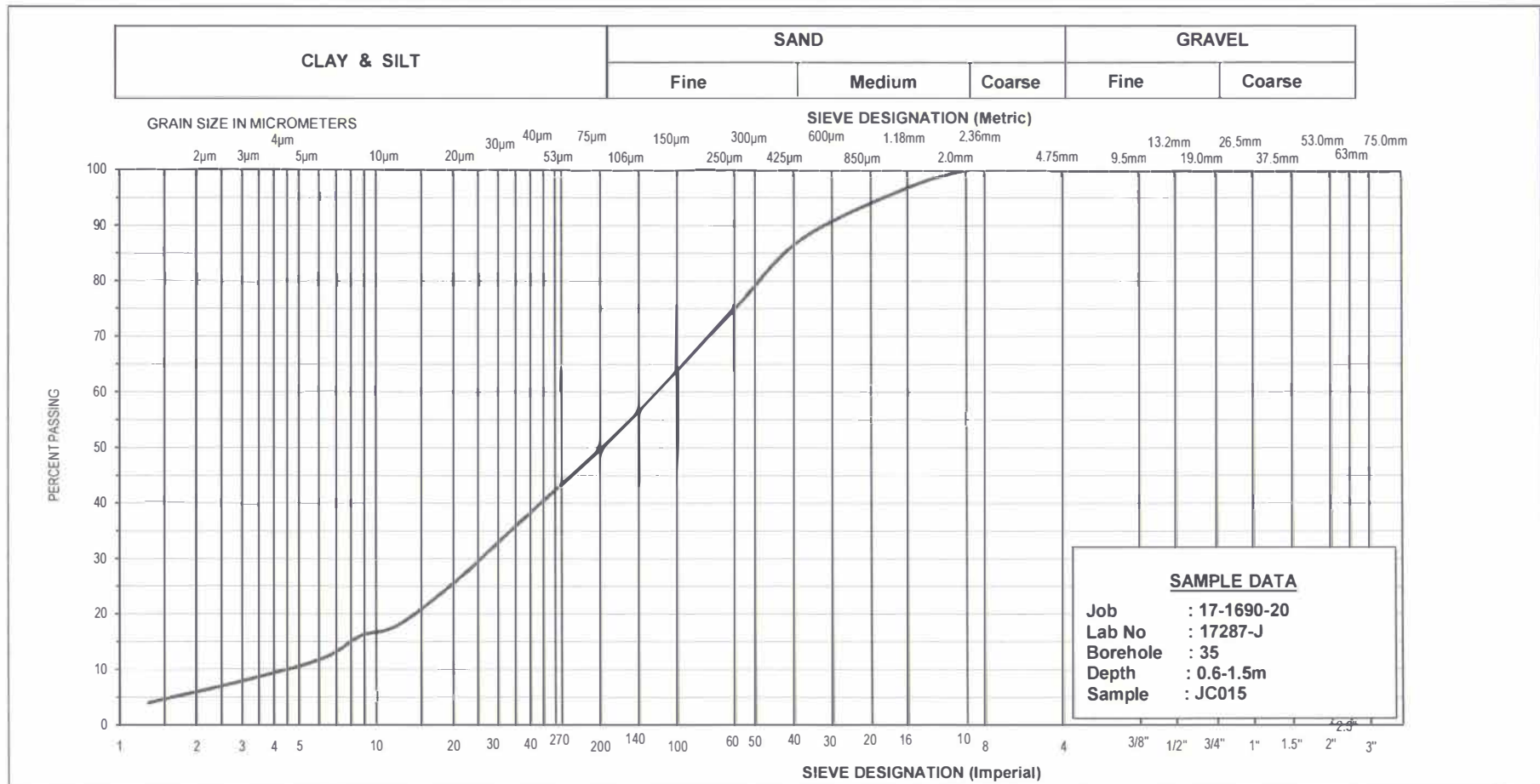
**Project Manager:** Mark McClelland, C.E.T.

Infrastructure





## UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	0	0	14	37	45	5

<b>SNC-LAVALIN</b> 1164 Clyde Court Kingston, Ontario K7P 2E4	<b>GRAIN SIZE DISTRIBUTION</b>		Client: Ainley	
	<b>SILT SAND</b>		Project: 15550-2	
	<b>Trace Clay</b>		Location: Litte Brother Dam	
			Date: October 31,2017	Moisture Content is 7.3%



Public Works  
Government Services  
Canada

Architectural and  
Engineering Services

Ontario Region

Travaux publics  
Services gouvernementaux  
Canada

Services d'architecture  
et de génie

Région de l'Ontario

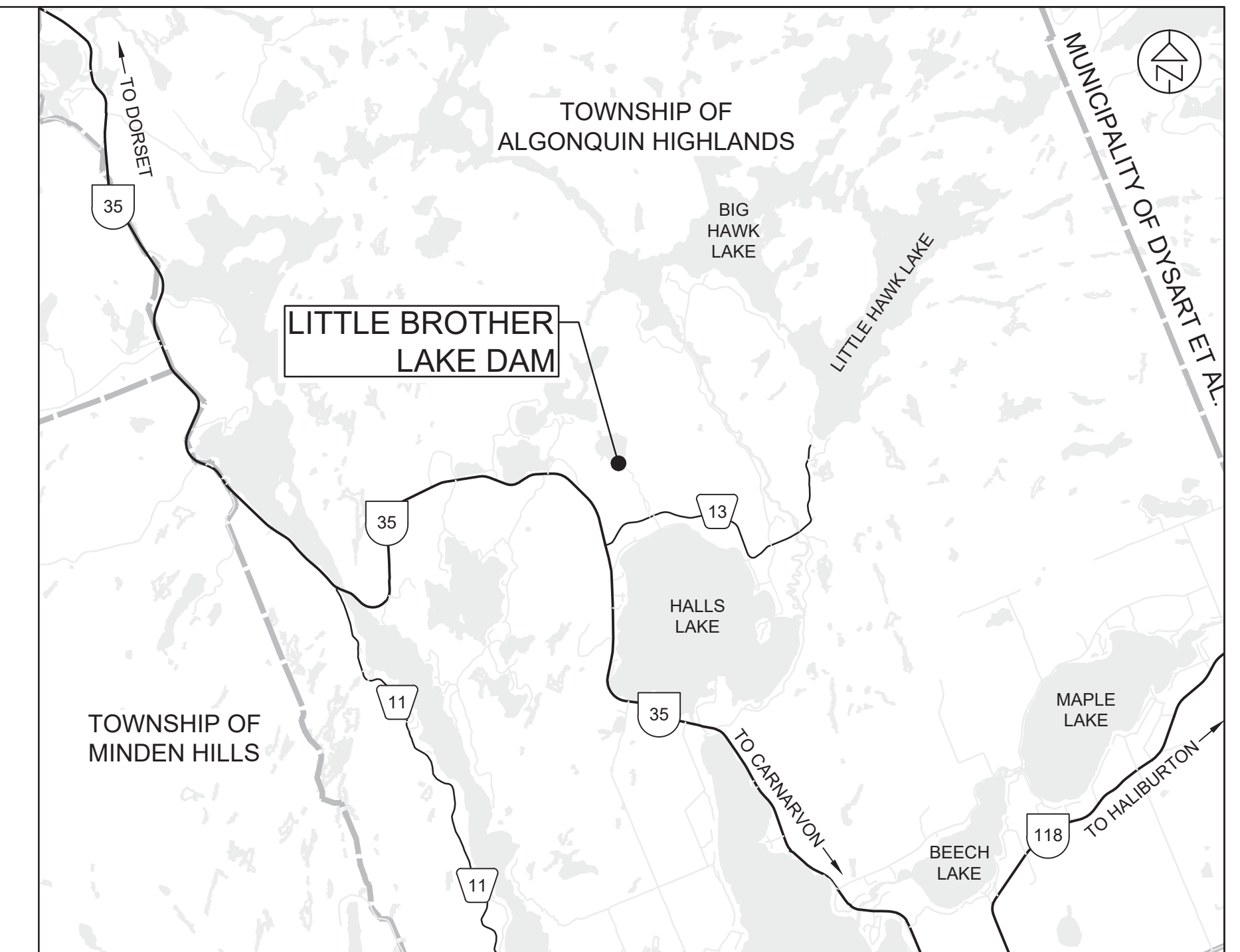
MINDEN ONTARIO

PARKS CANADA  
TOWNSHIP OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON

LITTLE BROTHER LAKE DAM  
ACCESS ROAD

R.076951.170

Canada



KEY PLAN  
N.T.S.

## LIST OF DRAWINGS

### CIVIL

- 000 - COVER SHEET
- 100 - LEGEND AND ABBREVIATIONS
- 101 - HORIZONTAL ALIGNMENT
- 200 - REMOVALS AND ENVIRONMENTAL MITIGATION STA. 0+000 TO 0+500
- 201 - REMOVALS AND ENVIRONMENTAL MITIGATION STA. 0+500 TO 1+012
- 202 - ENVIRONMENTAL MITIGATION DETAILS
- 300 - NEW CONSTRUCTION STA. 0+000 TO 0+250
- 301 - NEW CONSTRUCTION STA. 0+250 TO 0+500
- 302 - NEW CONSTRUCTION STA. 0+500 TO 0+750
- 303 - NEW CONSTRUCTION STA. 0+750 TO 1+012
- 400 - TYPICAL SECTIONS
- 401 - DETAILS
- 500 TO 512 - CROSS SECTIONS

EXISTING MONUMENT FEATURES

■ CM	CONCRETE MONUMENT
■ SIB	STANDARD IRON BAR
■ SSIB	SHORT STANDARD IRON BAR
■ RB	ROCK BAR
■ RP	ROCK POST
■ RPL	ROCK PLUG
■ RIB	ROUND IRON BAR
■ CC	CUT CROSS
■ CP	CONCRETE PIN
■ IB	IRON BAR
○ PK	SPIKE, NAIL, ROCK RIVET, ETC.
← ⊙ BM	BENCH MARK
● HCP	HORIZONTAL PROJECT CONTROL POINT
△ HCM	PRIMARY HORIZONTAL CONTROL MONUMENT

EXISTING UTILITY FEATURES

⚡ AN	ANCHOR FOR POLE
○ B	BELL POLE
○ B&H	BELL & HYDRO POLE
○ H	HYDRO POLE
○ LS	LIGHT STANDARD
○ PO	POLE OTHER
○ PW	POLE WELL (CRIB)
□ TB	TERMINAL BOX
○ W	WELL

REMOVALS

	CULVERT REMOVAL
	AREA TO BE CLEARED AND GRUBBED (NOTE 1)
	AREA TO BE SCARIFIED

NEW CONSTRUCTION PLAN FEATURES

	DITCHES, V TYPE INCL. DRAINAGE DIRECTION
	DITCHES, FLAT BOTTOM INCL. DRAINAGE DIRECTION
	RIP RAP
	ROCK OUTLINE (EXPOSED ROCK)
	EDGE OF GRAVEL ROAD
	TOE OF FILL SLOPE
	TOP OF CUT SLOPE

EXISTING GROUND FEATURES

	TOP OF ROCK CUT
	BOTTOM OF ROCK CUT
	ROCK OUTLINE / ROCK OUTCROP

EXISTING ROADWAY FEATURES

	EDGE OF SHOULDER
	GRAVEL ENTRANCE
	UNPAVED SIDEROAD

EXISTING BARRIER FEATURES

	GATE
	GUIDE RAIL
	FENCE LINE

EXISTING MISCELLANEOUS FEATURES

✦ BO	BOREHOLE
⚡	SIGN

EROSION AND SEDIMENTATION CONTROL

	LIGHT-DUTY SILT FENCE BARRIER
	COFFER DAM
	STRAW BALE FLOW CHECK DAM

NEW CONSTRUCTION PROFILE FEATURES

	FINISHED GROUND
	SUBGRADE
	BOTTOM OF DITCH LEFT
	BOTTOM OF DITCH RIGHT
	ORIGINAL GROUND
	ORIGINAL ROCK
	ROCK SHATTER
	ORGANICS

EXISTING VEGETATION FEATURES

	BUSH OUTLINE
	TREE
	HEDGE

EXISTING DRAINAGE FEATURES

	CULVERT
	BOTTOM OF DITCH WITH FLOW
	RIP-RAP OUTLINE
	WETLAND

EXISTING PROPERTY FEATURES

	PROPERTY LIMIT
	GENERAL BOUNDARY/PROPERTY LINE

ABBREVIATIONS

Asph	asphalt	PCC	point of compound curve
PI	point of intersection	PRC	point of reverse curve
BC	beginning of curve	PVI	point of vertical intersection
BM	benchmark	R	radius
BVC	beginning of vertical curve	Rk	rock
C/L or ☉	centreline	Rnd	rounding
CSP	corrugated steel pipe	RR	rip-rap
EC	end of curve	T/O	top of opening
Elev or EI	elevation	Twp	township
EVC	end of vertical curve	Typ	typical
Gr	gravel	WL	water level
HOT	hub on tangent		
LVC	length of vertical curve		
NIC	not in contract		
NTS	not to scale		
OPSD	Ontario Provincial Standard Drawing		
OPSS	Ontario Provincial Standard Specification		

NOTES:

1. PARKS CANADA AGENCY HAS COMPLETED SOME OF THE CLOSE CUT CLEARING IN THE STAGING AREAS IN ADVANCE OF THIS CONTRACT. REMAINDER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
2. ALL GRANULAR COMPACTION SHALL BE TO 100% SPMD.
3. IN ORDER TO MINIMIZE THE REVERSING OF VEHICLES AND/OR EQUIPMENT THE CONTRACTOR MAY CONSTRUCT TURN-AROUND POINTS AS REQUIRED. THE TURN-AROUND POINTS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION. MEASUREMENT FOR PAYMENT SHALL BE INCLUDED IN THE BALANCE OF PROJECT.



5	ISSUED FOR TENDER	2019/07/23
4	REVISED PER MITIGATION MEASURES	2019/03/28
3	FINAL SUBMISSION	2018/05/25
2	99% SUBMISSION	2018/02/12
1	50% SUBMISSION	2018/01/15
0	DESIGN CONCEPT SUBMISSION	2017/12/15
revision	description	date

Do not scale drawings.  
Verify all dimensions and conditions on site and  
immediately notify the engineer of all discrepancies.

A	Detail No.
B	No. du détail
C	drawing no. — where detail required dessin no. — où détail exigé
	drawing no. — where detailed dessin no. — où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**LEGEND AND ABBREVIATIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conc par  
**A.C.**

approved by  
approuvé par  
**B.P.**

tender  
soumission  
**PIERRE GRAMBERT**

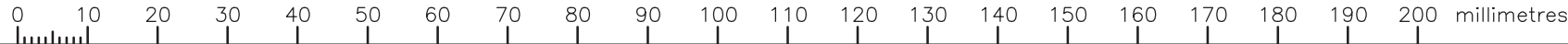
project manager  
administrateur  
de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**100**





ACCESS ROAD CENTRELINE ALIGNMENT									
Station 0+000.000 to 1+011.748									
ID	STATION	NORTHING	EASTING	ANGLE	BEARKING BACK	BEARING AHEAD	CURVE INFORMATION		
HOT BC PI	0+000.000 0+036.520 0+063.796	4999948.720 4999939.067 4999931.857	676210.276 676245.496 676271.803						
				140d1'43"	S 74d40'24" E	S 34d42'6" E	R=75 TC= 27.277	Arc ARC	LC=52.323 OC=39d58'17"
EC BC PI	0+088.842 0+110.558 0+136.814	4999909.433 4999891.580 4999869.994	676287.331 676299.694 676314.642	200d31'38"	S 34d42'6" E	S 55d13'45" E	R=145 TC= 26.256	Arc ARC	LC=51.949 OC=20d31'38"
EC BC PI	0+162.507 0+183.469 0+197.424	4999855.020 4999843.065 4999835.107	676336.210 676353.429 676364.892	148d48'44"	S 55d13'45" E	S 24d2'29" E	R=50 TC= 13.955	Arc ARC	LC=27.216 OC=31d11'16"
EC BC PI	0+210.686 0+214.447 0+230.023	4999822.363 4999818.928 4999804.704	676370.577 676372.109 676378.455	234d52'33"	S 24d2'29" E	S 78d55'2" E	R=30 TC= 15.576	Arc ARC	LC=28.733 OC=54d52'33"
EC BC PI	0+243.180 0+253.275 0+266.960	4999801.710 4999799.769 4999797.138	676393.740 676403.646 676417.077	130d57'23"	S 78d55'2" E	S 29d52'24" E	R=30 TC= 13.686	Arc ARC	LC=25.679 OC=49d2'37"
EC BC PI	0+278.954 0+289.857 0+302.402	4999785.271 4999775.817 4999764.939	676423.893 676429.324 676435.573	134d36'50"	S 29d52'24" E	S 15d30'45" W	R=30 TC= 12.545	Arc ARC	LC=23.764 OC=45d23'10"
EC BC PI	0+313.621 0+351.838 0+378.417	4999752.851 4999716.026 4999690.415	676432.217 676421.996 676414.888	263d4'44"	S 15d30'45" W	S 67d33'58" E	R=30 TC= 26.579	Arc ARC	LC=43.5 OC=83d4'44"
EC BC PI	0+395.338 0+402.937 0+414.686	4999680.273 4999677.373 4999672.889	676439.455 676446.479 676457.338	173d16'34"	S 67d33'58" E	S 60d50'32" E	R=200 TC= 11.749	Arc ARC	LC=23.471 OC=6d43'26"
EC BC PI	0+426.408 0+438.530 0+452.489	4999667.165 4999661.259 4999654.458	676467.599 676478.185 676490.375	141d31'32"	S 60d50'32" E	S 22d22'4" E	R=40 TC= 13.959	Arc ARC	LC=26.86 OC=38d28'28"
EC BC PI	0+465.390 0+516.504 0+537.369	4999641.549 4999594.282 4999574.986	676495.687 676515.138 676523.078	156d25'42"	S 22d22'4" E	S 1d12'14" W	R=100 TC= 20.865	Arc ARC	LC=41.14 OC=23d34'18"
PRC PI	0+557.644 0+569.412	4999554.126 4999542.361	676522.640 676522.393	206d29'14"	S 1d12'14" W	S 25d17'0" E	R=50 TC= 11.768	Arc ARC	LC=23.115 OC=26d29'14"
PRC PI	0+580.759 0+591.955	4999531.720 4999521.597	676527.418 676532.200	167d13'25"	S 25d17'0" E	S 12d30'25" E	R=100 TC= 11.196	Arc ARC	LC=22.299 OC=12d46'35"

ACCESS ROAD CENTRELINE ALIGNMENT									
Station 0+000.000 to 1+011.748									
ID	STATION	NORTHING	EASTING	ANGLE	BEARKING BACK	BEARING AHEAD	CURVE INFORMATION		
PRC PI	0+603.058 0+620.810	4999510.667 4999493.336	676534.625 676538.469	219d5'37"	S 12d30'25" E	S 51d36'2" E	R=50 TC= 17.752	Arc ARC	LC=34.116 OC=39d5'37"
PRC PI	0+637.173 0+652.965	4999482.310 4999472.501	676552.381 676564.757	144d56'43"	S 51d36'2" E	S 16d32'45" E	R=50 TC= 15.791	Arc ARC	LC=30.591 OC=35d3'17"
EC BC PI	0+667.764 0+740.265 0+754.831	4999457.364 4999387.865 4999373.902	676569.254 676589.901 676594.049	163d25'31"	S 16d32'45" E	S 360d1'44" W	R=100 TC= 14.566	Arc ARC	LC=28.928 OC=16d34'29"
EC BC PI	0+769.194 0+770.921 0+784.086	4999359.336 4999357.609 4999344.444	676594.041 676594.041 676594.034	227d23'12"	S 360d1'44" W	S 47d21'28" E	R=30 TC= 13.165	Arc ARC	LC=24.812 OC=47d23'12"
EC BC PI	0+795.732 0+803.483 0+820.989	4999335.526 4999330.275 4999318.417	676603.718 676609.419 676622.297	119d28'16"	S 47d21'28" E	S 13d10'16" W	R=30 TC= 17.506	Arc ARC	LC=31.693 OC=60d31'44"
EC BC PI	0+835.176 0+843.946 0+855.740	4999301.372 4999292.833 4999281.349	676618.308 676616.309 676613.622	222d55'28"	S 13d10'16" W	S 29d45'12" E	R=30 TC= 11.794	Arc ARC	LC=22.475 OC=42d55'28"
EC BC PI	0+866.421 0+874.136 0+884.885	4999271.109 4999264.411 4999255.079	676619.475 676623.304 676628.638	192d16'16"	S 29d45'12" E	S 42d1'28" E	R=100 TC= 10.75	Arc ARC	LC=21.417 OC=12d16'16"
EC BC PI	0+895.553 0+916.096 0+926.349	4999247.093 4999231.833 4999224.216	676635.835 676649.587 676656.451	142d15'47"	S 42d1'28" E	S 4d17'15" E	R=30 TC= 10.253	Arc ARC	LC=19.759 OC=37d44'13"
EC BC PI	0+935.855 0+939.942 0+949.571	4999213.992 4999209.916 4999200.314	676657.218 676657.523 676658.243	198d14'2"	S 4d17'15" E	S 22d31'18" E	R=60 TC= 9.629	Arc ARC	LC=19.095 OC=18d14'2"
EC BC PI	0+959.037 0+967.392 0+975.160	4999191.420 4999183.702 4999176.527	676661.931 676665.131 676668.107	175d33'6"	S 22d31'18" E	S 18d4'23" E	R=200 TC= 7.768	Arc ARC	LC=15.528 OC=4d26'54"
EC HOT	0+982.920 1+011.748	4999169.142 4999141.736	676670.516 676679.460						

HORIZONTAL AND VERTICAL CONTROL				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1000	4999191.983	676807.434	333.052	HCP
1002	4999170.615	676734.280	333.391	HCP
1003	4999929.756	676187.181	358.100	VCP TOP BOLT ON DAM
10413	4999954.563	676205.126	359.775	VCP BOLT IN ROCK

- NOTES:
- COORDINATES IN UTM ZONE 17 NAD83 CSRS 2010.
  - ALL ELEVATIONS BASED ON VCP 1003 (CGVD 2013 DATUM) AS ESTABLISHED BY C.D. BUNKER O.L.S., C.L.S. ON CANADA LANDS SURVEYS RECORDS 105200 PLAN OF SURVEY DATED APRIL 18, 2016.



4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
1	99% SUBMISSION	2018/02/12
0	50% SUBMISSION	2018/01/15
revision	description	date

Do not scale drawings.  
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immediately notify the engineer of all discrepancies.

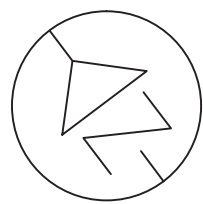
	A	Detail No.
	B	drawing no. - where detail required
	C	dessin no. - où détail exigé
		drawing no. - where detailed
		dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**HORIZONTAL ALIGNMENT**

drawn by dessine par	A.C.
designed by conc par	A.C.
approved by approuve par	B.P.
tender soumission	PIERRE GRAMBART
project manager administrateur de projets	
project date date du projet	2019/08
project no. no. du projet	R.076951.170
drawing no. dessine no.	101





5	ISSUED FOR TENDER	2019/07/23
4	REVISED PER MITIGATION MEASURES	2019/03/28
3	FINAL SUBMISSION	2018/05/25
2	99% SUBMISSION	2018/02/12
1	50% SUBMISSION	2018/01/15
0	CONCEPT DESIGN SUBMISSION	2017/12/15

revision	description	date
Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.		

A	Detail No. No. du détail
B	drawing no. - where detail required dessin no. - où détail exigé
C	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**REMOVALS AND  
ENVIRONMENTAL MIGITATION  
STA. 0+000 TO 0+500**

drawn by  
dessine par  
A.C.

designed by  
conc. par  
A.C.

approved by  
approuve par  
B.P.

tender  
soumission  
PIERRE GRAMBART

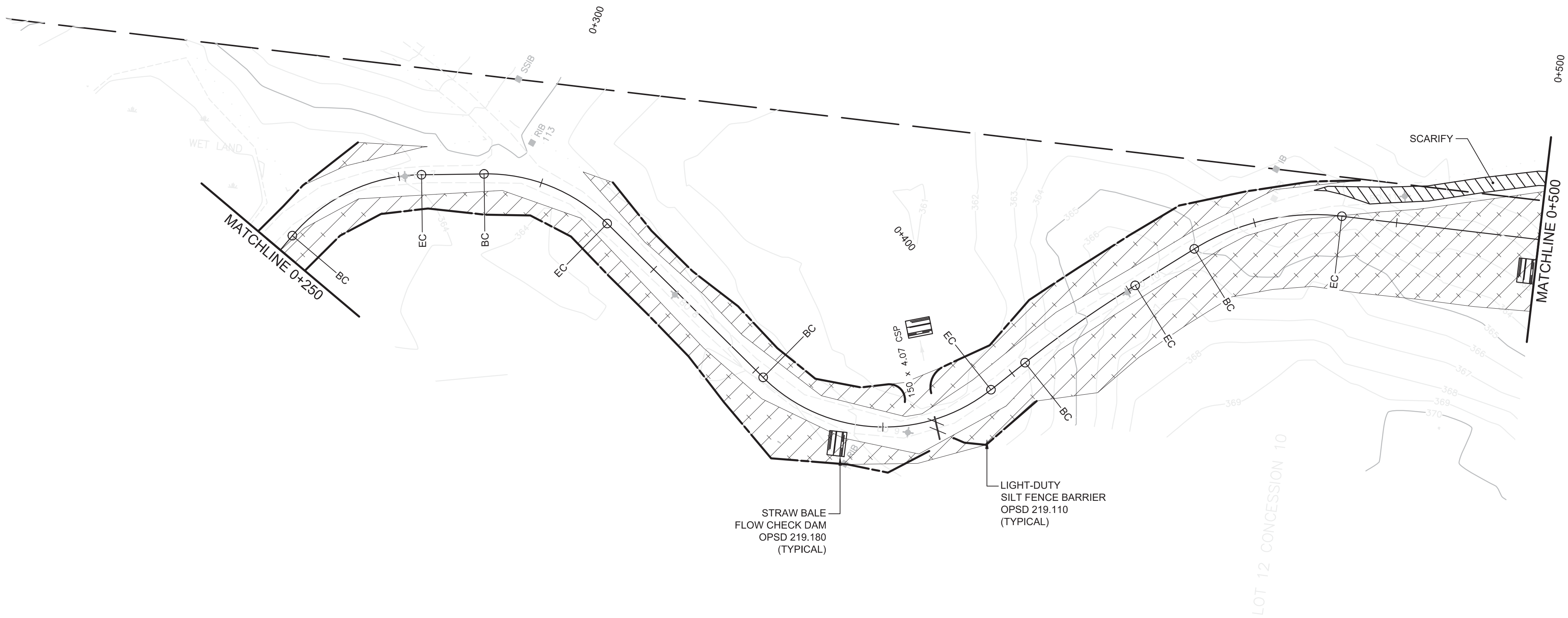
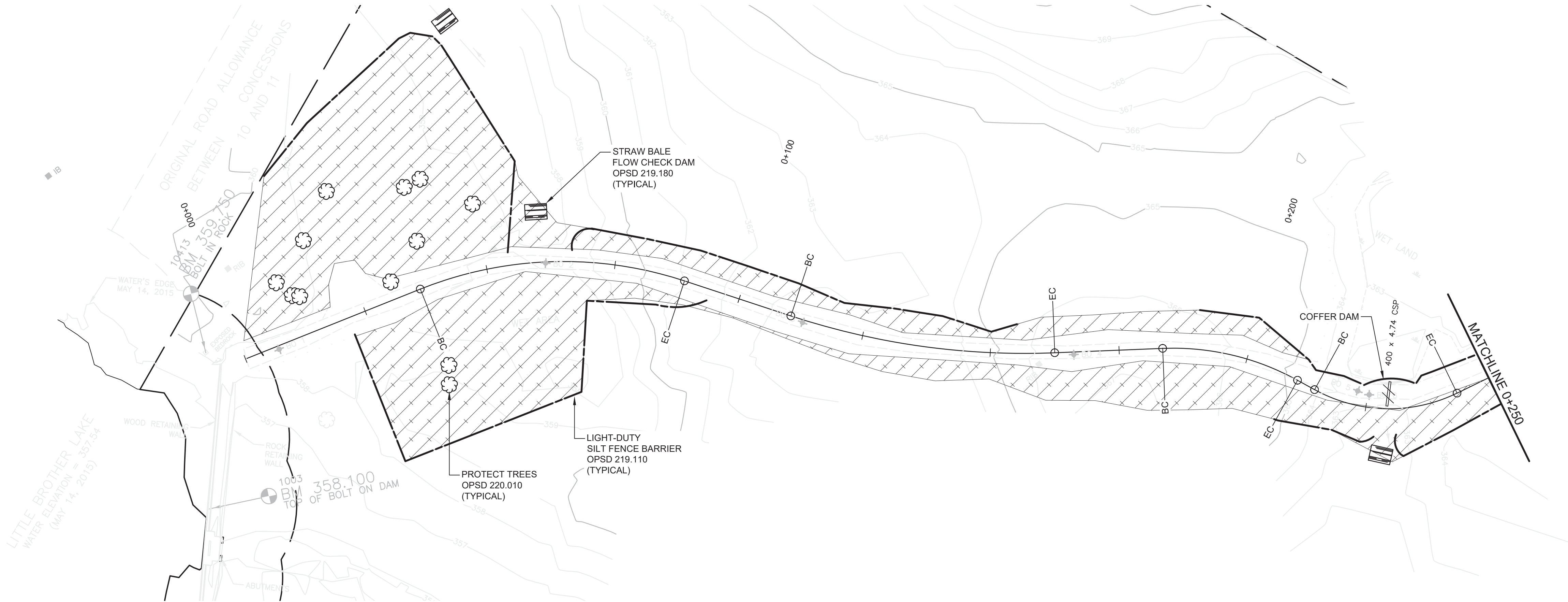
project manager  
administrateur  
de projets

project date  
date du projet  
2019/08

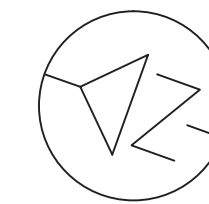
project no.  
no. du projet  
R.076951.170

drawing no.  
dessine no.  
200

SCALE  
5m 0 10m  
Horizontal







5	ISSUED FOR TENDER	2019/07/23
4	REVISED PER MITIGATION MEASURES	2019/03/28
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A	Detail No. No. du détail
B	drawing no. - where detail required dessin no. - où détail exigé
C	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet

**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin

**REMOVALS AND  
ENVIRONMENTAL MIGITATION  
STA. 0+500 TO 1+012**

drawn by  
dessine par

A.C.

designed by  
conc par

A.C.

approved by  
approuve par

B.P.

tender  
soumission

PIERRE GRAMBART

project manager  
administrateur de projets

project date  
date du projet

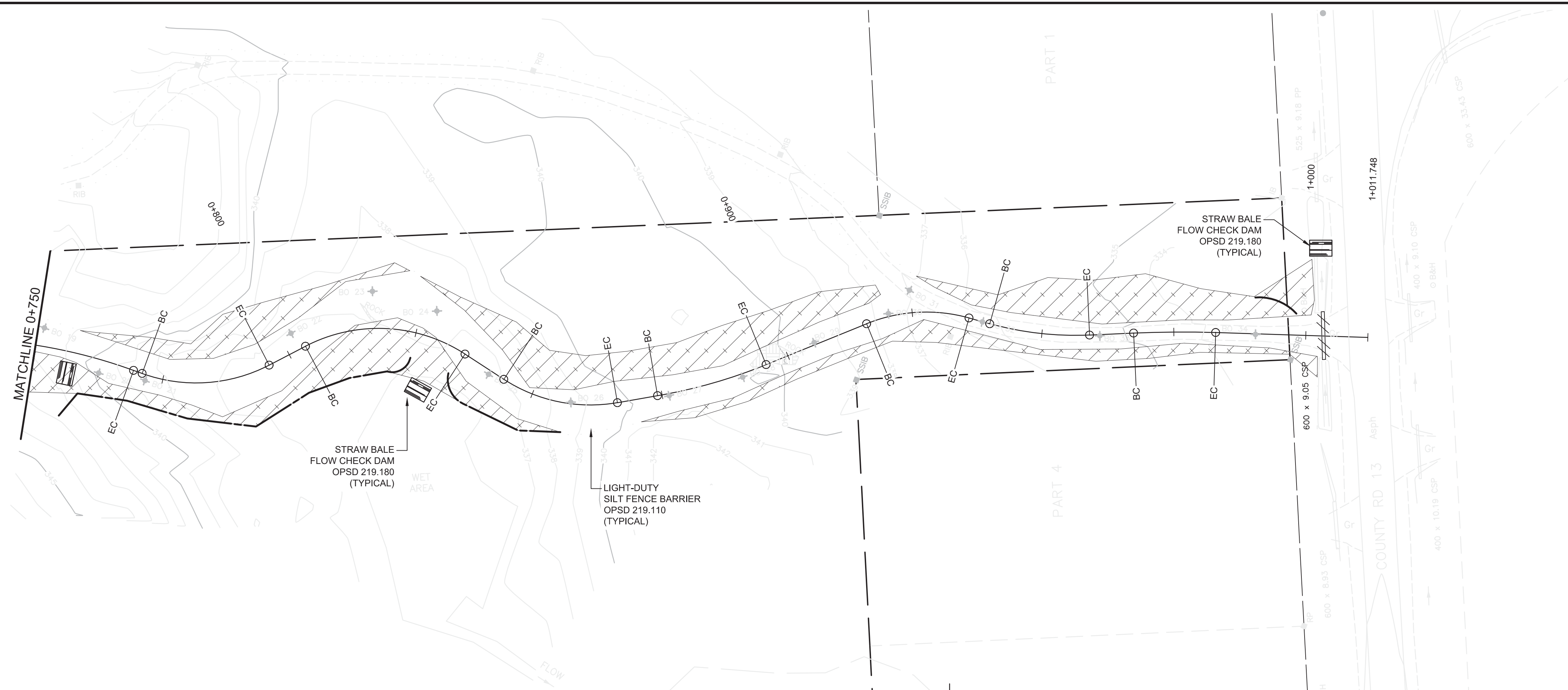
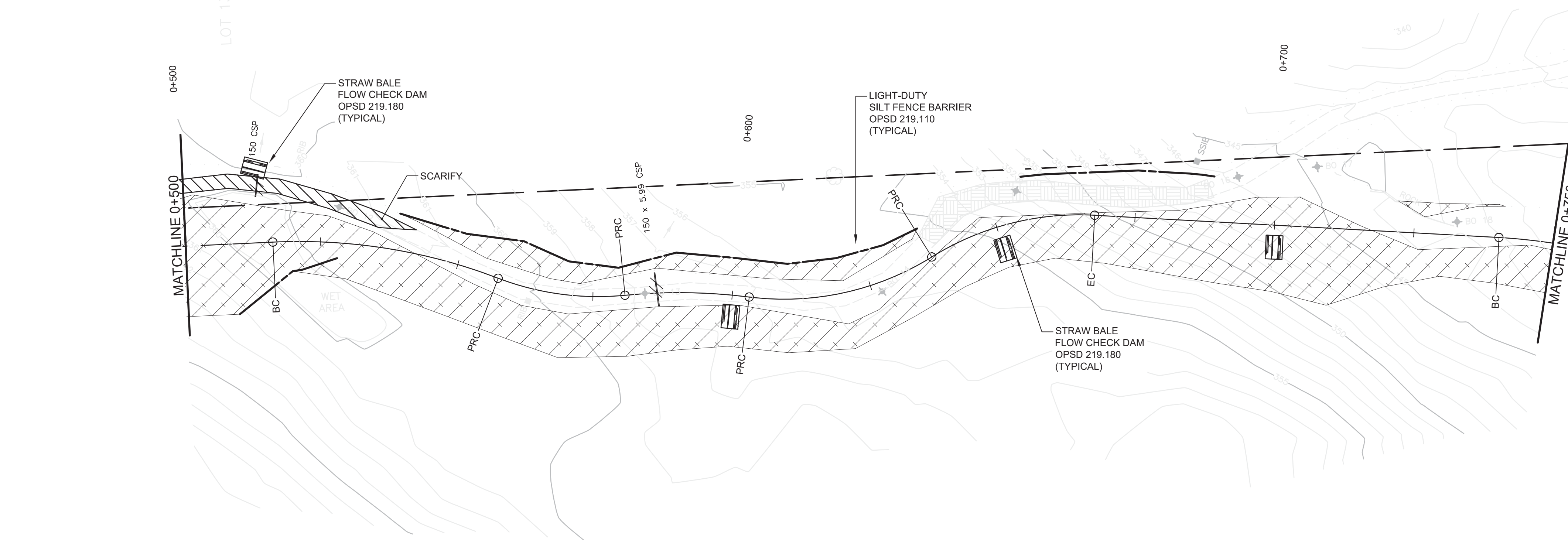
2019/08

project no.  
no. du projet

R.076951.170

drawing no.  
dessine no.

201



SCALE  
5m 0 10m  
Horizontal





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CONSULTING  
ENGINEERS  
PLANNERS



5	ISSUED FOR TENDER	2019/07/23
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revision	description	date

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A	Detail No.
B	No. du détail
C	drawing no. - where detail required dessin no. - où détail exigé
	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**ENVIRONMENTAL MITIGATION  
DETAILS**

drawn by  
dessiné par  
A.C.

designed by  
conçu par  
A.C.

approved by  
approuvé par  
B.P.

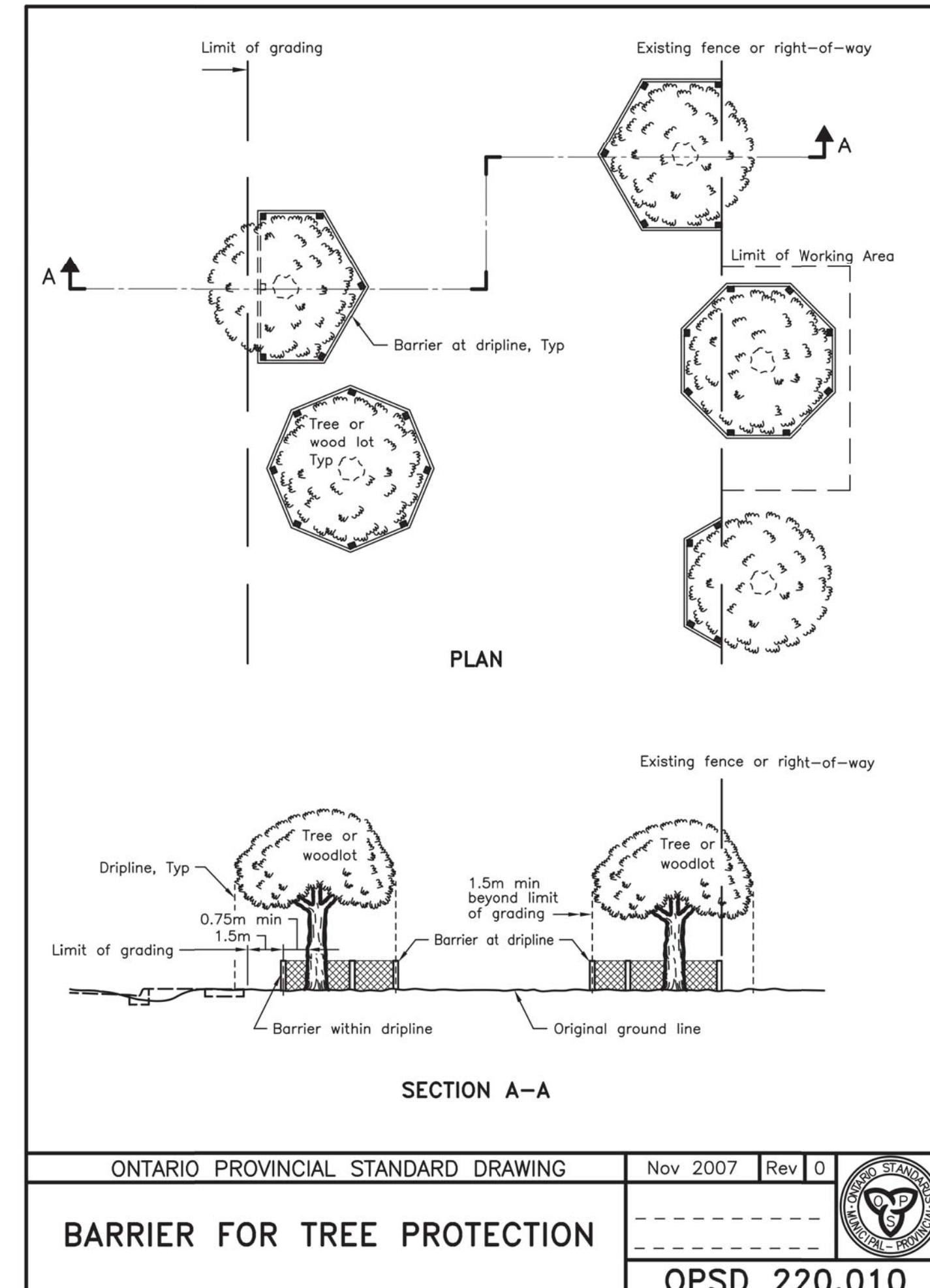
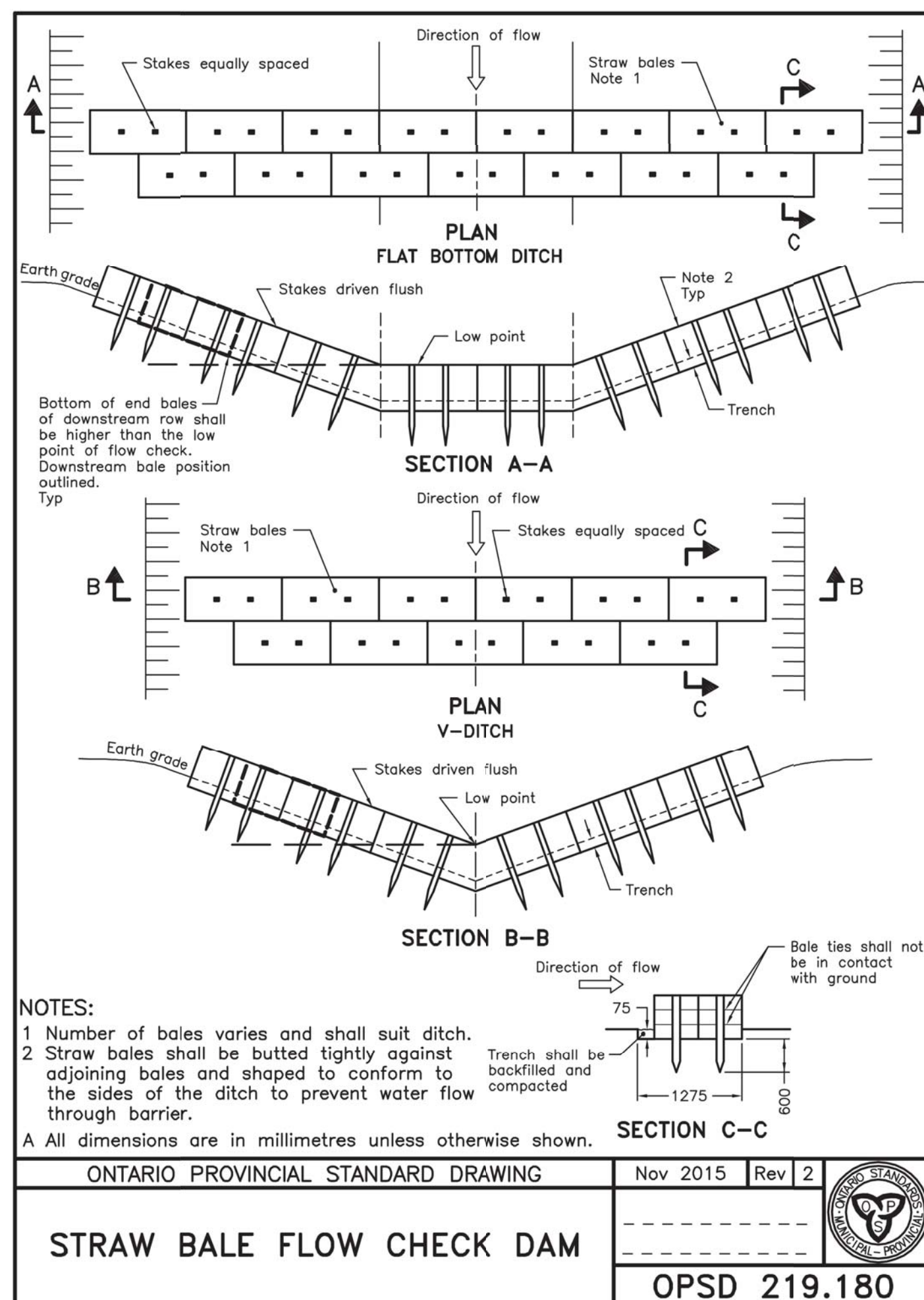
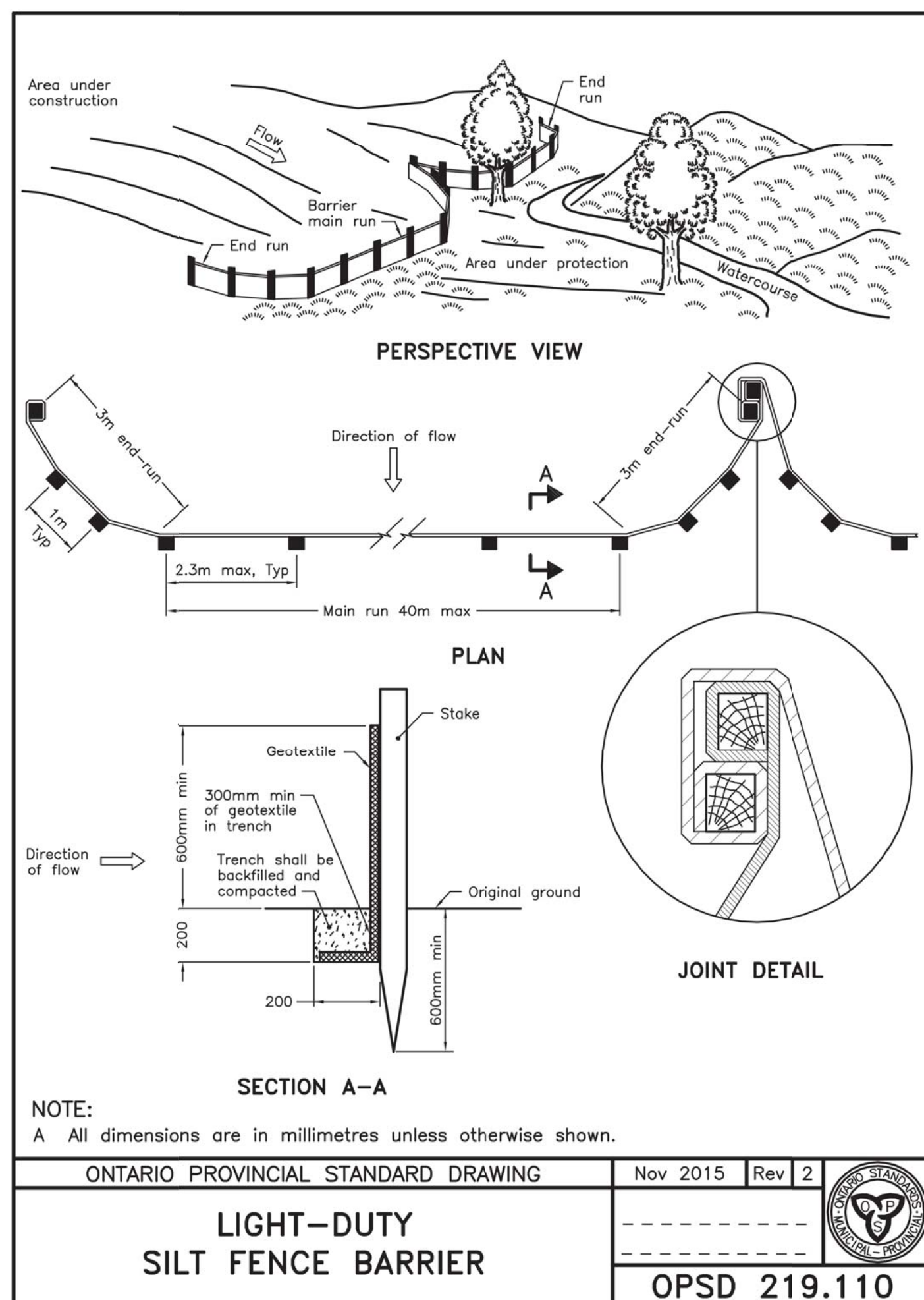
tender  
soumission  
PIERRE GRAMBART

project manager  
administrateur  
de projets

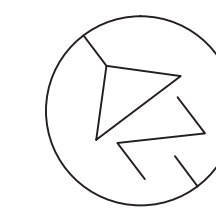
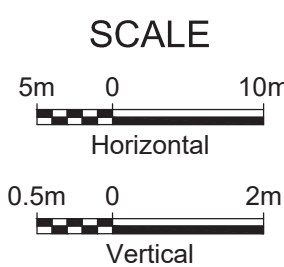
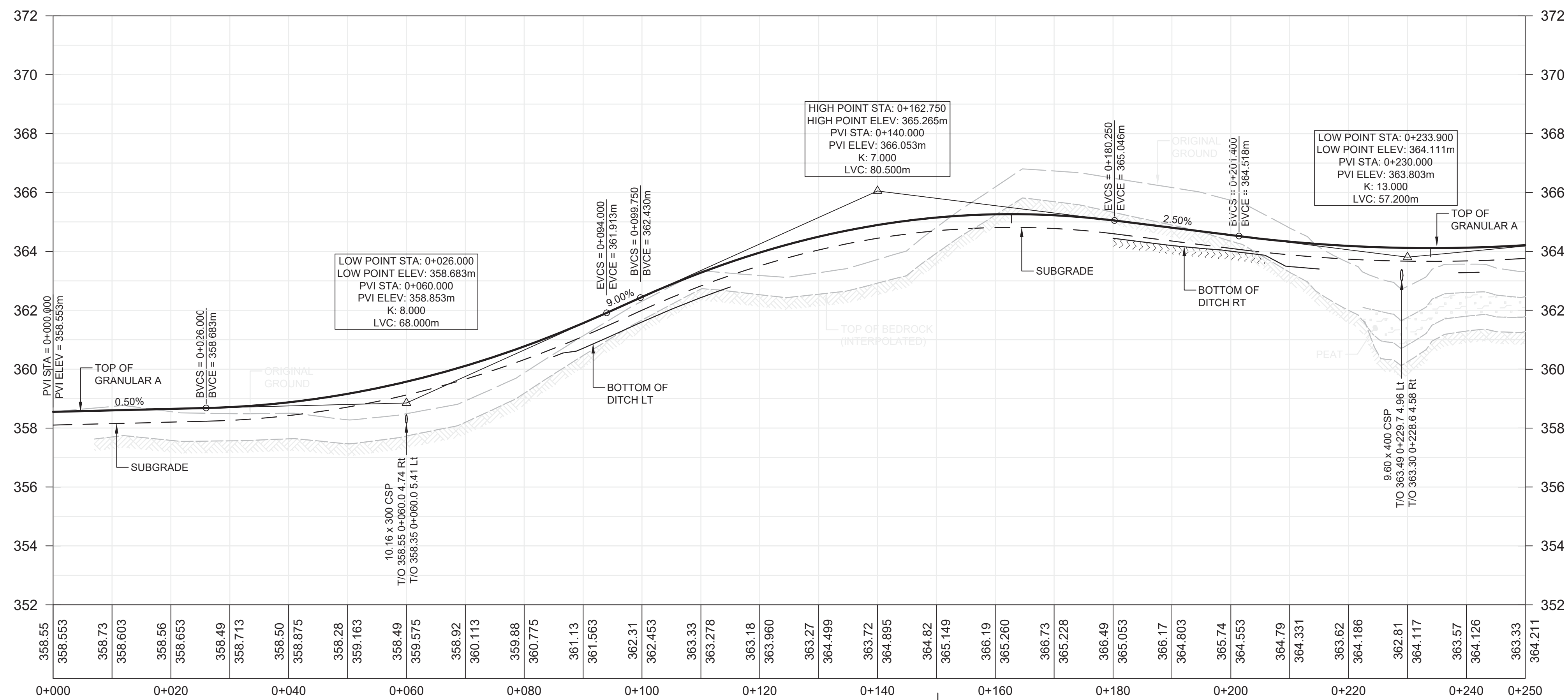
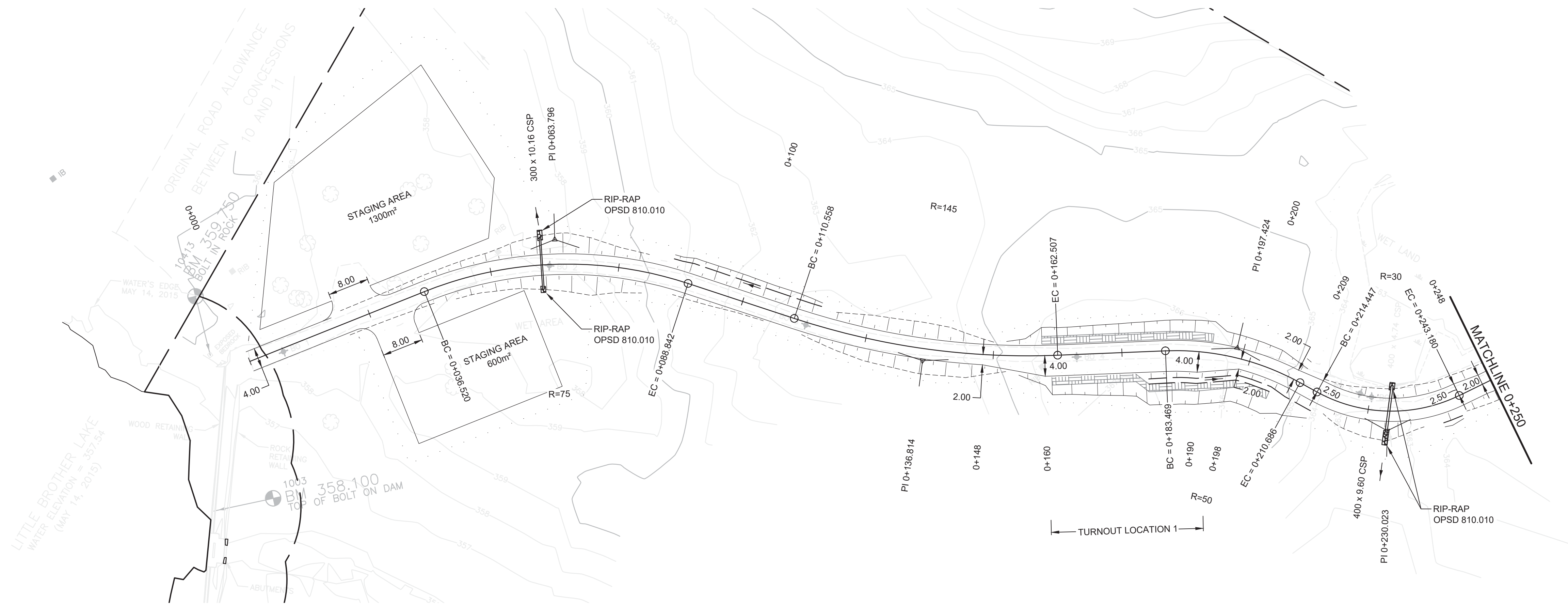
project date  
date du projet  
2019/08

project no.  
no. du projet  
R.076951.170

drawing no.  
dessiné no.  
202







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**Anley** CONSULTING  
ENGINEERS  
PLANNERS



5	ISSUED FOR TENDER	2019/07/23
4	REVISED PER MITIGATION MEASURES	2019/03/28
3	FINAL SUBMISSION	2018/05/25
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A	Detail No. No. du détail
B	drawing no. - where detail required dessin no. - où détail exigé
C	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**NEW CONSTRUCTION  
STA. 0+000 TO 0+250**

drawn by  
dessiné par  
A.C.

designed by  
conçu par  
A.C.

approved by  
approuvé par  
B.P.

tender  
soumission  
**PIERRE GRAMBART**

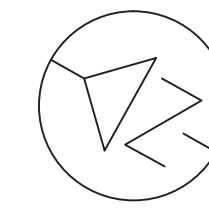
project manager  
administrateur  
de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**300**





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**inley** CONSULTING  
ENGINEERS  
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5	ISSUED FOR TENDER	2019/07/23
4	REVISED PER MITIGATION MEASURES	2019/03/28
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1	50% SUBMISSION	2018/01/15
0	CONCEPT DESIGN SUBMISSION	2017/12/15
revision	description	date

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A	Detail No. No. du détail
B	drawing no. - where detail required dessin no. - où détail exigé
C	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**NEW CONSTRUCTION  
STA. 0+250 TO 0+500**

drawn by  
dessiné par  
A.C.

designed by  
conçue par  
A.C.

approved by  
approuvé par  
B.P.

