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Building what matters

Public Works and Government Services Canada

CCHM-895 Rehabilitation of Federal Wharf -
Chambly Canal National Historic Site

Projet R.077244.001

ISSUED FOR CALL FOR TENDER

THIS DOCUMENT MUST NOT BE USED FOR CONSTRUCTION PURPOSES

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Revision 00

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ENGINEERS RESPONSIBLE FOR COMPLIANCE REVIEWS

The engineers undersigned have prepared and verified the following divisions of this specification:

Division - Title
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements
Division 02 – Existing Conditions
Division 03 - Concrete
Division 05 - Metals
Division 31 - Earthworks
Division 32 – Exterior Improvements
Division 35 – Waterway and Marine Construction

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Division - Title
Division 26 - Electrical

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END OF SECTION

Drawings list

Code	**Revision**	**Title**
CIVIL DRAWINGS		
131/00/PR1-142-C-01	00	TITLE PAGE AND DRAWING LIST
131/00/PR1-142-C-02	00	CRITERIA – NOTES AND LEGEND
131/00/PR1-142-C-03	00	SITE INSTALLATION PHASE 1
131/00/PR1-142-C-04	00	SITE INSTALLATION PHASE 2
131/00/PR1-142-C-05	00	SITE INSTALLATION PHASE 3
131/00/PR1-142-C-06	00	EXISTING CONDITION PLAN VIEW
131/00/PR1-142-C-07	00	BATHYMETRY PLAN VIEW AND WATER LEVEL
131/00/PR1-142-C-08	00	EXISTING CONDITIONS PHOTOGRAPHS
131/00/PR1-142-C-09	00	SHEET PILING WORK – PLAN VIEW AND DETAILS
131/00/PR1-142-C-10	00	SHEET PILING WORK – SECTIONS AND DETAILS
131/00/PR1-142-C-11	00	SHEET PILING WORK – SECTIONS AND DETAILS
131/00/PR1-142-C-12	00	PLAN VIEW, SECTIONS AND DETAILS – EXCAVATION AND DEMOLITION OF WHARF
131/00/PR1-142-C-13	00	WHARF PLAN VIEW AND DETAILS – WORKS INSTALLATION
131/00/PR1-142-C-14	00	PLAN VIEW SECTION AND DETAILS –CONCRETE SLAB REINFORCEMENT
131/00/PR1-142-C-15	00	PLAN VIEW – SECTIONS AND DETAILS – PREFABRICATED CONCRETE PANELS OPTION «A»
131/00/PR1-142-C-16	00	DETAILS OF COPING WALL WITH PRECAST PANELS OPTION «A»
131/00/PR1-142-C-17	00	PLAN VIEW - SECTIONS AND DETAILS – CAST-IN-PLACE CONCRETE OPTION «B»
131/00/PR1-142-C-18	00	DETAILS OF COPING WALL WHITH CAST IN PLACE OPTION «B»
131/00/PR1-142-C-19	00	ELEVATIONS
131/00/PR1-142-C-20	00	WHARF TYPICAL SECTION AND BACKFILL WORK
131/00/PR1-142-C-21	00	MOORING CLEAT AND BOLLARD DETAILS

Code	Revision	Title
131/00/PR1-142-C-22	00	LADDERS, FLOATING DOCK GUIDES - SECTIONS AND DETAILS
131/00/PR1-142-C-23	00	TYPICAL DETAILS – CONCRETE AND VARIOUS STRUCTURE
131/00/PR1-142-C-24	00	GUARDRAILS – TYPICAL DETAILS
131/00/PR1-142-C-25	00	NEW GANGWAYS TO FLOATING DOCKS
131/00/PR1-142-C-26	00	PLAN VIEW SECTION AND DETAILS –REHABILITATION OF ACCESS ROAD TO WHARF
131/00/PR1-142-C-27	00	PLAN VIEW AND DETAILS - URBAN FURNITURE
131/00/PR1-142-C-28	00	TYPICAL DETAILS - URBAN FURNITURE
ELECTRICAL DRAWINGS		
131/00/PR1-142-E-01	00	PLAN VIEW AND DETAILS
131/00/PR1-142-E-02	00	DETAILS

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 All of the sections of Division 01- General Requirements

1.2 WORK SEQUENCE

.1 Coordinate work schedule with "Site Installation Phases" as outlined in the plans and as a function of site occupancy, outside the fenced areas of the site, by the Parks Canada Agency during construction work.

.2 The work sequence shall be carried out in such a manner as to ensure, at all times during the navigation period or when the canal is in operation, safe access for the public to the floating docks of the lock.

.3 Critical phases of work and constraints to be anticipated:

.1 To carry out the work in phases so as to enable the public to use the Chambly Canal National Historic Site outside the fenced areas of the site, all in accordance with the "Site Construction Phases "shown on the plans.

.2 Mobilization and commencement of Phase 1 work scheduled from September 17, 2018.

.3 Beginning of water work on October 1st, 2018.

.4 The Contractor shall ensure that the construction of the concrete siding and the coronation wall in area 1 of the wharf is completed before March 1st, 2019 or before the spring flood, even if the rising waters may before that date. Subsequently, the Contractor must prepare for a demobilization including the closing and securing of the site before that date.

.5 Prior to the reopening of the site, the Contractor shall proceed with the installation of a temporary gangway to the floating docks 2 weeks before the start of the navigation season. The Contractor shall be responsible for the design, supply, installation and dismantling of this gangway.

.6 The Contractor shall have one week (5 working days) to carry out the following work as of April 29, 2019 or as soon as the water level permits. During this period (5 working days), the Contractor must:

.1 Reinstall floating docks and floating dock guides including anchor holds provided by PCA;

.2 Develop and implement temporary gangway to floating docks;

.3 Rehabilitate the parking lot belonging to the marina;

.4 Reorganize and rehabilitate the temporary site installation area, reposition or reconfigure site fencing with banners, set up marine signage, navigation light, etc.

.7 Repositioning of the fences for phase 3, as well as the rehabilitation of the parking belonging to the marina, must be completed as quickly as possible during this short period. .

.8 The work will, however, be interrupted from March 1st to August 5, inclusive, due to the high site traffic, with the exception of the work listed in item 6.

.9 Subsequently, the Contractor shall be authorized to re-mobilize for the continuation of the work (phase 3) and finalize the construction of the concrete facing and coping wall of the wharf in zones 2 to 6 inclusive from August 5th (or the return from construction vacation).

.10 Work that affects boaters' access to floating docks, which allow boaters to dock while waiting for access to locks, shall not be carried out during the navigation period or when the canal is in operation, that is, approximately between Victorai Day (or National Day of Patriots) and Thanksgiving each year inclusively.

.11 Completion of work, including complete demobilization of the site, site restoration and provisional acceptance of work (excluding furniture, electrical items and planting) is scheduled for December 13, 2019.

.12 The Contractor shall thereafter have two weeks (10 working days) from April 27, 2020 or as soon as the water level permits, to complete the installation of the furniture, plants and proceed with various electrical elements.

.13 Finally, final acceptance will be made after May 11, 2020, once the work has been fully completed and the deficiencies have been corrected to the satisfaction of the Departmental Representative.

.4 Refer also to "01 32 16.07 – Construction Progress Schedules Bar (GANTT)" and "01 52 00 – Construction Facilities".

.5 Contractor sequences and methods of operation shall also comply with all related sections.

.6 The Contractor will take into account these work constraints as no compensation is granted for overtime or for work performed outside normal working hours (evening, night, weekend).

1.3 CONTRACTOR USE OF PREMISES

.1 Carry out work in stages and in full collaboration with the Parks Canada Agency for the maintenance of activities outside the fenced areas of the site (marina and lock operations, public safety, traffic management, etc.).

.2 Limit use of premises for work, for storage, and for access, to allow:

.1 The Parks Canada Agency's occupancy.

.2 Public usage.

.3 Performance of work by other Contractors as required;

.4 Public access to the floating wharves at the lock

.5 Access to the marina site.

.3 Maintain access for fire protection purposes, and provide methods for fire fighting.

.4 Only the area within the boundaries shown on the plan is available to the Contractor.

.5 Co-ordinate use of premises under direction of Departmental Representative.

.6 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.7 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.8 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.9 Once completed, existing structures and the work area and all accesses shall be in a condition equivalent to or greater than the condition they presented prior to commencement of work. All existing surfaces altered by the work must be returned in a state superior or equivalent to the satisfaction of the Departmental Representative.

.10 The dock's operating load is not known and it is the responsibility of the contractor to obtain certification from an engineer that his working method is safe.

.11 The Contractor acknowledges that he is aware of the geographical location and the existing conditions, constraints of access, delivery, handling, transportation and temporary or permanent

storage of materials and equipment near the site, sidewalks and in the neighboring streets. He also acknowledges that he is fully aware of the municipality's requirements and regulations in this respect and agrees to comply therewith in every respect.

.12 The Contractor also acknowledges that the work must be carried out taking into account the particular (heritage) character of the site and the vocation maintained according to the marina and waterways. Perform work in such a way as to minimize inconveniences such as interference, disturbance and nuisance (noise, vibration, odours, dust, etc.). Work causing nuisance must be coordinated with the Departmental Representative to agree on an appropriate schedule.

.13 During construction, the Contractor shall ensure that his site facilities or the storage of materials does not interfere in any way with the safety of equipment and users.

.14 All existing equipment to be removed and delivered to the Owner must be stored at the Parks Canada Agency Workshops in Chambly.

.15 The Contractor acknowledges that in some areas maneuvering areas are very restricted or practically nil in some places and that he will have to adapt his scheduling consequently.

1.4 PARTIAL OCCUPANCY BY THE PARKS CANADA AGENCY

.1 The Parks Canada Agency will occupy the areas neighboring premises outside the fenced areas of the site throughout during all the construction work and will carry out normal activities during this period.

.2 Collaboration with the Parks Canada Agency in the establishment of the work schedule in a way that will reduce conflicts and facilitate use of neighboring sites outside of fenced areas by the Agency

1.5 EXISTING UTILITY SERVICES

.1 The Contractor will maintain electrical services and water services to the National Historical Site of Chambly Canal.

.2 Before undertaking excavation work, the Contractor shall verify the existence of underground services and shall protect, temporarily support or relocate the services to be retained. He must also contact utility companies to locate all public or private underground conduits at the site of the works and to protect them according to the directives of these companies. Any breakage to a public or private service resulting from the failure of the Contractor or any of its subcontractors to comply with this Directive will be repaired by the affected service company at the Contractor's expense.

.3 Location and elevations of existing infrastructure or other features shown on the plans are approximate and must be verified on site prior to commencement of work. Even if the existing structures can be shown on the plans, whether they be electrical or telephone poles, pipes, underground conduits, cables and groups of cables of electrical or telephone conduits or other structures in place, overhead or underground, public or private, their location is only approximate and must be clarified by the contractor to meet the requirements of his work. Existing works are not necessarily shown on the plans. If there is a major difference discovered during the work, follow the instructions of the Departmental Representative.

.4 Original plans may be provided on request for information purposes only and solely for the purpose of assisting the Contractor in carrying out his work. There is no guarantee that they represent exactly the existing conditions. Such plans shall not, as the case may be, form the basis for any reclamation or claim for unjustified compensation from the general contractor or his subcontractors in respect to this project.

.5 Since the plans do not necessarily accurately reflect the existing conditions, the Contractor must provide in his bid that additional surveys may be required from the Departmental Representative and under his supervision during the work. These additional surveys may be necessary to ensure the proposed concepts. As a result the drawings may be modified during the course of the work under the existing conditions and the modification of these designs cannot form the basis of any claim or demand for unjustified compensation from the general contractor or his subcontractors in relation to this project.

.6 All existing underground services (pipelines, electrical conduits, etc.) that will be encountered during excavation work and which must be kept intact shall be supported temporarily throughout excavation and backfilling.

.7 The Contractor shall provide to the Departmental Representative prior approval for methods of shoring and temporary bracing of existing ducts or other underground structures to be conserved and protected.

.8 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.9 Where work involves breaking into or connecting to existing services, give Departmental Representative 48 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic and tenant operations.

.10 Provide alternative routes for personnel, pedestrian and vehicular traffic.

.11 Establish location and extent of service lines in area of work before starting work. Notify Departmental Representative of findings.

.12 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.13 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.

.14 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.15 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.16 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.17 Record locations of maintained, re-routed and abandoned service lines.

.18 Construct work site fences in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 DOCUMENTS TO BE PROVIDED AT THE KICK-OFF MEETING

.1 In addition to the usual documents, the following documents must be presented at the preconstruction meeting:

.1 Document describing in details all the work by zone and access procedures to carry out the work according to the established schedule.

.2 Environmental plan incorporating any special environmental requirements associated with the work and described in the relevant sections of the specifications.

.3 Plans, sketches, details, methods and order of execution of demolition work of existing structures including shoring, underpinning and all equipment, machinery, and materials intended for this purpose, for each type of intervention (deconstruction or partial or total demolition).

.4 The drawings shall bear the seal and signature of a recognized professional engineer licensed to practice in Canada in the Province of Quebec. The Contractor's engineering services shall be borne by the Contractor.

.2 The contractor cannot begin work until approval by the Departmental Representative has been given with regard to the above indicated documents.

1.7 ENVIRONMENTAL AUTHORIZATIONS

.1 Works for the partial rebuilding of the Chambly Federal Wharf are subject to a certificate of authorization request issued by MDDELCC under article 22 of the “Loi sur la qualité de l’environnement”. Obtaining this certificate is prior to the beginning of the work in this area. This certificate relates to the work necessary for installing sheet piling, environmental protection measures such as the installation of a turbidity curtain, of and the use of a temporary servitude by maritime equipment for the partial rebuilding of Chambly Federal Wharf.

.1 In respect of the requirements for the management and protection of fish habitat, no work shall be performed around the Chambly Federal Wharf before October 1st, and after March 31st. with the exception of the project work approved in the environmental approvals.

.1 For all dredging of the marine bottom, water backfilling, sheet pile driving, concrete placement or any other work in a water environment, installation of a turbidity curtain is mandatory at all times.

.2 The Contractor shall be authorized to commence construction of the facing walls on or after August 8 (or upon the return from construction vacation). During this derogatory period, the Contractor will not be authorized to rework the marine bottom and will have to do everything possible to limit the emission of MES, especially when moving the barges assigned to the works

1.8 NAVIGATION CORRIDORS AND MARITIME SIGNALING

.1 The navigation corridors as identified in the plans must be rigorously respected for all work done before November 1st and after May 1st.

.2 The Contractor shall submit a marine signaling plan that meets all Transport Canada requirements to the Departmental Representative one (1) month prior to the establishment of the marine work areas.

.3 Present work method and schedules for any temporary works (bridge, wharf, pier, etc.) that could interfere with navigation. Do not install anything without first applying for a work order and obtaining approval under *Loi sur la protection de la navigation*.

.4 Keep the navigation light operational at all times during the navigation season; if necessary, install a temporary navigation light.

.5 Provide name and phone number of a representative on the job site.

.6 Contact the emergency services at 1-800-463-4393 or cellular *16 in the event of a marine incident or accident.

.7 In particular, the Contractor must comply with the following requirements:

.1 For the navigation season, ensure during the work, the safe passage of commercial and pleasure craft to minimize the impact on navigation.

.2 Upon completion of work, and at all times during work for the navigation season, ensure that navigational aids (fire (s)) are operational at night or in conditions of reduced visibility.

.3 Provide lighting for the work area and equipment at night or in conditions of reduced visibility.

.4 Install warning signs, as indicated below "Location and specifications of warning signs upstream and downstream of work", positioned and oriented around the work area to be visible to browsers at a distance of at least 100 meters:

Localisation et spécifications des panneaux d'avertissement en amont et aval des travaux

1. **Installation et orientation:** Les panneaux d'avertissement doivent être positionnées en amont et aval des travaux et être visible à une distance d'au moins 100 mètres à partir de la rivière.
2. **Dimensions (min) panneau:** 1300 x 1300 mm (4' x 4').
3. **Dimensions (min) lettrage:** Le lettrage doit avoir au minimum 140 mm de haut.
4. **Couleur et contraste:** Jaune international (Pantone Matching System® – Jaune).
5. **Construction:** Panneaux de couleur Jaune. Bande en périphérie d'une largeur de 100mm de pellicule réfléchissante (Diamond Grade(MC) 3M(MC) ou équivalent) Jaune international (Pantone Matching System®).
6. **Entretient:** Devra être maintenu pendant toute la durée des travaux.

.5 During the navigation season, mark the work area with yellow buoys marking the boundaries of work identified in the plans. The buoys used must have a minimum height of 60 cm outside the water and a yellow reflective tape 10 cm wide. Wet the buoys on each end of the work and at a maximum interval of 20 metres.

.6 Request the issuance of a Notice to Shipping by contacting the Canadian Coast Guard, Notices to Shipping / MCTS Les Escoumins by email at OPSAVIS@dfo-mpo.gc.ca, at phone number 418-233-2308 or by fax at 418-233-3299 at least 48 hours before the start of the work. Follow up the notice to shipping until the end of the work for cancellation.

.7 Provide revised plans marked "as constructed" within 90 days of completion.

.8 Also provide a sampling plan of the areas affected by the work (band 10 metres wide around the perimeter of the structure) within 90 days of the completion of the work.

.9 The Contractor shall submit, if required, a request for a work order for any temporary work (bridge, wharf, pier, sheet piling, etc.) that it proposes to set up within the limits of set by TC in order to carry out its project. Do not install anything without first applying for a work order for approval under *Loi sur la protection de la navigation*.

.10 Marine equipment, if used for the performance of the work, and personnel working on board, shall comply with the requirements of *Loi de 2001 sur la marine marchande du Canada* and its regulations.

.11 Ensure at all times that no equipment, material or debris resulting from the work is left or abandoned in the navigable watercourse or obstructs navigation.

.12 Implement marine signage, if necessary, to ensure a safe boating channel for boaters throughout the duration of the work.

.13 At the end of the work, remove all temporary equipment and works and restore the stream bed to its original state.

.14 All other special features required by Transport Canada.

1.9 PHOTO AND VIDEO SURVEY

.1 Prior to commencing work, the Contractor shall, together with the Departmental Representative, take a photographic record of existing works that are likely to be affected or damaged in the course of the work by his temporary facilities, his equipment, his materials, his workers and those of his subcontractors, etc.

.2 Photos must be of good resolution, sorted by work area and must be stamped with the date shown on each photograph.

.3 In additional prior to commencing work, the Contractor shall record in digital video format, in the presence of the Departmental representative, the areas (out-of-water)in which the Contractor is required to perform work in order to capture on film the pre-construction conditions (Condition of pavement, buildings, walls and walls, landscaping, trees, etc.), and to restore the initial conditions at the end of the work.

.4 A copy of photo and the video (DVD) must be provided to the Departmental Representative.

.5 For underwater video surveys and sequences, refer to section "01 14 00 – Work Restrictions"

.6 All existing works that have been affected or damaged in the course of the work by temporary installations, machinery, equipment, materials, workers and subcontractors. shall be repaired at the Contractor's expense and to the satisfaction of the Departmental Representative, without causing delays in the delivery of the Work.

1.10 GEOTECHNICAL STUDY

.1 A geotechnical study has been carried out as part of the present work and is annexed to this specification.

.2 The materials described in this report are representative only of the location of drilling or exploration wells. Any interpretation, supposition, extrapolation or interpolation drawn from these results is the responsibility of the Contractor.

.3 Unless otherwise specified in the special administrative and technical specifications, the recommendations in this report are for information purposes only and the Contractor shall comply with the requirements of the plans and specifications for the performance of this contract.

.4 It is the responsibility of the Contractor to visit the site and to acquaint himself with the conditions of the premises before submitting his tender. The Contractor must contact the Department for permission to conduct surveys if it deems it appropriate.

1.11 MANAGEMENT OF CONTAMINATED SOILS/SEDIMENTS

.1 Contractor must consider that any soil coming from the excavation of the wharf, the banks or dredging of marine bottom are considered contaminated and must undergo an environmental characterization to establish their degree of contamination.

.2 Considering the storage restraints associated with certain structural restrictions and the layout of the premises, Contractor shall provide, at its expense, a place for temporary storage of materials so that the Departmental Representative can proceed to the environmental characterization. Should the characterized materials be found contaminated, a coupon system must be established to control the quantities of contaminated materials to be disposed. Otherwise, Contractor shall dispose of materials at an authorized site at no extra cost.

.3 Where applicable, the Contractor must dispose of the materials in an authorized place, ie a treatment center or disposal site authorized by the MDDELCC.

.4 Contractor must refer to section 01 35 13.43 – Special Procedures for Contaminated Sites for any specific terms related to the management of contaminated soils.. An environmental characterization study has been carried out and it is presented in the appendix to this specifications and summarized in section 01 35 13.43.

1.12 WORK IN WINTER CONDITIONS

.1 Contractor shall include to the cost of its tender all costs generated by particular working methods or additional work resulting from weather conditions likely to be encountered during the period of work realisation. These fees include snow removal, ice control, pouring concrete in cold weather (in accordance with the requirements of article 7.1.2 of CSA A23.1/A23.2-14), production losses by his teams and all the other expenses caused by work done in winter conditions.

.2 The Contractor shall provide methods for the proper compaction of granular backfill material during winter or cold weather. Compaction rates must meet the results required during compaction during winter or cold weather as well as after settlement during the preparation of the "final grade" of the infrastructure prior to concreting the deck of the wharf.

.3 If the compaction results of the granular materials do not meet the requirements, the Contractor shall provide and erect a temporary shelter and provide the necessary heating for the proper performance of the work.

.4 All compacted granular materials entering the site must be approved by the Departmental Representative before they can be used as backfill and the temperature of the material must be collected.

.5 When loading granular materials into the quarry in cold weather, materials shall be taken from the core of the reserves and no frozen or snow or ice-containing materials shall be permitted. Temperatures of the reserves must be transmitted on request. A Departmental Representative must be able to go to the quarry to check the loading methods. The temperature and the water content of the aggregates must allow adequate placement and compaction.

.6 Contractor must obtain written authorization from Departmental Representative prior to loading materials to site.

.7 No stone reserves may be stored at the site. The Departmental Representative may require that reserves stored at the site be evacuated off site.

.8 Upon delivery to the site, the materials shall be immediately deposited on the unfrozen surface and compacted to the satisfaction of the Departmental Representative until the correct compactness is achieved.

1.13 BATHYMETRY AND UNDERWATER TELEVISED INSPECTIONS

.1 In addition to the requirements mentioned in section 01 45 00 – Quality control, Contractor must provide the following bathymetric surveys for control purposes:

.1 Bathymetric survey of the marine bottom on a distance of 20 m from the walls of the wharf before and after the works (Zones 1 to 6).

.2 Bathymetric survey of the marine bottom before the realization of a granular base pad.

.3 Bathymetric survey of the marine bottom after the realization of a granular base pad.

.4 The grid of the bathymetry must be realized with a multibeam echo sounder. The source file and a file processed with a spacing of 0.5 metre between each point must be provided to the Departmental Representative. All survey records must be incorporated into a final report at the end of the work.

.2 In addition to the requirements in section 01 45 00 – Quality control, Contractor must conduct an underwater televised inspection at the completion of each zone to confirm the compliance of the repairs or other underwater work. Each of the inspections must be immediately returned to the Departmental Representative for approval. All underwater inspections completed during construction must be provided at the end of the work as a final report.

1.14 REMOVAL OF EXISTING EQUIPMENT FROM THE WHARF

.1 The following equipment must be removed and stored for the Parks Canada Agency to use again:

.1 Existing guardrails;

.2 Fences and Jersey walls;

.3 Existing guides for floating docks.

1.15 CHAMBLY NATIONAL HISTORIC SITE LOCKS - SPECIFIC ASPECTS

.1 Dates of operation of Chambly locks are available on the Parks Canada Agency website. For information purposes, the dates of planned operation are as follows:

.1 May 18, 2018 to October 8 2018

.2 May 17, 2019 to October 14, 2019

.3 May 18, 2020 to October 12, 2020

.2 At all times during the works, a maritime access corridor to the locks must be maintained. This corridor must be operational at least two (2) weeks prior to the start of the navigation season and must be dismantled no earlier than two (2) weeks after the end of the navigation season

.3 The contractor is responsible for the seasonal removal and installation of the floating docks with belong to the Parks Canada Agency, from the beginning of the work until the contract closeout.

.4 The Parks Canada Agency is responsible for the new anchoring cleats on the floating docks. The Contractor must coordinate this installation with the Agency.

.5 The work sequence shall be carried out in such a way as to ensure safe access for the public to the floating docks of the lock. In particular, the Contractor must ensure that the construction of the concrete siding and the coping wall of zone 1 of the wharf is completed before March 1st, 2019 and that a temporary gangway to the floating docks the following spring (2 weeks before the start of the navigation season). The Contractor shall be responsible for the design, supply, installation and dismantling of this temporary gangway.

.6 Repositioning of the fences for Phase 3, as well as the rehabilitation of the parking belonging to the marina, must be completed before May 1st.

1.16 CHAMBLY NATIONAL HISTORIC SITE MARINA - SPECIFIC ASPECTS

.1 Parks Canada Agency (PCA) is not the operator or owner of the Chambly Marina.

.2 The operation dates of the Chambly marina are the same as those of the locks.

.3 Floating dock removal is normally done at Thanksgiving (beginning October) and installation is normally done one week prior to the opening of the navigation and canals season (beginning May).

.4 Prior to the beginning of the Phase 1 works only, the floating docks of the marina in conflict with the navigation corridor will be removed by the marina personnel. This accommodation will not be repeated during the subsequent phases.

.5 Allow a tow (2) weeks period for the removal or installation (by the marina employees) of floating docks and other maritime equipment when opening or closing the marina.

.6 The contractor must maintain a security access to the marina and to the boat launch ramp during the marina's period of operation. The Contractor is not permitted to use the ramp unless there is a specific agreement between the Contractor and the Marina Owner. In the event that an agreement is reached, a copy of this agreement specifying the terms of use of the ramp should be provided to the Departmental Representative as well as a receipt upon completion of the work.

1.17 SHEET PILE DRIVING – SPECIFIC ASPECTS

.1 The contractor must take into account that the corridor allowed for the maritime work adjacent to the wharf is relatively restrained.

.2 The Contractor shall consider in its scheduling that sheet piles may only be cut during remobilization for Phase 3 work to limit damage that could be caused by a potential spring flood.

.3 Generally speaking, the marine bottom is relatively dense. The contractor must take into account the possible presence of large boulders during the work of placing sheet piles.

.4 Allowances are provided for in the tender schedule to take account of the anticipated difficulties in performing sheet pile driving (loss of time or work stoppages, excavation and backfilling of the marine bottom, etc.). Refer to "01 29 00 - Payment" for details.

.5 The Contractor shall perform bathymetry at certain stages of construction in accordance with the requirements of the Specifications and other contract documents. These records will be used as a basis for comparing the amounts of sediment from the marine bottom to be disposed of. Refer to "01 35 13.43 - Special Procedures - Contaminated Sites" and "01 29 00 - Payment" for details.

.6 The Contractor's surveyor shall be present at the work site at all times during the course of the sheet pile installation work to assist the specialized Contractor and validate the positions of the sheet pile real-time, as well as verticality, alignment and various allowable installation tolerances. The various surveys will be carried out in coordination with the Departmental Representative and the computer files will have to be provided daily for validation.

1.18 OTHER CHARACTERISTICS TO BE CONSIDERED IN CONNECTION WITH THE ACHIEVEMENT OF THE WORK

.1 The Contractor shall adapt his working methods, work scheduling and any other aspects that may be influenced by the choice of one of the following two methods of construction:

.1 Manufacture of concrete facings in prefabricated concrete panels or;

.2 Making concrete facings entirely of cast-in-place concrete.

.2 No formwork ties shall be permitted for concrete facings. The Contractor shall announce his choice of one or the other of these methods of realization at the project start-up meeting.

.3 Given the potential for damage caused by the spring flood, the Contractor shall accurately record the MG-20 type fill embedded prior to the site closure planned for March 1, 2019 in order to compare or determine, after the spring flooding, the volume of backfill lost/to be replaced, if applicable. In addition, decontamination of the fill material is expected during the remobilization work as of August 5, 2019.

.4 Concrete with Exposed Aggregates: When carrying out pouring of concrete slabs with exposed aggregates, the Contractor shall scrupulously comply with all mitigation requirements and methods set out in the relevant sections of the specification such as "01 35 43 - Protection of the environment "and" Division 3 - Concrete structures ". In addition, special attention should be given to other requirements such as:

.1 Mock-up samples, mock-ups or reference plates to be provided prior to commencement of work for prior approval;

.2 Demonstration of Minimum Experience Required and Skills of Finishing Crews;

.3 Selection of Aggregates, Finish Rendering and Mixing Formulations, etc.

.5 The Contractor shall consider that the existing capacity of the existing wharf is zero (0 KPa), unless otherwise directed by an engineer contracted by the Contractor.

.6 Prior to commencement of work, the Contractor shall conduct underwater inspection and submarine surveys of the existing masonry wall of the existing lock at the point of connection to the new support bearing of the new gateway to the floating docks to determine:

.1 Measuring the angle on the existing masonry wall;

.2 Dimensions of foundation footings of wall where applicable;

.3 The condition and composition of the concrete structure behind the masonry.

.7 The Contractor shall also complete, prior to the commencement of the work, a supplementary survey to identify the exact diameter, depth and location of the drainage pipe that passes through the existing retaining wall to be demolished at the entrance to the wharf.

.8 All required statements must be provided to the Departmental Representative as soon as possible to obtain direction.

1.19 SPRING FLOODING

.1 The site is subject to heavy seasonal flooding.

.2 The water level during flooding canbe higher that the elevation of the present wharf, as well as the installation zone of the temporary worksite shown on the drawings.

.3 A table indicating the water levels surveys closes to the wharf between 1996 and 2012 is available in the appendix B. These surveys were conducted by the Parks Canada Agency during the period of navigation.

.4 The Contractor must consider that the water level during the flooding period might justify work stoppage.

.5 Estimated flood levels for 2-year and 100-year recurrences are shown on the plans and are derived from the study "PARTIAL REHABILITATION OF THE CHAMBLY BASIN FEDERAL WHARF EVALUATION OF FLOODING LEVELS AND WAVE SYSTEM Dated 8 December 2015, by WSP No. 141-21342-01 ".

.6 The Contractor shall refer to the Richelieu River hydrometric station for an approximation of flood trends for a portion of the watershed affecting the Chambly Basin water level. The Contractor is responsible for making his own interpretation of this data.

.7 It is the sole responsibility of the Contractor to validate or call upon his own experts to validate the water levels of the Chambly basin and to interpret all available data to assess the difficulties to be apprehended and the methods of construction and to take the necessary actions to secure the site in the event of flooding of the water level.

.8 No claim or request for unjustified compensation from the Contractor or his subcontractors for unforeseen working methods related to the water levels encountered during the work will be accepted on the basis of missing or erroneous information.

1.20 WORKING HOURS

.1 The working hours will be from 7:00am to 5:00pm, Monday to Saturday.

.2 If the Contractor plans work during Sundays, statutory holidays or nights, he must give written notice to the Departmental Representative at least five (5) days prior to the work. The Departmental Representative reserves the right to approve the request or not, or to impose certain conditions.

.3 The Contractor is responsible for obtaining the authorizations of the municipality if he wishes to carry out work likely to cause nuisances (noise, odours, dust, etc.) outside the authorized hours.

1.21 REQUIRED DOCUMENTS

.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 Transport Canada authorizations and notices.
- .12 C.A. of MDDELCC and DFO advice
- .13 Any other official authorization from the regulatory authorities and other documents indicated.

1.22 RECORDING OF CONDITIONS (AS-BUILT DRAWINGS)

.1 Record information on a set of opaque drawings provided by the Departmental Representative.

.2 Record information using red felt-tip markers.

.3 Record information as the work takes place. Do not cover the works before the required information has been recorded.

.4 Contract Drawings: indicate all data to show the works as they are, including the following:

.1 Location, measured in the horizontal and vertical planes, the bottom of excavations, the layer of quarry run and filter stone.

.2 Changes made on site to the dimensions and work details

.3 Changes made as a result of change orders

.4 Details not included on the original contractual documents

.5 Specifications: Register all data to describe the works as performed, including changes made by addenda or change orders.

.6 Other documents: keep the supplier certificates, certificates of inspection and test records from the quarry and site.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 CONSTRUCTION CONSTRAINTS

.1 Execution of work for the Project must take into account several constraints, specifically the following:

- .1 Availability of land and maritime accesses
- .2 Climatic conditions;
- .3 Steps or orders to perform work in accordance with "01 11 01 – Work Related General Information".
- .4 Security constraints
- .5 Water levels during flooding which can be higher than the present wharf elevation.
- .6 Environmental constraints (section 01 35 43 – Environmental Protection) concerning , especially, but not limited to:
  - .1 The period during which the work is forbidden in this habitat;
  - .2 The work methods required for environmental protection;
- .7 The period of navigation and access to the National Historical site of the Chambly Canal : in compliance with section 01 11 01 –Work Related General Information
- .8 Access Constraints and Land Constraints
  - .1 Access to the site shall be as specified in the tender documents. The Contractor shall respect the permissible loads on the driving lanes that are permitted for use.
  - .2 Contractor's site facilities shall be located within the areas provided to the Contractor.
  - .3 Methods of construction should allow work to be carried out within the boundary.
- .9 State of Existing Wharf
  - .1 Contractor's work plan should be adapted to the state of the wharf. The contractor should ensure that the methods and sequence of work are safe and consider the limited capacity of the existing wharf.
- .10 Heritage Value (Historical/Archeological Character)
  - .1 Works are carried out on a site of high heritage value. Rehabilitation of the works adjacent to the wharf is an important component of the project.
- .11 The Chambly Marina and Locks
  - .1 The work shall not affect the regular operations of the neighboring marina and locks.

.2 The Contractor will take into account the work constraints, as no compensation will be given for overtime hours or for work performed outside normal work hours (evenings, nights, and weekends).

.3 Work will be required to meet federal, provincial and local requirements for nuisance

1.2 EMERGENCIES OR FORCE MAJEUR

.1 The Departmental Representative may interrupt work at any time in emergency situations if, in their opinion, such interruption is necessary to protect life, structures or surrounding property or in any other event of force majeure, without possible claim on part of Contractor.

.2 The Contractor shall take into account these work constraints, as no compensation is granted for overtime or for work performed outside normal working hours (evening, night, weekend).

.3 During construction, the Contractor shall ensure that the installation of such work at the site or the storage of the materials does not interfere in any way with the safety of the equipment and the users.

.4 Refer to "01 35 43 - Environmental Protection" for requirements related to the Environmental Emergency Response Plan.

.5 Refer to "01 35 29.06 - Health and Safety" for health and safety requirements

1.3 ACCESS TO WORK SITE AND CONTRACTOR SITE

.1 Carry out a topographic survey and photographic survey of the infrastructures before work begins.

.2 If Contractor causes damage to neighbouring roads or facilities, Contractor bears entire responsibility to fix or replace them at own expense and to full satisfaction of the owner.

1.4 CLEANING AND UPKEEP OF PREMISES AND ENVIRONMENTAL PROTECTION

.1 Contractor must at all times keep premises free of all accumulation of materials, rubbish, waste and debris, and must do a full final clean-up, to satisfaction of the Departmental Representative, during and at end of work.

.2 Contractor is responsible for transporting rubbish, waste and debris to appropriate locations.

.3 Refer to section 01 74 11 – Cleaning and 01 35 43 – Environmental Protection for the cleaning of the traffic ways and the upkeep of the site.

1.5 WINTER CONDITIONS

.1 Snow removal of construction zone is the responsibility of Contractor.

.2 Contractor is also responsible for snow removal on all access ways outside existing roads.

.3 Comply with all sections of the specification related to the work during the winter period.

1.6 WORK ON WEEKENDS

.1 If Contractor intends to work on Sundays, statutory holidays or at night, written notification must be given to the Departmental Representative at least 5 working days in advance. The Departmental Representative retains the right to approve, or not approve the request and/or to impose certain conditions.

1.7 INSPECTION OF PREMISES

.1 Contractor’s decision to partially or completely commence work implies acceptance of existing conditions as satisfying. If Contractor performs work on defective surfaces or in unsatisfactory conditions, corrections or redoing of work will be at Contractor’s expense.

.2 The Contractor acknowledges that he is aware of the geographical location and the existing conditions, constraints of access, delivery, handling, transport and temporary or permanent storage of materials and equipment in the vicinity of the site, sidewalks and in the neighboring streets. He also acknowledges that he is fully aware of the municipality's requirements and regulations in this respect and agrees to comply with it in every respect

.3 The Contractor also acknowledges that the work must be carried out taking into account the particular character of the site and the vocation maintained according to the marina and the Canal de Chambly. Perform work in such a way as to minimize inconveniences such as interference, disturbance and nuisance (noise, vibration, odors, dust, etc.). Work causing nuisance must be coordinated with the Departmental Representative to agree on an appropriate schedule of work.

1.8 BLASTING

.1 No blasting work, of any nature, is allowed.

1.9 ENVIRONMENTAL CONSTRAINTS

.1 Environmental constraints are presented in Section 01 35 43 – Environmental Protection and 01 35 13.43 – Special Procedures – Contaminated Sites.

1.10 SURVEYING

.1 The Contractor is responsible for implementing different structures according to the Departmental Representative's plans. Contractor must survey the existing material and the perimeters of the structures to validate the connections to the existing material. Contractor must also notify the Departmental Representative of any unexpected circumstances or anomalies detected and plan for time required for potential verification by the Departmental Representative.

.2 At all times and throughout the duration of the work, the installation of the works shall be carried out using simple, recognized and verifiable methods on the site in such a way that the Departmental Representative can validate the accuracy of the dimensions , levels and other landmarks using equipment accessible to the construction site. The Contractor must coordinate with the Departmental Representative and provide implementation files as the work progresses for periodic validation

.3 Prior to the final acceptance of the work, the Contractor shall provide, on electronic media, survey drawings at the end of work (Final or "As-built" drawings).

1.11 MATERIELS AND EQUIPMENT TRANSPORTATION

.1 Transport of materials on public roads to the work site can be Monday through Saturday unless otherwise specified by the competent authorities. Transportation will be prohibited on Sundays and legal holidays

.2 The transport of materials through the municipality, may begin at 7:00 but end at 17:00. Transport outside of these hours will not be permitted. The Contractor shall obtain written permission from the Municipality for transportation outside of these hours.

.3 Except for the boat launch ramp for access to the barges, no other equipment or transportation of materials will be permitted in the circulation lanes of the marina.

.4 The Contractor shall maintain safe access to the marina and launching ramp during the operation of the marina. The Contractor is not permitted to use the ramp unless there is a specific agreement between the Contractor and the Marina Owner. In the event that an agreement is reached, a copy of this agreement specifying the terms of use of the ramp shall be provided to the Departmental Representative and a certificate upon completion of the work.

1.12 NAVIGATION INTERFERENCE

.1 The Contractor shall continuously and accurately report all movements of his floating equipment to Communications Services and Maritime Traffic of the Canadian Coast Guard. By contacting the Navigation Notices Office / MCTS Center Les Escoumins by e-mail at OPSAVIS@dfo-mpo.gc.ca, by phone at 418-233-2308 or by fax at 418-233- 3299. Monitor the navigation notices until the completion of the work for cancellation.

.1 Notice for navigation must be adjusted according to the work;

.2 If required, beacon the maritime zones for safety.

.2 The Contractor shall also submit, if required, a Request for Works Advice for any temporary works (bridge, wharf, jetty, sheet pile, barges etc.) which he proposes to install in the canal within the limits set by TC in order to carry out his project. Do not install without first submitting an application for a Notification of Approval under the Protection of Navigation Act.

.3 Comply with other Transport Canada requirements as described in "01 11 01 - General Requirements".

1.13 FLOATING EQUIPMENT

.1 The Contractor shall provide the equipment of a size and with sufficient capacity to perform the work described in the plans and specifications including excavation, handling, transport and installation of new or recovered material mentioned in the contract.

.2 A compliance certificate for each floating equipment must be sent to the Departmental Representative before the work begins

.3 During the execution of the contract, all machinery must be maintained in good working condition, as well as being serviced correctly and quickly at any time. All equipment used must be seaworthy and be in good condition. They must, by their dimensions, their characteristics and their draft, be able to perform the work.

.4 Mark floating equipment with signalling lights in accordance with the Canada Shipping Act. Submit the signalling plan to the Departmental Representative to obtain approval in conformity with the Loi sur la protection de la navigation (LPN).

.5 Provide on-board radio listening service.

.6 Establish and maintain functional buoys and signalling lights, for the duration of the contract.

.7 The Contractor shall provide, anchor and maintain, at his own expense, all the buoys or markers required to properly perform the work. If by chance or by accident, one or more buoys/or sink float adrift, they will be bailed out and/or recovered at the expense of the Contractor to the satisfaction of the Departmental Representative. The Contractor is responsible for any accident of any nature whatsoever, because of poor visibility or disposal buoys/markers during the day to their poor lighting at night, or for any other reason.

.8 Maintain functional all signs and signalling lights compulsorily installed on floating equipment required for the work, according to the "Collision Regulations" and "Navigation Safety Regulations." All equipment required for the work must be properly identified and/or visible at all times.

.9 Comply with other Transport Canada requirements as described in section "01 11 01 – Work Related General Information

1.14 PRESERVATION OF HISTORICAL/ARCHAEOLOGICAL NATURE

.1 The work zone is considered as an important historical site, containing numerous archaeological resources. In the case of an archaeological discovery during work, notify Departmental Representative immediately and wait for his written directions prior to pursue the work in the area of the discovery.

.2 During excavation work, an archaeologist hired and paid by Departmental Representative will be present on site to establish if eventual archaeological discoveries are possible.

.3 At least 48 hours prior to commencement of excavation work, notify Departmental Representative in order to insure the presence of a Departmental archaeologist.

.4 The contractor must facilitate the archaeologist’s access to the worksite and insure his collaboration in order to obtain desired information.

.5 In the contract, the Contractor must foresee halts of 30 minutes per half day of excavation, at his costs, in order to allow performance of archaeological surveys. If necessary, the halts provided that are not used by the archaeologist may be added up for a longer halt used strictly for the same motives.

.6 The contractor must provide for four extended halts of four hours each in the event of unforeseen discoveries requiring a halt longer than 15 minutes as described previously. The four hours halts may be used as needed and be combined in order to allow for greater halts. The Contractor must take account of these halts in his bid and will therefore not be allowed to claim any additional payment due to the application of these halts.

.7 If discoveries require a halt extended over the allocated time, the Contractor shall assign his machinery to another work in another area of the worksite in order to allow the work of the archaeologists to be continued. If such a reassignment is not possible, the Contractor will be compensated directly with the unused hours accumulated. If there are no accumulated hours, the Contractor will be compensated, subject to the approval of Departmental Representative regarding the delays and costs actually and directly caused by this situation.

.8 Considering the possibility of archaeological discoveries, manual excavation may be demanded. The presence of archaeological resources may also require to reduce the pace of the excavation in order to be able to clear certain types of vestige and protect them from damages. In such a case, the Contractor will be compensated, subject to the approval of Departmental Representative regarding the delays and costs actually and directly caused by this situation.

.9 Protection of vestiges and works: during excavation, the Contractor shall take all reasonable precautions in order to protect all vestige revealed and in order to clear them for examination by the archaeologists. Canada will not tolerate any derogation in this respect. If the Contractor deteriorates through neglect any vestige whatsoever, he will be held responsible and Canada may consider the implications.

.10 Provide for a plan describing procedures to follow for identification and protection of historical, archaeological, cultural and biological resources known to be on site and/or describing other procedures to follow in the case of unforeseen discovery of such elements on site or in the surrounding area during construction.

.11 The plan must include methods to insure the protection of resources known or discovered as well as lines of communication between the Contractor’s employees and Departmental Representative.

.12 Any element of historical/archaeological nature discovered on site of excavation must be handed in to Departmental Representative.

.13 In the case of incidental findings of cultural resources performed in the absence of an archaeologist, the Contractor must carefully suspend work in the immediate area of the discovery and notify the Departmental Representative.

.14 Should the Departmental Representative allow demolition of archaeological resources on site, the Contractor must take the necessary precautions in order to protect adjacent archaeological resources that are to be preserved. Demolition of these elements must be performed progressively and in a controlled way after the archaeological surveys have been completed. If resources are damaged during work, notify Departmental Representative.

PART 2 PRODUCT

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

This document presents the description of the prices and the method of payment accompanying the pricing schedule for the project at the Federal Wharf at theChambly Canal National Historic Site.

The tenderer must undertake, at his own expense, a careful examination of the location of the work in order to be aware of the condition of the site and any adjacent works or buildings, if any, availability of temporary water supply, drainage, electricity and power services, presence of contaminants or contaminated or hazardous material, and constraints related to the performance of the contract. In particular, he must obtain all relevant information and verify all the circumstances and conditions that may affect the execution and the price of the contract.

No claim shall be receivable in respect of any cause arising out of the location of the Work in respect of the performance of the Contract.

The price of the bid must be in Canadian dollars.

PART 1 GENERAL

1.1 UNIT AND LUMP SUM PRICES

.1 The total amount of the contract is broken down according to a description of work paid on a flat-rate basis (flat-rate on the price schedule) and paid work on a unitary basis (unit prices on the price schedule).

.2 Each of the unit or lump sum prices to be broken down shall include all expenditures, work, disbursements, payments, direct or indirect costs, mobilizations, demobilizations and acts, all facts, and all responsibilities, obligations, omissions and errors of The Contractor in connection with the completion of this work. These prices also include the transportation and use of materials, the cost of labor, materials, tools and equipment required for the performance of the contract, and all costs Corporate, administration, insurance, contributions, interest, rents, taxes and other incidental expenses. It must include losses and damages that may result from the nature of the work, fluctuations in prices and wages, business risks, strikes, delays not attributable to the Departmental Representative, transportation restrictions, accidents and the action of the elements of nature.

.3 Unit or lump-sum prices in the pricing schedule shall constitute the full remuneration of the Contractor and incorporate cost elements of any kind for the entire project. The cumulative price submitted includes all costs for the work shown on the plans, described in the estimate and also includes the costs for all the specific requirements of the construction estimate or general clauses of the contract. The Contractor shall prepare his bid diligently to ensure that the costs submitted for all work and general or specific contractual requirements are included in a relevant item on the pricing schedule. No request for additional costs for the claim of work shown on the drawings or described in the specification whose description is not explicitly mentioned in one of the descriptions of the items of the pricing schedule will be admissible

1.2 DEFINITIONS

.1 Fixed price: where the work is determined in a precise and detailed manner and a price is agreed and accepted by both parties for the whole.

.2 Unit price: where the specifications for the work are determined in a precise and detailed manner and all quantities on the price schedule are provided as an estimate.

1.3 DESCRIPTION OF ARTICLES IN THE PRICING SCHEDULE

PART A – TABLE OF UNIT PRICES:

.1 **Sheet pile walls**

.1 This price shall remunerate per square metre all necessary measures, actions and supplies, including, but not limited to, management, labor, machinery and equipment, materials; licensing, professional services, surveys and design engineering and land and marine construction for the supply and placement of sheet piling according to the drawaings and requirement of the specifications including land and marine transportation. The supply and installation of all the necessary elements essential for the complete installation must also be included.

.2 Payment shall be made by measuring the total area, in m², of sheet pilings actually installed and remaining in place, from the refusal to the top measured after cutting off a minimum height of 300mm. For payment purposes, only 300mm of cut-off will be payable and this, even if the height of cut-off is greater

.3 For this purpose, measure the planar surface of the sheet pile curtain by multiplying the length of a straight center line through the sheet pile curtain at the top by the average vertical length of the sheet piles used and incorporated in the work

.4 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative.