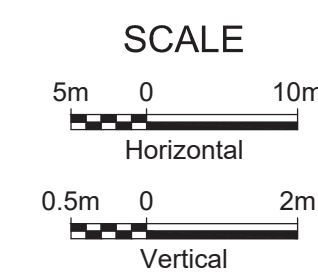
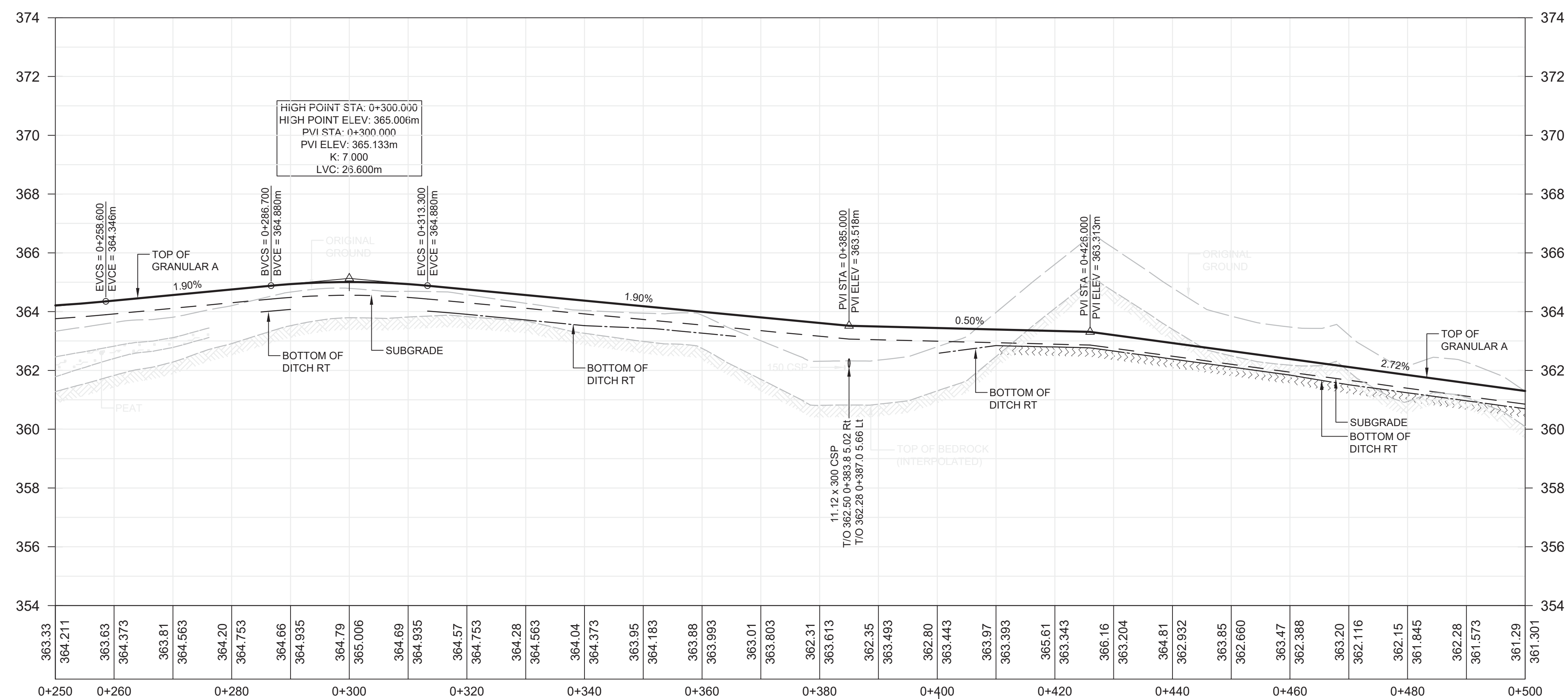
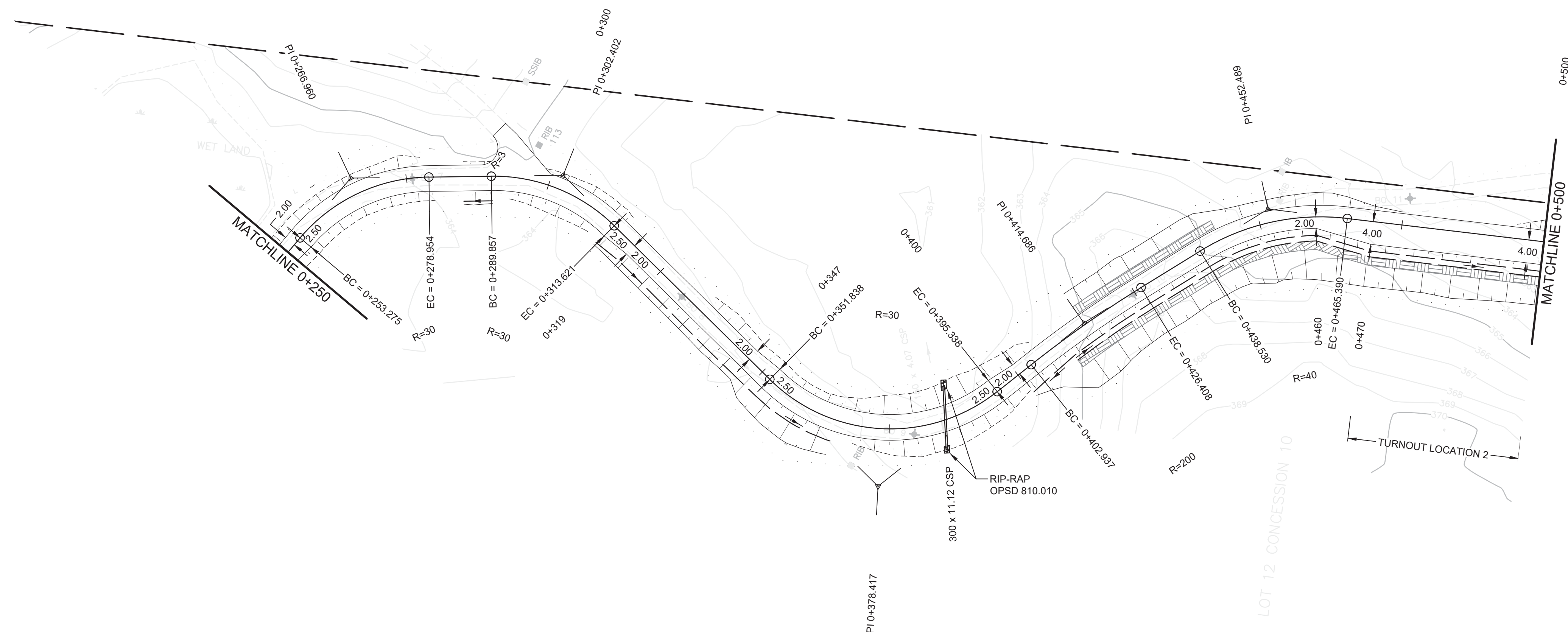
tender  
soumission  
**PIERRE GRAMBART**

project manager  
administrateur  
de projets

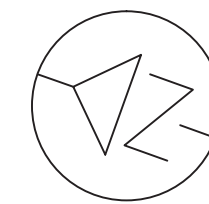
project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**301**







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5	ISSUED FOR TENDER	2019/07/23
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revision	description	date

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A	Detail No.
B	No. du détail
C	drawing no. - where detail required dessin no. - où détail exigé
C	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet

**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin

**NEW CONSTRUCTION  
STA. 0+500 TO 0+750**

drawn by  
dessiné par

A.C.

designed by  
conçue par

A.C.

approved by  
approuvé par

B.P.

tender  
soumission

PIERRE GRAMBART

project manager  
administrateur de projets

project date  
date du projet

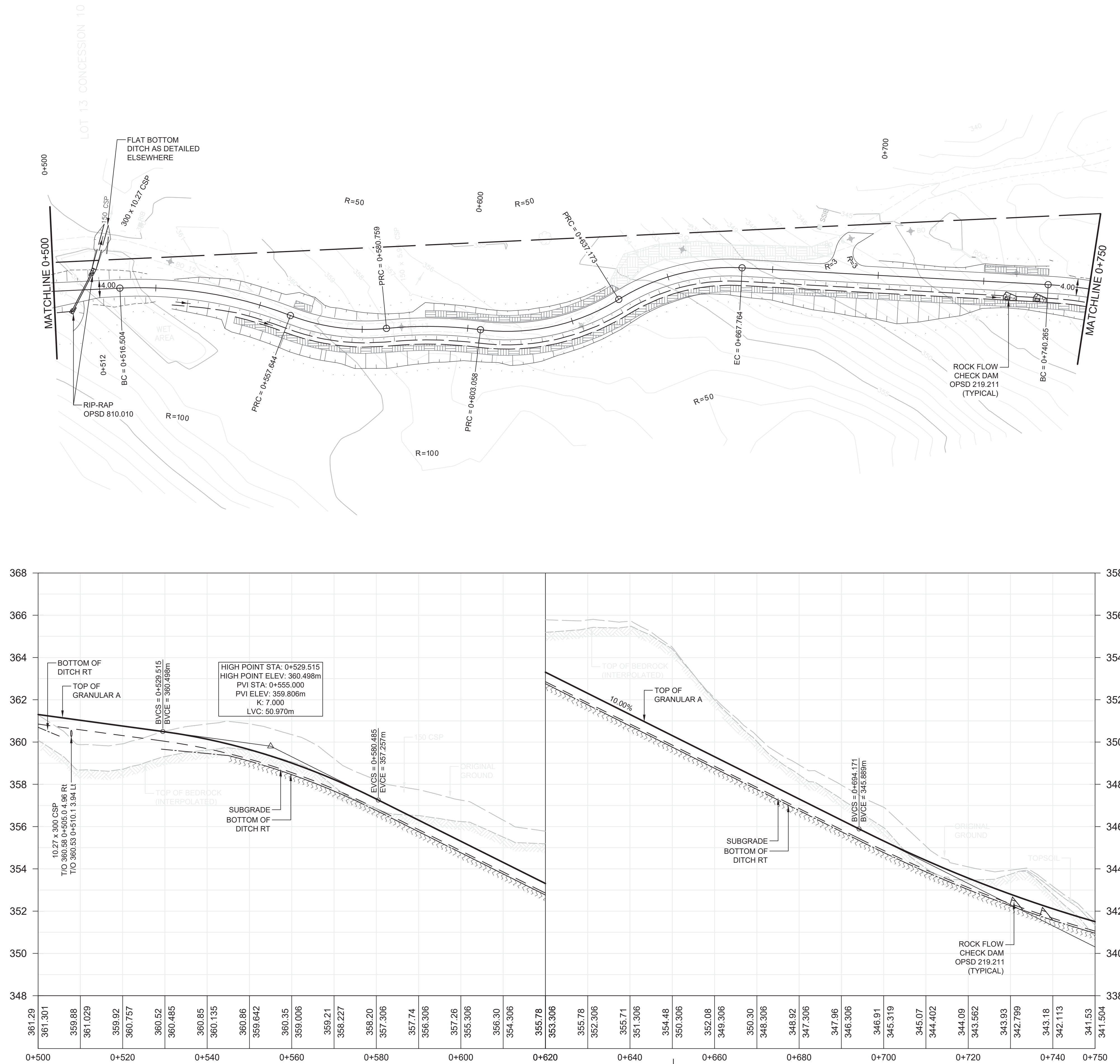
2019/08

project no.  
no. du projet

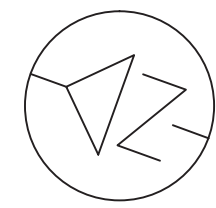
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drawing no.  
dessiné no.

302







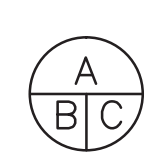
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Government Services Canada  
Architectural and Engineering Services  
Ontario Region

Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



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- A Detail No.  
No. du détail  
B drawing no. - where detail required  
dessin no. - où détail exigé  
C drawing no. - where detailed  
dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**NEW CONSTRUCTION  
STA. 0+750 TO 1+012**

drawn by  
dessiné par  
A.C.

designed by  
conçu par  
A.C.

approved by  
approuvé par  
B.P.

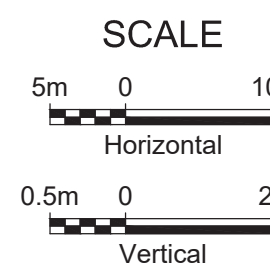
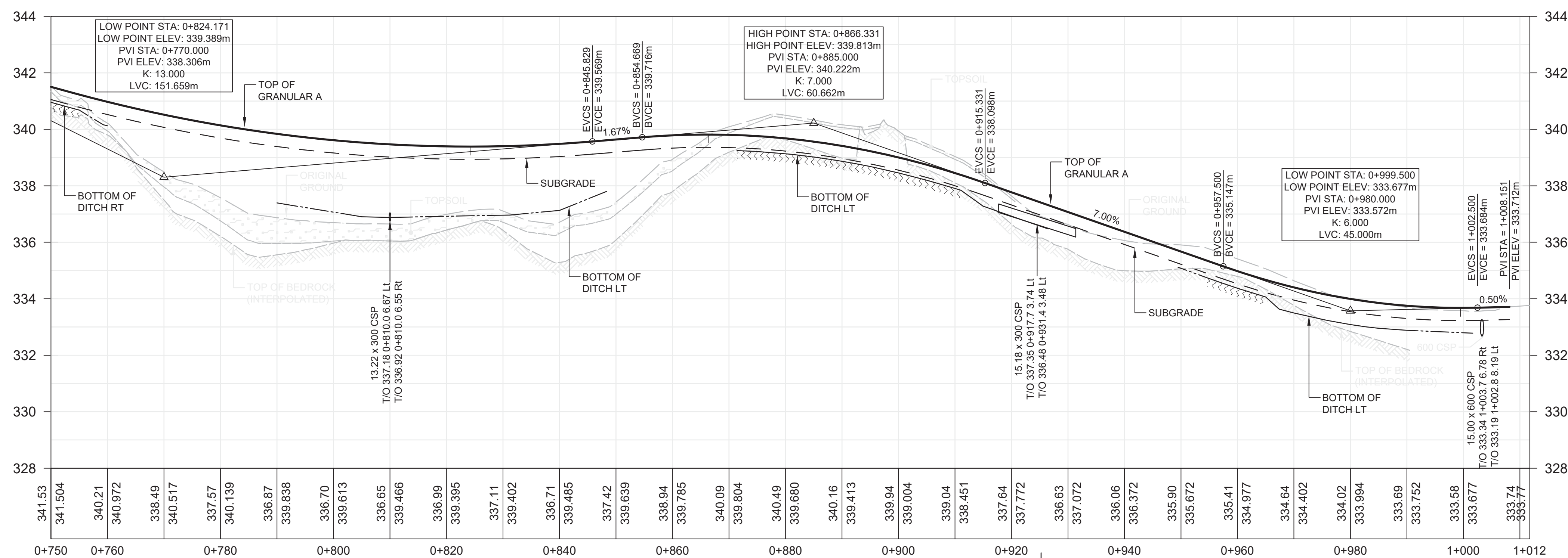
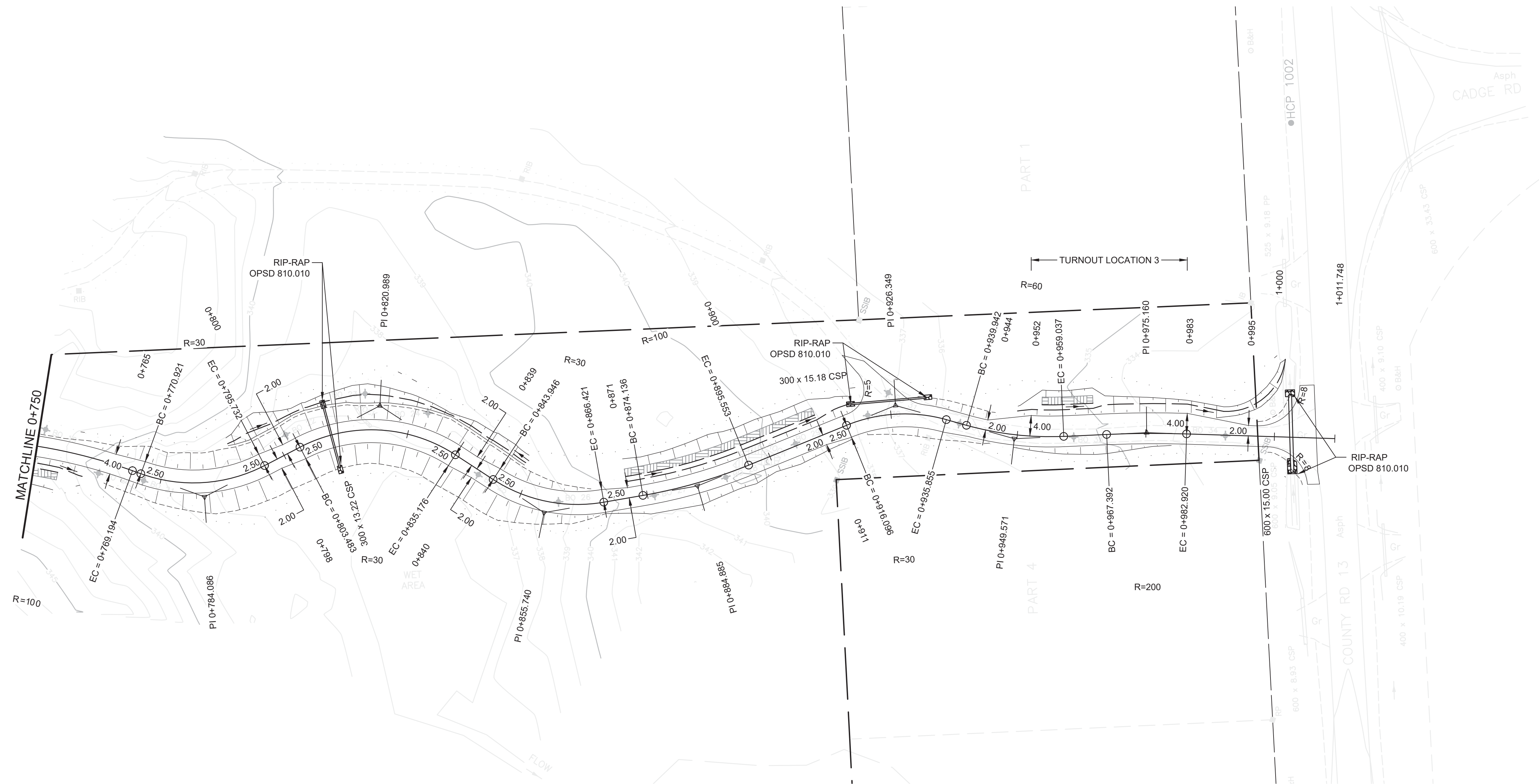
tender  
soumission  
PIERRE GRAMBART

project manager  
administrateur  
de projets

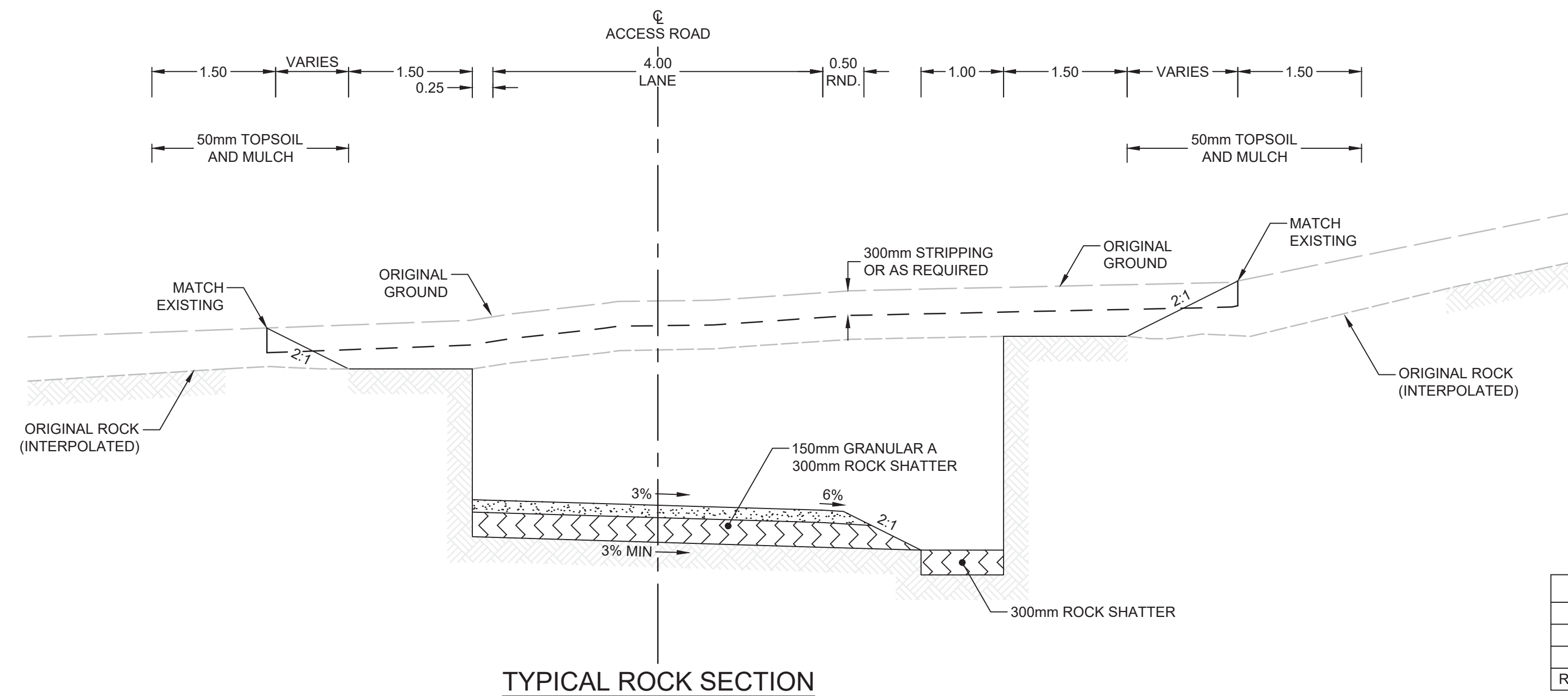
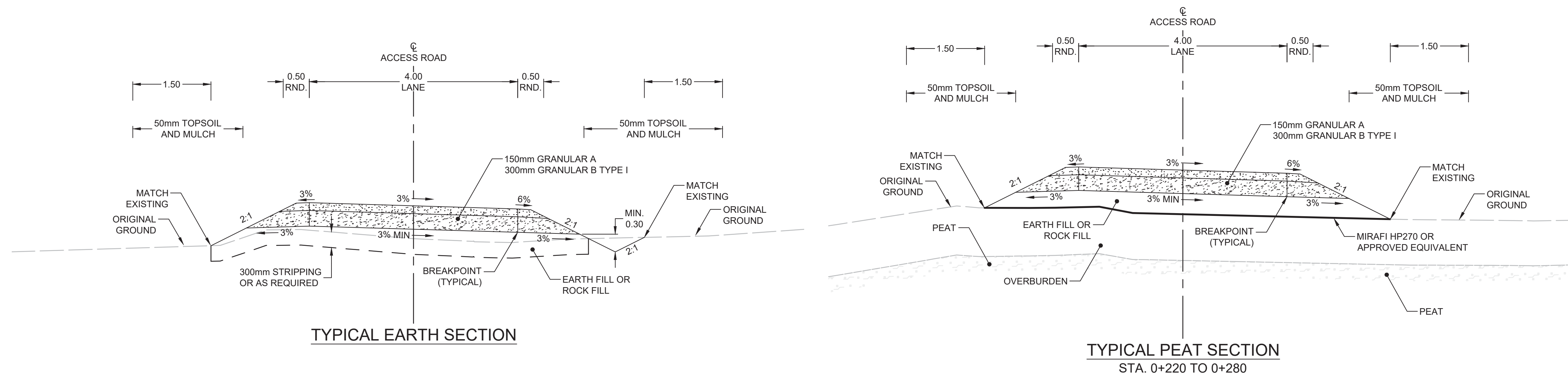
project date  
date du projet  
2019/08

project no.  
no. du projet  
R.076951.170

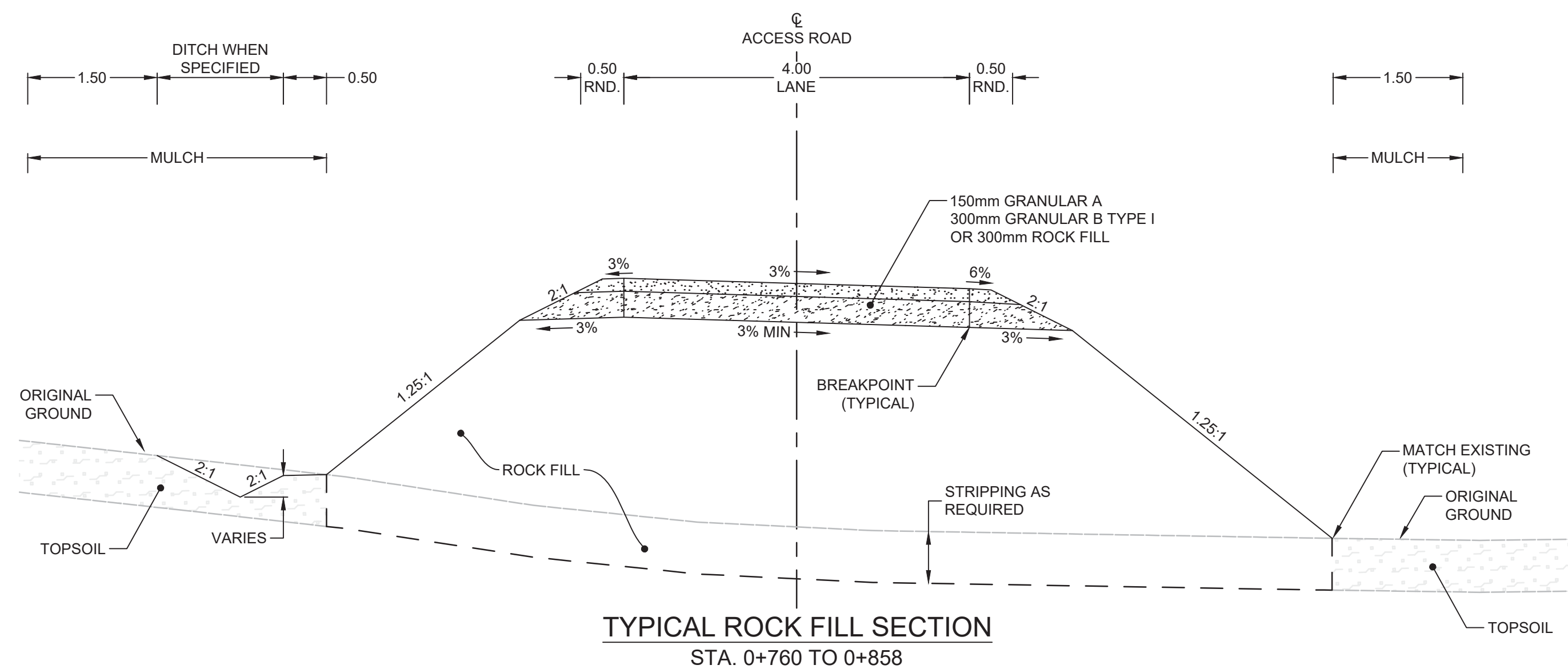
drawing no.  
dessiné no.  
303







TYPICAL CROSSFALL (%)							
LANE	+3	+2	+1	0	-1	-2	-3
LANE SUBGRADE	+3	-3	-3	-3	-3	-3	-3
ROUNDING	-3	-3	-3	-4	-5	-6	-6
ROUNDING SUBGRADE	-3	-3	-3	-3	-3	-3	-3



ACCESS RD LANE CROSSFALL (%)		
STATION	LT	RT
0+000.000	-3	-3
0+086.558	-3	-3
0+112.842	+3	+3
0+159.469	+3	+3
0+186.507	-3	-3
0+326.000	-3	-3
0+351.638	+3	+3
0+395.338	+3	+3
0+420.000	-3	-3
0+746.000	-3	-3
0+770.921	+3	+3
0+791.856	+3	+3
0+807.359	-3	-3
0+830.791	-3	-3
0+848.331	+3	+3
1+011.748	+3	+3

**NOTES:**

1. REFER TO PLANS AND CROSS SECTIONS FOR LOCATION(S).
2. DRAWING TO BE READ IN CONJUNCTION WITH OPSD 200 SERIES.
3. LANE WIDTHS VARY AT TURNOUT LOCATIONS AND WIDENING ON INSIDE OF SMALL RADIUS CURVES.

SCALE N.T.S.



5	ISSUED FOR TENDER	2019/07/23
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A	Detail No. No. du détail
B	drawing no. - where detail required dessin no. - où détail exigé
C	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**TYPICAL SECTIONS**

drawn by  
dessiné par  
A.C.

designed by  
conçue par  
A.C.

approved by  
approuvé par  
B.P.

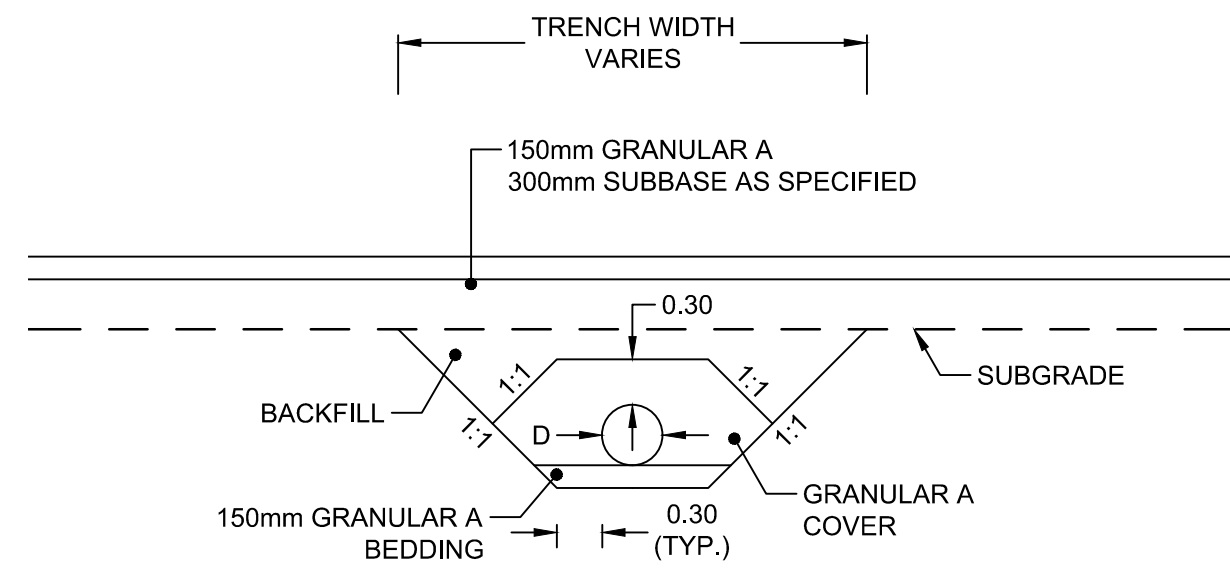
tender  
soumission  
**PIERRE GRAMBERT** project manager  
administrateur de projets

project date  
date du projet  
**2019/08**

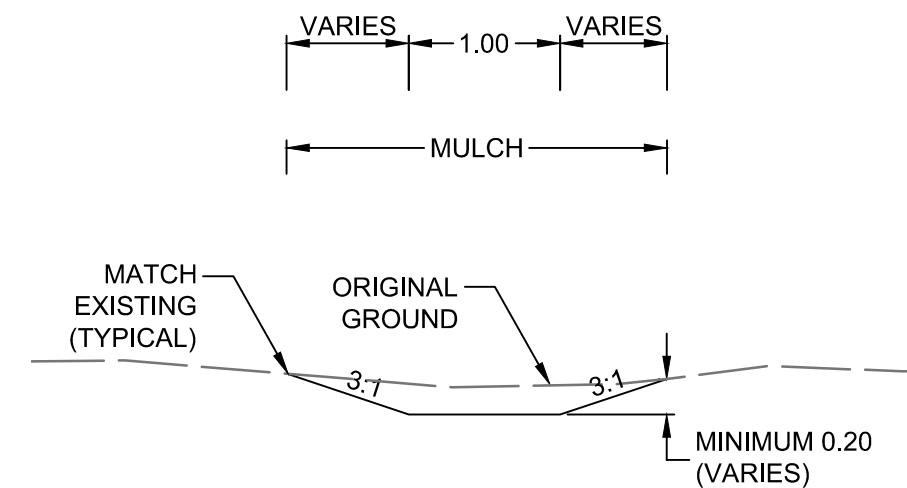
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no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**400**

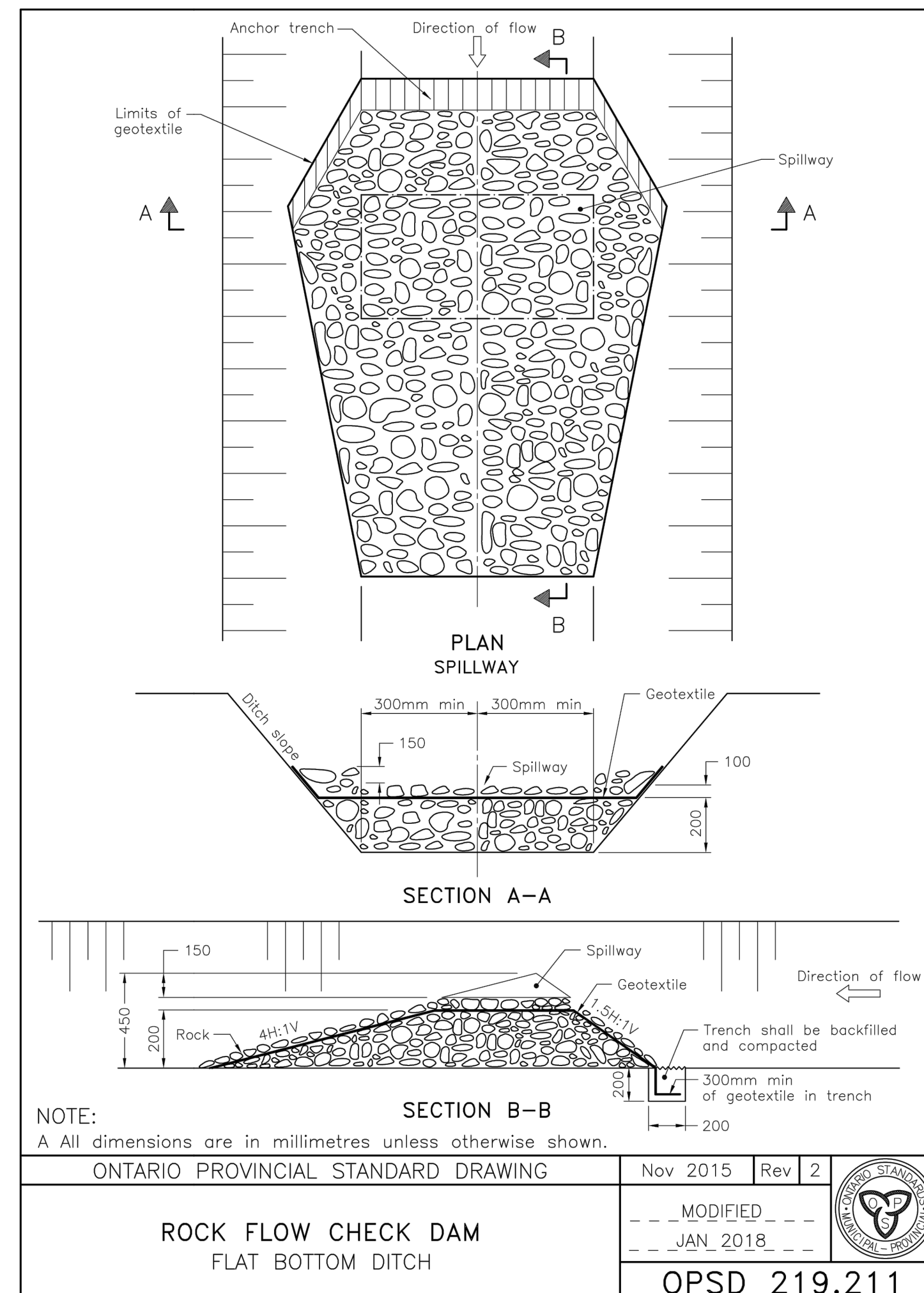
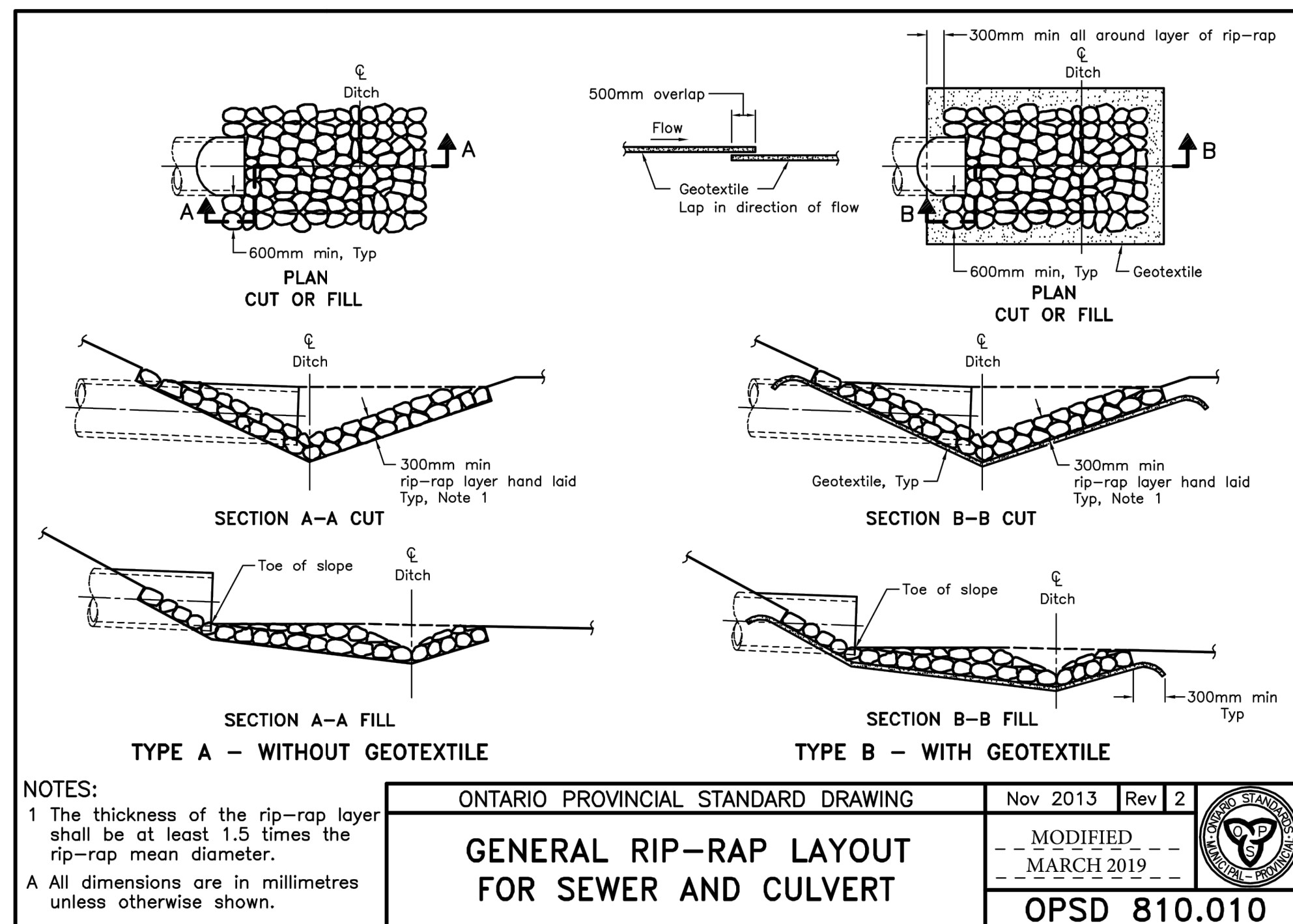




CULVERT TRENCH REINSTATEMENT DETAIL



FLAT BOTTOM DITCH

**NOTES:**

1. TYPICALS TO BE READ IN CONJUNCTION WITH OPSD 200 AND 800 SERIES.
2. "D" IS PROPOSED PIPE DIAMETER.
3. EMBEDMENT AND BACKFILL PER OPSD 802.010, 802.013, AND 802.014.
4. PROVIDE RIP-RAP TREATMENTS PER OPSD 801.010 AT INLET AND OUTLET OF CULVERTS COMPLETE WITH NON-WOVEN GEOTEXTILE.
5. REFER TO PLANS FOR LOCATIONS.

SCALE N.T.S.



5	ISSUED FOR TENDER	2019/07/23
4	REVISED PER MITIGATION MEASURES	2019/03/28
3	FINAL SUBMISSION	2018/05/25
2	99% SUBMISSION	2018/02/12
1	50% SUBMISSION	2018/01/15
0	CONCEPT DESIGN SUBMISSION	2017/12/15
revision	description	date

Do not scale drawings.  
Verify all dimensions and conditions on site and  
immediately notify the engineer of all discrepancies.

A	Detail No.
B	No. du détail
C	drawing no. - where detail required dessin no. - où détail exigé
	drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**DETAILS**

drawn by dessiné par	A.C.
designed by conçue par	A.C.
approved by approuvé par	B.P.
tender soumission	PIERRE GRAMBART
project manager administrateur de projets	

project date  
date du projet  
2019/08

project no.  
no. du projet  
R.076951.170

drawing no.  
dessiné no.  
401



Public Works and  
Government Services Canada  
Architectural and Engineering Services  
Ontario Region  
  
Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



CONSULTING  
ENGINEERS  
PLANNERS



4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
1	99% SUBMISSION	2018/02/12
0	50% SUBMISSION	2018/01/15
revision	description	date

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A	Detail No. No. du détail
B	drawing no. - where detail required dessin no. - où détail exigé
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project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessine par  
**A.C.**

designed by  
conc par  
**A.C.**

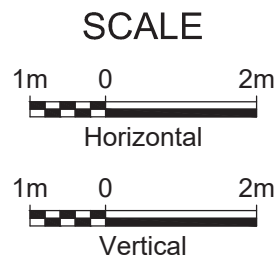
approved by  
approuve par  
**B.P.**

tender  
soumission  
**PIERRE GRAMBART** project manager  
administrateur de projets

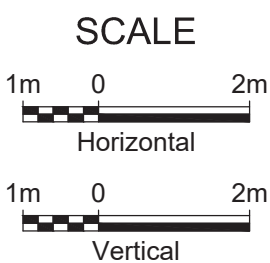
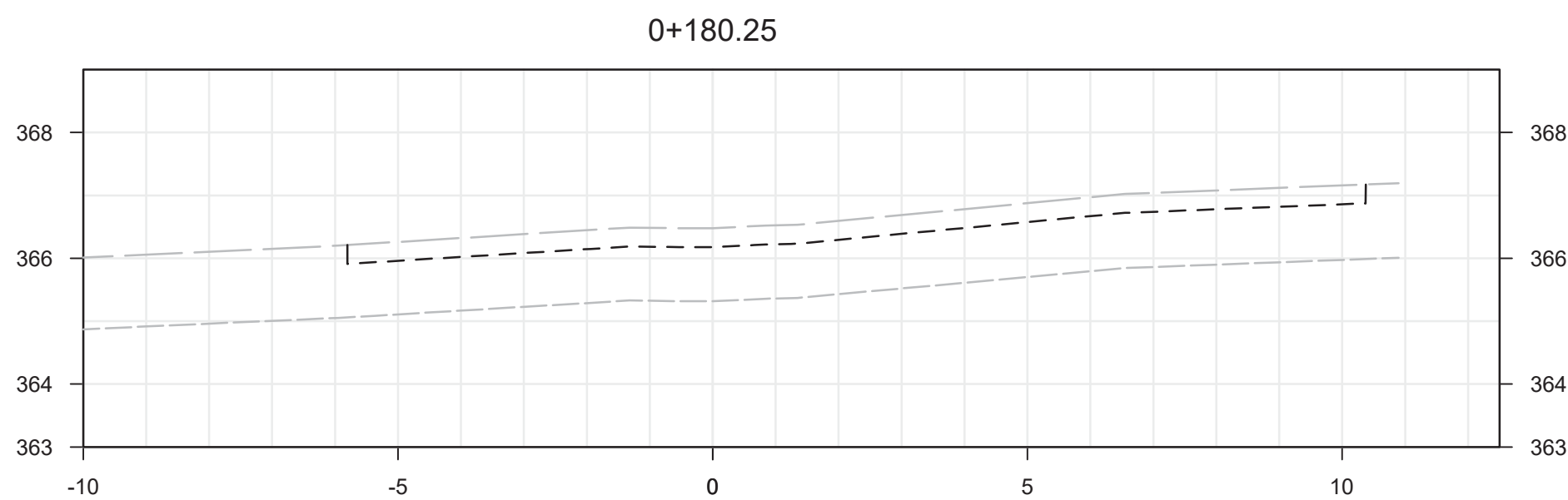
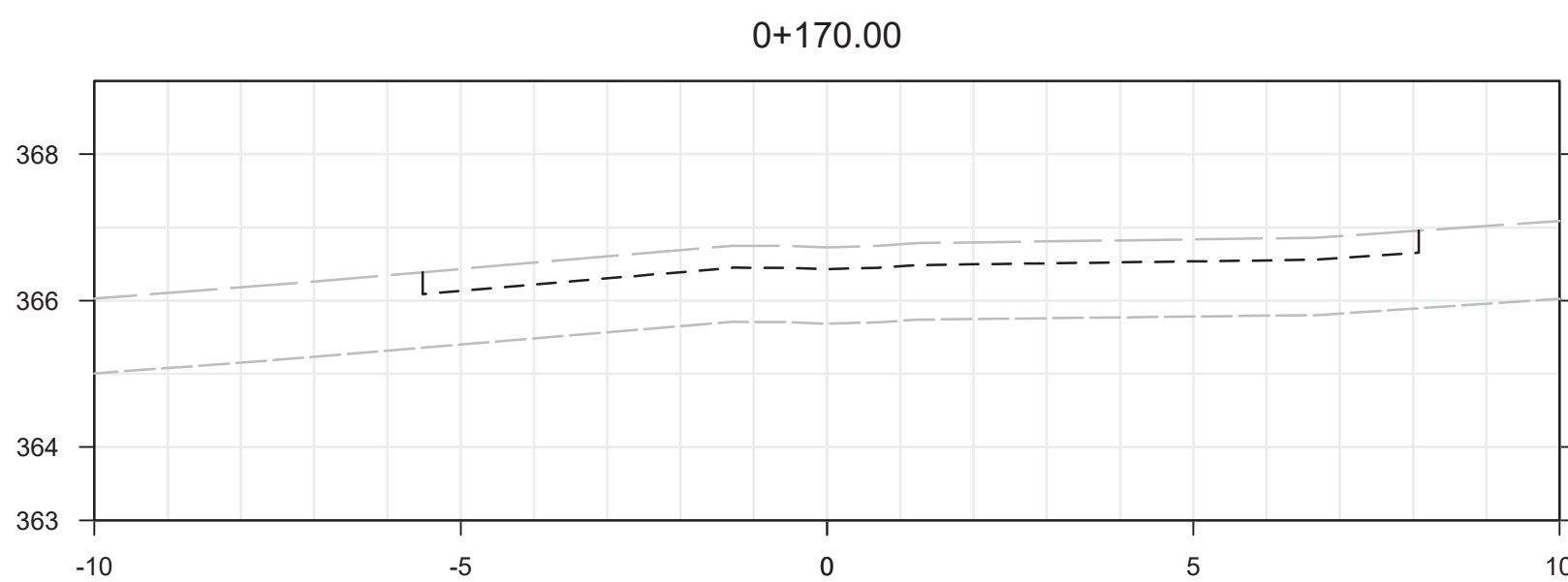
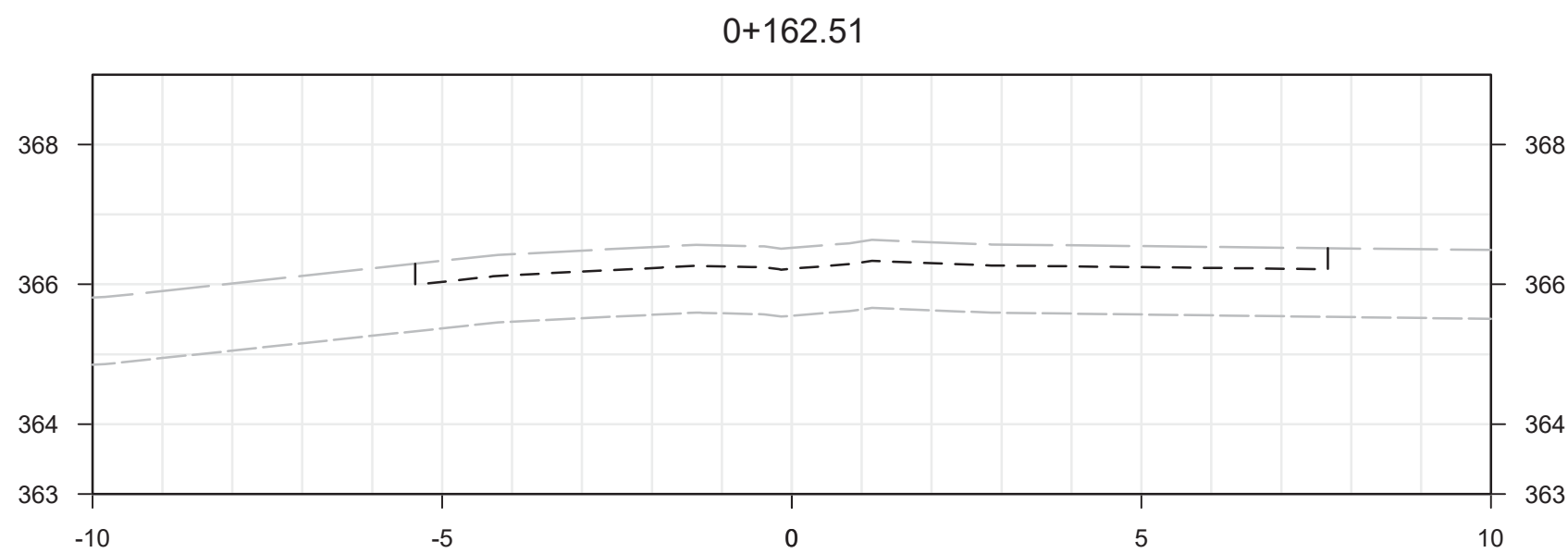
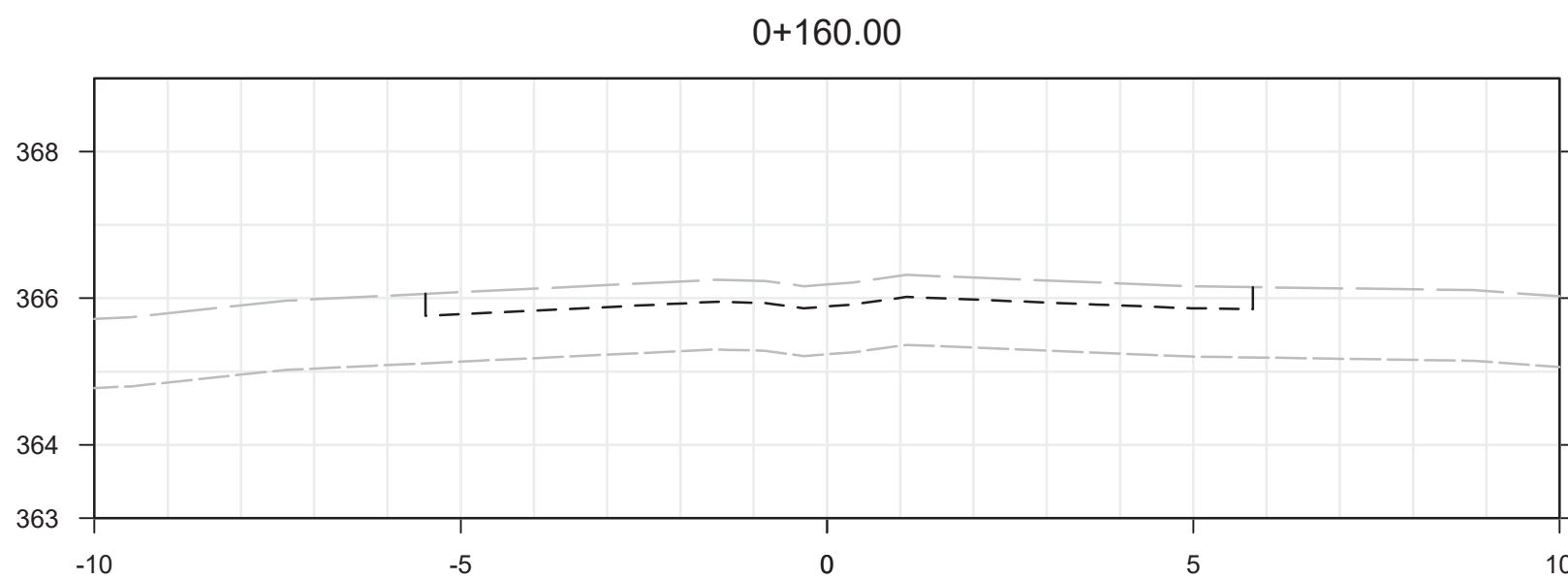
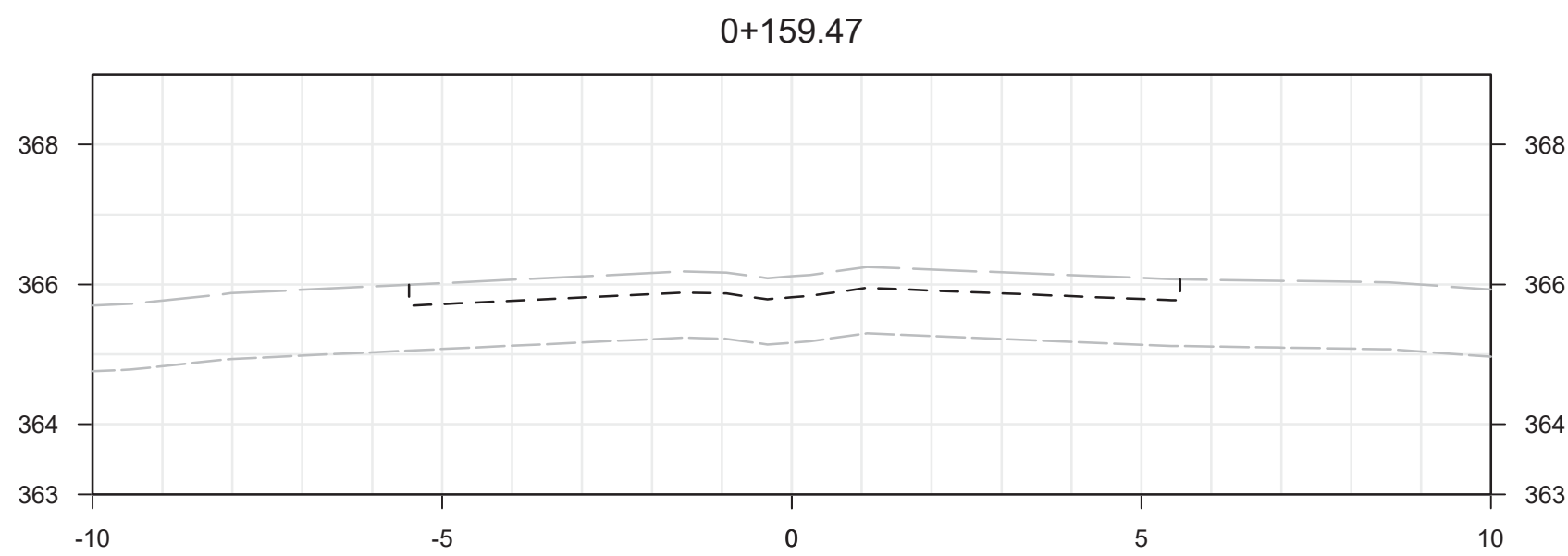
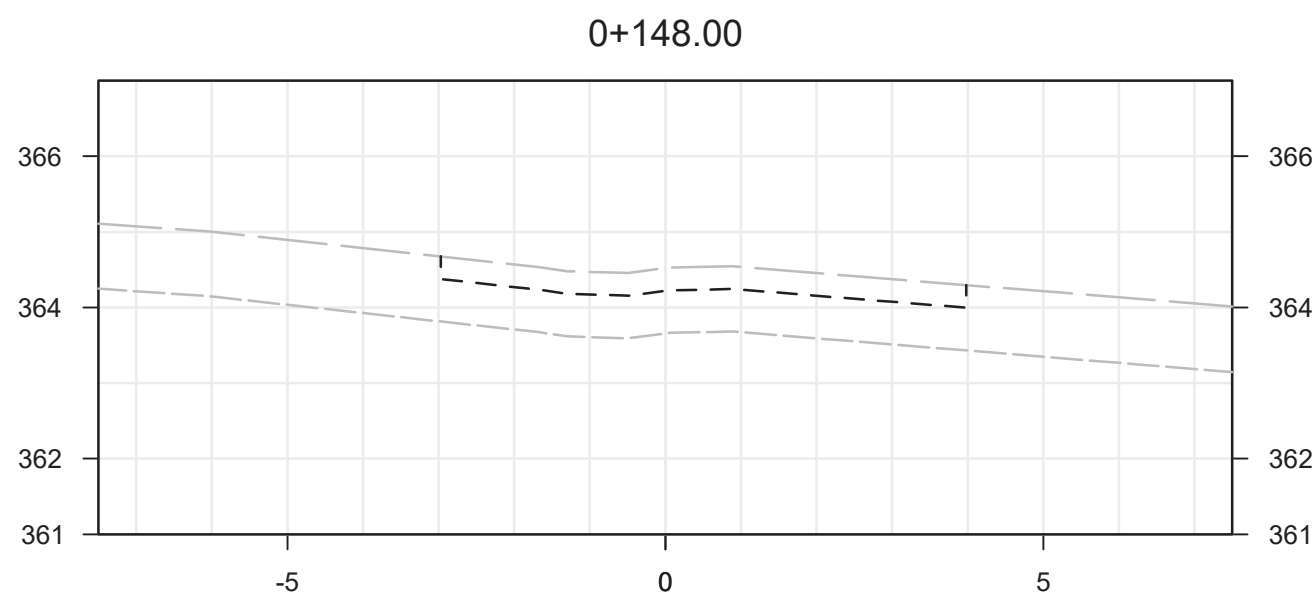
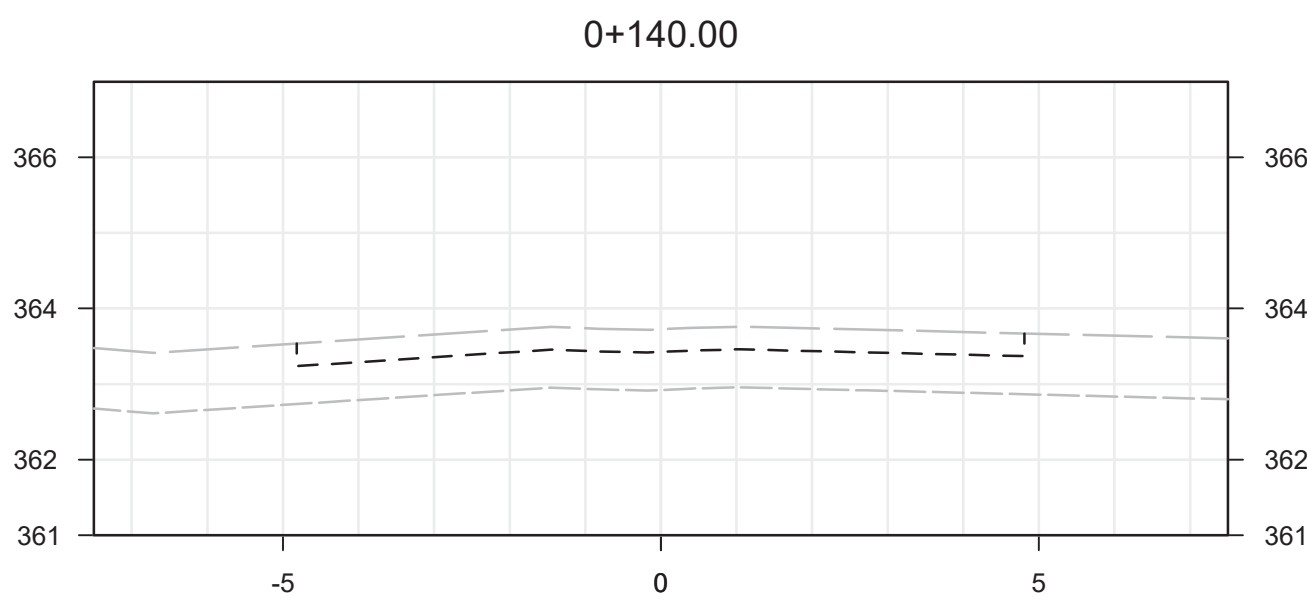
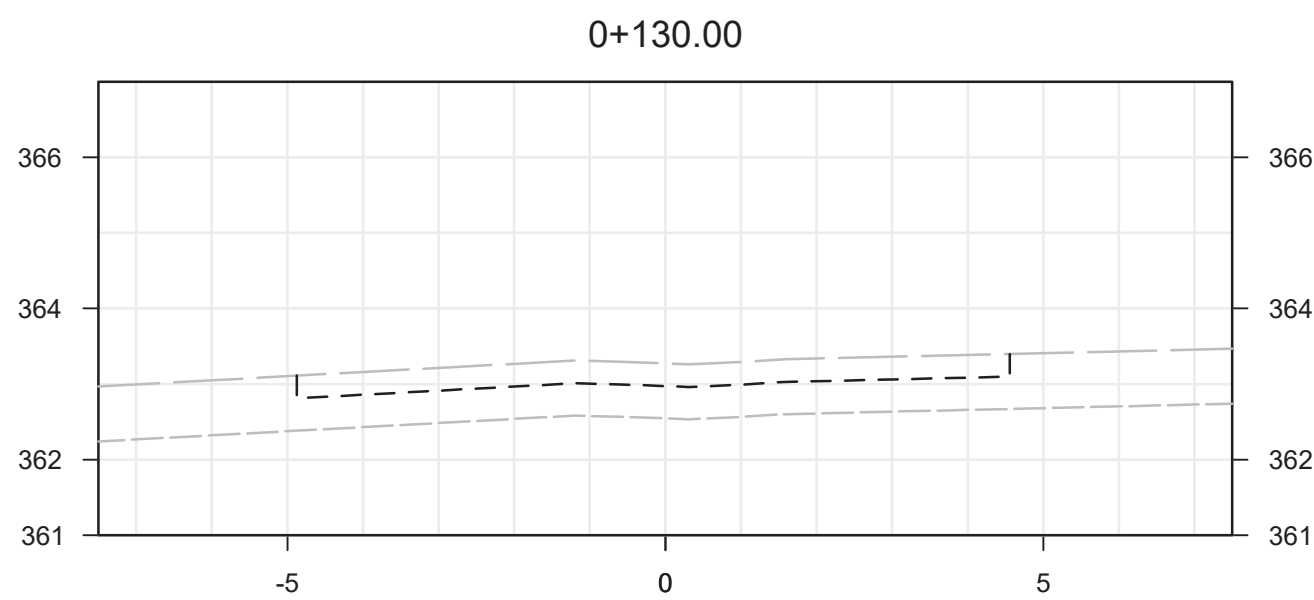
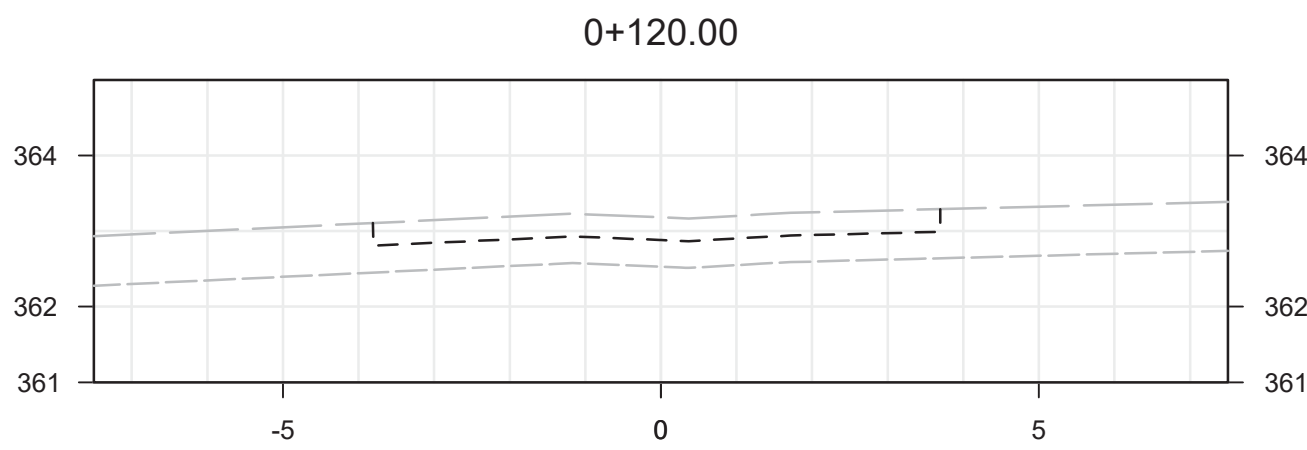
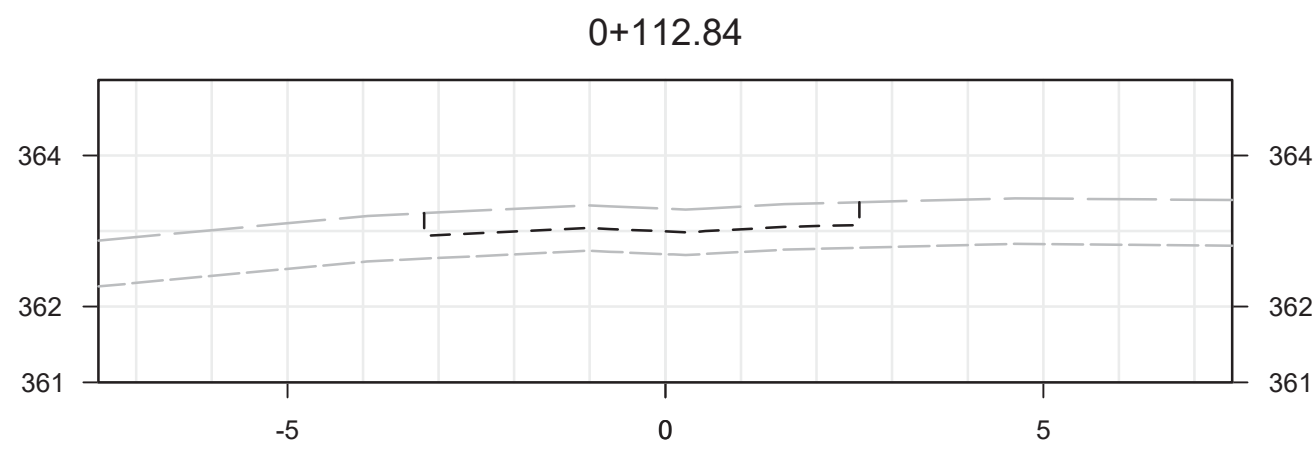
project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessine no.  
**500**










4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
1	99% SUBMISSION	2018/02/12
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revision	description	date

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	A Detail No. No. du détail
	B drawing no. - where detail required dessin no. - où détail exigé
	C drawing no. - where detailed dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conçue par  
**A.C.**

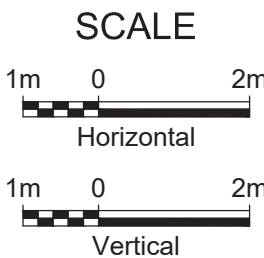
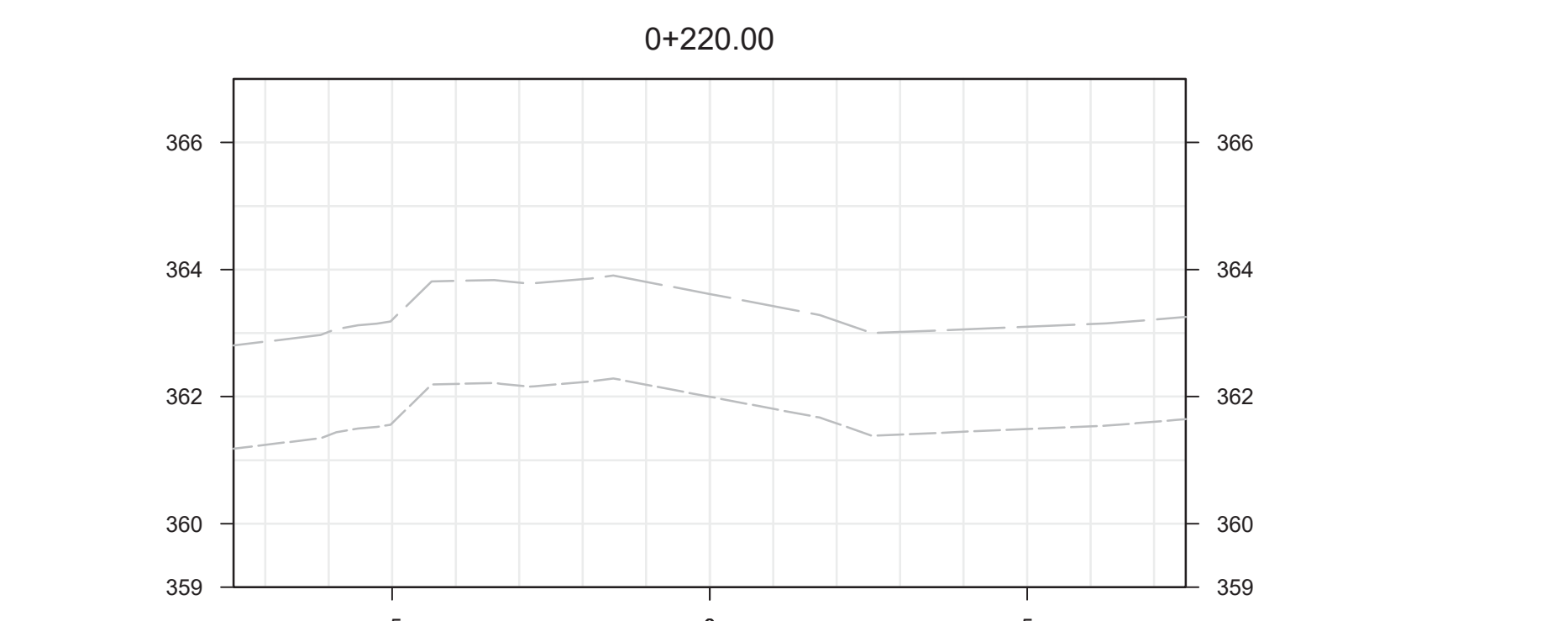
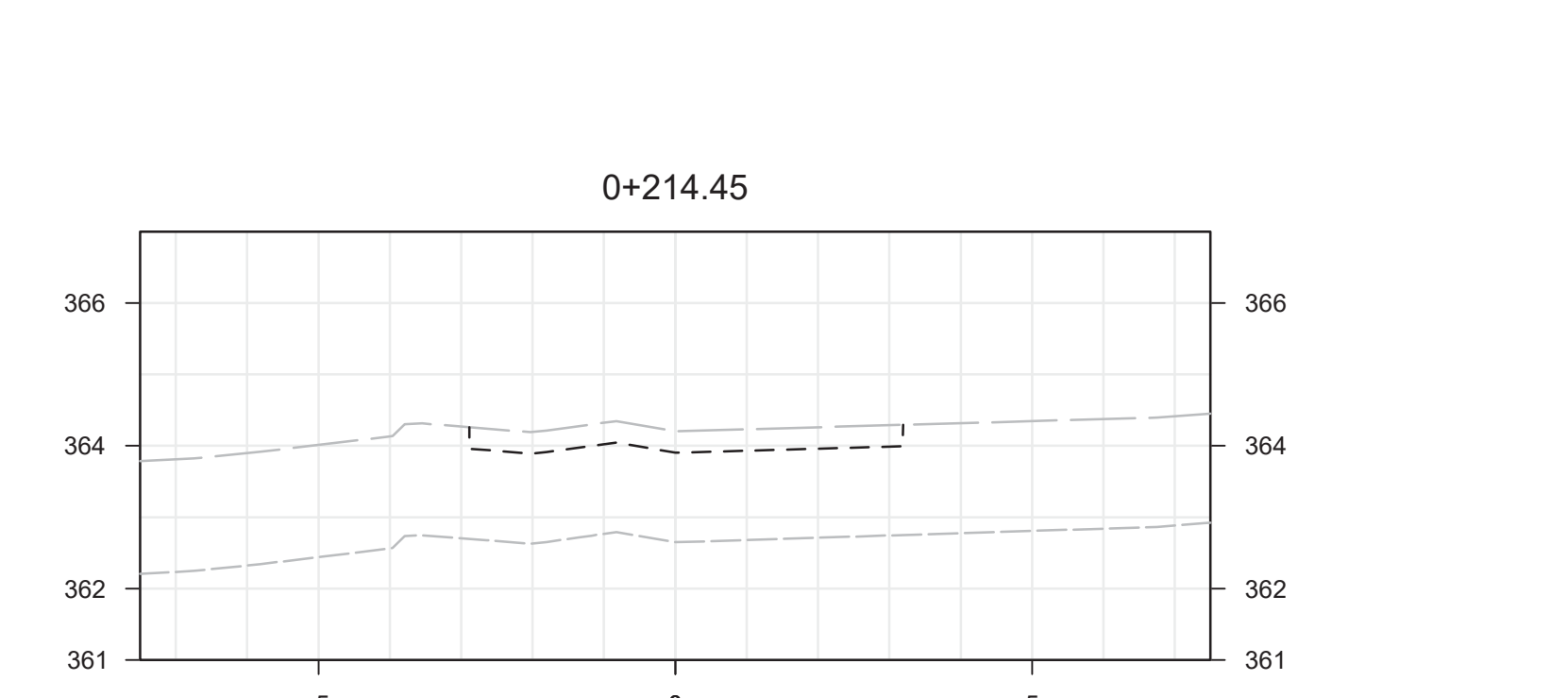
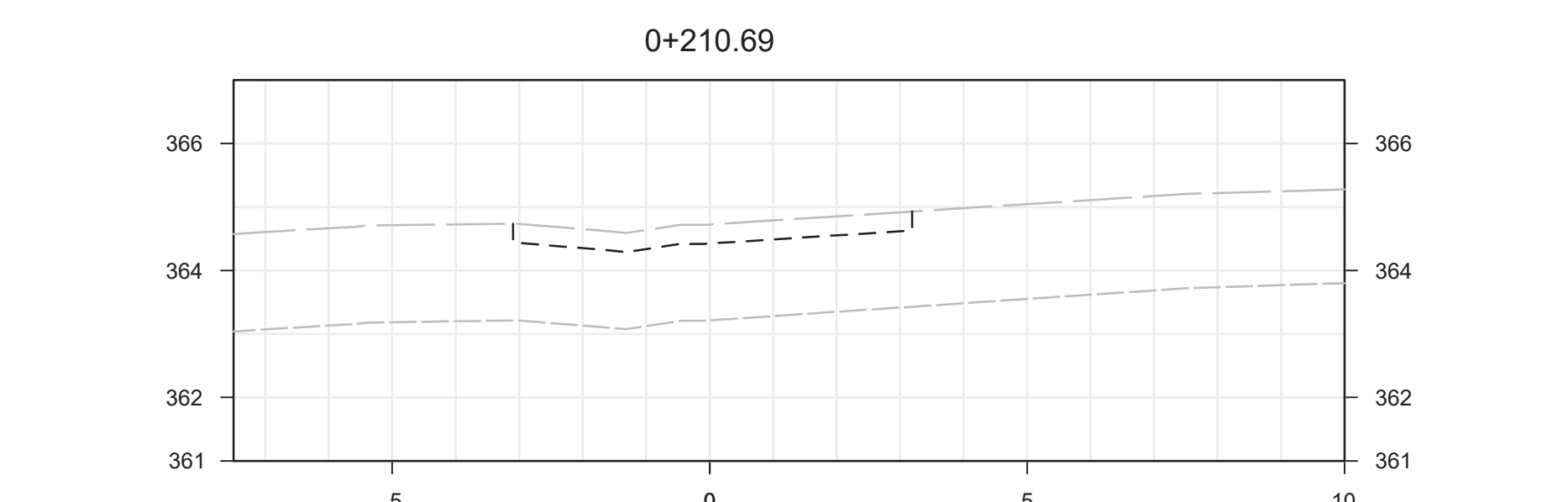
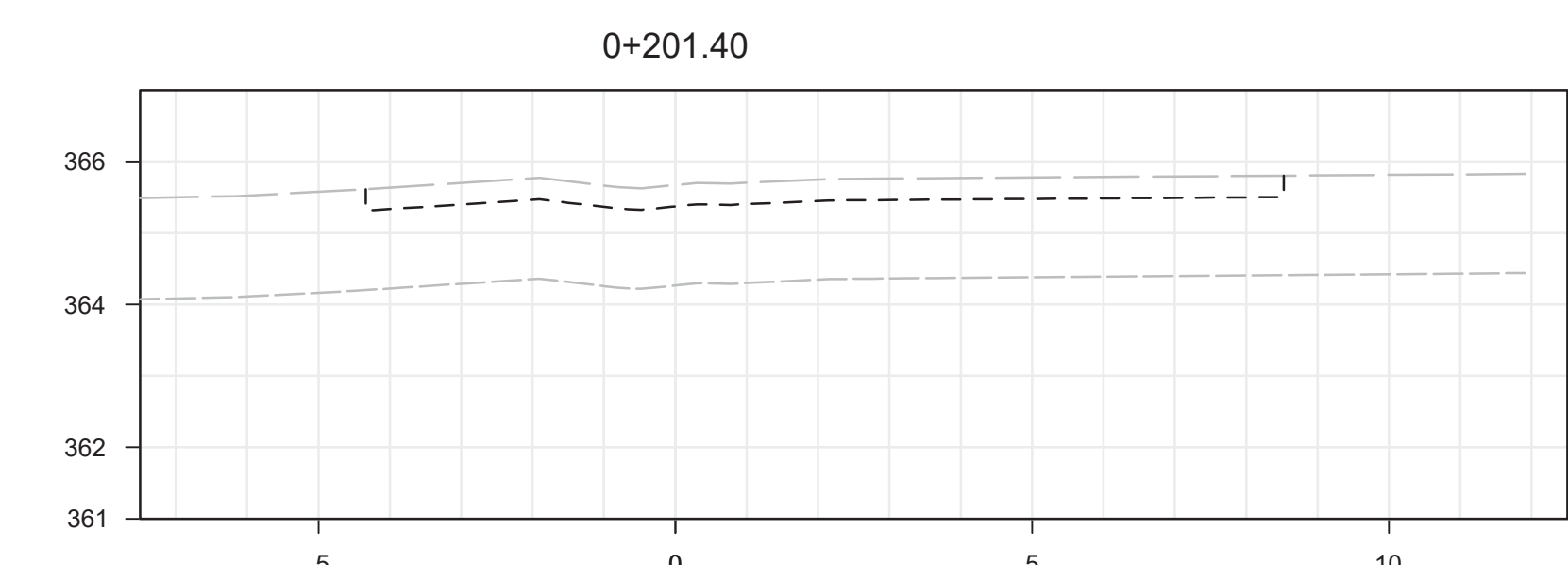
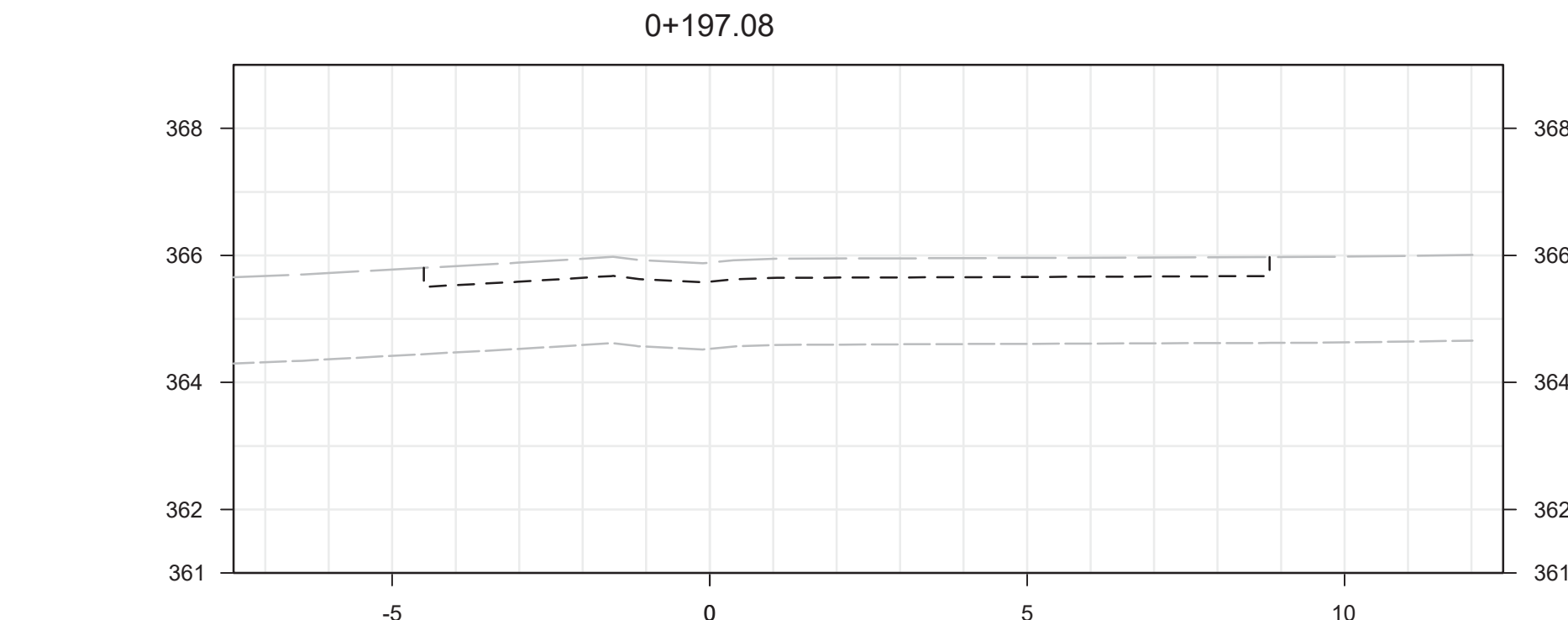
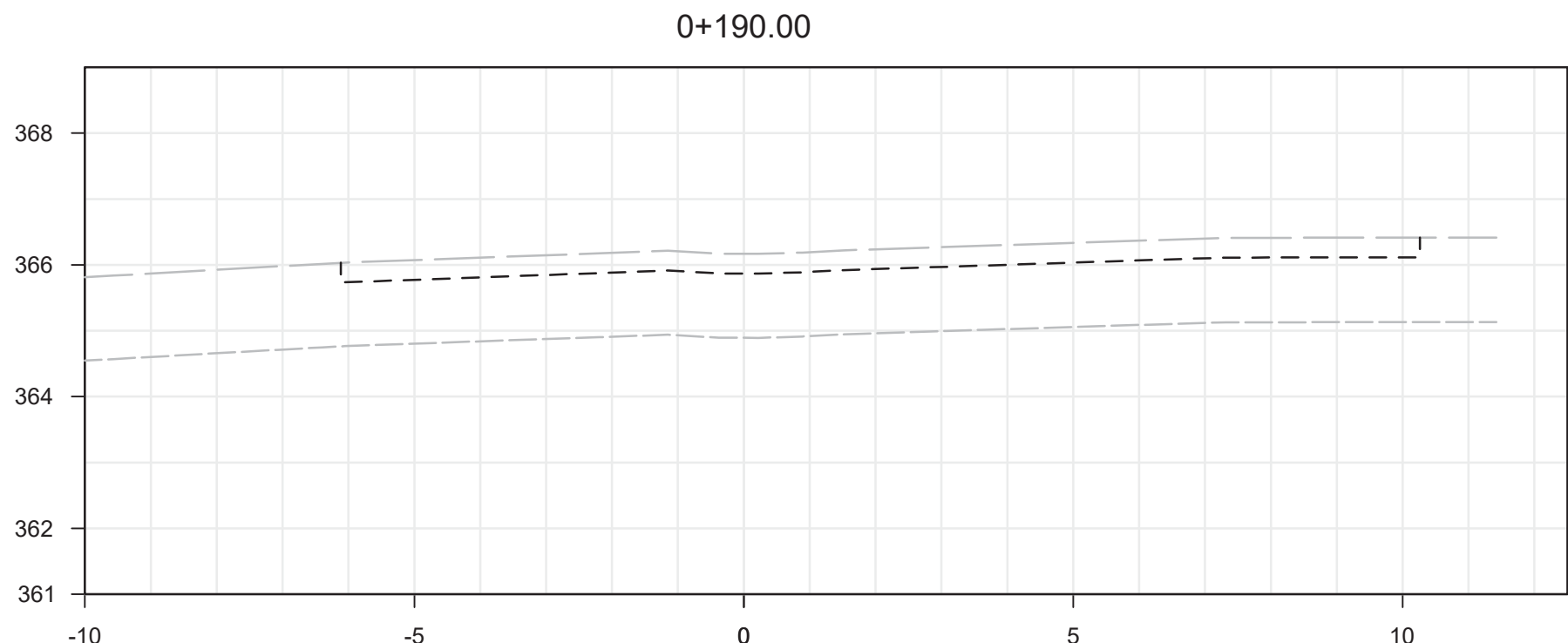
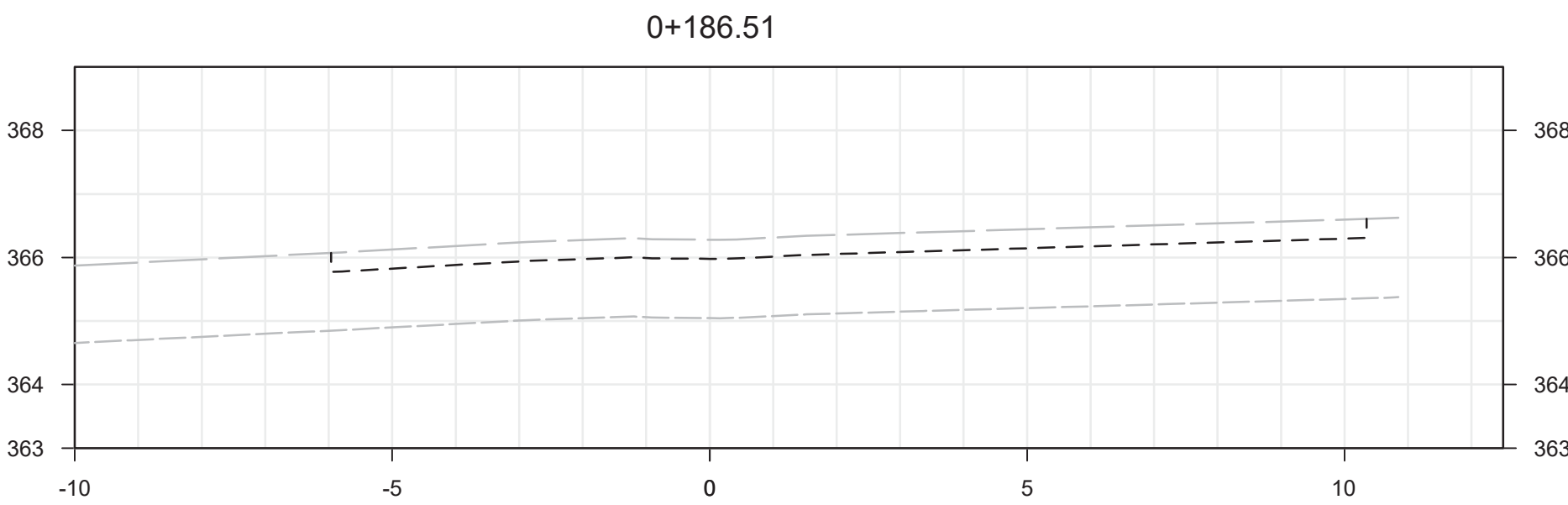
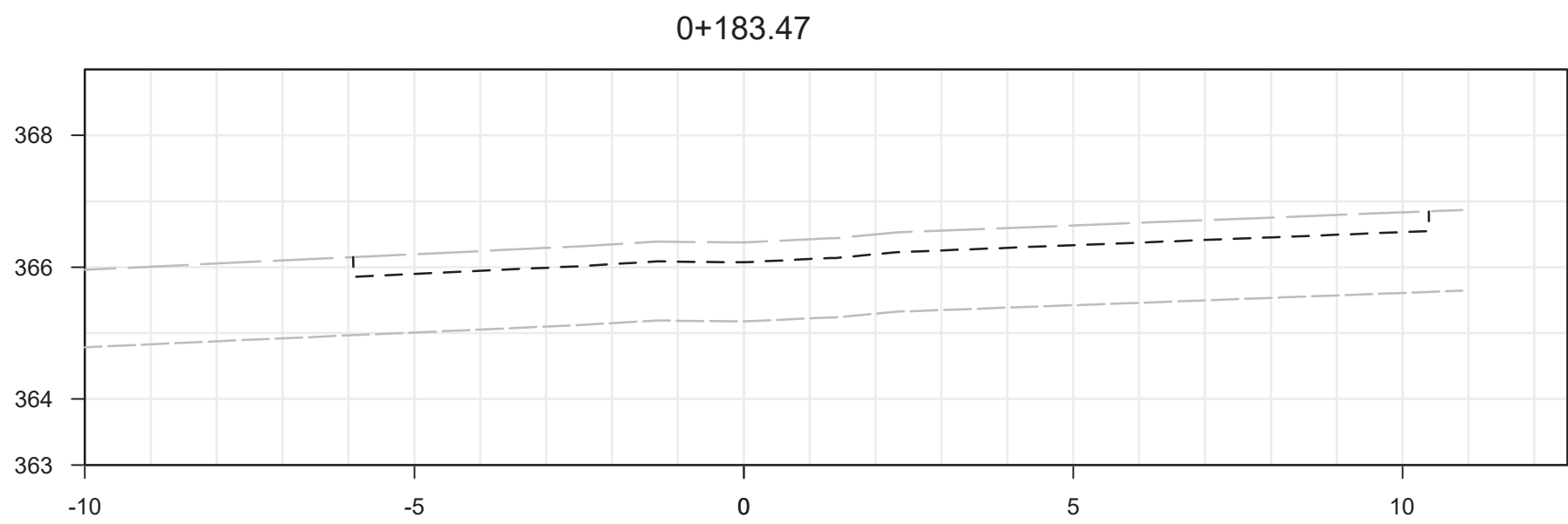
approved by  
approuvé par  
**B.P.**

tender  
soumission  
**PIERRE GRAMBART** project manager  
administrateur de projets

project date  
date du projet  
**2019/08**

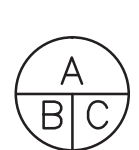


project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**501**



4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
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project title  
titre du projet  
**MINDEN** **ONTARIO**  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conçue par  
**A.C.**

approved by  
approuvé par  
**B.P.**

tender  
soumission  
**PIERRE GRAMBART** project manager  
administrateur de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**502**



4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
1	99% SUBMISSION	2018/02/12
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project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
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designed by  
conçue par  
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approved by  
approuvé par  
**B.P.**

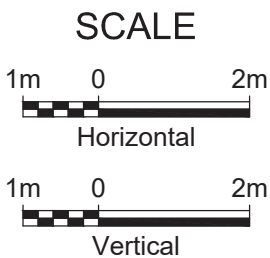
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soumission  
**PIERRE GRAMBART**

project manager  
administrateur  
de projets

project date  
date du projet  
**2019/08**

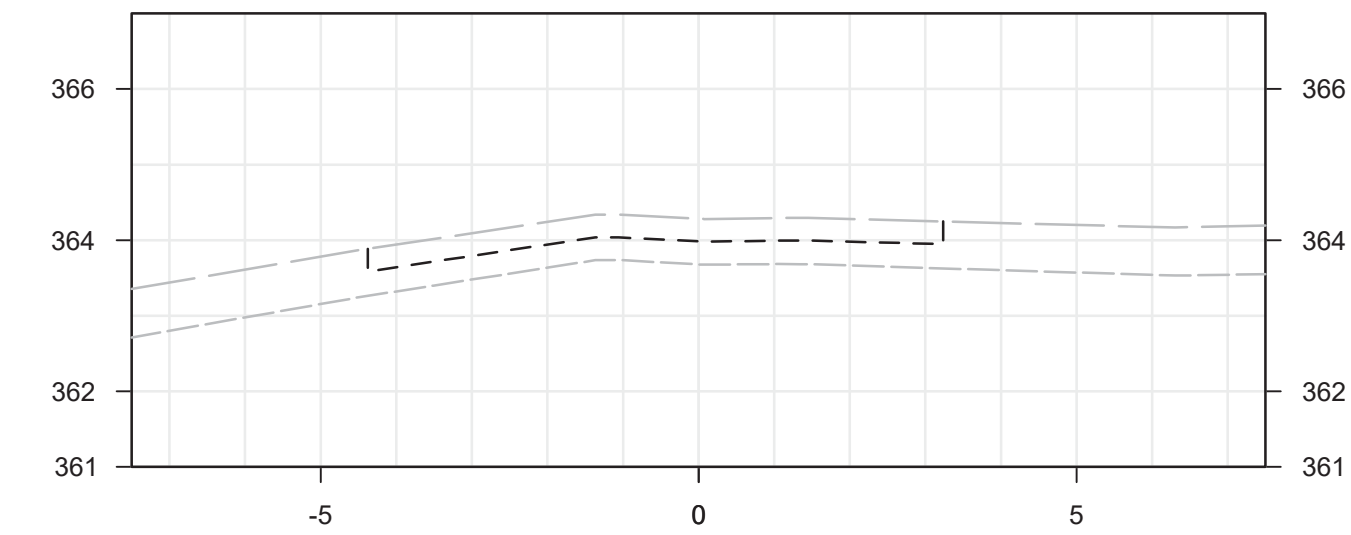
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no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**503**