.2 **Loss of time or work stoppage (if required) when placing sheet piles**

.1 This price shall pay, per hour, all necessary measures, actions and supplies resulting from lost time or work stoppages in connection with contingencies encountered during the placing of sheet piling. This unit price includes, but is not limited to, the mobilization and demobilization of all teams involved, management, coordination, labor, machinery and equipment, equipment, construction engineering and all expenses incurred in connection with such lost time or work stoppages or which could cause a delay in the timetable

.2 In the event of a refusal in the installation of sheet piles, and on written notice from the Departmental Representative, the Contractor shall immediately cease work on the sheet piling to enable the Departmental Representative to formulate new guidelines for the continuation of the work. From this point on, the Contractor will be remunerated under the heading "Loss of time or work stoppage while placing sheet piles" to cover the costs of waiting and the costs and other work necessary for relocation of the sheet pile installation team

.3 Where the Contractor is required to excavate the seabed to remove large stones or other obstacles which impede the placing of the sheet pile, the Contractor shall be given one hour from the issuance of the official directive of the Departmental Representative to mobilize the team that will carry out this work, otherwise the delay for "Loss of time or work stoppage during the installation of sheet piles" will be interrupted and will resume only when the team of excavation of the seabed will begin work. All costs and impacts on the work schedule due to the possible delay of mobilization of the seabed excavation team will be borne by the Contractor (beyond one hour following the issuance of the official directive) and no further delay may be claimed by the Contractor for this delay induced by the mobilization of the Contractor's teams. Once the excavation and backfilling have been completed, the Contractor will be given one hour to remobilize the sheet piling team and continue the work. Beyond this period, no charge for loss of time will be admissible to this item of the pricing schedule and no additional delay can be requested by the Contractor.

.4 In the event that the work of placing sheet piles can be carried out in another sector in parallel with the seabed excavation work, the time limit for "loss of time or work stoppage during sheet piling installation" be cumulated at the resumption of the sheet pile installation work

.5 The entire bank of hours allocated for this "lost time or stoppage of work" should be included in the Contractor's project schedule and positioned on the critical path of the project. No additional time on the entire project will be allocated to the Contractor for the use of this time bank. No request for additional costs may be made by the Contractor for the partial use of this time bank. In the event that the entire time bank is not used for "time-loss" due to sheet pile installation, the balance of the available hours may be used for additional delays due to other unforeseen additional work directly affecting the critical path of the project. These hours applicable to other unforeseen additional delays will not, however, be invoiced to the item of the payment note "Loss of time or stoppage of work when placing sheet piles". All indirect costs related to the organization of the site such as, but not limited to, administration and profits, insurance, etc. for the whole of this bank of hours must be included in the item "Site organization" of the table of flat prices

.6 This item is not applicable for "time losses" caused by methods of placing sheet piles that are not adapted to the conditions likely to be encountered or to the use of machinery with insufficient capacity under conditions likely to to be met.

.7 The unit price shall include all costs inherent in such time wastage and shall include all necessary work, measures, actions and supplies and which are not an integral part of a specific item in the pricing schedule, but are necessary for the complete execution of the work.

.8 Payment will be made on time based on the actual time required by the pile driving team or any other team affected by such loss of time as approved by the Departmental Representative.

.3 **Excavation of Seabed Necessary for the Placing of Sheet Piles (if required) and Transportation of Materials to the “Temporary Storage Site”**

.1 This price shall pay, per hour, all necessary measures, actions and supplies resulting from lost time or work stoppages in connection with contingencies encountered during the placing of sheet piling. This unit price includes, but is not limited to, the mobilization and demobilization of all teams involved, management, labor, machinery and equipment, materials, permits, professional services, construction engineering, for the realization of the following works:

.1 The necessary excavation of materials, blocks or large rocks (boulders) or existing sediments of the seabed which prevent the proper placement of sheet piles;

.2 Loading and transporting excavated material or excavated sediment from the barge to the "temporary storage area for excavated material" located on the Parc des Ateliers grounds south of Avenue Bourgogne.

.2 The Contractor shall, upon written instruction from the Departmental Representative, excavate the seabed to remove large stones or other obstructions that impede the installation of the sheet piles. All costs related to excavation of the seabed should be included in the hourly rate item "Excavation of the seabed required for placing of sheet piling". The Contractor will be remunerated for this item from the commencement of the excavation work and not from the commencement of the mobilization of the equipment. The Contractor shall cease to be paid for this item as soon as the excavation and backfilling have been completed and will not be remunerated for the demobilization period of the equipment. For the purpose of payment, the seabed excavation periods shall be for a minimum of 3 hours per mobilization.

.3 The team performing excavation of the seabed shall be composed of a barge with excavation equipment capable of reaching rock level, and of sufficient capacity to excavate in the type of soil encountered. The hourly rate submitted for this work should also include all equipment or methods necessary for the efficient transportation of excavated sediments to the bank, the treatment of excavated sediments (treatment of TSS in particular), the transportation of backfill material from the bank back to the dredging site, as well as the placement of the materials necessary for the backfilling of the excavations carried out in the seabed. The method of work associated with sediment transportation to the shoreline and the transport of backfill material from the shoreline

should be effective and should not result in any loss of overtime; in the event that the productivity of the excavation equipment is limited by the Contractor's transshipment method, the excavator's waiting times will not be eligible for the item "Excavation of the seabed necessary for the placing of sheet piles" nor for the item "Loss of time or work stoppage when placing sheet piles" if this item is applicable.

.4 The disposal of excavated material or sediments if they are found not to be contaminated by their characterization, as well as the supply of materials necessary for backfilling of the seabed are payable under the headings "Disposal, management and disposal off site of uncontaminated excavated material or sediments from excavation of the seabed to sheet piles placing (if required)" and "Rockfill or 0-100 granular material for backfilling of the cavities and serving as a stopper on the seabed of the existing wharf" of the pricing schedule.

.5 Excavation and disposal of excavated material includes drying of materials in accordance with environmental requirements as well as loading and transportation to the "temporary storage area for excavated material", temporary storage for processing material characterization, loading and disposal of materials temporarily stored at an authorized site if the soil is not contaminated. After characterization, if the materials are found to be contaminated, the supplement for the disposal of contaminated materials to a specialized treatment site applies and is paid to the relevant item in the pricing schedule.

.6 Payment will be made ,per hour, based on the actual time of the excavation work due to the waiting of the sheet piling crew or any other team affected by such lost time as approved by the Departmental Representative.

.4 **Disposal, Management and Off-site Disposal of Uncontaminated Excavated Material or Sediments from Seabed Excavation for Sheet Pile Placement (if required).**

.1 This price shall pay, per metric tonne (mt), all necessary measures, actions and supplies, including but not limited to the rental, installation of equipment, labor, machinery and equipment, materials, permits, professional services, surveys and construction engineering on land and water, as well as all management and characterization and coordination costs including loading and transportation required for the disposal and off-site disposal of uncontaminated excavated material or sediments to an authorized site and resulting from excavation of the seabed during the placement of the sheet piles. After characterization, if the materials are found to be contaminated, the supplement for the disposal of contaminated materials to a specialized treatment site applies and is paid to the relevant item in the pricing scedule.

.2 It also includes stockpiling, temporary site and piles protection, additional delays, drying or confinement of saturated soils in watertight buckets, and any other arrangements for the handling of cut material for characterization in accordance with the requirements of section "01 35 13.43 - Special procedures - Contaminated Sites"

.3 Measurement for payment shall be the determination of the quantities of excavated material indicated on the weight-ticket of each authorized load and compiled in a register approved by the Departmental Representative, depending on the actual quantities transported and processed in one site of disposal or treatment, approved by the Departmental Representative, holding a certificate of authorization of the MDDELCC and in conformity with the laws and regulations in force. All costs of excavation work carried out without the approval of the Departmental Representative, including excavation and excavation costs, will be at the expense of the Contractor

.4 Provide access to a scale at all times even when the disposal site does not have access to it.

.5 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative.

.5 **Rock-fill or 0-100 Granular Material for Backfilling of Cavities and Used as a Plug for the Seabed of the Existing Wharf**

.1 This price, remunerated per metric tonne (m.t) shall pay for the supply and placement of stone or 0-100 granular material for backfilling of cavities in the seabed left in place by excavation work or discovered during the work and used as a plug for the seabed prior to backfilling of the net stone, all as specified in the plans and shall include, but not be limited to, the supply of equipment and materials, machinery, equipment, and labor, the preparation, leveling, cleaning of the surface to be covered, transportation and installation of the stone and the cost of carrying out such work, whether they are specifically described or not, either in the drawings or in the specifications or other tender documents, but deemed necessary for the completion of the work.

.2 All costs to complete and supply this item must be included.

.3 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative.

.6 **Backfill of 20 mm Clean Stone and Geotextile**

.1 This price remunerated per metric tonne (m.t) shall compensate for the provision and installation of 20mm-sized crushed clean stone, including the geotextile membranes required for backfilling of the widened portions of the wharf, as specified in the drawings and specifications. This includes, but is not limited to, the provision of equipment and materials, machinery, tools and labor, preparation, leveling, cleaning and compaction, transportation and installation of materials, and the cost of performing such work, whether specifically described or not, in the drawings, specifications or other tender documents, but deemed necessary for the full completion of the work

.2 The provision and installation of all items and all costs necessary to complete and provide this item, such as, but not limited to, management, coordination, licenses, professional services, statements and engineering design and construction, land and sea, leveling and compaction of materials as well as coordination for drainage or electricity must be included

.3 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative.

.7 **Protective 300 – 500 Gauge Rock-fill (800 mm thick) and Geotextile**

.1 This price shall be paid, per metric tonne (mt), for the supply and placing of 300-500 gauge stone for rockfill under the surface of water to a thickness of 800 mm including the supply and the installation of the geotextile membrane, all as specified in the drawings and shall include, but not be limited to, the supply of equipment, machinery, equipment, preparing, leveling, cleaning the surface to be covered, transporting and placing the stone, and the cost of performing the work, whether specifically described or not, in the drawings or specification or other tender documents, but deemed necessary to bring them into conformity with the best practices.

.2 All costs necessary to complete and provide this item, including, but not limited to, coordination for the drainage shall be included

.3 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative.

.8 **Protective 200-300 Gauge Rock-fill (500 mm thick) and Geotextile**

.1 This price shall pay, per metric tonne (mt), the supply and placement of 200-300 gauge stone for above-water armour stone, 500 mm thickness, including supply and the installation of the geotextile membrane, all as specified in the drawings and shall include, but not be limited to, the supply of equipment, machinery, tools and labor, the preparation, leveling, cleaning of the surface to be covered, transportation and installation of the stone and the expenses for carrying out the work,

whether specifically described or not, in the plans or specifications or other tender documents but deemed necessary to bring them into conformity with best practices.

.2 All costs necessary to complete and provide this item, including, but not limited to, the coordination of drainage shall be included.

.3 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative.

.9 **Supplements for Disposal and Off-site Disposal of Cut Material and Contaminated Material:**

.1 Depending on the item, these prices pay the metric tonne (mt) or cubic metre (m^3) for all characterization, transportation, disposal and off-site disposal of contaminated materials from cut, excavation or demolition to disposal or treatment sites holding a certificate of authorization from the MDDELCC in the following categories:

.1 Supplement for disposal/elimination of excavated material, with concentration of contaminants, after characterization, is in range A-B (paid per m.t.)

.2 Supplement for disposal/elimination of cut materials with concentration of contaminants, after characterization, in the B-C Range (Paid by m.t.)

.3 Supplement for disposal/elimination of excavated material with contaminant concentration, after characterization, above criterion C and below the limit value of RESC (paid by m.t.)

.4 Supplement for disposal/elimination of wood treated wiwth creosote or lead: paid per cubic meter (m^3).

.5 Supplement for disposal/elimination of large stones or boulders with a volume greater than 1 cubic metre (paid by m^3)

.6 Supplement for disposal/elimination of leachate or contaminated water : paid per cubic meter (m^3)

.2 Tender prices are based on the degree and type of contamination and are a supplement to the disposition compared to uncontaminated soils with flat costs. Disposal Supplements are measured for payment based on actual quantities transported and processed to an appropriate disposal or treatment site approved by the Departmental Representative and holding a certificate of authorization from MDDELCC and in compliance with applicable laws and regulations

.3 This price includes transportation, rental, installation of equipment, machinery, tools, labor and all expenditures to perform characterization and off-site disposal of excavated material, even if they are not specifically described, either in the drawings or in the specifications or other tender documents, but deemed necessary to do the works according to best practices.

.4 All costs and expenses related to the management, coordination, stockpiling, temporary site and battery protection, additional delays, drainage or containment of waterlogged soils in tight buckets and any other provisions relating to the handling of excavated material for characterization in accordance with the requirements of "01 35 13.43 - Special Procedures - Contaminated Sites", shall be included.

.5 Measurement for Payment Purposes shall be the determination of the tonnage of excavated material indicated on the weigh tickets of each authorized load and compiled in a register approved by the Departmental Representative. All costs of excavation materials elimination and work carried out, including excavation and demolition carried out without the approval of the Departmental Representative, shall be at the expense of the Contractor.

.6 Provide access to a scale at all times even when the disposal site does not have access to it.

.7 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative.

PART B – TABLE OF LUM-SUM PRICES :

.10 **Site Organisation**

.1 This section includes the organization of the site and all elements described in this Part. It is paid on a flat-rate basis and includes all the requirements outlined in Division 1 (General Requirements) of this Specification as well as all other work that is not part of other Schedule items but is necessary for completing the work.

.2 It also includes the costs of mobilization and demobilization, the cost of purchasing, depreciating or leasing machinery, tools and equipment, personnel, materials, site facilities and any mobilization as may be required to meet the work schedule

.3 Maintenance and operating costs for the maintenance of machinery, equipment and tools included in the worksite facilities during the course of the work and the personnel supporting these facilities are also included

.4 Payment of this article shall be made as follows:

.1 25% with the first monthly payment, after mobilization and installation of site facilities;

.2 50% also distributed with milestone payments and in proportion to the progress of the work;

.3 25% with payment issued upon issuance of "Substantial (Provisional) Completion Certificate" after final cleaning.

.5 This price includes, but is not limited to:

.1 Land

.1 Expenses for the acquisition, lease, compensation and use of land other than those which may be made available to the Contractor, either for the construction site or for temporary deposits

.2 The costs of use and maintenance of the lands made available to the Contractor.

.2 Layout of Worksite Zones

Given the high archaeological potential of these areas, the Contractor must proceed, before the start of work, with layiing a geotextile and a cushion of 150mm of MG-20b on all grassed areas in the area interior of the limits of construction site to limit the tracks which could be formed following the passage of the machinery.

Following the work, the Contractor must dispose of the crushed stone cushion, remove the existing topsoil or existing Class B soil to a depth of 150mm (under the supervision of an archaeologist) and according to the requirements of the specifications (characterization of existing soil), place 150mm of new topsoil and re-turf the affected areas with turfgrass.

Existing topsoil may be reused only if it is sieved and sampled to ensure that the chemical and physical characteristics meet the requirements of the topsoil supply specification. Storage, sieving, sampling, laboratory costs and any necessary amendments to the existing mix to make it conform to the requirements of the specifications and allow its reuse are the responsibility of the Contractor. For the preparation of his tender, the Contractor must consider that the existing

topsoil is not reusable and provide all the costs incurred for the installation of a new layer of topsoil 150mm thick (cut, characterization, disposition, purchase, transport, implementation).

.1 Land layout required for set-up of site facilities
.2 Site drainage.
.3 Site office of the personnel.
.4 Office of the Departmental Representative.
.5 Premises for storage of equipment.
.6 External Storage for materiel and equipment.
.7 .Barriers and fencing required throughout the duration of the work, including its eventual movement and all temporary safety devices
.8 Temporary docks.
.9 Marking structures in water.
.10 The costs of guarding,
.11 Removal, temporary storage and reinstallation of various elements which will be in conflict with worksite development such as, but not limited to: benches, tables, garbage cans, fences , railings, concrete blocks, etc

.3 Access Roads

.1 Access and temporary roads.
.2 Maintaining safe access in the vicinity of the site.
.3 Missing access roads.
.4 Maintenance of access roads (cleaning in summer, leveling of gravel roads and installation of dust suppressant).
.5 Temporary site signage.
.6 Temporary detours, if required.
.7 Snow removal of roads and temporary roads by the Contractor, if required.

.4 Machinery, Equipment and Tools

.1 All machinery, material and equipment required to maintain site operations including operation (provide unit prices and hourly rates for each equipment used)
.2 Light trucks
.3 Scaffolding
.4 Generators and temporary lighting
.5 Tools
.6 Compressors

.5 Networks

.1 Toilets on site
.2 Water supply to site facilities. The Contractor is also responsible for obtaining all necessary permits from the competent authorities (municipal or other) for connections from existing hydrants.
.3 Fire protection
.4 Water for compaction of materials and dust suppressant
.5 Power supply
.6 Lighting on site

.7 Telephone and Internet links for use and use of the Departmental Representative.

.6 Health and Safety

.1 All equipment, labour, materials, machinery, tooling and accessories required to ensure health and safety in accordance with Section 01 35 29.06 of the construction Specification and applicable laws and regulations.

.7 Environment

.1 All equipment and supplies required to protect the environment, in accordance with the "01 35 43 - Environmental Protection" section of the construction specification and applicable laws

.2 All of the environmental protection measures described in the "01 35 43 - Environmental Protection" section of the construction specification and the laws in force, such as, but not limited to, a turbidity curtain, the installation of settling/sedimentation ponds, etc

.3 Construction/demolition waste management in accordance with the requirements of all sections of "Division 1 - General Requirements" of the construction specification

.4 Management of the temporary repository area and characterization of excavation materials in accordance with "01 35 13.43 - Special Procedures - Contaminated Sites" including, but not limited to:

.1 On-site disposal, site remediation and reclamation at the disposal site, management and characterization of piles, and the establishment of protective measures;

.2 The deposit site or "temporary storage area for excavated material", as indicated on the plans, is located at Parc des Ateliers on the other side of Avenue Bourgogne. Development of the land at the contaminated soil deposition site includes, but is not limited to, the installation and removal of a protective fence at the perimeter of the area identified on the plans, removal of topsoil for re-use, the supply and installation of protective membranes, the handling and temporary stockpiling of contaminated soils, the preparation of the surface to be sodded, the supply and spreading of topsoil with a thickness of 150mm after settlement, supply and laying of sod, including picketing and laying of a trellis when required by the slope of the ground, the application of a rooting fertilizer, the rolling of the lawn and its sprinkling at its resumption; the topsoil can be reused only if it meets the physical characteristics (sand and arable ratio, particle size, etc.) and chemical properties (nitrogen, phosphate, etc.) of the topsoil specified in the specification and, if not, be replaced by new soil which complies with those requirements.

.8 Services

.1 This lump sum price includes the total remuneration including the salaries and bonuses of the contractor's site staff and clerical staff who will provide the services of site organization during the duration of the work, including but not limited to:

.1 Superintendence and project management

.2 Topographic survey services

.3 Bathymetric surveys to monitor work.

.4 Studies of construction methods

.5 Quality control

.6 Health and Safety

.7 Environmental protection

.8 Work planning and subcontractor management

.9 Supply and Logistics

.10 Preparation and management of documentation (in accordance with Section 01 33 00 of the construction specifications, including shop drawings, final plans, operating manuals and suppliers).

.11 Commissioning

.12 Transportation, accommodation and subsistence costs of (indirect) support staff and all workers throughout the duration of the work.

.9 Miscellaneous

.1 Required boats

.2 Licenses

.3 Supply and installation of 1 Supply and installation, at locations identified by the Departmental Representative, of two (2) identification signs of approximately 6.0 m² each (provided by others)

.4 Provision of timetable of work

.5 All other costs, fees, expenses or other work that are not an integral part of a specific item in the pricing schedule but are necessary for the complete performance of the work, all in accordance with the specifications and drawings

.11 **Removal and Relocation or Return to Owner of Various Existing Equipment Including Coordination, Loading, Transportation and Storage:**

.1 This price shall compensate for all necessary measures, actions and supplies, including, but not limited to, labor, equipment, machinery and equipment, materials, professional services, land surveys, etc. for the removal and transportation to the temporary storage site and the transportation from the temporary storage site to the wharf for their relocation of the floating docks including the installation of the anchors and all necessary accessories

.2 Temporary storage near works is indicated on the drawings.

.3 This price also includes but is not limited to:

.1 The fact that this operation may be required more than once in accordance with the scheduling or phasing of the work until the works are received as final;

.2 Coordination with the Parks Canada Agency for the installation of anchor bars for floating dock guides where required;

.3 The design, provision and installation of a temporary bridge to floating docks following Phase 2 of the works;

.4 All safety measures necessary to ensure the protection of the public, such as, but not limited to, temporary guardrails, site fencing and other measures to prevent debris, materials or other objects falling to the floating docks.

.4 This price includes all necessary measures, actions and supplies, including, but not limited to, labor, equipment, machinery, materials, professional services, for the careful removal of the following metallic elements in accordance with the requirements and specifications in the plans and specifications and their transportation to the temporary storage site as shown on the drawings:

.1 Floating dock guides and related accessories (5 units);

.2 Guardrails;

.3 Fences and Jersey walls located at the entrance to the wharf;

.4 Vintage bollards (15 units, steel only);

.5 Black bollards (8 units).

.5 Of the 15 vintage bollards to be removed and temporarily stored for return to the Owner, 10 of them must be relocated in accordance with the specifications and details specified in the drawings. An item in the pricing schedule is provided for this purpose

.6 These items must be retained or returned to the Owner in good condition and must be transported to the temporary storage location near the work as indicated on the plans

.7 fees required to complete and provide this item must be included

.8 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative

.12 **Partial Demolition and Excavation of the Existing Wharf and Other Related Works**

.1 This price shall pay for all necessary measures, actions and supplies, including, but not limited to, management, coordination, labor, equipment, machinery and materials , professional services, construction engineering, land surveys, etc. for all the partial demolition and excavation works of the existing wharf required for the complete construction of the structure, namely:

.1 Removal of bituminous asphalt (paving) from the existing wharf including loading, transporting and disposal/elimination of bituminous surfacing at an authorized site.

.2 Breaking and removing concrete from existing wharf walls, lamp post concrete from old bases, navigation light (at the end of the wharf), vintage bollards, and any other existing elements buried in the backfill of the wharf the concrete slab discovered during the archeological digs, etc., as well as the loading, transportation and disposal/elimination of concrete and other miscellaneous materials at an authorized site. This price shall also include saw blades and any other expense for carrying out the demolition work of the concrete elements, whether or not specifically described, in the drawings, specifications or other tender documents, but deemed necessary for the complete construction of the structure.

.3 Removal and demolition of head of existing sheet piles (lock side) including sawing, loading, transportation and disposal/elimination at an authorized site. The drilling of sheet piling for the passage of tie rods, if any, is also included in this item as well as all related work

.4 Excavation of the existing backfill under the asphalt mix to the levels shown in the drawings including:

.1 Excavation of existing backfill;

.2 Dismantling and removal of treated/creosoted wood components in the backfill;

.3 Compaction of the undistrubed bottom of the excavation as indicated in the structural drawings;

.4 Loading and transporting materials to the "temporary storage area for excavated material" located on Parc des Ateliers grounds south of Avenue Bourgogne.

.2 Excavation and disposal of excavated material includes drying of materials in accordance with environmental requirements, loading and transport to the "temporary storage area for excavated material", temporary storage for the time required material characterization, loading and disposal of materials temporarily stored at an authorized site if the soil is not contaminated. After characterization, if the materials are found to be contaminated, the supplement for the disposal of contaminated materials to a specialized treatment site applies and is paid to the relevant item in the pricing schedule.

.3 Payment of this item will be made based on the progress of the work, as approved by the Departmental Representative

.13 **Bracing and Tie-Rod Systems and Weep Holes for Drainage**

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, coordination, labor, machinery and materials, licensing, professional services, surveys and design and construction engineering, both land and marine, for the supply and installation of the mooring and tie system as well as weep holes including adjustments in sheet piling, the protective membranes and all the accessories required according to the indications on the drawings and requirements of the specifications, including land and marine transportation.

.2 The provision and installation of all necessary components such as, but not limited to, steel profiles, plates, shims, tie rods, protective membranes, bolts, nuts and washers, etc. essential to the complete installation must also be included

.3 Payment will be made on the basis of progress as approved by the Departmental Representative.

.14 **Backfilling of Wharf including Geotextiles and Geogrids**

.1 This price shall compensate for the provision and placement of the MG20 crushed stone required for backfilling of the wharf (exluding the clean stone) and geotextile and geogrid reinforcement materials, all as specified on plans and specifications. This includes, but is not limited to, the provision of equipment and materials, machinery, tools and labor, preparation, leveling, cleaning and compaction of the backfill and the surface of the undisturbed excavation floor to be covered, the transport and installation of the materials and the expenses for carrying out this work, whether specifically described or not, in the specifications or other tender documents, but deemed necessary for the completion of the work.

.2 The provision and installation of all items and all costs necessary to complete and provide this item, such as, but not limited to, management, coordination, licenses, professional services, surveys and engineering design and construction, land and marine, leveling and compaction of materials, as well as coordination for drainage or electricity, must be included.

.3 Payment will be made on the basis of progress as approved by the Departmental Representative.

.15 **Concrete Facing (elevation -0.350 to 1.260) in Prefabricated Concrete Panels (Option 1) or in Cast-in-Place Conctrete (Option 2) Including Steel Shuttering Panels**

OPTION 1:

.1 This lump sum price shall pay for all necessary measures, actions and supplies, including, but not limited to, coordination of work sequencing, management, coordination, labor, machinery and equipment, materials, permits, professional services, design, manufacturing and construction engineering for the supply, delivery and installation of concrete siding in prefabricated concrete panels including steel shuttering panels as forms for the filling concrete, all according to the drawings and specifications

.2 All costs necessary to complete and supply this item must be included, this includes but is not limited to:

.1 Supply and installation of reinforcement and dowels;

.2 Supply and installation of steel shuttering panels;

.3 Temporary formwork and shoring;

.4 Coordination for cement mixing formula;

.5 Vibration, pumping, finishing and curing of concrete;

.6 Engineering for calculation and dimensioning of connections as well as for recessed supports used for panel handling;

.7 Supply of manufacturing drawings signed and sealed by a member engineer in good standing of the O.I.Q. ;

.8 Providing implementation methods for approval;

.9 The manufacturer's design briefs for the components;

.10 Details of prestressed concrete and non-prestressed concrete elements, reinforcements and connecting elements;

.11 Cambering where applicable;

.12 The nomenclature of finishes;

.13 Methods of handling and placing;

.14 Holes, sleeves, parts to embed and related reinforcement;

.15 And all related work.

.3 This price also includes the supply and installation of the reinforcement and dowels, temporary formwork and shoring and cast-in-place concrete for filling the facing to the ladders and corners of the dock. as well as behind the prefabricated concrete panels where applicable, all according to the drawings and requirements of the specification

.4 All other costs necessary to complete and supply this item, such as vibration, pumping, finishing, curing, application of sealant, joints, saw cuts, supply and installation including the coordination, anchors, sleeves or other elements to be embedded in the concrete and necessary for the complete construction of the structure shall be included.

.5 Payment shall be made in proportion to the percentage of completed work (installed panels and cast-in-place concrete) approved by the Departmental Representative.

OPTION 2 :

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, coordination of work sequencing, management, coordination, labor, machinery and equipment, materials, permits, professional services and construction engineering for the supply and installation of reinforcement and studs, formwork and temporary shoring and cast-in-place concrete. all facing including the ladders and corners of the wharf, as well as the steel shuttering panels used as formwork, all in accordance with the drawings and requirements of the specification

.2 All costs necessary to complete and supply this item, such as coordination for cement concrete mixing, provision of installation methods for approval, vibration, pumping, finishing, curing, application of sealant, joints, saw cuts and the provision and installation, including coordination, of anchors, sleeves or other elements to be embedded in concrete and necessary for the complete realization of the works must be included

.3 Payment shall be made in proportion to the percentage of completed work (Surfaces of facing and cast-in-place concrete) approved by the Departmental Representative.

.16 **Flower Boxes for Perennial Grasses and Various Equipment Bases of Cast-In-Place Concrete**

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, coordination, labor, machinery and equipment, materials , permits, professional services, construction engineering for the supply and installation of reinforcement and anchors, temporary formwork and shoring in place for the construction of the following cast-in-place concrete, including all the accessories, all according to the indications on the plans and requirements of the specifications:

.1 New perennial grasses boxes, including accessories = 4 units;

.2 New lamp post bases, including accessories = 8 units;

.3 New base for navigation light, including accessories = 1 unit;

.4 New bases for vintage bollards, including accessories = 10 units;

.2 All costs necessary to complete and supply this item, such as coordination for cement concrete mixing, vibration, pumping, finishing, curing, sealant application, seals, bushing and application of bonding agent, drilling of formwork for standby reinforcement, sawing lines, drilling of formwork if required, and provision and installation, including coordination, of anchors, sleeves or other elements to be embedded in the concrete and necessary for the complete construction of the structure shall be included

.3 This price also includes coordination for drainage or electricity as well as the absorption wells of geotextile coated stone and 100Φ PVC conduits, flexible sleeves and floor drains, etc. all according to the drawaings and specifications

.4 Payment shall be made in proportion to the percentage of work completed and approved by the Departmental Representative.

.17 **Cast-in-Place Concrete Coping Walls (elevation of 1.260 to 2.400)**

.1 This price shall pay for all necessary measures, actions and supplies, including, but not limited to, coordination of work sequencing, management, coordination, labor, machinery and equipment, materials, permits, professional services, construction engineering for the supply and installation of reinforcement and anchors, formwork and shoring and in-place concrete for construction of the new coping walls, all according to the drawings and requirements of the specifications.

.2 All costs to complete and furnish such item such as vibration, pumping, finishing, curing, application of sealant, joints, roughening and application of the bonding agent, drilling of formwork for reinforcement, saw cuts and installation including the coordination of all related accessories such as anchors, sleeves or other elements to be embedded in concrete and necessary for the completion of the work must be included.

.3 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.18 **Supply and Placing of Concrete Slabs on the Wharf Including Protective Works**

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, coordination, labor, machinery, materials , permits, professional services and construction engineering for the supply and installation of reinforcement, formwork and shoring and cast-in-place concrete including protective sealant or water repellent where required, for the construction of new slabs on the wharf, all according to the indications on the plans and requirements of the specifications.

.2 Price includes all required environmental protection measures such as, but not limited to, the provision, installation and removal of a waterproof enclosure, a splash guard, and gutter, absorbent material, pumps and vacuum as well as any expense related to the management and disposal of leachate or wash-off water for finishing of engraved concrete or exposed aggregates, all in accordance with the requirements of the section '01 35 43 - Protection of the environment'.

.3 All costs necessary to complete and provide this item such as coordination for work sequencing, vibration, pumping, finishing, curing, application of protective sealant (if required), joints, roughening and application of the bonding agent, drilling of formworks for reinforcement, saw cuts as well as installation including the coordination of all related accessories such as anchors, sleeves or any other element to be embedded in the concrete and necessary for the complete construction of the structure must be included.

.4 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.19 **Supply and Installation of Recessed or Embedded Anchors and Sleeves in Concrete Slabs for Attaching Furniture or Other Accessories to Wharf**

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, coordination, labor, machinery and equipment, materials, permits, professional services and construction engineering for the supply and installation of all anchors and sleeves or other components embedded in concrete slabs in place, or other fittings, for the attachment of wharf furniture or other accessories, all in accordance with the indications on the drawings and requirements of the specifications

.2 All costs to complete and provide this item, such as coordination with the Departmental Representative for sequencing work and exact location of each item (wharf furniture and accessories), as well as construction of templates and drilling of the formwork should be included.

.3 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.20 **Supply and Installation of Various Permanent Metal Equipment and Reinstallation of Vintage Bollards (10 units)**

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, coordination, labor, machinery and equipment, materials , permits, professional services, construction engineering for the relocation of existing vintagel bollards and the supply and installation of the following metal equipment or structures, including all required accessories, all as indicated in the plans and specifications:

.1 Reinstallation of existing ancestral bollards (10 units);

.2 New floating dock guides of painted galvanized steel;

.3 New galvanized steel guardrails;

.4 New safety ladders of painted galvanized steel;

.5 New bollards (or mooring cleats) of painted galvanized steel, including stainless steel nameplates

.2 All costs necessary to complete and supply such items, such as, but not limited to, transportation from temporary storage to wharf where applicable, reinstallation or installation of various structures, coordination with the Parks Canada Agency for the installation of the anchor bars, the supply and installation of nameplates, all in accordance with the details and specifications provided for in the plans must be included

.3 Payment shall be made in proportion to the percentage of work completed and approved by the Departmental Representative

.21 **Supply and Installation of the New Painted Aluminum Gangway (Access Ramp) To Floating Dock**

.1 This price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, coordination, labor, machinery and equipment, materials , permits, land and water surveys, professional services and design and construction engineering for the design and manufacture of the new painted aluminum gangway and its supports including the transportation and installation of it to allow safe access to the floating docks, all according to the drawings and requirements of the specification.

.2 The manufacturer shall assume all costs, including, but not limited to, preliminary and complete engineering as well as the supply of all materials, materials, labor, tools, equipment, protection and transportation necessary for the complete realization of this work.

.3 This price includes, but is not limited to:

.1 The design, management, coordination, manufacture, supply, delivery and installation of the gangway;

.2 The design and management, coordination, manufacture, supply, delivery and installation of all supports and other permanent connections to the dock or for handling, all as indicated in the plans;

.3 Transportation of gangway and other required accessories (between plant and wharf) and complete installation;

.4 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.22 **Supply and Installation of Removable Furniture**

.1 This price shall compensate for all measures, actions and supplies required, including, but not limited to, management, coordination, labor, equipment, materials, permits, professional services and construction engineering for the supply and installation of the following new furniture for the wharf, all in accordance with the drawings and requirements of the specification:

.1 Removable bollards (2 units);

.2 Removable flower boxes (2 units);

.3 Display column/Information panel (1 unit);

.4 Removable benches (10 units);

A) BI : Bench with backrest, without arm rests : 4 units

B) B2 : Bench with backrest, with arm rests : 4 units

C) B3 : Bench without backrest or arm rests : 2 units

.5 Double Adirondak Chairs Parks Canada (supplied by others - 2 units);

.6 Waste baskets (2 units);

.7 Recycling baskets (2 units);

.8 Bicycle stand (1 unit).

.2 All costs to complete and supply this item such as coordination for exact locations, installation of supports, anchors or sleeves, choice of colors, models, etc. must be included

.3 The price also includes all necessary expenditures such as on-site coordination for drainage and electricity, as well as any other necessary coordination with the Departmental Representative to carry out this work, whether specifically described or not , or in the drawings or specifications or other tender documents, but deemed necessary for the completion of the work.

.4 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.23 **Complete Access-Road Reconstruction with Double Surface Treatment**

.1 This lump-sum price remunerates all the following works for the rebuilding or complete reconstruction of the access road from the new wharf to Avenue Bourgogne, all as indicated on the drawings and specifications:

.1 Removal, loading and transportation to the "temporary storage area for excavated material" located on the grounds of Parc des Ateliers south of Avenue Bourgogne of the existing

surface coating, as well as supply and installation of a new double surface treatment type covering including all shoulders and transitional connections from the wharf to the access road as well as any other connections to the lock, pavement sidewalks, to driveway enterances, stairs and steps, to landscaped areas, etc.

.2 All preliminary surveys by a construction surveyor of all existing finished surfaces to ensure that future levels are identical to existing levels, in coordination with the Departmental Representative.

.3 Excavation and transportation to the "temporary cut material storage area" located on the grounds of Parc des Ateliers south of Avenue Bourgogne of existing foundation materials and supply and installation of new granular borrow material for the complete restoration of the foundations of the access road to Avenue Bourgogne, including all the transitional connections from the wharf to the access road, as well as any other connections to the lock, pavement sidewalks, driveway entrances , stairs and stairs, landscaped areas, etc

.2 Excavation and disposal of excavated material includes drying of materials in accordance with environmental requirements, loading and transportation to the "temporary storage area for excavated material", temporary storage for the time required material characterization, loading and disposal of materials temporarily stored at an authorized site if the soil is not contaminated. After characterization, if the materials become contaminated, the supplement for the disposal of contaminated materials to a specialized treatment site applies and is paid to the relevant item on the pricing schdule.

.3 Price must include all necessary measures, actions and supplies such as management, coordination, labor, equipment, machinery, materials, permits, professional services and engineering of the construction for the completion of the work, such as but not limited to saw lines, planing or removal of the existing coating and transitions if required, and scrapping of planing residues, preparation, leveling, cleaning of the surface to be covered, spreading of the bonding binder (if required), installation of the lifting shims (if required) and adjustment of all existing accessories if required (manholes, catch basins, valves, watr pipes, traps, utilities, etc.), transportation and installation of new materials (granular materials, aggregates and bitumen), backfilling, the making of the transverse and longitudinal joints in compliance with the requirements set out above (heating, overlap, transition, leveling, etc.), rolling and compacting of bituminous mix or surface treatment, using a pneumatic roller as well as any other related work required for carrying out this work

.4 This price also includes all materials, transportation, rental, installation of equipment, equipment, tooling, labor, expenses for backfilling and treatment work whether or not specifically described, in the plans, the specifications or other tender documents, but deemed necessary to bring them into conformity with best practices..

.5 All costs to complete and provide this item must be included.

.6 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.24 **Electrical Work**

Electrical Room:

.1 This price shall pay for all necessary measures, actions and supplies, including, but not limited to, management, labor, tools, equipment, materials, permits, surveys, professional services as well as engineering design and construction for the transportation and installation of materials and equipment required for electrical work in the electrical room according to the indications on the drawings and requirements of the specification.

.2 This price includes, but is not limited to

.1 Conduits, conduit fittings and terminal connectors.;

.2 Flexible conduits and sealed connections;

.3 Conduit and equipment supports;

.4 Circuit breakers in existing panels;

.5 Hardware, connectors, fasteners, junction boxes and pull boxes;

.6 Plugs, boxes, lids;

.7 Wiring and Fittings;

.8 Commissioning of equipment

.3 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

Underground and Under-the-Wharf Conduits and Wiring:

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, labor, tools, equipment, materials, permits, surveys, professional services as well as design and construction engineering for the transportation and installation of materials and equipment required for underground electrical works on land and under the wharf as per the drawings and requirements of the specification.

.2 This price includes, but is not limited to:

.1 CPV conduits and fittings;

.2 Conduit and equipment supports;

.3 Hardware, connectors, fasteners, junction boxes and pull boxes;

.4 Stainless steel boxes and lids;

.5 Wiring and Conductors RWU-90 1000V;

.6 Protective plates;

.7 Grounding of conduits and equipment;

.8 Decommissioning of existing power structures.

.3 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

Work on the Wharf:

.1 This lump-sum price shall compensate for all necessary measures, actions and supplies, including, but not limited to, management, labor, machinery and equipment, materials, permits, statements , professional services as well as design and construction engineering, transportation and installation of lighting fixtures and navigation lights on the wharf, according to the indications on the drawings and requirements of the specification

.2 This price includes, but is not limited to:

.1 Navigation light

.1 Luminaires for complete navigation light;

.2 Drum for navigation light;

.3 Wiring, conductors, compression joints, watertight shrink sleeves;

.4 Hardware, fasteners and connectors;

.5 Waterproof IP67 plugs and receptacles;
.6 Winter cover, bolts and accessories;
.7 Commissioning;

.2 Wharf Lighting

.1 Complete luminaires;
.2 Drum for lamp posts;
.3 Complete dimming system, control base, antenna, wireless capsules for each luminaire;
.4 Wiring, conductors, compression joints, waterproof heat shrink tubing;
.5 Fuse holder;
.6 Hardware, fasteners and connectors;
.7 Waterproof IP67 plugs and receptacles;
.8 Winter protection covers, bolts and accessories;
.9 Complete commissioning of the dimming system;
.10 Training of maintenance personnel;
.11 Five (5) Winter Protective Lids, Bolts and Surplus Accessories;
.12 Pre-assembled complete drum and luminaire with plugs and accessories ready for installation.

.3 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.25 **Planting and Sodding**

.1 This lump-sum price shall compensate the supply and installation of materials for all planting (in flower boxes) and sodding operations according to the drawings and specifications and shall include, but not be limited to, the provision of equipment, materials, machinery and labor and the excavation, preparation and cleaning of planting and sodding areas, transport, storage, supply, handling and placing of plants, potting soil and sod, placing of tents, tendons, guy wires and accessories, stakes and trellises where required due to the slope of the ground, planting, watering and maintenance during the establishment and guarantee period, cleaning and any activity necessary for the completion of the work, and works not specifically described, either in the drawings, or the specification or other tender documents of, but considered necessary for the complete realization of the work.

.2 All related items and other charges necessary to complete and furnish this item, such as but not limited to the supply and installation of geotextiles and membranes, net stone drain cushions or other specified materials, and coordination for drainage or electricity must be included.

.3 Payment of this item will be made based on the progress of the work, as approved by Departmental Representative.

.26 **Site Restoration Work**

.1 This lump-sum price shall compensate for all measures, actions and supplies required, including, but not limited to, management, coordination, labor, equipment, materials, permits, professional services and design and construction engineering for the rehabilitation and restoration, to the satisfaction of the Departmental Representative, of all surfaces damaged by the work including but not limited to:

.1 The rehabilitation or reconstruction of the bike path between Burgundy Avenue Bourgogne and the Parc des Ateliers, grassed areas, zones of sidewalks and curbs, sidewalks, concrete paving, bituminous covering, slabs or other concrete elements, steps and stairs, driveways, parking lots

or other areas with gravel or any other area affected by the work where appropriate and including surface preparation, recovery or supply and as the replenishment of materials;

.2 The repair and restoration of all wood, masonry, bituminous concrete or cement concrete surfaces, as well as all gravel surfaces damaged by work including foundation and granular sub-base (150mm MG-20 and 300mm MG-112), surface leveling, compaction and all related work;

.3 The relocation of all existing furniture temporarily relocated or stored by the Contractor (tables, benches, rubbish bins, poles, railings, fences, etc.).

.27 **Sandblasting Concrete Finishing Work**

.1 This price remunerates all measures, actions and supplies required such as, but not limited to, management, coordination, labour, equipment, materials, permits, professional services and design and construction engineering for sandblast concrete finishing for all exposed concrete surfaces except concrete floor slabs.

.2 This item is included in the submission form but is optional. All costs and any associated costs related to this item may be excluded from the work at the request of the Departmental Representative with the exception of the supply of samples. Thus, once the samples have been received, the Departmental Representative may decide that this item is removed from the schedule and at no additional cost.

.3 This item includes the provision and implementation of all environmental protection and mitigation measures applicable to this type of work in the marine environment such as shelters, recovery of projection materials, turbidity curtains, etc.

.4 The payment will be made according to the progression of the work, as approved by the Departmental Representative

PART 3 PRODUCTS

.1 Not Used

PART 4 EXECUTION

.1 Not Used

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 This section addresses Inspections and tests to be performed by the Departmental Representative. It completes the sections 01 45 00 Quality Control and 01 35 13.43 – Special Procedures for Contaminated Sites as well as the particular requirements described in the sections 03 to 35 for the Contractor.

1.2 APPOINTMENT AND PAYMENT

.1 The Departmental Representative will designate a laboratory services for control tests in addition to those required by the Contractor to meet the requirements stipulated in the contractual documents. Laboratory costs to be covered by the Departmental Representative, except:

.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.

.3 Mill tests and certificates of compliance.

.4 Tests specified to be carried out by Contractor under supervision of the Departmental Representative.

.5 Additional control tests which must be carried out following Contractor errors.

.6 Coordination for the tests of fill materials environmental characterisation.

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

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Supply labour and facilities to:

.1 Provide access to Work for inspection and testing.

.2 Facilitate inspections and tests.

.3 Make good Work altered by inspection and testing.

.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify the Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All section of Division 01 – General Requirements

1.2 ADMINISTRATIVE

.1 Schedule progress meetings throughout the progress of the work, at the request of the Departmental Representative, who will hold the meetings.

.2 The Representatives of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.3 PRECONSTRUCTION MEETING

.1 Within 15 days after awarding the Contract, hold a meeting of parties to discuss and resolve administrative procedures and responsibilities.

.2 This meeting shall be attended by the Departmental Representative, the Contractor's Representative, sub-contractors and any other parties deemed necessary by the Departmental Representative who regularly participate in the meetings and are authorised to intervene in the name of the parties they represent.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Agenda to include, but not limited to:

.1 Appointment of official representative of participants in the Work (list of stakeholders).

.2 Schedule of Work: in accordance with Section 01 32 16.07 – Construction Progress Schedules – Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings, samples, colour chips and technical data sheets in accordance with Sections: 01 33 00 – Submittal Procedures, .01 33 00A- Required Contractor Documents, and 01 33 00B Shop Drawings – Presentation Data

.4 Requirements for the regulation of vehicular and pedestrian traffic at and around the periphery of the work, in accordance with section "01 35 00.06 - Special procedures - Traffic control".

.5 Requirements for Characterization and Management of Contaminated Materials, as per Section "01 35 13.43 - Special Procedures - Contaminated Sites"

.6 Occupational Health and Safety Requirements as per Section "01 35 29.06 - Health and Safety".

.7 Requirements for construction facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 – Construction Facilities.

.8 Site security in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

.9 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.10 Record drawings in accordance with Section 01 33 00 – Submittal Procedures.

.11 Specific Requirements for the Performance of Work, in accordance with "01 73 00 - Performance Requirements".

.12 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 – Closeout Submittals.

.13 Monthly progress claims, administrative procedures, photographs, holdbacks.

.14 Appointment of inspection and testing agencies or firms.

.15 Insurances, transcript of policies.

.16 Work supervision modalities.

.17 Environmental restrictions.

.18 Continuity of operations.

.19 Legal and environmental requirements.

1.4 PROGRESS MEETINGS

.1 Progress meetings shall be held every 2 to 3 weeks throughout the project, or more often if necessary as directed by the Departmental Representative.

.2 This meeting shall be attended by the Departmental Representative, the Contractor's Representative, sub-contractors and any other parties deemed necessary by the Departmental Representative who regularly participate in the meetings and are authorised to intervene in the name of the parties they represent.

.3 Agenda to include, but not limited to:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Other business.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 ROLES OF THE PARTICIPANTS

.1 The Departmental Representative will prepare the agenda.

.2 The Departmental Representative will preside over the meeting.

.3 The Departmental Representative will write up the minutes of meetings and distribute them within 5 days following the meeting.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the section of Division 01 – General Requirements

1.2 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. Generally, Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.3 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 The schedule shall show for each activity the time required for the issuance of shop drawings, a reasonable period of time for approval, ordering and delivery of materials to the site, Site installation and any other relevant information.

.4 The critical path of the project should be clearly indicated.

.5 Any modifications to work in connection with requests for additional work from the Departmental Representative or unforeseen site conditions shall be incorporated into the Project Schedule. The Contractor must exercise due diligence to reorganize his schedule and avoid any additional delays. In the event that additional delays are unavoidable, the Contractor shall immediately notify the Departmental Representative and provide an update of the schedule showing the implication of the amendment on the critical path of the project.

.6 The Contractor shall also include in his schedule and order of work any time bank provided for in a specific item in the tender schedule for lost time or work stoppages in connection with the placing of sheet piles.

.7 To divide the main steps in the work schedule (sheetpiling, cross-piecing, coping wall) by work areas according to the following subdivisions:

.1 Zone 1: Axis A1 to B1

.2 Zone 2: Axis B1 to D1

.3 Zone 3: Axis D1 to D3

.4 Zone 4: Axis D3 to B3

.5 Zone 5: Axis B3 to A3

.6 Zone 6: Retaining wall

.8 The Contractor must begin work immediately after having submitted the insurance certificate to the satisfaction of the contractual authority.

.9 The work schedule and the Bar Diagram (GANNT) must take into account the restrictions imposed on the works and described in the related sections.

1.4 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

1.5 PROJECT MILESTONES

.1 The following project milestones are essential conditions to the contract which must be indicated in the Project Work Schedule.

.1 Award of contract to Contractor around June 8, 2018.

.2 Start of Work (Mobilization) from September 17, 2018

.3 Next periods of environmental restrictions, authorizations or exemptions:

.1 Environmental authorization for water works (sheet pile placement, excavation and seabed re-engineering and related work): October 1 to March 31 inclusive;

.2 Exemption from environmental authorization for water works (construction of concrete siding on the wharf) by minimizing the emission of TSS (including weekly water sampling) and seabed re-shaping: from August 8 to September 30 inclusively;

.4 The sheet pile work and the construction of the concrete siding and the capping wall including the installation of the floating dock guides for zone 1 between A1 and B1 must be completed and the work site closed before the March 1, 2019

.5 The Contractor shall have one week (5 working days) to complete the work listed in item 5 as of April 29, 2019 or as soon as the water level permits

.1 Reinstallation of floating docks;

.2 Installation of floating dock guides including anchor ties (supplied by PCA);

.3 Layout of temporary floating dock gangway prior to commencement of Phase 3 work;

.4 Rehabilitation of marina owned parking.