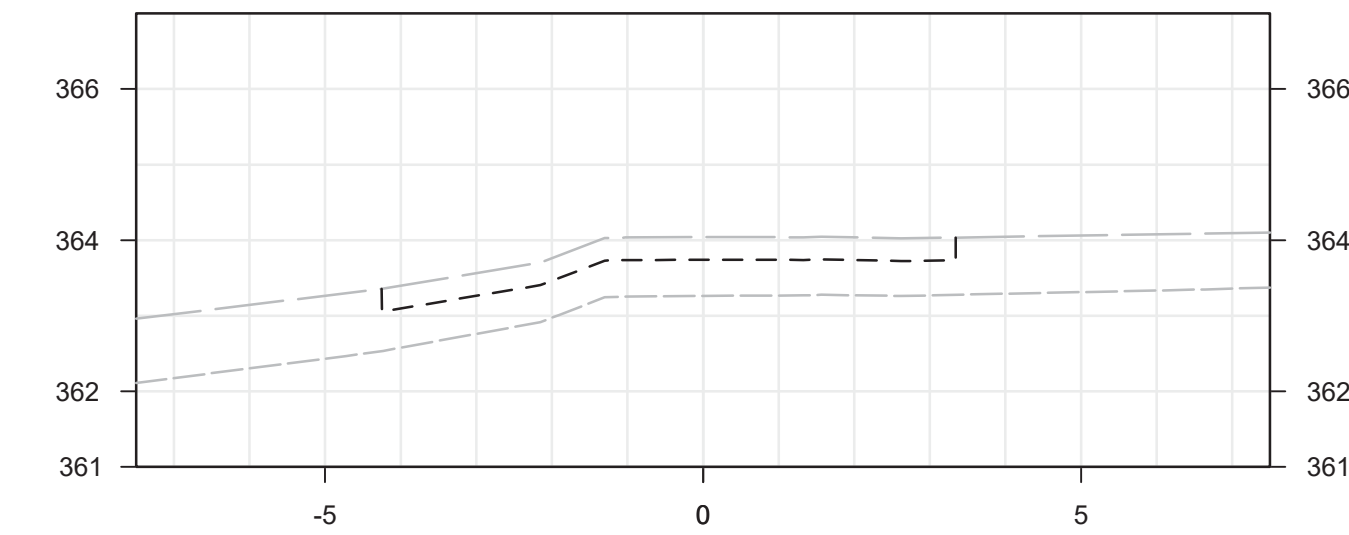




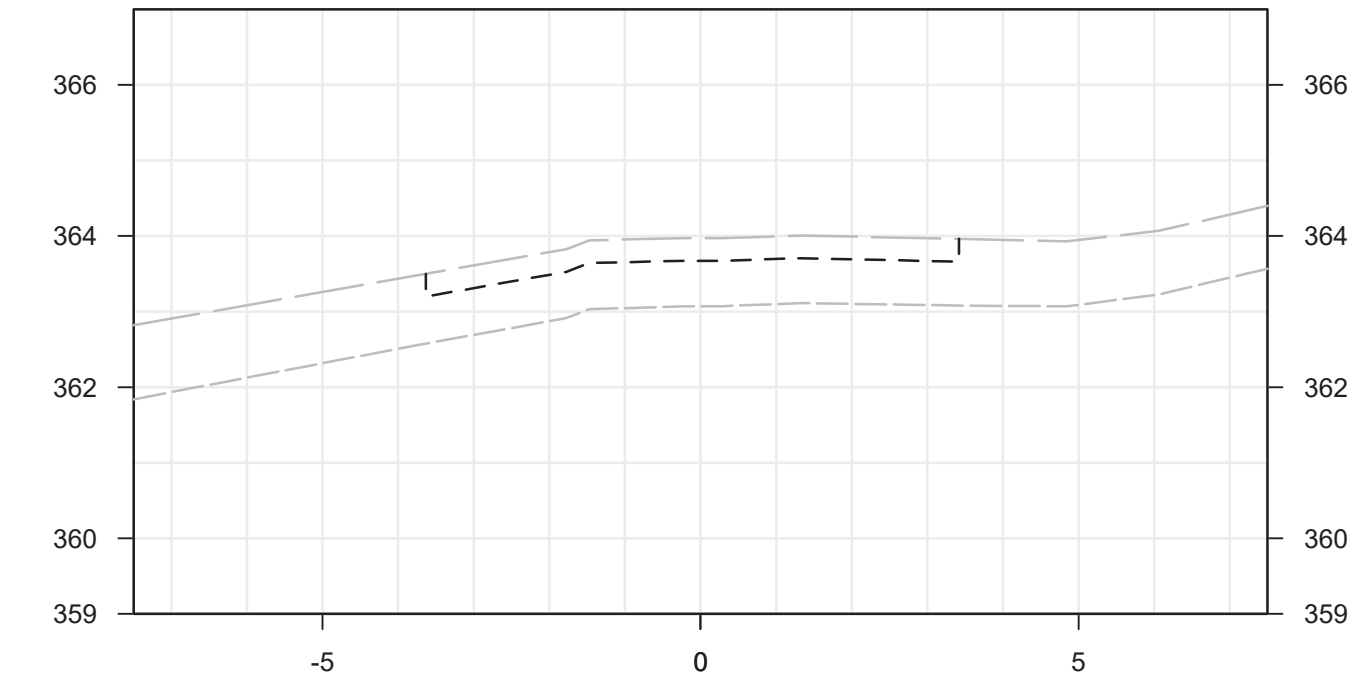
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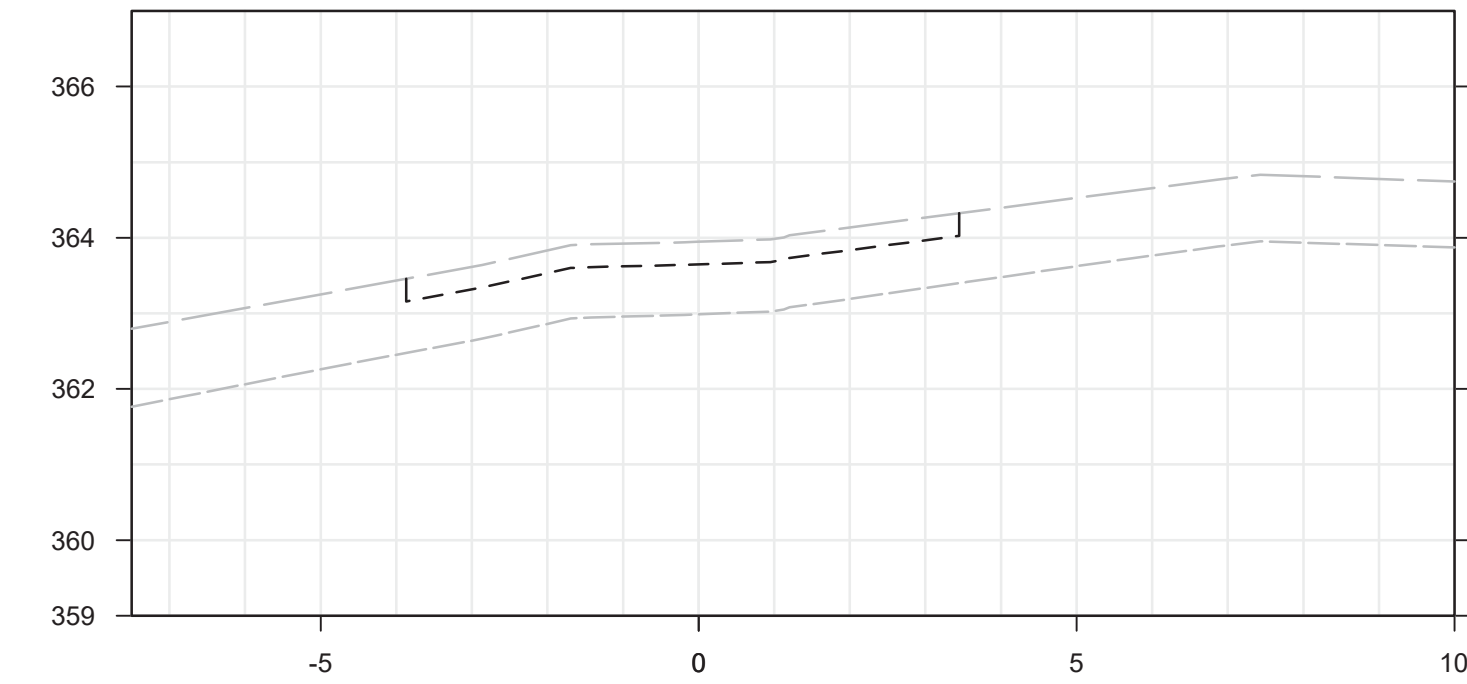
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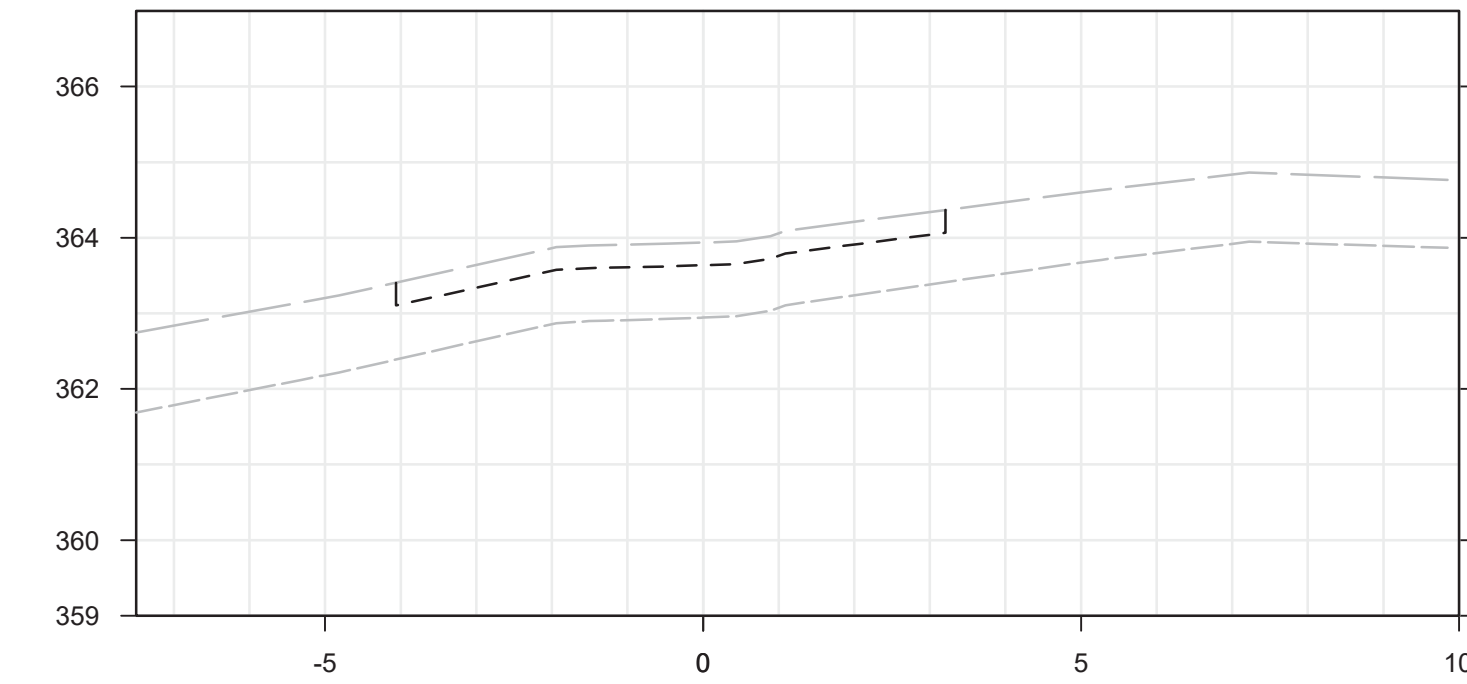
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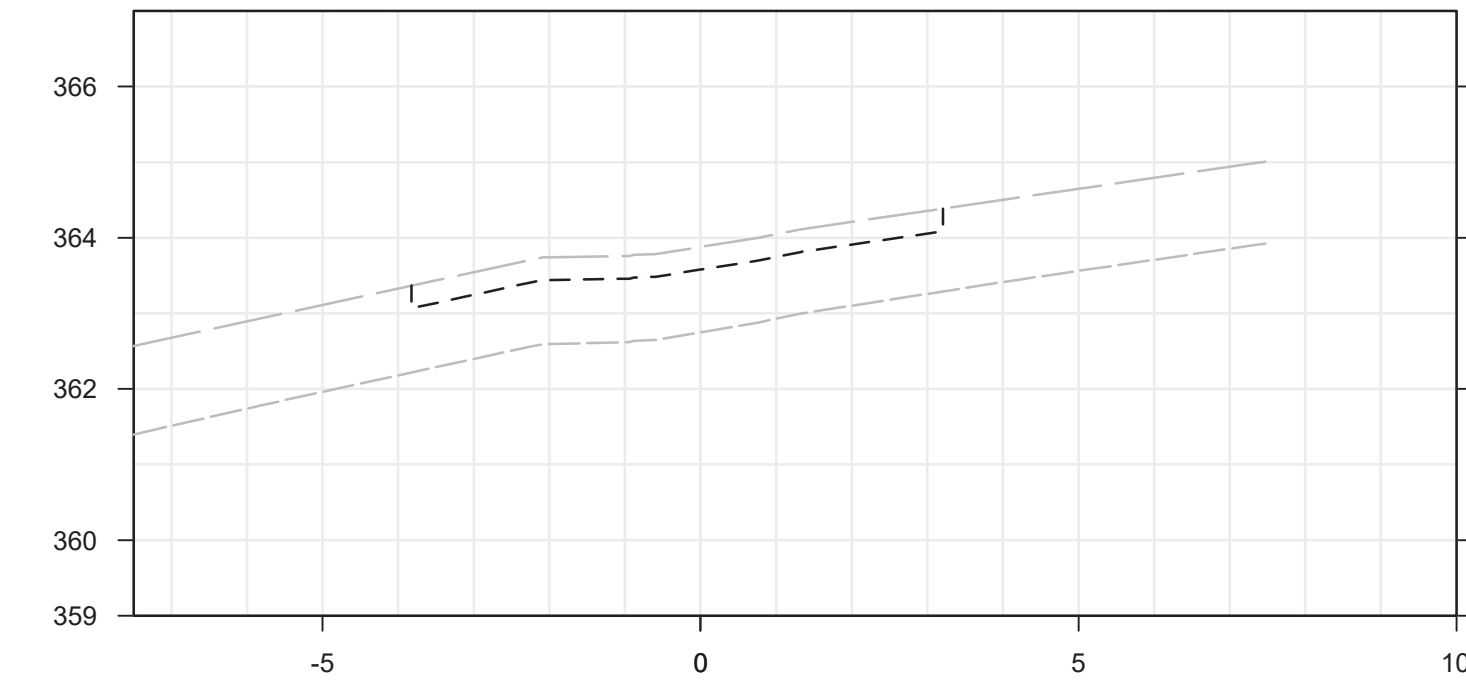
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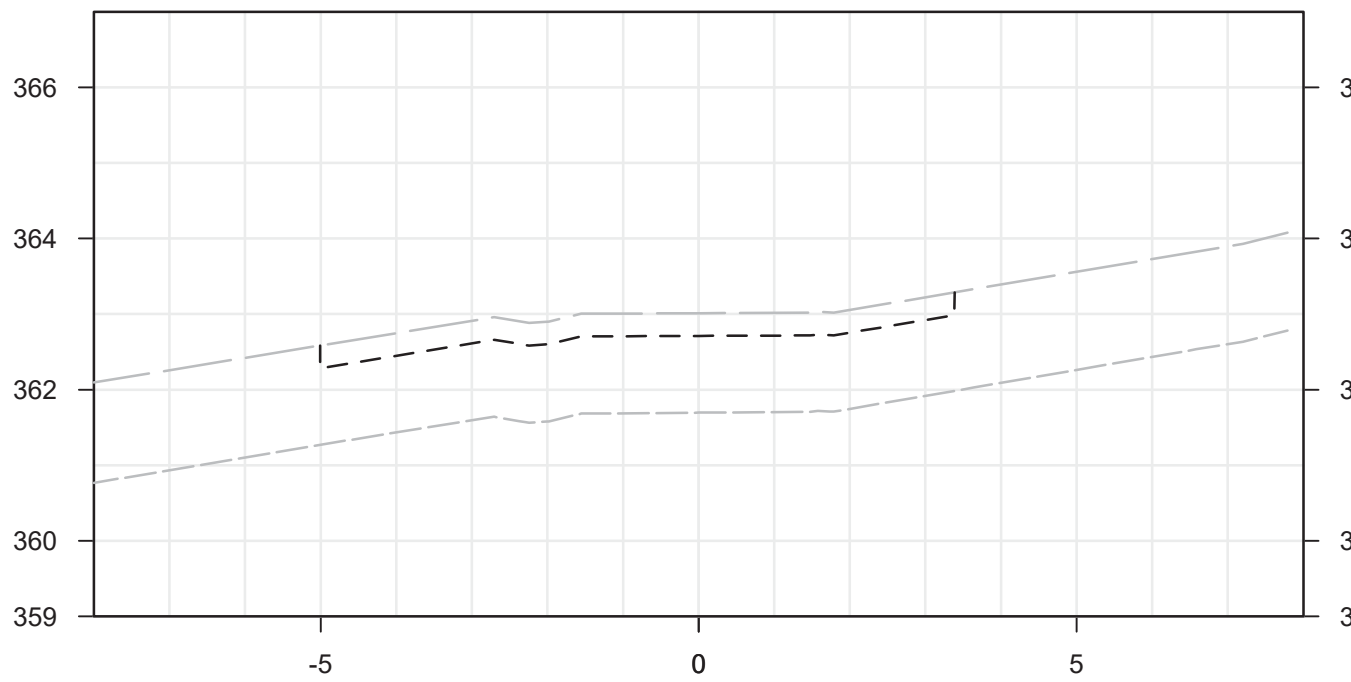
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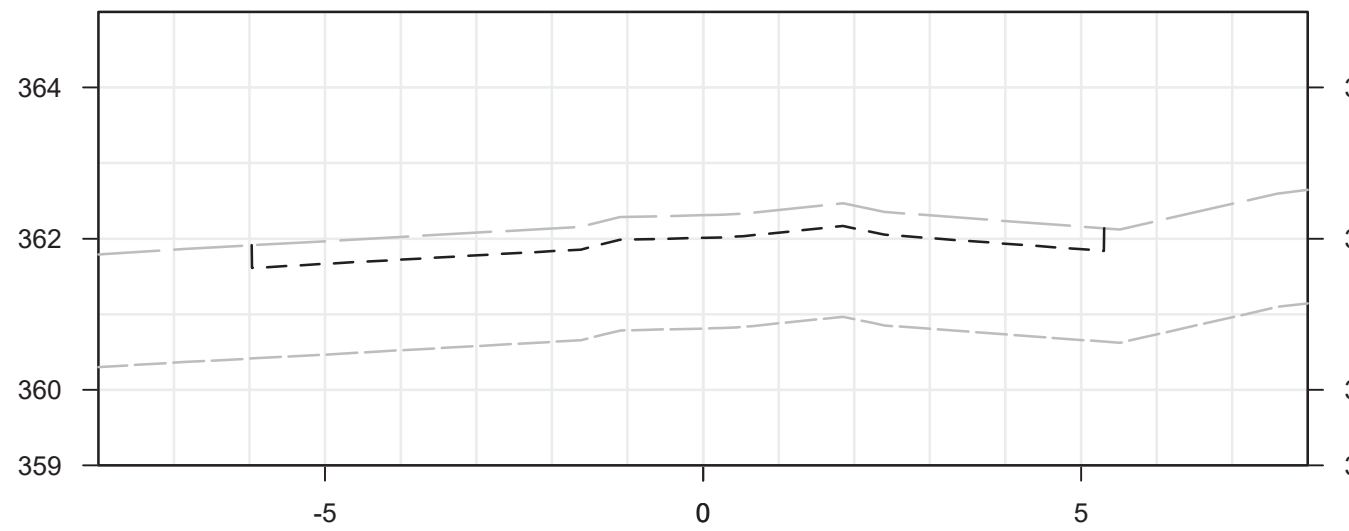
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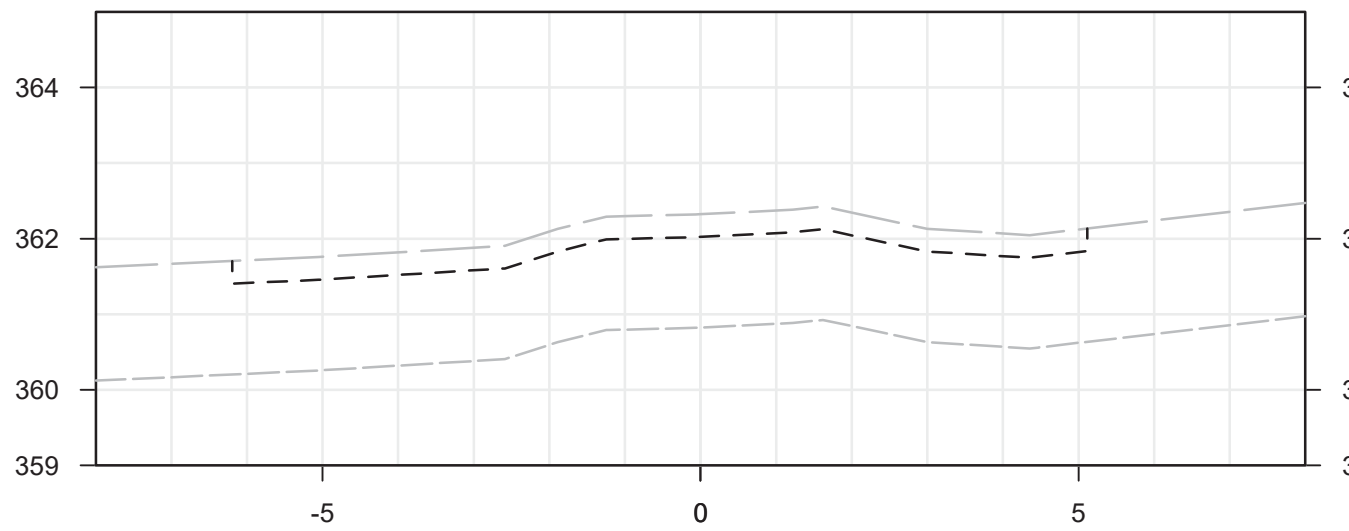
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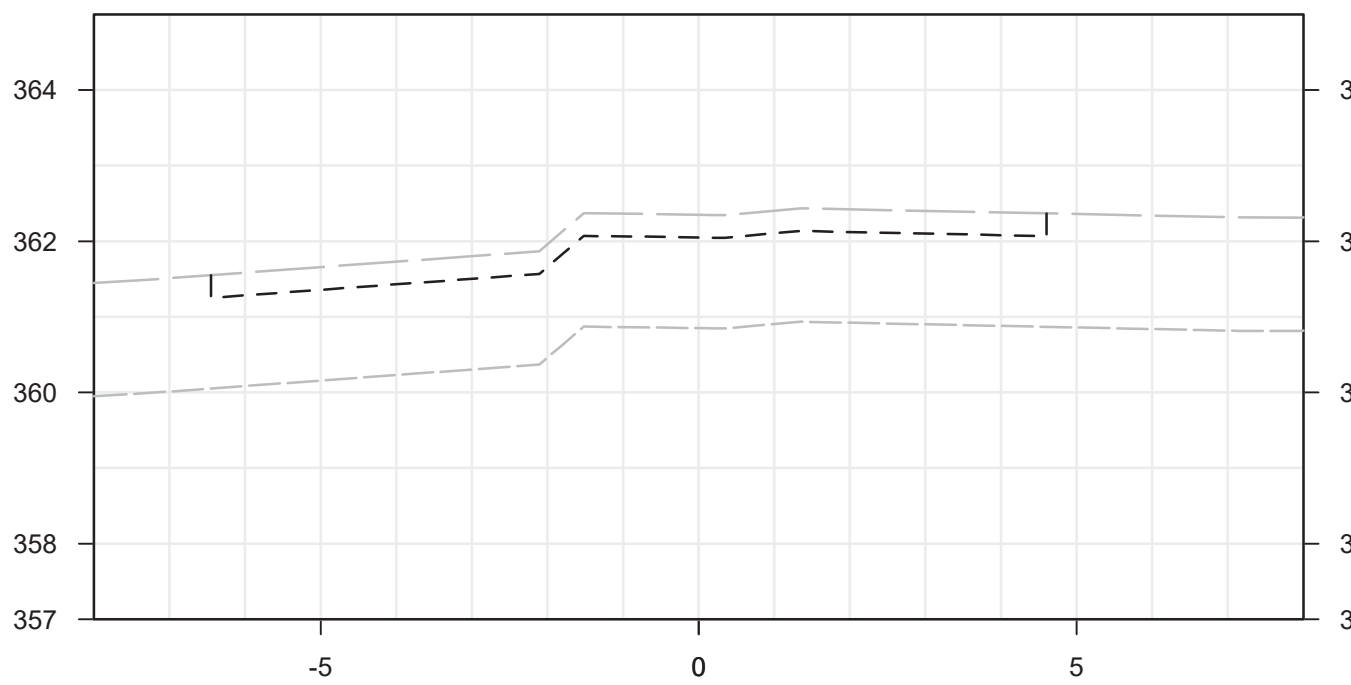
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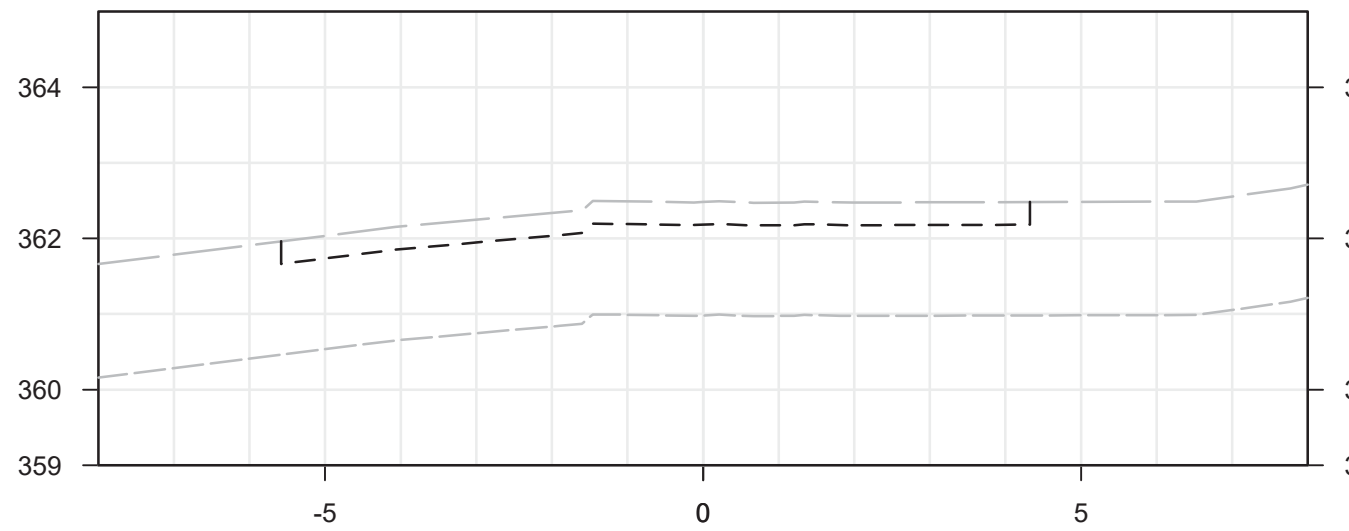
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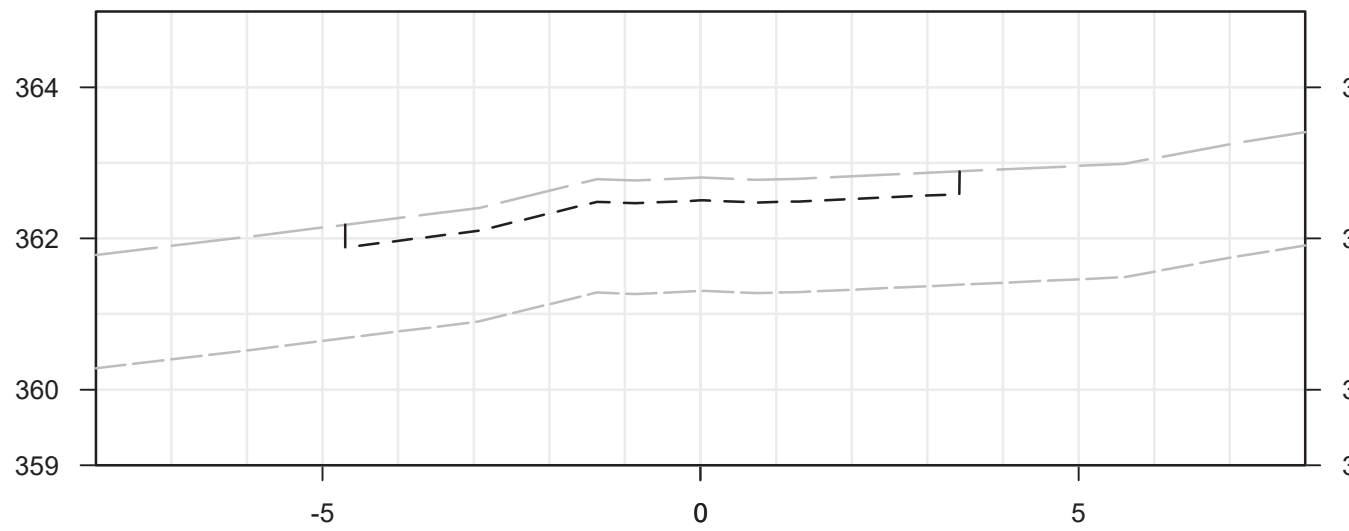
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0+395.34



0+400.00



Public Works and  
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Architectural and Engineering Services  
Ontario Region  
  
Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
1	99% SUBMISSION	2018/02/12
0	50% SUBMISSION	2018/01/15

revision	description	date
Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.		



- A Detail No.  
No. du détail
- B drawing no. - where detail required  
dessin no. - où détail exigé
- C drawing no. - where detailed  
dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conçu par  
**A.C.**

approved by  
approuvé par  
**B.P.**

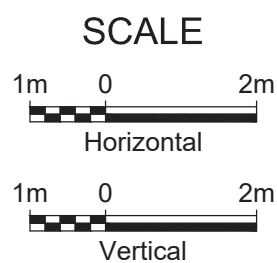
tender  
soumission  
**PIERRE GRAMBART**

project manager  
administrateur  
de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**504**





Public Works and  
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Architectural and Engineering Services  
Ontario Region  
  
Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



CONSULTING  
ENGINEERS  
PLANNERS



4	ISSUED FOR TENDER	2019/07/23
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project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessine par  
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designed by  
conc par  
**A.C.**

approved by  
approuve par  
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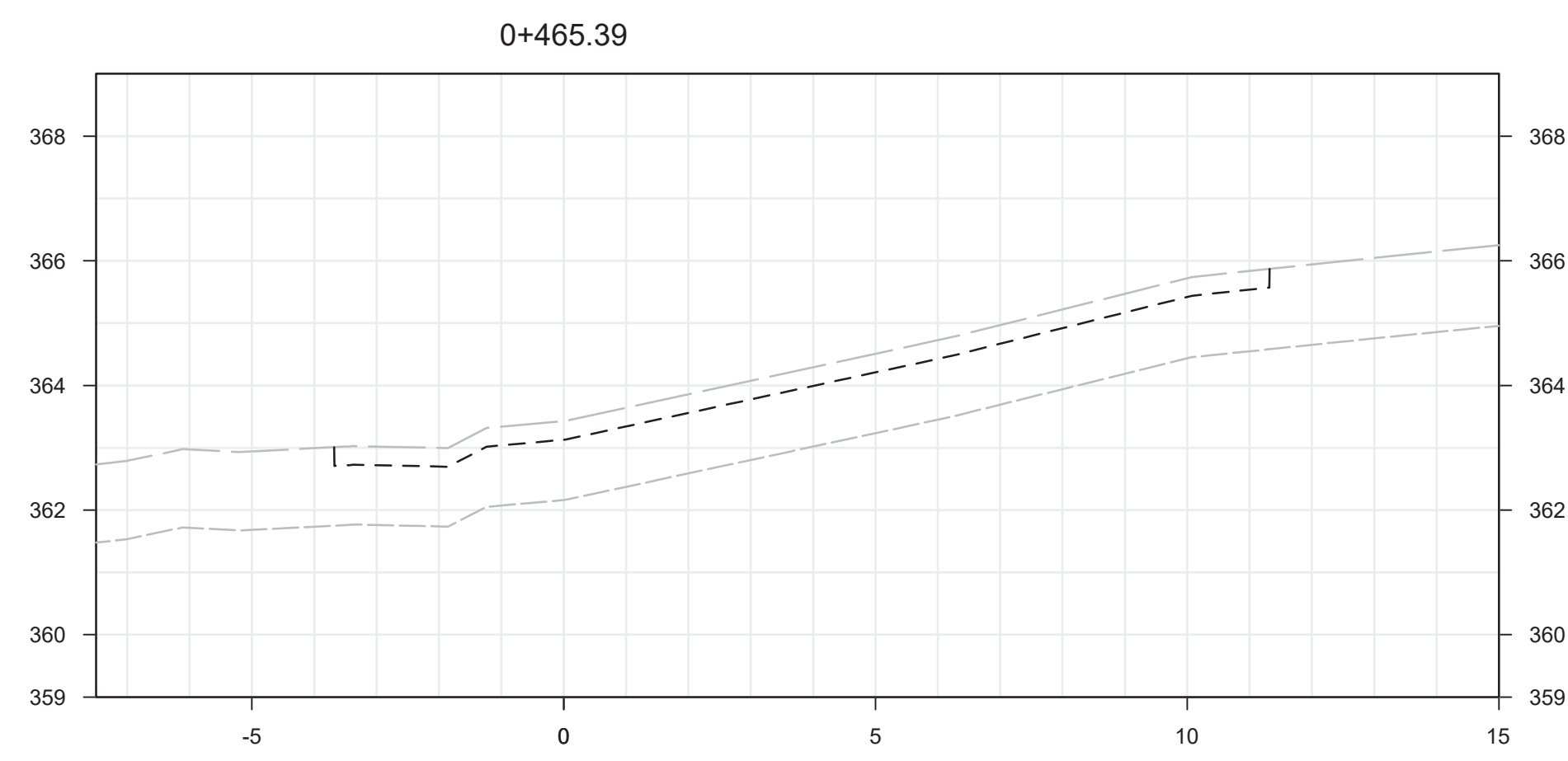
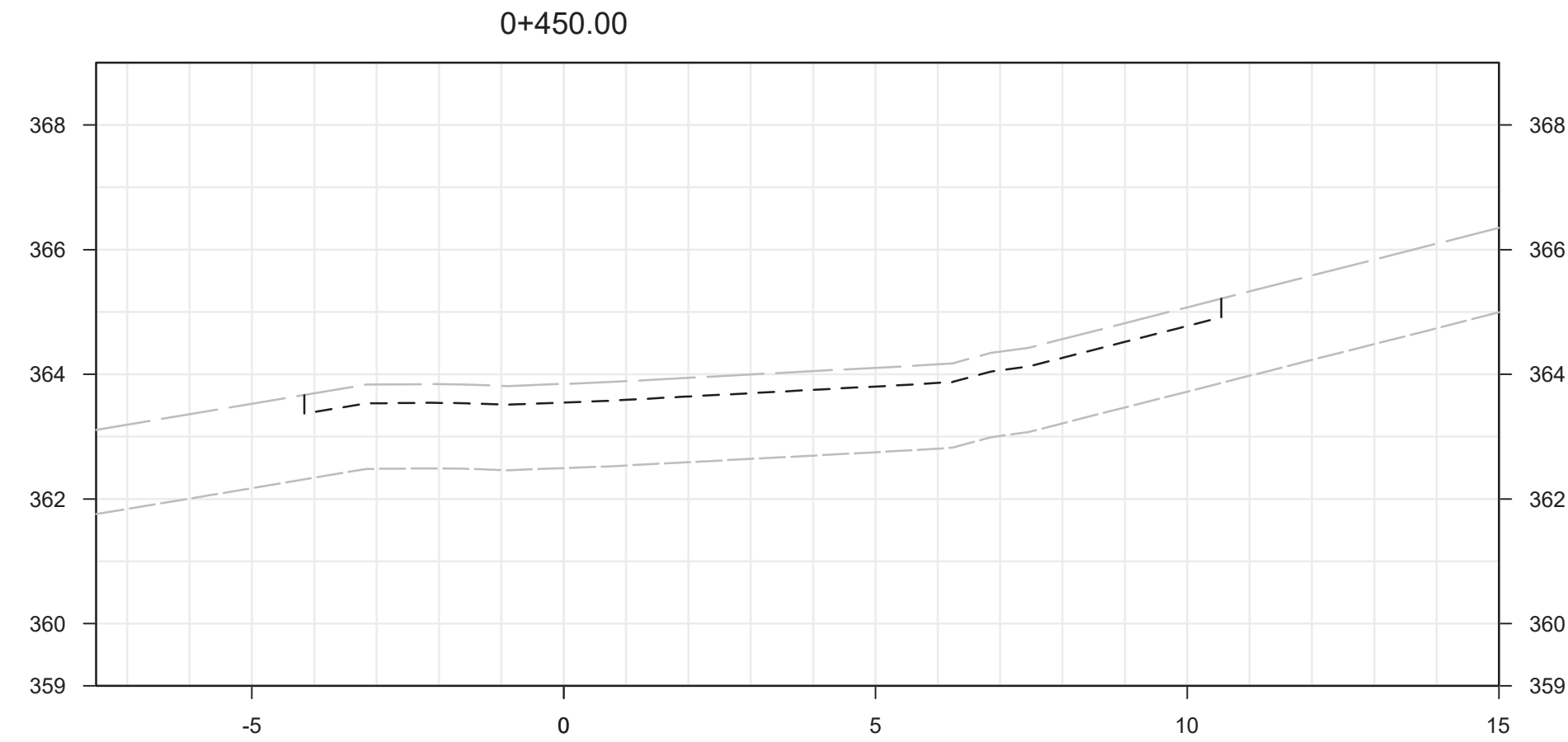
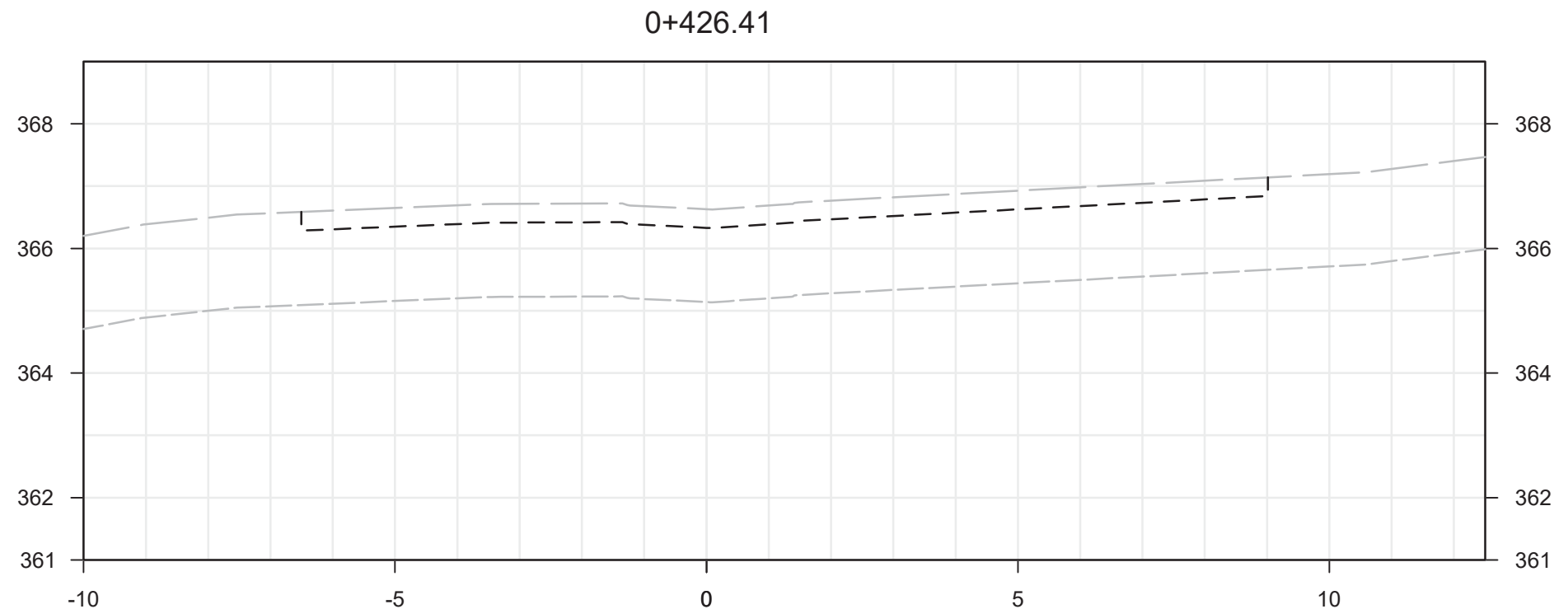
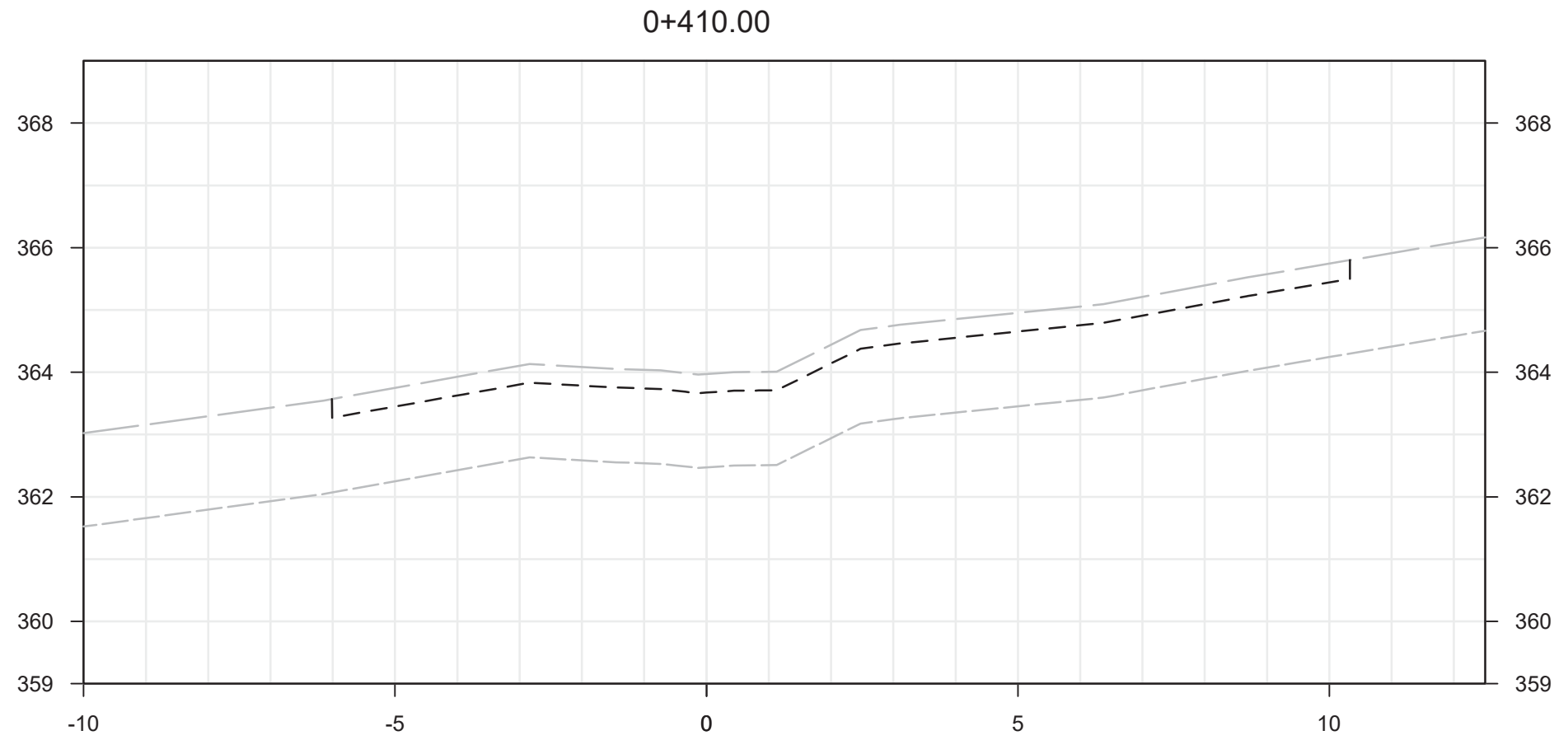
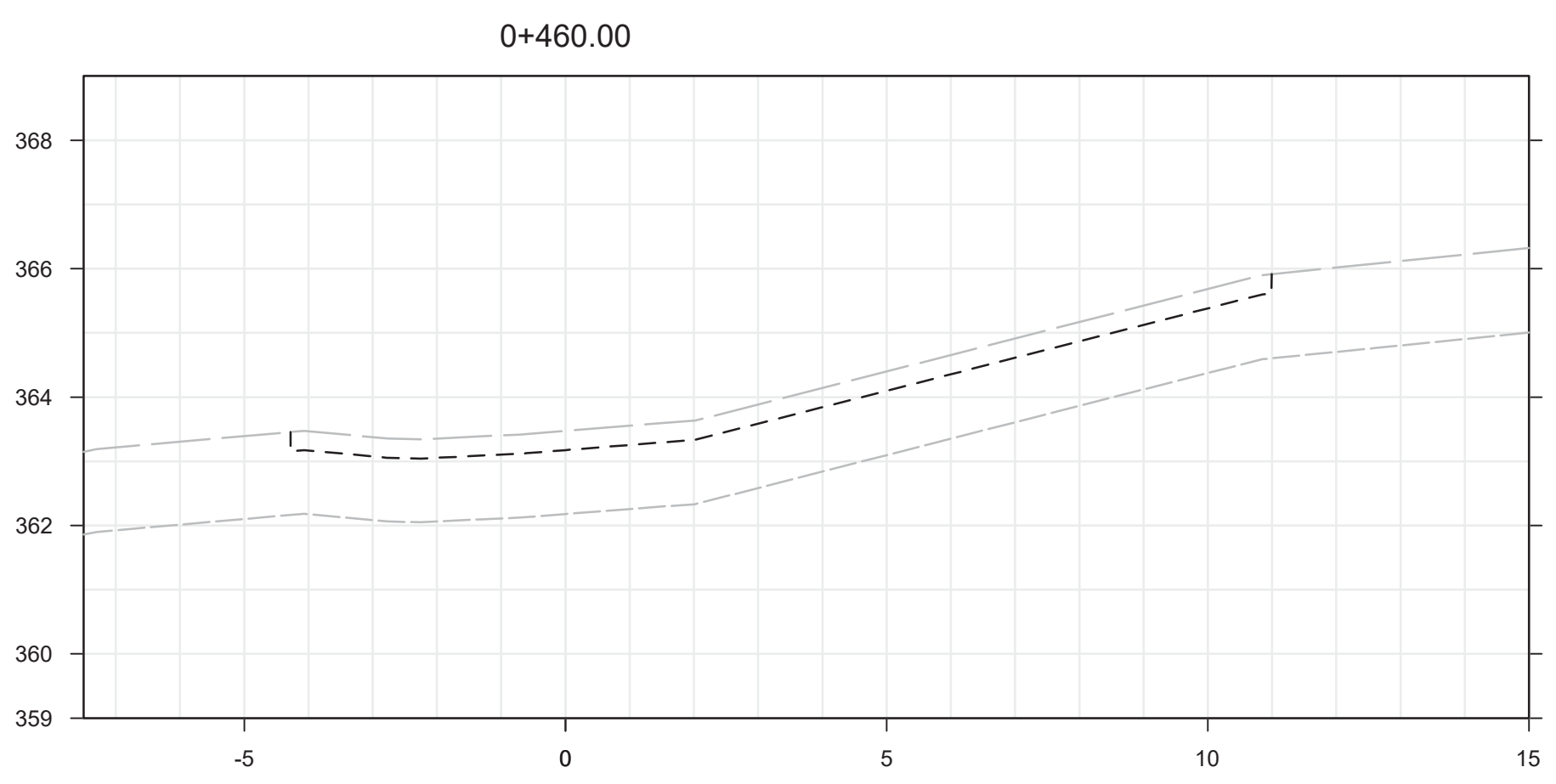
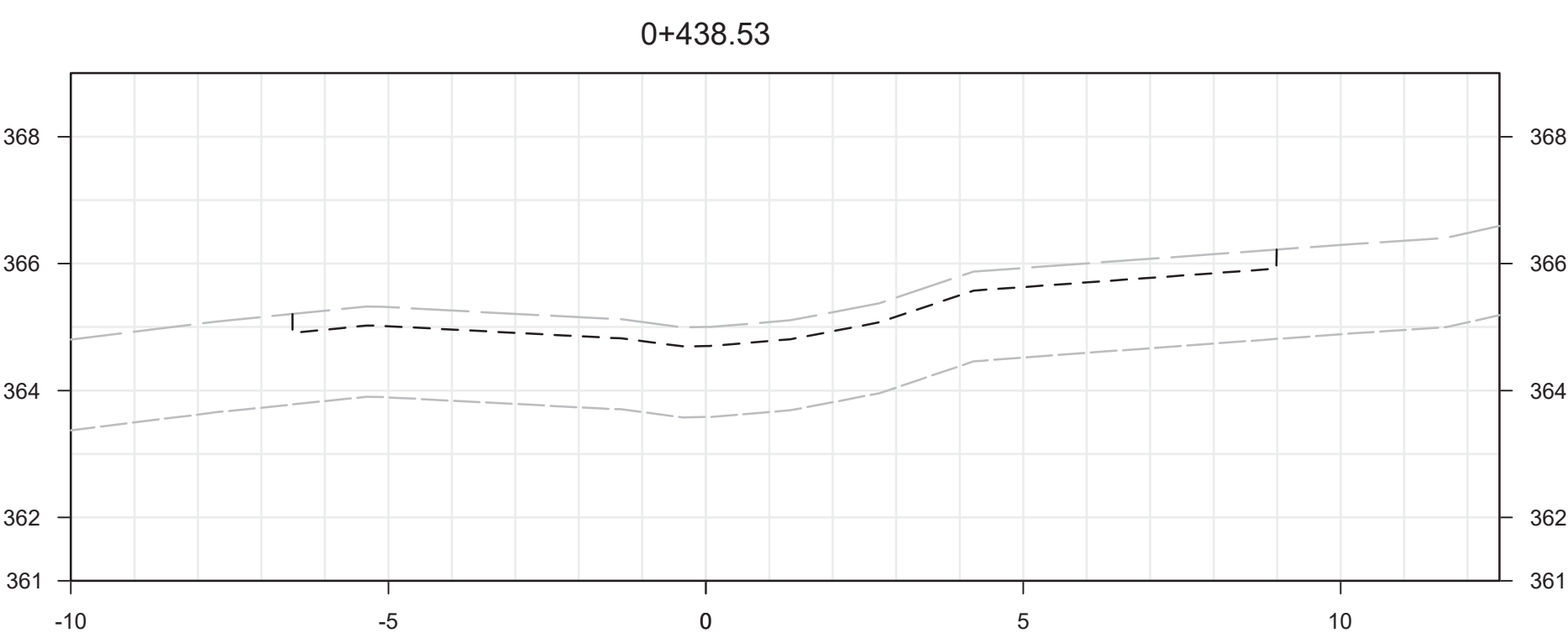
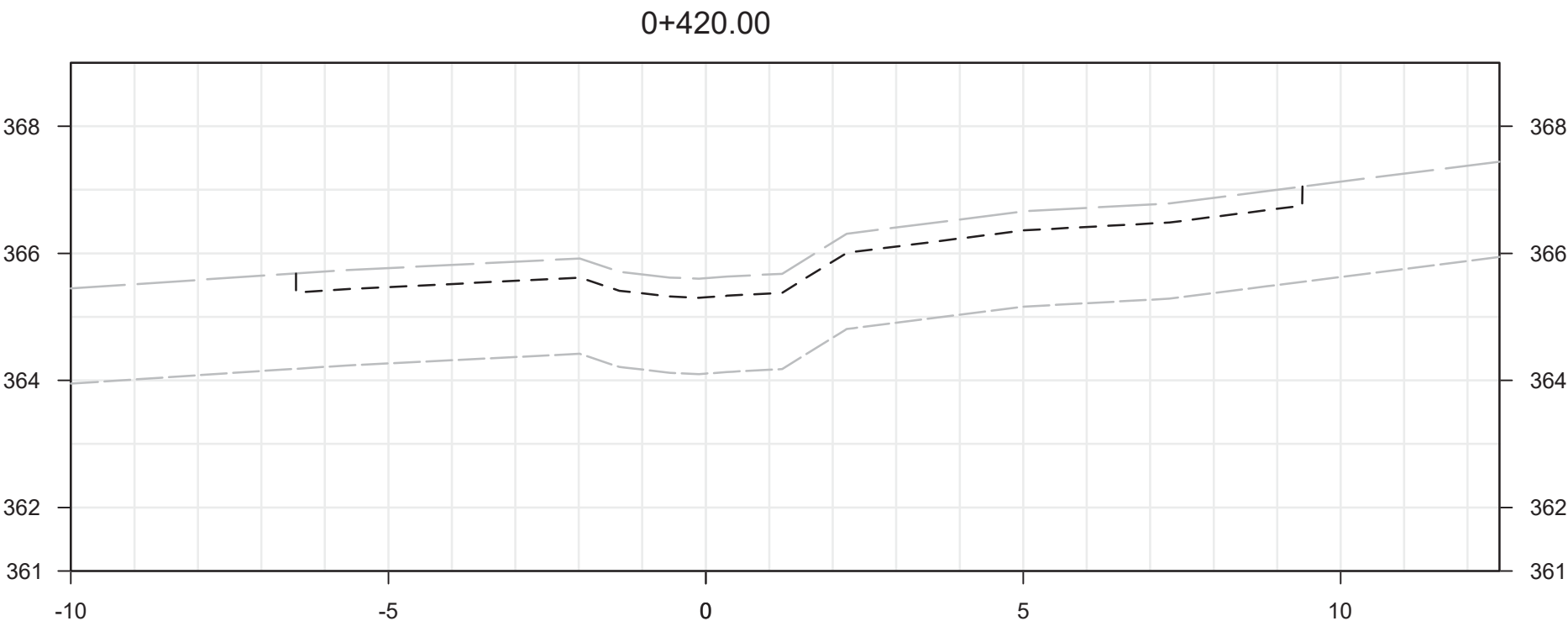
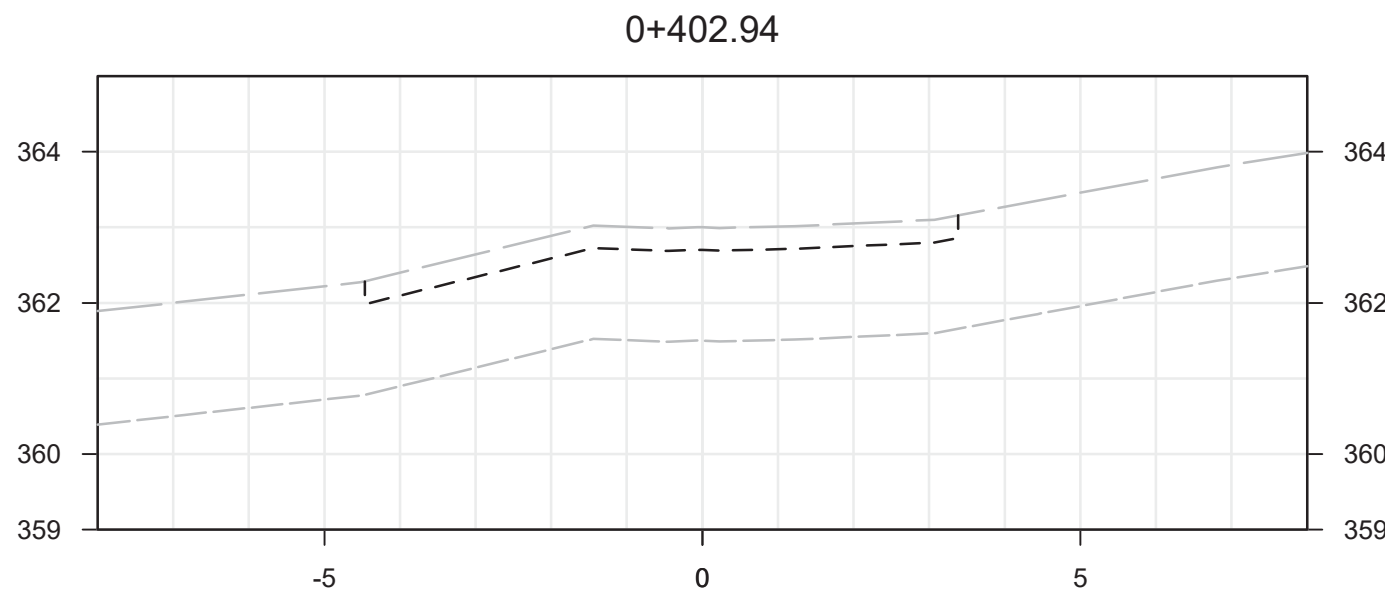
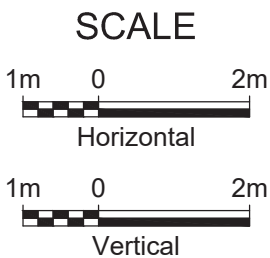
tender  
soumission  
**PIERRE GRAMBART**

project manager  
administrateur  
de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
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drawing no.  
dessine no.  
**505**