.5 Reorganization of the site (fencing and signage).

.6 Installation of adequate marine signaling to secure the worksite

.6 Work must be interrupted from March 10 to August 3, 2018 inclusive, due to high site traffic, except for the work listed in point 5

.7 The commencement of work on the construction of concrete siding and the coping wall of zones 2 to 6 inclusive may begin on or after August 5, 2018, or following the construction vacation.

.8 Buffer period of 15 working days: provide a cumulative period equal to 15 working days, continuous or not, randomly allocated to the work schedule and work scheduling but still part of the critical path, to be able to more easily deal with various unforeseen situation on the site or of any nature whatsoever.

.9 Completion of work, complete demobilization of the site, restoration of premises and provisional acceptance of works (excluding furniture, electrical items and planting) and provisional seasonal acceptance of works (excluding removable furniture and planting). December 13, 2019

.10 The Contractor shall have two weeks (10 working days) from April 27, 2020, or as soon as the water level permits, to complete the installation of the furniture, plant and start the various electrical aspects.

.11 Final acceptance of works on May 11, 2020, when the works will be totally completed and any deficiencies corrected to the complete satisfaction of the Departmental Representative

1.6 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 The Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.7 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.

.2 Identification of materials (such as sheet piling) which have deliveries critical to the schedule, including:

.1 Date of issue and approval of drawings

.2 Date of orders

.3 Date of deliveries

.3 Issuing of shop drawings, or samples.

.4 Permits.

.5 Mobilization.

.6 Demolition of existing wharf

.7 Construction of new wharf

.1 Sheet pile driving

.2 Installation of cross-bracings and tie rods

.3 Earthworks, excavation and fill of voids and levelling

.4 Concrete cladding work and coping wall

.5 Underwater work

.6 Slab reinforcement and concreting

.7 Installation services

.8 Reinstallation of floating docks

.9 Installation of furniture elements

.10 Reconditioning of premises

1.8 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress. It must be transmitted to all the stakeholders two (2) days prior to project site meeting.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

.3 Provide update of schedule to all stakeholders two days prior to site meeting.

1.9 PROJECT SITE MEETINGS

.1 The timetable submitted at the first site meeting will be subject to the reference schedule.

.2 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.3 Weather related delays and proposed remedial measures will be discussed and negotiated.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 This section concerns document management and completes all the particular requirements described in the sections of Division 01 to 35 for the Contractor.

1.2 ADMINISTRATIVE

.1 Submit to the Departmental Representative à list of submittals for review. Submit promptly and in an 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.

.2 Do not proceed with work subject to submittal and review process until review is complete.

.3 Present Shop Drawings, Product Data, Samples and mock-ups in SI metric units.

.4 Review submittals prior to submission to the Departmental Representative. This review indicates that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements stated in the Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.5 Notify the Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents, stating reasons for deviations.

.6 Verify that field measurements and affected adjacent structures are co-ordinated.

.7 Contractor’s responsibility for errors and omissions in submission is not waived by the Departmental Representative’s review of submittals.

.8 Contractor’s responsibility for conformity to requirements of contractual documents in submission is not waived by the Departmental Representative’s review of submittals.

.9 Keep one reviewed copy of each submission on site.

.10 Submit WHMIS Material Safety Data Sheets.

1.3 REQUIRED CONTRACTOR DOCUMENTS

.1 List of documents required from Contractor over course of work is found in Appendix A. This list is not restrictive.

.2 Contractor must also consult and refer to all the sections of Divisions 01 to 35 of the specification.

1.4 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit to the Departmental Representative documents required by organization with jurisdiction over workers’ compensation.

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 The term “Shop Drawings” means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Quality: provide original Shop Drawings by email in PDF format. Shop Drawings will not be accepted by fax for reasons of clarity.

.3 Submit drawings stamped and signed by professional by a registered and licensed professional in Quebec.

.4 Indicate materials, methods of construction, required connexions and anchors, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where items or equipment attach or connect to other items or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.5 Adjustments made to Shop Drawings by the Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Departmental Representative prior to proceeding with Work.

.6 Accompany submissions with transmittal letter containing:

.1 Date;

.2 Project title and number;

.3 Contractor's name and address;

.4 Identification and quantity of each document;

.5 Other pertinent data.

.7 Accompany submittals with presentation data (see Appendix B) summarizing following information:

.1 Date and revision dates;

.2 Project title and number;

.3 Name and address of Contractor, subcontractor, supplier and manufacturer;

.4 Identification and quantity of each Shop Drawing, Product Data and Sample;

.5 Other pertinent data.

.8 Contractor will be responsible for reproducing Shop Drawing presentation data and Shop Drawings in sufficient quantities for all subcontractors and suppliers, and for providing an additional copy to the Departmental Representative, and additional copies for operating and maintenance manuals.

.9 Shop Drawings will be reviewed only if submitted according to described procedure.

.10 Before sending Shop Drawings to the Departmental Representative for verification, Contractor must:

.1 Number each page;

.2 Point out all equipment and/or accessories included in Shop Drawings;

.3 Verify that Shop Drawings are in accordance with plans and specifications with regard to quality, characteristics and outline.

.11 The Departmental Representative will have 10 working days from date of receipt of documents at their office to verify Shop Drawings.

.12 Verification of Shop Drawings by the Departmental Representative is an intermediate quality control step and will not constitute a change order to Contract Documents.

.1 The Departmental Representative will verify drawings submitted by Contractor only with regard to overall layout of equipment. Contractor's or supplier's responsibility for accuracy of documents or their compliance with Contract Documents and work site conditions is not relieved by the Departmental Representative's review. Notes made by the Departmental Representative on drawings are not restrictive.

.13 Following 4 notes may be found on Departmental Representative 's verification stamp:

.1 NO CORRECTION NOTED means Contractor may proceed according to drawing;

.2 MAKE INDICATED CORRECTIONS means Contractor may proceed according to drawing, taking into consideration notes added by the Departmental Representative; copy of drawing becomes official copy, and Contractor is not required to resubmit drawing;

.3 RESUBMIT means information on drawing is incomplete or drawing is incomplete, illegible, etc., and information does not allow the Departmental Representative to determine compliance with plans and specifications; in such case, the Departmental Representative may indicate on drawing points that Contractor must specify or complete before resubmitting drawing;

.4 NOT ACCEPTED means drawing includes materials or structures that are not in compliance with plans and specifications; in such case, Contractor must provide the Departmental Representative with another drawing as per requirements of plans and specifications.

.14 Make changes to Shop Drawings as the Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify the Departmental Representative in writing of revisions other than those requested.

.15 Submit 1 electronic copy of product data sheets or brochures when shop drawings will not be prepared due to standardized manufacture of product.

.16 Keep 1 reviewed copy of Shop Drawings and Appendix B, Shop Drawings – Presentation Data, on site, and make available at all times for required purposes.

.17 Submit 1 electronic copy of test reports as requested by the Departmental Representative.

.1 Report signed by authorized official of testing laboratory must confirm that material, product or systems identical to specified material, product or system and that it has been tested in accordance with specified requirements.

.2 Testing must have been performed within 3 years of date of Contract award for project.

.18 Submit 1 electronic copy of required certificates and as requested by the Departmental Representative.

.1 Certificates must be printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of the contract and state the project's name.

.19 Submit 1 electronic copy of required manufacturer's instructions in specification Sections and as requested by the Departmental Representative.

.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.

.20 Submit 1 electronic copy of manufacturer's field reports as requested in specification Sections and as requested by the Departmental Representative.

.21 Submit documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.22 Submit 1 electronic copy of operation and maintenance data as requested in specification Sections and as requested by the Departmental Representative.

.23 Delete information not applicable to project.

.24 Supplement standard information to provide details applicable to project.

.25 If, upon review by the Departmental Representative, no errors or omissions are discovered in Shop Drawings or if only minor corrections are made, copies 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 work may proceed.

.26 Review of Shop Drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review will not mean that the Departmental Representative approves detailed design inherent in Shop Drawings, responsibility for which will remain with Contractor, and such review will not relieve Contractor of responsibility for errors or omissions in Shop Drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 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.

.27 Upon receipt of the Departmental Representative's letter of intention, the successful Bidder will have 30 working days to provide all Shop Drawings for approval.

1.6 SAMPLES

.1 Contractor must submit for Departmental Representative's approval, manufacturer's standardized samples as reasonably required by Departmental Representative. Samples must be labelled indicating its origin and intended use in Work, in accordance with requirements of Contract Documents.

.2 Contractor must provide specified Samples of complex or sized products or elements.

.3 Do not order, purchase or produce products or materials before receiving written approval of Samples required in specifications.

.4 Products and structures must be similar to approved Samples.

1.7 TESTING AND BATCH MIXES

.1 Contractor must provide test results and dosing mixtures requested by the Departmental Representative.

.2 In particular, no pouring of concrete or placement of pavement will be authorized before Contractor proves compliance of materials.

1.8 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic and hard copy of colour digital photography in fine resolution, weekly with progress statement, as directed by the Departmental Representative.

.2 Project identification: name and project number of project and date of exposure indicated.

1.9 FINAL DRAWINGS

.1 Site Records

.1 Provide 1 set of drawings and mark changes as Work progresses.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Keep drawings on site and make available for reference purposes and inspection.

.2 As-Built Drawings

.1 Before starting testing, adjusting and balancing of systems, finish as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: “AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW STRUCTURES AND SYSTEMS AS INSTALLED” (Signature of Contractor) (Date).

.3 Submit drawings to the Departmental Representative for approval and make corrections as directed.

.4 Submit completed reproducible as-built drawings with operating and maintenance manual.

.5 Submit 1 copy of each as-built drawing and incorporate it into final report on testing, adjusting and balancing of systems and installations.

PART 2 PRODUCTS

2.1 SUBSTITUTION REQUESTS

.1 With respect to specific materials or equipment in the contract, Contractor must request and obtain written approval from Departmental Representative for any materials or equipment substitution by forwarding the following:

.1 Reasons for substitution.

.2 Prices of specified materials and name of supplier.

.3 Prices of chosen materials and name of supplier.

.4 Amount of credit offered to PWGSC.

.5 Consequences to the project, if applicable.

.6 Demonstration of equipment or materials equivalency, approved by an engineer member of the Ordre des ingénieurs du Québec (OIQ).

.2 Proof of equivalency is entirely at Contractor’s expense and must contain the following:

.1 Characteristics, technical specifications and any information deemed necessary for comparison with specified materials.

.2 All resistance and performance tests results required by Departmental Representative and executed by a certified laboratory.

.3 Any additional information, maintenance condition, test result or report required by Departmental Representative.

.3 Materials must meet all specified contractual requirements and comply with specified standards. Departmental Representative may approve or reject any substitution requests. Only fully documented substitution requests shall be analyzed. Contractor is responsible for any direct or indirect delay caused by any substitution. Any modifications to other parts of the Work due to the substitution are at Contractor’s expense.

PART 3 EXECUTION

3.1 NOT USED.

.1 Not Used.

END OF SECTION

PART 1 REQUIRED DOCUMENTS AT START OF WORK SITE

.1 These documents must be completed and submitted in accordance with the requirements of the *General Condition of Contract* as soon as the contract is awarded:

- .1 List of subcontractors and their contact information
- .2 List of suppliers with addresses and contact persons
- .3 List of machinery used
- .4 List of hourly rates for labour and machinery
- .5 List of staff assigned to project and their contact information
- .6 Work schedule
- .7 Safety program
- .8 Opening of work site to CSST
- .9 Environmental protection plan
- .10 Work methods
- .11 Video surveys and photographs of existing works prior to construction
- .12 Inspection and underwater survey of masonry wall and foundations of existing lock
- .13 Provenance of aggregate and concrete sample boards with exposed aggregates
- .14 List of signaling and signaling crews including their copies of certificates of completion of required training courses

PART 2 DOCUMENTS REQUIRED WHILE WORK IS IN PROGRESS AND UNTIL PROVISIONAL ACCEPTANCE

.1 These requirements must be met prior to application for provisional acceptance (prerequisite for acceptance) for acceptance with reservations.

- .1 List of Shop Drawings
- .2 Shop Drawings
- .3 Test reports (ex. concrete bundling tests)
- .4 Manufacturer’s instructions
- .5 Factory testing and verification documentation
- .6 In situ testing and verification program
- .7 Documentation of testing
- .8 Start-up and commissioning programs
- .9 Operating manuals
- .10 Manufacturer’s manuals
- .11 As-built plans
- .12 Personnel training program
- .13 Parts list
- .14 Final report of underwater television inspections

END OF APPENDIX A

GENERAL CONTRACTOR OR PROJECT MANAGER:	
Responsible person:	
Telephone: ( )	Email:

SPECIALTY CONTRACTOR:	
Address:	
Responsible person:	
Telephone: ( )	Email:

SPECIALTY (discipline):	
Shop drawing No.:	**No. of Pages:**
Deadline for delivery (after verification):	
DESCRIPTION OF SHOP DRAWING:	
Reference to the plan:	
Reference to the specifications: Section: Subsection: Page:	

DISTRIBUTOR:	
Address:	
Responsible person:	
Telephone: ( )	Fax: ( )

PRODUCT SUBMITTED:	**DRAWING ISSUED FOR:**
☐ As is ☐ Equivalent ☐ Substitution	☐ Verification ☐ Information ☐ Coordination ☐ Other:

REVISION	**DATE OF ISSUE**

NOTE:

VERIFICATION OF COMPLIANCE

Nature and scope of the verification

☐ Compliance with plans and specifications
☐ Other:

This verification does not constitute a complete and detailed verification of the design.

☐ No correction noted
☐ Make the indicated corrections
☐ Correct and resubmit
☐ Not accepted

Signature ☐ Engineer ☐ Other Date

Name OIQ member No

The verification of this document is restricted to the indicated nature and scope. It does not release the person or business that prepared it from any obligations of any kind

END OF APPENDIX B

PART 1 GENERAL

1.1 SCOPE OF SECTION 01 35 13.43

.1 This section is part of the management of potentially contaminated materials resulting from the Chambly wharf reconstruction project. Since the project requires excavation of the soil within the wharf structure, the dismantling of treated wood structures and possibly excavation of sediments at the perimeter of the wharf, this section is part of a context of managing potentially contaminated materials and not in a context of environmental rehabilitation of the site.

.2 The work described in this document must be consistent with all other work. The Contractor is obliged to collaborate with the contracting authority and the Consultant and to plan the layout of the site and the progress of the work in such a way as to minimize any delays that may be incurred by the work described in this document.

.3 Any delays in the management of potentially contaminated materials shall not be used by the Contractor as grounds for any claim or demand of any kind against the Departmental Representative or the Department.

1.2 ANTICIPATED ENVIRONMENTAL CONDITIONS

.1 The information available to date on the environmental quality of soils (SNC-Lavalin, 2016, report No. 634206-rap-1) indicates that the embankment soils inside the wharf structure, as well as sediments located on the periphery of the wharf, are likely to contain contaminants whose concentrations are located in the AB range according to the provincial criteria of the Ministry of Sustainable Development, Environment and Climate Change (MDDELCC). However, measured concentrations are lower than the CCME soil quality guidelines for residential / park use.

.2 On the other hand, the caissons on the wharf are made of treated wood. Based on the information available to date, treated wood is likely to contain relatively high concentrations of petroleum hydrocarbons (HP C10-C50).

.3 Due to the heterogeneous nature of the soil and sediment to be excavated and the limited amount of information concerning the environmental quality of these materials, these materials will be systematically stored on the site for further environmental characterization purposes once they have been excavated, to guide their management. The characterization will be carried out by a Departmental Representative during the project.

1.3 RELATED REQUIREMENTS

.1 All of divisions 01 – General Requirements and 02 – Existing Conditions

.2 Section 31 23 33.01 – Excavating, Trecnching and Backfilling

1.4 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-51M-81, Polyethylene Sheet for Use in Building Construction.

.2 Canadian Council of Ministers of the Environment (CCME) Documentation

.3 Government of Québec, MDDELCC

.1 Environmental Quality Act (RSQ, c. Q-2)

.2 Contaminated Landfill Burial Regulations (Q-2, r.18)

.3 Contaminated Soil Transfer and Storage Regulations (Q-2, r.46)

.4 Response Guide - Soil Protection and Contaminated Land Rehabilitation, MDDELCC, 2016

.5 Soil Protection and Contaminated Land Reclamation Policy - 2017-2021 Action Plan, MDDELCC, 2017

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00- Submittal Procedures.

.2 Submit, at least one week prior to commencement of work, a management plan for the temporary excavated materials storage area. The plan must be submitted for approval to the Departmental Representative.

.3 Submit, at least one week prior to commencement of work, an off-site waste management plan. The plan must be submitted for approval to the Departmental Representative.

.4 Submittals for Progress Meetings: make submittals at least 24 hours before each weekly meeting.

.1 Survey of the volumes of excavated material stored in the temporary storage area.

.2 Copies of air sampling results.

.3 Copies of transport manifests, trip tickets, and disposal receipts for waste materials removed from work area.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION OF WORK

3.1 NATURE OF THE WORK

.1 All soils excavated within the wharf structure and all sediments excavated for the placement of sheet piles or other related structures shall be considered as potentially contaminated and shall be placed in temporary storage at designated by the Department for environmental characterization by the Departmental Representative.

.2 Excavation and temporary storage of excavated material must be carried out selectively so as not to mix excavated material with potentially different levels of contamination. At no time should excavated soil and sediment be mixed.

.3 Once the degree of contamination of the soils and sediments placed in temporary storage is known, the Contractor shall route the same to a treatment center or disposal site authorized by the MDDELCC.

3.2 REGULATORY REQUIREMENTS

.1 Work to meet or exceed minimum requirements established by federal and provincial laws and regulations which are applicable.

.1 Contractor: responsible for complying with amendments as they become effective.

.2 In event that compliance exceeds scope of work or conflicts with specific requirements of contract notify Departmental Representative immediately.

.3 Contractor is responsible for obtaining approvals required under applicable federal and provincial laws and regulations.

3.3 SEQUENCING AND SCHEDULING

.1 Contractor may not commence excavation of soil or sediment prior to the management plan of the temporary excavated materials storage area, the management plan for the equipment decontamination area and the plan for off-site management be approved by the Departmental Representative.

3.4 TEMPORARY STORAGE OF EXCAVED SOILS AND SEDIMENTS

.1 The storage of soil and sediment excavated materials for additional environmental characterization and off-site disposal may be carried out in the area designated by the Department. This area is located in the Parc des Ateliers, on Avenue Burgundy, within the limits of the construction site. The precise location of the temporary storage area is shown on the drawings.

.2 For any agreement with an individual concerning the use of land outside the site of the site for the temporary storage of the site, the Contractor shall provide a copy of the agreement signed with the Land Owner to the Departmental Representative. All measures for the storage of contaminated soil in the estimate and the MDDELCC « Storage and Contaminated Soil Transfer Regulations » must be followed. Upon completion of the work, a copy of the landowner's release must be provided to the Departmental Representative.

.3 Provide, use and maintain storage / storage facilities as specified in the management plan for the Temporary Storage Area.

.4 The management plan for the temporary excavation reserve area shall include, as a minimum, measures to:

.1 Prevent contact between contaminated excavated materials or leachate from contaminated excavated materials with existing soil.

.2 Prevent the dispersal of contaminated material from the temporary storage area by rainwater run-off, snowmelt or wind erosion.

.3 Prevent dispersal of leachate from dredging of contaminated material outside the temporary excavated materials storage area.

.4 Prevent dispersal of leachate from dredging of contaminated material outside the excavated materials storage area.

.5 Recovery of leachate from contaminated excavated materials.

.6 Permit the sampling of excavated material and leachate by the Departmental Representative.

.7 Clearly identifying different categories of excavated material.

.8 Maintain impermeable cover membrane on cuttings when not handled.

.9 Prevent equipment that may have been contaminated by contact with excavated materials from the temporary storage area without decontamination.

.10 Prevent unauthorized persons from entering the temporary excavated materials storage area.

.5 Provide Departmental Representative with excavation machinery required for excavation sampling.

3.5 REMOVAL AND ELIMINATION

.1 Dispose off-site of all equipment and materials stored in the temporary storage area in accordance with the off-site spill management plan approved by the Departmental Representative.

.2 Provide, use and maintain equipment as specified in Offsite Site Management Plan.

.3 The management plan for the equipment decontamination area shall include, as a minimum, measures to:

.1 Dispose of excavated material in MDDELCC authorized sites, which will be identified in the management plan with full contact information.

.2 Recover, contain and treat (if applicable) leachate from contaminated excavated materials drip. For release to the environment, the leachate must meet MDDELCC surface water quality criteria (protection of aquatic life - acute effect), suspended solids, pH and C10-C50. For leachate disposal, leachate must meet municipal wastewater disposal standards. As a last resort, the leachate can be transferred to a treatment site, which will be identified in the management plan with full contact information. The Contractor must obtain authorization from the Departmental Representative prior to any release to the environment, release to sewer or off-site disposal of leachate.

.3 Minimize dust emissions from excavated loads. Tarpaulins should be installed on all trucks carrying the excavated material

.4 Prevent spills from spilled or leached loads. The leachate should be transported in watertight tanks or containers.

.5 Obtain a transport manifest for each load of soil or leachate to be transported off-site. Transit manifests are prepared by the Departmental Representative and then handed over to the driver / carrier. The required information on the transport manifest is as follows:

.1 Name of carrier.

.2 Vehicle registration.

.3 The date.

.4 Start time of loading.

.5 The origin of the load.

.6 Type of soil transported (« A-B », « B-C », « > C »).

.7 The destination of the load.

.8 Signature of Departmental Representative (issuer of coupon).

.9 Signature of waste disposal site representative.

.4 Distribute copies of transport manifest in the following manner:

.1 A copy of the transport manifest shall be retained by the Departmental Representative at the site.

.2 A copy of the transport manifest shall be kept by the representative of the disposal site.

.3 A copy of the transport manifest shall be returned to the Contractor and to the supervisor completed for compilation on the payment slip.

.4 A copy shall be retained by the carrier.

.5 Obtain a weigh slip or a transport voucher for each load of soil or leachate to be transported off-site. The Contractor shall deliver the ticket or weigh slip to the Departmental Representative no later than the day following the shipment of the load. The information required on the weigh slip or the ticket is as follows:

.1 Name of disposal site.

.2 Vehicle registration.

.3 The date.

.4 The time of arrival of the load.

.5 The origin of the load.

.6 Type of soil transported (« A-B », « B-C », « > C »).

.7 Vehicle tare.

.8 Weight in metric ton (soil) or volume in liters (leachate) of load.

.9 Signature of representative of place of disposal.

3.6 FINAL DECONTAMINATION

.1 The part of the land used as temporary excavation storage area shall be returned to its original condition upon completion of the work.

.2 It is the responsibility of the Contractor to demonstrate, if required by the Departmental Representative, that the chemical quality of the soil and groundwater underlying the storage area has not been altered. In the event of contamination caused by his activities, the Contractor must recondition the premises at his own expense.

3.7 RECORD KEEPING

.1 The Contractor shall submit to the Departmental Representative a daily report of the work indicating the quantities of excavated materials deposited and the quantities of excavated material removed from the site.

3.8 WORK SUPERVISION

.1 Consultant's Responsibilities

.1 Environmental supervision of excavation and waste management is the responsibility of the Departmental Representative. The tasks of the Departmental Representative will include:

.1 Approve material disposal sites;

.2 Supervise or perform additional characterization work, if required;

.3 Supervise excavation work and assist Contractor in segregating different types of excavated material;

.4 Monitor temporary stacking of different types of excavated material;

.5 Monitor off-site disposal of excavated material;

.6 Supervise or carry out characterization of excavated material, as well as excavation bottoms and walls where required;

.2 Contractor's Responsibilities

.1 The Contractor shall provide for all necessary coordination for the taking of samples by Departmental Representative, the supply of a hydraulic excavator for characterization purposes, as well as waiting times for test results.

.2 The Contractor shall notify the Departmental Representative at least 48 hours prior to the completion of any work covered by this section of the specifications.

.3 The results of chemical analyses carried out on samples of certain materials of questionable environmental quality and put into piles will enable the identification of their management methods. No complaint will be admissible due to the analysis deadlines. A minimum of 3 working days must be provided for the transmission of these results from the time of sampling.

.4 The Contractor shall proceed with diligence to limit the number of laboratory mobilizations to characterize materials stored at the temporary storage site. For this purpose, a minimum of 200 tonnes of material temporarily stored is required before characterizing the stored materials.

.5 The Contractor shall follow the instructions of the Departmental Representative in all stages of environmental supervision of excavation and excavation work.

END OF SECTION

PARTIE 1 GENERAL

GENERAL NOTE: In this section, the term « site » extends to all installations located on the site where the site is being constructed (site itself, buildings, access, infrastructure, parking lots, docks, etc.).

1.1 RELATED SECTIONS

.1 No used.

1.2 REFERENCES

.1 Province of Quebec

- .1 *Loi sur la santé et la sécurité du travail*, L.R.Q., c. S-2.1 (Act respecting occupational health and safety).
- .2 *Code de sécurité pour les travaux de construction, L.R.Q., c. S-2.1*, r.4 (Safety code for the construction industry)

.2 Canadian Standards Association (CSA International)

- .1 CAN / CSA-W117.2-F12 - Welding, Cutting and Related Procedures
- .2 CSA Z462-F15, Safety in the Workplace
- .3 CAN / CSA-Z94.4-E11 (C2016), Selection, Use and Maintenance of Respirators
- .4 CAN / CSA-Z259.1-F05 (C2015), Work belts and saddles for work positioning and movement limitation.
- .5 CAN / CSA-Z259.10-F12 (C2016) - Safety harnesses
- .6 CAN / CSA Z275.1-F16, Hyperbaric Installations.
- .7 CAN / CSA Z275.2-F15, Occupational safety code for diving operations.
- .8 CAN / CSA Z275.4-F12, Competency Standard for Diving, the Use of Hyperbaric caisses and the Operation of Remote-Controlled Vehicles

1.3 SUBMITTAL PROCEDURES

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Departmental representative, and the CNESST the site-specific prevention program, as outlined in the article “GENERAL REQUIREMENTS”, at least 10 days prior to the start of work.

.3 Departmental representative will review Contractor’s site-specific prevention program and provide comments to Contractor within 10 days after receipt of the document. Revise plan as appropriate and resubmit to Departmental representative within 5 days after receipt of comments from Departmental representative. Departmental representative reserves the right not to authorize the start of work on the construction site as long as the content of the prevention program is not satisfactory. The Contactor shall then update his prevention program and resubmit it to the Departmental representative if the scope of work changes or if the working methods of the Contractor differ from his initial plans or for any other applicable new condition.

.4 Departmental representative’s review of Contractor’s site-specific prevention program should not be construed as approval of the program and does not reduce the Contractor’s overall responsibility for construction Health and Safety during the work.

.5 Submit copies of Contractor's authorized representative's construction site health and safety inspection reports to Departmental representative, at least once a week.

.6 Submit to Departmental representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit to Departmental representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard.

The investigation report shall contain at least the following:

.1 date, time and place of accident;

.2 name of sub-contractor involved in the accident;

.3 number of persons involved and condition of wounded;

.4 witness identification;

.5 detailed description of tasks performed at the time of the accident;

.6 equipment being used to accomplish the tasks performed at the time of the accident;

.7 corrective measures taken immediately after the accident;

.8 causes of the accident;

.9 preventive measures that have been put in place to prevent a similar accident.

.8 Submit to Departmental representative WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittals and Section 02 81 01 - Hazardous Materials. Contractor must also keep one copy of these documents on the construction site.

.9 Medical Surveillance: where prescribed by legislation, regulation or prevention program, submit certification of medical surveillance for construction site personnel prior to commencement of Work, and submit additional certifications for any new construction site personnel to Departmental representative.

.10 Submit to Departmental representative an on-site Emergency Response Plan at the same time as the prevention program. The Emergency Response plan must contain the elements listed in the article "GENERAL REQUIREMENTS" of this section.

.11 Submit to Departmental representative copies of all training certificates required for the application of the prevention program, in particular (if applicable) for the following:

.1 first aid in the workplace and cardiopulmonary resuscitation;

.2 work likely to release asbestos dust (mandatory for all work where asbestos is present);

.3 work in confined spaces (mandatory for all work in confined spaces);

.4 lockout-tagout procedures (mandatory for all work requiring lockout);

.5 safely operating forklift trucks (mandatory for all forklift usage);

.6 safely operating elevating work platforms (mandatory for the use of all elevating platforms);

.7 any other requirement of Regulations or the safety program.

In addition, the certifications of the *Cours de santé et sécurité générale pour les chantiers de construction (General Health and Safety Training for Construction Sites)* shall be available on demand on the construction site.

.12 Engineer's plans and certificates of compliance: Contractor must submit to the Departmental representative and to the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST) a copy signed and sealed by engineer of all plans and certificates of compliance required pursuant to the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry) or by any other legislation or regulation or by any other clause in the specifications or in the contract. The Contractor must also submit a certificate of conformity signed by an engineer once the facility for which these plans were prepared has been completed and before a person uses the facility. A copy of these documents must be available on site at all times.

1.4 FILING OF NOTICE OF CONSTRUCTION SITE OPENING

.1 Notice of construction site opening shall be submitted to the CNESST before work begins. A copy of such notice and acknowledgment of receipt from the CNESST shall be submitted to Departmental representative.

At the completion of all the work, a notice of construction site closing shall be submitted to the CNESST, with a copy to Departmental representative.

.2 The Contractor shall assume the role of being the Principal Contractor in the limits of the construction site and elsewhere where he must execute work within the framework of this project. The Contractor shall recognize the responsibility of being the Principal Contractor of the project and identify himself as such in the notice of the construction site opening he provides to the CNESST.

.3 The Contractor shall accept to divide and identify the construction site adequately in order to define time and space at all times throughout the course of the project.

1.5 HAZARD ASSESSMENT

.1 The Contractor must perform construction site specific safety hazard assessment related to project.

1.6 MEETINGS

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

.2 Contractor's representative with decision power must attend any meetings at which construction site safety and health issues are to be discussed.

.3 If it is anticipated that there will be 25 workers or more on the construction site at any given time, the Contractor shall set up a worksite committee and hold meetings as required by the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4) (Safety code for the construction industry). A copy of the minutes of the meetings of the committee shall be provided to the Departmental representative no later than 5 days after the committee meeting.

1.7 REGULATORY REQUIREMENTS

.1 Do the Work in accordance with Section 01 1400 01 Work Restrictions and section 41 00 - Regulatory Requirements].

.2 Comply with all legislation, regulations and standards applicable to the construction site and its related activities.

.3 Comply with specified standards and regulations to ensure safe operations on a site containing hazardous or toxic materials.

.4 Always use the most recent version of the standards specified in the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), notwithstanding the date indicated in that Code.

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with *the Loi sur la santé et la sécurité du travail* (L.R.Q., c. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4.) (Safety code for the construction industry) in addition to respecting all the requirements of this specification manual.

1.9 RESPONSIBILITIES

.1 The Contractor must acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the *Loi sur la santé et la sécurité du travail* (L.R.Q., ch. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry).

.2 The Contractor must be responsible for health and safety of persons on construction site, safety of property on construction site and for the protection of persons adjacent to construction site and the environment to the extent that they may be affected by conduct of the work.

.3 No matter the size or location of the construction site, the Contractor must clearly define the limits of the construction site by physical means and respect all specific regulation requirements applicable in this regard. The means chosen to define the limits of the construction site must be submitted to the Departmental representative.

.4 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 prevention Plan.

1.10 WORK PERFORMED BY EXTERNAL CONTRACTORS

.1 No used.

1.11 RISK GENERAL REQUIREMENTS

.1 Before undertaking the work, prepare a site-specific prevention program based on the hazards identified according to the article “HAZARD ASSESSMENT” and the article “RISKS INHERENT TO THE WORKSITE” in this section. Apply this program in its totality from the start of the project until demobilization of all personnel from the construction site. The prevention program shall take into consideration the specific characteristics of the project and cover all the work to be executed on the construction site.

.2 The safety program must include at least the following:

- .1 company safety and health policy;
- .2 description of the stages of the work;
- .3 total costs, schedule and projected workforce curves;
- .4 flow chart of safety and health responsibilities;
- .5 physical and material layout of the construction site;
- .6 risk assessment for each stage of the work, including preventive measures and the procedures for applying them;

.7 identification of the preventive measures relative to the specific risks inherent to the worksite indicated in the article “RISKS INHERENT TO THE WORKSITE”;

.8 identification of preventive measures for health and safety of employees and / or public works site as indicated in the article “SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC”;

.9 training requirements;

.10 procedures in case of accident/injury;

.11 written commitment from all parties to comply with the safety program;

.12 construction site inspection cheklist based on the preventive measures;

.13 emergency response plan which shall contain at least the following:

.1 construction site evacuation procedures;

.2 identification of resources (police, firefighters, ambulance services, etc.);

.3 identification of persons in charge of the construction site;

.4 identification of the first-aid attendants;

.5 communication organizational chart (including the person responsible for the site and the Departmental representative);

.6 training required for those responsible for applying the plan;

.7 any other information needed, in the light of the construction site’s characteristics.

If available the Departmental representative will provide the evacuation procedures to the Contractor who shall then coordinate the construction site procedure with that of the site and submit it to the Departmental representative.

.3 Departmental representative may respond in writing, where deficiencies or concerns are noted in the prevention program and may request resubmission with correction of deficiencies or concerns.

.4 In addition to the prevention program, during the course of the work the Contractor shall elaborate and submit to the Departmental representative specific written procedures for any work having a high risk factor of accident (for example: demolition procedures, specific installation procedures, hoisting plan, procedures for entering a confined space, procedures for interrupting electric power, etc.) or at the request of the Departmental representative.

.5 The Contractor shall plan and organize work so as to eliminate the danger at source or ensure collective protection, thereby minimizing the use of personal protective equipment.

.6 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public shall be deemed inadequate for the work to be executed.

.7 All mechanical equipment (for example, but not limited to: hoisting devices for persons or materials, excavators, concrete pumps, concrete saws) shall be inspected before delivery to the construction site. Before using any mechanical equipment, the Contractor shall obtain a certificate of compliance signed by a qualified mechanic dated less than a week prior to the arrival of each piece of equipment on the construction site; the certificate shall remain on the construction site and transmitted to the Departmental representative on demand.

.8 Ensure all inspections (daily, periodic, annual, etc.) for the hoisting devices for persons or materials required by the current standards are carried out and be able to provide a copy of the inspection certificates to the Departmental representative on demand.

.9 The Departmental representative can at all times, if he suspects a malfunction or the risk of an accident, order the immediate stop of any piece of equipment and require an inspection by a specialist of his choice.

.10 The Departmental representative must be consulted for the location of storing gas cylinders and tanks on the construction site.

1.12 RISKS INHERENT TO THE WORKSITE

.1 In addition to the risks related to the tasks to be carried out, personnel responsible for the execution of the work on the construction site will be exposed to the following risks, inherent to the area where the work will be executed. Without limiting his prevention program to these, the Contractor shall also include these elements in his program.

At the worksite there is the presence of the following:

.1 materials containing asbestos;

.2 materials containing lead;

.3 mold;

.4 other hazardous materials (specify);

.5 enclosed spaces;

.6 overhead power lines;

.7 underground services (electricity, gas, steam, aqueduct, etc.);

.8 laboratories;

.9 trees and landscaping to conserve and protect;

.10 potentially unstable soils;

.11 barbed wire fences;

.12 nearby body of water;

.13 contaminated sediment;

1.13 SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC

.1 The worksite is occupied by employees and/or the public. The Contractor shall consider the following specific requirements for the protection of employees and / or the public:

.1 Presence of a boat launch ramp

.2 Presence of a marina

.3 Public site (National Historic Site of Chambly Canal)

These requirements must be included in the Contractor’s site-specific safety plan as well as any other measures provided by the Contractor to protect the health and safety of employees and / or the public on the site.

1.14 UNFORESEEN HAZARDS

.1 Whenever a source of danger not defined in the specifications or identified in the preliminary construction site inspection arises as a result of or in the course of the work, the Contractor must immediately suspend work, notify the person responsible for health and safety on the construction site, take appropriate temporary measures to protect the workers and the public and notify Departmental representative, both

verbally and in writing. Then the Contractor must do the necessary modifications to the prevention program or apply the security measures required in order to resume work.

1.15 PERSON IN CHARGE OF HEALTH AND SAFETY

.1 If the construction site meets the requirements of article 2.5.3 of the *Code the sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), the Contractor needs to hire a competent person authorized as a safety officer and appoint this person full time from the beginning of the work. This person's tasks shall solely be dedicated to the management of health and safety on the construction site. This safety officer must have the following qualifications:

.1 have a safety officer certificate issued by the CNESST since at least 10 years;

.2 have site-related working experience specific to the activities associated with the present project;

.3 have working knowledge of occupational health and safety regulations in the workplace;

.4 be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter the construction site to perform work;

.5 be responsible for implementing, enforcing in detail and monitoring site-specific Contractor's Health and prevention program;

.6 be on construction site at all times during execution of work;

.7 inspect the work and ensure compliance with all regulatory requirements and those indicated in the contract documents or the site-specific prevention program.

.8 Keep a daily log of actions taken and submitting a copy to Departmental representative each week.

The safety officer's certificate shall be submitted to the Departmental representative before the start of the work.

.2 When the hiring of a safety officer is not required or if this person is hired by the Departmental representative, the Contractor shall designate a competent person to supervise and take responsibility for health and safety, no matter the size of the construction site or how many workers are present at the workplace. This person shall be on construction site at all times and be able to take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the construction site and likely to be affected by any of the work. The Contractor shall submit the name of this person to the Departmental representative before the start of work.

1.16 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on construction site in accordance with Acts and Regulations of the Province, and in consultation with Departmental representative.

.2 At a minimum, the following information and documents must be posted in a location readily accessible to all workers:

.1 notice of construction site opening;

.2 identification of principal Contractor;

.3 company OSH policy;

.4 site-specific prevention program;

.5 emergency plan;

.6 minutes of worksite committee meetings;

.7 names of worksite committee representatives;

.8 names of the first-aid attendants;

.9 action reports and correction notices issued by the CNESST.

1.17 INSPECTION OF THE CONSTRUCTION SITE AND CORRECTION OF NON-COMPLIANCES

.1 Inspect the construction site and complete the construction site inspection checklist and submit it to the Departmental representative in accordance with the article “ACTION AND INFORMATIONAL SUBMITTALS” in this section.

.2 Immediately take all necessary measures to correct any situations deemed non-compliant during the inspections mentioned in the previous paragraph or noticed by the authorities having jurisdiction or the Departmental representative or his agent.

.3 Submit to Departmental representative written confirmation of all measures taken to correct the situation in case of non-compliance in matters pertaining to health and safety.

.4 The Contractor shall give the safety officer or, where there is no safety officer, the person assigned to safety and health responsibilities, full authority to order cessation and resuming of work as and when deemed necessary or desirable in the interests of safety and health. This person should always act so that the safety and health of the public and construction site workers and environmental protection take precedence over cost and scheduling considerations.

.5 The Departmental representative or his agent may order cessation of work if the Contractor does not make the corrections needed to conditions deemed non-compliant in matters pertaining to health and safety. Without limiting the scope of the preceding articles, the Departmental representative may order cessation of work if, in his view, there is any hazard or threat to the safety or health of construction site personnel or the public or to the environment.

1.18 PREVENTION OF VIOLENCE

.1 Health and safety management of Public Works and Government Services Canada construction sites includes the implementation of measures designed to protect the psychological health of all persons who access the construction site where the work is taking place. Consequently, in addition to physical violence, verbal abuse, intimidation and harassment are not tolerated on the construction site. Any person who demonstrates such actions or behaviors will receive a warning and/or could be definitely expelled from the construction site by the Departmental representative.

1.19 BLASTING

.1 Not used.

1.20 POWDER ACTIATED DEVICE

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

.2 Any person using a sealing gun must have a training certificate and meet all requirements of section 7 of the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4) Safety Code for construction.

.3 Any other cartridge device shall be used as specified by the manufacturer and in accordance with applicable standards and regulations.

1.21 USE OF PUBLIC ROADS

.1 Where it is necessary to encroach on a public road for operational reasons or to ensure the security of the workers, the occupants or the public (for example: the use of scaffolding, cranes, excavation work, etc.), the Contractor shall obtain at his own expense any authorizations and permits required by the competent authority.

.2 The Contractor shall install at his own expense any signage, barricades or other devices needed to ensure the safety and security of the public and the Contractor's own facilities.

1.22 LOCKOUT-TAGOUT

.1 For all work on electrically or otherwise energized equipment, the Contractor shall draw up and implement a general lockout-tagout procedure and submit it to the Departmental representative.

.2 Supervisors and all workers concerned by work requiring lockout-tagout must have received training on lockout-tagout procedures by a recognized organization; Contractor shall submit training certificates to the Departmental representative.

.3 Before starting the lockout-tagout procedure of a piece of equipment on an occupied site, Contractor must coordinate his work with the representative of the site if the interruption of the power sources can have an impact on the operations of the site or on its occupants.

.4 Contractor must designate a qualified person as responsible for the lockout-tagout and must make sure that that person prepares a lockout-tagout data sheet for each piece of equipment involved. The lockout-tagout data sheet must be submitted to the Departmental representative at least 48 hours before the beginning of the work. The Departmental representative will review the data sheet with the representative of the site if the work takes place in an existing building. The data sheets for lockout-tagout must contain at least the following information:

  .1 description of work to carry out;

  .2 identification, description and location of the circuit and/or piece of equipment to lockout-tagout;

  .3 identification of energy sources that feeds the piece of equipment;

  .4 identification of each cutout point;

  .5 sequence of lockout-tagout and the release of residual energy as well as the sequence of unlocking;

  .6 list of material needed for the lockout-tagout;

  .7 method of verification of zero energy implementation;

  .8 name and signature of the person who prepared the data sheet.

.5 When required by the Departmental representative, Contractor must record all this information on the site's representative form.

.6 At the time of lockout-tagout, the person responsible must date the data sheet and ensure that each worker involved in the work on the circuit/piece of equipment to lockout-tagout puts his name on the data sheet and signs it.

1.23 ELECTRICAL WORK

.1 Contractor shall ensure that all electrical work is executed by qualified employees in accordance with the provincial regulation respecting vocational training and qualification.

.2 Contractor shall respect all requirements of standard CSA Z462 Workplace Electrical Safety Standard.

.3 No repairs or alterations shall be carried out on any live equipment except where complete disconnection of the equipment is not feasible.

.4 Contractor shall respect all requirements prescribed in paragraph “LOCKOUT-TAGOUT” in this section.

.5 Contractor shall advise in writing the Departmental representative of all the work that cannot be done with de-energized equipment and obtain his authorization. Contractor shall demonstrate to the Departmental representative that it is impossible to do the work with de-energized equipment and provide all the information necessary to request and obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) before the beginning of the work, excluding for the exceptions indicated in standard CSA Z462 Workplace electrical safety.

.6 The energized electrical work permit on must contain at least the following elements:

.1 description of the circuit and equipment and its location;

.2 justification for having to do the work in an energized condition;

.3 description of safe work practices to apply;

.4 results of the shock hazard analysis;

.5 limit of the protective perimeter against electric shocks;

.6 results of the arc flash hazard analysis;

.7 description of the arc flash protection boundary;

.8 description of the personal protective equipment required;

.9 description of the means to limit access to unqualified persons;

.10 proof that an information session has been carried out;

.11 approval signature of the energized electrical work (by a person in authority or by the owner).

.7 If for the operational requirements of the occupants of the site the representative of the site requires that the Contractor performs work in an energized condition, the Contractor shall obtain all the information required to request and obtain obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) and have it signed by the representative of the site assigned by the Departmental representative before the beginning of the work.

1.24 EXPOSURE TO ASBESTOS

.1 Not used.

1.25 FUNGAL CONTAMINATION

.1 Not used.

1.26 EXPOSURE TO SILICA

.1 For any interior or exterior work generating silica, the Contractor must respect the following requirements, in addition to those in the *Code de sécurité pour les travaux de construction S-2.1, r.4* (Safety code for the construction industry).

.1 Work in wet environment or use tools with the inflow of water in order to reduce dustiness, if not, collect dust at the source and retain it with a high-efficiency filters not to propagate dust in the environment.

.2 Clean surfaces and tools with water, never with compressed air.

.3 Sand and pickle surfaces by using an abrasive containing less than 1% of silica (also called amorphous silica).

.4 Install shields or other containment device to prevent silica dust from migrating toward other workers or the public.

.5 Wear individual respiratory and ocular protection equipment during all the operations that could generate silica dust in accordance with the requirements of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry).

.6 Wear coveralls to prevent contamination outside the construction site.

.7 Do not eat, drink, or smoke in a dusty environment.

.8 Wash the hands and the face before drinking, eating or smoking.

1.27 SANDBLASTING

.1 Prior to starting any sandblasting work, the Contractor must:

.1 Provide a written procedure of the work that meets the requirements of section 3.20.of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the Construction Industry).

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

.3 All sanding and sandblasting work shall be done by using an abrasive containing less than 1% of silica.

1.28 LEAD-BASED PAINT REMOVAL

.1 Not used.

1.29 EXPOSURE TO ANIMAL'S FECAL DROPPINGS

.1 Prior to all work where workers are likely to come in contact with materials contaminated by animal's fecal droppings, the Contractor must:

.1 Provide a written procedure for the work which respects all the requirements of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry), as well as the requirements indicated in the document "*Des fientes de pigeons dans votre lieu de travail: méfiez-vous"* (Pigeon droppings in your workplace: Beware" published by the CNESST (http://www.csst.qc.ca/publications/100/Documents/DC100_1331_1web2.pdf)

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.30 RESPIRATORY PROTECTION

.1 Contractor must ensure that all workers who must wear a respirator as part of their duties have received training for that purpose as well as fit testing of their respirator, in accordance with CSA Standard Z94.4 Selection, use and care of respirators. Submit the certificates of the fit testings to the Departmental representative on demand.

1.31 FALL PROTECTION

.1 Plan and organize work so as to eliminate the risk of fall at the source or ensure collective protection, thereby minimizing the use of personal protective equipment. When personal fall protection is required, workers must use a safety harness that complies with CSA standard CAN/CSA -Z259.10. A safety belt must not be used as fall protection.

.2 Every person using an elevating platform (scissors, telescopic mast, articulated mast, rotative mast, etc.) must have a training regarding this equipment.

.3 The use of a safety harness is mandatory for all elevating platforms with telescopic, articulate or rotative mast.

.4 Define the limits of the danger zone around each elevating platform.

.5 All openings in a floor or roof must be surrounded by a guardrail or provided with a cover fixed to the floor able to withstand the loads to which it could be exposed, regardless of the size of the opening and the height of the fall it represents.

.6 Everyone who works within two metres from a fall hazard of three metres or more must use a safety harness in accordance with the requirements of the regulation, unless there is a guardrail or another device offering an equivalent safety.

.7 Despite the requirements of the regulation, the Departmental representative may require the installation of a guardrail or the use of a safety harness for specific situations presenting a risk of fall less than three metres.

1.32 SCAFFOLDING

.1 In addition to the requirements of *Code de sécurité pour les travaux de construction L.R.Q., C.S-2.1, r.4*, the Contractor using scaffolding shall meet the following requirements:

.1 Foundation

.1 Scaffoldings shall be installed on a solid foundation so that it does not slip or rock.

.2 Contractors wishing to install scaffoldings on a roof, overhang, canopy or awning shall submit their calculations and loads, as well as plans signed and sealed by an engineer to the Departmental representative and obtain his authorization before beginning installation.

.2 Assembly, bracing and mooring

.1 All scaffoldings shall be assembled, braced and moored in accordance with the manufacturer's instructions and the provisions of the *Code de sécurité pour les travaux de construction L.R.Q.,C.S-2.1,r.4* (Safety code for the construction industry).

.2 Where a situation requires the removal of part of the scaffoldings (e.g., crosspieces), the Contractor shall submit to the Departmental representative an assembly procedure signed and sealed by an engineer certifying that the scaffolding assembled in that manner will allow the work to be done safely given the loads to which it will be subject.

.3 For scaffoldings where the span between two supports is greater than three metres, the Contractor shall provide the Departmental representative an assembly plan signed and sealed by an engineer.

.3 Protection against falls during assembly

.1 Workers exposed to the risk of falling more than three metres shall be protected against falls at all times during assembly.

.4 Platforms

.1 Scaffolding platforms shall be designed and installed in accordance with the provisions of the *Code de sécurité pour les travaux de construction L.R.Q.,C.S-2.1,r.4* (Safety code for the construction industry).

.2 If planks are used, they shall be approved and stamped in accordance with section 3.9.8 of the *Code de sécurité pour les travaux de construction L.R.Q.,C.S-2.1,r.4* (Safety code for the construction industry)

.3 Scaffoldings of four sections (or six metres) high or more shall have a full platform covering the entire surface between the putlogs every three metres high or fraction thereof, and the components of that platform shall not be moved at any time to create an intermediate landing.

.5 Guardrails

.1 A guardrail shall be installed on every landing.

.2 Cross braces shall not be considered as guardrails.

.3 If the platforms are not covering the entire surface between the putlogs, the guardrail must be installed just above the edge of the platform so that there is no empty horizontal space between the platform and the guardrail.

.4 Where scaffoldings has four sections (or six metres) high or more and full platforms are required, the guardrails shall be installed on each landing at the start of work and shall remain in place until the work is completed.

.6 Access

.1 The Contractor shall ensure that access to the scaffoldings does not compromise worker safety.

.2 Where the platforms of the scaffoldings are comprised of planks, ladders shall be installed in such a way that planks extending beyond the platform do not block the way up or down.

.3 Notwithstanding the provisions of the *Code de sécurité pour les travaux de construction L.R.Q.,C.S-2.1,r.4* (Safety code for the construction industry), stairs shall be installed on all scaffoldings that have six or more rows of uprights or is six sections (or nine metres) high or higher.

.7 Protection of the public and occupants

.1 When scaffoldings are installed in a zone accessible to the public, the Contractor shall take the necessary measures to prevent the public from having access to them and, if applicable, to the work or storage area located in the vicinity of these scaffolding.

.2 Contractor must install covered walkways, nets or other similar devices to protect workers, the public and the occupants against falling objects. The means of protection must be approved by the Departmental representative.

.8 Engineering plans

.1 In addition to those required by the *Code de sécurité pour les travaux de construction L.R.Q.,C.S-2.1,r.4* (Safety code for the construction industry), the Departmental representative reserves the right to require engineering plans for other types or configurations of scaffoldings.

.2 A plan signed and sealed by an engineer is required for all scaffoldings that will be covered with a canvas, a tarpaulin or any other material that has wind resistance.

.3 A certificate of conformity signed by an engineer is required in all cases where an engineering plan is required for the installation and this, before anybody uses the facility. A copy of these documents must be available on the construction site at all times.

1.33 CLOSED SPACES

.1 Not used.

1.34 EXCAVATION WORK

.1 In addition to the requirements of the *Code de sécurité pour les travaux de construction*, the Contractor performing trenching or excavation work shall meet the following requirements:

.1 Complete the form below and forward it to the Departmental Representative prior to the start of excavation work.

.2 Submit to the Departmental Representative, as applicable, the following documents:

.1 Drawings and specifications, signed and sealed by an engineer, to be installed for excavation work; or

.2 Engineer's notice specifying trench wall angle or excavation

Continued on next page

Excavation guidelines

N° ____ of ____

This directive is provided as an example by the Commission de la santé et de la sécurité du travail (CSST). It contains the main instructions that the employer should give to the person responsible for the work on the site and to the operator of the earth-moving machine.

Company name	
Project name	Project no.
Address of the site	Construction start date

Field survey

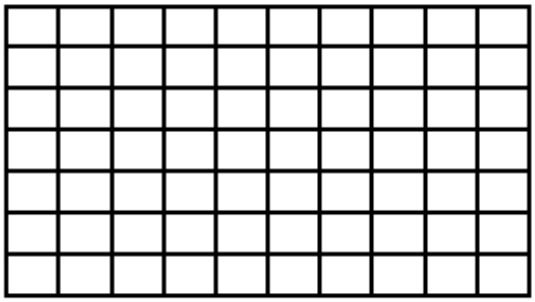
Chaining or axes : from _____ to _____ Attached plan ☐ Plan no. : _____

Working method to use

While making sure the excavation walls do not pose the risk of landslide

- ☐ dig and shore according to the plans and specifications of the engineer ;
- ☐ dig and shore using a trench box ;
- ☐ dig without shoring as long as one of the following conditions is respected:
  - ☐ rock is sound;
  - ☐ no worker goes down in the trench or excavation;
  - ☐ the walls are dug according to the engineer's advice.

Dimensions of excavation (Dig according to the following profile.)



	Minimum	Maximum
H Depth		
Wb Width at bottom		
Width at top		

Safety measures

Deposit the materials at a distance of at least 1.2 metre (4 feet) from top of walls.
Do not allowed any vehicle to come closer than 3 metres (10 feet) from top of walls.

- ☐ Respect the engineer's plan concerning work in the proximity of an existing facility.
- ☐ Follow the location plan to locate the underground infrastructures.
- ☐ Install signaling devices prescribed in the traffic plan (barriers, visual references, etc.).
- ☐ Assign a flag person or more to control the flow of traffic.
- ☐ Respect the procedure prescribes for work near power lines.
- ☐ Provide protection devices for the workers, such as concrete crash barriers.

Name	Occupation	
Signature	Date	Telephone no.

Directive submitted
☐ to the responsible of the work on the site ☐ to the operator of the earth-moving machine

DC700(4066-2 (2001-01)

1.35 LOAD LIFTING USING A CRANE OR CRANE TRUCK

.1 Unless otherwise specified, the Contractor shall prepare a lifting plan and forward it to the Departmental Representative for any lifting operation using a crane or crane truck at least 5 days before the start of the lifting operations covered by this plan. This lifting plan must contain at least the information listed at the end of this section.

.2 The lifting plan shall be signed and sealed by an engineer for the following lifting operations:

- .1 Lifting of concrete panels;
- .2 Lifting mechanical/electrical equipment on a roof or on floors of a building;
- .3 Lifting of loads encroaching on public roads;
- .4 Lifting large loads or heavy trucks;
- .5 Any other lifting operation, as required by the Departmental Representative.

.3 In addition to the above requirements, the Contractor shall plan the lifting operations in such a manner as to prevent loads from passing over occupied areas on a site. When it is impossible to do otherwise, the lifting plan must be signed and sealed by an engineer and must guarantee the safety of the occupants of this zone; this plan must be approved by the Departmental Representative. The Departmental Representative may, if deemed necessary, impose evening and weekend work.

.4 From the beginning of the work on the site, the Contractor must send to the Departmental Representative a list of the lifting plans planned for the entire duration of the work. This list should be updated as necessary if changes are made during the work.

.5 In addition to the mechanical inspection certificate, all cranes or truck cranes shall carry the annual inspection certificate and logbook of the crane on board the cabin.

.6 The entire lifting area shall be delimited so as to prevent unauthorized persons from entering.

.7 The Contractor shall inspect all slings and lifting accessories carefully to ensure that those in poor condition are destroyed and disposed of.

.8 Lifting of compressed gas cylinders shall be carried out using a specially designed basket.

.9 Minimum lift plan content:

- .1 Sketch showing minimum location of crane, surrounding facilities, area covered by lifting operations, pedestrian and vehicular traffic lanes, perimeter security, etc.
- .2 Weight of loads
- .3 Dimensions of loads
- .4 List of lifting accessories and weights for each
- .5 Total weight lifted
- .6 Maximum height of obstacles to be crossed
- .7 Height of lifting loads from the roof surface (in the case of lifting loads to be placed on roofs)
- .8 Using guide cables
- .9 Type of crane used
- .10 Crane capacity
- .11 Boom length
- .12 Boom angle

.13 Crane operating radius

.14 Stabilizers deployment

.15 Percentage of use of crane capacity

.16 Confirmation of verification of lifting equipment

.17 Identification of crane operator and lift operator with signatures and date

1.36 HOT WORK

.1 Hot work refers to all work that uses a naked flame or that can produce heat or sparks such as riveting, welding, cutting, brazing, grinding, burning, heating, etc.

.2 Welding and cutting

In addition to the requirements set out in the preceding paragraphs, the Contractor shall meet the following requirements:

.1 Welding and cutting operations shall be carried out in accordance with the requirements of the *Code de Sécurité pour les travaux de construction*, S-2.1, r.4 and CSA W117.2 *Règles de sécurité en soudage, coupage et procédés connexes.*.

.2 Use an air extraction system with filters for any welding or cutting operations performed inside.

.3 Discontinue any activity that produces flammable or combustible gases, vapors or dusts in the vicinity of welding or cutting operations.

.4 Store compressed gas cylinders on fireproof surface and ensure room is well ventilated.

.5 Store all oxygen cylinders at a minimum distance of 6 metres from flammable gas cylinders (ex.: acetylene) or combustible material such as oil or grease, unless they are separated by a partition made of non-combustible material as specified in article 3.13.4. of the *Code de Sécurité pour les travaux de construction* S-2.1, r.4.

.6 Store bottles away from sources of heat.

.7 Do not store bottles near stairs, outlets, corridors and elevators.

.8 Do not expose acetylene to metals such as silver, mercury, copper, and brass alloys with more than 65% copper, to avoid the risk of explosive reaction.

.9 Check that the electric arc welding equipment has the required voltage and is grounded.

.10 Ensure that electrical conductor wires are not damaged.

.11 Place welding equipment on level ground protected from the elements.

.12 Install flame retardant fabrics when welding is done in suspension or where there is a risk of sparking.

.13 Remove or protect flammable or combustible materials within 15 metres of welding.

.14 Never weld or cut on closed container.

.15 Do not cut, weld or work over open flames on containers, tanks, pipes or other containers that have contained a substance or residues of flammable or explosive products unless:

.1 They have been cleaned and air samples have been taken indicating no explosive vapors; and

.2 Provision has been made for the safety of workers.

1.37 ROOF WORK

.1 Not used.

1.38 ERECTION AND REMOVAL OF METAL STRUCTURAL FRAMING

.1 In addition to section 3.24 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4), the Contractor shall comply with the requirements set out in the following paragraphs.

.2 The Contractor shall forward the following documents to the Departmental Representative prior to the commencement of erection of metal structural framing:

.1 Assembly procedure in accordance with article 3.24.10 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4);

.2 Rescue procedure for the release of a worker suspended in a safety harness within a maximum of 15 minutes, adapted to the site and complying with article 3.24.4 of the same code; This procedure must be accompanied by a written confirmation to the effect that it has been proven;

.3 Engineer certification that the anchor rods have been installed in accordance with the anchorage plan, as required by section 3.24.12 of the said code;

.4 Lifting procedure in the case of lifting in one of the ways specified in article 3.24.15 of the same code;

.5 Name of person identified as rescuer and rescue training certificate of that person;

.6 The name of the person identified as a rescuer and attestation of first aid training for that person;

.3 The Contractor shall ensure that the following documents are available at all times on site for consultation:

.1 Manufacturer’s erection plan for structural steel in accordance with section 3.24.9 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4);

.2 Anchor plan for anchor rods in accordance with Section 3.24.11 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4);

1.39 WORK NEAR A BODY OF WATER

.1 For all work carried out in the vicinity of a water body (such as work above water, work on a wharf, work on the edge of a watercourse, etc.), the Contractor must comply with the requirements of the following paragraphs in addition to section 2.10.13 of the *Code de sécurité pour les travaux de construction*, RSQ, CS-2.1, r.4.

.2 The Contractor shall plan his work so that safety measures are in place to prevent any worker from falling into the water. The use of these safety measures must be preferred to the wearing of the lifejacket.

.3 Ensure workers wear lifejackets to keep the user's head out of the water and to safely float the arms if no other safety measures can protect him.

.4 Provide to the Departmental Representative, prior to commencement of work, the following documents:

.1 Description of water body;

.2 Description of work carried out in the vicinity of that body of water;

.3 A water transport plan adapted to the work and characteristics of the water body;

.4 Rescue plan adapted to the work and characteristics of the body of water;

Each of the documents listed above must contain at least the information required by section 11 of the *Code de sécurité pour les travaux de construction* L.R.Q., C.S-2.1, r.4.

If it is possible that all or part of the work is carried out during the winter period, the safety measures included in the documents required above must be adapted accordingly.

.5 The Contractor shall transmit to the Departmental Representative the training certificate required by section 11.2 of the *Code de sécurité pour les travaux de construction*, L.R.Q., C.S-2.1, r.4, for the following persons:

.1 The person designated to prepare the documents required in the preceding paragraph; and

.2 Each person responsible for transport or rescue operations.

.6 If the rescue plan involves the use of a lifeboat, the Contractor shall forward to the Departmental Representative the certificate or certificate of competence of the rescue workers for its work, issued by Transport Canada.

.7 The Contractor shall include in his weekly inspection schedule the devices required by sections 11.4 and 11.5 of the *Code de sécurité pour les travaux de construction, L.R.Q., C.S-2.1, r.4*.

.8 Ensure that a lifeboat moored and in water is available at each location where a worker is likely to fall into the water. However, one lifeboat may serve several locations on the same site provided that the distance between each of these locations and the lifeboat is less than 30 m.

.9 Where a work site is a dock, pond, jetty, wharf or other similar structure, a ladder with at least two (2) rungs below the water surface shall be installed on the In front of the structure, every 60 m.

1.40 INTERIOR USE OF INTERNAL COMBUSTION ENGINES

.1 Not applicable. In addition to section 3.10.17 of *Code de sécurité pour les travaux de construction, L.R.Q., C.S-2.*

1.41 TEMPORARY HEATING

.1 In addition to Section 3.11 of the *Code de sécurité pour les travaux de construction*, L.R.Q., C.S-2.1, r.4., The Contractor shall comply with the requirements set out in the following paragraphs.

.2 A portable fire extinguisher shall be available at all times in the vicinity of the heater, regardless of the type of heater used.

.3 Appliances must always be used according to manufacturer's specifications.

.4 Where applicable, canvases and tarpaulins used in the vicinity of heating appliances must be securely attached so that they cannot fall onto such appliances, the piping connected to such appliances or any other source of heat.

.5 Gas cylinders shall be installed so that they are protected from vehicular traffic and other equipment.

.6 For the use of non-electrical heaters, the Contractor shall install a carbon monoxide detector in the work area, near the equipment and/or workers, for the duration of the heating. The Contractor shall immediately make the necessary corrections to the heating installations if the detector alarm sounds.

.7 Contractor to ensure minimal monitoring of heaters outside working hours (evenings and weekends). He must submit a monitoring plan to the Departmental Representative prior to the use of the heaters.

1.42 WORK NEAR OVERHEAD ELECTRICAL LINES

.1 Where there is an overhead power line in the works area and the Contractor chooses to apply paragraph 5.2.2 (b) of the *Code de sécurité pour les travaux de construction, L.R.Q., C.S-2.1, r.4*., a copy of the agreement with the electrical operating company and a copy of the work process, as required by section 5.2.2 (b), shall be forwarded to the Departmental Representative prior to the beginning of work related to these documents.

1.43 DIVING WORK

.1 By accepting this contract, the Contractor undertakes to comply with the following requirements:

.1 Comply with all requirements of *Règlement sur la santé et la sécurité du travail* S-2.1, r. 19.1 specifically Section XXVI.I, *Travail effectué en plongée*. Also comply with CSA Standard Z275.2 - *Occupational safety code for diving operations* and CSA standards Z275.1 - Hyperbaric chambers and CSA Z275.4 - *Competency standard for diving*, most recent editions. If there is a difference between two requirements for the same point, the most stringent requirement applies.

.2 In addition to the preceding paragraph, in the case of construction work, also comply with the *Code de sécurité pour les travaux de construction*, L.R.Q., C.S-2.1, r.4.

.3 Prior to commencement of work, forward to the Departmental Representative the following documents, as required by *Règlement sur la santé et la sécurité du travail* (S-2.1, r.19.1):

.1 the professional diving training certificate of each member of the diving team OR the document attesting to the recognition of the skills of these persons in accordance with Standard CAN / CSA Z 275.4-02, Pursuant to section 312.8 of that Regulation;

.2 the certificate of first aid training in the workplace of each member of the diving team;

.3 The medical certificate of each member of the dive team;

.4 For each of the dives provided for in this mandate, a diving plan containing the following elements, in addition to those required by the *Règlement sur la santé et la sécurité du travail* (S-2.1, r.19.1):

- the isothermal protection to be used;
- the factor of successive dives;
- the ascent limit without decompression stop;
- circumstances requiring the interruption of the dive;
- procedures to ensure that machinery, equipment or devices that may be at risk have been locked;
- the decompression table to be used, if required;

.5 a notice confirming that a communication system with the Medical Emergency Department for diving emergencies is available at all times at the diving station.

.4 The Contractor shall consider the following particulars on the work site and adapt the contents of his dive plan accordingly.

.5 Where diving takes place at one of the following locations, send to the Departmental Representative a confirmation that the authorities concerned have been notified:

.1 Upstream or downstream of a hydraulic structure or submerged pipe;

.2 In navigable waterways;

.3 In port facilities.

.6 If the diving station is more than 2 metres above water, send to the Departmental Representative:

.1 The plan of the equipment used to put the worker in the water if equipment other than a pod is used as a means of launching;

.2 The plane of the apparatus used to lift the pod or other equipment, unless the apparatus is a crane or a boom truck.

.7 If diving is carried out from a boat, send to the Departmental Representative the following documents:

.1 proof of qualification of the boat operator;

.2 certification of conformity of the vessel issued by.

.8 Prior to commencement of work, simulate site rescue procedure as required by section 312.31 of *Règlement sur la santé et la sécurité du travail* (S-2.1, r.19.1).

.9 Complete on a daily basis and forward to the Departmental Representative a checklist confirming the presence and condition of the equipment required at the dive site in accordance with the dive plan.

.10 Ensure that all other documents required by Section XXVI of th *Règlement sur la santé et la sécurité du travail* (S-2.1, r.19.1) are available at all times (dive log, Divers, etc.).

1.44 SUBORDINATION AGREEMENT SST

.1 Not Used.

PARTIE 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PARTIE 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 All sections of divisions 01 to 35 inclusive

1.2 DESCRIPTION

.1 This section describes the environmental requirements related to the Project. The Contractor is responsible for meeting these requirements at all times during the work covered by these specifications.

.2 Other sections may also contain specific requirements pertaining to environmental procedures. These specific requirements are supplementary to the requirements set out in this section. In the event of contradiction, the most stringent requirement shall apply

.3 The following standards, laws, regulations and references apply:

.1 Canadian Environmental Protection Act (SC 1999, c.33)

.2 Canadian Environmental Assessment Act (SC 1999, c.19, s.52)

.3 An Act respecting the quality of the environment (RSQ, c. Q-2)

.4 Historic Canals Regulations (SOR / 93-220)

.5 Hazardous Substances Regulations (Q-2, r.32)

.6 Clean Air Regulations (Q-3, r 4.1)

.7 Solid Waste Regulations (Q-2, r 13)

.8 Contaminated Soil Landfill Regulations (Q-2, r 18)

.9 Contaminated Soil Transfer and Storage Regulations (Q-2, r.46)

.10 Species at Risk Act (L.C. 2002, c.29)

.11 Fisheries Act (L.R.C. (1985), F-14)

.12 Act respecting the conservation and development of wildlife (RSQ, c C-61.1)

.13 Migratory Birds Convention Act (L.C. 1994, c.22)

.14 Wildlife Habitat Regulations (C-61.1, r.18)

.15 Canadian Environmental Quality Guidelines (CCME)

.16 Guidelines for treated timber, MSDEFCC, October 2011

.17 Response to Soil Protection and Contaminated Sites Remediation and Action Plan 2017-2021, MSDEFCC, 2017

.18 Surface Water Quality Criteria, MSDEFCC, 2013

.19 Regulation 2008-47 on the Clean-up of the Metropolitan Community of Montreal (municipality of Chambly, subject)

.20 BPH Environnement, 2017. Complete rehabilitation of the federal wharf at the Chambly Canal, Basic Impact Analysis Report, prepared for Public Works and Procurement Canada on behalf of the Parks Canada Agency, February 2017.

.21 Federal Wharf Rehabilitation Chambly Canal National Historic Site, Geotechnical and Environmental Characterization Study, File no. R077244.001-634206-rap2, March 2017, 117 pages.

1.3 DEFINITIONS

.1 Invasive species: Species foreign to the ecosystem in which it is found, but capable of reproduction and likely to adversely affect the economy, the environment or human health. Other than plants, this type of harmful organism also includes certain animals, mushrooms and microorganisms that are a threat to biodiversity.

.2 Ministère du Développement Durable, de l'Environnement et de la Lutte contre les Changements Climatiques / MSDEFCC : Ministry of Sustainable Development, Environment and the Fight against Climate Change.

.3 FOC : Fisheries and Oceans Canada

.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 contamination, pollution and habitat or environment disruption during construction. Prevention of environmental pollution and damage requires consideration of soil, water and air; biological and cultural resources; and includes management of visual esthetics; noise; solid, chemical, gaseous and liquid waste; radiant energy and radioactive material, as well as other pollutants.

1.4 CONTRACTOR'S OBLIGATIONS

.1 The PPB-MPO holds environmental permits for the planned work. The Contractor shall comply with the requirements of the conditions associated with each environmental permit

.2 The work must be completed to the satisfaction of the Departmental Representative regarding standards and environmental regulations. The Contractor shall comply with the environmental guidelines of this analysis and this must include the costs associated with these requirements.

.3 The Contractor must ensure that his work complies with:

.1 The laws and legislation of the municipal environmental provincial and federal authorities;

.2 The requirements established in this specification;

.3 The requirements associated with each of the conditions of the environmental permits;

.4 To the other standards and guidelines that may be established by the Departmental Representative.

.4 In the event of work not planned and stated in the environmental permits, the Contractor must, in addition to notifying and obtaining the consent of the of Departmental Representative, obtain from organizations concerned authorizations and permissions necessary to complete his work. Costs and delays related to compliance and enforcement of environmental requirements contained in these licenses and permits will be provided and borne entirely by the Contractor.

1.5 ENVIRONMENTAL CONSTRAINTS

.1 Protection of fish and fish habitat:

.1 The Contractor shall develop his work schedule and methods of construction so as not to carry out any intervention in the Chambly basin between April 1 and September 30 except for the exception to the environmental authorization for construction of concrete facings by limiting the emission of TSS and the movement of the bottom of the canal as much as possible: 8 August to 30 September

.2 Control of Sediment Erosion and Transport:

.1 When working in or near aquatic environment (sheet pile installation, demolition, shore or water excavation, concrete pouring and application of retarding agent, stone placing for stabilization of shores, etc.), installation and maintenance of a turbidity curtain are required. The turbidity curtain shall be installed in accordance with the manufacturer's instructions and the Contractor shall be responsible for ensuring that its performance meets the environmental requirements and the permissions obtained.

.2 Turbidity curtains shall comply with the requirements of Article 3.2.

.3 Use all effective measures to eliminate the risk of sediment entering the aquatic environment (eg, berms, sediment traps, sediment barriers, temporary slope stabilization, runoff management, etc.). The Contractor will be responsible for ensuring that the measures it implements are monitored to ensure compliance with the environmental requirements and the authorizations obtained.

.4 Installing Sheet Piles:

.5 The driving of sheet piles shall be carried out in a gradual manner so as to allow fish to leave the immediate area of work by the following method:

.1 Starting the depression in progressive mode at minimum power of the hammer for 1 minute for a duration of 5 minutes.

.2 Subsequently, progressive increase of 20% of the power per minute to the desired maximum power.

.3 Schedule work stoppage 2 times per day for a minimum of 30 minutes.

.4 Restart in progressive mode after more than 30 minutes of work stops.

.2 Sediment and Soil Management

.1 Contaminated sediments and soils in range A-B or benefits at range A-B of the MSDEFCC criteria will be managed in accordance with sections 35 20 23 A - Sediment management and 01 35 13.43 Special procedures-Contaminated sites.

.3 Management of Creosote Wood from Demolition of the Wharf

.1 Submerged timber shall be deemed to be uncontaminated and shall be located in a technical landfill or re-used in accordance with the provisions of the MSDEFCC treated wood management guidelines.

.2 Handle treated wood structures in large sections rather than smaller sections to reduce the contact area of treated wood with air. If it is necessary to saw portions of treated wood to facilitate handling or transport, this activity should be carried out in an open environment, preferably fresh, and on a surface that facilitates the recovery of sawdust. Recover, treated wood sawdust in tight containers.

.3 Wood from the wharf caissons above water level is not considered a hazardous material. However, it cannot be disposed of in a technical landfill since its phenol concentration exceeds the criteria of the Solid Waste Regulations applicable to this type of site:

.1 reused as construction material or other use as set out in the MSDEFCC treated wood management guidelines;

.2 dispose in a treatment and/or landfill authorized by the MSDEFCC to receive these materials. In this event, the Contractor must provide proof of disposition at an authorized site.

.4 Management of leaching water

.1 Contractor shall secure the entire wharf in order to control runoff water and water from spraying activities of the setting retarder on the concrete surface, to prevent water or runoff into the surrounding aquatic environment. For this purpose, the following devices are required:

.1 A splash guard wall associated with a gutter installed at the perimeter of the coffered area for pouring concrete with exposed aggregates to collect runoff and leaching water

.2 Waterproof cover when using pressure sprayer (typically between 3000 and 5000 psi).

.3 Provide for the use of absorbent materials to clog possible leakage of liquid from the gutter into the aquatic environment.

.2 The collected water shall be pumped into tight containers and the Contractor shall dispose of it in accordance with the regulations in force.

1.6 NOTICE OF NON-COMPLIANCE

.1 A notice of non-compliance will be issued in writing to the Contractor by the Departmental Representative every time a non-compliance with a law, regulation or a federal permit, provincial or municipal, or other element of the environmental protection plan to be implemented by the Contractor is observed.

.2 After receiving a notice of non-compliance, the Contractor must propose corrective measures to the Departmental Representative and must implement them within a short period with the approval of the latter.

.3 The Contractor shall wait to have obtained written approval from the Departmental Representative prior to the implementation of the proposed measures

.4 If necessary, the Departmental Representative may order the cessation of work until satisfactory corrective action is taken.

.5 No additional delay and no adjustment will be granted following the work stoppage.

2.1 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for dangerous materials used on the worksite and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit certificates of equipment attesting to the use of vegetable or biodegradable oils at the start-up meeting for gear that will be used within 60 m of the Chambly Basin or a watercourse.

.2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval to the Departmental Representative or his representative for environmental matters.

.1 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction and their applicable protection measures.

.2 The actions included in the environmental protection plans must be presented with a degree of detail which is relative to the environmental problems and the construction works to be executed.

.3 Include in Environmental Protection Plan:

.1 Name of person responsible for ensuring adherence to Environmental Protection Plan.

.2 Name and qualifications of the person responsible for manifesting hazardous waste to be removed from site.

.3 Name and qualifications of person responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program;

.4 Erosion and sediment control plan identifying 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. A prevention plan for storm water pollution can replace the plan of erosion control measures and sediment transportation.

.5 A runoff and leach management plan, indicating the measures to be taken to prevent any discharge of water from the site into the surrounding aquatic environment. The Contractor shall include a detailed plan of the facilities provided at the perimeter of the wharf formwork for the collection of water and liquids, and the method of containment and disposal.

.6 Drawings showing the location of temporary excavations or site trails in embankments, watercourse crossings, materials, constructions, sanitary installations, deposits of surplus materials or contaminated materials; The drawings illustrating the methods that will be used to control runoff and to confine the materials to the site.

.7 Traffic control plans, including measures to reduce the erosion of temporary road platforms by the movement of construction vehicles, particularly in rainy weather. These plans must include measures to reduce the transport of materials on public roads by vehicles or runoff.

.8 A plan of the work area showing the activities planned in each part of the work area and indicating the areas of restricted use and the prohibited areas of use. This plan shall include measures to mark the boundaries of usable areas and methods of protection of the elements within authorized work areas to be preserved.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 A plan for the disposal of non-hazardous residual materials, hazardous or special residual materials including methods and locations for the disposal of solid wastes and debris from clearing operations.

.11 An air pollution control plan detailing provisions to control that dust, debris, materials, and trash, are contained within project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste Water Management Plan identifying methods and procedures for management or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

2.2 INVASIVE SPECIES

.1 Aquatic ecosystems are vulnerable to alien or invasive species, for example, when carrying out work requiring floating equipment. In order to avoid the introduction of invasive alien species into the natural ecosystem when performing aquatic work with floating equipment, the following measures should be followed. The risks of introduction of allochthonous species are minimized by the use of clean equipment and stored on land before the work is carried out. The Contractor shall provide the Departmental Representative with a written list of such equipment, the place of storage and the proposed date for launching. The Departmental Representative must be able to verify that the equipment is properly cleaned and stored on land prior to the completion of the work.

.2 For equipment already in water, the Contractor shall demonstrate, at his own expense, that such floating equipment is free of invasive species when mobilized to the site of work. The Contractor shall provide a written inspection report, immediately prior to the mobilization of the latter to the site of the work, certifying that it is free of invasive species. The inspection report must be produced by a qualified biologist in the identification of benthic fauna. Sampling must be done by divers. The report shall include, but is not limited to, the following information: a list of equipment inspected (tugboats, barges, etc.), date and place of inspection, summary of sampling protocols and d Identification, list of samples, a table of results and a certification of the presence or absence of invasive species. The report must contain photographs and must be signed by the competent biologist before being handed over to the Departmental Representative with the other required contractual documents before mobilizing the equipment.

.3 In the event that the inspection report confirms the presence of invasive species, the Contractor is required to replace the equipment or to complete the cleaning of the equipment at its own expense. The description of the cleaning work carried out must be included in the new inspection report (after cleaning) with all the relevant information mentioned above.

.4 The Departmental Representative reserves the right to conduct a second opinion at any time. In the event that invasive species are observed, the Contractor shall interrupt the work and carry out, at his own expense, the cleaning of the affected equipment and follow the procedure mentioned above.

2.3 FIRES

.1 Fires and burning of rubbish on site is not permitted.

.2 Provide supervision, attendance and fire protection measures as directed.

2.4 DRAINAGE

.1 Provide temporary drainage and pumping required to keep excavations and site free from water.

.2 Runoff water in the work areas must be confined, sampled and treated, if required.

Runoff water within the work areas must be pumped to a vegetation zone to allow for settling of suspended materials. (voir article 1.5).

.3 Ensure that water pumped to a watercourse, a sewage network or a drainage evacuation system respects the surface water quality criteria of the Ministry of Sustainable Development, Environment and the Fight against Climate Change (MSDEFCC) - Protection of aquatic life - Acute effect, for suspended solids, pH, metals, HAP, pentachlorophenols, or CID-CS0 before it is discharged into the environment. The

Contractor must obtain authorization from Departmental Representative in environmental matters before proceeding to a discharge into the environment.

.4 Control disposal or runoff of water containing suspended or other harmful substances in accordance with local authority requirements si applicable (voir article 1.5).

3.1 WORK ADJACENT TO WATERWAYS

.1 Pay special attention to weather conditions when planning and carrying out work. Suspend work during periods of high flooding (mid-April to mid-May) and pay special attention to the water level during construction as some project activities will be carried out using floating equipment

.2 Avoid sudden movement of machinery when working in aquatic environment

.3 Do not skid logs or construction materials across waterways

.4 Prior to commencement of work, site Departmental Representative shall identify a maintenance area for machinery, storage and handling of hazardous materials. This site must be at least 30 m from a watercourse or body of water.

.5 Construction machines must not be stored less than 15 m from the shoreline. However, use of construction machines with vegetable oil hydraulic system (biodegradable) is permitted for work in water or in areas less than 15 m from the water.

.6 Waterways to be kept free of excavated fill, waste material and debris (article 2.1.1.2).

.7 Any debris accidentally dropped into the water of an aquatic area must be immediately removed.

3.2 PROTECTION OF WATERCOURSES AND WATERBODIES

.1 Works in watercourse

.1 Comply with schedule to ensure that no water works are carried out between April 1 and September 30 inclusive and that sheet piling is not carried out after January, with the exception of planned work and approved in environmental approvals.

.2 The Contractor shall not do work in the existing rock protection as defined in River, Coastal and Flood Plains Protection Policy; except for work planned for the project and approved in the environmental permits.

.3 The free flow of water must be maintained at all times during construction.

.4 When carrying out work using barge, the Contractor shall avoid stirring up the bottom of the watercourse during barge moves regardless of water level.

.5 If the Contractor must use a turbidity curtain, compliance to article 1.6 Environmental Constraints is required. The turbidity curtain must comply with the following requirements:

.1 The vertical height of the curtain must be adapted to the water depth and potential fluctuations in water level so that it completely reaches the seabed;

.2 Is held by weights at the bottom of the water so as to follow the asperities;

.3 Is firmly anchored on the shore;

.4 Is clearly marked for safe navigation;

.5 Turbidity curtain must be cleaned when necessary during construction if the filtration membrane is clogged.

.6 At the end of the work, the turbidity curtain should be left in place for at least 48 hours or until the turbidity is comparable to that of the surrounding waters. When removing the curtain, the Contractor must proceed with caution and avoid resuspending the accumulated sediment.

.7 In the event that the turbidity curtain cannot be deployed (for immediate interventions in extraordinary site conditions), real-time monitoring of turbidity should be carried out to ensure that the increase in total particulate matter generated by Work does not exceed the value recommended by the CCME for the protection of aquatic life, ie a maximum increase of 8 NTU relative to the background value (or a maximum increase of 10% of the background value when this value is> 80 UTN). This real-time follow-up can only be carried out after having been authorized by the Representative of the Ministry and on receipt of a request formulated by the Contractor.

.2 Excavation work

.1 Do not use any borrowed material in the water.

.2 The banks created by the excavation will be stabilized by riprap to prevent their subsequent erosion. A geotextile will be used under the rock to trap sediment and shorelines that have been exposed. The stones used will be washed be minimum size of 50-200 mm.

.3 In places where riprap is not planed, a silt curtain shall be used to cover the soil exposed and the land will be seeded or sod planted following the application of a thin layer of topsoil

.3 Soil and Sediment Control

.1 The Contractor must plan a drainage network of the work areas and foresee measures of temporary stabilisation of the stockpiling sites to avoid runoff of the water to the watercourse.

.2 The sediment barriers (barrier with a geotextile or retention device) must be installed, without being limited to, the following areas: at the bottom of the pile, around a work area, parallel to a watercourse and or a waterbody as well as around the perimeter of a pile of non-consolidated material.

.3 Cover materials during transport.

.4 Final Management of Contaminated Sediments and Soils

.1 Refer to 01 35 13.43 Special Procedures - Contaminated Sites and 35 20 23A - Sediment Management. Contaminated sediments and soils may be recovered on site in accordance with good practice or will be disposed of at an authorized MSDEFCC site based on the characterization results from the stacked sediments.

.5 Water Discharge

.1 Any water whose quality has been directly or indirectly affected, in whole or in part, by the activities of the site or any pumping water or collected near the piles shall not be discharged directly into the basin or its tributaries. These waters must be confined, sampled and treated (where applicable) in order to meet MSDEFCC 's surface water quality criteria and the CCME (Aquatic Life Protection - Acute Effects) suspension, pH, metals, PAHs, pentachlorophenol and C10-C50s before being released to the environment. The Contractor must obtain authorization from the Departmental Representative before proceeding with any release to the environment.

.6 Disposal of used snow

.1 Snow from clearing of work areas shall be disposed of by the Contractor into a designated area, in agreement with the Departmental Representative. No used snow can be placed in the water body or the surrounding streams.

3.3 POLLUTION PREVENTION

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent sanding materials, dust generated and other foreign matter from contaminating the air and the waterways beyond the area of application. Provide temporary shelters where indicated according to the directives of the Departmental Representative.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Surface wash water (cleaning of walls, sills and central pillars) should be confined to the work area and treated (if required) to ensure that they meet surface water quality criteria of MSDEFCC - Protection of aquatic life - Acute effect, before discharge to the environment. The Contractor must obtain permission from the Departmental Representative or his environmental representative prior to any discharge to the environment.

.5 All necessary measures will be taken to minimize the suspension and transport of fine particles in the sea. Any accidental spill of concrete in the work zone must be gathered and the concrete residue will be disposed of with the construction waste in an authorised site.

3.4 PRESERVATION OF HISTORICAL/ARCHAEOLOGICAL CHARACTER

.1 Carry out work in accordance with Section 01 14 00 Work Restrictions.

3.5 CLEANING

.1 Progress cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Ensure that streams and storm and sanitary sewers remain free of residual materials and that volatile materials are removed.

.2 Final cleaning

.1 Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Sort the surplus materials according to section 01 74 21 Construction/Demolition Waste Management and Disposal and the section 02 50 13 – Management of Toxic Waste.

.3 Construction debris and residual materials will be sorted and temporarily stored on site. The residual materials will then be transported to sites duly authorized by the MSDEFCC, depending on their nature. The disposal of debris and residual materials and the selection of authorized sites will be the responsibility of the contractor appointed by PWGSC to carry out the work.

.4 No residual material shall be burned, buried or submerged in site.

.5 The wash water of concrete mixers must be collected in a watertight basin arranged in such a way as to avoid any discharge into the environment. The cleaning area must be located more than 30 metres from the water body and must be authorized in advance by the Departmental Representative

.6 Excess concrete from concrete pumps shall be poured into molds or other types of leakproof containers in a location approved by the Departmental Representative. After hardening, the surplus concrete must be managed with the construction waste and disposed off site

.7 All treated wood debris shall be temporarily stored in tight containers and covered with a tarpaulin to prevent contamination of soil or water. This debris will be managed in accordance with the *Guidelines for Treated Wood Management (MSDEFCC, 2011*). Leaching tests will be carried out to define the physicochemical characteristics of the wood debris in relation to the different management criteria to be considered. Reuse of treated wood debris is preferred

.8 Separately dispose of non-recyclable and recyclable residual materials. Remove bins and recycling bins from site and dispose of materials at appropriate facilities. Proof of disposal in a location authorized by the MSDEFCC shall be provided to the Departmental Representative.

3.6 EQUIPMENT, VEHICLES AND MACHINERY

.1 Job-site traffic

.1 Access road limits and work areas must be clearly identified at the site. Machinery traffic must be limited to designated access roads and work areas, specifically within the diked work areas in water environments, as per the environmental authorizations.

.2 Transportation of materials should be limited to normal working hours between 7:00 am and 7:00 pm, Monday to Friday, and 8:00 am to 5:00 pm Saturday to reduce the impact on the quality of life of nearby residents.

.3 Fording watercourses is prohibited.

.4 Mobile equipment and machinery traffic is strictly prohibited within the 15-metre protective strip on any watercourse or water body unless it is provided for in the environmental authorizations or prior permission has been obtained from the Departmental Representative or his representative for environmental matters.

.5 Contractor must not leave any equipment or machinery less than 30 metres from any watercourse or water body outside of working hours or during prolonged shutdowns of the work site. If this is impossible, measures must be in place to protect the soil beneath the equipment or machinery during the entire above-mentioned period (e.g. containment tanks with a volume equivalent to at least 125% of the fuel tank for the equipment or machinery).

.2 Machinery refuelling and maintenance

.1 Maintenance, refuelling and cleaning of machinery and equipment containing petroleum products must be done at a site that is specially equipped for that purpose, where there is no risk of contaminating the soil or underground or surface water. This site must be more that 60 m from the watercourse. If it is not the surface must be waterproof and have a capacity to contain all the hydrocarbons in the case of leakage. All these activities must be done under constant supervision.

.2 Oil changes for any mobile equipment must not be done at the job site; oil changes may be made only on non-mobile machinery. When oil changes are being made on non-mobile equipment, the Contractor must have spill recovery equipment in place (such as a collection basin) or provide minimum protection for the soil (e.g. water-repellent absorptive mats).

.3 Used oil must be recovered, placed in barrels, identified and disposed of along with residual hazardous materials to a recycler that has been approved by the Ministry of Sustainable Development, Environment and the Fight against Climate Change (MSDEFCC).

.4 Water used to wash equipment cannot be discharged directly into a watercourse, water body or onto the ground. This water must be sampled and treated (where necessary) to meet surface water quality criteria of the MSDEFCC - Protection of aquatic life-Acute effect, before being discharged into the environment. Contractor to obtain authorisation from the Departmental Representative before discharging anything into the environment.

.5 Equipment used must, at all times, be in proper operating condition, clean and leak-free. Otherwise, it must be removed immediately from the job site. Machinery which is within 15 m of a watercourse must use biodegradable vegetable hydraulic oil.

3.7 PROTECTION OF THE FAUNA

.1 Refer to article 1.3 – Environmental Constraints

.2 The Contractor must comply with the requirements of the Environment Quality Act (R.S.Q., c. Q-2), the Act respecting the Conservation and development of Wildlife (R.S.Q., c. C-61.1) and the Fisheries Act (R.S.C. (1985), c. F-14), and also comply with the requirements associated with each of the environmental authorizations affecting wildlife habitats and species requiring protection.

.3 Restriction Period

.1 Work in the watercourse is prohibited between April 1 and September 30 inclusive (BPH Environment, 2017 and DFO 2016), with the exception of the work provided for in the project and approved in the environmental approvals.

.4 Aquatic vegetation zone

.1 The Contractor shall limit the excavation in aquatic vegetation zones to authorized and necessary areas. He must also limit the removal of aquatic vegetation to a minimum.

.5 Withdrawal of water from the watercourse.

.1 The withdrawal of water from the watercourse is prohibited.

3.8 PROTECTION OF AIR QUALITY

.1 No particulate or dust emissions are tolerated on site beyond the standards set out in the Clean Air Regulations (Q-2, r 4.1), or dusts that are visible to more than 2 m from the source.

.2 The Contractor shall:

.1 Avoid idling of all vehicles, equipment and machinery when not in use.

.2 Immediately repair equipment and machinery that produces excessive exhaust emissions.

.3 Maintain equipment antipollution system in good condition.

3.9 NOISE PROTECTION

.1 The Contractor must control sound levels from the job site by applying the following measures:

.1 Comply with municipal noise regulations.

.2 Machinery, equipment and any vehicles must be equipped with functioning mufflers at all times;

.3 The slamming of dump-truck back panels must be avoided at all times.

.4 Give preference to the use of equipment that generates low noise levels.

3.10 MANAGEMENT OF HYDROCARBONS AND HAZARDOUS MATERIALS

.1 Petroleum products and any other hazardous materials must be stored in dedicated areas at more than 60 m from any water body. Hazardous materials must be stored in dedicated and confined areas in accordance with the provisions of the Regulation respecting hazardous materials (Q-2, r. 32).

.2 Stationary machinery and equipment (such as generators and compressors) located on the shore or in dewatered work areas must be equipped with collection basins to catch any leaks or spills (volume equivalent to at least 125% of the volume of the fuel tank of the equipment or machinery). These basins to be kept operational at all times.

.3 The Contractor must supply the Departmental Representative with the technical specifications for the products it intends to use, at least 48 hours before it arrives at the job site.

.4 New hazardous materials must not be discarded. When work is concluded, the Contractor must take back its unused hazardous materials and leave the job site completely clean.

.5 Hazardous waste must be disposed of in a site properly authorised by the MSDEFCC.

3.11 SPILL PREVENTION AND MANAGEMENT

.1 Carry out, under constant supervision, all handling of fuel, oil and other hazardous materials in order to avoid accidental spills.

.2 Provide emergency spill kits (oleophilic and water repellent rod and absorbent material, polyethylene, waterproof bags, watertight containers, shovels, gloves, leakage plugs, etc.) on site for petroleum products and residual materials and absorbent materials in the event of a spill.

.3 Establish emergency plan and ensure immediate implementation prior to commencement of work.

.4 In case of an environmental incident, the Contractor must immediately notify the Departmental Representative and comply with the following:

.1 Control all leakages;

.2 Contain the spill;

.3 Collect the contaminants and the contaminated materials;

.4 Prepare a detailed incident report including a description and location of the accident, the spills and the quantity, date and time of the event as well as the name and the person's phone number having found the accident.

.5 In case of environmental incident, the Contractor is responsible for immediately contacting the authorities (Emergency Environment and Environment Canada), upon becoming aware of the event

.6 In the event of an environmental incident involving the aquatic environment, the Contractor is responsible for prompt communication, also with the Coast Guard (barge or machinery leakage on a barge).

.7 The Contractor is responsible for paying all costs for decontamination and disposal of contaminated soil following a spill or leak of a contaminant directly or indirectly from its activities. The Contractor shall dispose of the contaminated material to a site duly authorized by the MSDEFCC. The available evidence must be sent to the Departmental Representative.

.8 It is forbidden to mix contaminated soil with clean soil or soil less contaminated in order to have a less restrictive way of disposing of the contaminant.

.9 The Contractor must permanently keep a sufficient number of emergency petroleum product recovery kits at the site. Kits to include sufficient absorbent material to allow for rapid and effective intervention, both on water and on land. These kits must be easily accessible at all times to allow for rapid response. Workers who could potentially need to use these kits must be given the appropriate training. The location of the kits must be given to the Departmental Representative.

3.12 TEMPORARY SANITARY FACILITIES

.1 The Contractor must provide and maintain on the site temporary sanitary facilities necessary for the use of persons accessing the site, and he must remove these facilities at the completion of the work.

.2 Wastewater from the temporary sanitary facilities must be disposed of according to the regulations in force and at a site authorized by the MSDEFCC. Proof of disposal must be provided to of the Departmental Representative.

3.13 MANAGEMENT OF CUT AND FILL

.1 Cover materials during transport.

.2 Do not use any borrowed material in the waterbody.

.3 The backfill material required for the work must be free of anthropogenic contamination (Criterion A of the Soil Protection and Contaminated Land Reclamation Policy).

.4 Soils of cuttings in the A-B range of the Policy or below Criterion A may be re-used if they meet the associated technical requirements of the Act and the applicable regulations.

.5 Excess material that will not be reused on site should be disposed of in accordance with applicable regulations and according to the level of contamination. If necessary, written proof of their admission (manifest of transport or other, specifying the nature of the materials and their quantity) in a place authorized by the MSDEFCC must be submitted to the Ministry Representative (reference section 01 35 13.43

.6 Piles of fine material must be covered to limit erosion by wind or surface runoff. Sediment barriers must be installed around the perimeter of all stacks of fine materials (reference section 01 35 13.43).

.7 The piles of materials should be covered with a thin layer of top soil to promote plant recovery.

.8 During excavation, in the event that visual or olfactory cues do not correspond to anticipated contamination levels, temporarily store the soils on site at a designated site, perform the required analyses and dispose of these soils according to their level of contamination.

4.1 RECLAMATION OF THE WORK AREA

.1 When work on the shoreline is complete, all sediment retention devices (sediment barriers, turbidity curtain, etc.) will be removed.

.2 Ensure no waste is left on site

.3 Rehabilitate land and vegetation damaged by work so that site is left as it was prior to construction (if necessary).

.1 Grass surfaces damaged by work are repaired with sod tiles.

.2 Rehabilitated surfaces should have a degree of compaction and aeration corresponding to the initial state (before work) to prevent the transport and circulation of soil particles (if necessary)

.4 Any surface susceptible to erosion shall be covered with stone, peat moss or coconut carpets. Only arable land (topsoil) taken on the spot and set aside or certified free from seed will be accepted.

.5 For the rehabilitation of temporary excavation storage area, refer to Section 2.7 of Section 01 35 13.43.

4.2 RESTORATION WORK

.1 Work areas along the shore must be dismantled

.2 If the exposed surfaces cannot be stabilized immediately, temporary protection measures against soil erosion must be put in place on slopes until the final stabilization

End of Section

PART 1 GENERAL

1.1 CODES, STANDARDS AND OTHER DOCUMENTS

.1 The work must meet the applicable requirements of the standards (latest edition) of the Office of the Government of Canada standards (ONGC), the Canadian Standards Association (CAN/CSA), the National Building Code of Canada (NBCC), the American Society for Testing Materials (ASTM), the American Concrete Institute (ACI), the Terms of Reference and general specifications (CCDG) of the Ministry of Transport of Quebec and the other codes presented herein. The latest revised editions, until the date of the start of the bidding period, should be used. In case of differences between the requirements of different materials, the most stringent prevail

.2 During construction, when there is conflict between different regulations, the most stringent standards will be observed.