Public Works and  
Government Services Canada  
Architectural and Engineering Services  
Ontario Region  
  
Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



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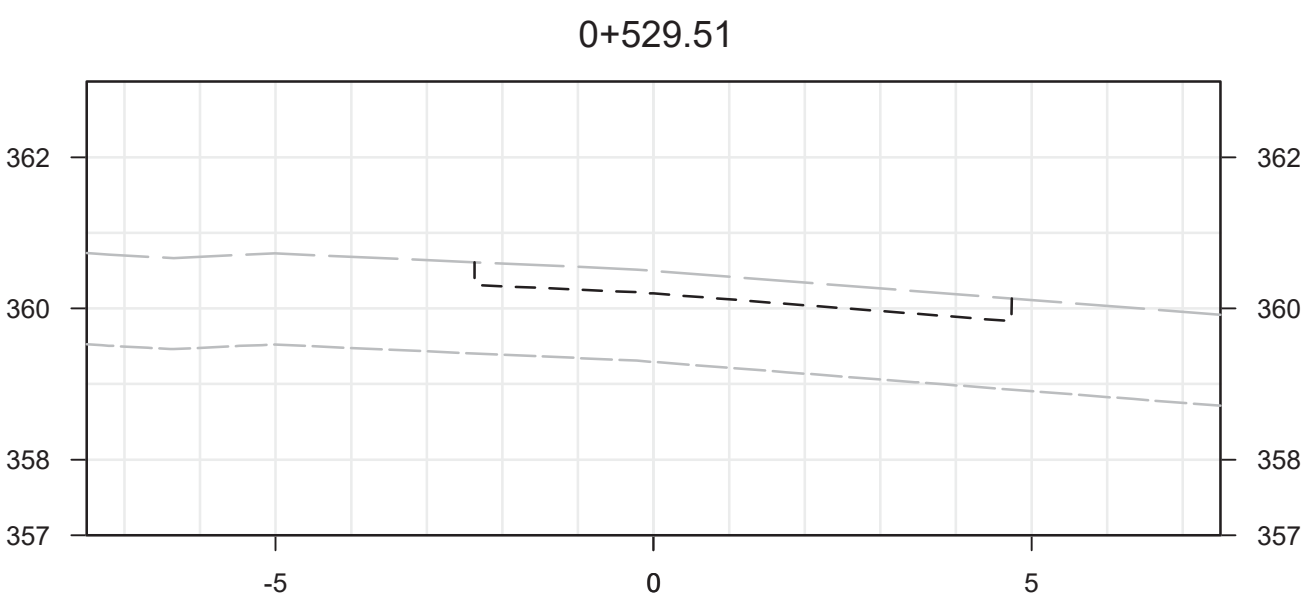
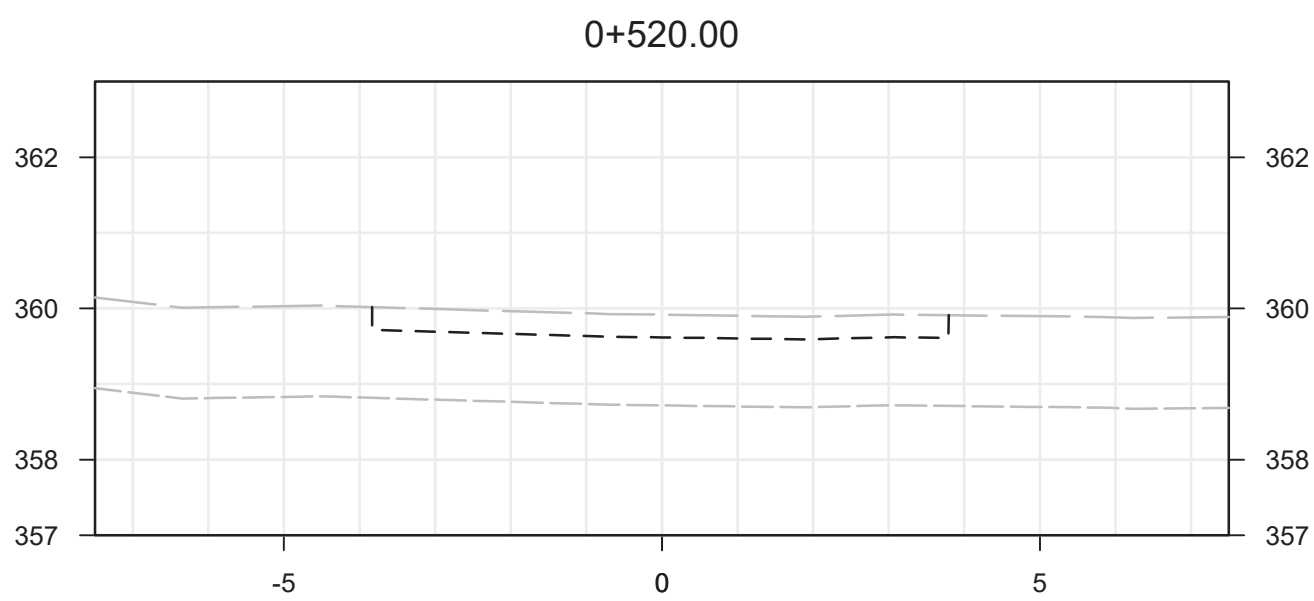
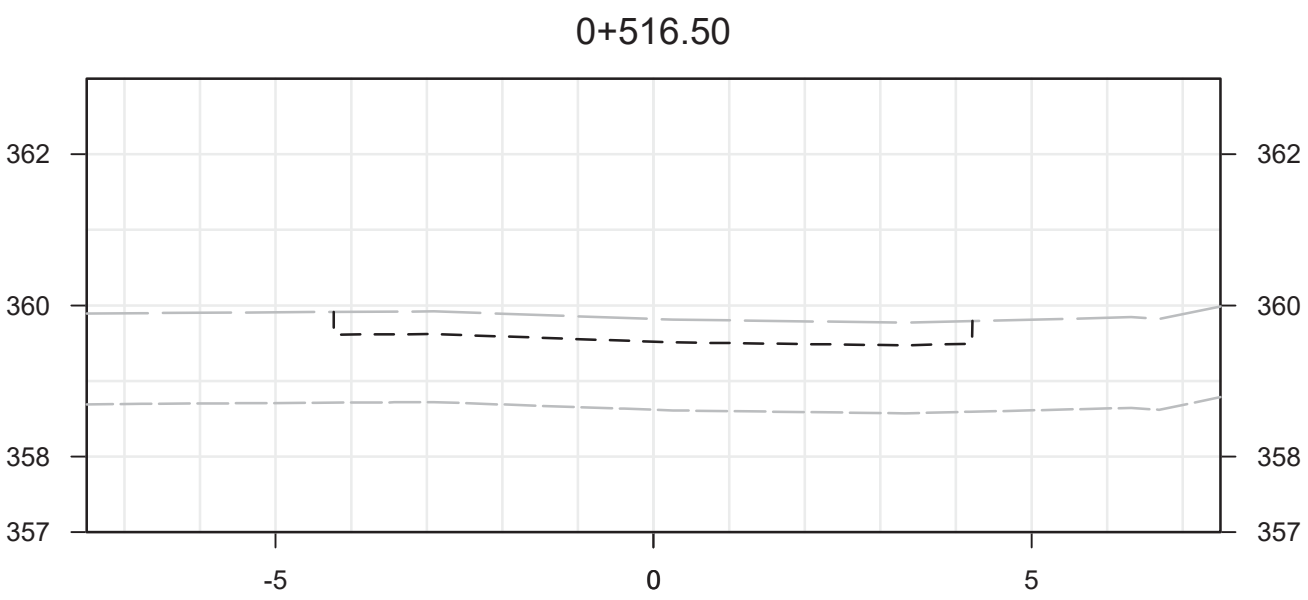
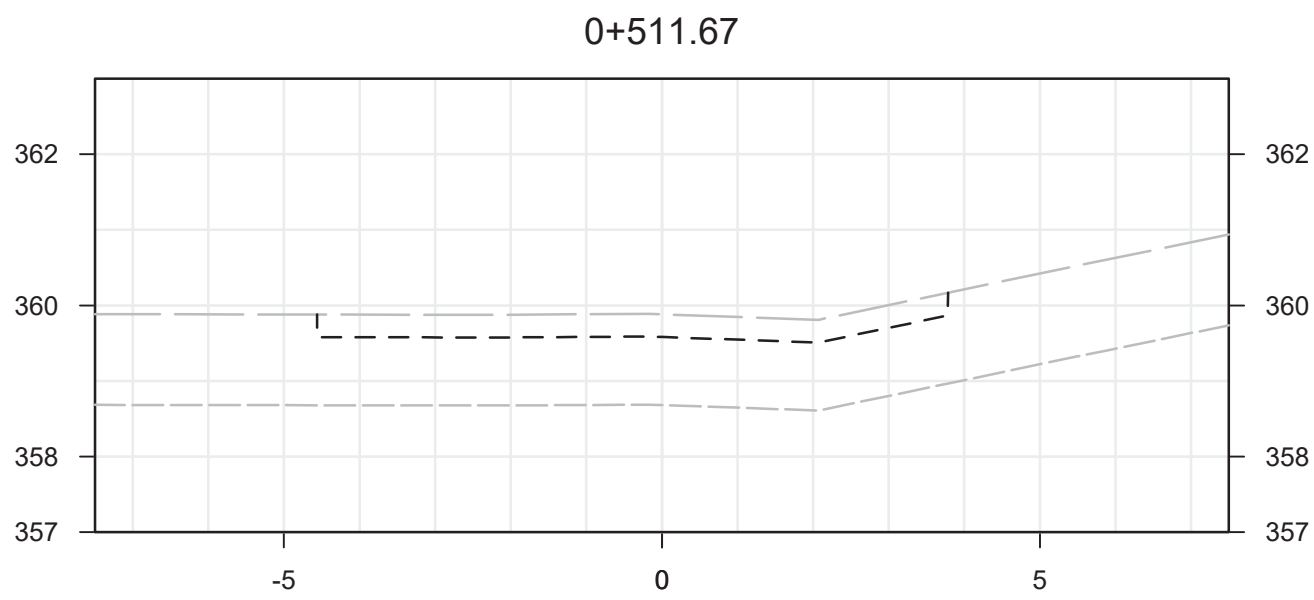
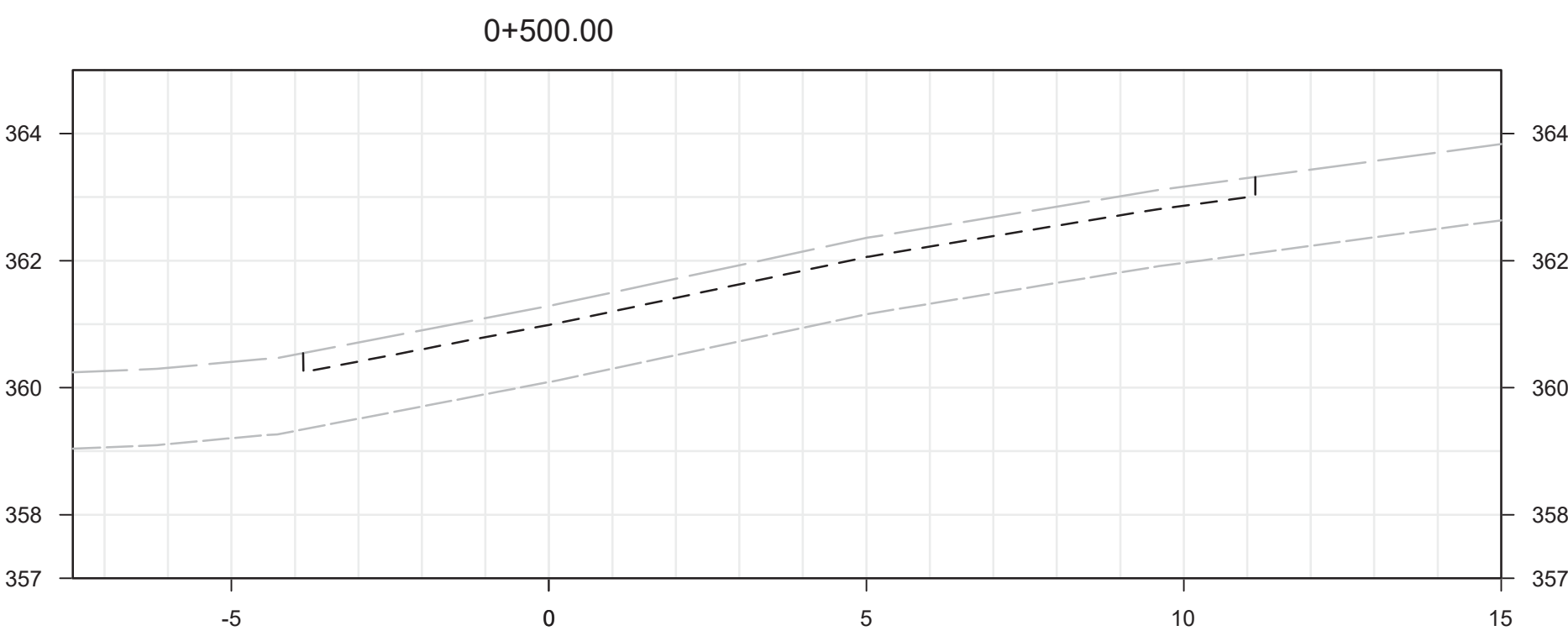
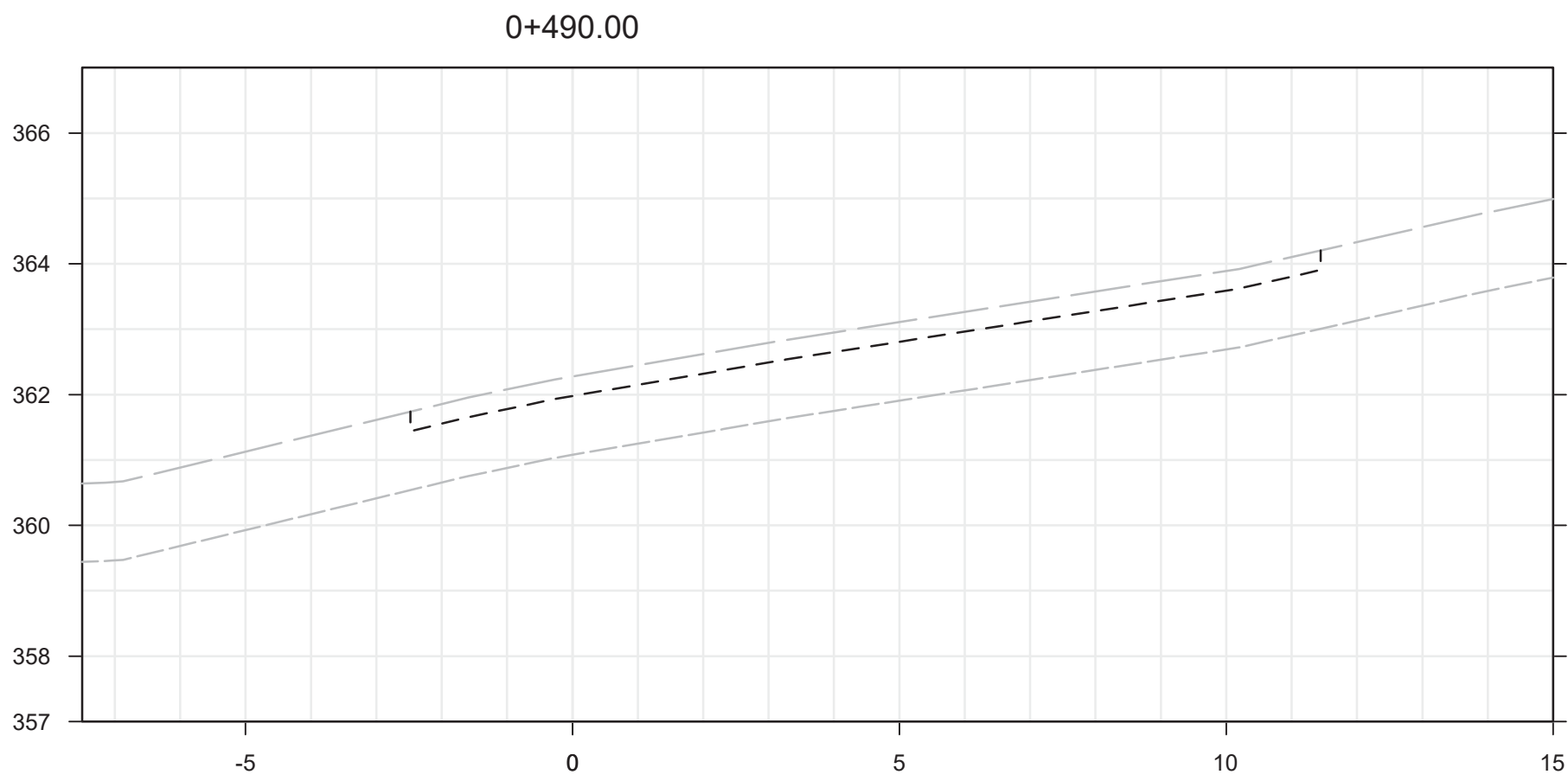
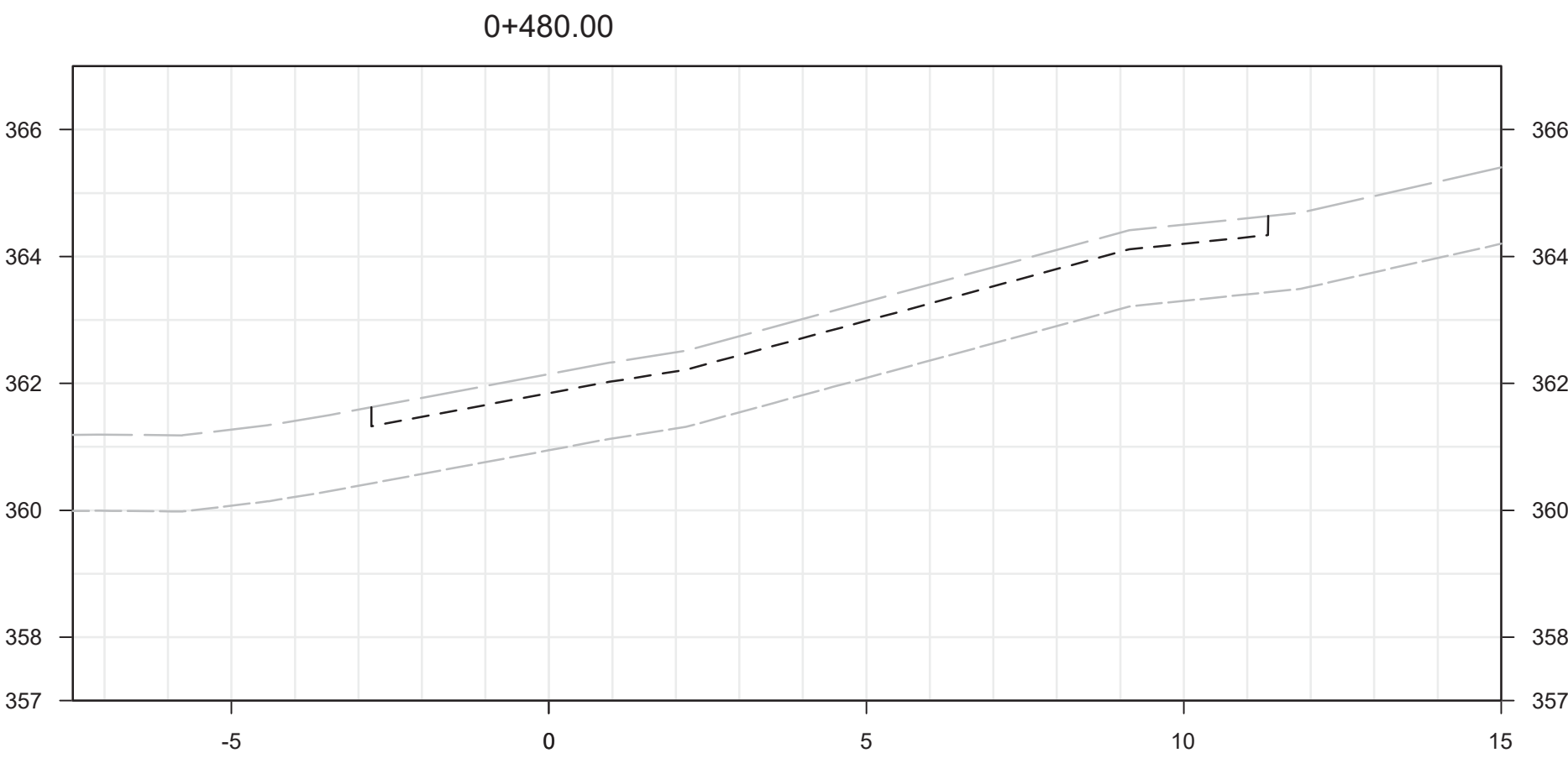
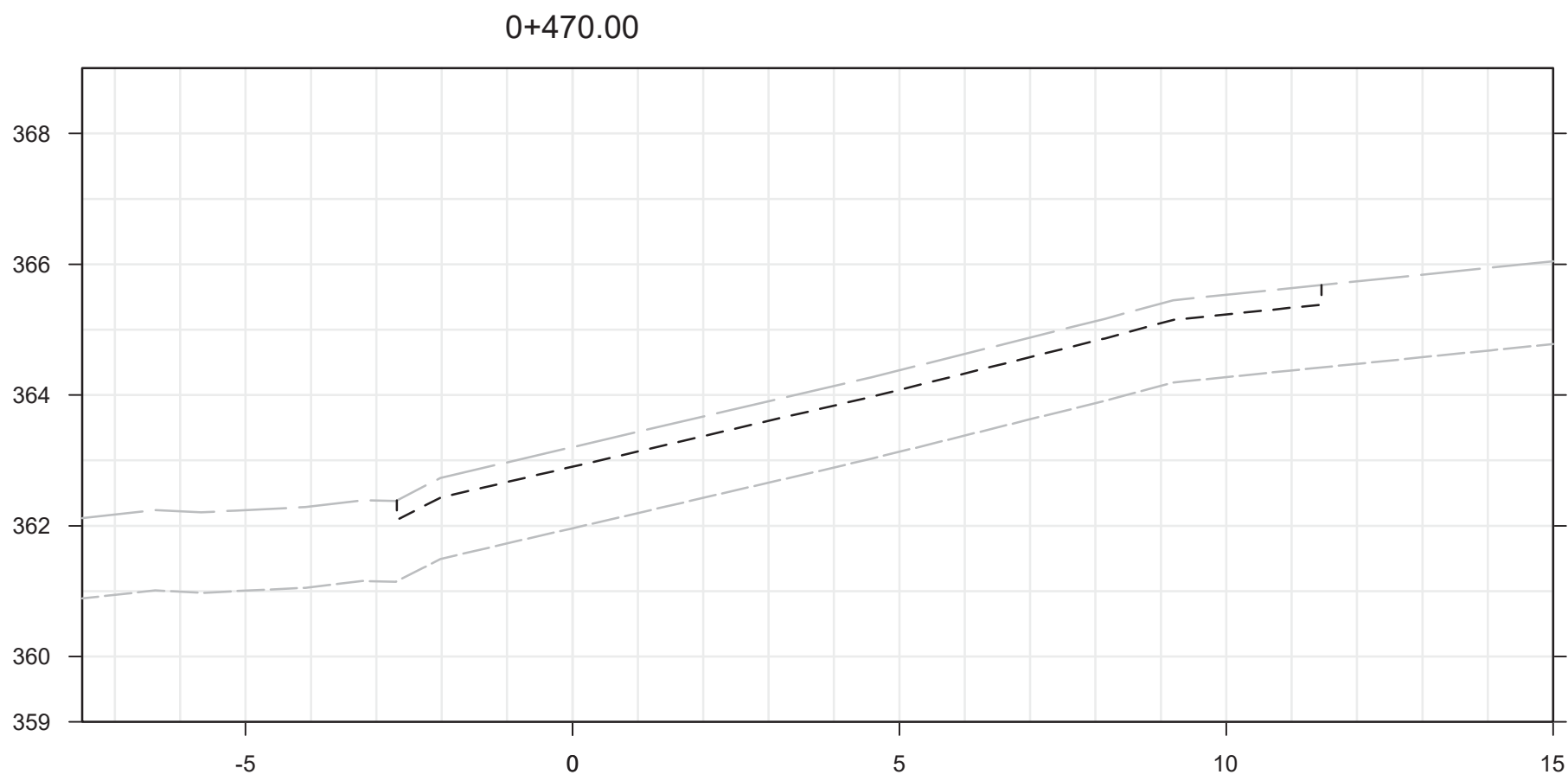
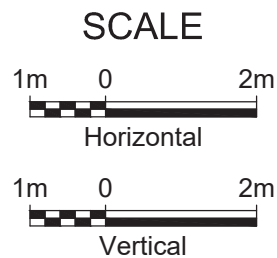
Do not scale drawings.  
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	A	Detail No.
	B	drawing no. - where detail required
	C	drawing no. - where detailed

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by dessine par	A.C.	
designed by conc par	A.C.	
approved by approve par	B.P.	
tender soumission	PIERRE GRAMBART	project manager administrateur de projets
project date date du projet	2019/08	
project no. no. du projet	R.076951.170	
drawing no. dessine no.	506	





Public Works and  
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Ontario Region  
  
Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



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ENGINEERS  
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4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
1	99% SUBMISSION	2018/02/12
0	50% SUBMISSION	2018/01/15
revision	description	date

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project title  
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**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conçu par  
**A.C.**

approved by  
approuvé par  
**B.P.**

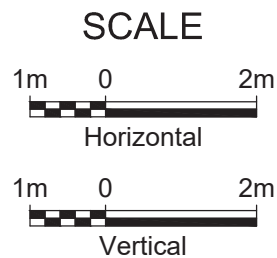
tender  
soumission  
**PIERRE GRAMBART**

project manager  
administrateur  
de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**507**





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Government Services Canada  
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Travaux publics et  
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CONSULTING  
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PLANNERS



4	ISSUED FOR TENDER	2019/07/23
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- A Detail No.  
No. du détail  
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C drawing no. - where detailed  
dessin no. - où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
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**LITTLE BROTHER LAKE DAM  
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drawing title  
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**CROSS SECTIONS**

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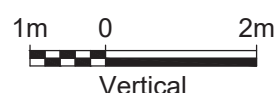
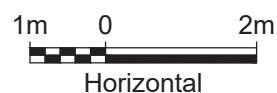
tender  
soumission  
project manager  
administrateur de projets  
**PIERRE GRAMBART**

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

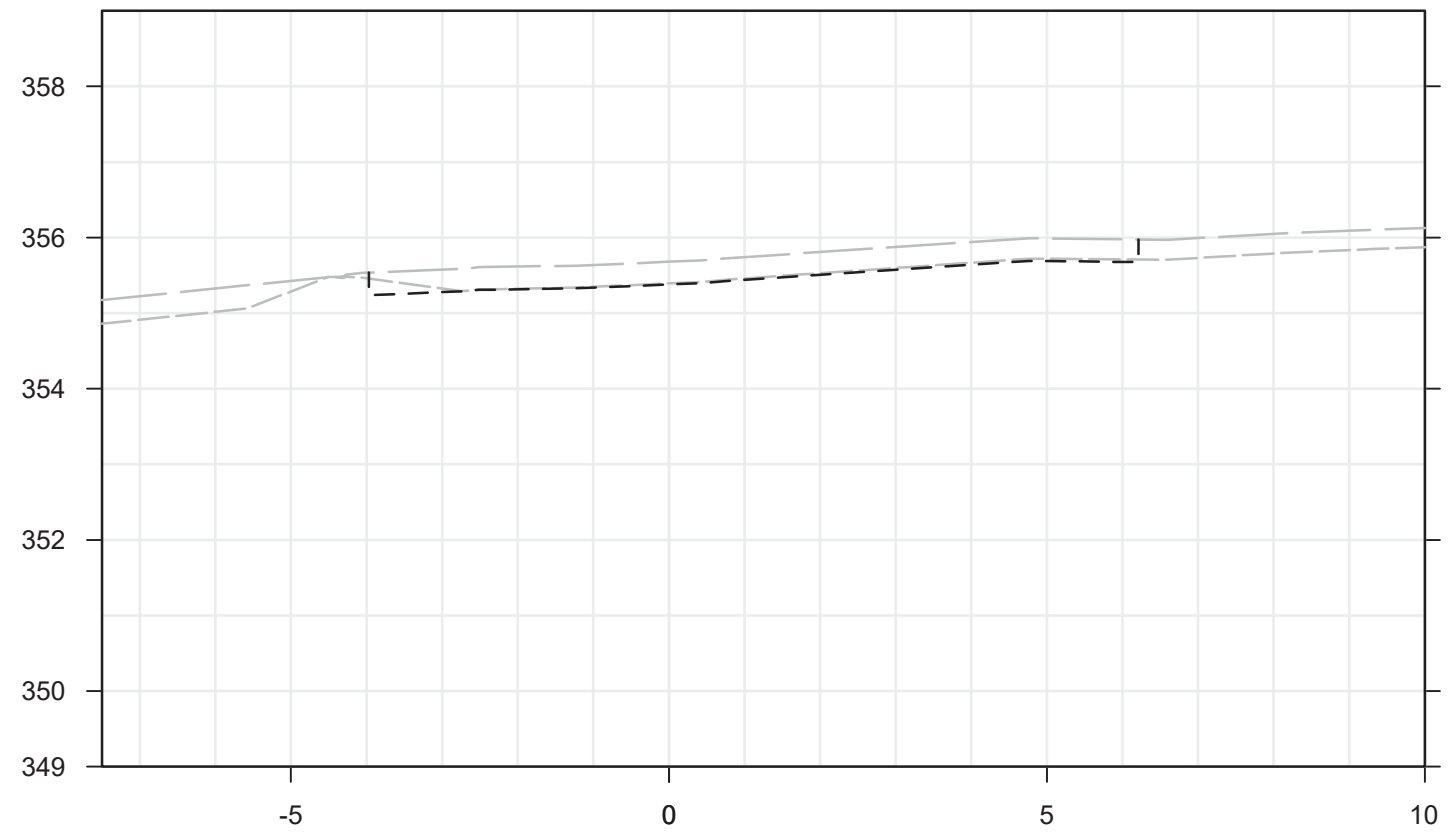
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dessiné no.  
**508**