.3 At all times, when the specification refers to standards, it is understood that this will be the latest revised edition independent of editions currently designated.

.4 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 LAWS, REGULATIONS AND ORDERS

.1 The Contractor shall respect the rights and privileges of others and comply with all laws, regulations and orders federal, provincial and municipal. He must also ensure that employees by law or by fact, including subcontractors also comply.

.2 Permits and applicable approvals should be obtained by the Contractor before the work begins.

1.3 NON SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

1.4 FEES, TAXES AND PERMITS

.1 The Contractor shall give all notices and obtain and pay all fees and building permits required for the excavation, construction, and other services as required or requested by the authorities having jurisdiction in the region.

.2 The Contractor will be liable for any damages and costs resulting from failure to obtain these licenses and permits.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 PURPOSE

.1 This Section of Construction Specifications provides information about quality assurance program to be implemented by Contractor and its subcontractors and suppliers during Work. This program is not intended to replace contractually required quality assurance program. It sets out minimum quality activities to be performed by Contractor and its subcontractors and suppliers at their facilities or on Work site.

1.2 RELATED REQUIREMENTS

.1 All of the sections of the division 01-General Requirements

1.3 RESPONSIBILITIES

.1 Contractor is responsible for implementing all provisions of quality assurance program.

.2 Contractor is responsible for ensuring all its subcontractors and suppliers perform quality activities described in this Section.

.3 Contractor and its subcontractors and suppliers must demonstrate their quality assurance program is implemented and their Work complies with drawings and technical specifications during fabrication and construction.

.4 Allow the 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.

.5 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Departmental Representative instructions, or law of Place of Work.

.6 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.

.7 The Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, after examination, the work is declared non-compliant with the requirements of the contract documents, the Contractor shall take the necessary measures to render the work conform to the specified requirements and bear the cost of inspection and repair.

1.4 INDEPENDENT INSPECTION/TESTING AGENCIES

.1 Independent inspection/testing agencies will be engaged by the Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Departmental Representative.

.2 Employment of inspection/testing agencies does not relax responsibility of Contractor and its subcontractors and suppliers to perform Work in accordance with Contract Documents.

.3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. The Contractor and his subcontractors and suppliers will have to correct defect and irregularities as advised by the Departmental Representative at no cost to the Departmental Representative and pay costs for retesting and re-inspection.

1.5 ACCESS TO WORKSITE

.1 Allow inspection/testing agencies access to worksite and off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.6 PROCEDURE

.1 Notify appropriate agency and the Departmental Representative 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.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

.4 The use of testing and inspection organizations shall not relieve the Contractor of his responsibility for the performance of the work in accordance with the requirements of the contract documents.

.5 If defects are identified during testing and/or inspections, the Designated Body will require further inspection and/or testing to accurately define the nature and extent of these defects. The Contractor shall correct deficiencies and imperfections as directed by the Departmental Representative at no additional cost to the Departmental Representative and assume the cost of the tests and inspections to be carried out after these corrections.

1.7 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’s failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

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

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested, within a reasonable delay.

1.9 INSPECTIONS

.1 Conduct required surveys and inspections and provide, as and when completed, results in the form of reports. Each inspection shall be separated by work area in accordance with the nomenclature identified in the drawings and shall include the date and nature of the inspection.

.2 Without limitation, the following statements and inspections are required from the Contractor:

.1 Submarine survey of foundation geometry and masonry wall of lock # 1;

.2 Underwater television inspections of all underwater work (demolition, formwork, installation of sheet piling and various underwater elements, etc.) for all stages of construction and completion of work.);

.3 Complete bathymetry on the entire mobilized area corresponding to the Contractor's work area (first 20 meters from the wharf) before and after construction.

.4 See also "01 11 01 - General Requirements" in the bathymetric and submarine television inspections.

.5 Underwater survey of drainage pipe near retaining wall.

1.10 SAMPLES OF WORKS, SHOP DRAWINGS AND TECHNICAL DATA SHEETS

.1 Prepare samples of works specifically required in the specification. The requirements of this Article shall apply to all sections of the specification in which samples of works are requested.

.2 In a non-limiting manner, provide the following work samples:

.1 Surface treatment for the access road rehabilitation;

.2 Concrete slabs for concrete with exposed aggregates.

.3 Construct samples of works at various locations approved by the Departmental Representative.

.4 Prepare samples of work for approval by the Departmental Representative within a reasonable time and in a predetermined order, in order not to delay the execution of the work.

.5 A delay in the preparation of samples of works shall not constitute a sufficient reason for obtaining an extension of the time limit for completion of the works and no such request shall be accepted.

.6 Where necessary, the Departmental Representative will assist the Contractor in establishing a schedule for the preparation of samples of the works.

.7 The Departmental Representative will specify where samples of works are involved, whether or not they may be part of the finished work and when they should be removed, if applicable.

1.11 FACTORY TESTS, VISITS AND INSPECTIONS

.1 Submit Factory Test Certificates that are required in the various sections of the Specifications.

.2 The Contractor shall arrange for a factory visit during the manufacture of the precast concrete panels, if any

1.12 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and other systems.

1.13 QUALITY RELATED DOCUMENTS

.1 Quality Manual

.1 Contractor must submit to the Departmental Representative its Quality Manual for review and approval.

.2 If Contractor has a quality assurance program registered with a recognized registrar, it must submit to the Departmental Representative a copy of its certificate and a copy of Table of Contents of its Quality Manual rather than entire Manual.

.2 Quality Plan

.1 Contractor must submit to the Departmental Representative for review and approval a Project-specific Quality Plan. See Article 1.9 for more information about content of Quality Plan.

.2 Contractor is responsible for ensuring all its subcontractors and suppliers implement and continue to enforce their own quality assurance program.

.3 Inspection and Testing Plan (ITP)

.1 Before beginning Work at factory or Work site, Contractor must submit to the Departmental Representative its ITP and those of its subcontractors and suppliers for review and approval. Contractor remains responsible for review and approval of ITPs of its subcontractors and suppliers.

.2 Contractor is responsible for implementing and continuing to enforce all quality activities described in its ITP.

.3 Contractor is responsible for ensuring all its subcontractors and suppliers implement and continue to enforce their respective ITPs.

.4 See Article 1.10 for more information about drafting an ITP.

.4 Welding Procedures

.1 Contractor must submit its Work-specific welding procedure specifications for review and approval. Procedures must first be approved by the Departmental Representative. Procedures must include all tests required in contractual specifications.

.5 Work Procedures

.1 Contractor must submit its Work-specific work procedures and those of its subcontractors for review and approval. Procedures must comply with contractual specifications.

1.14 QUALITY PROGRAMMING

.1 Contractor must provide details of quality programming it intends to implement for Project.

.2 Key personnel will not be replaced without prior notice from the Departmental Representative.

.3 Contractor must present organizational diagram of its subcontractors and suppliers assigned to Project.

.4 All organizational diagrams must be included in Contractor's Quality Plan (see Section 1.9).

1.15 MANUFACTURING

.1 General

.1 Contractor must maintain in operation at its facilities, for duration of Work, quality assurance program approved by the Departmental Representative in accordance with:

.1 Contractor's Quality Manual as described in Article 1.6.1; and/or

.2 Project-specific Quality Plan as described in Article 1.9; and/or

.3 Project-specific Inspection and Testing Plan (ITP) as described in Article 1.10; and/or

.4 Construction and manufacturing activities as described in Articles 1.8.1 to 1.8.9.

.2 Receipt of Materials

.1 Materials provided by the Departmental Representative

.1 If the Departmental Representative provides Contractor with materials or equipment to execute any Work, Contractor must verify their condition prior to taking possession.

.2 Receipt of Materials Purchased by Contractor

.1 Contractor must be able to demonstrate at any time compliance of all materials and equipment it has purchased or manufactured. These quality files must be complete and available at facilities of Contractor or its subcontractors or suppliers.

.2 Contractor must complete an acceptance inspection for each material received on site.

.3 Quality files of Contractor or its subcontractors or suppliers must provide proof of completion of acceptance inspections and review by Contractor of compliance documents, i.e., material analysis certificates and inspection reports.

.4 All materials provided by Contractor must be new. Origin and source of materials must be identified. Refurbished materials are not acceptable.

.3 Non-Compliant Materials

.1 Non-compliant materials must be correctly identified (labelled “hold” or “ne pas utiliser”) and/or be set aside in a holding area.

.3 Document Control

.1 Contractor must implement and maintain a document control system that makes it possible to control following activities:

.1 Ensure only latest revision of specifications, plans and procedures are accessible at facilities of Contractor and its subcontractors and suppliers.

.2 Ensure that if copies of past revisions are kept, they are labelled “Outdated.”

.3 Provide functional system to distribute documents, drawings, procedures, reports, etc.

.4 Ensure all quality files are catalogued and stored in a controlled environment.

.4 Identification and Traceability

.1 Identification

.1 Contractor is responsible for ensuring all materials and equipment used in Work are identified and traceable, and remain so until end of Work.

.2 Traceability

.1 It must be possible at any time to associate materials and equipment with documentation establishing their compliance and inspection status.

.5 Calibration of Measuring Equipment

.1 Contractor and its subcontractors and suppliers must continue to maintain a control and recall system for calibrated measuring and testing equipment.

.2 Contractor and its subcontractors and suppliers must keep their equipment calibration certificates at their facilities.

.3 Contractor and its subcontractors and suppliers must store their measuring and testing equipment in a secure and controlled environment.

.6 Inspections and Tests

.1 Contractor and its subcontractors and suppliers must keep an up-to-date list of all their personnel assigned to inspection and specialized procedures in each discipline in which they are involved, with qualifications of personnel.

.2 All control and testing activities must be performed in accordance with technical specifications and approved ITP.

.3 Contractor and its subcontractors and suppliers must implement a notification system so the Departmental Representative can attend tests provided for in technical specifications and ITP.

.7 Inspections completed

.1 Contractor must be able to demonstrate at any time during Work which inspections have been completed.

.2 Completed inspections must also be verifiable in Contractor's quality files. Depending on discipline, Contractor must monitor inspection levels using annotated drawings or computerized lists or databases.

.3 It must be possible at any time to verify progress of inspection and testing activities, with references to reports produced.

.4 Regardless of type of monitoring system chosen by Contractor and its subcontractors and suppliers, it must be possible to demonstrate that 100% of Work, inspections, tests and reports has been completed.

.8 Final Inspection

.1 At end of different manufacturing and construction phases, Contractor must declare said phases complete and compliant, submit its quality files and ask the Departmental Representative to complete final inspection.

.2 The Departmental Representative must receive advance notice requesting performance of final inspection as defined in Contract.

.3 Upon receipt of request for final inspection, the Departmental Representative must complete final inspection of materials and equipment prior to issuing an inspection certificate.

.9 Quality Records

.1 Quality files of Contractor and its subcontractors and suppliers must include but are not limited to following documents:

.1 Inspection and testing plan (ITP) approved by the Departmental Representative;

.2 Checklists;

.3 Relevant inspection and testing reports;

.4 Inspection and testing procedures;

.5 Material analysis certificates;

.6 Certificates of compliance;

.7 Non-compliance closure reports;

.8 Declarations to authorities having jurisdiction;

.9 As-built plans;

.10 Welding procedure specifications;

.11 Welding procedure qualification records;

.12 List of welders, including their qualifications;

.13 Weld repair procedures;

.14 Approved deviations/variations if applicable.

1.16 QUALITY PLAN

.1 Quality Plan must explicitly describe organization, assigned personnel, quality assurance personnel, activities, responsibilities, resources, documents used and applicable quality procedures used to implement quality assurance program components in accordance with standards and regulations applicable to performance of Work.

.2 Quality Plan must include:

.1 Terms and definitions, including acronyms and abbreviations;

.2 Organizational diagrams of Contractor's Project team, quality assurance personnel with their qualifications, and subcontractors and suppliers;

.3 Scope of Contractor's Work and list of subcontractors and suppliers with their respective areas of activity;

.4 List of procedures and references to sections in Contractor's Quality Manual;

.5 Document control;

.6 Measuring equipment calibration;

.7 Quality control records;

.8 Non-compliant product control;

.9 Audit in reference to Quality Manual section;

.10 Applicable corrective measures;

.11 Identification of product traceability;

.12 Handling, storage, packing, protection and delivery of equipment;

.13 Specific exclusions not covered by Quality Plan.

.3 Quality Control Plan, Inspection and Testing Plan (ITP) and Monitoring Plan are synonymous and refer to same type of document.

1.17 INSPECTION AND TESTING PLAN (ITP)

.1 Inspection and Testing Plan (ITP), Quality Control Plan and Monitoring Plan are synonymous and refer to same type of document.

.2 Purpose of this section is to set out instructions applicable to Contractor for preparation and issuing of inspection and testing plans for manufacturing, construction/installation or verification prior to operation.

.3 This specification is for those responsible for Project quality control once applicable ITPs have been submitted as required in Contract.

.4 This specification includes a standardized form that parties responsible for quality control must use in event format or content of their own ITP does not comply with instructions.

.5 ITP review based on requirements of this document.

.6 Identification

.1 ITP code, including revision number and date.

.2 Identify client, project, region and equipment tag numbers.

.3 Identify contract, component, Work package, Work, discipline or system to which ITP applies.

.4 Identify person in charge of quality assurance and quality control activities in facilities of Contractor and its subcontractors and suppliers, and on Work site.

.5 Obtain signatures of persons in charge of verifying and approving ITP.

.6 Number each page of ITP (99 of 99).

.7 Work Items and Stages

.1 This is normally based on detailed Work schedule. An additional level or a specific level of detail may be required.

.8 Quality Control Points

.1 For each Work item or stage, identify required quality control points, and include brief description of activities involved.

.9 Responsibilities

.1 Identify positions of responsibility for quality control activities.

.10 Frequency

.1 Specify percentage, frequency or sampling applicable for quality control points.

.11 Specification References

.1 Quality control activities must be described using specific and accurate references to specified requirements, in other words drawings, technical specification sections and/or applicable codes and specifications, as case may be.

.12 Parameters and Characteristics

.1 List parameters and characteristics to take into consideration for quality control points.

.13 Criteria and Tolerances

.1 List criteria and tolerances to be used for acceptance of quality control points.

.14 Procedures Used

.1 List detailed procedures and instructions to control performance of Work or quality control activities.

.15 Control Equipment

.1 Describe equipment to be used to perform measuring, inspection or testing. Proof of calibration must be provided.

.16 Checklists

.1 Information specified in Articles 1.10.3 to 1.10.10 above must be incorporated into a list to be attached to ITP as incidental to it.

.17 Forms

.1 Specify forms to be used to record quality control results and attach them to ITP. Results recorded in these forms by Contractor include an inspection and testing report.

.2 When forms of Contractor and its subcontractors and suppliers and quality control procedures are insufficient or unsatisfactory, the Departmental Representative reserves right to incorporate all its own forms or quality control procedures necessary to complete quality control program of suppliers and ensure fulfillment of Contract quality control requirements.

.18 Quality Records

.1 In ITP, specify types of inspection and testing reports to be submitted to the Departmental Representative, by lot, by partial deliveries or by quality record lots. Attach table of contents and submittal schedule for quality record items to ITP.

.2 Contractor and its subcontractors and suppliers must maintain records of all documents required to provide objective proof, demonstrating and confirming that quality assurance requirements specified in Contract have been met.

.3 Contractor is responsible for ensuring documents remain secure for entire period of Contract. Contractor must submit quality files to the Departmental Representative within time limits and in quantities specified in Contract.

.4 Unless indicated otherwise, original test certificates are required. When it is not possible for Contractor to provide the Departmental Representative with originals for reasons acceptable to the Departmental Representative, copies of certificates and reports will be accepted only when individually certified as being copies of originals.

.5 There will be no modifications or transcriptions other than those authorized in this Article. Certified copies must be sufficiently clear to permit scanning and photocopying, otherwise they must be considered unacceptable. Transposition of data from original is not acceptable.

.6 All inspection and testing documents must bear:

.1 Number of Project;

.2 Number of applicable item, tag or part;

.3 Name of Project.

.19 Traceability

.1 General

.1 Definitions of full traceability and compliance with Contract are provided below.

.2 Full Traceability

.1 Full traceability is required for items for which an inspection certificate is required. For all other items, demonstrate compliance with Contract. For components for which full traceability is required, Contractor and its subcontractors and suppliers must maintain a traceability system that guarantees that materials used can be identified with certainty using certificates of origin from manufacturer. Measures to be adopted by Contractor and its subcontractors and suppliers to achieve objectives set are as follows:

.2 Materials must be checked upon receipt against certificate of origin from manufacturer for compliance with specified requirements.

.3 Material lots and specification and grade details must be identified (with permanent marking when possible) throughout manufacturing process.

.4 Material location files must be maintained.

.5 Prior to applying final surface treatment, complete record of location of materials must be compiled for inclusion in manufacturing data records:

- Construction files must contain records of location of materials and certificates of origin from manufacturer.
- Verification files must be maintained.

.3 Compliance with Contract

.1 For items that must comply with Contract, Contractor must maintain a traceability system that can be checked to confirm compliance with Contract.

.2 Materials must be checked upon receipt in accordance with Contract. For materials that are issued by lot (for example, welding consumables and cable), Contractor must keep lots of goods separated and traceable from storage through use.

.20 Quality Control Monitoring Points

.1 Prior to beginning Work, define categories of quality control monitoring points when reviewing ITP and approval process.

.2 Choice of monitoring points depends on level of monitoring chosen, based on requirements of quality monitoring specifications.

.21 Review

.1 ITP and its appendices must be reviewed and approved by the Departmental Representative and/or the Departmental Representative's quality control monitoring department prior to start of Work.

.2 Inspection and testing reports, as well as progress sheets if applicable, must be prepared and reviewed by the Departmental Representative's quality control monitoring department on an ongoing basis as Work in question progresses so that quality record lots can be assembled prior to interim acceptance.

.22 Typical ITP form

.1 A sample of a typical ITP form will be provided by the Departmental Representative at beginning of Work. Supplier may submit own format of ITP, but all items set out in this specification must be addressed.

PART 2 PRODUCT

.1 Not Used.

PART 3 EXECUTION

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

All of the sections of the Division 01 – General Requirements

1.2 LOCATION OF WORK SITE

.1 Three (3) phases of site installation have been determined in order to meet the requirements to maintain the activities of the Chambly Canal National Historic Site and the Chambly Marina.

.2 The drawings of the worksite installation phases show :

- .1 The spaces available for the on-land and maritime works;
- .2 Certain temporary accesses for the public to the installation of the Chambly Canal National Historic Site;
- .3 The accesses to the worksite;
- .4 The authorised traffic lanes;
- .5 The spaces reserved for the worksite facilities and storage areas of materials and prefabricated construction elements;
- .6 The location of worksite fencing;
- .7 The authorised parking zones.
- .8 All other requirement or restriction

1.3 LIMITATION OF RESPONSIBILITY

.1 Contractor will be responsible for:

- .1 Field offices;
- .2 Offices for the Ministry and its representative;
- .3 Equipment storage facilities;
- .4 Outdoor storages for material and equipment;
- .5 Missing access roads;
- .6 Detour roads, if any:
- .7 Washrooms at work site;
- .8 Water to compact material and dust control;
- .9 Transportation of personnel;
- .10 Safety of own personnel and equipment;
- .11 All loading and unloading work;
- .12 Protection and maintenance of traffic
- .13 Maintenance of access roads (cleaning in summer, grading of gravel roads, oiling and snow removal on Work site accesses);
- .14 Waste disposal;

.15 Telephone lines and Internet;

.16 Customs clearance, if required;

.17 Work site fencing;

.18 Temporary signalling

.19 Safe accesses for visitors to the National Historic Site;

.20 Lighting for night work.

1.4 INSTALLATION AND REMOVAL OF EQUIPMENT

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Provide a plan for the protection of existing installations.

.4 Indicate use of supplemental or other staging area.

.5 Clean, level and set up construction facility area.

.6 Provide construction facilities in order to execute work expeditiously.

.7 Remove from site all such work after use.

1.5 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings (the office must accommodate at least 12 people) and furnished with drawing laydown table. Office must also be air conditioned to 22 degrees C. The location of the site office must be submitted for approval to the Departmental Representative. The meeting office must be included in the contractors worksite installations.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

.4 The Departmental Representative's office

.1 Provide temporary office for the Departmental Representative. Placement is to be confirmed with the Departmental Representative.

.2 Inside dimensions minimum 6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with four 50% opening windows and one lockable door.

.3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.

.4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.

.5 Install electrical lighting system to provide min 750 lx using surface mounted shielded commercial fixtures with 10% upward light component.

.6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.

.7 The Contractor will supply and install in office the following furnishings: 2 desks 1500 mm x 900 mm with drawers, 2 revolving chairs, 4 chairs, 1 drawing table, 1 stool, 1 support for plans 1 water cooler, 1 display board attached to the wall of minimum dimensions 750 mm x 900 mm, 1 drawered filing cabinet and a clothes rack. The file cabinet will be equipped with effective lock, which cannot be easily opened or bypassed.

.8 Maintain in clean condition.

1.6 SERVICES

.1 The Contractor shall provide and pay for the installation of two telephone lines with separate numbers and a high speed internet service (a router with at least 2 ports per wire and WIFI service in the office of the Departmental Representative, until the installations of public services.

.2 Contractor must provide a sufficient number of chemical toilets.

.3 The office of the Departmental Representative must also be equipped with a fax having photocopying and scanning functions, for regular letter and legal sized sheets, and required supplies for its functioning.

1.7 CONSTRUCTION PARKING

.1 Parking is authorized only in certain areas of work, storage and worksite facilities zones shown on the drawings

.2 Provide and maintain adequate access to project site.

.3 Clean areas where site equipment has been used.

.4 Minimize the number of personal vehicles belonging to employees. Provide 3 parking spaces at all times for the needs of the Departmental Representative near the site.

1.8 STORAGE AREA

.1 Storage is permitted in work site areas indicated on the drawings.

.2 Contractor provides adequate and covered spaces, if needed, for storage of materials.

.3 The Ministry is not responsible for theft of tools, equipment or materials. Contractor is responsible for keeping own tools, equipment and materials safe.

1.9 WORK SITE FENCING

.1 Work site fencing, described in section 01 56 00, must be provided around work areas and construction facilities.

1.10 WORK SITE SIGNAGE

.1 Work site signage is allowed only on work site trailers. Dimensions and placement of signage must be approved by the Departmental Representative before installation.

1.11 LIGHTING SYSTEM FOR NIGHT WORK

.1 Contractor must provide and install lighting systems for all night work The lighting of the work during the navigation period is a requirement of Transport Canada.

1.12 WORKSITE SIGNAGE

.1 Contractor must install and maintain adequate and safe signage to indicate Work-related detours, bypasses and hazards.

.2 This signage must be placed and maintained throughout duration of work in compliance with applicable safety codes and to satisfaction of the Departmental Representative. If, for some reason, signage is insufficient or poorly maintained in the Departmental Representative's opinion, fees incurred to re-establish signage will be directly deducted from amounts payable to Contractor.

.3 Refer to the section 01 55 26 – Traffic Control for requirements concerning temporary signalisation

.4 Comply with other Transport Canada requirements as described in section "01 11 01 - General information on the work".

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by the Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor is responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.9 Dust control: adequate to ensure safe operation and environmental protection at all times.

.10 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.11 Provide snow removal during period of work.

.12 Upon completion of work, remove haul roads designated by the Departmental Representative.

.13 Refer to "01 55 26 - Traffic Control" for traffic control requirements.

.14 During the periods of work stoppage provided for in the documents, the Contractor shall ensure that his signage is compliant and maintain it even if no work is carried out. At least one weekly visit will be required to inspect the site and ensure compliance. The Contractor must designate a safety officer who can intervene on site in less than one hour during periods of work stoppage.

1.14 PROTECT OF PEDESTRIANS AND CYCLISTS

.1 Maintain and protect the pedestrian and cyclist traffic on the roads affected by the construction works, unless otherwise indicated by the Departmental Representative.

.2 The drawings of the installation phases of the worksite indicate the closure of a portion of the sidewald and the cycling path during the works along Bourgogne avenue, between the temporary storage zone and the work site.

.3 Refer to "01 55 26 - Traffic Control" for temporary signaling requirements.

.4 During periods of work stoppage specified in the documents, the Contractor shall ensure the conformity of his signaling and maintain it even if no work is carried out. At least one weekly visit will be required to inspect the site and ensure compliance. The Contractor must designate a safety officer who can intervene on site in less than one hour during periods of work stoppage.

1.15 CLEAN-UP

.1 Remove construction debris, waste materials and packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Do not stack stored new or salvaged material in construction facilities.

.5 The contractor must remove snow from the paths and temporary roads if required.

.6 The Contractor shall clean daily, to the satisfaction of the Departmental Representative, the streets and accesses of the machinery and equipment on site. In addition, cleaning with water must be done weekly or more regularly if the condition of the pavement justifies it.

.7 Refer to "01 74 11 - Cleaning" for other cleaning requirements.

PART 2 PRODUCT

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the section of Division 01 – General Requirements

1.2 REFERENCES

.1 Work signs shall conform to the requirements included in the latest editions of the following referenced documents, unless otherwise indicated in this document:

.1 Uniform Traffic Control Devices for Canada (UTCD), January 1976 (distributed by the Transportation Association of Canada).

.2 Manual of Uniform Traffic Control Devices for Streets and Highways, US FHWA, Part IV, - 1988.

.3 Québec Highway Safety Code, latest edition;

.4 Safety Code for Construction Work, latest edition;

.5 ;

.6 Volume I - Road Design Standard - Road Construction Series of the Department of Transport, latest edition - Volume I below;

.7 Volume II - Road Construction Standards - Road Construction Series of the Department of Transport, latest edition - Volume II below;

.8 Volume III - Structures of the Normes - Ouvrages d'art collection of the Ministère des Transports, latest edition - Volume III below;

.9 Volume V - Road Signs, Volumes 1, 2 and 3, of the Normes - Ouvrages routiers collection of the Ministère des Transports, latest edition - Volume V below;

.10 Volume VII - Materials from the Department of Transport Standards - Road Construction Series, latest edition - Volume VII below;

.11 Volume VIII - Holding Devices of the Norms - Road Construction Series of the Ministère des Transports - Volume VIII below;

.12 Safety Action Plans for Road Works Sites (2014-2017 Edition).

.13 The Contractor shall take note that the schedule to be met for the upgrading of Volume V signaling devices is invalid for this contract. The Contractor must therefore comply with the signaling standards in force on the date of the opening of tenders.

1.3 SCOPE OF TEMPORARY SIGNALING WORK

.1 The work includes, but is not limited to, supplying and placing temporary signage to maintain traffic and protect workers during the rehabilitation of the Federal Wharf at the Chambly Canal National Historic Site, in the city of Chambly and all related work specified in all contract documents.

.2 The work covered by this document includes, but is not limited to:

.1 Preparing all temporary signaling plans and detour roads;

.2 Providing, mobilizing, maintaining, maintaining, moving, replacing, putting into operation or deactivating and demobilizing temporary signage, according to this document;

.3 Maintaining signage and traffic lanes.

.4 Winter maintenance;

.5 Providing, mobilizing, maintaining, maintaining, moving, replacing and demobilizing self-supporting fences to limit the work areas and to control access by users, pedestrians and cyclists to the site;

.6 Supply, mobilization, maintenance, upkeep, moving, replacing and demobilizing concrete guards for construction;

.7 Providing signalers as required;

.8 Temporary signaling, equipment and manpower required for the completion of all the above-mentioned work;

.9 The recording of existing vertical or ground signaling to be removed, covered or moved, stored for the duration of the work and relocated at the end of the work;

.10 Other work required for the complete implementation of the project in a safe environment for road users, pedestrians, cyclists, workers and neighbors, as well as the related work required to complete the project, of this present contract;

.3 The Departmental Representative may request that additional temporary signaling work be put in place to ensure the safety of workers and road users or to improve traffic flow.

1.4 PROTECTION AND MAINTENANCE OF PUBLIC TRAFFIC

.1 Comply with applicable laws, regulations and ordinances governing the movement and use of traffic lanes where work is required or materials and equipment are transported.

.2 No traffic or access roads shall be closed without written authorization from the Departmental Representative.

.1 Before diverting traffic, install appropriate signage in accordance with the Roadworks Signage Guide.

.3 Provide access roads and temporary diversion routes to maintain and protect traffic on the roads around the site at all times throughout the duration of the work.

.4 Provide measures for traffic protection and diversion, including departmental and signaling services, barricade installation, installation of lighting around and in front of equipment and work areas, installation and maintenance of warning signs, hazard signs and appropriate direction signs

.5 The Contractor's wheeled equipment used for the transport of equipment/materials entering or leaving the work site must inhibit traffic as little as possible.

.6 Take necessary measures to remove dust to ensure safe operation at all times.

.7 Provide snow removal throughout construction.

.8 Upon completion of work, dismantle the temporary access roads and site tracks designated by the Departmental Representative.

1.5 INFORMATION AND WARNING DEVICES

.1 Provide and install signage, delineators, barricades and other warning devices in accordance with the Roadworks Signage Guide.

.2 Place signals and other warning devices in locations recommended in the Roadworks Guidelines.

.3 Prior to commencement of work, consult with the Departmental Representative to prepare a list of signals and other devices required for the work. For detailed verification, send detailed signaling plans for each work sequence. If the situation on the site changes, revise the list and plans to the satisfaction of the Departmental Representative.

.4 Provide, install and maintain signs, lights and the like (ex. Concrete guards for the worksite and to reduce impact) to indicate the presence of a construction zone or other temporary situation arising from the performance of the work and requiring a reaction or a reflex on the part of the public.

.5 Maintain all signaling devices as follows.

.1 Check signs every day to ensure that they are legible, in good condition, in the right place and that they meet the requirements. Clean, repair or replace the signals, as necessary, to maintain clarity and reflectance.

.2 Remove or cover signals that do not apply to existing situations, which may vary from day to day.

.6 All signals and signs provided by the Contractor must be project specific and designed in accordance with applicable municipal and provincial laws and regulations.

1.6 REGULATING PUBLIC TRAFFIC

.1 Provide on-site competent signaling services with training and equipment in accordance with the Roadworks Guidance Manual for the following situations.

.1 When public traffic (including cyclists and pedestrians) must bypass vehicles or equipment that block the roadway, in whole or in part.

.2 When temporary protective measures are required during installation or removal of signaling devices.

.3 Where emergency protection measures are required due to the impossibility of obtaining rapid signaling devices.

.4 In all cases where other signaling devices do not provide complete protection for workers, equipment and public traffic.

.5 When the public traffic must not be interrupted by work for more than 15 minutes.

.2 Provide a copy of certificate of completion of “Road Construction Flagman” Course.

PART 2 CLOSURE OF ROAD LANES AND CYCLING PATH

2.1 REQUEST FOR CLOSING TRAFFIC LANES AND TIME LIMITS

.1 For any intervention on a network under municipal responsibility or to use the municipal network as a detour, the Contractor must obtain from the municipality concerned, a permit to occupy the public domain. The application must be received by Municipality at least five (5) days before the start of the work..

.2 This application is sent by means of a form available from the municipality concerned. When this request is sent by a subcontractor, a letter of authorization from the Contractor is then required.

.3 The Contractor shall attach to his permit application a signaling plan and a detour plan (if required), approved in advance by the Departmental Representative, for each of the obstacles he intends to put in place. The Contractor must indicate the contract number, in his application for a permit.

.4 Following the request of the Contractor, the Municipality shall issue an authorization concerning the conditions for occupancy of the municipal public domain. This authorization shall state the reason, date and time at which the Contractor may commence the obstruction, its duration and nature, the hours authorized and the conditions to be met by the Contractor during the obstruction period. Requests for

closures are analyzed and coordinated with other requests from other contracts before closure is permitted.

.5 The Contractor shall forward to the Departmental Representative, prior to the commencement of the operation, a copy of the permits obtained.

.6 The cost of the permit varies depending on location, space occupied, presence of parking meters, length of occupation, etc. It is the responsibility of the Contractor to validate with the municipal authorities concerned and, if necessary, to include the costs of obtaining permits in the price mentioned in the article "Maintenance of Traffic and Temporary Signage " of the submission slip.

2.2 TRAFFIC OBSTRUCTION

.1 The Contractor shall take the necessary measures to ensure that the equipment, materials, installations, the movement of vehicles at the work site and the work do not interfere with the movement and operation of public utilities

.2 The following shall be considered as an obstruction of traffic:

.1 Any action or inaction by the Contractor that interferes with the free movement of automobiles without authorization or permit;

.2 Any obstacle or vehicle preventing the free movement of automobiles without authorization or permit;

.3 Any lane closures without any work being done;

.4 Early lane closures or late opening of lanes over permitted time;

.5 Any closure of lanes or bicycle lanes without the presence of work signs and detour roads required to bypass cyclists on a paved link;

.6 Any obstruction or closure of a lane subject to an application for a license of occupation or temporary obstruction without transmission of the license to occupy the public domain.

.3 Where the Contractor and/or one of its subcontractors contravenes any of the conditions of occupancy of the public domain, the Municipality concerned may issue notices or statement of offence.

.4 The Contractor is in breach of the law when he occupies the public domain without providing the necessary information or does not comply with the conditions of occupation.

2.3 CANCELLATION OF A PLANNED CLOSURE DUE TO FORCE MAJEURE

.1 The Departmental Representative reserves the right to cancel a closure provided for in the Contractor's schedule.

.2 In return, the period is extended by one day per day of cancellation if the Contractor demonstrates that this cancellation influences the critical progress of his schedule and jeopardizes the completion date of the work.

.3 In the case of such closure cancellation by the Departmental Representative, the associated costs shall be allocated to the various items in the tender form.

2.4 AUTHORIZED CLOSURES TIME AND RESTRICTIONS

.1 In general, the rehabilitation work on the Federal wharf of the Chambly Canal is carried out with a minimum of closures to minimize the impact of the work on traffic. The duration and conditions imposed are intended to limit the disadvantages of obstruction of the public domain. The Contractor shall take all necessary measures to respect the duration and conditions of occupancy of the public domain and, if

necessary, to ensure compliance by his subcontractors. The Contractor is authorised to make the following obstructions:

.2 The Contractor must carefully plan his work to minimize the closure of lanes and bicycle lanes.

.3 Approval of work by the Departmental Representative is required prior to any lane closures.

.4 All operations of the Contractor requiring the short-term closure of lane shall take place outside the morning and evening peak hours. These operations include the installation of temporary signage and its complete dismantling. These hours may be modified as required by the Departmental Representative.

2.5 OTHER RESTRICTIONS REGARDING LANE CLOSURES

.1 Effective October 15, the Departmental Representative may not authorize the closure of traffic lanes during precipitation (ice-rain, snow, blowing snow, etc.) requiring snow removal and de-icing of the road network. .Also, as of October 15, all temporary signaling equipment required for short-term closures left in operation must be picked up when lanes are opened.

.2 During public holidays, the Departmental Representative reserves the right not to authorize closures or to modify the time slots

.3 The Contractor shall take these days into account in the development of its schedule. In this case, the days on which the Contractor is prohibited from making closures cannot be carried forward to the work schedule and any claim based on these closure bans is rejected.

.4 The Contractor shall manage pedestrian and cycling traffic so that there is no interference with the development of a paved detour road.

.5 The Contractor shall take into consideration the navigation schedule in the Chambly Canal and ensure that it does not impede the navigation of the vessels. In addition, it must ensure that there is always a dock available to serve the marine system.

.6 The Contractor shall provide for the installation of special signs at five strategic locations to inform cyclists of the obstruction of the bicycle path and the proposed detour. In addition, must reduce the speed of cyclists when approaching the obstruction.

PART 3 MAINTAININGTRAFFIC AND TEMPORARY SIGNALING

3.1 OBJECTIVES AND RESPONSIBILITIES

.1 The objectives of maintaining traffic are to ensure the safety of users and workers as well as to maintain the fluidity of traffic.

.2 The Contractor is be responsible for ensuring the flow of traffic in accordance with the requirements of this document for the duration of the work.

.3 Work is carried out on a schedule that takes account of traffic requirements. The Contractor must be able to intervene at all times, seven (7) days per week.

.4 The Contractor shall take the necessary measures with its teams and with its subcontractors to ensure that the material, equipment, installations, and movement of the vehicles at the site and the work do not impede traffic or the operation of public services.

.5 The Contractor may submit a proposed amendment to the Contract. In this case, the Contractor must clearly demonstrate the benefits of productivity and maintaining traffic.

3.2 TEMPORARY SIGNALING PLANS

.1 The Contractor shall provide temporary signaling plans in accordance to the current applicable standards. Plans shall include the traffic control plans representing each of the phases of work and the plans for the closure of lanes required for the execution of the works. They must also include detour plans, designs for the production of detour and special signs, plans required for the management of pedestrians and cyclists. The plans must be true to the actual terrain conditions (horizontal and vertical curves) and indicate the location of the accesses to the site.

.2 Temporary signaling plans shall be produced in 279 mm x 432 mm (11 "x 17") electronic PDF format. The deadline for the submission of plans to the Departmental Representative representing each of the phases (maintenance plans), plans for the closure of lanes or detour routes is ten (10) days before the signing of each phase of the work.

.3 The delivery of the plans within the prescribed time limits and their approval by the Departmental Representative is prior to the authorization of the start of the works. The Departmental Representative reserves the right to make any modification deemed necessary to these plans.

.4 The detours and those required for the management of pedestrians and cyclists must meet the requirements of this document.

3.3 SPECIAL REQUIREMENTS FOR MAINTAINING TRAFFIC AND TEMPORARY SIGNALING

.1 Notwithstanding the duration of the closure, the choice of the signal board and the size of the boards must comply with the Long Term Work (LTW) criteria.

.2 The Contractor must fence the entire work area. In addition, he must ensure that a secure paved link is maintained at all times to divert pedestrians and cyclists. Traffic maintenance plans illustrate the impediments to be predicted and the detours available. The Contractor must ensure that the detours proposed to the contractual documents are available before obstructing the existing cycling path in the area of the work on the wall 11. If unable to maintain access to the proposed detour paths proposed in this document, the Contractor shall provide two signalers, at his own expense, to ensure the safety of the cycling path users as often as required.

.3 Where signs are no longer relevant, the Contractor shall pick them up or render them inoperative without delay, as follows:

.1 Visual markings not in operation shall be left outside the circulating lanes as far as possible on the shoulder, and placed behind a guardrail, where possible;

.2 Barriers T-B-2 shall be located outside the shoulders and behind a guardrail or be removed and picked up during openings;

.3 Work signs and special panels not in use shall be removed and picked up or hidden in accordance with one of the options in Figure 4.44-1 of Volume V. Only one option shall be applied throughout the worksite and the Contractor must specify, at the beginning of the work, the option he has chosen. According to Option 3 in Figure 4.44 1 "Panel Masking" in Volume V, the rigid cover shall be black and identified on the back of the name of the signaling company (name and telephone number). However, the dimensions of the retro-reflective strip must be 80 mm thick and cover the entire width of the panel to be masked. The only alternative to masking signs is their complete pickup, including their weights.

3.4 PERSONNEL ASSIGNED TO SIGNALING, SIGNALING TEAM AND FLAGMEN

.1 The Contractor shall forward to the Departmental Representative, at the start-up meeting, a list of all his signaling personnel and his flagmen crews. They must also provide a copy of their certificates of completion of the required training courses. The list of staff and the certificates of success are preliminary to the authorization of the beginning of the works.

3.5 SERVICE VEHICLES

.1 .Each service vehicle and escort vehicle shall have the following characteristics:

.1 Be a pickup truck;

.2 Have a minimum gross mass of 2,700 kg;

.3 Be equipped with a full width bench seat capable of accommodating three (3) persons in accordance with the Regulation respecting road safety;

.4 Be equipped with a lightning and flashing arrow and a traffic light (rotating beacon) in accordance with articles 4.36 "Rotating beacon" and 4.37 "Signal arrows" in Volume V;

.5 Have a retroreflective yellow strip (Standard 14101 "Retroreflective Sheeting" of Volume VII) Type III with a minimum width of 75 mm at the rear and sides of the vehicle.

3.6 SIGNALING EQUIPMENT

.1 VISUAL MARKERS

.1 Accepted visual references are T-RV-1 (in deviations only), T-RV-2, T-RV-7, T-RV-8, T-RV-9 and T-RV-10.

.2 Visual markings shall conform to the requirements of Volume V as to form, color and reflectivity of their retro-reflective film shall not be less than 50%. They must be in good condition, well positioned (on or off), in sufficient quantity and clean.

.2 BARRIERS T-B-2

.1 In addition to the requirements of Volume V, each end of the bicycle path, bicycle access ramps and lanes closed to traffic shall have one or more T-B-2 barriers.

.2 Barriers T B 2 shall comply with the requirements of Volume V, in good condition, properly positioned (on or off), in sufficient quantity (to ensure complete closure of the passage) and clean.

.3 WORK SIGNALING PANELS

.1 Signs for works are the signs required in the sheets of volume V modified according to the site conditions of this contract and those included in Appendix B "Signaling devices for works" in Chapter 4 " Works of Volume V.

.2 Minimum size of work sign shall correspond to the speed displayed on the P-70 panel with white background and T-V standards.

.3 Signage signs must be manufactured according to MTMDET manufacturing specifications available on the Transport Québec website at www.rsr.transports.gouv.qc.ca

.4 In addition to the requirements of Volume V, all work signs, including special signs and detour panels, shall meet the following requirements:

.1 All panels mobilized for more than 3 consecutive days must be permanently installed (planted on the ground, or attached to a rigid concrete guardrail) and located at the outer limits of the shoulder;

.2 When the ballast panels are placed in the shoulder, they shall be located as far as possible from the traffic tracks;

.3 Where signs are located near the sidewalks, they shall completely clear the sidewalk and shall also be installed at a height of 2.2 m from the ground;

.4 Where signs are located near a bicycle path, the signs shall clear the path completely and be installed at a height of 2.5 m from the path.

.5 In addition to the requirements of Volume III, all posts planted and whose lateral clearance of the panel (work signs or special panels) is lower than that indicated in the chart on page 3 of Chapter 2 "Securing Roadsides" of Volume VIII shall correspond to those forming part of the approval list for the HOM 6310-101 program for "Support giving way under impact - Small signage"

.6 Before proceeding with post implantation, the Contractor shall make all necessary checks to ensure that no utility or buried structures are damaged.

.7 Panels shall conform to Volume V requirements as to form, color and reflectivity of their retroreflective sheeting shall not be less than 50%. They must be in good condition, well positioned (on or off), in sufficient quantity and clean.

3.7 ACCESS TO WORK AREAS

.1 Entry and exit operations shall be safe and carried out in such a way as to ensure full protection for workers, road users, cyclists and pedestrians.

.2 The Contractor and its subcontractors must provide for the use of signalers at all times to manage any vehicle entering or leaving a work area adjacent to the bicycle path or traffic lanes open to users. The Contractor must also provide this service to the teams of the Departmental Representative. In addition, the Contractor must provide for the presence of a signaller in order to escort at all times the vehicles or machinery that circulate around the bike pathThe Contractor must provide a signaller at all times along the locks and 2 signalers during the navigation period or during an intensive trucking period for the needs of the site (concreting, cut/fill work, delivery of materials, handling of sheet piles, etc. .).The costs of signalers are included in the "Worksite organisation" section of the tender form.

.3 Procedures for access to work areas shall be provided to the Departmental Representative prior to commencement of work.

.4 It is the responsibility of the Contractor to obtain the authorizations from the Municipality and various public or private owners in order to exploit the work areas illustrated in the contract documents. Work areas must be kept closed with site fencing at all times when they are used.

.5 All vehicles accessing the work area shall use dedicated accesses to the site a must be identified and shall be equipped with a rotating beacon.

.6 All accesses must be kept closed with site fencing when not in use. During periods of work, the accesses can be kept open if a signaller is present to control the accessibility of the site. However, the Contractor must under no circumstances carry out work or store equipment or equipment in the area of access to the site. The costs of this signaller are also included in the "Worksite organisation" section of the tender form.

3.8 STORAGE OF EQUIPMENT AND MACHINERY

.1 At all times, even outside working hours (evenings, weekends and holidays), the Contractor must park machinery and equipment and store materials in a manner that is safe for users of the road and bike path

and beyond it, according to the chart on page 3 of Chapter 2 "Securing the Roadsides" of Volume VIII. The storage site is subject to approval by the owner.

3.9 MAINTENANCE OF SIGNALING DEVICES

.1 Where signaling devices are in place, whether on or off, the Contractor shall provide labor, equipment and materials necessary for the regular cleaning of the devices (visual, Signaling arrows, TB-2 barriers, fences, worksite concrete guards, impact reducers, road signs and special panels) to maintain their reflectivity.

.2 In addition to regular maintenance as defined above, a maintenance crew must also conduct a full site inspection by day and perform all necessary corrective measures for temporary signaling. This inspection must be done between 9:00 and 15:00. Before commencing each inspection, the maintenance team must report its presence to the Departmental representative. In addition, a daily report for each inspection should be provided to the Departmental Representative at the end of each visit. A copy of the inspection report to be completed by the inspection team will be provided to the Contractor at the start-up meeting.

.3 During the period from March 1, 2019 to August 8, 2019, the Contractor must provide a weekly visit. The Contractor must designate a safety officer who can intervene on site in less than 1 hour.

3.10 MAINTENANCE OF TRAFFIC LANES AND CYCLING PATHS

.1 The Contractor shall be responsible for the maintenance of the lanes used, including bicycle lanes footpaths, and the footbridges (George-Étienne-Cartier, lock #4 and Côte Saint-Paul during the construction period . More explicitly, the Contractor is responsible for:

.1 Repacking holes twenty-five (25) millimeters deep or more on roads and shoulders as soon as the site is in his charge and throughout the duration of the work;

.2 Cleaning and maintaining free of any debris or liquid or solid material, whether sand, earth, gravel, etc., from the site or not, and by the traffic, by the Contractor or by the weather;

.3 Taking all measures to prevent the deposition of these materials on the roadway and to intervene immediately to remove them, if necessary;

.4 Maintaining work areas and traffic lanse so that there is no dust rising;

.5 Ensuring proper drainage of pavements;

.6 Removing snow and ice from portions of the bicycle path within the right-of-way of these works (including portions of detours);

.7 Performing other work necessary to well maintain traffic.

3.11 EMERGENCY RESPONSE

.1 The Contractor shall intervene at the site within one hour following a call from the Departmental Representative or at the request of the Departmental Representative for a situation affecting the safety of the users (ex .: Temporary signaling equipment moved in traffic lanes), at any time, seven (7) days a week. It may also involve the maintenance of traffic lanes outside working hours at the site such as repairing a hole in the asphalt.

3.12 EXISTING SIGNALING

.1 By taking possession of the site, the Contractor shall be responsible for the existing road signs on the site.

.2 The Contractor shall maintain, keep up, conceal, remove, store, move or adjust any signage on the site or its surroundings for the duration of the Contract, the content of which is inappropriate. Upon completion of the work, all permanent signs existing prior to the commencement of the contract, removed, stored, moved, masked or modified shall be resettled as required by Volume V or restored to their original condition.

.3 Prior to authorization of commencement of work and jointly with the Departmental Representative, the Contractor shall undertake a site tour to make a detailed record of the existing signage to be hidden, removed or moved

.4 For each of these signs, this record shall include at least one photograph of the sign as well as a sketch of its location (position, clearance and height). A copy of this statement must be provided to the Departmental Representative prior to authorization to commence work.

.5 The Contractor shall also complete the complete marking of the existing pavement to be erased in order to be able to repaint the pavement adequately at the end of the work. A copy of this statement must be submitted to the Departmental Representative prior to authorization of the start of work.

.6 The Contractor shall notify the Municipality at least forty-eight (48) hours prior to any de-installation of signs belonging to the Municipality.

PART 4 SPECIAL PANELS

4.1 DESCRIPTION

.1 Special panels shall be manufactured on 19 mm thick (¾ ") plywood panels or aluminum in accordance with Table 6.6-1" Sheet Thickness of Signs "in Volume III.

.2 They are mainly coated with a retroreflective film (standard 14101 "retro reflective film" of Volume VII) high intensity type VII fluorescent. The lettering is black in color and, where required, the numbering badge of the road concerned consists of a high-intensity type IV film. The inscriptions and pictograms must be designed as illustrated in Chapter 4 "Works" of Volume V.

.3 At the request of the Departmental Representative, special panels may be manufactured on "Coroplast" if they are to be installed over existing panels.

.4 Each panel shall consist of one piece as shown in Figure 4.20-2 "Mounting with Detour Panels" in Volume V or as specified by the Departmental Representative. A sketch (manufacturing slip or technical document) of these signs must be presented to the Departmental Representative prior to the manufacture and installation of the sign.

.5 Special panels are signs complementary to the signage of works and may also be signs of prescription or danger requested by the Departmental Representative. They must meet the requirements of the Departmental Representative as well as the requirements specified in Article 3.7.3 "Signs of Work" of this document.

.6 In addition, T-90 panels, excluding T-90-4, T-90-5 and T-95 series, are not considered special panels Are part of Annex B "Signaling devices for works" in Chapter 4 "Work" of Volume V and are considered as work signs.

4.2 INSTALLATION AND MAINTENANCE

.1 Additional signs may be installed on floor-mounted supports, planted on the ground, impact-resistant supports, or installed on concrete or low wall runners. The stability of the panels on the support on the ground is ensured by weights in sufficient number to keep the panel in place.

.2 One (1) week prior to commencement of work, the Contractor shall construct and install four (4) T-210 modified work panels to indicate closure of the bicycle path. The exact location of the signs shall be specified by the Departmental Representative.

.3 Forty-eight (48) hours following the request of the Departmental Representative, the Contractor shall manufacture and install additional signage at the designated locations. The same period applies to the Contractor for the replacement, in whole or in part, of a panel due to breakage or vandalism and for the dismantling and removal of these panels.

.4 For each type of installation, the Contractor must provide a plan signed and sealed by a member of the Ordre des ingénieurs du Québec showing the details of the panel (GuidSIGN), installation details (including hardware required)) And the location of its installation.

.5 For maintenance, the Contractor shall have four (4) hours to re-install a displaced panel (fallen or crooked panel) and one (1) hour for cleaning to ensure visibility.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All the sections of Division 01 – General Requirements

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

- .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)

- .1 CAN / CSA-086-F14, Rules for the Design of Wood Framing
- .2 CAN / CSA O86S1 F05 Supplement Number 1 to CAN / CSA-086-01
- .3 CSA O121-F08 (C2013), Douglas Fir Plywood.
- .4 CSA O151-F09 (C2014), Canadian Softwood Plywood.
- .5 CSA O153-F13, Poplar plywood.
- .6 CSA O437-93 (C2011), Particle Board and Particle Board Standards.
- .7 CSA S269.1-16, Temporary Works and Forms.
- .8 CAN / CSA S269.2-M87, Scaffolding.
- .9 CAN / CSA-S269.3-FM92 (C2013), Formwork, National Standard of Canada.
- .10 CAN / CSA-W117.2-F12 - Welding, Cutting and Related Procedures
- .11 CSA Z462-F15, Safety in the Workplace
- .12 CAN / CSA-Z259.10-F12 (C2016) - Safety harnesses
- .13 CAN / CSA Z275.2-F15 Safety Rules for Diving Workers

.3 Public Works and Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R2002D, Title: General Conditions ‘C’, in effect as of May 14, 2004.

.4 Province of Québec

- .1 Loi sur la santé et la sécurité du travail, L.R.Q., c. S-2.1
- .2 Code de sécurité pour les travaux de construction, L.R.Q., c. S-2.1, r.6

1.3 ACCESS TO SITE

.1 Provide and maintain access lanes, sidewalk crossings and ramps as may be required for access to the work site.

1.4 CORRIDORS AND TEMPORARY FOOTBRIDE ACCESSES

.1 Provide access to required corridors, tunnels, ramps or temporary access bridges as required on the plans to enable users and the public to safely access floating docks from locks side or to any other sector of the Chambly Canal National Historic Site which remains operational.

.2 Temporary pedestrian tunnels to be constructed shall, unless otherwise indicated, be constructed in accordance with prevailing standards using a temporary steel structure (scaffold type) covered with 13 mm plywood on all faces. (Ceiling and side walls). Ceilings shall be capable of supporting a load of 4.8 kPa (100 lbs/ft²). These tunnels shall be permanently illuminated with sufficient intensity to enable pedestrians to orient themselves well. The tunnels will have to be moved according to the steps of execution and under the responsibility of the contractor.

.3 Particulars about the temporary pedestrian tunnels to the floating docks:

.1 The pedestrian tunnel must be installed by May 1st at the latest;

.2 The design and supply, installation and dismantling of the pedestrian tunner is the full responsibility of the Contractor, and must be of sufficient capacity, safe for the public and must move with the fluctuations in the water level.

1.5 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform work and protect public.

.2 Provide a copy of the attestation to completion of the course “Signaling on road work sites” of the flagmen.

1.6 EMERGENCY ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.7 PROTECTION FOR NEIGHBOURING PRIVATE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of work.

.2 Be responsible for any damage incurred.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 CONSTRUCTION FENCE

.1 Erect a temporary fencing around the worksite, consisting of a new 1.8 m high Omega type fence attached with wire to T-profiled columns at 2.4 m centers. Provide a lockable access barrier for trucks, minimum. Place fences around trees and plants to be left in place to protect them from damage that may be caused to them by the equipment used or by certain construction practices. Fences must be securely fastened with concrete blocks and stiffeners to prevent their falling over.Fence on the periphery of the site shall be provided to support banners 1.8m high at the locations identified on the plans. The access doors to the site as well as the openings necessary for the proper operation of the site will not need banners. Arrange the installation of the banners with the co-ordination of a Parks Canada Agency Representative. The graphic design of the banners will be provided by Parks Canada through electronic support.

.2 Technical specifications of the banners:

.1 MESH material with printed design by Parks Canada Agency.

.2 Perforation type 60% printable / 40% air flow rate.

.3 Dimensions: 1.8m high x length of fence sections to be covered.

.4 Finish: matt.

.5 Perimeter with hem and double seam.

.6 Use: outdoor use.

.7 Hooking system: with 12 "or 24" eyelets (as recommended by manufacturer).

.8 Submit all posters at the end of the worksite to Parks Canada.

.9 Provide a 1.0m x 1.0m print sample for Parks Canada approval prior to full printing.

PART 3 EXECUTION

3.1 INSTALLATION AND REMOVAL

.1 Provide, install or arrange temporary access and protection structures to enable work to be carried out expeditiously.

.2 Dismantle and evacuate equipment from site when no longer needed

END OF SECTION

PART 1 GENERAL

1.1 QUALITY

.1 Products, materials, equipment and articles incorporated in work must be new, not damaged or defective, and of best quality for purpose intended. If requested, provide 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 waive 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 feasibility of products, decision rests strictly with the Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item.

1.2 AVAILABILITY OF PRODUCTS

.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 the 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 the Departmental Representative at commencement of work and should it subsequently appear that work may be delayed for such reason, the Departmental Representative reserves right to substitute with a more readily available equivalent product, at no increase in Contract Price or Contract Time.

1.3 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, alterations, 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 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store lumber and sheet materials on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of the Departmental Representative.

.9 Touch up damaged factory finished surfaces to satisfaction of the Departmental Representative. Use touch-up materials to match original. Do not paint over name plates.

1.4 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of work.

.2 Unload, handle and store such products. For the sheet piling, the transportation cost from the Contractor's storage site to the worksite will be covered by the Contractor. The storage site must be as close as possible to the worksite or within a radius of 100 km maximum.

1.5 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 the Departmental Representative in writing of conflicts between specifications and manufacturer's instructions, so that the Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.6 QUALITY OF WORK

.1 Ensure quality of work is of highest standard, executed by experienced and skilled workers in respective duties for which they are employed. Immediately notify the 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. the Departmental Representative reserves right to require dismissal from site of workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of quality of work in cases of dispute rest solely with the Departmental Representative, whose decision is final.

1.7 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.

1.8 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

1.9 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 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform the Departmental Representative of conflicting installation. Install as directed.

1.11 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.

1.12 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.

1.13 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building.

1.14 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute work at times directed by local governing authorities, with minimum of disturbance to work and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative

1.2 SURVEY REFERENCE POINTS

.1 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.2 Make no changes or relocations without prior written notice to Departmental Representative.

.3 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.4 Require surveyor to replace control points in accordance with original survey control.

1.3 SURVEY REQUIREMENTS

.1 Establish two (2) permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.2 Establish lines and levels, locate and lay out, by surveying instruments.

.3 Stake for excavation, demolition, concrete formwork, grading, fill and topsoil placement and landscaping features.

.4 Stake slopes and berms.

.5 Establish pipe invert elevations.

.6 The Contractor shall assume full responsibility for the staking of the work and shall ensure that the work is fully executed according to the location, lines and levels indicated.

.7 Provide material for staking and location.

.8 Provide required equipment, such as rules and templates, to facilitate the work of the Departmental Representative in the inspection of the work.

1.4 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.5 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.6 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

1.7 DOCUMENTS/SAMPLES TO SUBMIT FOR INFORMATION/APPROVAL

.1 Submit name and address of Surveyor to Departmental Representative.

.2 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform to Contract Documents.

1.8 SUBSURFACE CONDITIONS

.1 Promptly notify Departmental Representative in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Departmental Representative determine that conditions do differ materially; instructions will be issued for changes in Work as provided in Changes and Change Orders.

1.9 INSPECTION OF THE WORKSITE AREA

.1 Prior to submitting the bid, the Contractor shall, if deemed necessary, visit the site to familiarize himself with the existing terms and conditions and to consider such other details as may affect the cost, duration and methods of execution of the work. The ignorance of local conditions will not at any time constitute a valid reason for claiming an additional amount of money.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of Division 01 – General Requirements

1.2 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of elements of project.

.3 Include in request:

.1 Identification of project.

.2 Location and description of affected Work.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed Work, and products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on Work of Owner or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.3 MATERIALS/EQUIPMENT

.1 Materials and equipment required for original installation.

.2 Change in materials/equipment: Submit request for substitution in accordance with Section 01 33 00 – Submittal Procedures.

1.4 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching. Take photographs and video of the state of the conditions before the beginning of the worksite and submit a copy to the Parks Canada Agency on DVD disc or USB memory stick.

.2 After uncovering, inspect conditions affecting performance of work.

.3 The contractor must carry out, prior to the start of the works, an underwater inspection and survey of the existing wall of the lock, at the area of connection with the new support platform of the new gangway leading to the floating docks to determine:

.1 The measurement of the angle of the existing concrete wall;

.2 The dimensions of the base of the foundation wall, if there is one;

.3 The station and composition of the concrete structure behind the masonry.

.4 Beginning excavation or partial demolition means acceptance of existing conditions.

.5 Supply and install supports to assure structural integrity of surroundings. Provide devices and methods to protect other portions of project from damage.

.6 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.5 EXECUTION OF WORK

.1 Execute partial demolition, as well as excavation and filling, to complete Work.

.2 Fit several parts together, to integrate with other work.

.3 Execute work by methods that avoid damage to other work, and which will provide proper surfaces to receive patching and finishing.

.4 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.5 Restore work with new products in accordance with requirements of Contract Documents.

.6 Refinish surfaces to match adjacent finishes. Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the section of division 1 – General Requirements and division 2 Existing Conditions

1.2 REFERENCES

.1 Environment Quality Act (CQLR, c Q-2)

.2 Regulation Respecting Hazardous Materials (Q-2, r 32)

.3 Regulation Respecting the Landfilling and Incineration of Residual Materials (Q-2, r 19)

.4 Regulation Respecting Historical Canals (DORS193-220)

1.3 PROJECT CLEANLINESS

.1 Maintain work in tidy condition, free from accumulation of waste products and debris, including that caused by the Departmental Representative or other Contractors.

.2 Remove debris and waste products from worksite regularly to keep it free from garbage, hazardous waste (HW), waste products, material, substances or equipment not needed for carrying out work and dispose of them in compliance with the regulations in effect. Proof of disposal in a place authorized by the Department of Sustainable Development, the Environment and the Fight Against Climate Change (MDDELCC) shall be provided to the Departmental Representative.

.3 Do not burn waste materials on site.

.4 Throwing any material, waste, HW, debris or residue into the waterway is strictly prohibited. Should it occur, the material shall be recovered immediately.

.5 Clear snow and ice from access roads. Contractor shall dispose of snow removed from work areas in a designated site authorized by MDDELCC, in agreement with the Departmental Representative. No removed snow can be deposited in the basin or the canal (for the canals, see *Règlement sur les canaux historiques* (Regulation Respecting Historical Canals)

.6 Keep public roads around the worksite free from material, waste, HW, debris, residue, or scrap from the worksite, and clean the public roads immediately should any such material be found thereon.

.7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.8 Provide on-site containers for collection of waste materials and debris.

.9 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.10 Dispose of waste materials and debris off site.

.11 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.12 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.13 Provide adequate ventilation during use of volatile or noxious substances.

.14 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.15 Water Used for Washing Concrete Mixers

.1 Excess concrete and cement from concrete mixers shall be poured into molds or some other type of leak-proof container. Concrete residue shall be managed with construction waste.

.2 Water used for washing concrete mixers shall be collected in a leak-proof pond so as to prevent any run-off into the environment. The cleaning area shall be located over 30 m from the waterway.

.3 Water used for washing shall not be released directly into a watercourse or body of water or on the ground. Water used for washing may be collected by the concrete supplier and returned to the concrete plant for disposal. Otherwise, this water shall be confined, sampled and treated (if necessary) in order to meet MDDELCC's surface water quality criteria (protection of aquatic life – acute effects) for suspended material, pH and C_{10}-C_{50}, before release into the environment.

1.4 FINAL CLEANING

.1 When work is substantially completed remove surplus products, tools, construction machinery and equipment not required for performance of remaining work.

.2 Remove waste products and debris other than that caused by others, and leave work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products from the site and dispose of them in compliance with the regulations in effect. Do not burn waste materials on site. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris. Proof of disposal in a place authorized by MDDELCC shall be provided to the Departmental Representative.

.5 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.6 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls and floors.

.7 Clean lighting reflectors, lenses, and other lighting surfaces.

.8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.9 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.10 Remove dirt and other disfiguration from exterior surfaces.

.11 Sweep and wash clean paved areas.

.12 Clean roofs, downspouts, and drainage systems.

.13 Remove snow and ice from access to building.

.14 Contractor shall recover all hazardous waste (HW) produced during the work. All HW shall be sorted and managed in compliance with the regulations in effect, more particularly the Regulation Respecting Hazardous Materials (Q-2, r. 32).

.15 Contractor shall dispose of the HW in a site duly authorized by the MDDELCC. Proof of disposal shall be provided to the Departmental Representative.

.16 Contractor shall recover all residual material produced during the work (waste, recyclables, construction debris, etc.). All residual material shall be sorted and managed in compliance with the regulations in effect.

.17 Contractor shall dispose of the residual material in a site duly authorized by MDDELCC. Proof of disposal shall be provided to the Departmental Representative.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal, and Section 02 50 13 – Management of Toxic Waste.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of Division 1 - General Requirements and Division 2 – Existing Conditions

1.2 WASTE MANAGEMENT GOALS

.1 Prior to start of work conduct meeting with the Departmental Representative to review and discuss waste management goal and Contractor's proposed Waste Reduction workplan for Construction, Renovation and/or Demolition (CRD) waste to be project generated.

.2 The waste management goal is to divert as much as possible of total Project Waste from landfill sites. Prior to project completion provide the Departmental Representative with documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.

.3 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.

.4 Protect environment and prevent environmental pollution damage.

1.3 DEFINITIONS

.1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.

.2 Class III: non-hazardous waste – construction renovation and demolition waste.

.3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste generated during construction, demolition, and/or renovation activities

.4 Inert Fill: inert waste – exclusively asphalt and concrete.

.5 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.

.6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.10 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.11 Separate Condition: refers to waste sorted into individual types.

.12 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

.13 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled.

.14 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction workplan (WRW) goals and identifies lessons learned.

.15 Waste Management Co-ordinator (WMC): Contractor Representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.

.16 Waste Reduction workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction workplan information acquired from Waste Audit.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Prepare and submit at intervals agreed to by the Departmental Representative the following:

.1 Receipts, scale tickets, waybills and/or receipts for disposal of waste materials generated during the work (hazardous waste, waste, recyclable materials, construction debris, etc.) indicating the quantities and types of materials reused/repurposed, recycled or disposed of.

.2 Submit prior to final payment the following:

.1 Provide the receipts, scale tickets, waybills and receipts for disposal of waste materials generated during the work (hazardous waste, waste, recyclable materials, construction debris, etc.) that confirm the quantities and types of materials reused/repurposed, recycled and disposed of, as well as their destination.

1.5 USE OF SITE AND FACILITIES

.1 Execute work with minimal interference and disturbance to normal use of premises.

.2 Maintain security measures established by facility. Provide temporary security measures approved by the Departmental Representative.

1.6 WASTE PROCESSING SITES

.1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.7 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by the Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor’s property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 All HW must be separated and managed in accordance with regulations in effect, specifically, the Regulation Respecting Hazardous Materials (Q-2, r. 32).

.5 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.6 Protect structural components not removed and salvaged materials from movement or damage.

.7 Support affected structures. If safety of structures is endangered, cease operations and immediately notify the Departmental Representative.

.8 Protect surface drainage, mechanical and electrical from damage and blockage.

.9 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.10 Separate and store materials produced during project in designated areas.

.11 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.

.3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site and provide to the Departmental Representative.

.4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.8 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of materials, waste, hazardous waste, debris or residue into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Total tonnage generated.

.4 Tonnage reused or recycled.

.5 Reused or recycled waste destination.

.4 Remove materials on-site as work progresses.

.5 Contractor is responsible for collecting all HW generated during the work. All HW must be separated and managed in accordance with regulations in effect, specifically, the Regulation Respecting Hazardous Materials (Q-2, r. 32).

.6 Contractor shall dispose of its HW at a disposal site approved by the MDDELCC. Proof of disposal shall be provided to the the Departmental Representative.

.7 Contractor shall collect all waste materials generated during the work (waste, recyclable materials, construction waste, etc.). All waste materials shall be separated and managed in accordance with the regulations in effect.

.8 Contractor must dispose of its waste materials at a disposal site approved by the MDDELCC. Proof of disposal shall be provided to the Departmental Representative.

1.9 SCHEDULING

.1 Co-ordinate work with other activities at site to ensure timely and orderly progress of work.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 APPLICATION

.1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning and Section 02 50 13 – Management of Toxic Waste.

.1 Leave work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning and Section 02 50 13 – Management of Toxic Waste.

.3 Waste Management: separate waste materials for reuse and recycling or disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.2 Source separate materials to be reused/recycled into specified sort areas.

3.3 WASTE DIVERSION

.1 Separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by the Departmental Representative and consistent with applicable fire regulations.

.1 Mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of Division 01 – General Requirements

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of work Procedures:

.1 Certificate of Practical Completion – from Departmental Representative's Inspection:

.1 The Departmental Representative and Contractor are to inspect work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.2 Certificate of Practical Completion for the season - from Departmental Representative's Inspection:

.1 In the event that the period of the year is not suitable for the provisional acceptance of the entire works but the Contractor is contractually bound to demobilize for a certain period of time, a Certificate of Practical Completion for the season may be given

.2 The Contractor shall list the work he wishes to submit for Practical Completion for the season. The Departmental Representative will perform a work inspection with the Contractor to identify defects and failures.

.3 The Contractor shall make the corrections requested.

.3 Completion Tasks: submit written certificates in French that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, and fully operational.

.4 The required certificates have been submitted

.5 Operation of systems: demonstrated to the Departmental Representative.

.6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to the Departmental Representative.

.7 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by the Departmental Representative and Contractor.

.2 If work is incomplete according to the Departmental Representative, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Completion: Where the Departmental Representative considers that deficiencies and defects have been remedied and the contractual requirements appear to be substantially met, submit a request for the production of a Certificate of Substantial Completion of Work.

.6 Beginning of the warranty period and the exercise period of the right of retention: The date of acceptance by the Departmental Representative of the declaration of substantial completion of work submitted shall be the date of commencement of the exercise of the right of retention and the period of guarantee, unless otherwise prescribed by the regulations relating to the right of retention in force at the place of work.

.7 Final Payment

.1 When the Departmental Representative considers that deficiencies and defects have been corrected and the contractual requirements are fully met, submit a final payment request.

.2 If the work is deemed incomplete by the Departmental Representative, complete the items that have not been completed and submit a new inspection request.

.8 Witheld payment: Upon issuance of the Certificate of Substantial Completion of Work, submit a request for payment of the withheld funds in accordance with the terms of the contractual agreement.

1.3 FINAL CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENT

.1 Section 01 33 00 - Submittal Procedures.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Departmental Representative to:

.1 Verify Project requirements.

.2 Review warranty requirements and installation instructions.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

.5 Upon demand, provide the documents confirming the type, the supply source and the quality of the supplied products.

1.4 PRÉSENTATION

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by [process flow,] [systems,]under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dxf, dwg format on CD.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume:

.1 provide title of project;

.2 Date of submission; names.

.3 Names, addresses and telephone numbers of the Departmental Representative and Contractor with names of responsible parties.

.4 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of opaque drawings and in copy of specifications.

.2 Use felt tip marking pens.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to grade.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Documents.

.7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Provide digital photos, if requested, for site records.

1.7 FINAL SURVEY CERTIFICATE

.1 Submit certificate of survey confirming compliance or non-compliance with contractual site requirements and grade levels of completed works.

1.8 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor'sco-ordination drawings, with installed colour coded piping diagrams.

.12 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.13 Include test and balancing reports as specified in Section 01 45 00- Quality Control

.14 Additional requirements: as specified in individual specification sections

1.9 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.10 MAINTENANCE OF MATERIALS/EQUIPMENT

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.11 TRANSPORTATION, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.12 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint warranty inspection, measured from time of acceptance, by Departmental Representative.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at [4]and [9]month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 32 16.07 – Construction Progress Schedule Bar (GANTT) Chart

.2 Section 01 33 00 – Submittal Procedures

.3 Section 05 50 00 – Metal Fabrications

1.2 GENERAL

.1 CX is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. CX is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:

.1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.

.2 Ensure appropriate documentation is provided.

.3 Effectively train O M staff.

.2 Contractor assists in CX process, operating equipment and systems, troubleshooting and making adjustments as required.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.

.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.3 Design Criteria: as per requirements, to meet project functional and operational requirements.

1.3 COMMISSIONING OVERVIEW

.1 CX activities supplement field quality and testing procedures described in relevant technical sections.

.2 CX is conducted in concert with activities performed during stage of project delivery. CX identifies issues in Planning and Design stages which are addressed during Construction and CX stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. CX activities include transfer of critical knowledge to facility operational personnel.

.3 The Departmental Representative will issue Interim Acceptance Certificate when:

.1 Completed CX documentation has been received, reviewed for suitability and approved by Departmental Representative.

.2 Equipment, components and systems have been commissioned.

.3 O M training has been completed.

.4 Performance testing has been completed and is compliant, and report has been submitted.

.5 Operating and manufacturer's manuals have been submitted.

.6 As-built plans have been submitted.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during CX, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by the Departmental Representative, to ensure effective performance.

.2 Costs for corrective work, additional tests and inspections to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 PRE-CX REVIEW

.1 Before Construction:

.1 Review Contract Documents and confirm by writing to the Departmental Representative:

.1 Adequacy of provisions for CX.

.2 Aspects of design and installation pertinent to success of CX.

.2 During Construction:

.1 Co-ordinate provision, location and installation of provisions for CX.

.3 Before start of CX:

.1 Have completed CX Plan up-to-date.

.2 Ensure installation of related components, equipment, sub-systems and systems is complete.

.3 Fully understand CX requirements and procedures.

.4 Have CX documentation shelf-ready.

.5 Understand completely design criteria and intent and special features.

.6 Submit complete start-up documentation to Departmental Representative.

.7 Have CX schedules up-to-date.

.8 Ensure systems have been cleaned thoroughly.

.9 Complete TAB procedures on systems and submit TAB reports to Departmental Representative for review and approval.

.10 Ensure as-built system schematics are available.

.4 Inform the Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.6 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to the Departmental Representative before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit the required documents and samples as per section 01 33 00 – Submital Proceedures

.2 Submittals: in accordance with Section 01 33 00 – Submittal Procedures. Submit no later than 4 weeks before CX:

.1 Name of Contractor's CX agent.

.2 Draft CX documentation.

.3 Preliminary CX schedule.

1.8 COMMISSIONING DOCUMENTATION

.1 The Departmental Representative must review and approve CX documentation.

1.9 COMMISSIONING SCHEDULE

.1 Provide detailed CX schedule as part of construction schedule in accordance with Section 01 32 16.07 – Construction Progress Schedule – Bar (GANTT) Chart.

.2 Provide adequate time for CX activities prescribed in technical sections and commissioning sections including:

.1 Approval of CX reports.

.2 Verification of reported results.

.3 Repairs, retesting, re-commissioning, re-verification.

.4 Training.

1.10 COMMISSIONING MEETINGS

.1 At 80% construction completion stage, in accordance with Section 01 32 16.07 – Construction Progress Schedule – Bar (GANTT) Chart, the Departmental Representative to call a separate CX scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for CX. Issues at meeting to include:

.1 Review duties and responsibilities of Contractor and subcontractors.

.2 Address delays and potential problems.

.3 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.

.2 Thereafter CX meetings to be held until project completion and as required during equipment start-up and functional testing period.

.3 Meeting will be chaired by the Departmental Representative, who will record and distribute minutes.

.4 Ensure subcontractors and relevant manufacturer representatives are present as required at all further meetings.

1.11 STARTING AND TESTING

.1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.12 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days' notice prior to commencement.

.2 The Departmental Representative to witness start-up and testing.

.3 Contractor's CX Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 MANUFACTURER'S INVOLVEMENT

.1 Factory testing: manufacturer to:

.1 Coordinate time and location of testing.

.2 Provide testing documentation for approval by the Departmental Representative.

.3 Obtain written approval of test results and documentation from the Departmental Representative.

.2 Obtain manufacturer's installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with the Departmental Representative.

.1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.

.2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

.3 Validation of Warranties

.1 Verify with manufacturer that testing as specified will not void warranties.

.4 Qualifications of manufacturer's personnel:

.1 Experienced in design, installation and operation of equipment and systems.

.2 Ability to interpret test results accurately.

.3 To report results in clear, concise, logical manner.

1.14 PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and CX.

.2 Conduct start-up and testing in following distinct phases.

.1 Included in delivery and installation:

.1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.

.2 Visual inspection of quality of installation.

.2 Start-up: follow accepted start-up procedures.

.3 Operational testing: document equipment performance.

.4 System PV: include repetition of tests after correcting deficiencies.

.5 Post-substantial performance verification: to include fine-tuning.

.3 Correct deficiencies and obtain approval from the Departmental Representative after distinct phases have been completed and before commencing next phase.

.4 Document required tests on approved PV forms.

.5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by the Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:

.1 Minor equipment/systems: implement corrective measures approved by the Departmental Representative.

.2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by the Departmental Representative.

.3 If evaluation report concludes that major damage has occurred, the Departmental Representative shall reject equipment.

.1 Rejected equipment to be removed from site and replaced with new.

.2 Subject new equipment/systems to specified start-up procedures.

1.15 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to the Departmental Representative for approval before commencement of commissioning.

.2 Start-up documentation to include:

.1 Factory and on-site test certificates for specified equipment.

.2 Pre-start-up inspection reports.

.3 Signed installation/start-up check lists.

.4 Start-up reports.

.5 Step-by-step description of complete start-up procedures, to permit the Departmental Representative to repeat start-up at any time.

1.16 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel. Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start-up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.2 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.3 Post instructions where directed.

.4 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.5 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.17 TEST RESULTS

.1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-commissioning.

1.18 START OF COMMISSIONING

.1 Notify the Departmental Representative at least 21 days prior to start of CX.

.2 Start CX only after elements of building affecting start-up and performance verification of systems have been completed.

1.19 INSTRUMENTS/EQUIPMENT

.1 Submit to the Departmental Representative for review and approval:

.1 Complete list of instruments proposed to be used.

.2 Listed data including serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

.2 Provide following equipment as required:

.1 2-way radios.

.2 Ladders.

.3 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out CX:

.1 Under actual (or accepted simulated per the Departmental Representative's instructions) operating conditions, over entire operating range, in all modes.

.2 On independent systems and interacting systems.

.2 CX procedures to be repeatable and reported results are to be verifiable.

.3 Follow equipment manufacturer's operating instructions.

1.21 WITNESSING COMMISSIONING

.1 The Departmental Representative is to witness activities.

1.22 AUTHORITIES HAVING JURISDICTION

.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.

.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

.3 Provide copies to the Departmental Representative within 5 days of test and with CX report.

1.23 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during start-up and CX to satisfaction of the Departmental Representative.

.2 Report problems, faults or defects affecting CX to the Departmental Representative in writing. Stop CX until problems are rectified. Proceed with written approval from the Departmental Representative.

1.24 COMPLETION OF COMMISSIONING

.1 Upon completion of CX, leave systems in normal operating mode.

.2 Complete CX prior to issuance of Interim Certificate of Completion.

.3 CX to be considered complete when contract CX deliverables have been submitted and accepted by the Departmental Representative.

1.25 ACTIVITIES UPON COMPLETION OF COMMISSIONING

.1 When changes are made to baseline components or system settings established during CX process, provide updated CX form for affected item.

1.26 TRAINING

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Submit training proposal complete with hour-by-hour schedule including brief overview of content of each segment to the Departmental Representative and PWGSC 30 days prior to anticipated date of beginning of training.

.1 List name of trainer, and type of visual and audio aids to be used.

.2 Show co-ordinated interface with other mechanical and electrical training programs.

.3 Submit reports up to 1 week before anticipated start date of training program.

.4 While not an exhaustive list, provide training for following systems, devices or equipment:

.1 Not applicable

.5 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

1.27 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

.1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in Contract.

1.28 OCCUPANCY

.1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.29 MEASUREMENT TOLERANCES DURING VERIFICATION

.1 Unless otherwise specified, actual values to be within ± 2% of recorded values.

1.30 DEPARTMENTAL REPRESENTATIVE'S PERFORMANCE TESTING

.1 Performance testing of equipment or system by the Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

1.31 CLEANING

.1 Clean and touch up surfaces with shop coat that were scratched or damaged during delivery and installation (according to section 05 50 00 - Metals requirements). Use type and colour of original paint.

.2 Clean hooks, supports, fasteners and other visible non-galvanized fasteners, and apply primer to prevent rust.

.3 Right before final acceptance of facility, clean and restore all devices to new condition and leave in perfect working order.

PART 2 PRODUCT

2.1 NOT USED

.1 Not used

PART 3 EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 All sections of Division 1 - General Requirements

1.2 WASTE MANAGEMENT AND ELIMINATION

.1 Sort waste destined for recycling and reuse according to section « 01 74 21 - Construction/Demolition Waste Management and Disposal ».

.2 Dispose of contaminated material, if any, in accordance with « 01 35 13.43 - Special Procedures for Contaminated Sites ».

.3 Send unused bituminous materials to a local installation approved by the Departmental Representative.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used

PART 3 EXECUTION

3.1 PREPARATION

.1 Prior to beginning removal operation, inspect and verify with the Departmental Representative areas, depths and lines of asphalt pavement to be removed.

3.2 PROTECTION

.1 Protect asphalt surface that must remain in place, lighting installations and other works from deterioration. Immediately repair or replace damaged items at no cost to the Departmental Representative and to his satisfaction.

3.3 REMOVAL

.1 Remove existing asphalt pavement to lines and grades as indicated or established by the Departmental Representative.

.2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.4 Suppress dust generated by removal process.

.5 For protection measures and other environmental requirements, refer to « 01 35 43 - Environmental Protection ».

3.4 EVACUATION OF MATERIALS

.1 Pile the removed asphalt material exterior the worksite.

3.5 FINISH TOLERANCES

.1 Finished surfaces in areas where asphalt pavement has been removed to be within ±10 mm of grade specified but not uniformly high or low.

3.6 CLEANING

.1 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand sweeping as required, at the request of the Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 20 00 – Concrete Reinforcing

.4 Section 3 30 00 – Cast In Place Concrete

.5 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.2 REFERENCES

.1 Ministère du Développement durable, de l'Environnement et des Parcs , Québec

.1 Laws and Reglements of the Ministry.

.2 Laws and Regulations of the Federal Government of Canada.

.1 Canadian Environmental Protection Act, 1988.

.2 Canadian Environmental Assessment Act (CEAA), 1995

.3 Transportation of Dangerous Goods Act (TDGA), 1992.

.4 .Motor Vehicle Safety Act (MVSA), 1995.

.3 Canadian Standards Association (CSA).

.1 CSA International: CSA S350-FM1980(R2003), Code of Practice for Safety in Demolition of Structures.

.4 .Canadian Safety Code on Construction Sites.

.5 Safety Code for Construction Work in Quebec.

.6 .Also comply with the requirements of the National Building Code of Canada, Part 8, Site Safety and Provincial Regulations.

.7 ICRI - Guide No. 03732 (E) - Technical Guide on Preparations for Concrete Surfaces.

.8 MDDEP - Procedures for the discharge of wastewater into a watercourse

1.3 DEFINITIONS

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

.2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.

.3 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill.

.4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

.5 Deconstruction: When this term is used, this means that the demolition must be carried out with care not to damage the parts of adjacent structures to be kept intact.

.6 Approximate dimensions: When dimensions are marked « ± », they are dimensions that may vary at the site during the execution of the work. The General Contractor is required to verify all dimensions on site before undertaking the work.

.7 Co-operation/Co-ordination: Where one of these words is included in the plans or specifications, this means and implies that the General Contractor has full responsibility for coordinating and ensuring the cooperation of all other stakeholders, without exception, involved in the work in order to deliver a complete work conforming to the contract documents.

.8 Openings / Piercing: Where one of these words is included in drawings or specifications, this means and implies that the General Contractor shall consult all drawings, including those of each discipline, in order to coordinate the dimensions and the exact locations of each opening or hole in a wall, floor, roof or any other element. This also means that the General Contractor has an obligation to consult with the Departmental Representative to ensure that each opening or drilling is carried out in accordance with good practice.

.9 Recovered/recycled materials: When one of these words is included in drawings or specifications, this implies and implies that the General Contractor must dismantle the item for reuse. The item must be temporarily stored, cleaned and reinstalled as specified.

.10 Recycled materials: When one of these words is included in drawings or specifications, this means and implies that the General Contractor will be able to recycle certain materials following the deconstruction and decommissioning of these materials. The General Contractor has full responsibility to include in its bid all costs related to the necessary steps, recycling and disposal of all materials.

.11 To be retained or protected: When any of these words is included in the plans or specifications, this means and implies that the General Contractor must provide for all materials, manpower, installation of the protective structures required to keep intact or to protect from damage any parts of the building that are to be retained.

.12 Do, ask provide install, new, etc. : When one of these words is included in drawings or specifications, this means and implies that the General Contractor has included in its bid all costs related to manufacture up to the installation of the item at the site including all the guarantees it must provide.

1.4 EXISTING CONDITIONS

.1 Existing conditions shall mean the condition of the structures to be demolished on the day of acceptance of the tender.

.2 Demolition drawings on structural plans refer mainly to existing elements of concrete, masonry, steel or wood, the demolition of which is necessary for the complete construction of the structure or works, in accordance with the other indications in contract documents. These drawings should be read in conjunction with those of other disciplines.

.3 For dimensions of items to be demolished or deconstructed, where not shown on structural plans, refer to plans of other disciplines. When not shown on plans, refer to existing plans available on request. However, the General Contractor must take into account in his bid that for certain works to be demolished there is no existing plan available and additional records may be required at the request of the Departmental Representative.

.4 Exact information and dimensions of existing structures.

.1 Exact dimensions of existing elements may vary slightly depending on site conditions. If there is a major difference discovered during the work, follow the instructions of the Departmental Representative.

.2 Some plan sketches have been reproduced from the final or « as-built » plans available. It is not guaranteed that it represents exactly the existing conditions and the General Contractor must take into account the lack of information in the establishment of his tender. Despite the lack of information, the General Contractor is fully responsible for providing the Owner with a complete book.

.3 The information reproduced on the drawings cannot be used as a basis for any claim or claim for unjustified compensation from the General Contractor or its subcontractors for the deconstruction of the identified works.

.5 General Contractor to verify all dimensions and dimensions on site. Before proceeding with the fabrication of the elements, verify the dimensions and condition of the existing structure and advise the Departmental Representative of any dimensional deviations or potential connection problems for instructions.

.6 Prior to commencement of work, the General Contractor, together with the Departmental Representative, shall make a photographic survey of existing works that may be affected or damaged in the course of the work by his temporary facilities, his equipment, his materials, his workers and those of his subcontractors, etc.

.7 Plan and coordinate with other disciplines all planned work according to the existing conditions.

.8 The General Contractor acknowledges that he is aware of the geographical location and the existing conditions, constraints of access, delivery, handling, transport and temporary or permanent storage of materials and equipment near the site, Sidewalks and in the neighboring streets of the work site. He also acknowledges that he is fully aware of the municipal regulatory requirements in this area and agrees to comply therewith in every respect.

.9 The demolition of sound materials (masonry, concrete, rock or other) to meet the minimum requirements of the plans shall be provided for in the General Contractor's bid prices.

.10 Under this project, some work may require the use of confined space procedures.

1.5 INSPECTION OF THE AREA

.1 The General Contractor shall:

.1 Inspect site and anticipate any conditions that may affect the course of work. Submission of a bid will be evidence that the bidder has inspected the site and has made an informed bid;

.2 Determine the nature and extent of hazards inherent in the removal of materials;

.3 Take all necessary protective measures to prevent damage to third parties.

.2 Exact location, dimensions and elevations of existing infrastructure and features shown on the plans are approximate and must be verified on site prior to commencement of work. Even if the existing structures can be shown on the plans, whether they be electric or telephone poles, pipes, underground conduits, electrical or telephone cables or other structures in place, air or underground, public or private, Their location is only approximate and must be specified by the General Contractor to meet the requirements of its work. Existing works are not necessarily shown on the plans.

.3 Prior to commencement of work, the General Contractor shall, together with the Departmental Representative, make a photographic survey of existing works that are likely to be affected or damaged in the course of the work by his temporary facilities, his equipment, his materials, his workers and those of

his subcontractors, etc. All damaged works shall be repaired at the expense of the General Contractor and to the satisfaction of the Departmental Representative, without causing delays in the delivery of the works.

1.6 DEMOLITION/DECONSTRUCTION DRAWINGS

.1 Submit recommended methods, drawings, diagrams or details indicating the order of the demolition or deconstruction, shoring and underpinning work, as appropriate, for approval, as well as the equipment used to do so.

.2 The drawings must bear the seal and signature of a member engineer in good standing of the OIQ, competent and recognized in the field. The General Contractor shall assume the costs of the services of the General Contractor's Engineer.

.3 Submit shop drawings as prescribed in « 01 33 00 - Submittal Procedures ».

.4 The General Contractor shall provide all shop drawings and technical data sheets required for approval.

.5 In the event that discipline-related elements are included in another discipline but omitted in the discipline concerned, the General Contractor must still plan and include these elements in its submission.

1.7 TEMPORARY PROTECTION MEASURES

.1 The General Contractor is fully responsible for protecting all existing services not affected by the works and located within the limits of the work. He is responsible for any damage that may occur to them as a result of his operations; He must go to the site during the submission period to assess all risks.

.2 General Contractor is responsible for protection against damage to surrounding structures.

.3 The General Contractor shall take strict measures to ensure that no material, product, debris or other object causes damage to the environment and to any other person, and shall maintain in this respect the Departmental Representative for all legal proceedings, claims, losses or damage inherent in and resulting from its default.

.4 The General Contractor is responsible for ensuring the safety of the worksite at all times, including outside working hours.

.5 Take necessary measures to prevent the displacement or subsidence of existing structures and infrastructure and the parts of buildings to be retained and to prevent damage to them. Supply and install bracing and shoring parts. If necessary, repair damaged structures during demolition or deconstruction work as directed by the Departmental Representative.

.6 Thoroughly support structures or works covered and if it appears that the demolition or deconstruction work constitutes a danger to the rest of the structure or the existing pipes to protect and preserve, take appropriate precautionary measures, stop the work and notify the Departmental Representative.

.7 Ensure deconstructions do not obstruct the surface water drainage system and other electrical and mechanical systems and infrastructure that should remain functional.

.8 Ensure that demolition or deconstruction does not result in excessive levels of air, sound or noise pollution. Comply with the specification requirements and general conditions, particularly in regard to nuisances such as noise, dust, noxious fumes, working hours, public protection, etc.

.9 It is prohibited to burn waste and materials on site.

.10 Do not discharge waste or volatile materials, such as mineral spirits, oils, petroleum-based lubricants or toxic cleaning solutions into storm or sanitary sewers. Ensure that appropriate methods for the disposal of this type of waste are maintained throughout the duration of the work.

.11 Do not discharge water containing suspended solids into watercourses, storm sewers, sanitary sewers or adjacent land by pumping or otherwise.

.12 Ensure drainage and containment of runoff containing suspended solids or other harmful substances in accordance with local authority requirements.

.13 Provide all necessary work to contain contaminated runoff. Particularly, erect temporary watertight structures that provide protection and containment for run-off water containing suspended particulates that may be discharged into watercourses where appropriate.

.14 Two weeks prior to commencement of work, the General Contractor shall provide a methodology describing in detail all means to be used and the recommended equipment and procedures for holding, filtering, pumping and channeling runoff to appropriate outside services to avoid spill problems in watercourses.

.15 Protect vegetation (trees, plants, shrubs and foliage) on the property and adjacent properties, as indicated.

.16 To prevent foreign substances or matter from contaminating air inside the work site near fresh air intakes of buildings and outside the building site by erecting temporary protection enclosures for the execution of demolition or deconstruction work

.17 Cover dry material and waste or wet slurry to prevent the raising of dust and debris. Apply a dust suppressant on all temporary access routes.

.18 The concrete elements to be demolished are generally in a healthy state. The General Contractor shall take into account in determining his price that he will demolish sound concrete, masonry or other materials to carry out his work.

.19 Upon completion of work, remove all temporary protective structures that have been required.

.20 Perform demolition or deconstruction work in accordance with the requirements of CSA S350 M1980 and all other provincial regulations, including the construction code S-2.1 r.6 final edition.

.21 Carry out work in accordance with « 01 35 43 - Environmental Protection ».

.22 Before cutting and removing materials, protect existing service mains and ensure that materials from demolition or deconstruction do not obstruct them.

1.8 DOCUMENTS TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submit documents and samples required according to sections 01 33 00 – Submittal Procedures and 01 74 21- Construction/Demolition Waste Management and Disposal

.2 Submit demolition procedures.

.1 Where required, submit for approval and review by the Departmental Representative schematics or details indicating the order of the demolition, bracing and underpinning works as well as the elements used to do these works. In this case, drawings stamped and signed by qualified professional engineer registered and licensed in province of Quebec, Canada.

.2 Submit to the Departmental Representative, demolition procedures, which must meet environmental protection requirements. These procedures must also indicate how and where materials will be disposed of.

.3 The General Contractor shall ensure compliance with all requirements for the transmission of the required documents, samples and reports to the satisfaction of the Departmental Representative.

.4 Before undertaking the work, submit a detailed waste reduction plan showing the expected percentages of reused, recycled and landfilled materials, the plan for demolition or selective deconstruction, the nature

and quantities of the materials to be recovered, the number and location of salvage bins, the anticipated collection frequency, and the name and address of the waste management centers.

.5 Provide, at the request of the Departmental Representative, copies of certified receipts issued by landfills and authorized reuse and recycling centers for all materials discharged from the site. Obtain written authorization from the Departmental Representative prior to forwarding materials to the waste management centers listed in the waste reduction plan.

1.9 REGULATORY REQUIREMENTS

.1 Ensure work is completed in accordance with CEPA, CEAA, TDGA, LSVA and all applicable provincial and municipal regulations.

.2 All applicable regulatory requirements shall be strictly adhered to and no compensation shall be granted to the General Contractor to comply with them.

1.10 WORK SCHEDULE AND NOISY WORK

.1 The General Contractor shall provide in its execution schedule and scheduling that certain noisy disruptive work shall be carried out on a sometimes discontinuous schedule in accordance with the other requirements of the contract documents and in close coordination with the Departmental Representative.

.2 In addition to the general conditions of the quote, the General Contractor shall also comply with all applicable municipal by-laws concerning hours of work, noise levels, etc.

1.11 MATERIALS, EQUIPMENT AND MACHINERY

.1 Heavy equipment and machinery shall be operated to meet or exceed the requirements of all relevant fumes standards.

.2 Switch off machines at the end of their use, unless extreme temperature conditions require uninterrupted operation.

.3 General Contractor shall prevent harmful substances, vapors or foreign matter from contaminating the air in the vicinity of the fresh air intakes of buildings and outside the building site by erecting protective enclosures during deconstruction work. In particular, the General Contractor must comply with the other requirements of the contract documents with respect to potentially harmful fumes from its machinery.

.4 All equipment, machinery and equipment required for demolition or deconstruction shall be located at a safe distance from existing sections of structures to be protected or maintained.

.5 Refer also to « 01 55 26 - Traffic Control » for traffic, management and construction machinery requirements.

1.12 EVACUATION OF DEBRIS

.1 All debris from demolition or deconstruction shall be evacuated as the work progresses.

.2 At all times all access roads or traffic shall be available to users and the handling of debris shall be carried out in such a manner as to not obstruct traffic and safely outside the hours of high traffic.

.3 Provide signaling services with transmitter-receiver radios where access or traffic routes are to be partially and temporarily obstructed.

PART 2 PRODUCTS

2.1 RECYCLED, RECOVERED OR RE-USED MATERIALS

.1 Refer to « 31 23 33.01 - Excavation, Trenching and Backfilling » for recycling, recovery or reuse requirements for dry materials from the structure as well as « 01 74 21 – Construction/Demolition Waste Management and Disposal » for recycling requirements for metals from the structure.

.2 Refer to demolition requirements and drawings for materials and materials to be recovered for reuse/reuse.

.3 Remove items to be re-used/re-cycled, store them in accordance with Departmental Representative's instructions and return them to the owner, as prescribed in the relevant section of the specifications.

PART 3 EXECUTION

3.1 GENERAL

.1 The General Contractor shall include in his submission and in its scheduling and scheduling that the work must be carried out in a manner that will not adversely affect the users and boaters of Chambly marina and the Chambly canal during the operation.

.2 The General Contractor shall be solely responsible for the demolition or deconstruction methods and methods, while respecting the requirements mentioned. However, it must provide the Departmental Representative with demolition or deconstruction plans that it intends to use, as well as plans for the temporary support of the affected services, if any. These methods and means must have been prepared by an engineer, a member in good standing of the Ordre des Ingénieurs du Québec and bear its seal.

.3 If, in the opinion of the Departmental Representative or the representatives of the security organizations, including CNESST, the demolition or deconstruction methods recommended by the General Contractor are likely to cause damage or inconvenience to the person, property or they may require that they be modified or adapted solely for the cost of the General Contractor.

.4 The intervention of the Departmental Representative does not relieve the General Contractor of his responsibilities; conversely, its non-intervention does not constitute an endorsement of those means or methods.

.5 The demolition or deconstruction methods used by the General Contractor shall be controllable.

.6 The General Contractor must fully control all steps and be able to predict the effect of his actions on the element being demolished or deconstructed and on the remaining parts. In particular, the General Contractor shall avoid overloading debris in the parts of the structure to prevent damage.

.7 Provide bracing, scaffolding, ladders, chutes, temporary platforms, when required over utilities, streets, buildings, etc., and the means of protection required for the work.

.8 Construct and maintain such works in accordance with laws, codes, regulations, best practices and directives of the Departmental Representative.

.9 If the demolition or deconstruction of a part of the structure entails the obligation to place temporary supports or temporary braces in an adjacent part to be subsequently demolished, the General Contractor shall, Install such struts or braces at his own expense.