SCALE

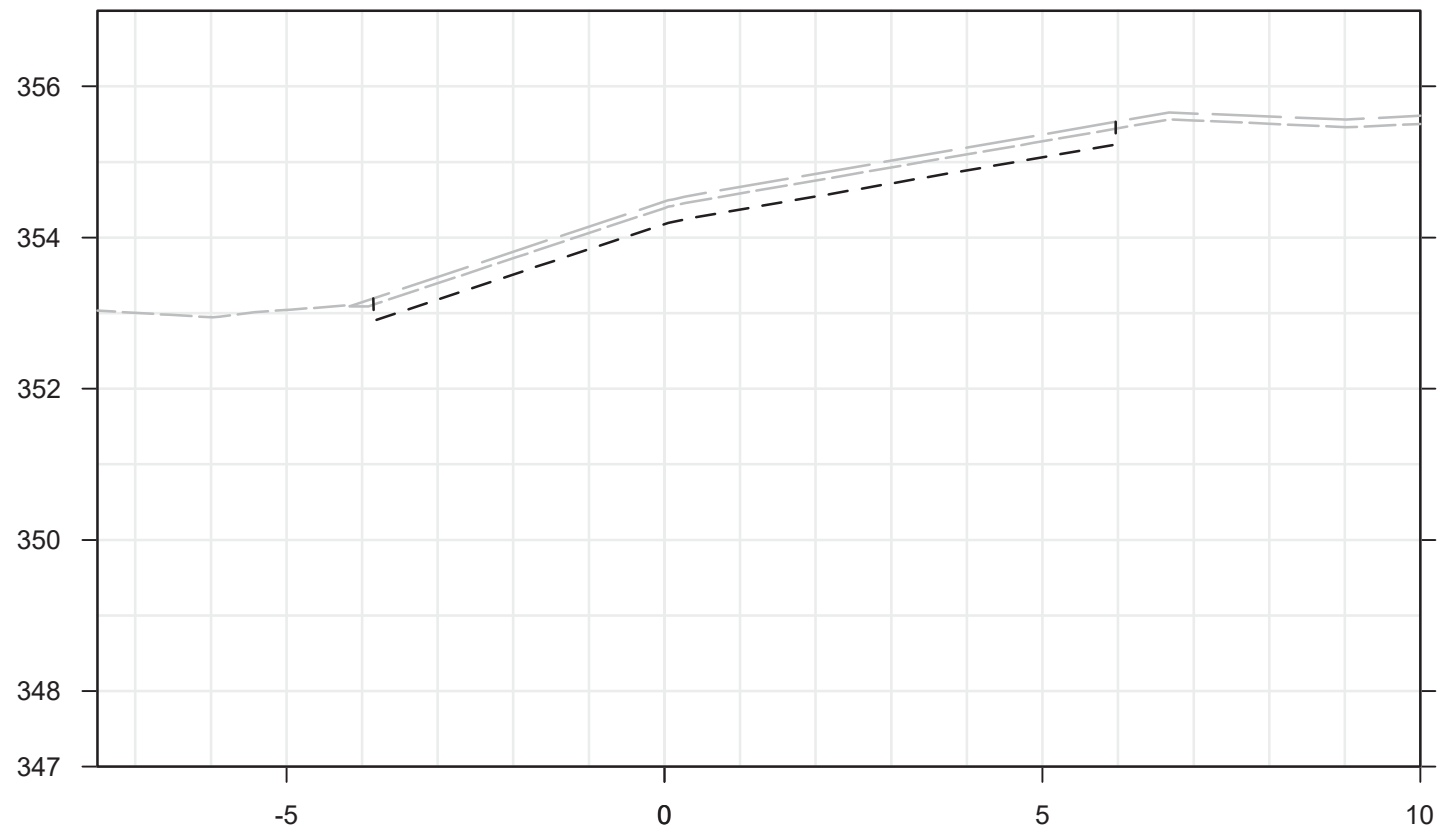


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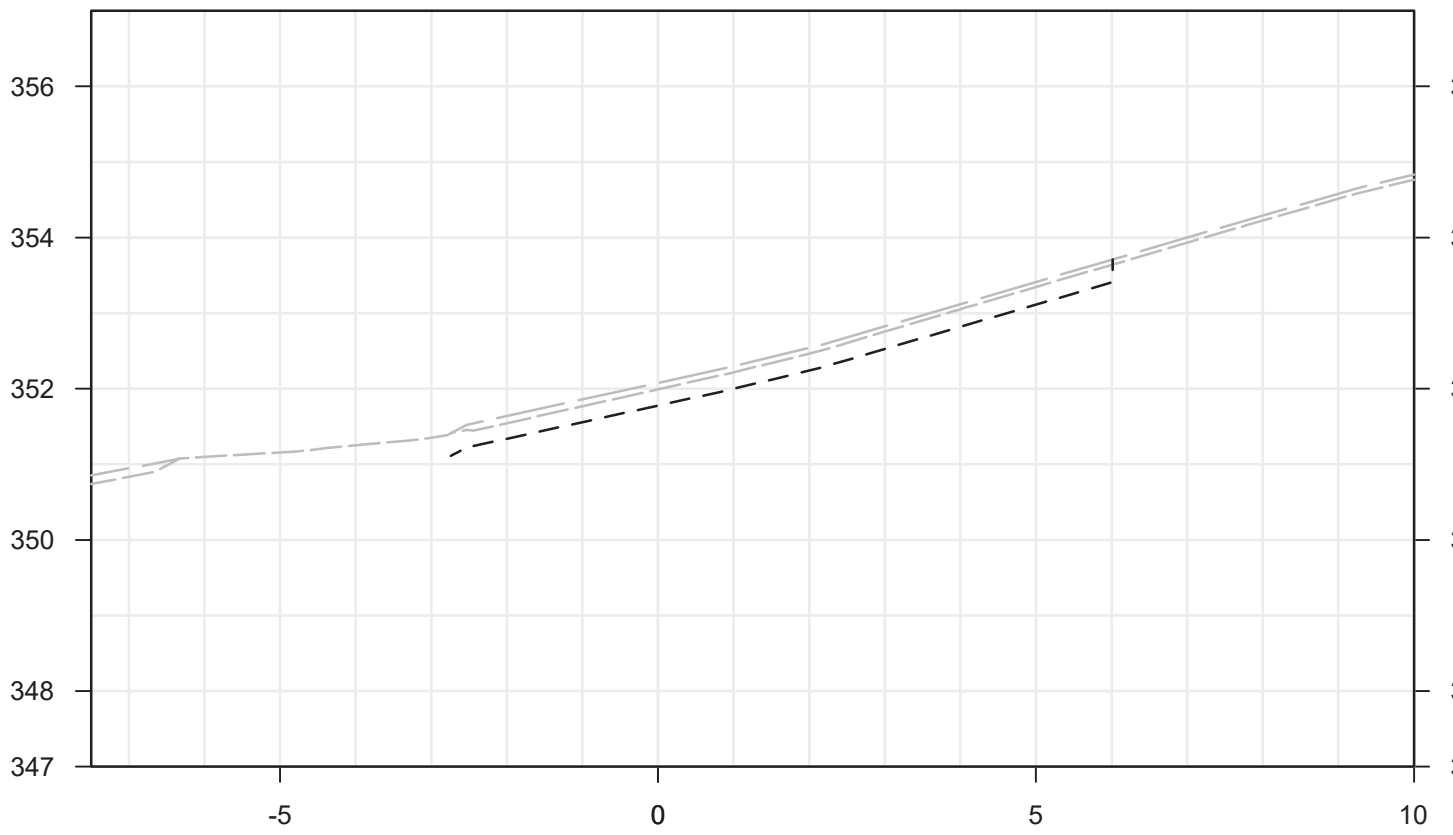
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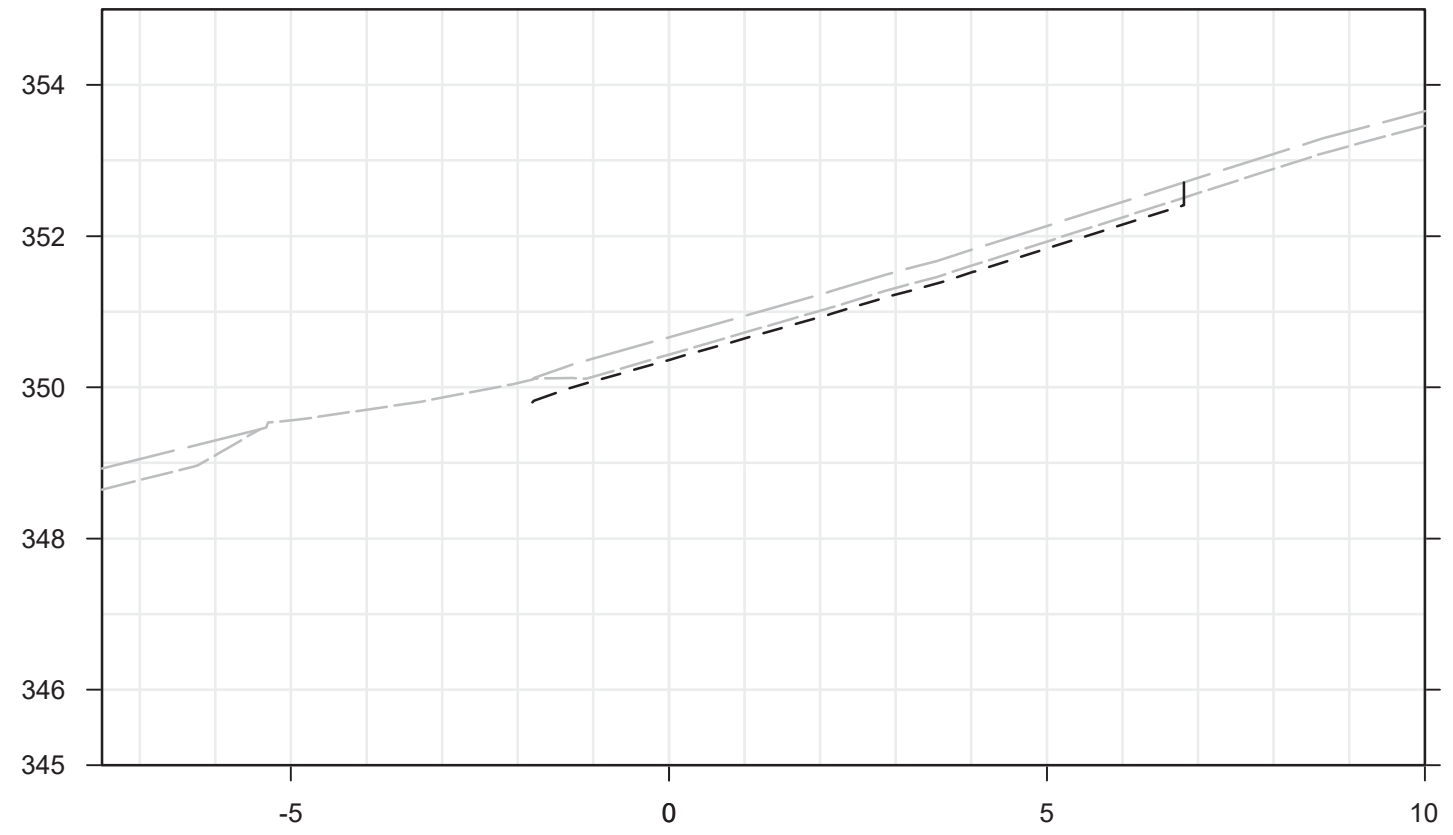
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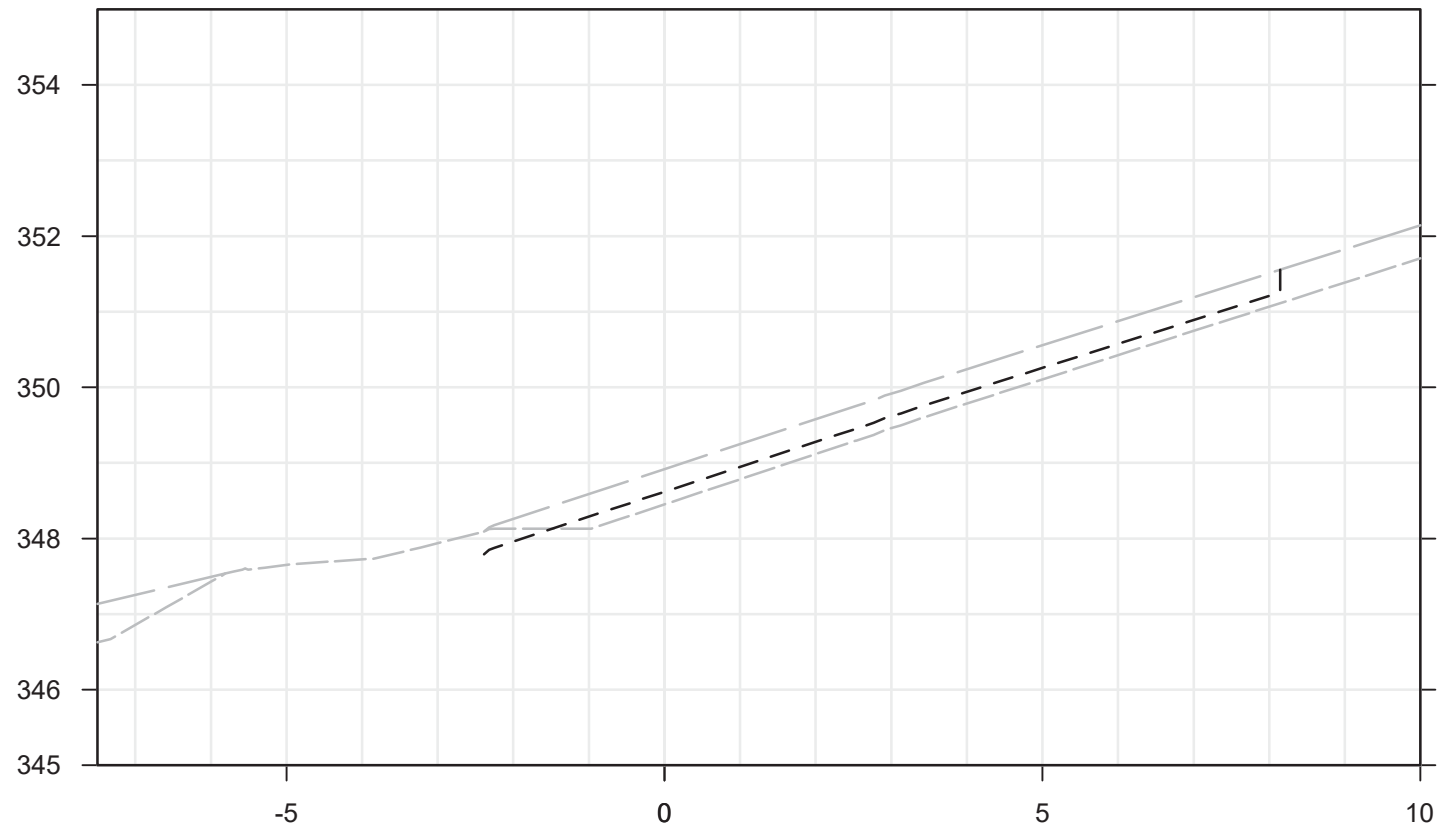
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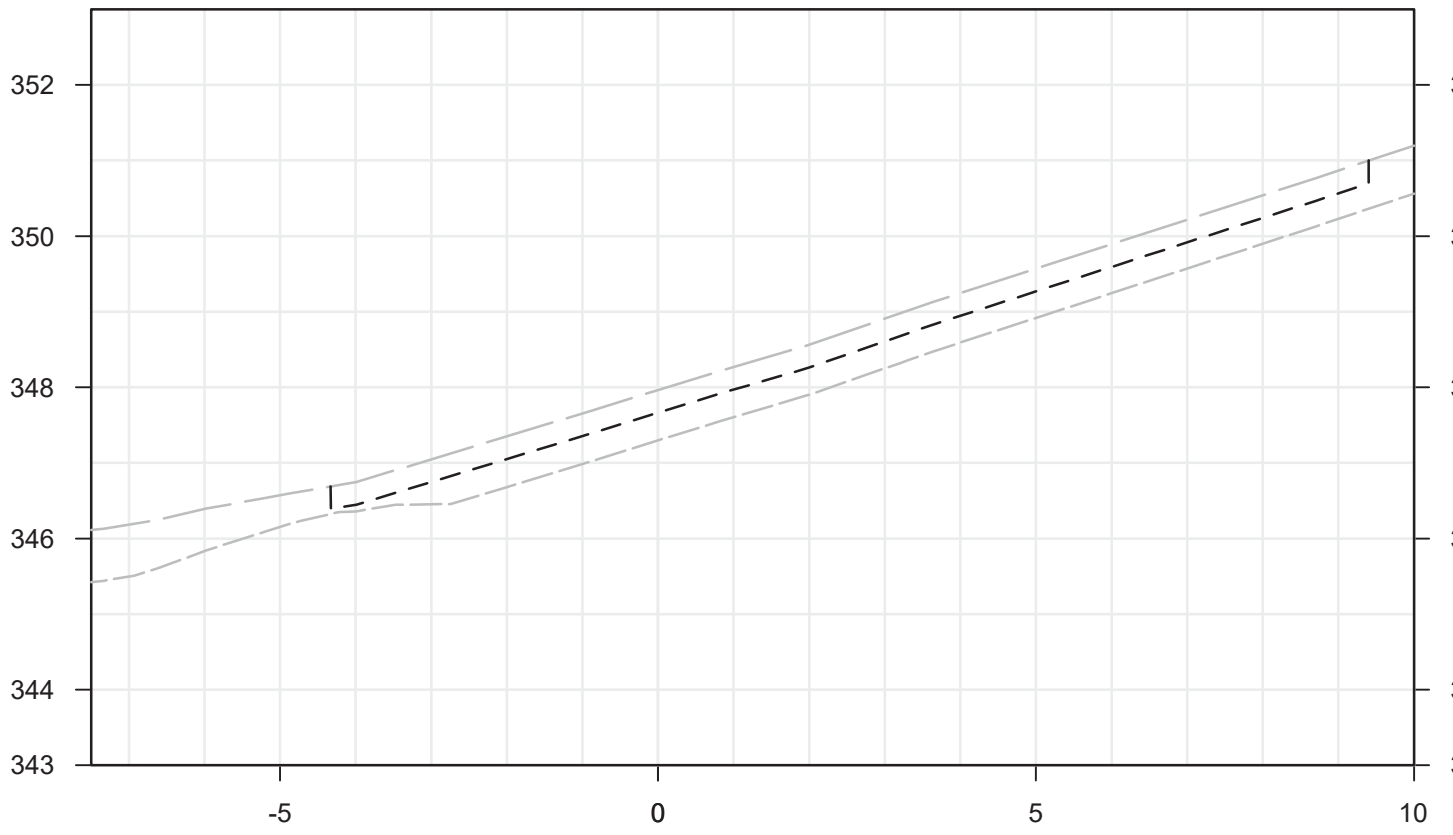
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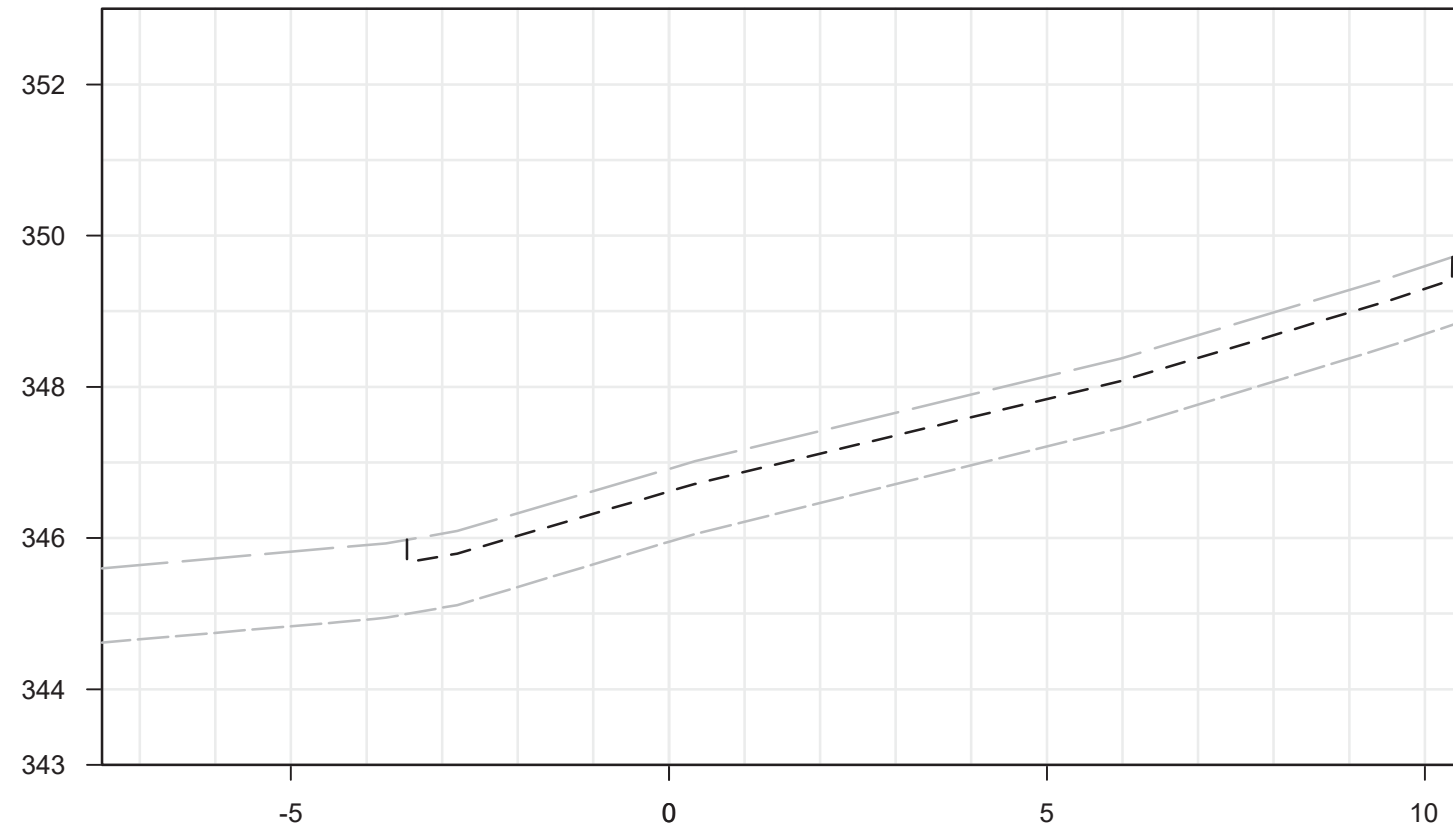
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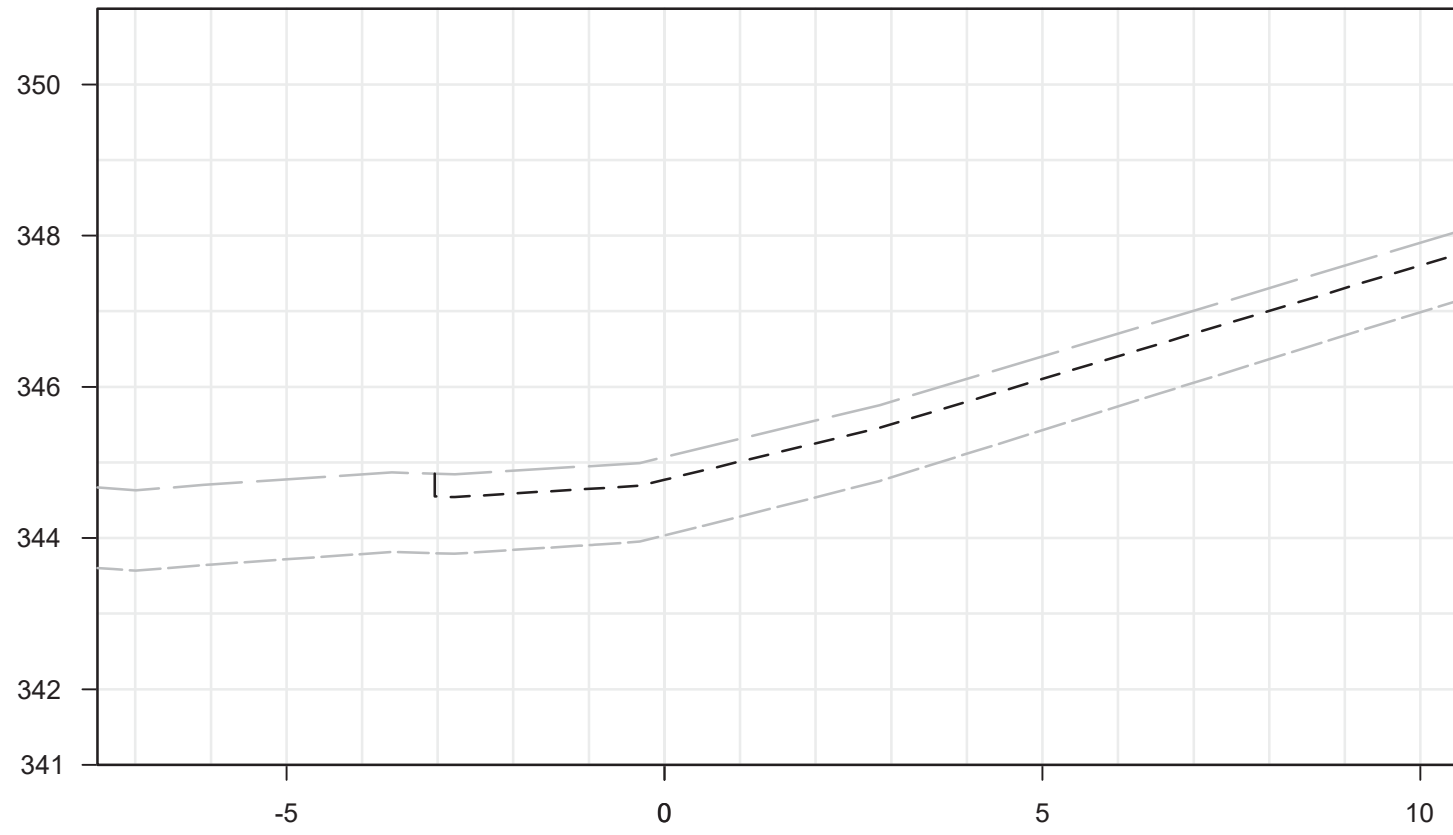
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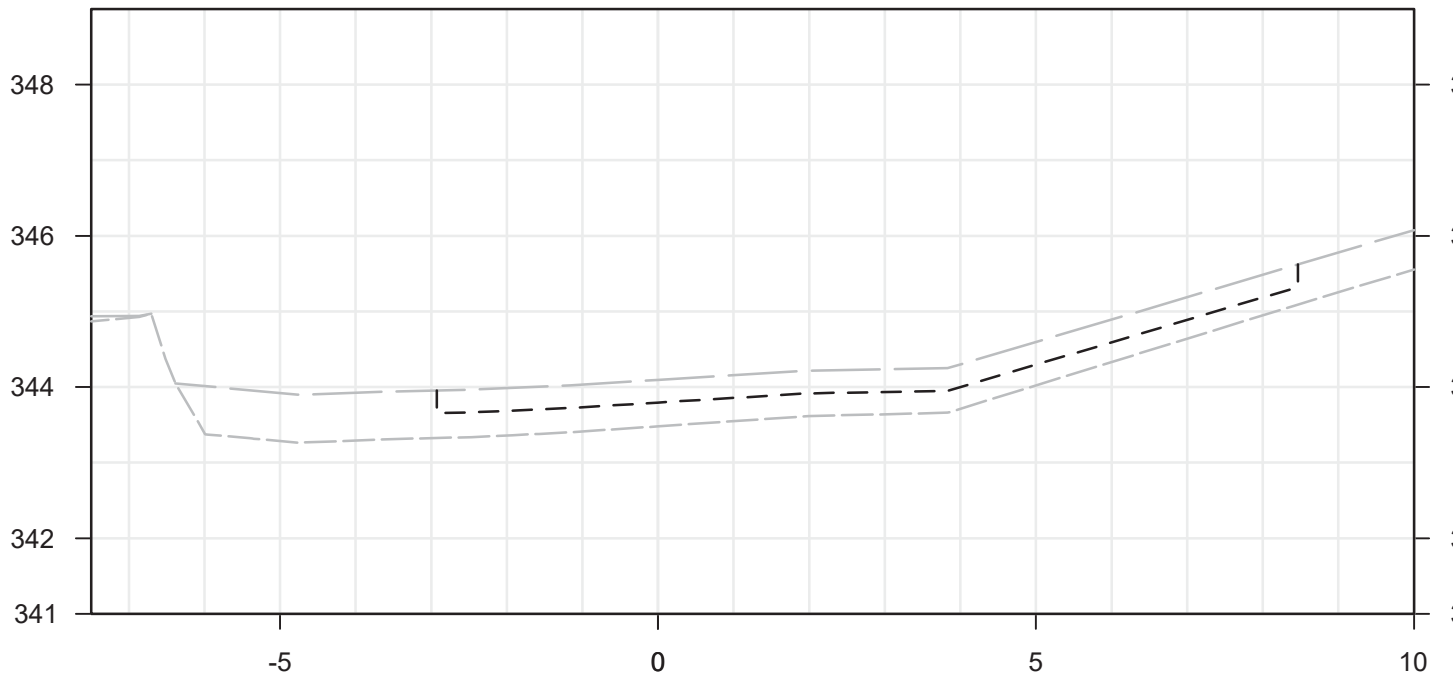
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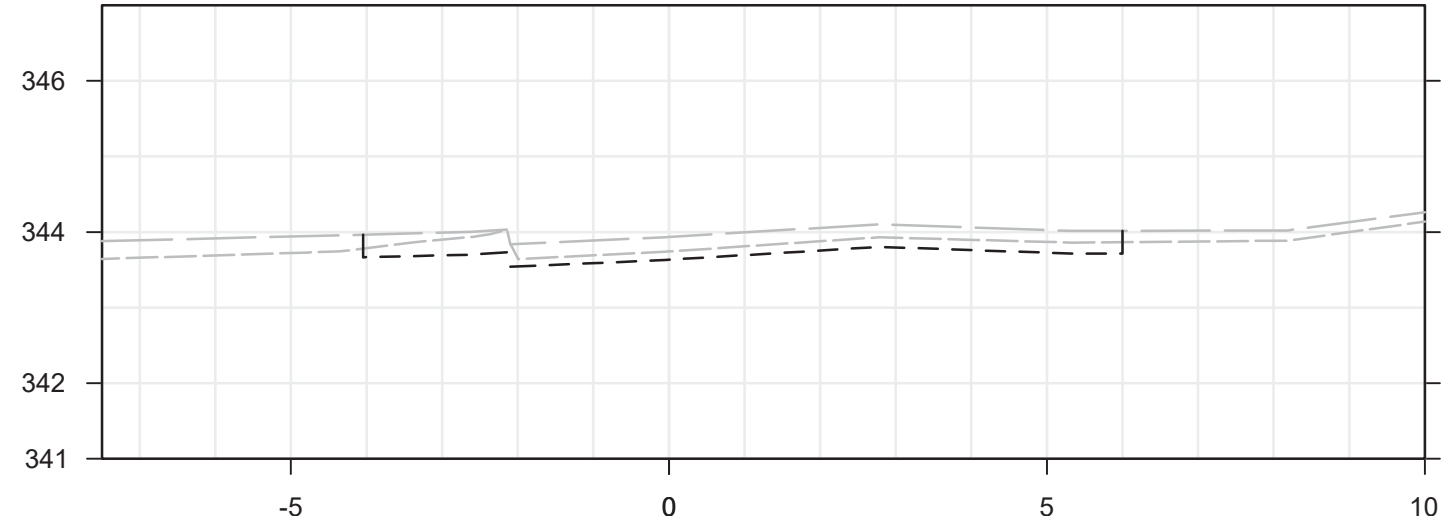
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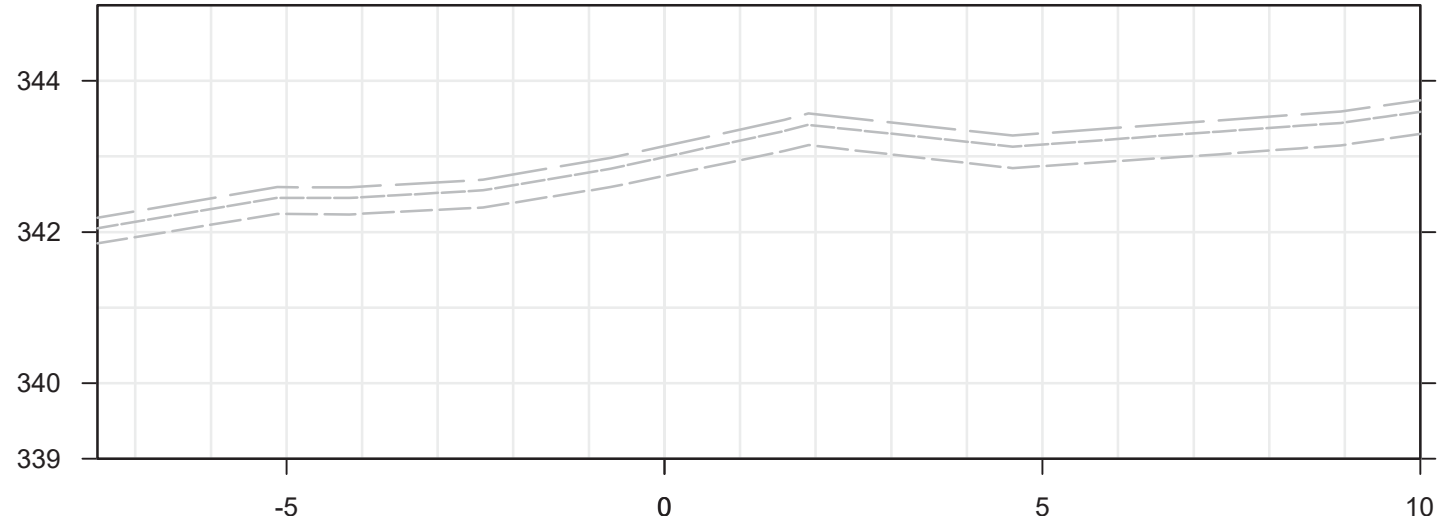
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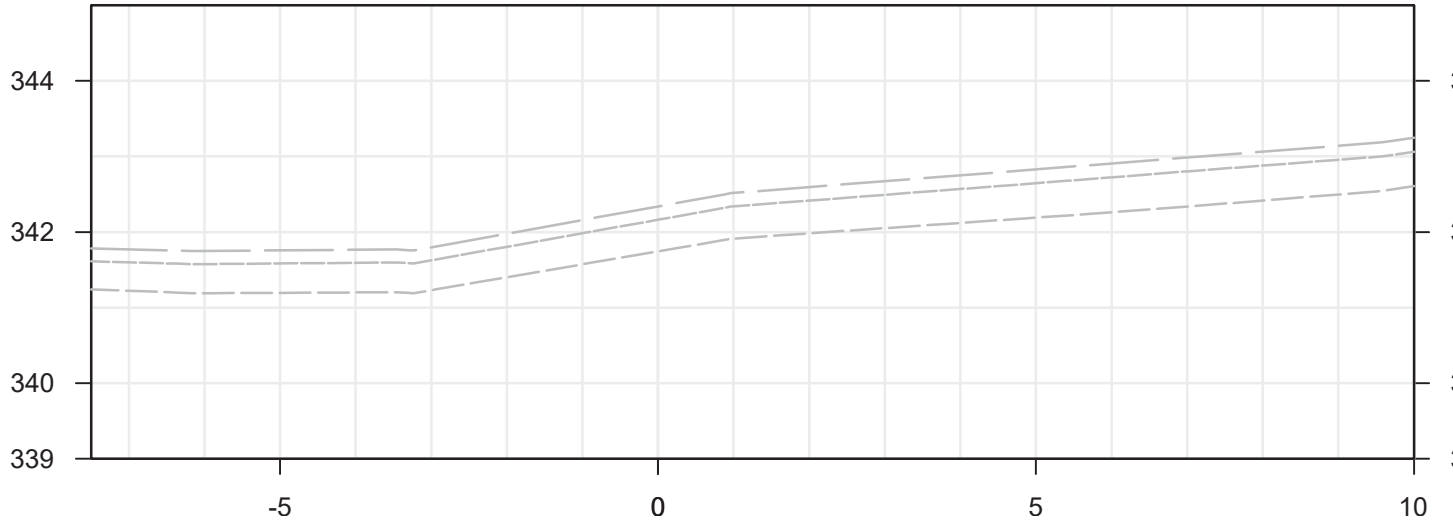
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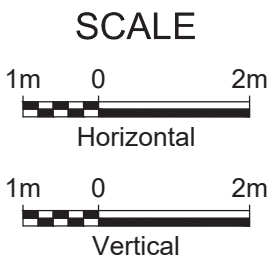
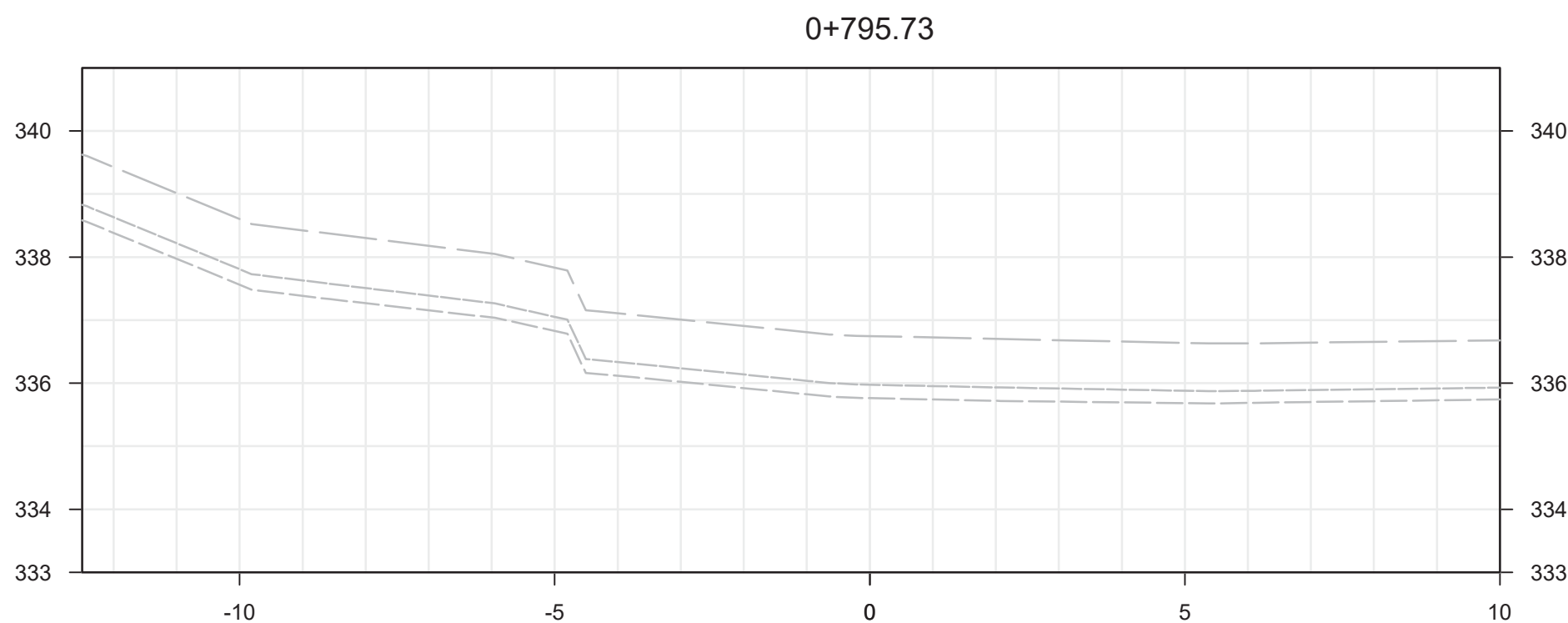
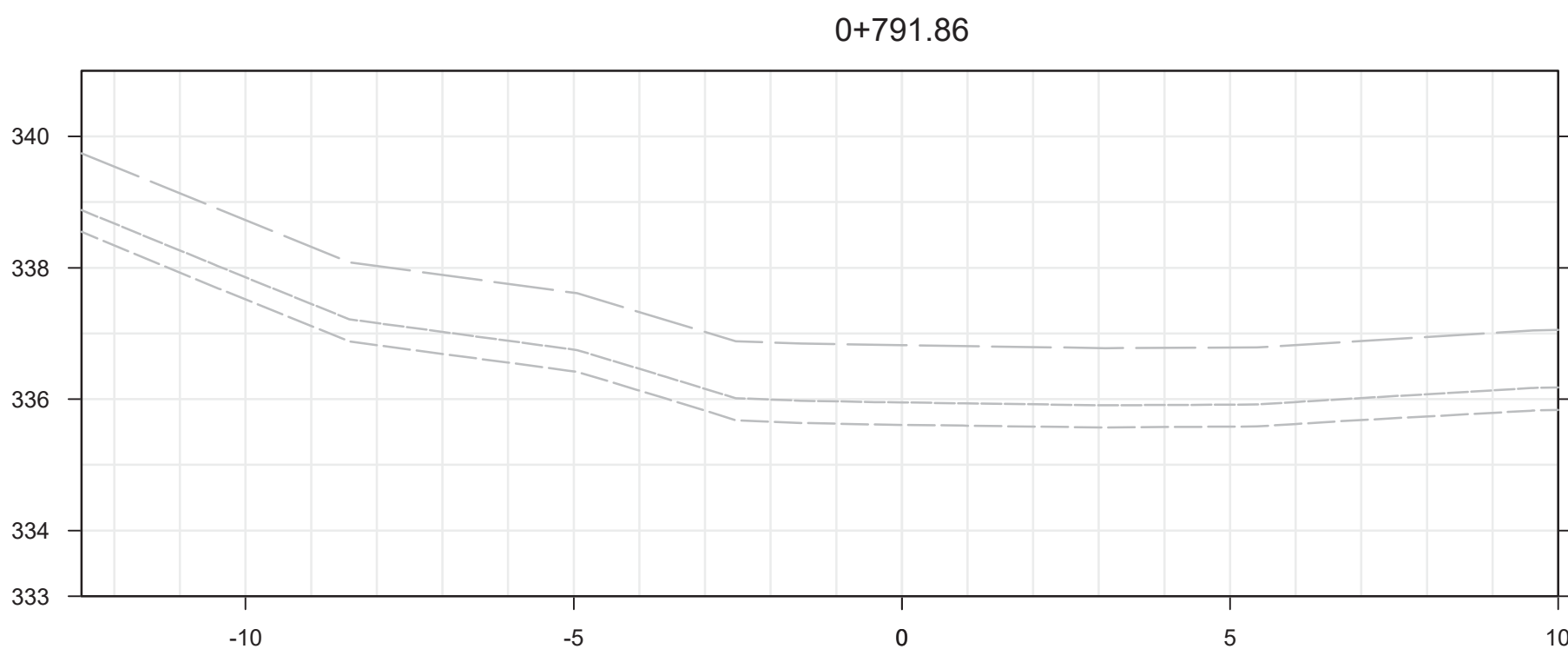
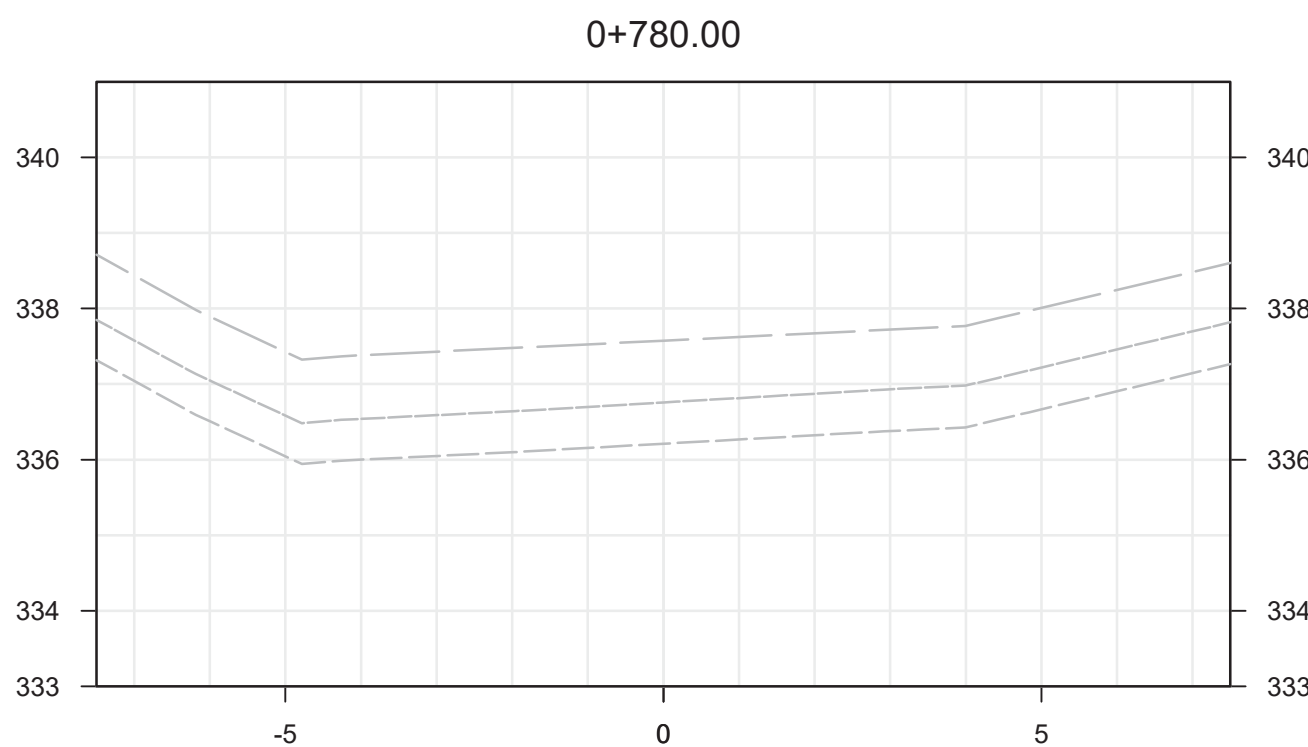
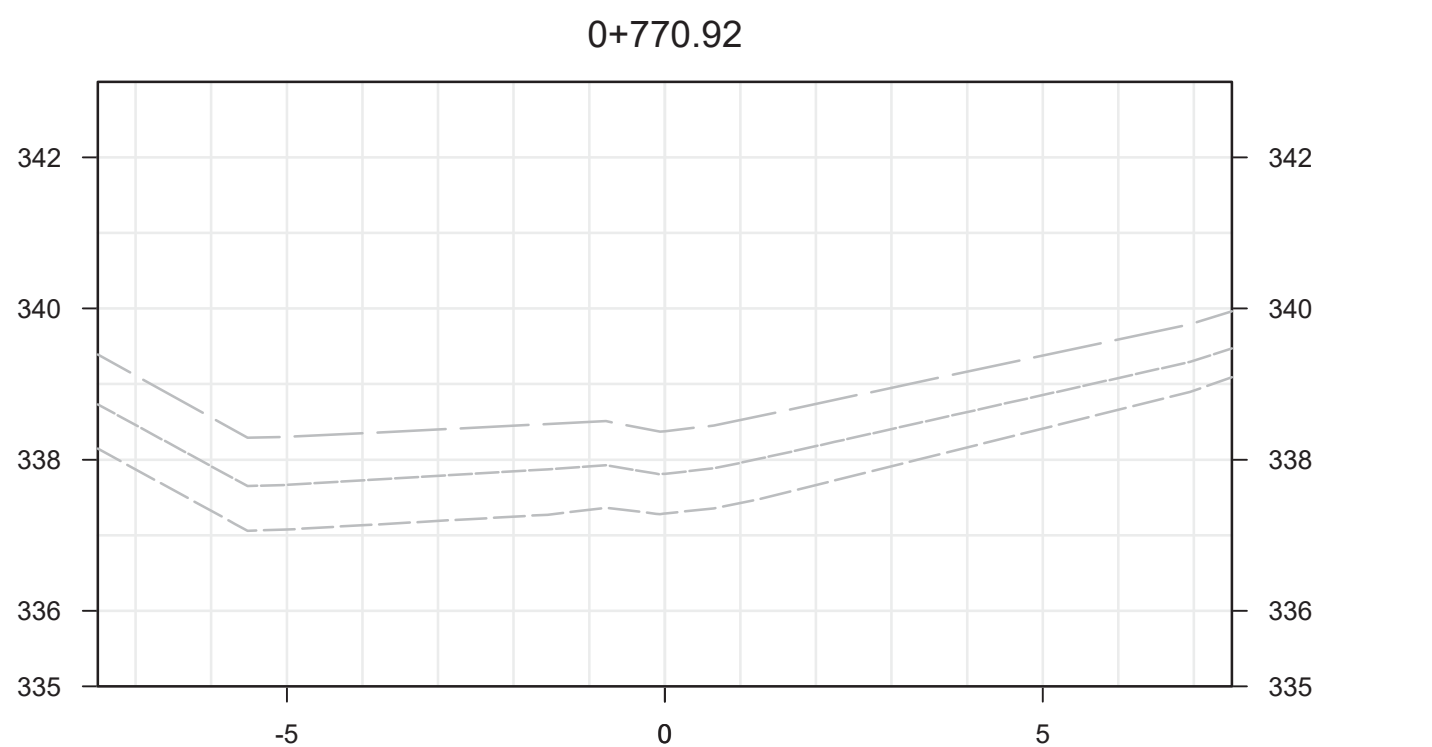
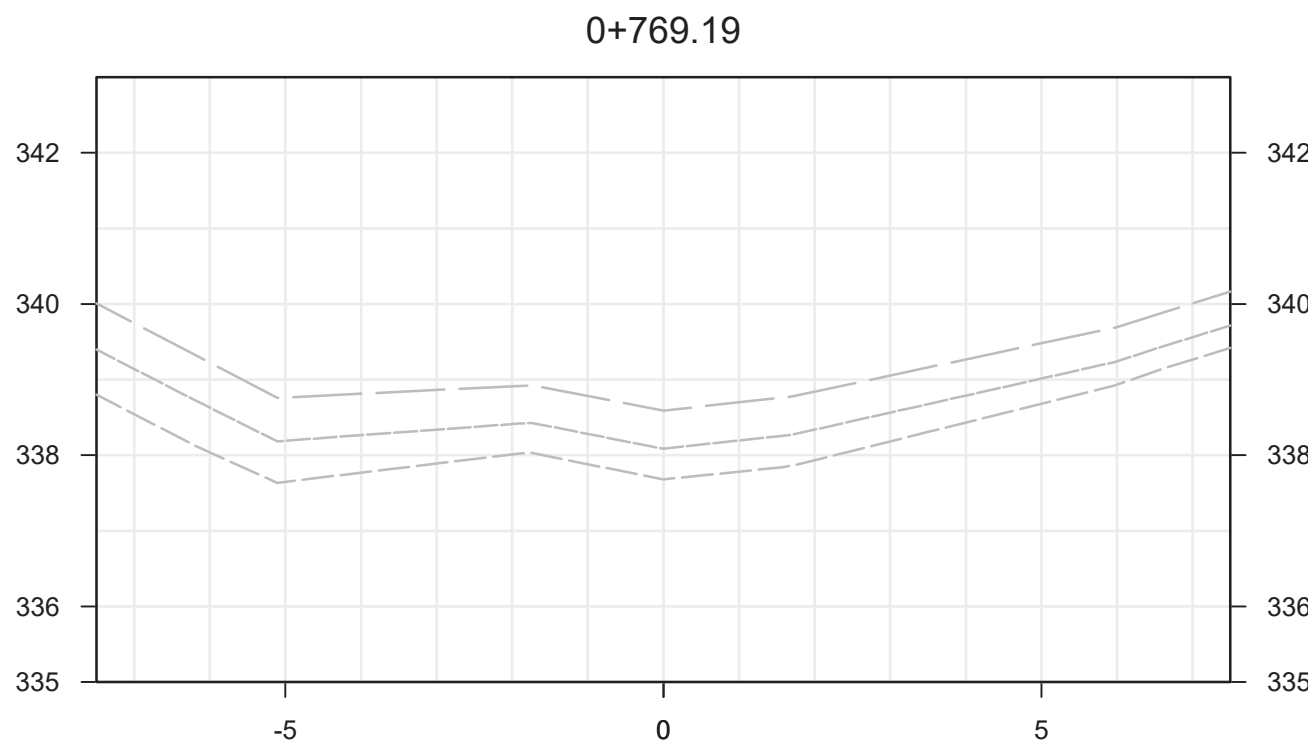
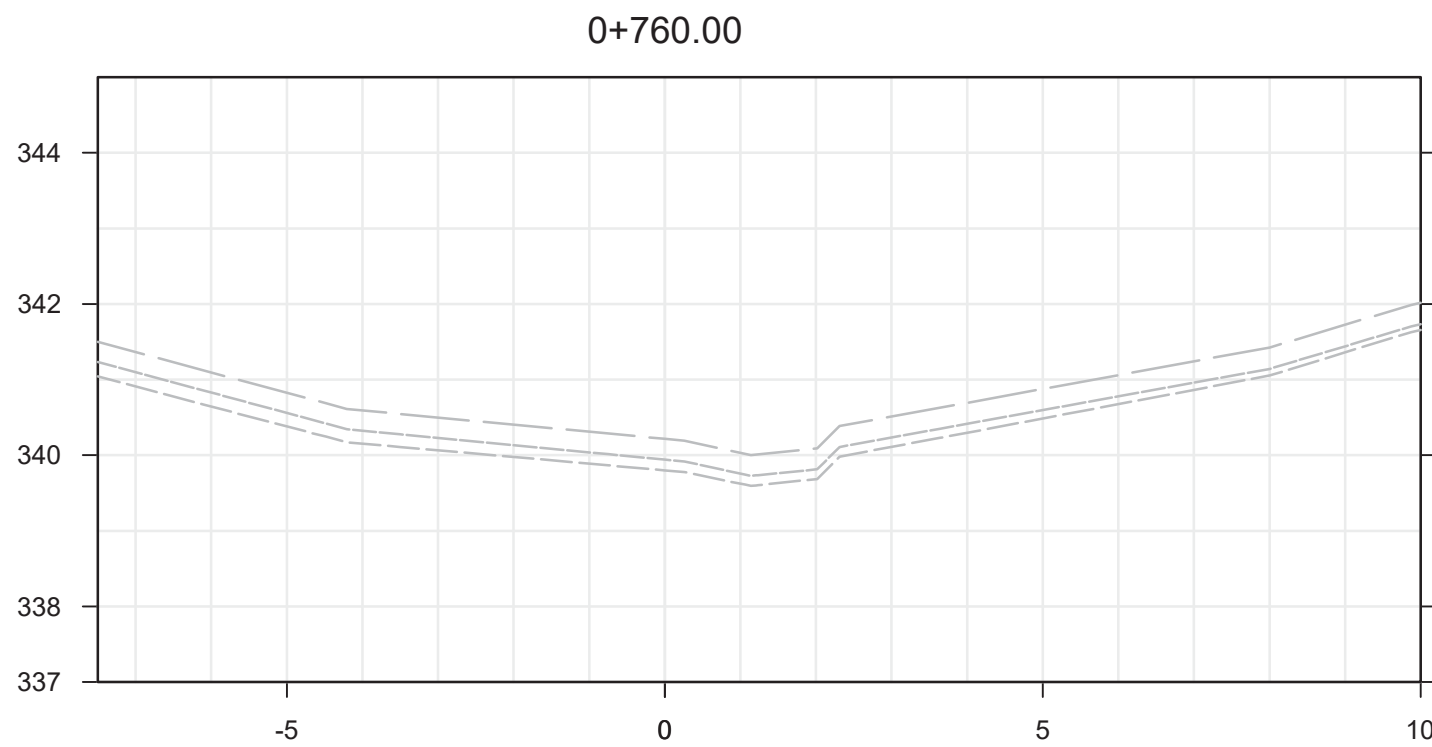
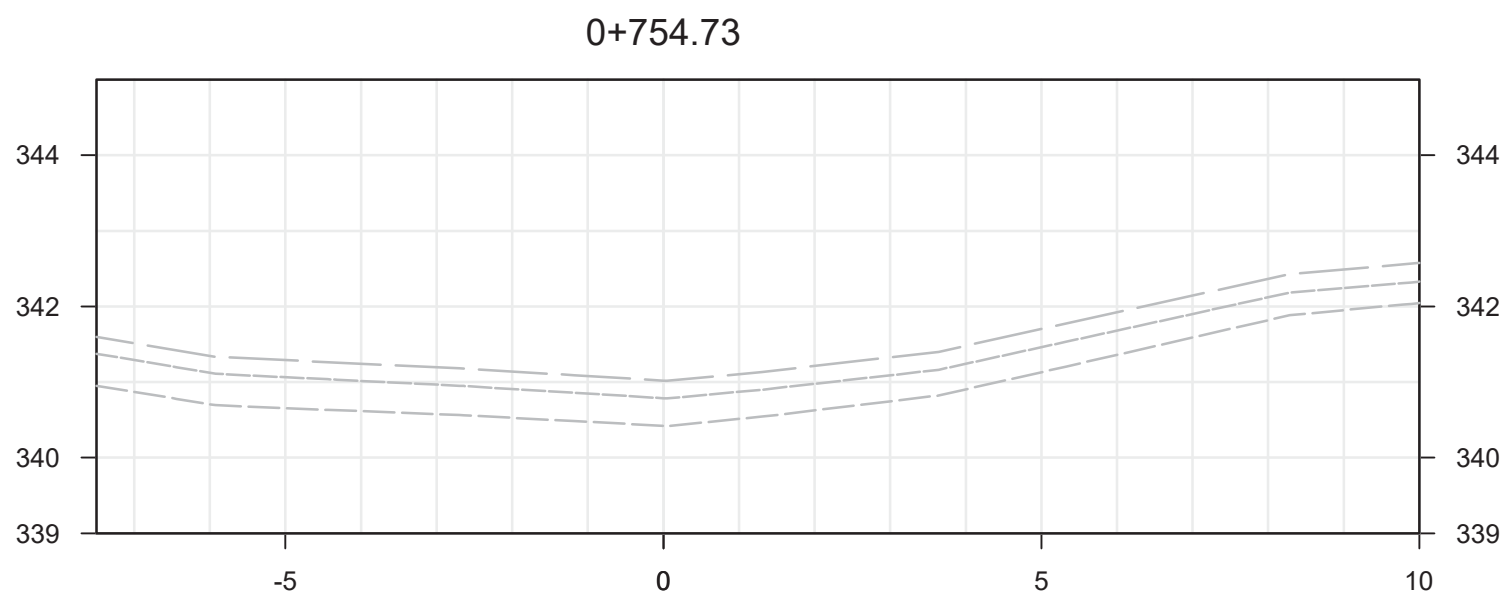
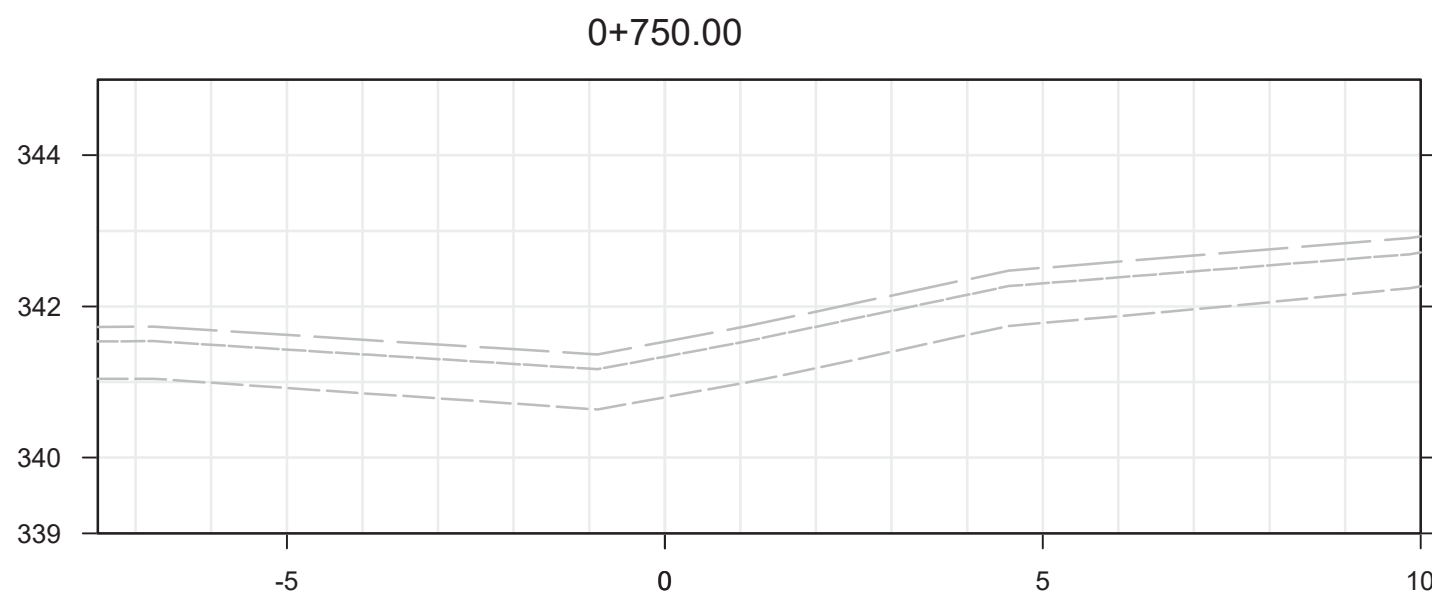
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4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
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revision	description	date

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A	Detail No. No. du détail
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project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conçu par  
**A.C.**