.10 In selecting the order to demolish or deconstruct the various elements of the structure, the General Contractor shall ensure that the sequence he has selected is such that the removal of the structural

elements, an element does not endanger the stability of a large part still standing in order to avoid a cascade break in the whole structure.

.11 Where required by the plan or as the Departmental Representative deems necessary and in the areas required for the safety of workers and the structural integrity of the structure, sealing existing structures by means of jacks and/or temporary supports braced around the parts to be demolished before proceeding with the demolition or deconstruction work. The General Contractor shall provide the shop drawings of the temporary shoring which he intends to use to the Departmental Representative for approval.

.12 Do not cross the saw cuts in the interior corners or on the face or back of the section to be cut. Complete the cutting in the interior corners by drilling juxtaposed holes of small diameter along the entire depth of the section.

.13 Break or cut into small pieces the parts to be demolished for ease of handling and transport.

.14 Brush with waterproof, two-component, epoxy-based protective coating on stripped frame ends that should remain visible.

.15 Carry all demolition or deconstruction products off the premises as the work progresses, in accordance with the requirements of the Departmental Representative.

3.2 EXAMINATION

.1 Some demolition or deconstruction may require prior interventions such as temporary protection work, temporary service disruptions, movement of existing equipment, etc. All the preparatory and preliminary work necessary for the proper execution of the works must be carried out in coordination with all the stakeholders.

.2 Inspect work site with the Departmental Representative and verify location and extent of items that must be removed, disposed of or salvaged, and those that must stay in place.

.3 Locate and protect public and private services and maintain in good condition those that remain in service on site.

.4 Notify public utility companies and the Departmental Representative and obtain their approval before commencing demolition work.

.5 Disconnect, cap or re-route, as needed, existing service lines on site that hinder execution of Work, in accordance with requirements of authorities having jurisdiction. Locate these service lines and those already abandoned on site, and indicate their location (horizontal and vertical plane) on final drawings. Properly support, underpin and maintain in place service lines and conduits encountered.

.1 Immediately notify the Departmental Representative as well as concerned public utility company of any damage caused to a service line to be maintained.

.2 Immediately notify the Departmental Representative of discovery of any unidentified public utility line and wait for his written instructions about measures to be taken.

3.3 GENERAL PREPARATIONS

.1 Protection of in-place conditions

.1 Take necessary measures to prevent movement, settlement or damage to adjacent structures and utility lines. Provide bracing and shoring required.

.2 Keep noise, dust and inconvenience to occupants to minimum.

.3 Protect mechanical and electrical devices, systems and installations as well as public and private utility lines.

.4 Provide dust screens, covers, railings, supports and other protection as required.

.5 Execute Work in accordance with health and safety requirements.

3.4 SECURITY

.1 Blasting is not permitted for the execution of demolition or deconstruction work.

.2 Perform dismantling work in accordance with the requirements of CSA S350 M1980 and all other municipal and provincial regulations, including the construction code S-2.1 r.6, last edition.

3.5 REMOVAL OF HAZARDOUS WASTE

.1 Remove material deemed to be contaminated or hazardous by the Departmental Representative or environmental protection authorities and remove the material from the site by taking all necessary safety measures to minimize hazards during their removal and their evacuation.

.2 Before proceeding with demolition or deconstruction, evacuate contaminated or hazardous materials from the site as instructed by the Departmental Representative.

3.6 DUST CONTROL METHODS

.1 The General Contractor is required to provide a recognized and proven method of controlling dust emissions during demolition or deconstruction. The proposed methodology must be tested and approved by the Departmental Representative prior to the commencement of work that is likely to generate dust. For example, the General Contractor may propose continuous « misting » to the emanation zones.

.2 Method(s) proposed for removing dust during demolition or deconstruction work shall be adapted to the seasons.

.3 The General Contractor shall, among other things, test certain methods for removing dust in order to ensure that the dust is effective in accordance with the particular conditions of the site and in accordance with the sequence of work and the seasons. For example, the General Contractor will be required to test mist or mist spray guns, oil-hydraulic systems with high-pressure spray nozzles or perforated flexible pipes, etc. The spray guns must have a sufficient spray range and must be sufficient in number to allow the dust particles to be felled in such a way that the fumes comply with the tolerances provided for in the relevant laws and regulations.

.4 The General Contractor shall provide in his bid that the reduction of dust at the source by using water necessarily involves dirt in neighboring streets and shall comply with the requirements of the contractual documents for cleaning of traffic lanes.

.5 The General Contractor shall provide in his bid that the reduction of dust at source by using water necessarily involves managing the ice build-up at the site during the winter period. The management of frozen water as well as the de-icing of traffic lanes, both inside and outside the construction site, when this is generated by the methods of the General Contractor, will be his responsibility and he shall comply with the requirements of the contract documents for the cleaning of the traffic lanes.

.6 Cleaning of equipment used (nozzles, guns, turbines, filters, etc.) for dust reduction at source is the sole responsibility of the General Contractor.

.7 Water used for dust removal is the sole responsibility of the General Contractor and must come from a network of drinking water pipes to avoid the presence of legionella that may contaminate the ambient air. Provide U.V. filters where applicable.

3.7 DEMOLITION, SALVAGE AND DISPOSAL

.1 Carry out the required demolition work to allow for the indicated work.

.2 During demolition/deconstruction, take all precautions to avoid damaging the existing reinforcing steel to be retained if necessary. The General Contractor must put all his efforts and use a proper method of deconstruction not to damage the reinforcing steel to be retained, according to the details shown on the plans. However, if it is clearly demonstrated to the Departmental Representative that some bars can not be retained over an overlap length, in order to join existing concrete to new concrete, anchors will be drilled as required by the specifications of the Departmental Representative and. details shown on the plans.

.3 Remove all traces of rust on the reinforcement to be retained by stripping with a strong wet sandblast and proceed to the cleaning of the concrete surfaces

.4 At the end of each work day, ensure that the work is safe and stable

.5 Carry out the demolition work in a way that raises as little dust as possible. Keep materials humid according to instructions from the Departmental Representative.

.6 Do not eliminate the indicated materials in any other manner than an ecological method. Sort materials and matter into appropriate piles for reuse or disposal methods.

.7 Unless otherwise indicated, the contractor alone is responsible for removal and disposal of materials to the approved disposal site.

.8 Refer to demolition drawings and specifications for items to be salvaged for reuse.

.9 Remove items to be reused, store as directed by the Departmental Representative, and re-install according to appropriate section of specification.

3.8 STOCKPILING

.1 Label stockpiles, indicating material type and quantity

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft

.3 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures

3.9 REMOVAL FROM SITE

.1 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.2 Carry materials for environmentally friendly disposal using approved trucking companies identified in the waste reduction plan and in accordance with applicable regulations.

.1 A written authorization from the Departmental Representative must be obtained for the use of trucking companies other than those specified in the waste reduction plan.

.3 Dispose of materials and materials not intended for environmentally sound disposal in accordance with applicable regulations.

.1 Use approved landfills identified in waste reduction plan.

.2 A written authorization from the Departmental Representative must be obtained to transport products and materials to landfills other than those indicated in the waste reduction plan.

3.10 RAPPORTS

.1 On receipt of information on bills, provide the following information to the satisfaction of the Departmental Representative:

.1 Description of materials.

.2 Amount of material discharged.

.3 Breakdown of quantities of reused, recycled and landfilled material.

.4 Final destination of evacuated materials.

3.11 CLEANING

.1 Progress Cleaning: leave Work area clean at end of each day.

.2 Final Cleaning: remove surplus materials, rubbish, tools and equipment to satisfaction of the Departmental Representative.

.3 Refer to plans for items to be salvaged for reuse.

.4 Waste Management: separate waste materials for possible reuse or recycling.

.5 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian Environmental Protection Act (CEPA), 1999.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 National Fire Code of Canada, 2015.

.4 Transportation of Dangerous Goods Act (TDGA), 1999 c. 34.

.5 Transportation of Dangerous Goods Regulations (TDGR), T-19.01-SOR/2016-95.

.6 Ozone-Depleting Substances Regulations 1998, SOR/99-07.

.7 Environmental Code of Practice on Halons, July 1996.

.8 Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems, April 2015.

.9 Environment Quality Act (LRQ, c. Q-2)

.10 Regulation Respecting Hazardous Materials (c. Q-2, r. 32)

1.2 DEFINITIONS

.1 Toxic: substance is considered toxic if it is listed on Toxic Substances List found in Schedule 1 of CEPA.

.2 List of Toxic Substances: found in Schedule 1 of CEPA, lists substances that have been assessed as toxic. Federal Government can make regulations with respect to a substance specified in List of Toxic Substances. Column II of this list identifies type of regulation applicable to each substance.

.3 PCBs: includes chlorobiphenyls referred to in Column I of item 1 of the List of Toxic Substances in Schedule I of Canadian Environmental Protection Act.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 01 35 29 06 – Health and Safety.

.2 Submit photocopy of shipping documents to the Departmental Representative when shipping toxic or hazardous wastes (HW) off site.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Store and handle HW and toxic wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.2 Store and handle flammable and combustible waste materials in accordance with current National Fire Code of Canada requirements.

.3 Coordinate storage of toxic wastes with the Departmental Representative and follow local requirements for labelling and storage of wastes.

.4 Keep quantities to minimum. Smoking is prohibited in areas where toxic wastes are stored, used, or handled.

.5 Only certified persons who have successfully completed Environment Canada Environmental Awareness Course for Environmentally Safe Handling of Refrigerants are permitted to work on refrigeration and air conditioning systems.

.6 Report spills or accidents involving toxic wastes immediately to the Departmental Representative and to appropriate regulatory authorities. Take reasonable measures to contain the release while ensuring health and safety is protected.

.7 Transport toxic wastes and HW in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.8 Use authorized/licensed carrier to transport toxic waste.

.9 Coordinate transportation and disposal of toxic wastes and HW materials with the Departmental Representative.

.10 Notify appropriate regulatory authorities and obtain required permits and approvals prior to exporting toxic or hazardous wastes.

.11 Dispose of toxic wastes and HW generated on site in accordance with applicable federal and provincial acts, regulations, and guidelines.

.12 Ensure toxic wastes and HW are shipped to authorized/licensed treatment or disposal facility. Ensure that liability insurance requirements are met. Submit proof of disposal to the Departmental Representative.

.13 Minimize generation of toxic wastes and HW to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

.1 Canadian Environmental Protection Act (CEPA), 1999

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

.2 Department of Justice Canada (Jus)

.1 Transportation of Dangerous Goods Act (TDG Act), 1992, (c. 34).

.2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 National Research Council of Canada

.1 National Fire Protection Code of Canada (NFPC), 2015

1.2 DEFINITIONS

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

.3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials. Include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29 06 – Health and Safety Requirements to Agency Representative for each hazardous material required prior to bringing hazardous material on site.

.3 Submit hazardous materials management plan to the Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 – Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.4 Storage and Handling Requirements:

.1 Coordinate storage of hazardous materials with to the Departmental Representative and abide by local requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.

.4 Keep up to 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use, provided that the following conditions are met.

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.2 Storage of quantities of flammable and combustible liquids exceeding 45 litres requires the approval of to the Departmental Representative.

.5 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.6 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.7 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area.

.8 Keep quantities to minimum. Smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.9 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 When hazardous waste is generated on site:

.1 Coordinate transportation and disposal with to the Departmental Representative.

.2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.

.5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Ensure that only trained personnel handle, offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to the Departmental Representative.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to the Departmental Representative.

.9 Report discharge, emission, or escape of hazardous materials immediately to the Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

.12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.13 Report spills or accidents immediately to the Departmental Representative. Submit a written spill report to the Departmental Representative within 24 hours of incident.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Bring on site only quantities of hazardous material required to perform Work.

.2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

PART 3 EXECUTION

3.1 CLEANING

.1 Progress cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All the section of Division 01 – General Requirements

.2 Section 03 20 00 – Concrete Reinforcing

.3 Section 03 25 00 – Accessories for Concrete

.4 Section 03 30 00 – Cast-in-Place Concrete

.5 Section 03 35 00 – Concrete Surfaces Finishing

.6 Section 03 37 26 – Underwater Placed Concrete

.7 Section 03 41 00 – Precast Structural concrete

.8 Section 05 50 00 – Metal Fabrications

1.2 REFERENCES

.1 Unless otherwise indicated, refer to latest edition and amendments of following standards prevailing at effective date of Contract.

.2 Canadian Standards Association (CSA)/ CSA International

.1 CAN/CSA-A23.1-09/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-O86-14, Engineering Design in Wood.

.3 CAN/CSA-O86S1-F05 Supplement number 1 to CAN/CSA-086-01

.4 CSA O121-08 (C2013), Douglas Fir Plywood.

.5 CSA O151-09 (C2014), Canadian Softwood Plywood.

.6 CSA O153-13, Poplar Plywood.

.7 CAN/CSA-O325 16, Construction Sheathing.

.8 CSA O437 Series-93 (C2011), Standards for OSB and Waferboard.

.9 CSA S269.1- 16, Falsework for Construction Purposes.

.10 CAN/CSA S269.2-M87, Scaffolding

.11 CAN/CSA-S269.3-M92 (C2013), Concrete Formwork, National Standard of Canada.

.3 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.4 Council of Forest Industries of British Columbia (COFI)

.1 COFI, Exterior Plywood for Concrete Formwork.

.5 American Concrete Institute (ACI)

.1 Manual SP-4, Formwork for Concrete, 5th edition.

.2 ANSI/ACI-347-01, Recommended Practice for Concrete Formwork.

.6 Éditeur officiel du Québec

.1 S-2.1, r.6; Code de sécurité pour les travaux de construction.

.7 Where applicable, always refer to the latest version of applicable codes and standards.

1.3 DOCUMENTS/SAMPLES SUBMITTALS FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit shop drawings for formwork and falsework.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.3 Submit WHMIS Material Safety Data Sheets (MSDSs).

.4 Co-ordinate submittal requirements and provide submittals.

.5 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners and locations of temporary embedded parts. Comply with CSA S269.1 for falsework drawings and with CAN/CSA-S269.3 for formwork drawings.

.6 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

.7 Indicate on the shop drawings, at each place where the temporary structures are hooked or supported on an existing structure or on the structure already in progress, the intensity and direction of the maximum loads transmitted to the structure that carries the loads including site overloads.

.8 The Contractor shall provide to the Departmental Representative for approval at least 10 days prior to the slab castings, the detailed drawings showing the exact locations of all anchors, sleeves and other accessories to be placed in the cast-in-place concrete.

.9 Indicate sequence of erection and removal of formwork/falsework as directed by the Departmental Representative.

.10 When slip forming is used, submit details of equipment and procedures for review by the Departmental Representative.

1.4 DESIGN OF FORMWORK SHORING AND FALSEWORK

.1 Comply with each of the provisions of section VI of the Code de sécurité pour les travaux de construction, S-2.1, r.6 (latest edition) published by the Éditeur officiel du Québec.

.2 Comply also at all times and at every step of the execution with applicable governmental standards (both municipal, provincial and federal) governing the duties and obligations of the Specialized Contractor with respect to worker protection on construction sites

.3 Design falsework in accordance with good engineering practice and in particular to ensure that loads exceeding those permitted are not placed on the structure in progress.

.4 Consider construction sequences when designing temporary structures. Describe on the shop drawings or in an explanatory note the order and use of the formwork, the position of the planned construction joints and the principle of re-use of temporary structures and formwork.

.5 Submit for approval the location of all construction, control, uncoupling and expansion joints.

.6 Formwork shoring plans shall be sealed and signed by an active member engineer of the Ordre des ingénieurs du Québec. The services of this engineer, hereinafter called the Contractor's Engineer, shall be retained and paid by the Contractor.

.7 The Contractor's Engineer shall seal and sign an attestation of the conformity of the shoring implemented with that shown on the plans.

.8 Submit copies of formwork shoring plans as well as each statement of the Contractor's Engineer in accordance with the requirements of the Structural Documents and "01 33 00 – Submittal Procedures".

.9 Shoring brackets shall be provided with skids of sufficient width to permit good distribution of the load and to avoid penetration into the ground or surface covering if any.

.10 The Departmental Representative will only perform his own formwork inspection when all of the requirements outlined in the above sub-sections have been met.

1.5 IMPLANTATION, LINES AND LEVELS

.1 The Contractor's Surveyor shall be present at the site during the entire period of the concrete and cementing work on the site to verify the installation tolerances as to the linearity and verticality of the wall. elements of exposed walls.

.2 Place and secure on site all markers required to erect formwork in strict accordance with lines and levels shown on plans.

.3 The Contractor shall be solely responsible for the accuracy of these benchmarks and shall check them regularly and whenever the Departmental Representative deems it necessary.

.4 Immediately replace or rectify any marker that has been removed or moved before the concrete work for which it is required has been completed and approved by the Departmental Representative.

.5 The Contractor shall be solely responsible for carrying out all calculations and surveys necessary for the proper installation of the works, all in accordance with the provisions of all the contractual documents.

.6 Concrete structures shall be laid out at all times and throughout the duration of concrete work using simple and verifiable methods at the site and in such a way that the Departmental Representative can validate the work, accuracy of dimensions, levels and other markers using a tape measure.

.7 Provide the Departmental Representative, as work progresses, with ".DWG and georeferenced" survey files representing the precise coordinates and alignment of sheet piles as installed after they have been implanted definitively.

1.6 TOLERANCES

.1 Specific tolerances of height, flatness, horizontalness, verticality, location and geometrical configuration of concrete elements after formwork stripping, in relation to plan indications, shall conform to the tolerances prescribed by the most recent edition of CAN / CSA A23.1 / A23.2, sections 6.4 and 7.5, the straight rule method.

.2 Classification of finishes on slab surfaces shall be in accordance with Table 22 of CAN / CSA-A23.1.

.3 The Contractor must fully comply with all requirements and shall plan, coordinate and organize a preparatory meeting with all involved parties prior to the start of the formwork. This meeting will be scheduled by the Contractor but will be supervised by the Departmental Representative.

.4 If the tolerances specified in sections 6.4 and 7.5 of CAN / CSA-A23.1 have not been observed in the construction of any element of the structure shown on the plans, the Departmental Representative may require that this item be demolished and rebuilt to the prescribed tolerances at no additional charge.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with "01 35 43 - Environmental Protection".

.2 Waste management and disposal

.1 Store and manage hazardous materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Divert wood materials from landfill to a recycling or reuse facility as approved by the Departmental Representative.

.4 Divert plastic materials from landfill to a recycling or reuse facility as approved by the Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS/EQUIPMENT

.1 Formwork materials

.1 For the placement of exposed concrete and specifically for the concrete construction work of the facing and coping walls of the wharf, use only steel formwork

.2 Rigid insulation board: to CAN/ULC-S701.

.3 For the purposes of the project, the formwork must be drilled for the installation of sleeves, weep holes or other, or the passage of the reinforcing bars which must be left on hold for structural continuity by overlap at the construction joints or elsewhere.

.2 Form ties

.3 For this project, no form ties will be allowed. Form release agent: non-toxic, biodegradable, low VOC.

.4 Form stripping agent: Colorless, non-toxic, biodegradable, low-VOC, kerosene-free mineral oil with a Saybolt Universal viscosity expressed in seconds is at least 70 and at most 110 at 40 ° C and Flash point in open crucible is at least 150 ° C.

.5 Falsework materials: to CSA-S269.1.

.6 Sealant: as recommended by the Departmental Representative or in plan notes.

PART 3 EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain the Departmental Representative’s approval for use of earth forms framing openings not indicated on drawings but which may be required for construction purposes.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect falsework in accordance with CSA S269.1 and the guide “Exterior Plywood for Concrete Formwork” from COFI..

.5 Do not place shores and mud sills on frozen ground.

.6 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.7 Making and installing formwork in accordance with CAN/CSA-S269.3, to obtain finished concrete structures of a shape, size and level in accordance with the instructions and located at the locations indicated; comply with the tolerances prescribed in CSA-A23.1/A23.2. Properly fasten the formwork and tie it together to maintain the desired position and shape during the placement of the concrete and to keep it in place until the concrete has reached its compressive strength indicated on the drawings or in the specifications or when the formwork removal is authorized by the Departmental Representative.Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.8 Unless otherwise specified, use 25mm chamfer strips for projecting angles and/or 25mm rods for inside corners of form joints.

.9 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.10 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.11 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

.12 Prior to closing formwork, notify Departmental Representative in advance to allow inspector to perform inspections. The placement of the concrete in the formwork can not take place until it has received written authorization from the Departmental Representative.

.13 Erect formwork to allow accessibility at all times for the proper placement of the epoxy binder on all existing concrete or hardened concrete surfaces to be bonded with new concrete, where appropriate, a few hours before casting the new concrete.

.14 Erect formwork to allow adequate vibration of concrete in hard to reach places or for high height or thickness.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 3 days for walls and sides of beams.

.2 3 days for columns.

.3 28 days for beam soffits, slabs, decks and other structural members, or 7 days when replaced immediately with adequate shoring to standard specified for falsework.

.4 3 days for footings and abutments.

.2 The times specified above represent a cumulative number of hours, days or fractions of days, not necessarily consecutive, during which the ambient temperature is maintained at 10°C minimum.

.3 Remove formwork when concrete has reached 80% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.4 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.5 Space reshoring in each principal direction at not more than 2400 mm apart.

.6 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

.7 Due to atmospheric conditions, concreting process and curing conditions, the Engineer may specify the minimum time that must be observed before the form removal of different castings.

3.3 TEMPERATURE OF FORMWORK

.1 At the time of concrete pouring, maintain the formwork at a temperature above 5°C.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of the Division 01 – General Requirements

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 25 00 – Accessories for Concrete

.4 Section 03 30 00 – Cast-in-Place Concrete

.5 Section 03 35 00 – Concrete Surfaces Finishing

.6 Section 03 37 26 – Underwater Placed Concrete

.7 Section 03 41 00 – Precast Structural concrete

.8 Section 05 50 00 – Metal Fabrications

1.2 REFERENCES

.1 Unless otherwise indicated, refer to latest edition and amendments of following standards prevailing at effective date of Contract.

.2 American Concrete Institute (ACI)

.1 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 ACI 315-99, Details and Detailing of Concrete Reinforcement.

.3 ASTM International

.1 ASTM A1064/A1064-M-16b, Standard specification For Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed for Concrete.

.2 ASTM A143/A143M-07 (C2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.4 Canadian Standards Association (CSA)

.1 CSA-A23.1-09/A23.2-F14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-F14, Design of Concrete Structures.

.3 CAN/CSA G30.3-M-1983 (C1998) cold-drawn steel wire for reinforcement of concrete.

.4 CSA G30.5-M1983 (R1998), Welded mesh for reinforcement of concrete.

.5 CSA-G30.18-09 (2014), Carbon Steel Bars for Concrete Reinforcement.

.6 CSA-G40.20/G40.21-04-F13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.7 CAN/CSA-G164-M92 (C2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.8 CSA W186-M1990 (C2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.5 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2006, Reinforcing Steel Manual of Standard Practice.

.6 Where applicable, always refer to the latest version of applicable codes and standards

1.3 DOCUMENTS/SAMPLES SUBMITTALS FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Drawings of reinforcement shall be carried out in accordance with the *Recommended Standards Manual* published by the Reinforcing Steel Institute of Canada and ACI 315 and Handbook No. ACI 315R, *Manual of Engineering and Placing Drawings for Reinforced Concrete Structures*, published by ACI.

.3 Shop Drawings

.1 Submit drawings stamped and signed by professional engineer registered or licensed in province of Quebec, Canada.

.1 Indicate placing of reinforcement and:

.1 Bar bending detail.

.2 Lists.

.3 Number of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings, according to prescriptions of RSIC's "Manual of Standard Practice".

.5 Indicate sizes, spacings and locations of chairs, And other bar supports, separators or « spacers », additional bars and other supports and accessories required to support and secure the frames during the placement of the concrete

.4 Wait for final approval of shop drawings before cutting and shaping rebar.

.5 Provide details on installation of reinforcements under special conditions.

.6 Marks must be given to the frames so that they can be easily and quickly identified on the order forms.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver trusses and trusses to site in clearly identified lots.

.2 Handle reinforcement and mesh with care to prevent distortion.

.3 As soon as it is delivered to work, stack reinforcing steel and trusses properly on wooden sills to protect them from rust and do not come into contact with the ground.

.4 When snow is present, cover all steel with woven fabric to protect it from weather.

.5 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.6 Storage and Handling Requirements

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean area.

.2 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS/EQUIPMENT

.1 Substitute different size bars only if permitted in writing by the Departmental Representative.

.2 Reinforcement bars:

.1 Unless otherwise specified, high-adhesion bars of billet-steel, grade 400 or 500, conform to CSA-G30.18;

.2 Weldable steel reinforcing bars are acceptable and sometimes even required in drawings: high adhesion bars of low-alloy weldable steel, grade 400W or 500W conform to CSA-G30.18.

.3 Welded wire mesh: made of welded steel wire conform to ASTM A1064/A-1064M

.1 The mesh must be supplied in flat sheets only.

.4 High-adhesion wire mesh: Welded steel wire mesh, high adhesion, conform to ASTM A1064 / A1064M

.1 The mesh must be supplied in flat sheets only.

.5 For the purposes of this project, all reinforcing steel, unless otherwise indicated in the plans mesh and anchor bolts shall be made of galvanized steel

.6 Tying wire: annealed steel wire and cold drawn, conforming to CSA G30.3

.7 Wire deformed steel for the reinforcement of concrete: conforms to ASTM A1064 / A1064M.

.8 Chairs, bolsters, bar supports and spacers: in plastic to CSA-A23.1/A23.2.

.9 Mechanical splices: subject to approval of the Departmental Representative.

.10 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Unless otherwise indicated, steel reinforcements shall be shaped in accordance with CAN/CSA A23.1/A23.2 and ANSI/ACI 315 and the Recommended Standards Manual published by the Reinforcing Steel Institute of Canada (RSIC) and Handbook No. 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures, published by the ICA.

.2 Obtain the Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval by the Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

.5 Unless otherwise indicated, the straight lengths of sealing and lengths of covering of the bars which must comply with CAN / CSA-A23.3.

.6 Take all measurements on the job site before fabricating the elements and supplying the shop drawings or reinforcement lists

2.3 SOURCE QUALITY CONTROL

.1 Provide the Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis as well as reinforcement galvanization reports, minimum 2 weeks prior to beginning work.

PART 3 EXECUTION

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by the Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars which develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain the Departmental Representative’s approval of reinforcing material and placement.

.3 Ensure cover of reinforcement is maintained during concrete pour.

.4 Ensure that the reinforcements are clean, free of dirt, form release oil or other contaminants. Clean reinforcing elements before pouring the concrete.

.5 The spacing of the bar supports in the formwork shall not exceed 72 times the smallest diameter of the supported bars or 1000 mm x 1000 mm.

3.4 REINFORCEMENT COVERING

.1 Ensure reinforcing bars are covered with sufficient concrete thickness when casting concrete.

.2 Unless otherwise indicated on drawings, the minimum rebar coating shall be 75mm everywhere.

3.5 MÉCANIQUES MECHANICAL OVERLAPS AND JOINTS

.1 Overlap reinforcements as shown on typical drawings and details.

.2 Overlap lengths and extensions of bars beyond critical points shall conform to CSA-A23.3. Unless otherwise indicated in the drawings, all overlaps shall be class "B" (1.3 Lc), as shown in Table 17b Upper Reinforcement Tensile Overlap of the Recommended Standards Manual of the Reinforcing Steel Institute of Canada (RSIC).

.3 Obtain prior approval of Departmental Representative for reinforcement overlap locations other than those shown on plans.

.4 Overlap of trellis sheets on a surface of at least 10% but never less than one mesh.

3.6 FIELD TOUCH-UP

.1 Reinforced rebar on site must be repaired by applying a minimum of 87% metallic zinc in the dry film to the brush with 2 coats of zinc-rich coating. Damaged surfaces must first be cleaned according to the

requirements of SSPC-SP11 « power tool cleaning to bare metal ». The minimum total thickness of the coated dry film shall be 130 µm.

3.7 TEMPERATURE OF REINFORCEMENT

.1 At the moment of pouring concrete, the temperature of the steel present in the formwork must not be less than 5 °C.

3.8 CLEANING

.1 Progress Cleaning: carry out cleaning work.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion, remove surplus materials, rubbish, tools and equipment from Work site.

.3 Waste Management: separate waste materials for reuse or recycling.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of the Division 01 – General Requirements

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 20 00 – Concrete Reinforcing

.4 Section 03 30 00 – Cast In Place Concrete

.5 Section 03 35 00 – Concrete Surfaces Finishing

.6 Section 03 37 26 – Underwater Placed Concrete

.7 Section 03 41 00 – Precast Structural concrete

.8 Section 05 50 00 – Metal Fabrications

1.2 REFERENCES

.1 Unless otherwise indicated, refer to latest edition and amendments of following standards prevailing at effective date of contract.

.2 American Society for Testing and Materials International, (ASTM)

.1 ASTM C171, Standard Specification for Sheet Materials for Curing Concrete.

.2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-05, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM D412-98a, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.

.5 ASTM D570, Standard Test Method for Water Absorption of Plastics.

.6 ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.

.7 ASTM D638, Standard Test Method for Tensile Properties of Plastics.

.8 ASTM D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.

.9 ASTM D695, Standard Test Method for Compressive Properties of Rigid Plastics.

.10 ASTM D696, Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between −30°C and 30°C with a Vitreous Silica Dilatometer.

.11 ASTM D732, Standard Test Method for Shear Strength of Plastics by Punch Tool.

.12 ASTM D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.13 ASTM D881, Test Method for Deviation of Line of Sight Through Transparent Plastics.

.14 ASTM D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

.15 ASTM D1002, Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).

.16 ASTM D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.

.17 ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.18 ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.19 ASTM D1922, Standard Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method.

.20 ASTM D2240-02a, Standard Test Method for Rubber Property - Durometer Hardness.

.21 ASTM D5199, Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.

.22 ASTM E1447, Standard Test Method for Determination of Hydrogen in Titanium and Titanium Alloys by Inert Gas Fusion Thermal Conductivity/Infrared Detection Method.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.40 97, Paint for anti-corrosion primer, alkyd resins, for structural steel.

.2 CAN/CGSB 1.181 99, Organic and prepared zinc-rich coating.

.3 CAN/CGSB-19.24, Multicomponent, Chemical-Curing Sealing Compound.

.4 CAN/CGSB-37.2, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing, and for Roof Coatings.

.5 CAN/CGSB-51-GP-51M, Standard for polyethylene sheet for use in building construction.

.4 Canadian Standards Association (CSA) / CSA International

.1 CAN/CSA A23.1 / A23.2 09, Concrete: Components and Workmanship / Test Methods and Standardized Practices for Concrete.

.2 CAN/CSA G40.20 / G40.21 F04, General Requirements for Rolled or Welded Structural Steel / Structural Steels.

.3 CSA G164 FM92 (C2003), hot dip galvanizing irregularly shaped objects.

.4 CSA-W47.1-F03, Certification of Fusion Welding Companies of Steel Structures.

.5 CSA W48 06, Filler Metals and Associated Materials for Arc Welding.

.6 CSA W59 03, Welded steel construction (arc welding).

.7 CSA W186 FM1990 (C1998), Rebar Welding in Reinforced Concrete Structures.

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN / ULC S701 01, Polystyrene Thermal Insulation Standard, Piping Panels and Coatings.

1.3 DOCUMENTS/SAMPLES SUBMITTALS FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with section « 01 33 00 – Submittal Procedures ».

.2 Each submitted workshop design must bear the seal and signature of a qualified engineer recognized or licensed to practice in Canada, in the Province of Quebec, Canada.

1.4 FASTENERS

.1 In all cases where fasteners not shown on the drawings are required in concrete elements to support vertically and/or laterally non-structural elements, prefabricated concrete elements, mechanical, electrical or other equipment, The structural design and the calculation of these fixings are entirely and exclusively within the competence of the manufacturer who must provide them, and in no way incur the responsibility of the Departmental Representative.

.2 The fasteners referred to in sub-section .1 above include plates, angles and all other hardware in direct contact with the concrete of the elements identified in the drawings, including rods, bolts, studs, sleeves, various anchoring devices and all other accessories fully or partially embedded in this concrete.

.3 The specialized Contractor shall, however, submit to the Departmental Representative for information a reproducible copy and a copy of the shop drawings clearly indicating the location of all required fasteners as well as the intensity and direction of the stresses, they are introduced into the concrete elements; these drawings must have been previously approved for construction by an engineer active member of the *Ordre des ingénieurs du Québec*.

.4 All sleeves and fastening hardware for removable equipment and furniture shall be of the "vandal-proof" type.1.5 For the purposes of this project, all reinforcing steel, mesh and studs must be made of galvanized steel.

PART 2 PRODUCTS

2.1 MATERIALS/EQUIPMENT

.1 All products that may be in contact with water must be NSF certified or designed to minimize environmental impacts.

.2 All products must be pre-approved by the Departmental Representative prior to entering the site.

.3 **Preformed Seal Bottom**:

.1 Foam rubber in rolls with detachable strips pre-notched in accordance with ASTM D1752.

.2 Required dimensions for seams on plans.

.4 **Auxiliary supporting rod for joints**: closed-cell polyethylene foam, diameters required according to the dimensions shown in the drawings.

.5 **Horizontal Joints Sealant**: (where required) two-component chemical-curing, elastomeric, polyurethane-based material in accordance with CAN/CGSB-19.24, ASTM C679, C920, D412, D624 and D2240. Product of self-leveling consistency, capable of ± 50% joint movement and can be placed in joints exceeding 13mm depth.

.6 **Saw cut line filler**: n/a.

.7 **Vertical Joints sealant**: (where required) a multi-component chemical-hardening, elastomeric, polyurethane-based material complying with CAN/CGSB-19.24, ASTM C679, C794, C920, D412 and D2240. Product of non-collapsing consistency, capable of ± 25% joint movement and can be placed in joints varying from 6 to 13mm deep.

.8 **Sealant primer**: a one-component product used to promote adhesion to clean, solid, dry concrete, masonry and wood prior to placement of sealant material. The primer and sealant must be compatible.

.9 **Reinforcing steel**: as per section « 03 20 00 - Concrete Reinforcement ».

.10 **Steel of flush-mounted parts**: complies with the requirements of CSA-G40.21, grade 300 MPa.

.11 **Stainless steel for anchors and recessed sleeves**: AISI 316L grade.

.12 **Stainless steel anchor rods for chemical anchors**: Threaded rods of AISI 316 grade, having a minimum tensile strength of 689 MPa and a minimum yield strength of 448 MPa, of dimensions as shown on the drawings.

.13 **Galvanized steel anchor rods for chemical anchors**: Hot-dip galvanized steel threaded rods conforming to ISO 898 class 5.8, having a minimum tensile strength of 500 MPa and a minimum yield strength of 400 MPa, dimensions shown on the plans.

.14 **Horizontal concrete surface retarders**: Green, water-based, low-VOC, solvent-free, water-soluble and flammable, acting as a chemical retarder for exposed concrete aggregates in accordance with ASTM C494/C494M. The setting retarder film should not be exposed to moisture at any time.

.15 **Curing Products for Vertical Surfaces**: curing products must comply with the requirements of Standard 3501 of the Ministère des Transports du Québec. Unless otherwise indicated, use a white, type 2 product conforming to CSA A23.1 / A23.2 and ASTM C309, or type 1 D, translucent, containing a fugitive dye.

.16 **Single-use curing blanket for horizontal surfaces**: 1.4 mm thick rolls of cover with a shrink-wrapped plastic film of transparent poly and a coated, opaque and transparent cellulose fabric a non-perforated reflective protective barrier against ultraviolet rays. Product with tensile strength in accordance with ASTM D882 and a minimum retention capacity of 6.5 (g) that meets or exceeds the requirements of ASTM C171 and AASHTO M171. Also complies with ASTM D1709, D1922, D5199 and E1447 standards.

.17 **Corrosion inhibitor and bonding agent**:

.1 Component anti-corrosion and bonding agent with corrosion inhibitors based on water-based modified cement and epoxy, used as adhesion grout and corrosion protection for reinforcing steel.

.2 With a 14 day adhesion strength of 20.7 MPa (Fees/Expenses) in accordance with ASTMD C882.

.3 Complies with CSA A23.1 / A23.2, ASTM D696, D790 and D1002 requirements.

.4 Resistant to temperatures ranging from -60ºC to 145ºC.

.18 **Crack Sealant for injection**: (if required)Two-component, solvent-free, 100% solid, moisture-insensitive structural epoxy resin adhesive before, during and after ripening. High performance, high modulus, high strength curing product in accordance with ASTM C881, C882, D570, D638, D648, D695, D732 and D790. The maximum thickness of the epoxy mortar is 38mm per layer.

.19 **Epoxy for crack injection of 6mm or less**: (if required) Solvent-free, moisture-insensitive, low viscosity, high strength two-component epoxy resin adhesive in accordance with ASTM C881, C882, D570 , D638, D648, D695, D732 and D790 and intended to be injected under pressure into concrete cracks of 6mm or less.

.20 **Epoxy for injection of cracks greater than 6mm**: (if required)Two-component, solvent-free, moisture-insensitive, low-viscosity, liquid-based injection product based on epoxy resin in accordance with ASTM D695 And intended to be injected by gravity or under pressure into concrete cracks of more than 6 mm.

.21 **Chemical Anchor System**: High-strength, two-component, high strength epoxy resin injection mortar. Specifications such as required stem and drill sizes are shown on the drawings.

.22 **Sealing Waterstops**:

.1 Polyvinyl chloride (PVC) ribbed waterstops manufactured by extrusion and having the following properties:

.1 Minimum tensile strength: 11.4 MPa.

.2 Elongation at break: 275%.

.3 Minimum tear resistance: 50 kN / m (ASTM D624-00, Die "B" Method).

.4 Waterstops shall be of specified width and thickness on plans. If no dimension is given, they shall be at least 150 mm wide and 10 mm thick.

.5 At T, L, or Cross intersections use pre-cut and factory pre-assembled components.

.23 **Sealing strips**:

.1 Sealing and re-sealing strips in rolls 19 x 25 mm x 5 m long.

.2 Material and Form: Specially formulated mixture of natural sodium bentonite and rubberized butyl.

.3 Water tightness of the installed strip: complete under a water pressure of 700 kPa (head of water of 70 m).

.4 Installation accessories:

.1 Adhesives: Single-component, multi-purpose adhesive sealant.

.2 For uneven surfaces or where adhesion is poor, use expanded metal mesh bands.

.24 **Water repellent agent**:

.1 Apply water repellent, in two perpendicular coats, applied in accordance with the manufacturer's recommendations to all concrete surfaces of the slabs on grade including slabs with exposed aggregates.

.2 Use penetrating silane (100% silane), based monomer solution to form waterproofing (hydrophobic) film on masonry or concrete surface.

.1 Use a ready-mixed colorless, U.V. resistant water repellent, which allow vapor release and penetrates deeply into concrete and has the following characteristics: Flash Point: 145 degrees F

.2 NCHRP No. 224 Reduction of Chloride Content

.1 Average : 91%

.2 Min. required : 75%

.3 NCHRP No. 224 Reduction of water absorption:

.1 1 day in the water: 94%

.2 3 days in the water 89%

.4 VOC content: 248 g / l

.5 Average depth of penetration: 0.2 inches

.6 The Manufacturer must have ISO 9001 certification

.25 **Expansion Gaskets**: See drawings.

.26 **Disconnection / insulation joint**: See bottom of preformed joints.

.27 **Repair grout**: Cement-based grout with no shrinkage.

.28 **Water evacuation Tubes**: Plastic.

.29 **Vapor barrier membrane**: 0.15 mm thick polyethylene, conforming to CGSB 51-GP-51M.

.30 **Water repellent material**: Mineral colloid non-fired asphalt emulsion conforming to CAN / CGSB-37.2.

PART 3 EXECUTION

3.1 BACKING FOAM

.1 Construct seals, joints or expansion joints and seams at indicated locations and as indicated in drawings.

.2 Unless otherwise specified in the drawings, use a 12.7 mm thick backing foam to separate floor slabs from vertical surfaces and a 25 mm backing foam at required locations.

3.2 VAPOUR BARRIER

.1 Not used.

3.3 JOINT SEALING

.1 Immediately remove laitance, dust, loose mortar and other foreign matter and dry joint surfaces..

.2 Prepare surfaces in accordance with manufacturer's instructions for caulking.

.3 Open joint to required depth to permit installation of a support rod to allow for caulking thickness in accordance with manufacturer's recommendations for caulking joint width.

.4 Apply primer to contact surfaces and apply caulking following manufacturer's recommendations. Clean adjacent surfaces immediately after application.

3.4 JOINT WATERPROOFING

.1 Refer to drawings to determine construction joints to be waterproofed with waterstops. Even if there is no indication on the drawings, all seals below the level of the wharf should be waterproofed with sealing strips or waterstops.

.2 Construction joints of the wharf facing or joints between prefabricated concrete panels shall be provided with sealing strips. In the case of panels, the strips must be glued in the panel manufacturing plant.

.3 Be careful not to deform or damage the sealing waterstops by sticking them in the formwork; avoid moving the adjacent reinforcement and ensure that the waterstops will not move or fold during concreting.

.4 Seal the sealing waterstops by hot welding, as recommended by the manufacturer, each weld should be completely sealed. The joining of the waterstops on site is permitted only in the case of segments of the the waterstops situated in the extension of one to another.

3.5 BUILT-IN COMPONENTS

.1 All work for the manufacture of build-in components shall be carried out in accordance with the requirements of CAN/CSA-S16-01.

.2 Provide the Departmental Representative, at least one month before the start of concrete work, in addition to the plan of installation of removable guardrails, a location plan of all the parts to be embedded in concrete such as anchors, sleeves, etc.

3.6 HORIZONTAL CONCRETE SURFACE RETARDING AGENTS

.1 At the request of the Departmental Representative, produce and provide samples, models or any other true size showing the final appearance of concrete with exposed aggregates.

.2 Confirm to the concrete supplier that the finish will be for concrete with exposed aggregate so that the mix is adequate for this type of finish.

.3 Confirm to the concrete paver subcontractor the desired degree of exposure and coloring of concrete and aggregates where appropriate.

.4 For finished concrete with exposed aggregate, the application of the surface retarder shall be done with a vaporizer in a uniform manner and at the recommended rate.

.5 Brushing concrete surface to expose aggregates should be done 24 hours after surface retarder is applied with a brush and water wash under low tap pressure. This operation must be carried out with great attention in order to obtain the desired result, that is to say aggregates exposed to a depth not exceeding 2 to 3mm. Do not brush too hard at first. Start with small areas to ensure you have the desired level of washout

.6 For other types of applications and with the written approval of the Departmental Representative, the Contractor may use a setting retarder to roughen surfaces during surface preparation prior to concreting and at joints. of construction.

.7 Refer also to sections “03 35 00 – Concrete Surfaces Finishing” and “03 30 00 – Cast in Place Concrete”

3.7 CHEMICAL ANCHORING SYSTEMS - IMPLEMENTATION

.1 Drill a hole 4 mm longer than the anchor bar.

.2 Ensure drill hole is clean, free of mud and debris or dry concrete dust. The holes are drilled with a percussion drill. The holes must be cleaned with high-pressure air.

.3 Prepare and apply epoxy resin as per manufacturer's specifications.

.4 Where possible, fill epoxy hole in part and insert bar if not inserted rod and inject epoxy resin.

.5 Anchor the rod in the concrete to a minimum depth of 15 times the bar diameter unless otherwise indicated.

3.8 BINDING AGENT - IMPLEMENTATION

.1 For any concrete poured against existing or hardened concrete, a binding agent is mandatory except for shotcrete. Strictly follow the requirements of concrete poured against existing or hardened concrete from the « 03 30 00 - Cast in Place Concrete » section of the construction estimate.

.2 Bush and clean surfaces with a wet or dry sand jet to remove any grease, oil or rust, and removable aggregates.

.3 Wet concrete surface to obtain saturated superficially dry substrate.

.4 Apply a layer of 0.5 mm thickness to the entire area to be bound with a vaporizer according to the manufacturer's recommendations. Reactivate the binder with a reactivator when the binder is no longer sticky to the touch.

.5 Install new concrete (fresh concrete) or repair concrete within the maximum time frame prescribed by the manufacturer. The application times of the binder are generally of the order of 1 to 2 hours before the placing of the concrete.

3.9 WATER REPELLENT AGENT

.1 New exposed concrete surfaces to be protected by a water repellent must have matured for a minimum of 28 consecutive days prior to product application.

.2 The installation of the water-repellent agent must be carried out after a complete cleaning of the surface so as to remove all residues as well as any trace of laitance, all according to the recommendations of the manufacturer. Surfaces must be structurally sound, clean, dry, free from dust, dirt, paint, efflorescence, curing compounds, laitance or other contaminants that may prevent the penetrating water repellent from penetrating properly.

.3 Dry substrate is required for good sealant penetration.

.4 Before application, joints or cracks must be properly sealed.

.5 If acid is used for cleaning, completely neutralize before application of penetrating water repellent.

.6 Apply as recommended by the manufacturer using low-pressure airless spray equipment or a brush at the rate of 7.4 m^2 / liter.

.7 The actual coverage and number of layers shall be determined by the application of the field test sample and the water absorption tests, all in order to obtain the final approval of the Departmental Representative.

3.10 FORMWORK LINING TEXTILE (IF REQUIRED)

.1 The liner shall be stretched and fastened to the formwork by a method approved by the manufacturer so that no creasing or bubbling of the lining happens during the concreting.

.2 Liner must be dry and free of oil when concreting.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of the Division 01 – General Requirements

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 20 00 – Concrete Reinforcing

.4 Section 03 25 00 – Accessories for Concrete

.5 Section 03 35 00 – Concrete Surfaces Finishing

.6 Section 03 37 26 – Underwater Placed Concrete

.7 Section 03 41 00 – Precast Structural Concrete

.8 Section 05 50 00 – Metal Fabrications

1.2 REFERENCE STANDARDS

.1 Unless otherwise stated, the last publication and the amendments to the following standards shall prevail on the date of entry into force of the contract.

.2 ASTM International

.1 ASTM A 820, Specification for Steel Fibers for Fiber-Reinforced Concrete.

.2 ASTM C 109/C109M-02, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).

.3 ASTM C260/C260M-10a 2016- Standard Specification for Air-Entraining Admixtures for Concrete.

.4 ASTM C309-11 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.5 ASTM C 332-87(1991), Specification for Lightweight Aggregates for Insulating Concrete.

.6 ASTM C 418, Standard Test Method for Abrasion Resistance of Concrete by Sandblasting.

.7 ASTM C457, Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.

.8 ASTM C494/C494M-16 - Standard Specification for Chemical Admixtures for Concrete.

.9 ASTM C666, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

.10 ASTM C 779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.

.11 ASTM C 827-95a, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.

.12 ASTM C1017/C1017M-13e1 - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.13 ASTM C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

.14 ASTM C882/C882M-13a Standard Test Method for Bond Strength of Epoxy-resin Systems Used with Concrete by Slant Shear.

.15 ASTM C 939-02, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

.16 ASTM C 995, Test Method for Time of Flow of Fiber-Reinforced Concrete Through Inverted Slump Cone.

.17 ASTM C 1018, Test Method for Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading).

.18 ASTM C 1116, Standard Specification for Fiber-Reinforced Concrete and Shotcrete.

.19 ASTM C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

.20 ASTM C 1399, Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete.

.21 ASTM C 1550, Standard Test Method for Flexural Toughness of Fiber Reinforced Concrete (Using Centrally Loaded Round Panel).

.22 ASTM D 412-92, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

.23 ASTM D 624-91, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.24 ASTM D 1751-83(1991), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.25 ASTM D 1752-84(1992), Specification for reformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

.26 ASTM E1155M-87, Test Method for Determining Floor Flatness and Levelness Using the F-Number System.

.27 ASTM D1002.

.28 ASTM D696 CD720.

.3 Canadian Standards Association (CSA International)

.1 CSA A23.1/A23.2-F14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-A23.5-03, Cement Additions.

.3 CSA A283-06 (R2016), Qualification Code for Concrete Testing Laboratories.

.4 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 CAN/CSA-A5-93, Portland Cement

.6 CAN/CSA-A363-M88(R1996), Cement-based hydraulic slag.