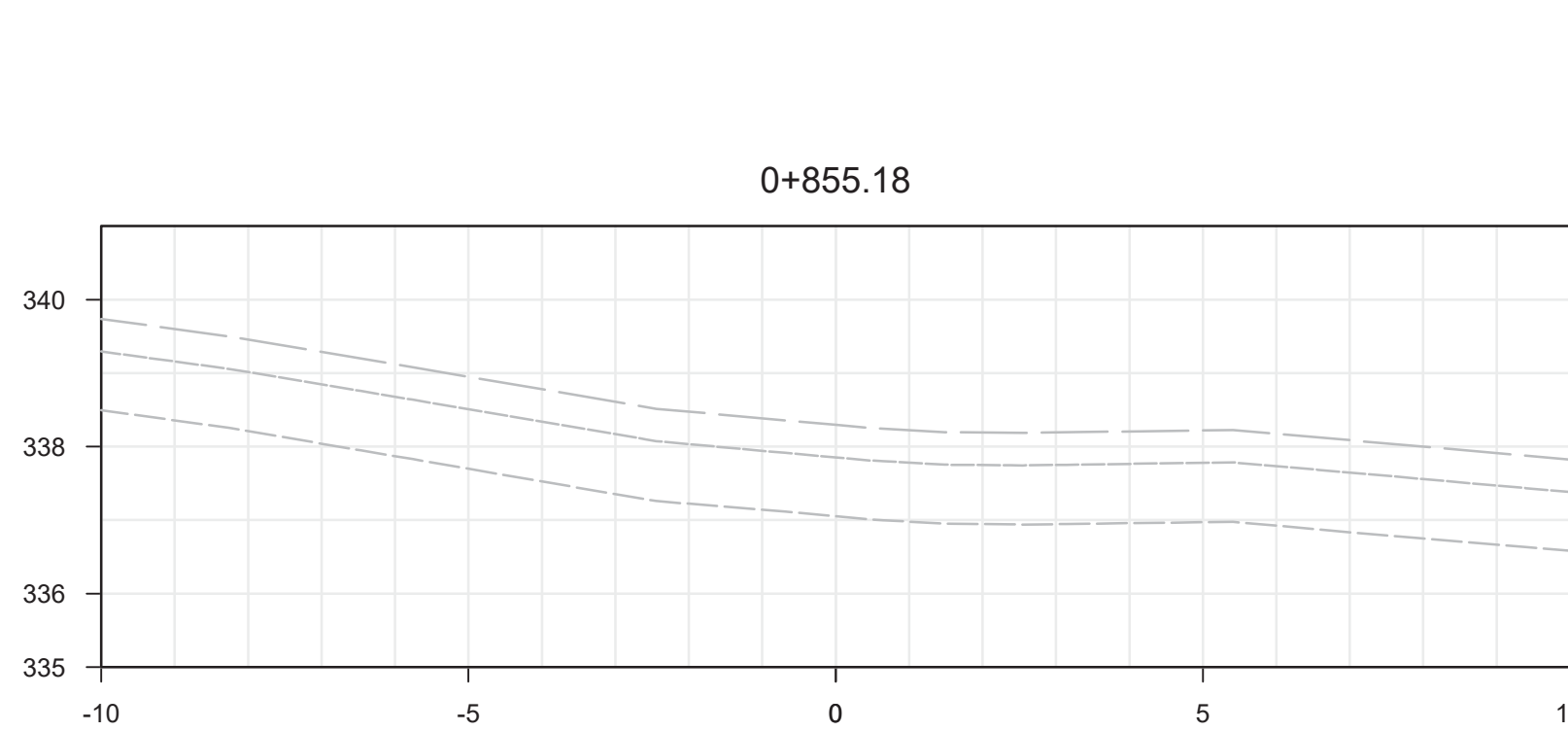
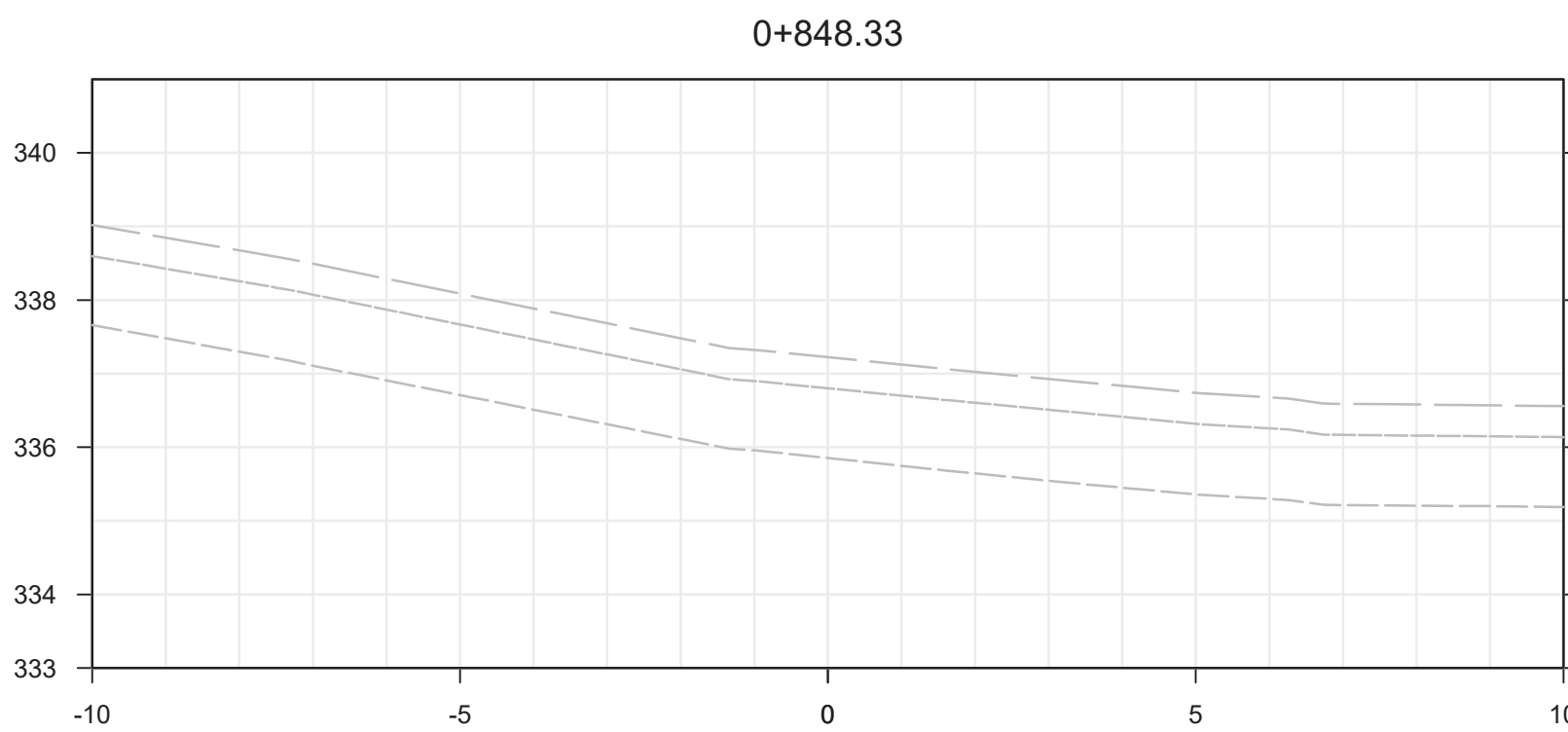
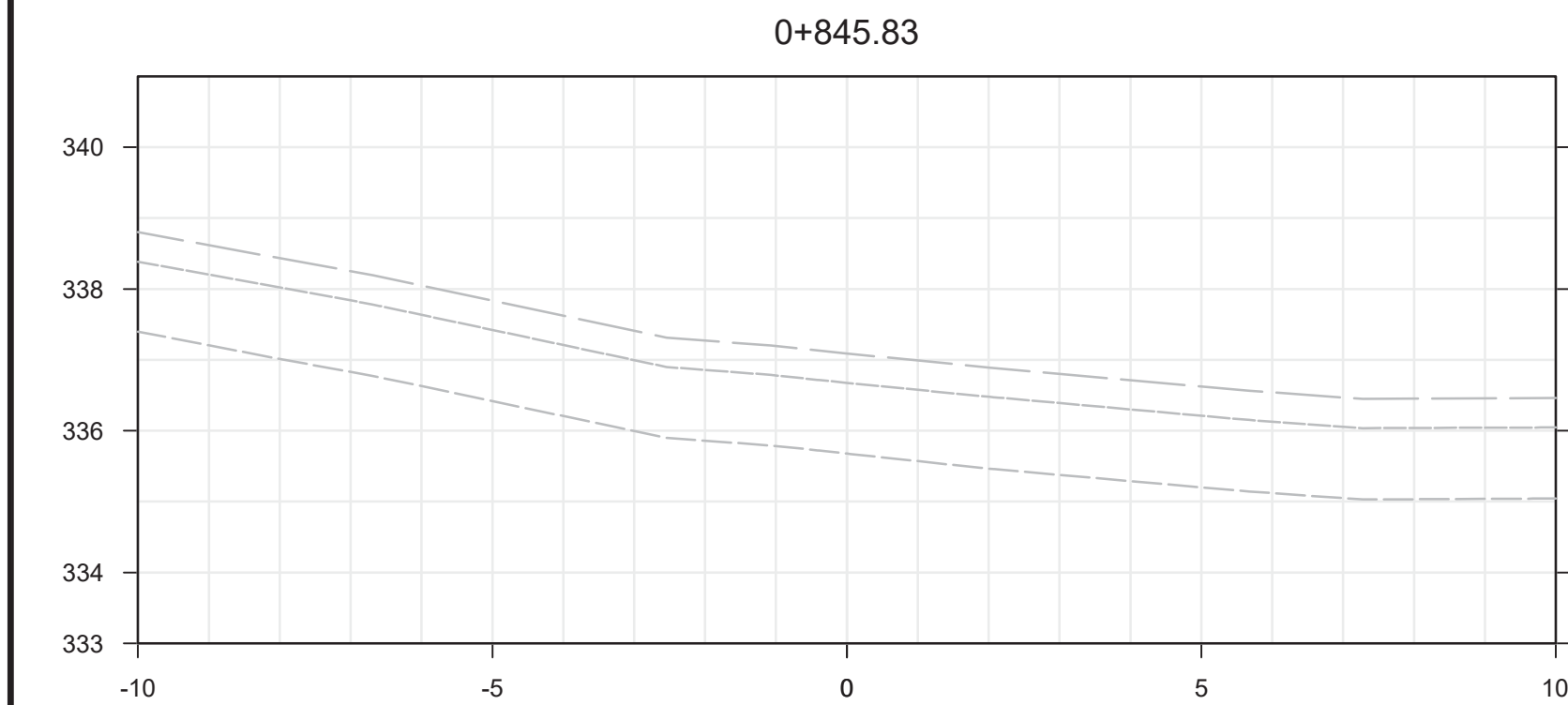
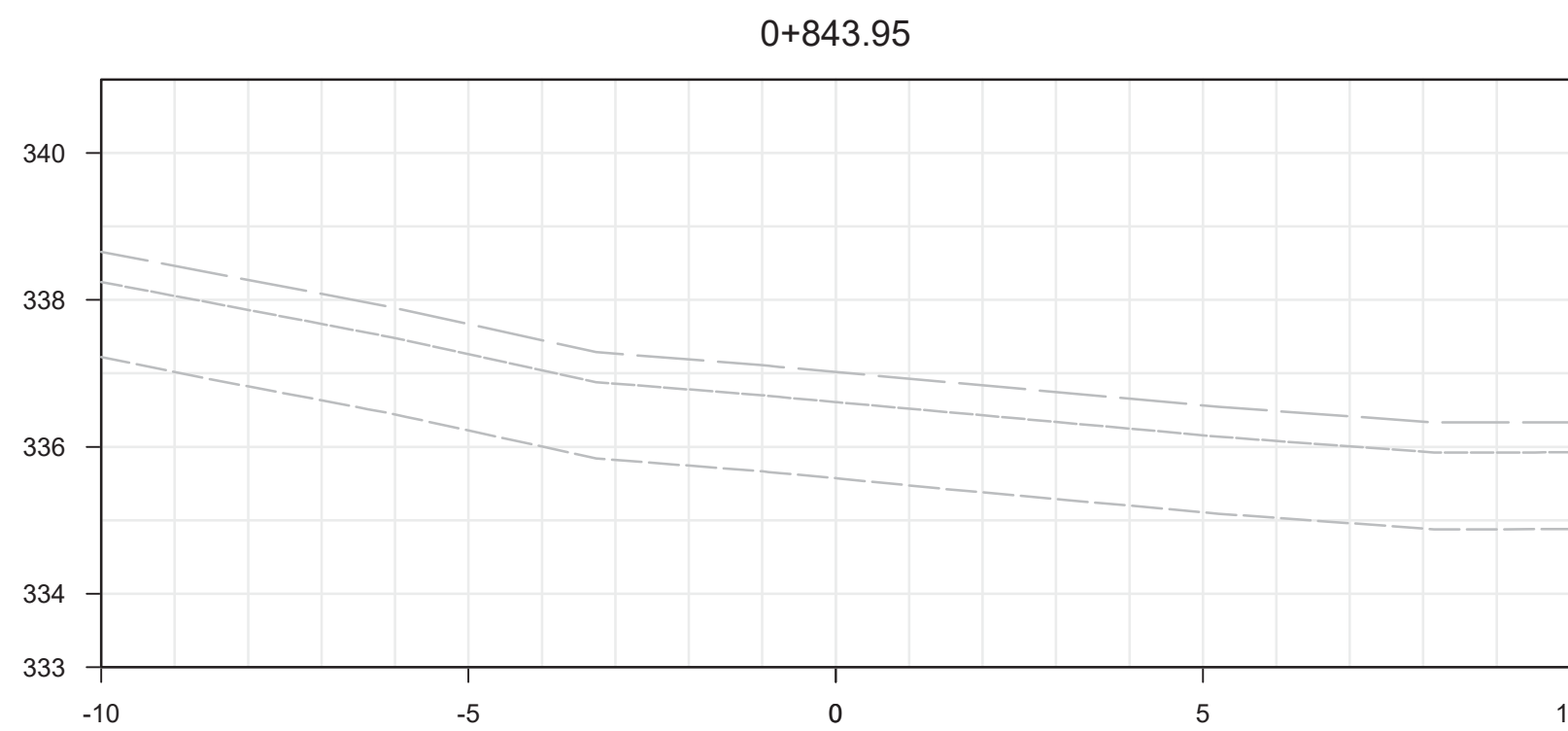
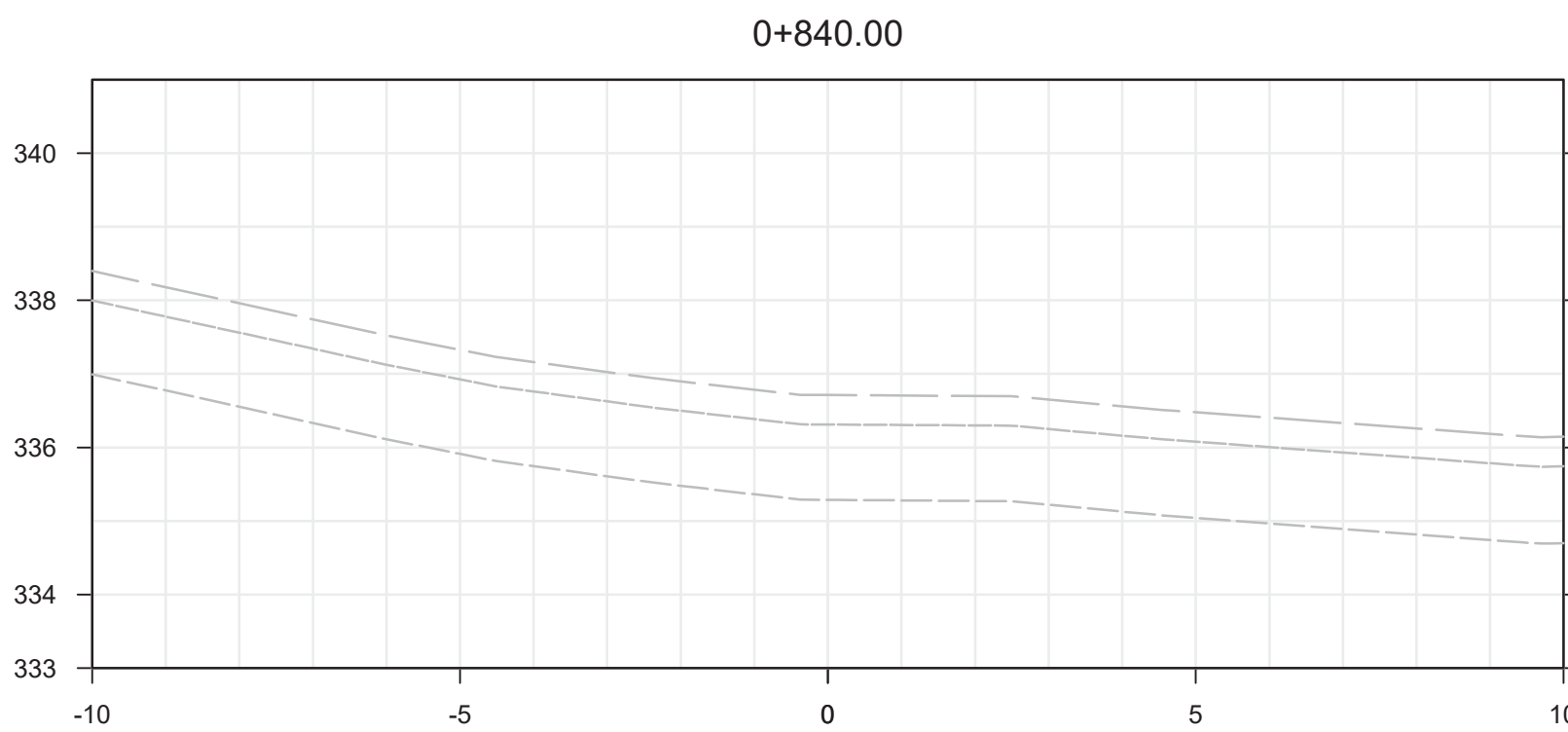
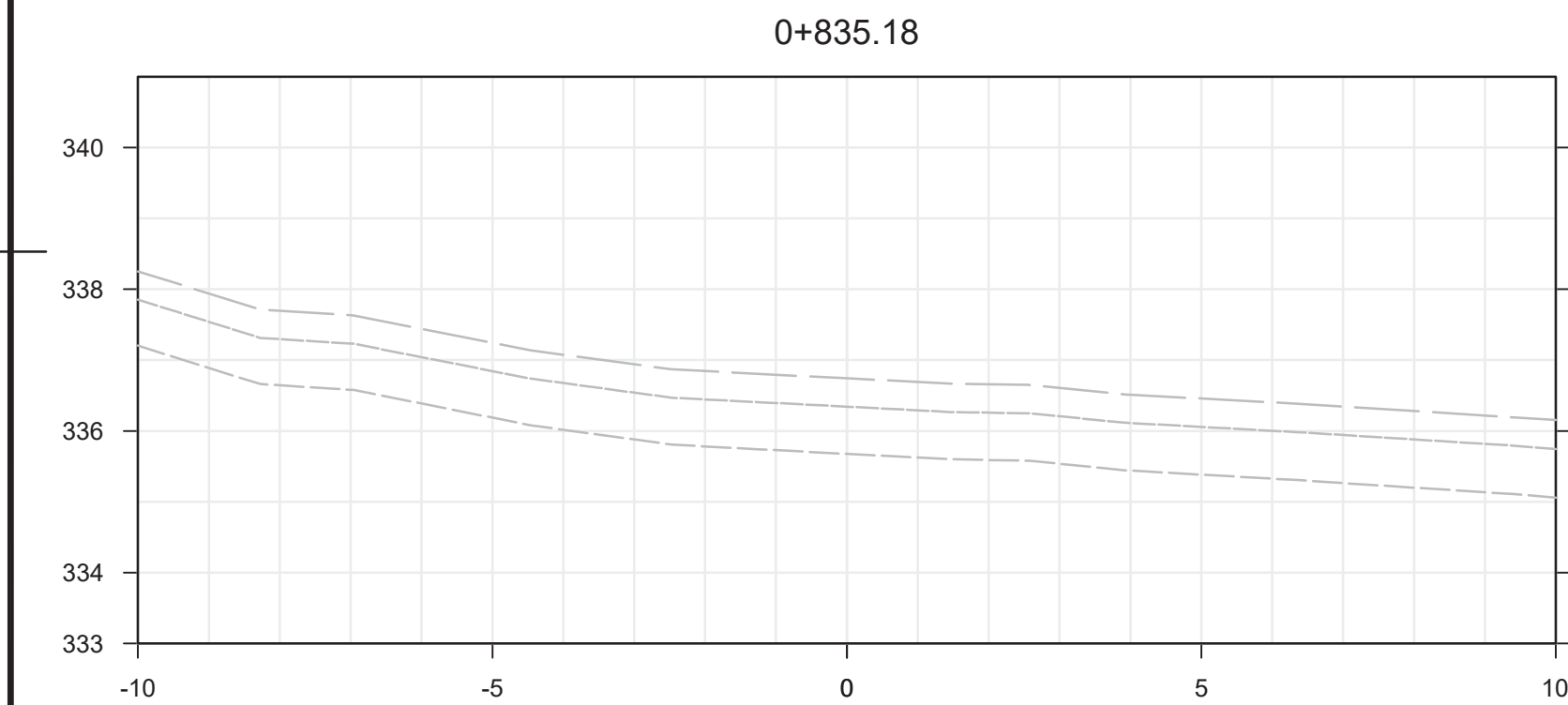
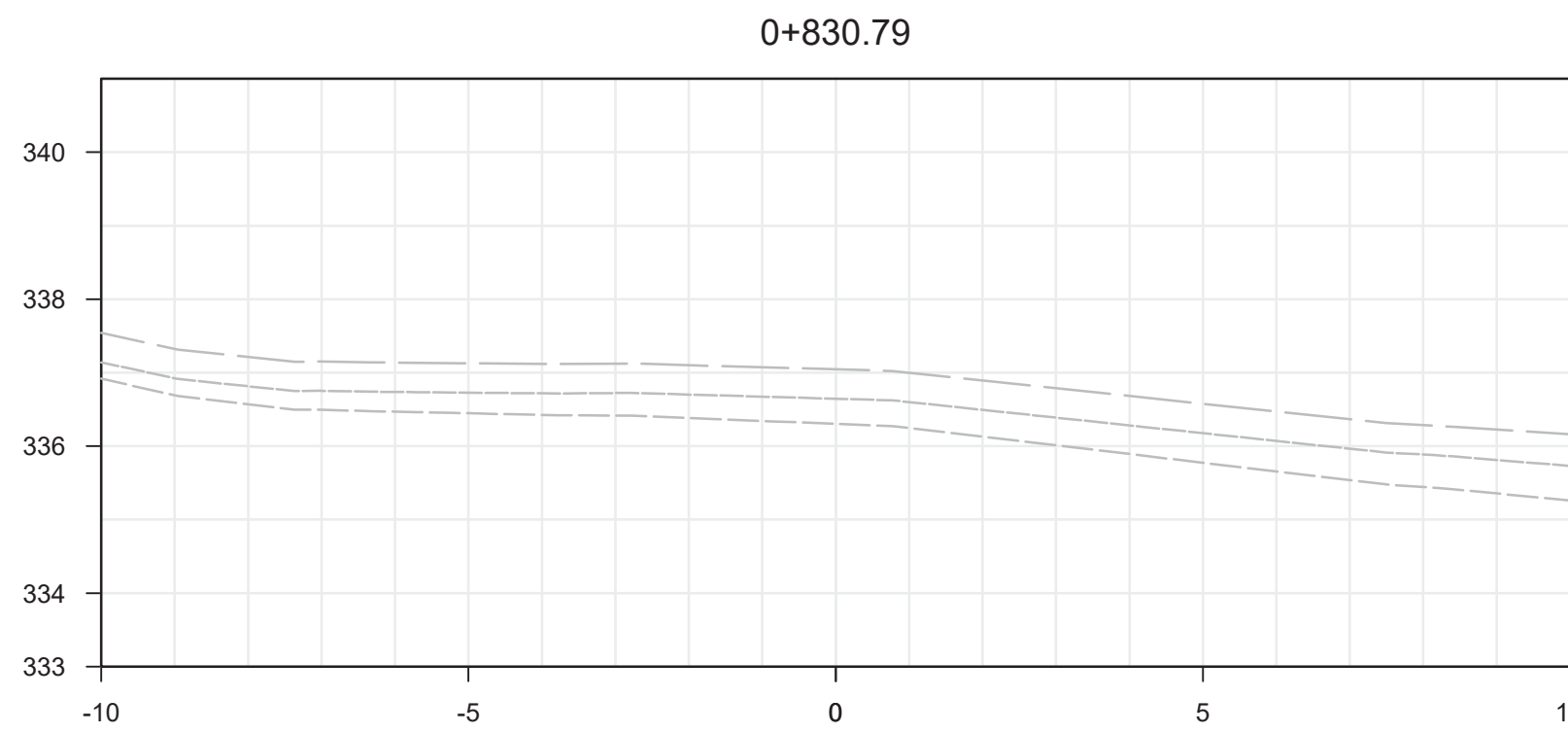
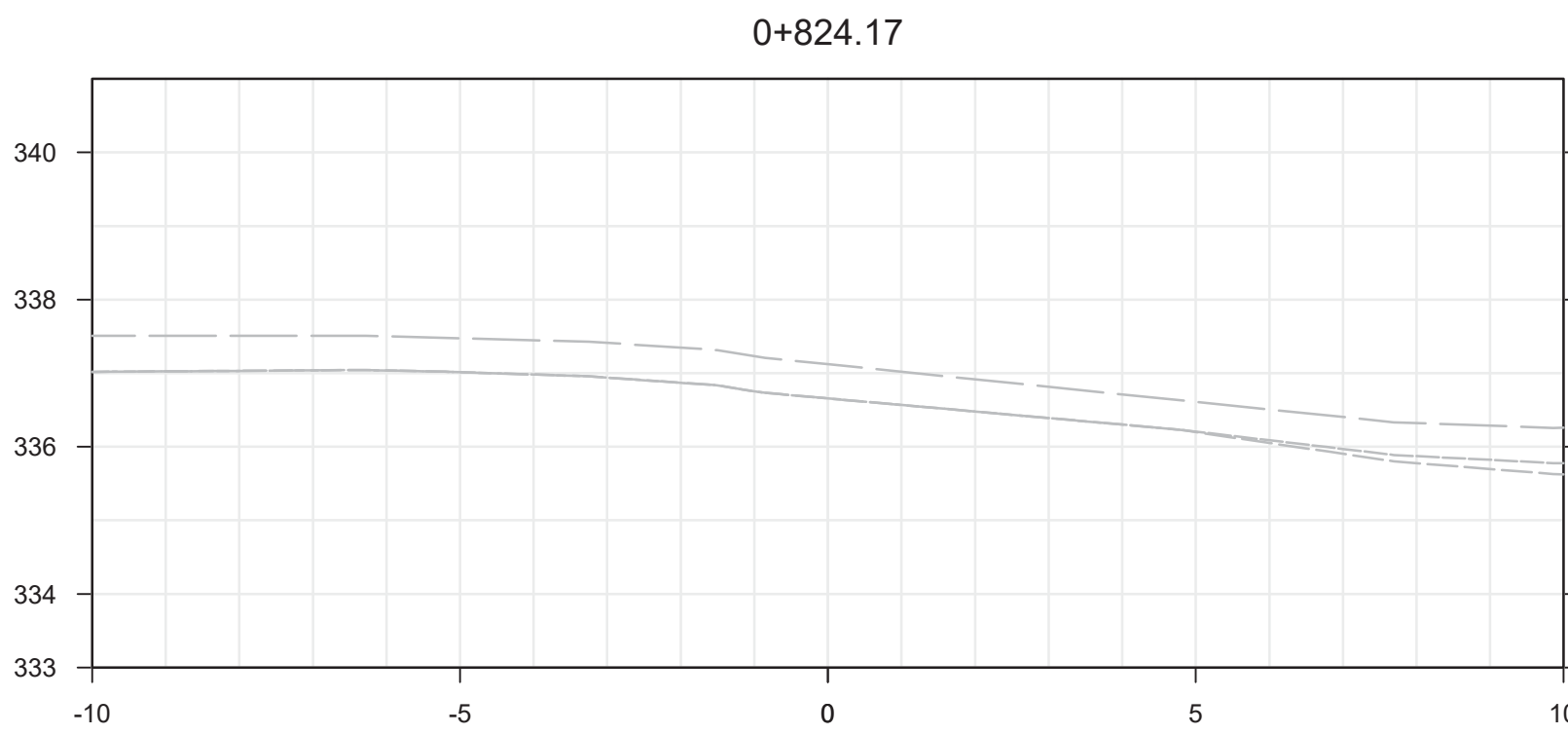
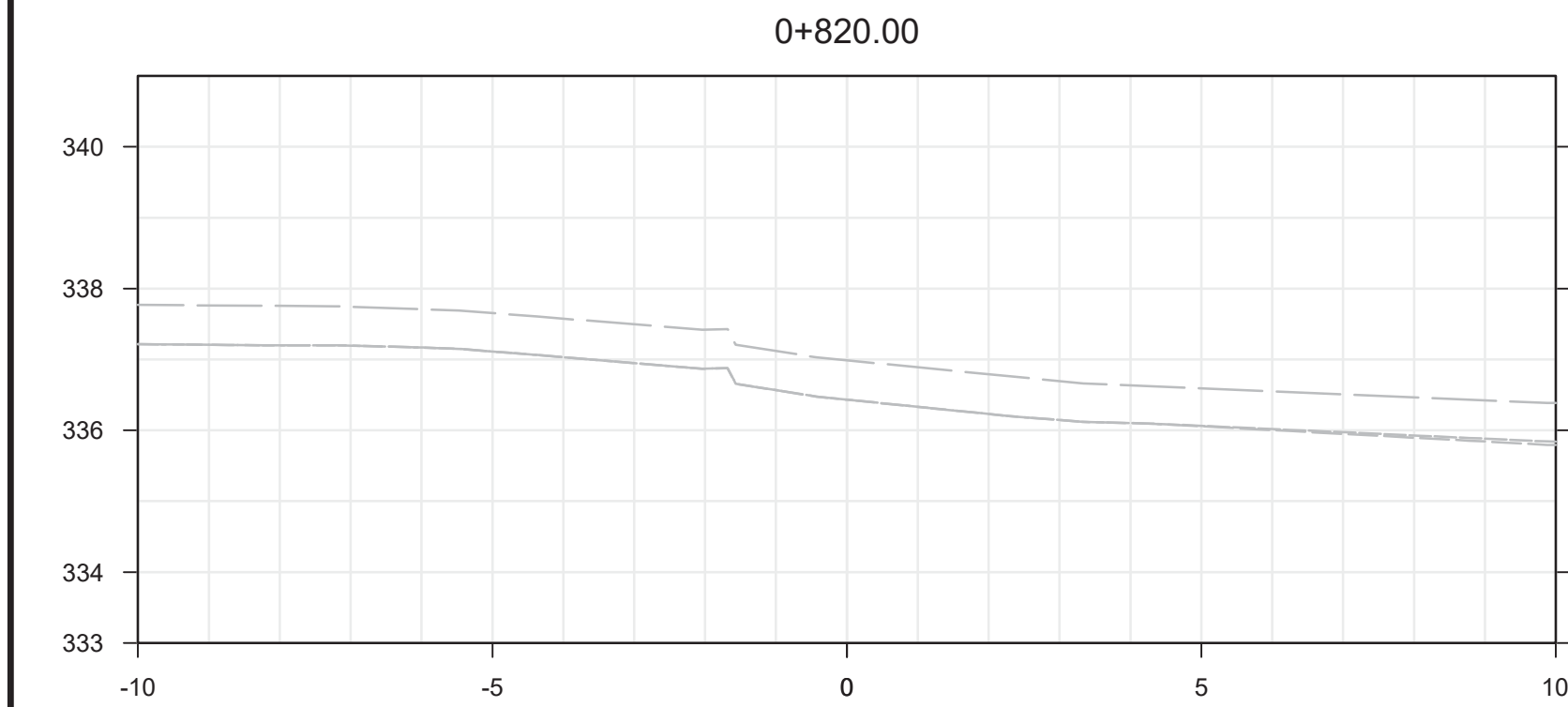
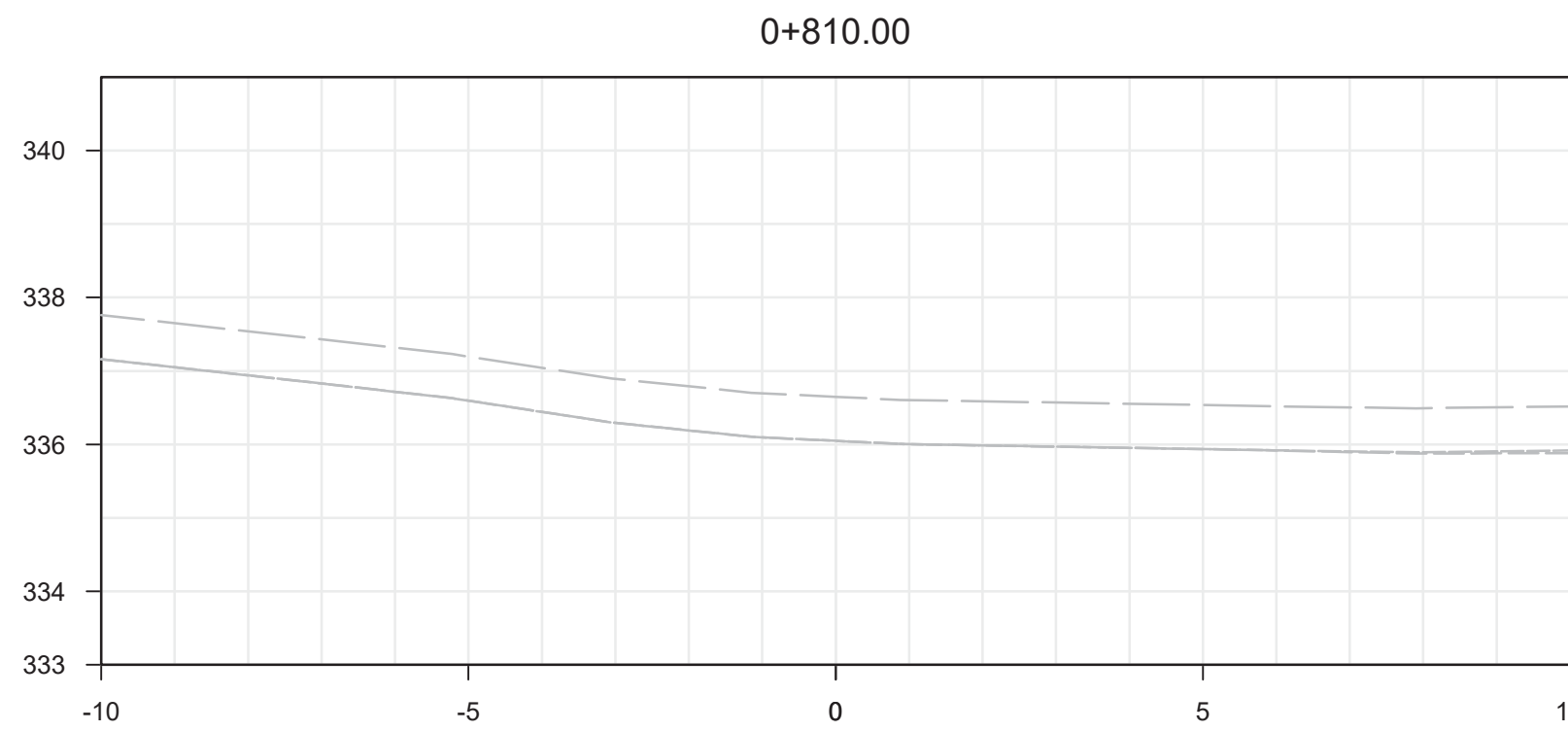
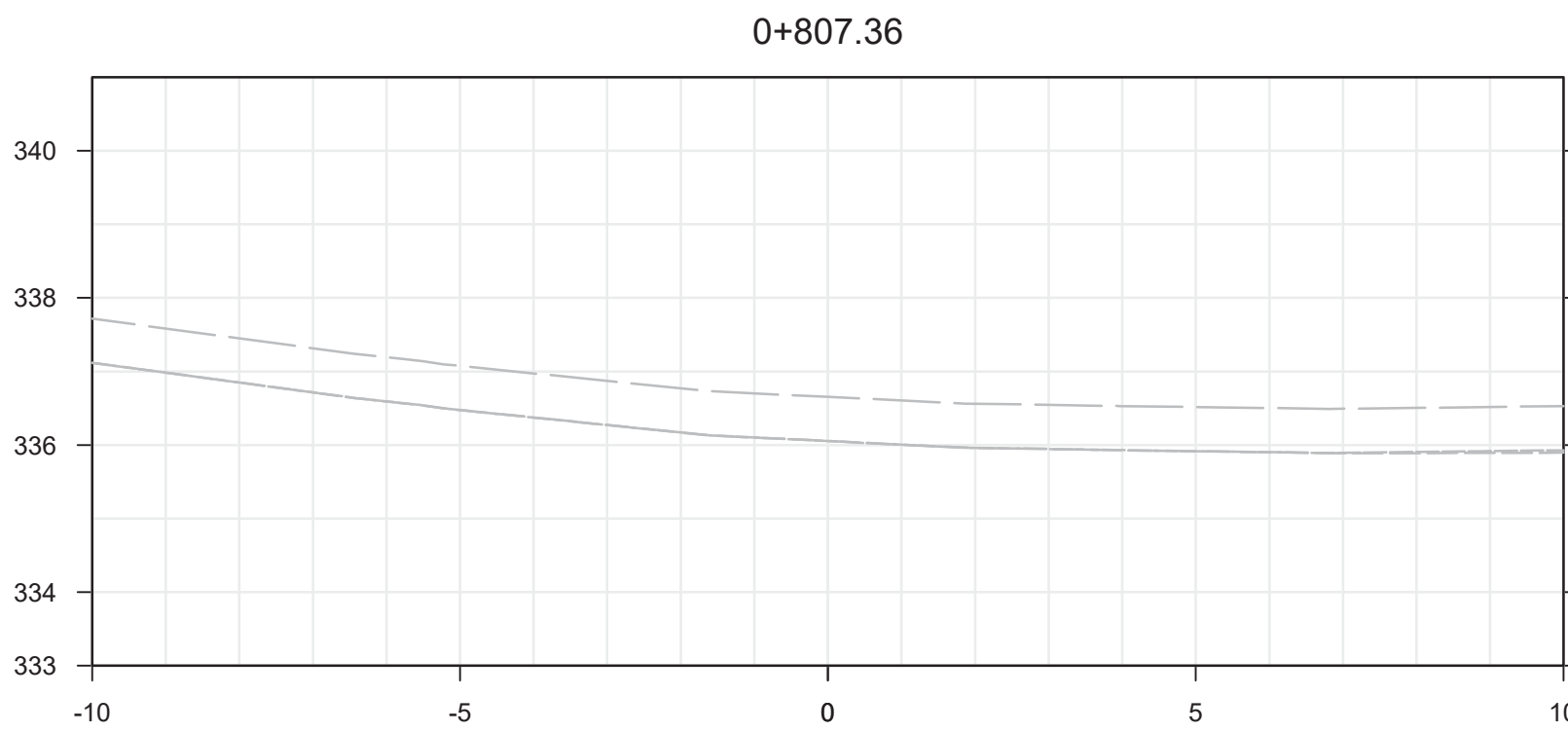
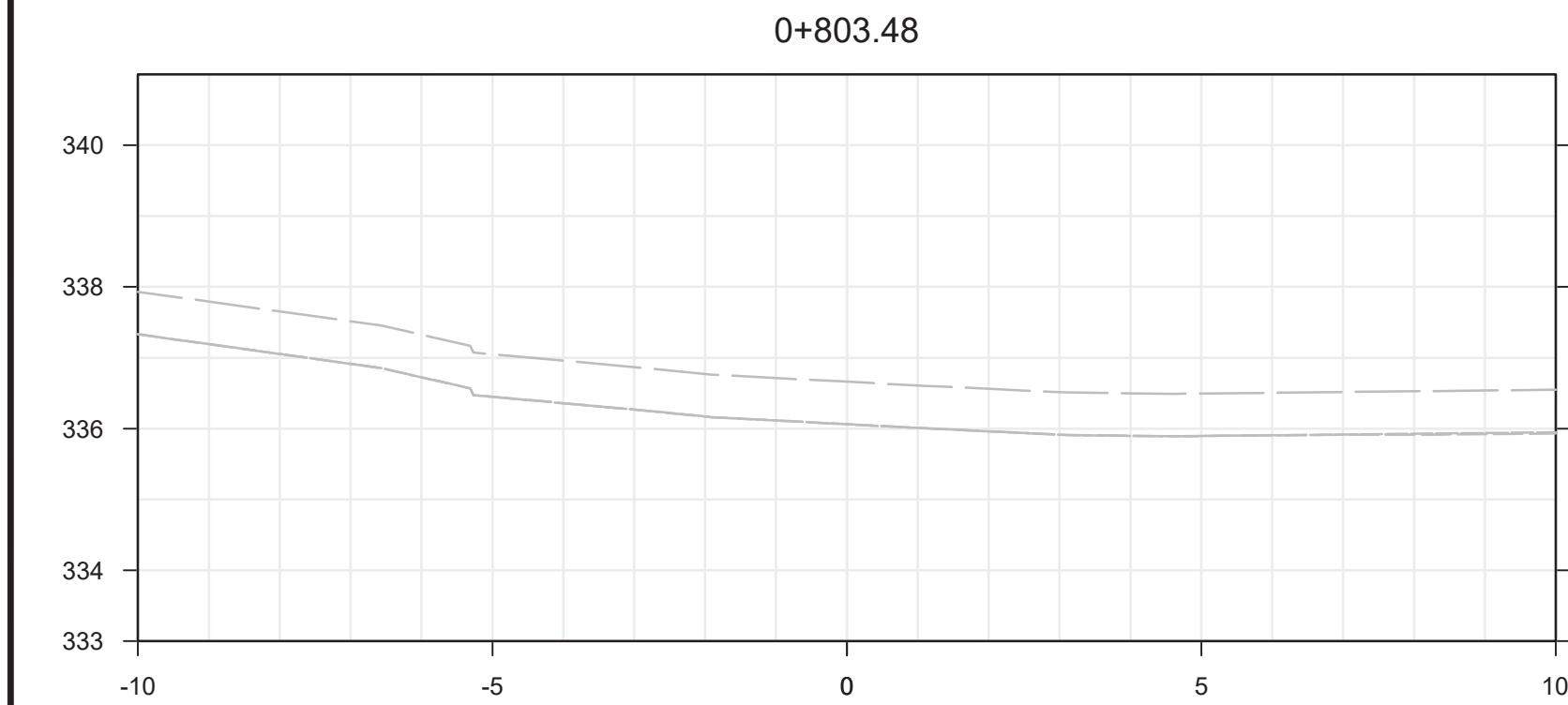
approved by  
approuvé par  
**B.P.**

tender  
soumission  
**PIERRE GRAMBART** project manager  
administrateur de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**509**



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Government Services Canada  
Architectural and Engineering Services  
Ontario Region  
  
Travaux publics et  
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Services d'architecture et de génie  
Région de l'Ontario



CONSULTING  
ENGINEERS  
PLANNERS



4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
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project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conçu par  
**A.C.**

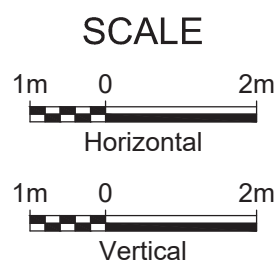
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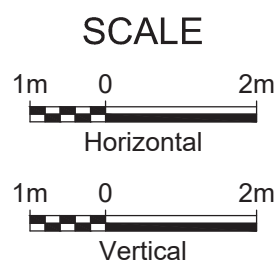
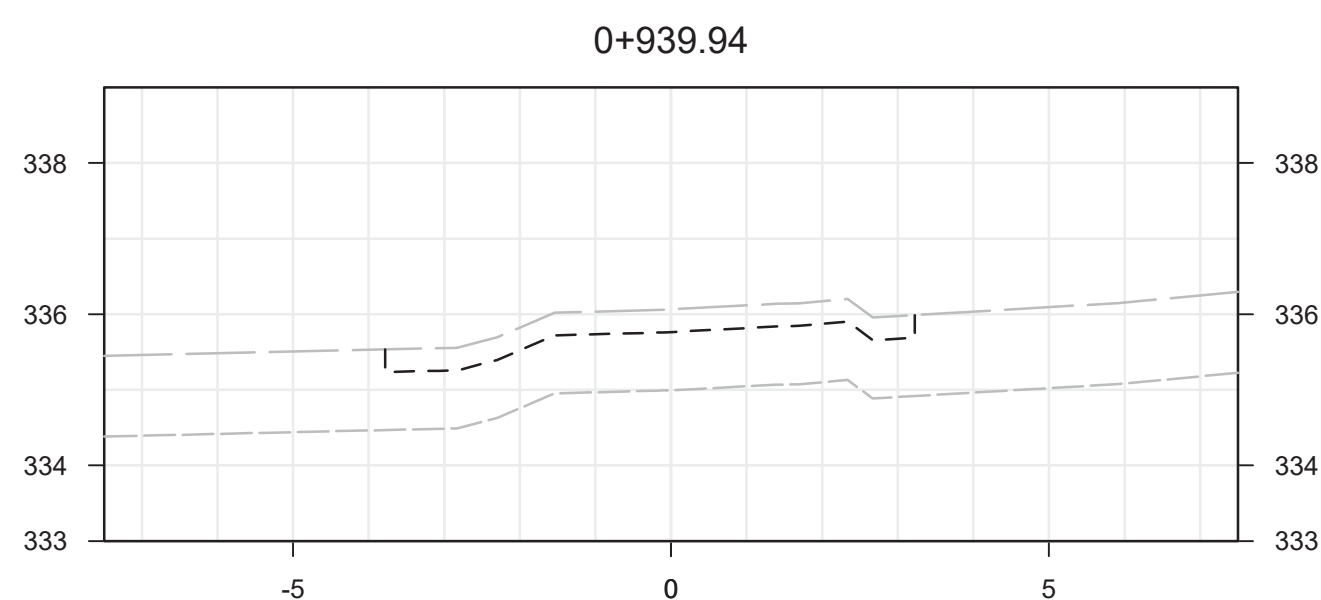
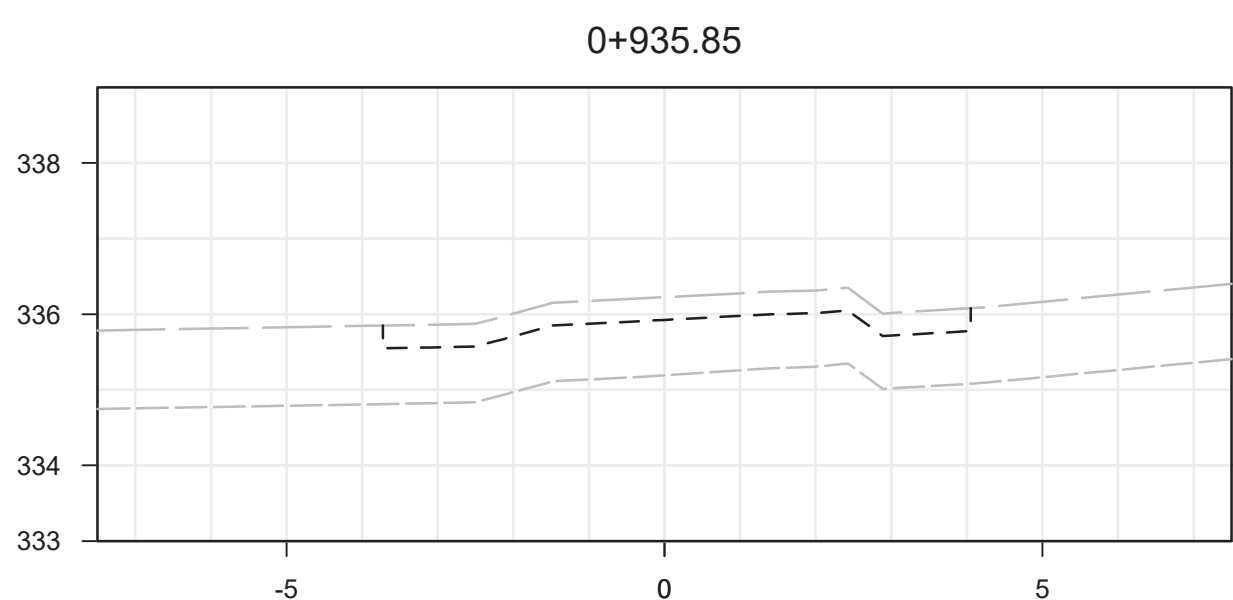
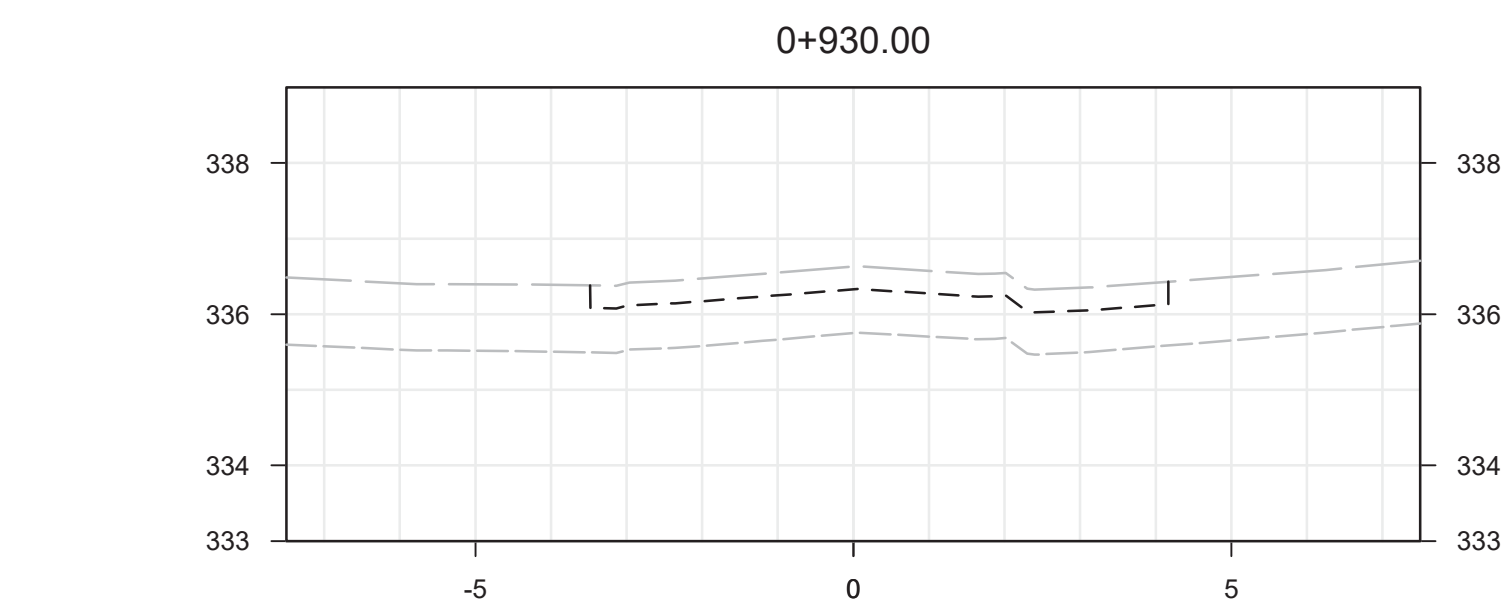
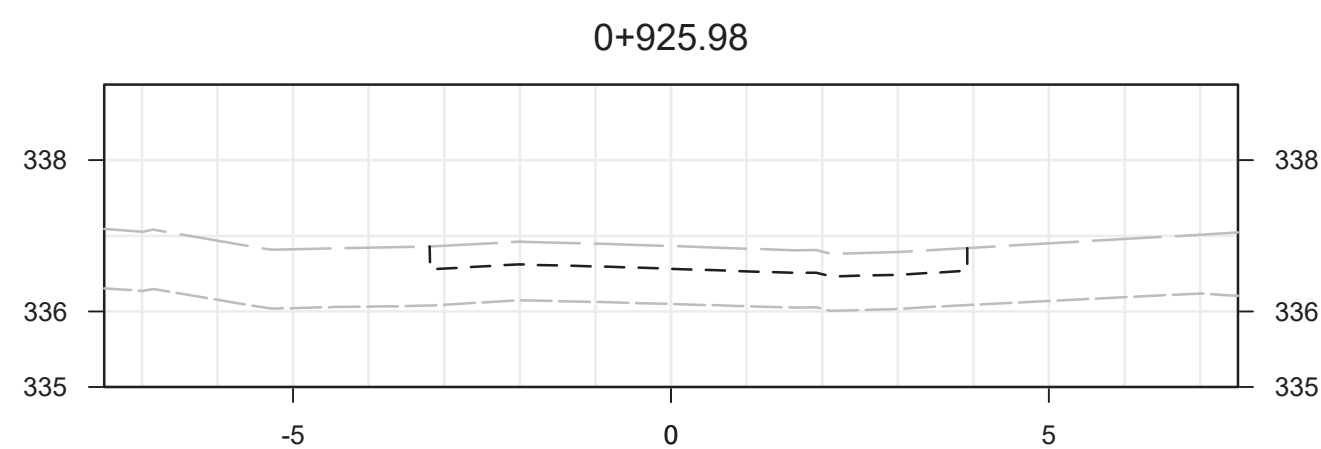
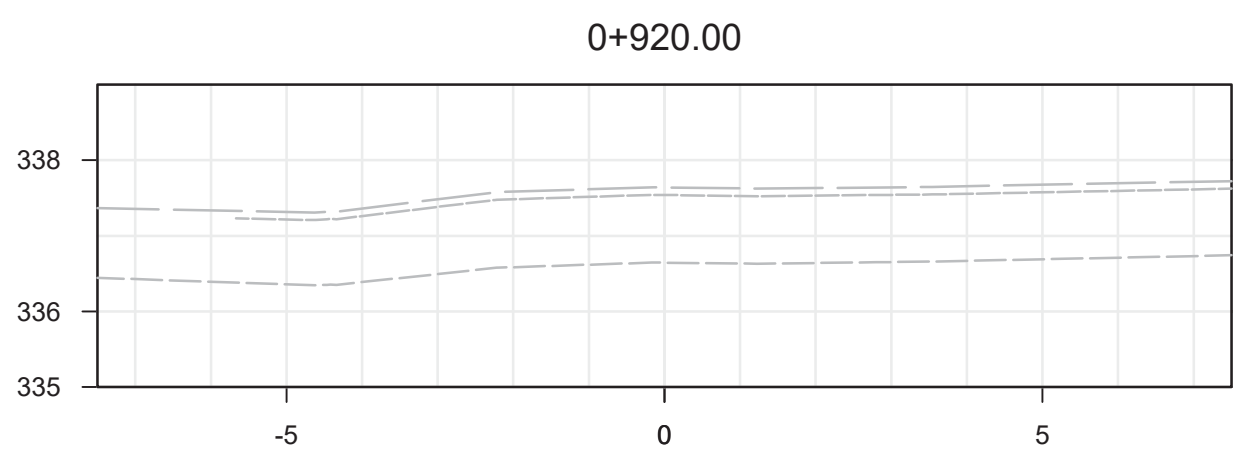
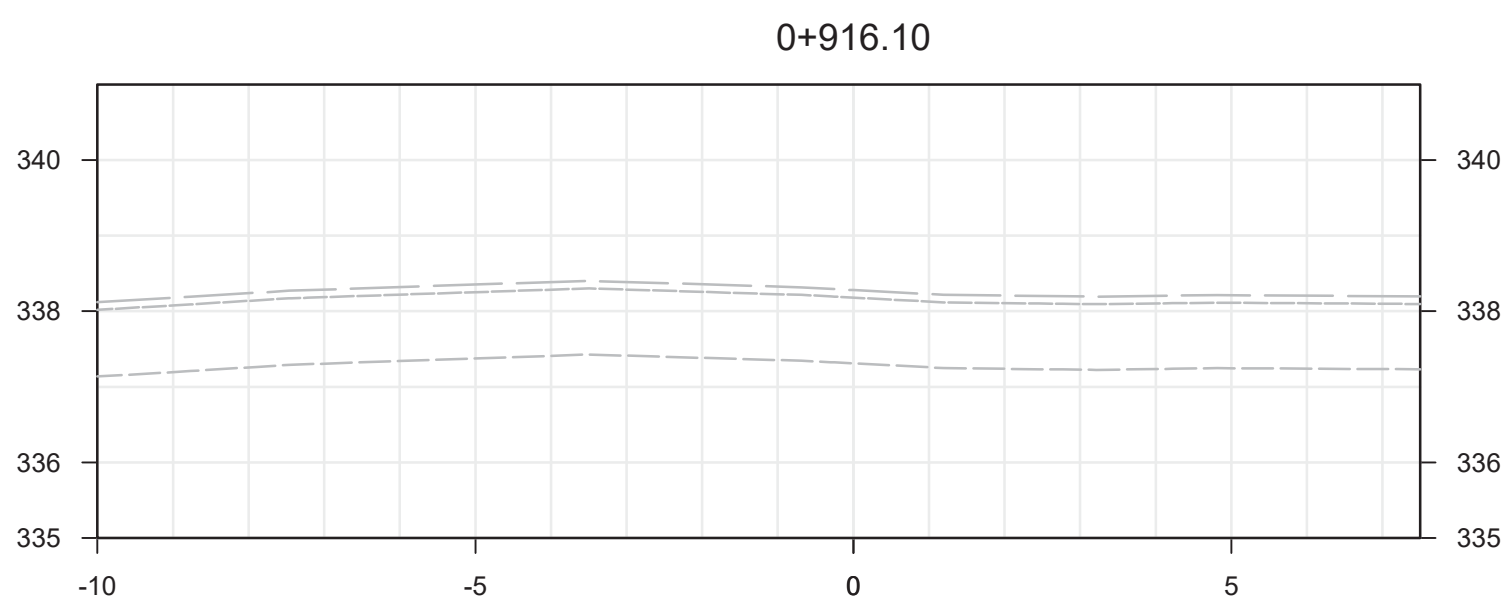
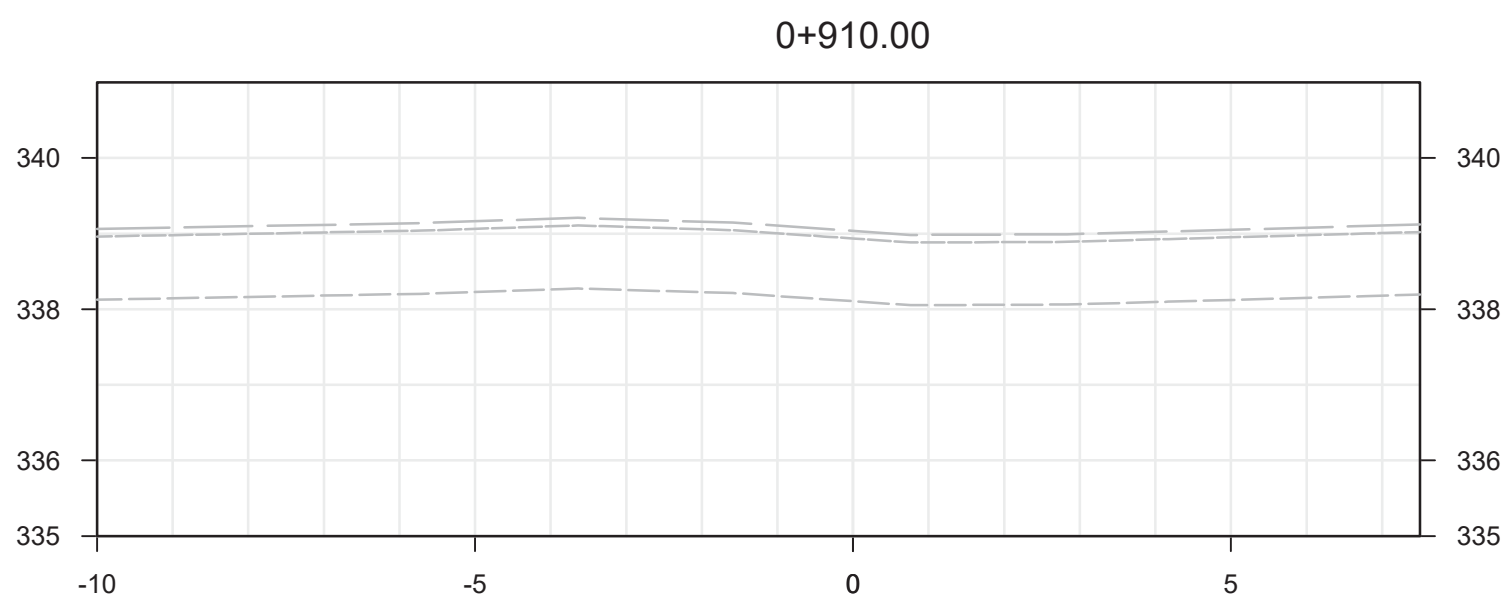
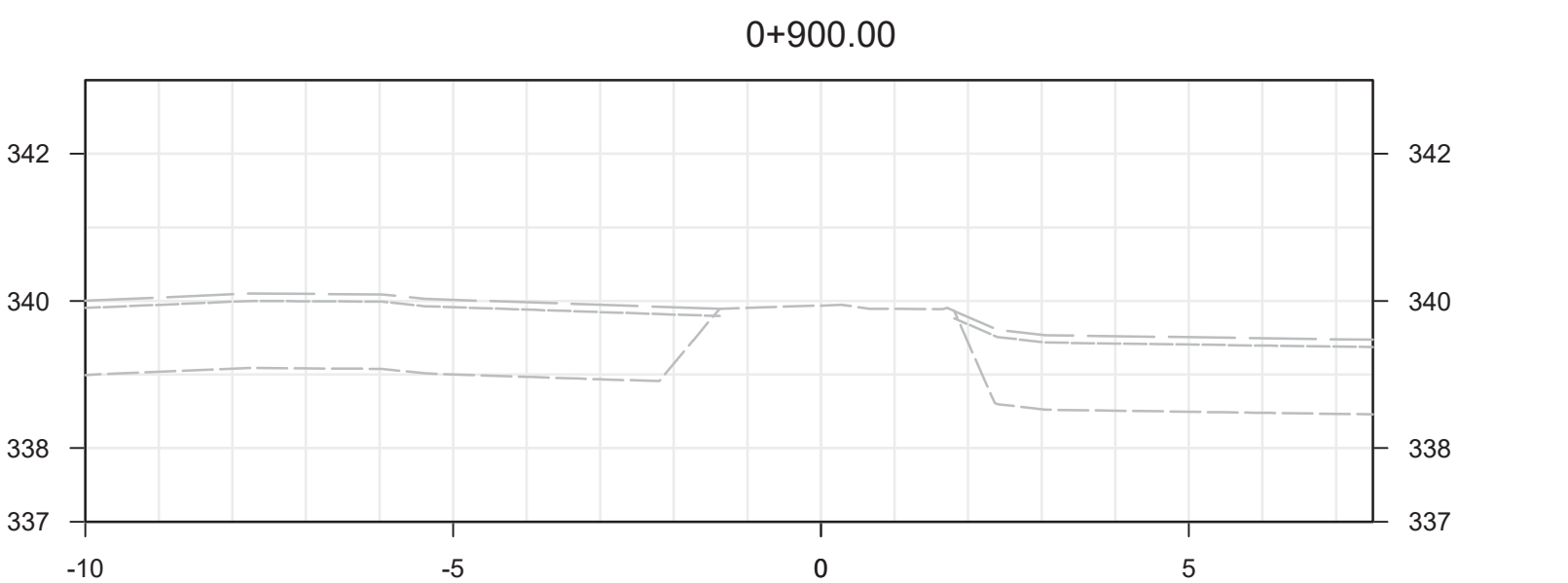
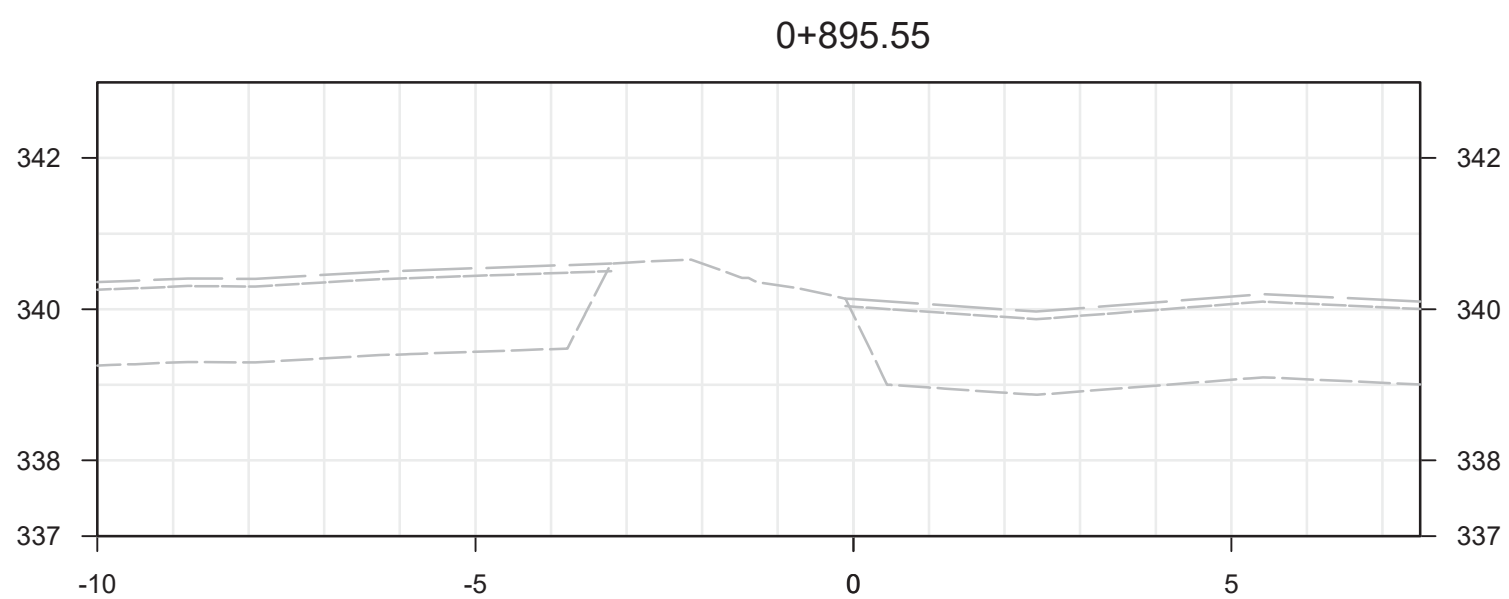
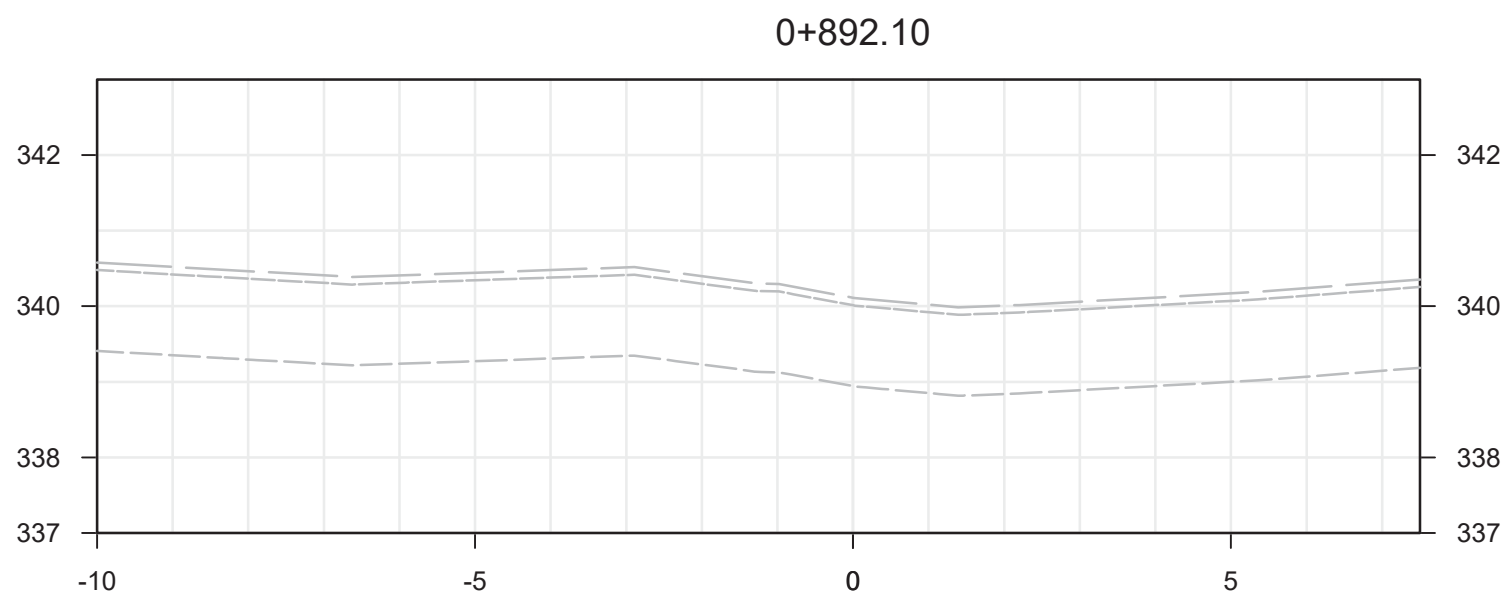
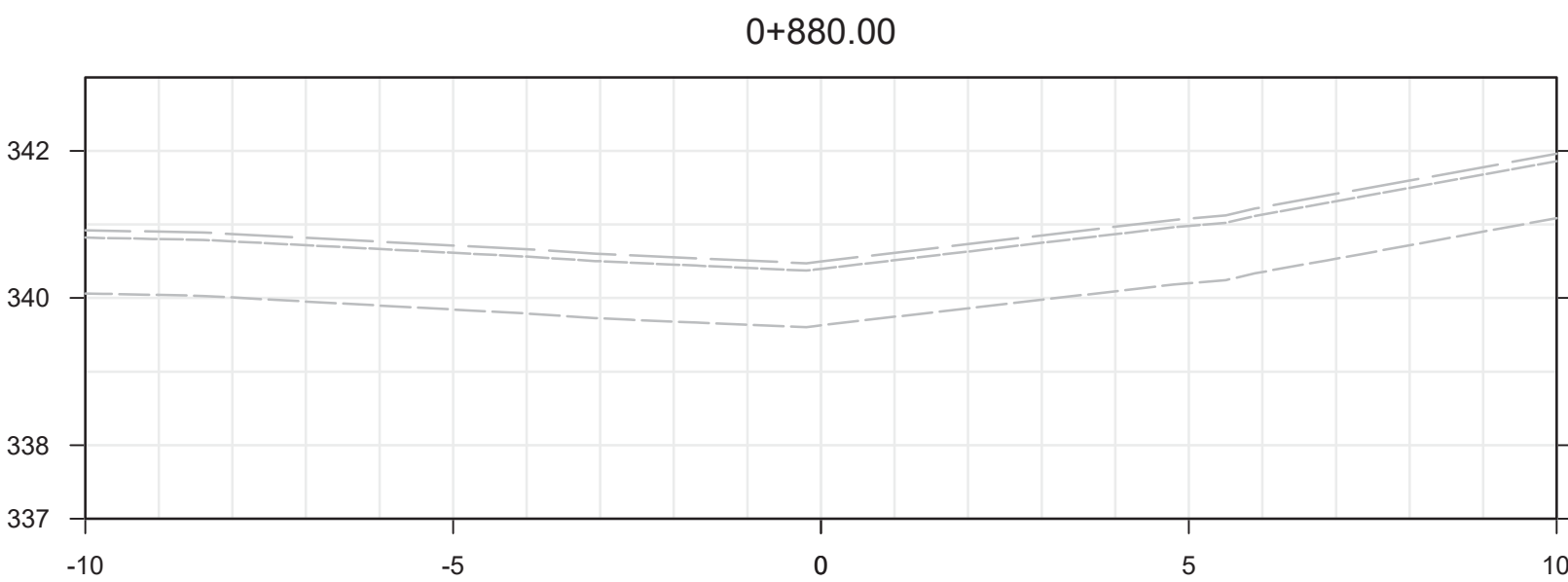
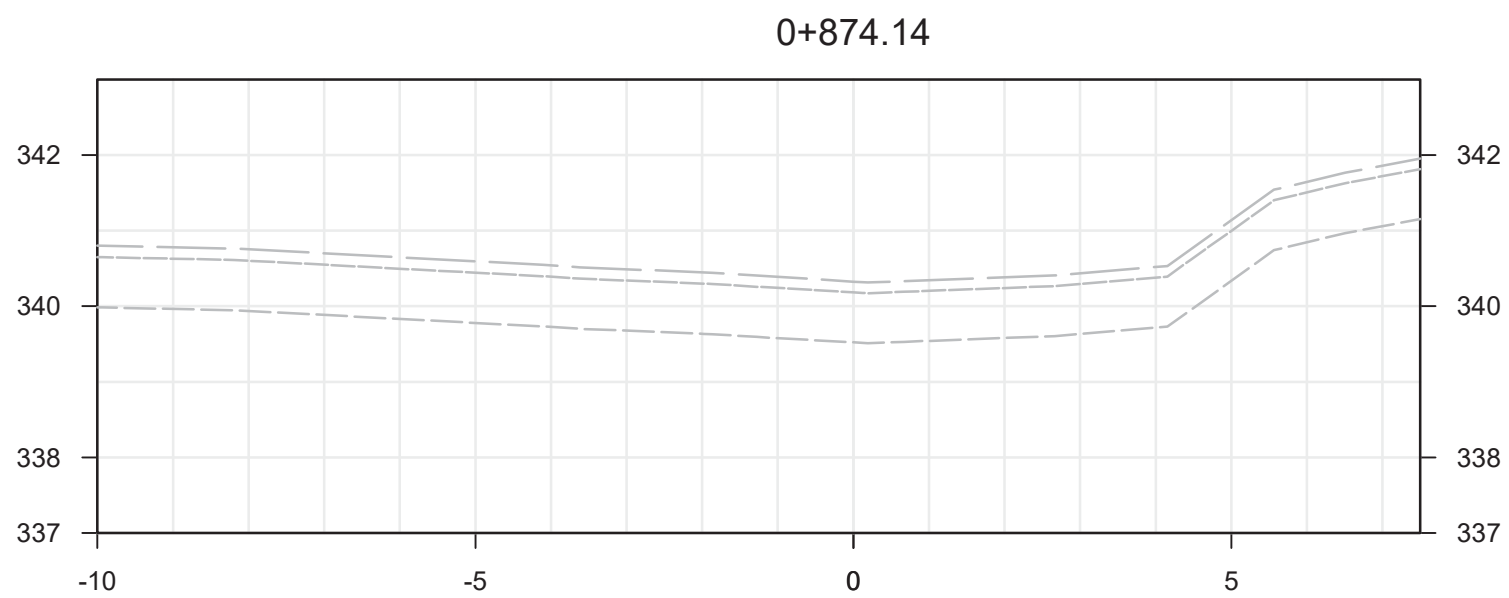
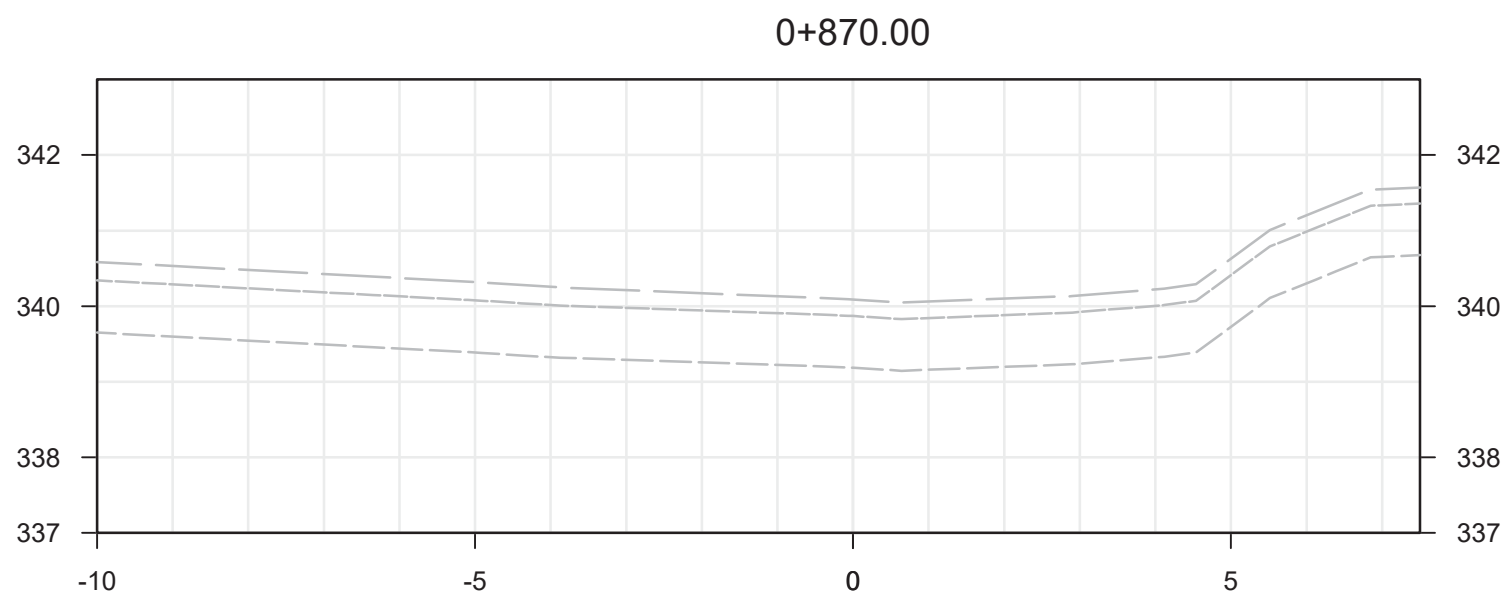
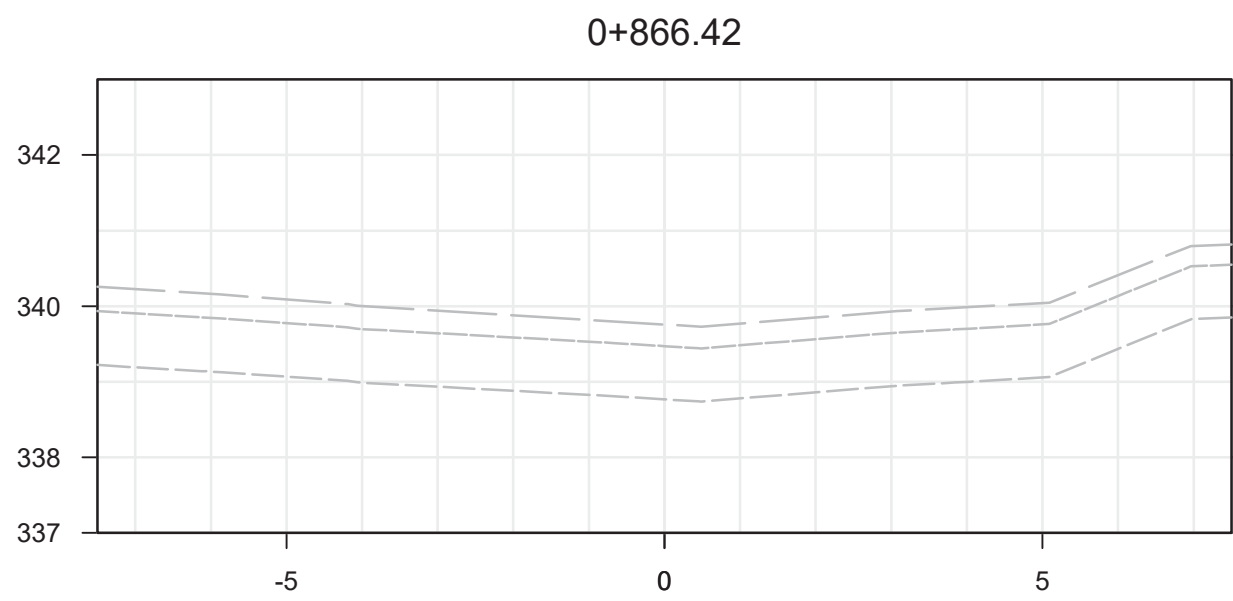
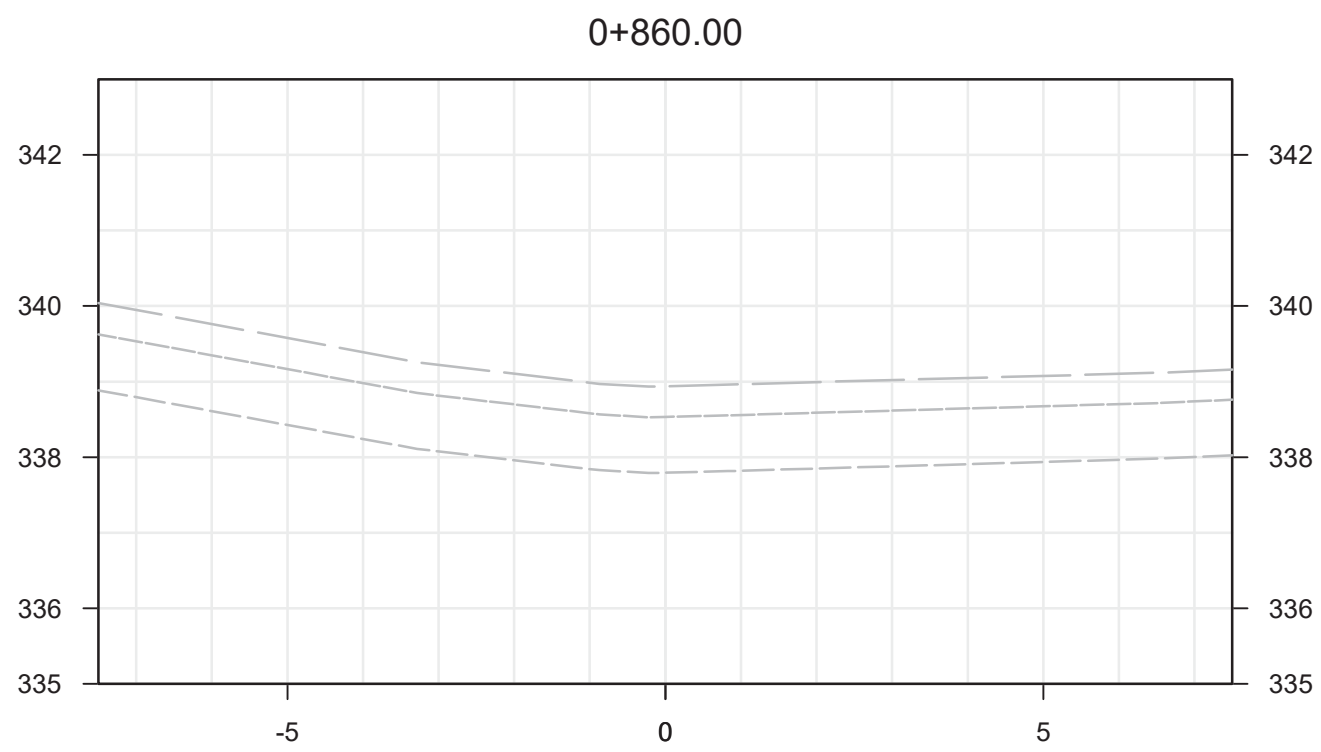
tender  
soumission  
**PIERRE GRAMBART** project manager  
administrateur de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**510**





4	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
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titre du projet

**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin

**CROSS SECTIONS**

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dessiné par

A.C.

designed by  
conçu par

A.C.

approved by  
approuvé par

B.P.

tender  
soumission

PIERRE GRAMBART

project manager  
administrateur  
de projets

project date  
date du projet

2019/08

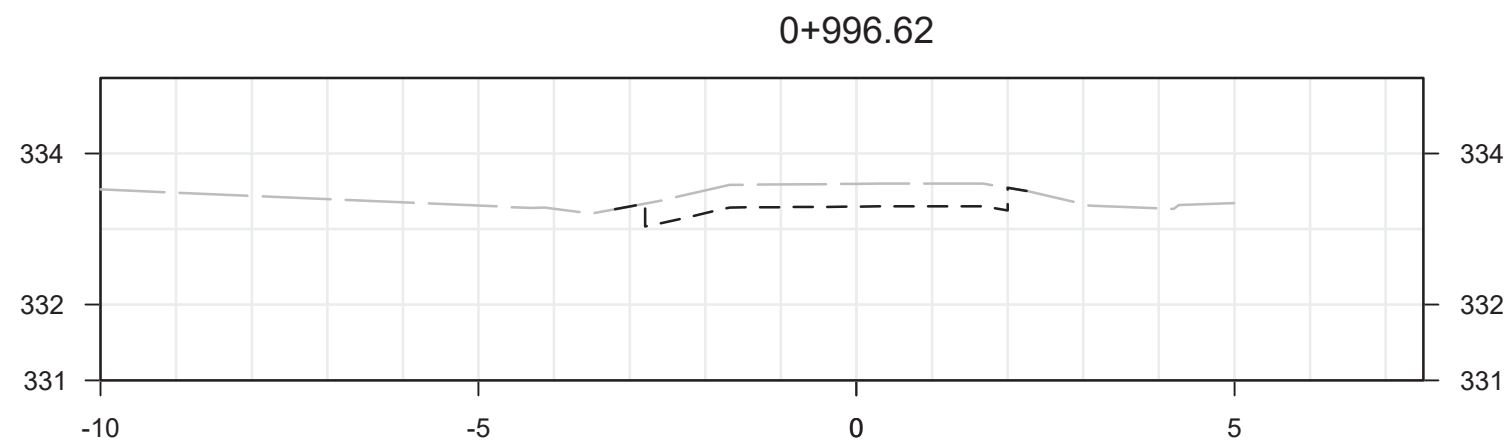
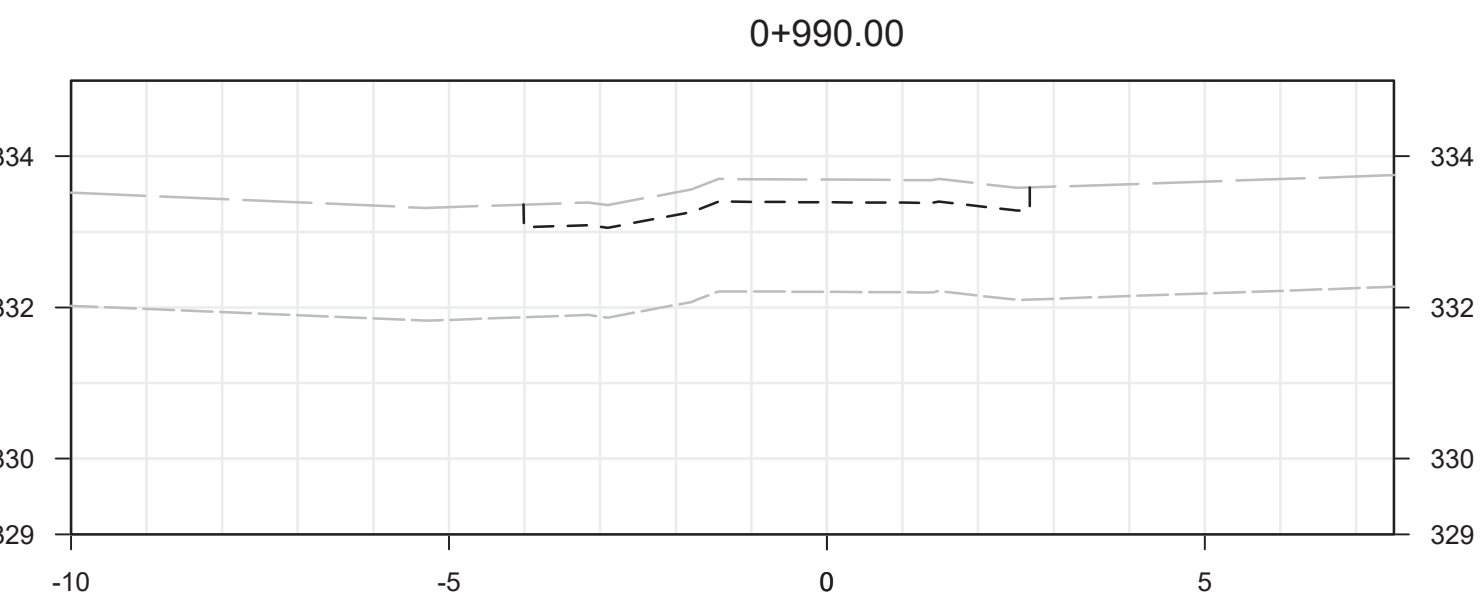
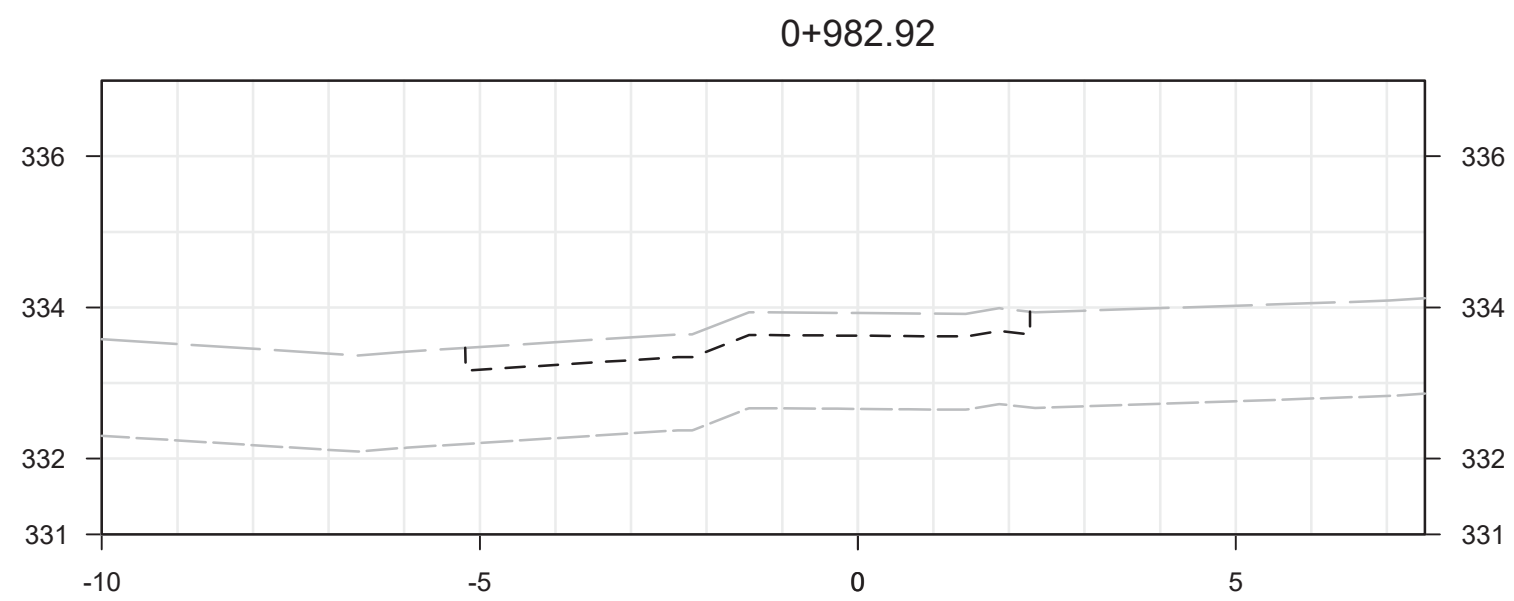
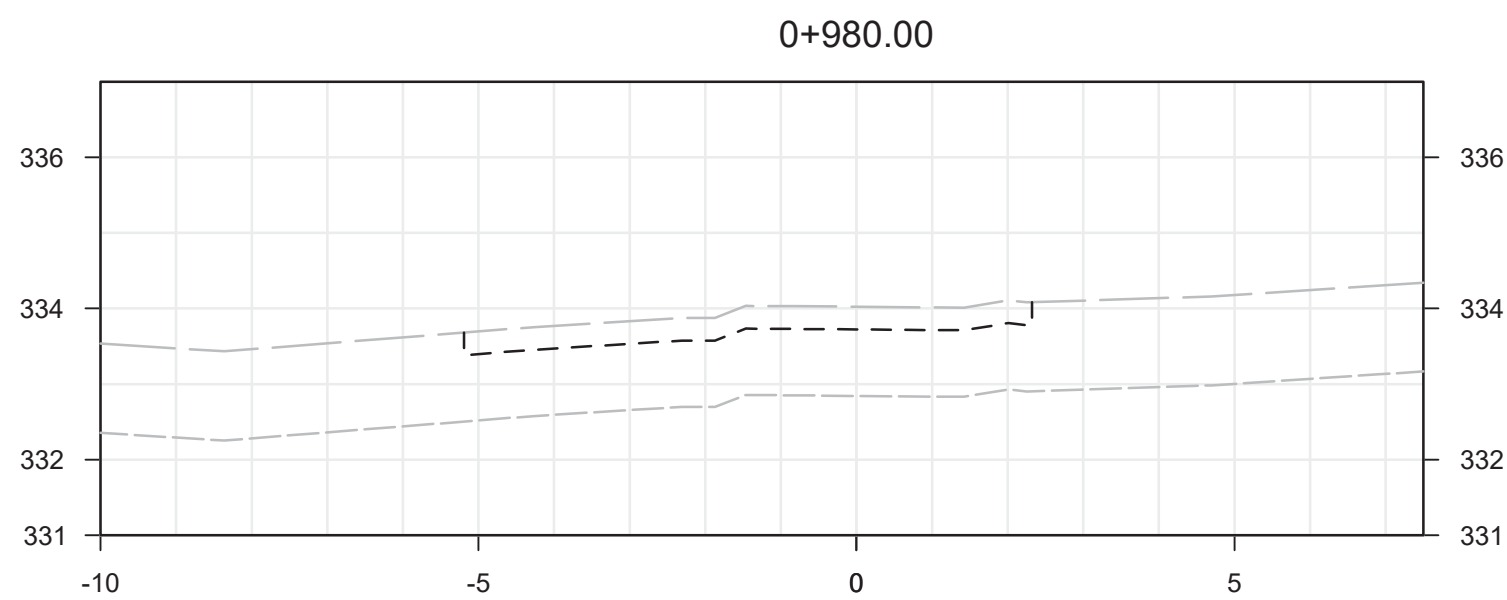
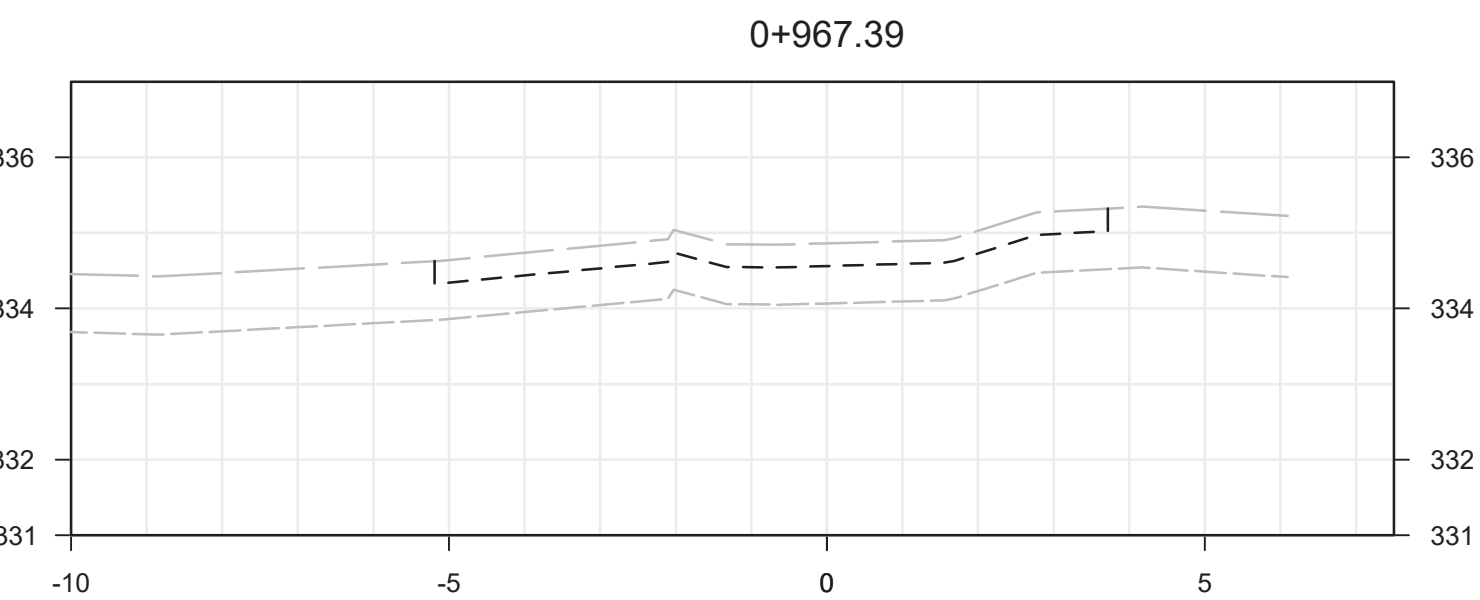
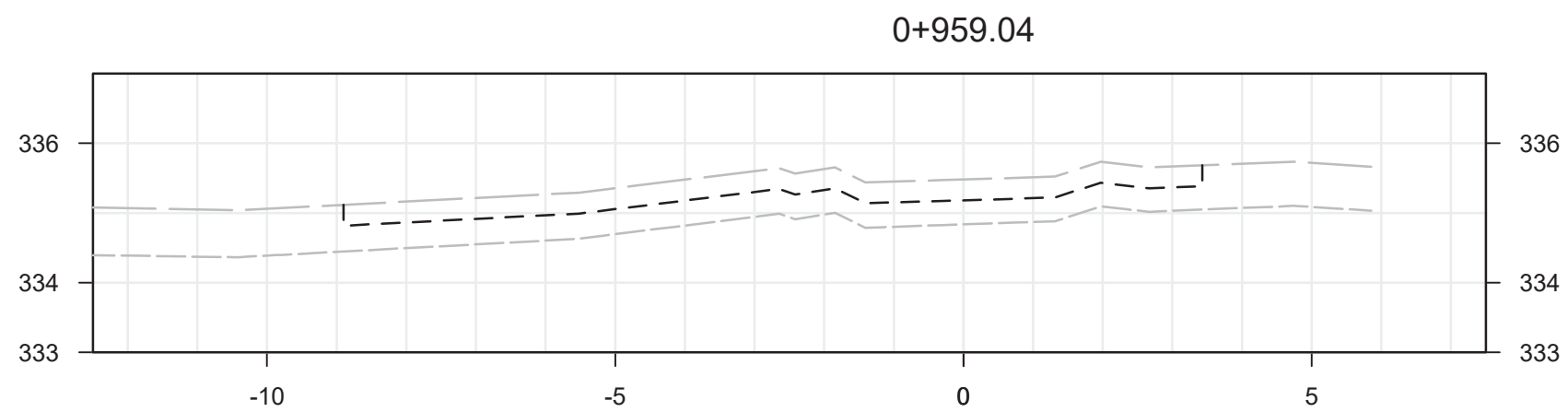
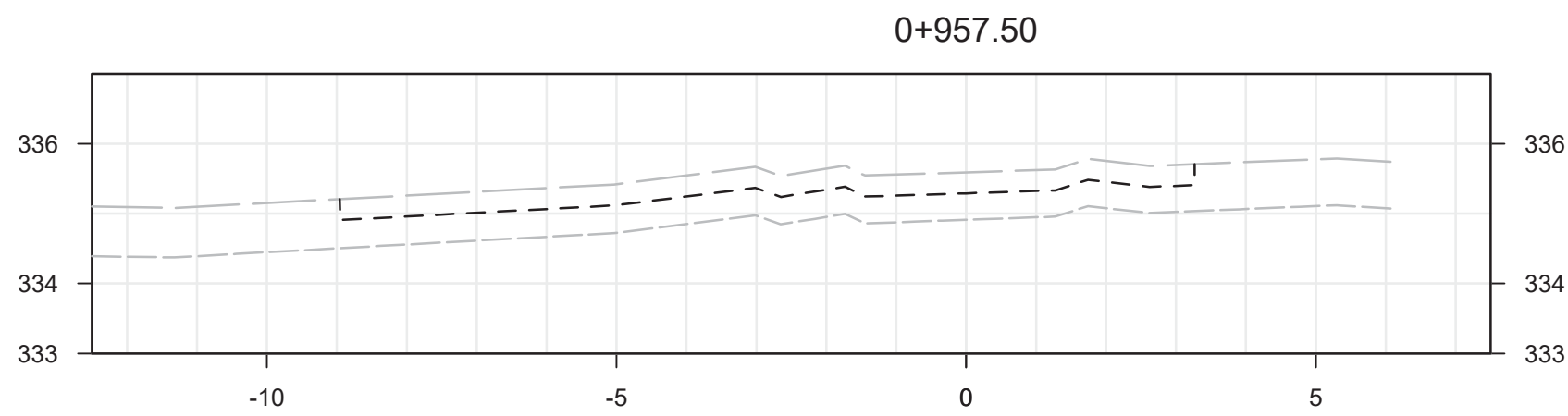
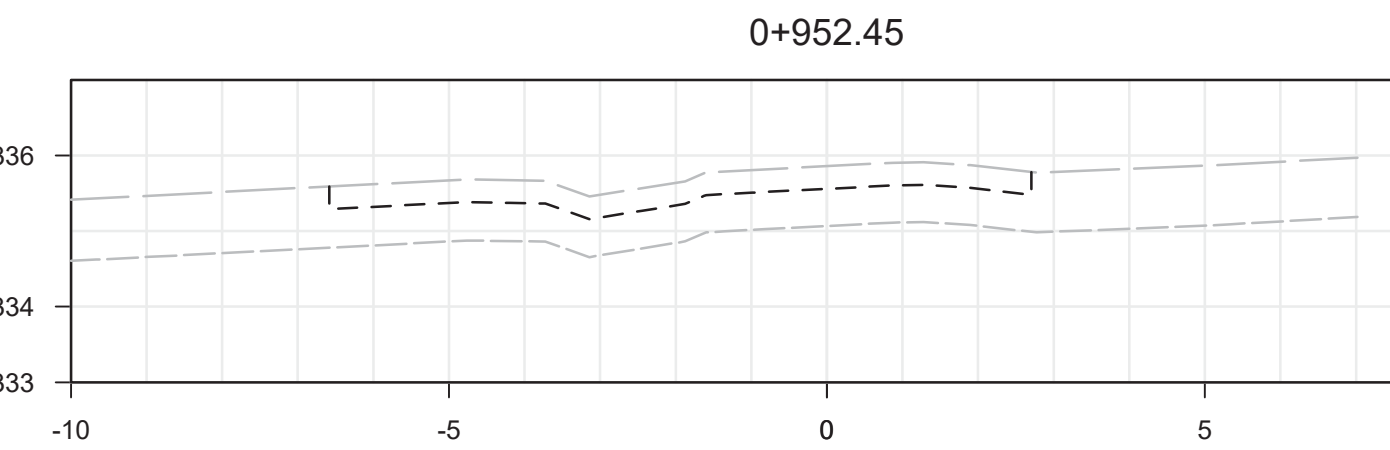
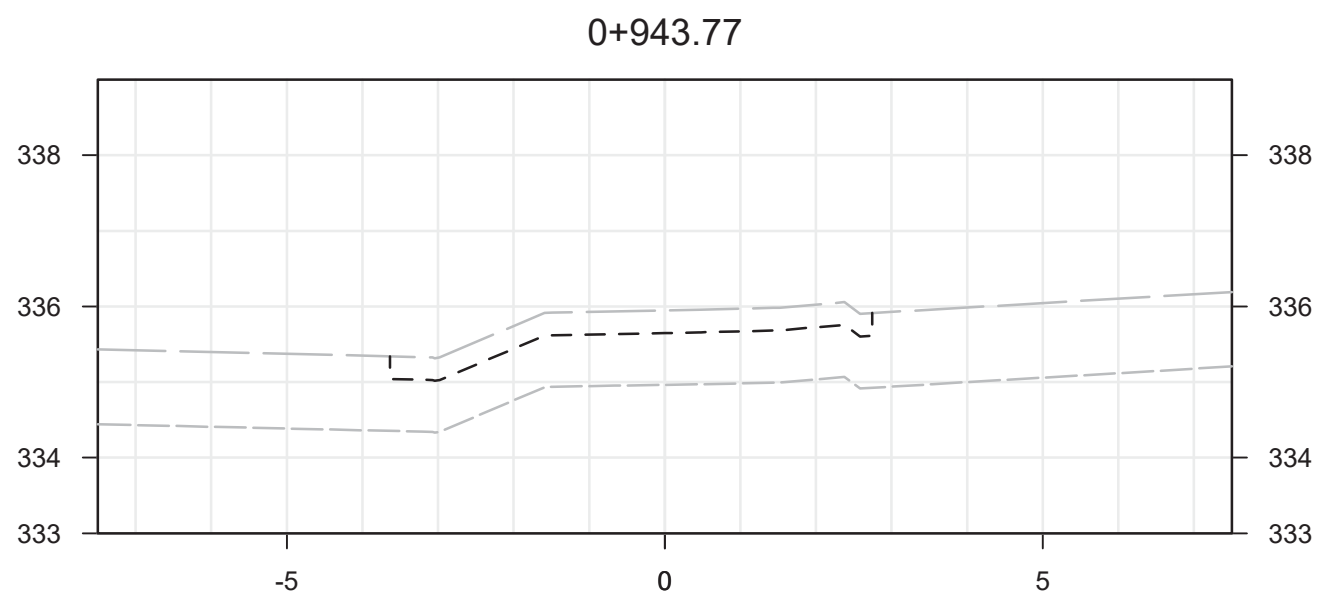
project no.  
no. du projet

R.076951.170

drawing no.  
dessiné no.

511





Public Works and  
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Architectural and Engineering Services  
Ontario Region

Travaux publics et  
Services gouvernementaux Canada  
Services d'architecture et de génie  
Région de l'Ontario



5	ISSUED FOR TENDER	2019/07/23
3	REVISED PER MITIGATION MEASURES	2019/03/28
2	FINAL SUBMISSION	2018/05/25
1	99% SUBMISSION	2018/02/12
0	50% SUBMISSION	2018/01/15
revision	description	date

Do not scale drawings.  
Verify all dimensions and conditions on site and  
immediately notify the engineer of all discrepancies.

<div>A</div>	Detail No.
<div>B</div>	No. du détail
<div>C</div>	drawing no. – where detail required dessin no. – où détail exigé
<div>C</div>	drawing no. – where detailed dessin no. – où détaillé

project title  
titre du projet  
**MINDEN** ONTARIO  
PARKS CANADA AGENCY  
TWP. OF ALGONQUIN HIGHLANDS  
COUNTY OF HALIBURTON  
**LITTLE BROTHER LAKE DAM  
ACCESS ROAD**

drawing title  
titre du dessin  
**CROSS SECTIONS**

drawn by  
dessiné par  
**A.C.**

designed by  
conçue par  
**A.C.**

approved by  
approuvé par  
**B.P.**

tender  
soumission  
**PIERRE GRAMBART**

project manager  
administrateur de projets

project date  
date du projet  
**2019/08**

project no.  
no. du projet  
**R.076951.170**

drawing no.  
dessiné no.  
**512**