.7 CAN/CSA-A23.3-14, Rules for the calculation of concrete structures in building.

.8 CAN3-A266.1-M78, Air drives for Concrete.

.9 CAN3-A266.2-M78, Chemical Admixtures of concrete.

.10 CAN3-A266.4-M78, Guide to the Use of Concrete Admixtures.

.11 CAN3-A362-M89, compound hydraulic cements.

.4 Bureau de normalisation du Québec (BNQ) :

.1 NQ 2621-900, Bétons de masse volumique normale et constituants.

.2 BNQ 2621-905, Béton prêt à l'emploi – Programme de certification.

.5 American concrete institute (ACI) :

.1 ANSI/ACI 117-81, Tolerances for Concrete Construction and Materials.

.2 ACI 302.1R, Guide for Concrete Floor and Slab Construction.

.3 ACI 360R, Design of Slabs on Grade.

.4 ACI 506.1R, State-of-the-Art Report on Fiber-Reinforced Shotcrete.

.5 ACI 544-1R, State-of-the-Art Report on Fiber Reinforced Concrete.

.6 ACI 544-2R, Measurement of Properties of Fiber Reinforced Concrete.

.7 ACI 544.3R, Guide for Specifying, Proportioning, Mixing, Placing and Finishing Steel Fiber-Reinforced Concrete.

.8 ACI 544-4R, Design Considerations for Steel Fiber Reinforced Concrete.

1.3 DEFINITIONS

.1 Portland cement: hydraulic cement, blended hydraulic cement (XXb – b denotes blended) and Portland-limestone cement.

.1 Type GU, GUb and GUL – General use cement.

.2 Type MS and MSb – Moderate sulphate-resistant cement.

.3 Type MH, MHb and MHL – Moderate heat of hydration cement.

.4 Type HE, HEb and HEL – High early-strength cement.

.5 Type LH, LHb and LHL – Low heat of hydration cement.

.6 Type HS and HSb – High sulphate-resistant cement.

.2 Fly ash:

.1 Type F – with CaO content less than 8 %.

.2 Type CI – with CaO content ranging from 8 % to 20%.

.3 Type CH – with CaO greater than 20%.

.3 GGBFS – Ground, granulated blast-furnace slag.

1.4 DOCUMENTS/SAMPLES SUBMITTALS FOR APPROVAL/INFORMATION

.1 Submit required documents and samples compliant to section 01 33 00 – Submittal Procedures.

.2 From the outset of the work, the Contractor shall plan the finishing of the slabs on the wharf to provide the Departmental Representative with actual slabs of **finished slabs with exposed aggregates** and proceed in the following order the following steps:

.1 Step # 1: Selection and testing of aggregates:

.1 Provide samples of each type of coarse aggregate (5 Kg) and fine aggregate (2 Kg) required, as well as individual technical data sheets

.2 As long as the final choice of aggregates has not been made by the Departmental Representative, the procedure stops here and cannot continue.

.3 For each type of aggregate selected by the Departmental Representative, provide the following source and characteristics::

.1 Caliber
.2 Granulometry
.3 Relative density S.S.S.
.4 Fineness modulus
.5 % Absorption
.6 Pounding density
.7 % fractured particles

.4 .At the end of this stage, the Departmental Representative will have made the final choice of one or more types of aggregates to continue the procedure.

.2 step # 2: Begin concrete mixing according to the concrete mixing formulas specified in the specifications, perform the tests and provide the following information and results:

.1 Date and time of sampling

.2 Weather conditions during mixing (temperature, humidity, etc.)

.3 Exact composition of mixture (Water, cement, aggregates) and% of each component

.4 Air Content

.5 Slump (Before and After Adding Superplasticizer)

.6 Density

.7 .Concrete temperature

.8 Chemical admixtures used including technical data sheets, material safety data sheets and ratios used

.9 Type of retarding agent (or surface retarder) used including specifications, data sheets and MSDSs

.10 Compressive strength in accordance with A23.2-9C at 18 and 24 hours and at 3, 4, 7, 14 and 28 days (two cylinders at 28 days)

.11 Results of air bubble system parameters in hardened concrete in accordance with ASTM C457, Procedure B (depending on the type of cement and mixture, air content.) Volume of paste, specific surface area, spacing factor, etc.).

.12 Water-soluble chloride ion tenure results according to Rapid Chloride Test standard exposure to icemelting salts (chloride ion content, percentage of concrete mix, percentage of binder content).

.13 Results of permeability to chloride ions according to ASTM C1202 (Coulomb permeability at 91 days).

.14 Resistance to chipping in accordance with NQ 2621-900 and BNQ 2624-905 (Appendix B) - (Chipping loss in 7, 21, 55 and 56 cycles for a washed and silane-treated surface).

.15 Results of resistance to freeze-thaw cycles according to ASTM C666, Procedure A. Relative durability factor in % of the prisms after 300 cycles, variation with the mass in % of the prisms after 300 cycles, change of length in % after 300 cycles).

.16 Chlorine ion content after exposure to 3% NaCl saline solution for 56 cycles.

.17 Type of water repellent agent used including technical data sheets, material safety data sheets and ratios used.

.18 Provide a photographic record of all operations for each result obtained

.3 Step # 3: Provide a full report including all conclusions and recommendations, all prepared by a geotechnical engineer, active member of the OIQ and specializing in concrete structures. Recommendations should cover at least the following:

.1 Water Content (aggregates, mixing water, etc.)

.2 Concrete temperature and evolution of the concrete during curing

.3 Surface finishing and flatness

.4 Method of application of surface retarder and brushing

.5 Product compliance with environmental requirements

.6 Strength and durability of concrete

.7 Curing Methods

.8 Application of Water Repellent

.4 Step # 4: Provide at least two samples, in true size and for each type of mix (concrete slabs with exposed aggregate, standard concrete slabs, brushed finished, coping walls standard concrete, concrete with anti-wash-out agent and concrete precast panels, if required). The samples shall consist of molded plates of ± 300 x 300 x 75mm thickness cut in 6, and representing the finished product corresponding to the mix types and aggregates previously selected or selected by the Departmental Representative at the end of Step # 1.

.5 Step # 5: All results must meet the requirements outlined in the "Mix Formula" section and be approved by the Departmental Representative before proceeding. For this purpose, photographs representing the expected results have been added to the Appendixof the specifications and the Contractor must refer to them. The Departmental Representative will then have a period of 4 weeks to make recommendations so that the Contractor can continue the steps associated with this work. The Contractor must include this procedure in his schedule of work ordering so as not to delay work, if it is necessary.

.3 At least four (4) weeks prior to the work, submit to the Departmental Representative samples of the following materials proposed for the work:

.1 five (5) liters of curing compound;

.2 Three (3) kg of each type of cement addition;

.3 Ten (10) kg of each type of hydraulic cement;

.4 Five (5) kg of each adjuvant.

.5 Twenty (20) kg (2 bags of ten (10) kg) of each type of fine aggregate and coarse aggregate.
Identify the proposed source of supply for the aggregates in addition to providing the Laboratory with samples of each type of fine and fine aggregate that will be incorporated into the concrete mixtures and their characteristics and identify the quarry from which they originate.

.4 Provide the Laboratory with a document signed by a recognized petrographer, certifying that none of the harmful alkali-aggregate reactions described in appendix B of CAN / CSA A23.1 is likely to occur in concrete after its application.

.5 Provide mixing formulas for approval by the Laboratory mandated by the Departmental Representative and a certificate stating that the selected mix form will produce concrete with the required quality, strength and performance and that it meets the requirements Of CSA-A23.1 / A23.2.

.6 Submit results and test reports to the Departmental Representative for review, and in case of any deviation or any deviation from the formula or dosing parameters prescribed for the concrete mixture, do not continue work without prior written permission

.7 Concrete batches: submit accurate records of concrete batch set up the date and location of each batch, concrete quality, air temperature and specimens taken as directed by Article 3.6 - Field Quality Control.

.8 Concrete Transfer time: Submit to the Departmental Representative, for consideration, any deviation greater than the allowable maximum of 105 minutes for the delivery of concrete to the construction site and pouring of the batch.

.9 Submit two (2) copies of MSDSs required under WHMIS.

1.5 QUALITY ASSURANCE AND CONTROL

.1 All concrete must be ready-mix ready and must be from a single batching unit that must have ABQ-BNQ certification. The choice of this manufacturer is subject to approval by the Departmental Representative.

.2 The manufacturer of the ready-mix concrete shall be solely responsible for the batch of the concrete and shall, at his own expense, take all necessary measures to ensure the quality and uniformity of his product.

.3 Provide a certificate that the mixing plant, equipment and materials to be used in the concrete production meet the requirements of CSA-A23.1 / A23.2.

.4 Provide a certificate that the selected batching form will produce concrete with the required quality and performance, the strength of which will meet the requirements of CAN / CSA-A23.1 and the batching formula has been modified to prevent problems likely to be caused by the aggregate-alkali reaction.

.5 Submit to the Departmental Representative, minimum four (4) weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.1 Provide test data, compliance certificates, technical data sheets, and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture that meet specified requirements.

.6 Minimum four (4) weeks prior to starting concrete work, submit proposed quality control procedures for review by the Departmental Representative on following items:

.1 Erection of temporary shoring

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finish of swept finish concrete

.6 Finish of Concrete with exposed aggregates

.7 Finish of engraved stamped

.8 Any other type of finish and especially for the exposed concrete surfaces

.9 Removing and replacing props, if required

.10 Cast concrete against existing or hardened concrete

.11 Vibration of hard-to-reach concrete

.12 underwater placed concret

.13 Pumping concrete

.14 Execution of all types of joints

.7 Quality Control Plan: submit a written report to the Departmental Representative, certifying compliance of cast in place concrete to the performance requirements set out in Article 2.2 – Performance Criteria.

.8 Carry out the following tests in accordance with « 01 45 00 - Quality Control » and submit a report in accordance with « 01 33 00 – Submittal Procedures ».

.1 Concrete mixes for prefabricated concrete panels where applicable.

.2 Sink tests, temperature and air content measurement for cast-in-place concrete.

.3 Removal of concrete test specimens on site for laboratory analysis.

.4 Ambient temperature readings during concreting.

.9 Inspection and testing of concrete and its constituents shall be carried out by the Laboratory services designated by the Departmental Representative, to the satisfaction of the Departmental Representative in accordance with CSA A23.1 / A23.2.

.10 The Laboratory service is certified to CSA A283.

.11 Ensure that test results are provided to the Departmental Representative for review during the pre-concrete meeting.

.12 The laboratory will collect additional test specimens during cold weather concreting operations.

.13 Curing of specimens shall be carried out at the site under the same conditions as the concrete mixes from which they are extracted.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: deliver to site of Work and discharged within 105 minutes maximum after batching.

.1 Where applicable, any changes to the maximum transport time must be accepted in writing by the Departmental Representative and the producer of concrete, as indicated in CSA A23.1 / A23.2.

.2 Deviations must be submitted to the Departmental Representative for review.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

PART 2 PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 Quality Control Plan: ensure concrete supplier is able to provide satisfactory concrete performance criteria established by the Departmental Representative, and provide for monitoring compliance of the material according to the requirements of Article ”Quality Assurance and Control” in Part 1.

2.2 MATERIALS

.1 Cement: for general use in accordance with CAN / CSA-A3001, GU-type.

.2 Compound hydraulic cement: type GUb in accordance with CAN / CSA-A3001.

.3 Supplementary cementing materials: GUB with minimum 8% silica fume, to CSA A3001.

.4 Water: to CSA A23.1/A23.2.

.5 Fine aggregates: normal density, in accordance with section 4.2.3 of CSAA23.1 / A23.2. It can be either natural sand or manufactured sand with a proportion of at least 20% natural sand.

.6 Large aggregates: normal density, in accordance with CSA-A23.1 / A23.2, section 4.2.3, the particles shall be clean, durable, free from dust and deleterious materials. The particle size shall be that corresponding to a maximum particle size of 20 mm, unless otherwise indicated. A maximum thickness of 13 mm may be used, with the approval of the Departmental Representative, in certain areas of difficult casting. Large aggregates must be of normal density. The amount of flat, elongated particles shall be in accordance with Table 12 of CSA-A23.1 / A23.2.

.7 Aggregates: Complies with CAN / CSA-A23.1 / A23.2 with the certificate of conformity certifying that the aggregates meet the DB classification in accordance with the CTQ-M200 petrographic swelling potential index (PSPI).

.8 All aggregates and granular materials used in concrete mixtures shall be approved by the Departmental Representative prior to providing mixing formulas.

.9 The quarries used as suppliers of stone will have to be approved in the list of quarries which have carried out a thorough study of their aggregates by a recognized laboratory. The in-depth study on aggregates must include at least the following tests:

- .1 A visit by a geologist from your quarry / sand pit;
- .2 Inspection of operating facies for the current year;
- .3 The collection by a geologist of representative samples of the stockpile (s) of concrete aggregates;
- .4 Complete petrographic analysis, as well as thin-plate analysis;
- .5 Study of the various percentages of pyrite and pyrrhotite;
- .6 Total sulfur content;
- .7 Certification of aggregate grade DB (concrete slab);
- .8 A synthesis report of the 6 elements mentioned above, signed by a geologist.

.10 Admixtures:

- .1 Air entraining admixture: to ASTM C260.
- .2 Chemical admixture and pozzolanic mineral additives: meet the specifications of ASTM C494 / C494M and ASTM C1017 / C1017M respectively. The use of calcium chloride or additives containing calcium chloride is not permitted. The Departmental Representative to approve set accelerating or set retarding admixtures during cold and hot weather placing.
- .3 The use of calcium chloride is prohibited.
- .4 The addition of a superplasticizer to concrete prior to installation is mandatory unless otherwise specified by the construction professional.
- .5 The total mass of cement additivess (fly ash and silica fume or slag and silica fume) shall not exceed 30% of the total mass of Portland cement.

.6 Ensure that the adjuvants used are compatible and are incorporated into the concrete according to the manufacturer's instructions. If an adjuvant is found to be harmful or ineffective, immediately replace it with a substitute approved by the construction professional; assume all costs.

.11 Latex emulsion: The latex must be a styrene-butadiene conforming to C1059-91 type II.

.12 Grout or Non-shrink grout: Premixed product containing non-metallic aggregate, Portland cement, plasticizer and water reducer, in accordance with CSA-A23.1 / A23.2.

.1 Capable of achieving compressive strength of 15 MPa at 24 hours and 35 MPa at 7 days.

.2 Net withdrawal: no more than 2% at 28 days.

.13 Unmixed Grout: A product containing Portland cement with a non-metallic aggregates base and sufficient water to maintain its shape when balled in hands and capable of achieving a compressive strength of 50 MPa to 28 days.

.14 Superplasticizer: Complies with ASTM C494 / C494M specifications.

.15 Cement Hydraulic Slag: Complies with CAN / CSA-A362.

.16 Corrosion inhibitor (if required)

.1 Meets requirements of ASTM C494, Type C.

.2 Minimum calcium nitrite content of 30%.

.3 Mix between 10 and 23 liters per cubic metres of concrete.

.4 Relative density: 1.27 and 1.33.

.5 Density: 1.25 to 1.35 lg / liter.

.6 Optimal formulation shall be tested and provided for approval at least four (4) weeks prior to the start of casting.

.7 Adjust the amount of mixing water in the concrete to account for water in the product to maintain the water/binder ratio.

.17 Steel Fibers: n / a.

.18 Synthetic Macro Fibers for Fiber Reinforced Concrete: n / a.

.19 Refer also to « 03 25 00 – Accessories for Concrete » for all other concrete-related products.

2.3 MIXES

.1 Contractor must submit batching forms to construction professional for approval. No concrete can be placed without the mix formula being approved.

.2 Prepare concrete of normal density in accordance with CAN / CSA-A23.1, section 4 and as specified in structural drawings.

.3 Ensure that the concrete supplier meets the performance requirements set out below and perform the conformity check as described in the PART 3 « ON-SITE QUALITY CONTROL ».

.4 In the plastic state, the concrete batching shall conform to the following requirements:

.1 Uniformity.

.2 Maneuverability and pumpability.

.3 Workability: concrete free from surface stains, loss of mortar, color variations and segregation.

.4 Finishing: bleed up to 2% maximum and must be absorbed within 24 hours.

.5 Setting time: normal.

.6 Slump: at least 60 mm but not more than 100 mm at the time of unloading of the mixer truck. In all cases where the addition of a superplasticizer is accepted, these minimum and maximum subsidence must be verifiable before the superplasticizer is incorporated into the concrete. After the addition of the superplasticizer, the slump must be at most 150 mm.

.5 **Normal density concrete for concrete used in the construction of wharf slabs on soil as in the construction of other elements, when they are not cast under water, such as facing and coping walls (including concrete fillers at corners and ladders, the retaining wall the footbridge support platform and behind the facing) as well as for bases for equipment, bollards, street lamps and navigation lights :**

.1 Characteristics of fresh cast-in-place concrete:

.1 Ciment : Mélange spécialement formulé de manière à obtenir

.1 70% de type GU

.2 30% de type GUb-SF

.2 Slump: 50 to 110 mm

.3 Air Content: 5% to 8%

.4 Maximum water/binder ratio: 0.4

.5 Aggregates/granular material:

.1 For concrete - brushed (wharf tiles) or wood trowel (trowelled tiles) - use aggregates with a maximum diameter of 19 mm in standard proportion

.2 For finished concrete with exposed aggregates or engraved, aggregates shall meet the following requirements:

.1 Color: beige/brown including variety colors (beige, pink, red, blue and gray) recalling the masonry color of Chambly Fort located near the federal wharf

.2 Of igneous or granitic origin, originating from a quarry located near the federal wharf

.3 The aggregates shall consist of round natural, non-crushed gravel of 5-14 mm with an approximate density of 1100 kg/m³.

.4 Particular attention must be given to the water content of the aggregates in order to precisely determine the amount of mixing water of the concrete mix

.6 Provide a document stating that the selected batching will produce a concrete of the prescribed quality and having the expected yield and strength in accordance with the following standards:

.1 CSA A23.1/A23.2-F14 Concrete: components and workmanship/Test methods and standardized practices for concrete.

.2 ASTM C457, Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.

.3 Rapid Chloride Test.

.4 ASTM C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

.5 Résistance à l’écaillage, norme NQ 262-900

.6 ASTM C666, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

.7 Use of cement with an alkali content of less than 0.6%

.8 Addition of silica fume in accordance with CSA-A23.5M

.2 When cured, the concrete mix shall conform to the following requirements:

.1 Durability and Exposure Class: C-1

.2 Compressive strength:

.1 at least 35 MPa at 28 days

.2 maximum 49 MPa à 28 days

.3 Spacing factor of the air bubble system in hardened concrete (µm): 260 max.

.4 Chloride ion content:

.1 % of the mass of the concrete: 0,005

.2 % of the binder content: 0.03

.5 Chloride ion permeability: 1500 Coulombs max. to 91 days

.6 Resistance to chipping (with silane): 0.50 kg / m² max. at 56 cycles

.7 Resistance to freeze-thaw cycles (% of prisms after 300 cycles): 60% min.

.8 Chloride ion content after exposure to 3% saline solution NaCl for 56 cycles: 0.15 max

.3 For concrete with exposed aggregates, the Contractor shall also provide:

.1 The physical characteristics of the aggregates used and the reference appearance that the mixture will produce.

.2 600 mm x 600 mm x 100 mm thick mock-up boards, cut into six equal pieces and used to validate the result of the finished surface of the concrete with exposed aggregates.

.3 The following test results, performed by an independent laboratory:

.1 Aggregate Testing (Particle Size, Relative Density S.S.S, Absorption (%), Density);

.2 Concrete Compressive strength at 18 and 24 hours, 3, 4, 7, 14 and 28 days;

.3 Air content on hardened concrete (network of air bubbles);

.4 Slump (before and after addition of superplasticizer), density of the mixture and temperature;

.5 Granulometric analysis, relative density, absorption and colorimetry on fine aggregates (1 type of sand);

.6 Granulometric analysis, relative density and absorption on coarse aggregates (3 types of stone);

.7 Bulk density on coarse aggregates;

.8 Water-soluble chloride ion content;

.9 Permeability to chlorine ions;

.10 Resistance to rapid freeze-thaw cycles (2 prisms);

.11 Resistance to chipping of concrete surfaces with de-icing salts, 56 cycles;

.12 Chloride ion content after exposure to 3% NaCl saline solution for 56 cycles.

.6 **For underwater concrete with anti-washout agent**, refer to Section 03 37 26 – Underwater Placed Concrete for mixing characteristics and other requirements.

PART 3 EXECUTION

3.1 PREPARATION

.1 Obtain the Departmental Representative's written approval before placing concrete.

.1 Provide 24 hours minimum notice prior to placing of concrete.

.2 Also notify the Laboratory services designated by the Departmental Representative at least 24 hours in advance of such work.

.2 Place concrete reinforcing in accordance with Section « 03 20 00 – Concrete Reinforcing ».

.3 Observe the following instructions during concreting:

.1 Unless otherwise expressly authorized in writing by the Departmental Representative, it is forbidden to make gaskets (or construction) in floor slabs of the same type of finish. Concrete castings, for the same type of finish, must be made in a single casting between the expansion joints.

.2 No casting joint or (construction joint) is authorised in the slabs

.3 Ensure that concrete is transported and handled in a manner that minimizes interference during installation and does not cause damage to the works or existing structures.

.4 Pumping of concrete is permitted only after approval of equipment and mix.

.5 When concrete is pumped, the concrete batches shall be adjusted accordingly. The concrete must retain its characteristics up to the outlet of the pump line.

.6 When the concrete is to be pumped, the Contractor shall be required to make suitability test pours in advance.

.7 For all concrete placed using a concrete pump, the first 0.5 m^3 of concrete or mortar pumped at the start of use of a concrete pump must be discarded.

.8 Ensure that reinforcement and embedded parts are not moved and that the form panels are securely fastened before and during the concrete pouring.

.9 Prior to placing of concrete obtain the Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.10 Protect previous Work from staining.

.11 Clean and remove stains prior to application for concrete finishes.

.12 Maintain accurate records of poured concrete items to indicate date, location of pour, les numéros de camion, the concrete characteristiqes, quality, air temperature and test samples taken.

.13 Do not place load upon new concrete until authorized by the Departmental Representative.

.14 Comply in all aspects with requirements for pouring concrete against existing or hardened concrete.

.15 It is forbidden to pour concrete when it rains or snow, unless the Departmental Representative, satisfied with the arrangements made to shelter the concrete during its transport and installation, has given his authorization.

.16 The authorization granted by the Departmental Representative to pour concrete when the outside temperature is less than 5°C or higher than 25°C does not in any way relieve the Contractor of his entire responsibility for the resistance and durability of the poured concrete.

3.2 INSTALLATION/APPLICATION

.1 Implementation and execution of cast-in-place concrete work to CSA A23.1 / A23.2.

.2 For concrete poured in water, use an anti-washout concrete. Refer to Section 03 37 26 - Underwater Placed Concrete for mixing characteristics and other requirements.

.3 Conduct concrete consolidation using mechanical vibrators of a model and dimensions approved by the Departmental Representative.

.4 Select an appropriate type and number of vibrators and use them in accordance with CSA-A23.1 / A23.2.

.5 Systematically and rigorously comply with the following procedures and requirements for all work of concrete pouring on existing concrete or cured concrete structures:

.1 First, roughen all existing or hardened concrete surfaces that will be in contact with fresh concrete before applying the epoxy binder. Alternatively, a retarding agent may be used, upon prior recommendations from the manufacturer and the Departmental Representative.

.2 Immediately before applying epoxy binder, clean, moisten, and lightly dry surfaces so that they are saturated with water but dry to the touch.

.3 Apply an epoxy binder (bonding agent) pre-approved by the Departmental Representative and as recommended by the manufacturer. The binder must cover all exposed surfaces (concrete and steel).

.4 Use a vaporizer to apply the binder that will remain sticky to the touch otherwise a new coat (or reactivator) should be applied.

.6 Place concrete without interruption or in layers of such thickness that each new layer will integrate with the underlying layers before the concrete has hardened to the point of causing « cold joints ».

.7 If the interruption of concrete placement extends beyond 45 minutes, a construction joint shall be made.

.8 If difficulties arise during installation, modify the concrete formula as directed by the laboratory and use the additive(s) prescribed by the laboratory; assume all costs.

.9 The addition of a superplasticizer to the concrete before it is pumped or placed in the formwork is mandatory when concreting elements with a high concentration of reinforcements or where concrete is difficult to access

.10 Sleeves and inserts:

.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through any element, except where indicated or approved by the Departmental Representative.

.2 Where approved by the Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.3 Sleeves and openings greater than 100 mm x 100 mm not shown must be reviewed by the Departmental Representative.

.4 Reinforcement must not to be disturbed or removed to place hardware parts. If inserts cannot be placed at prescribed location, modification must be approved in writing by the Departmental Representative before concrete pouring.

.5 The Contractor shall be solely responsible for coordinating the exact location and dimensions of the openings to be provided and the different elements to be encased or embedded in the concrete.

.6 Confirm locations and sizes of sleeves and openings shown on drawings.

.7 Place special inserts for strength testing as indicated and according to methods used for non-destructive testing of concrete.

.11 Anchor bolts:

.1 Set anchor bolts to templates avec a tolerance of ± 1,5 mm, while under the supervision of the tradesmen providing the anchors, before pouring the concrete

.2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from the Agency Representative.

.1 The drilled holes should have a diameter of at least 100 mm

.2 The diameter holes drilled after the concrete must exceed at least 25 mm of the used bolts and follow the manufacturer's recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.4 Set bolts and fill holes with shrinkage compensating à compensation de retrait grout.

.12 The Contractor shall be solely responsible for providing the anchors, sleeves and other parts to be encased or embedded in the concrete and to coordinate the installation of the anchors with his sub-contractor in the formwork work. In the event that the Contractor fails to comply with this requirement and the concrete of an already constructed part of the structure shown on the plans does not contain the anchors and other embedded parts, the Departmental Representative shall require that work to be either demolished or rebuilt, at no additional cost and without causing delays in the delivery of the work.

.13 Weep Holes and Drainage Holes

.1 Form weep holes and drainage holes in accordance with Section 03 10 00 – Concrete Forming and Temporary Formwork. If wood forms are used, remove them after concrete has set.

.2 .Plan for the formwork to be drilled for the installation of these elements

.3 Install weep hole tubes and drains as indicated.

.14 Apply grout under the railing post bearing plates in accordance with manufacturer’s recommendations to obtain a contact surface equal to 100% of the grouted area.

.15 Finishing

.1 Finish concrete to CSA A23.1/A23.2.

.2 Refer also to "03 35 00 – Concrete Surfaces Finishing" for requirements related to the execution of this work.

.3 Use procedures as reviewed by the Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

.4 Unless otherwise indicated, finish surface with broom (monolithic wood trowel finish and brushed with stiff-bristled brush).

.5 For finished concrete with exposed aggregates, the concrete must be finished using a long-handled magnesium float and/or a wooden float.

.6 The finishing method shall meet the flatness requirements of CSA A23.1 or the requirements of the specification.

.7 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

3.3 CONSTRUCTION JOINTS

.1 If Contractor selects cast-in-place as the method for making concrete facing, no horizontal construction joint will be accepted between the “facing wall” and the “coping wal”l beam (only a bevel or double-chamfer is permitted here).

.2 Follow section 7.2 of CSA-A23.1 / A23.2 for construction joints. Systematically and rigorously follow the procedures and requirements for concrete structures poured against existing or hardened concrete.

.3 Immediately before re-pouring or overlaying a construction joint, clean and scarify the surface of the hardened concrete to remove any loose fragment and mildew, moisten the surface and allow to dry to obtain a saturated concrete with a dry surface.

.4 In order to ensure a satisfactory joint, from one pour to another at the construction joints, use an binding agent or construction joint epoxy binder approved by the Departmental Representative.

.5 At least two weeks prior to the commencement of concreting, the Contractor shall provide the Departmental Representative with approval of the plans for the location of the construction joints provided.

.6 The location of construction joints delineating each concrete cast shall be approved by the Departmental Representative. If he sees fit, he may require that these joints be brought together or arranged differently.

.7 None of the construction joints already shown on the drawings shall be moved or removed without prior authorization from the Departmental Representative.

.8 The location and details of construction joints not shown on the plans are subject to the approval of the Departmental Representative. The construction joints must conform to the typical details shown on the drawings.

.9 Provide a minimum of 7 days of curing between castings of two adjacent sections of concrete. Several non-adjacent sections can be cast simultaneously.

.10 For slabs, beams and foundations use only vertical construction joints, unless otherwise indicated. Generally, joints in slabs and beams shall be one third of the span if the Departmental Representative does not require otherwise.

3.4 CONCRETE CURING

.1 Obtain approval by Departmental Representative, at least 24 hours in advance, of the proposed curing method.

.2 Curing of concrete is performed in accordance with CSA-A23.1 / A23.2, Section 7.7. Walls and slabs with a thickness of 500mm and more are considered mass concrete.

.3 Unless otherwise indicated, use of curing products is prohibited.

.4 Where appropriate, when authorized by the Departmental Representative in writing, use curing agents compatible with the finish applied to the concrete surfaces. Attach a written statement certifying that the various products used are compatible. The curing agent must be cleaned following the cure so that no trace of the application is left.

.5 Concrete curing of horizontal surfaces is ensured by the use of a curing blanket which is to be constantly kept moist for a period of at least 7 to 10 consecutive days at a temperature maintained at 10°C. The covers used must overlap by 150mm, be sealed together and completely cover the surface, including the edges of the slabs. Use weights along the edges of the curing blankets to prevent them from being lifted by the wind

.6 Curing of walls and other enclosed surfaces shall extend for a period of 7 days, ie:

.1 Forms left in place with moist cure on top of elements: 3 days;

.2 Wet cure on all surfaces after removal of formwork: 4 days.

.7 **Curing of finished concrete engraved or with exposed aggregates must be done with water using polyethylenes installed over the entire surface of the concrete but without touching it, leaving a free space of 25 to 50mm, closed to each end and securely held in place. Also use a misting system or perforated garden hoses to maintain the wet surface throughout the curing period uninterrupted.** Use enough equipment to allow watering of the entire surface to be covered.

.8 **The curing of brush-finished concrete slabs shall be done using curing blankets kept moist throughout the curing period, uninterrupted.**

.9 Failure to commence a satisfactory course within the prescribed time limits will result in a permanent hold-back as liquidated damages assessed as follows:

.1 $5 per square metre of surface area for the first hour of delay with a minimum of $100 per discontinuous area deficient.

.2 $10 per square metre of surface area for the second hour of delay with a minimum of $200 per discontinuous area deficient.

.3 $15 per square metre of surface area for each subsequent hour of delay with a minimum of $400 per hour per discontinuous area deficient.

.10 Any premature termination or default in maintaining a proper cure shall result in a permanent withholding of liquidated damages assessed as follows:

.1 $2 per square metre of surface, per hour of shutdown or failure to maintain a conformal treatment with a minimum of $100 per hour per deficient discontinuous area. The deductions apply cumulatively.

.11 When exterior temperature exceeds 20°C for mass concrete or 27°C otherwise, keep the formwork wet prior to concrete pouring and during the time they remain in place.

.12 Ensure that during the course of the curing process the concrete will not be subjected to any overloading and will be adequately protected against severe impact, excessive vibration, bad weather and other disturbances.

.13 The provision, installation and maintenance of all temporary structures and equipment required for the curing and protection of concrete in hot weather or cold weather, as well as the supply of such equipment, shall form part of the contractual work. Contractor to assume all costs.

.14 All tooling required for curing and concrete protection must be within reach and ready for use prior to concrete placement.

.15 Where concrete has been adequately cured, the exposed surfaces shall be kept continually moist for at least seven consecutive days after placing the concrete. The water used for cured must be clean and free from any material that may stain or discolor the concrete.

.16 Curing of concrete must begin immediately after surface finishing. The Contractor shall not be authorized to proceed with concreting unless he has previously demonstrated to the Departmental Representative that all equipment and personnel required for curing and protection of the concrete are within reach and ready to be used.

.17 The Contractor shall provide in his work schedule that certain ground coverings and finishing coats or protection coats require particular moisture conditions of the concrete and that they cannot be touched for some period of the curing.

3.5 SLABS ON FILL

.1 Verify that the fill on which the slabs are poured have been compacted and leveled to the satisfaction of the Departmental Representative and are clean and free of traces of worked soil. If the work is done in cold weather, make sure that the fill is not frozen.

.2 Moisten the fill before placing concrete; in doing so, avoid creating puddles of water and muddy or soft areas.

.3 Before pouring concrete, extend geotextile membranes on the backfill if it consists of clean stone.

.4 It is prohibited to place the welded wire mesh and any other reinforcement required in the slabs directly on the fill in order to lift them up and to press them against the liquid concrete during the installation of the latter.

.5 Increase slab thickness to allow cover of at least 40mm of concrete above and below electrical conduits.

.6 Unless otherwise indicated, slabs on fill shall be installed by panels, the largest side of which shall not exceed 7.5 meters for interior slabs and 4.0 meters for exterior slabs. The ratio of length to width should not exceed 1.5. The location of these construction joints must be approved by the Departmental Representative. At least 7 days must elapse prior to concreting a new panel against or between existing panels.

.7 Alternatively, the contractor may make controlled saw cuts in accordance with the requirements for construction joints.

.8 Execute control joints in tiles in accordance with the following:

.1 Initiate this work as soon as the surface of the concrete has hardened sufficiently that it will not be subject to crumbling, and complete it within 12 hours after the concrete is placed.

.2 Use a power saw equipped with a 3 to 5mm (maximum) blade and cut grooves up to 6 mm deep.

.3 Immediately clean these grooves using high-pressure water jet to eliminate buildup of laitance and clean all stains on the concrete.

.4 When the concrete has completely dried, but not less than 56 days after placement, clean each groove dry and seal, unless indicated otherwise, with a sealant as specified in « 03 25 00 - Accessories for Concrete » and In accordance with the manufacturer's instructions.

.5 The location and center-to-center distance of the saw cuts on the slabs on fill is shown on the drawings.

.6 Water used for sawing as well as residues and laitance must be controled, to avoid any contamination to the environment. All water and any residu must be drained and evacuated.

.9 Particular requirements related to the placement of concrete slabs on soil with exposed aggregates:

.1 Pay particular attention to the water content of aggregates to determine the amount of mixing water accurately.

.2 Limit concrete temperature to a maximum of 23ºC. In hot weather, it will be necessary to replace part of the mixing water with ice.

.3 Concrete finishing must be done with a magnesium long-handled float and/or wood float.

.4 The finishing method must meet the requirements of CSA A23.1.

.5 The application of the surface retarder must be done with a uniform spray at the recommended rate.

.6 The brushing of the concrete surface must be carried out 24 hours after the surface retarder has been applied with a brush and a water wash under low tap pressure. This operation must be carried

out with great attention in order to obtain the desired result, that is to say aggregates exposed to a depth not exceeding 2 to 3mm.

.7 Control cylinders shall be broken at 18 and 24 hours or even earlier, if required, to determine the compressive strength of the concrete and to allow circulation of personnel for the washing operation. Light vehicles must not travel until the compressive strength reaches 70% of the specified resistance.

.8 Install thermocouples in a control cylinder and in the middle of the slab to follow the evolution of the concrete temperature and adjust the result of compressive strength at a young age.

3.6 SURFACE TOLERANCE

.1 Concrete surface tolerances must comply with CSA A23.1.

3.7 CONCRETE POURING IN HOT WEATHER

.1 When the outside temperature is greater than or equal to 25 C or it is foreseeable that it be within 24 hours, the temperature of the concrete at the time of the casting must be less than 25 C.

.2 Take the necessary measures to prevent overheating thick concrete elements during the three (3) days following the pouring.

.3 For concreting slabs on grade, it is imperative to limit the concrete temperature to a maximum of 25 °C. In hot weather, it will be necessary to replace part of the mixing water with ice.

.4 Thermocouples should be installed in a cylinder and in the middle of the slab to monitor the temperature of the concrete.

3.8 CONCRETE POURING IN COLD WEATHER

.1 When the outside temperature is less than or equal to 5 degrees C, or it is foreseeable that it be within 24 hours, the temperature of the concrete at the time of pouring, must be 25 to 30 C.

.2 Four three (3) days following the cast or until it is demonstrated that the concrete has reached a compressive strength of 7 MPa, maintaining the concrete temperature at 10 C minimum for the elements of 0.3m or less thickener, and 5°C minimum for thicker elements.

.3 When the outside temperature is below 5 C, protect the concrete with insulation. If the outside temperature is below 0 C, provide adequate shelter and heat by a method approved by the Departmental Representative.

.4 Protect concrete surfaces from direct contact flue gas heaters

3.9 FIELD QUALITY CONTROL

.1 Site tests: conduct following tests in accordance with Section « 01 45 00 – Quality Control » and submit report as described in Article 1.3 of section « 01 33 00 - Submittal procedures »

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength: 7 day and 28 day.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by the Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure that the testing laboratory is certified according to CSA A283.

.3 Suitability tests to allow for faster decanting or other testing at the Contractor's request shall be paid for by the Contractor.

.4 The Laboratory is the Departmental Representative for all matters pertaining to the mixing and placement of concrete, and as such, is empowered to issue directions to be followed by the Contractor and his concrete supplier.

.5 Cooperate with Laboratory staff so that during each casting process, the laboratory can closely monitor the placement of concrete and take the samples required for control testing.

.6 Provide a weatherproof location on site where concrete cylinders may be stored at an ambient temperature of not less than 10°C and not more than 25°C prior to shipment to the Test Laboratory.

.7 For each 50 m³ of concrete of the same element or for each type of element (eg wall, low wall, coping wall, facing wall, prefabricated concrete panels, beam, column, pilaster, slab on grade , structural slab, sidewalk and curbs, equipment base, filler concrete, etc.), the laboratory will take samples of poured concrete placed, with which it will mold four (4) standardized cylinders which will be used for resistance tests at the age of 7 and 28 days. The Laboratory, however, will never take less than one (1) sample per day of the concrete from each installed class for each type of structural element executed.

.8 Ensure that test results are transmitted to the Departmental Representative and to the Laboratory services Representative for them to exam during the meeting prior to the concrete casting.

.9 The Departmental Representative will pay for tests as specified in Section « 01 29 83 – Payment Procedures for Laboratory Services ».

.10 Laboratory services representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.11 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2 at 3, 7, 14 and 28 days.

.12 Inspection or testing by the Departmental Representative or Laboratory services Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

.13 Where the testing Laboratory for inspections reveal that the works are not in conformity with the requirements of the contract, the Contractor shall bear the costs of the additional tests that may be requested by the Departmental Representative to verify the acceptability of the corrections made.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of the Division 01 – General Requirements

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 20 00 – Concrete Reinforcing

.4 Section 03 25 00 – Accessories for Concrete

.5 Section 03 30 00 – Cast In Place Concrete

.6 Section 03 37 26 – Underwater Placed Concrete

.7 Section 03 41 00 – Precast Structural Concrete

1.2 REFERENCE STANDARDS

.1 Unless otherwise stated, the last publication and the amendments to the following standards shall prevail on the date of entry into force of the contract.

.2 Canadian Standards Association (CSA International)

.1 CAN / CSA-A23.1-14, Concrete - Components and Works.

.2 CAN / CSA-A23.2-14, Test Methods and Standardized Practices for Concrete.

.3 International Concrete Repair Institute:

.1 Technical Guide No. 03732 (E) - Select and specify the correct preparation of concrete surfaces for the application of polymer sealants, coatings and coatings.

.4 American concrete institute (ACI) :

.1 ANSI/ACI 117-81, Tolerances for Concrete Construction and Materials.

.2 ACI 302.1R, Guide for Concrete Floor and Slab Construction.

.3 ACI 360R, Design of Slabs on Grade.

.4 ACI 506.1R, State-of-the-Art Report on Fiber-Reinforced Shotcrete.

.5 ACI 544-1R, State-of-the-Art Report on Fiber Reinforced Concrete.

.6 ACI 544-2R, Measurement of Properties of Fiber Reinforced Concrete.

.7 ACI 544.3R, Guide for Specifying, Proportioning, Mixing, Placing and Finishing Steel Fiber-Reinforced Concrete.

.8 ACI 544-4R, Design Considerations for Steel Fiber Reinforced Concrete.

.5 Bureau de normalization du Québec (BNQ):

.1 NQ 2621-900, Betons de masse volumique normale et constituants

1.3 QUALITY ASSURANCE AND CONTROL

.1 Applicator’s and Specialised Contractor’s Qualifications

.1 For concrete surface finishing work, particularly for concrete slabs, whether finished concrete with exposed aggregates or engraved concrete, the Specialized Contractor shall demonstrate his qualifications by providing, from the start-up meeting, a list of 5 similar projects carried out in the last 5 years.. The Departmental Representative reserves the right to refuse a Contractor without adequate experience.

.2 Work must be carried out by qualified workers holding a « Certificate of competence as a tradesperson ».

.3 Apprentices may also be hired on the condition that they work under the direct supervision of a skilled worker in accordance with the regulations governing this trade.

.2 Product Qualifications

.1 Submit written certification that the different treatment products used are compatible and will not affect the properties of the foundation coverings or the adhesives used to apply them.

.3 Samples of the work

.1 Carry out samples of required work in accordance with « 01 45 00 Quality Control ».

.1 Prepare designated part and apply, according to specified requirements, prescribed coating in accordance with selected colors, textures and degrees of gloss or luster.

.2 Samples shall be used for the following purposes:

.1 Evaluate substrate / substrate preparation, material operation, quality of materials and quality of work performance as per MPI Architectural Painting Specification Manual.

.3 Carry out samples of work at specified locations.

.4 Allow 48 hours for persons responsible for examining samples prior to commencing work.

.5 Once accepted, samples of the work will be the minimum standard for work. Approved samples may be part of the finished work.

.2 Refer also to "03 30 00 - In-Place Concrete" for requirements related to samples of the work to be provided, especially for finished concrete with exposed aggregates

.4 Health and Safety

.1 Take necessary building health and safety measures in accordance with CNESST requirements.

.5 Ventilation

.1 The work area shall be adequately ventilated in accordance with the engineer's instructions using approved portable blower and exhaust fans.

.2 Continuous ventilation shall be provided during and after application of the coating.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED

.1 Submit shop drawings, samples and technical specifications required in accordance with « 01 33 00 - Submittal Procedures ».

.2 Refer also to "03 30 00 – Cast-In-Place Concrete" for samples of the work to be submitted, especially for finished concrete with exposed aggregates

.3 .Each submitted shop drawing must bear the seal and signature of a qualified engineer recognized or licensed to practice in Canada, in the Province of Quebec, Canada.

.4 Datasheets

.1 Submit data sheets and instructions required for coating.

.2 Submit two (2) Material Safety Data Sheets (MSDS) required under the Workplace Hazardous Materials Information System (WHMIS), which must conform to this system, under « 01 33 00 - Submittal Procedures ». The records must indicate the VOC emission rate of the products during application and cure.

.5 Samples

.1 Submit samples of all colors available if products are manufactured in a restricted color range.

.2 Manufacturer's instructions

.3 Submit manufacturer's application and implementation instructions.

.4 Documents/Items to be delivered on completion of work: submit the following information related to maintenance work for inclusion in the manual specified in « 01 78 00 – Closeout Submittals ».

.1 Name, type and method of use.

.2 Manufacturer's product number.

.3 Color numbers.

.6 The rating given to the product according to the MPI Environmental Choice program classification.

1.5 CONDITIONS FOR IMPLEMENTATION

.1 Temporary Lighting

.1 A light source with a power of at least 1200 W per 40 m² surface area shall be provided; the source must be placed 2.5 m above the floor surface.

.2 Power Supply

.1 Sufficient power to operate normal equipment shall be provided during construction.

.3 Work Area

.1 Work area shall be protected from rain and other adverse weather conditions.

.4 Temperature

.1 Maintain an ambient temperature of at least 10°C and a relative humidity of not more than 40% for a period of 7 days prior to implementation, during processing and for at least 48 hours after the completion of the work (including the complete ripening period until the specified capacity of the material is obtained).

.2 For concreting floor slabs, it is imperative to limit the concrete temperature to a maximum of 25 ºC. In hot weather, it will be necessary to replace some of the mixing water with ice.

.3 Thermocouples should be installed in a cylinder and in the middle of the slab to monitor the temperature of the concrete.

.5 Moisture Content

.1 The moisture content of the concrete substrate shall be within the limits prescribed by the manufacturer of the flooring or any other manufactured product in contact with the concrete.

.6 Security

.1 The use, handling, storage and disposal of hazardous materials shall be conducted in accordance with WHMIS requirements.

.7 Ventilation

.1 Where applicable, the work area shall be ventilated as directed by the Departmental Representative, using approved portable blower and exhaust fans.

.2 Continuous ventilation shall be provided during and after application of the coating.

.8 Environmental Requirements and Constraints

.1 Refer to the section "01 35 43 - Environmental Protection" for all environmental protection requirements, especially when finishing concrete surfaces (saw cuts, applications of such products as bonding agents and surface retardants.

.2 During this work, the Contractor shall provide a waterproof enclosure, a splash guard, drainage gutters, absorbent materials, etc.

1.6 WARRANTY

.1 The General Contractor shall ensure that the work associated with this section will be free from defects in material and workmanship for one year from the date of installation.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Not used.

PART 3 EXECUTION

3.1 FINISHING - GENERAL

.1 Float the surface with a long-handled wood or magnesium ”floater” and bring the surface to the levels shown in the drawings.

.2 Finish concrete surfaces in accordance with CSA A23.1 / A23.2. The finishing method must respect the tolerances for flatness in Table 22 of the standard.

.3 Use methods defined in CAN / CSA A23.1 / A23.2 to remove excess bleed water. Be careful not to damage the surfaces of the concrete elements.

.4 Use curing agents compatible with finish coats applied to concrete surfaces. Attach a written statement certifying that the various products used are compatible.

.5 Unless otherwise indicated, rub with carborundum the sharp edges of exposed concrete to obtain rounded edges with a radius of 3 mm.

.6 Expansion Joints

.1 Only expansion joints shall be filled with polyurethane sealant in accordance with application standards, manufacturer's instructions and details on drawings

.2 Do not start filling joints before 56 days after concrete placement.

.3 The faces of the joints should be slightly abraded using a sandpaper or mechanical steel brush and subsequently cleaned with an industrial vacuum cleaner to remove any residue.

.4 During application, floor surfaces adjacent to joints should be masked to prevent splattering of primer and/or sealant.

3.2 CONTROL JOINTS CUTTING (SAW CUTS)

.1 Saw cuts, in perfectly straight lines, shall be made in the slabs according to the typical details shown on the plans. Make saw cuts when the concrete can be cut without breaking and before uncontrolled withdrawals occur.

.2 Generally, these must be carried out within a maximum of 4 to 12 hours after concreting, with a mechanical saw suitable for this purpose. The maximum separation between the control seals in each direction is 2 m. Validate with the Departmental Representative for all joints not shown on the plans.

.3 Unless otherwise indicated, sawing of control joints as shown in drawings.

.1 The maximum width of the saw cut is 5 to 6 mm.

.2 The depth of the saw cut is 6 mm maximum.

.4 After cleaning the saw blades with a stream of water and compressed air, sweep immediately with an industrial vacuum to remove any residue or laitance and any stain on the concrete from saw cuts as the work is progressing.

.5 Water used for sawing and residues and laitance must be checked to prevent contamination of the environment. All water and residues must be drained and evacuated.

3.3 SAND BLASTED CONCRETE FINISH

.1 From the beginning of the work, produce and provide samples demonstrating the final appearance of concrete once treated with sandblasting.

.2 All exposed concrete surfaces, except concrete floor slabs, shall be sandblasted to provide a uniform surface finish and a porous, rough finish (CSP3 type light sandblasting).

.3 Use non-siliceous grade 40 sand for this work.

.4 Works cover the entire height of the concrete siding, the coping wall and the flower boxes.

.5 Works must be carried out when the water level is at its lowest, outside periods of environmental restriction (after October 1st) and after the season of navigation (after the removal of floating docks in the fall 2019).

.6 Completely sealed shelters must be provided to ensure that all spray residues are recovered and disposed of. No projection or rebound must reach the water of the Chambly basin.

.7 In addition, all environmental protection and mitigation measures applicable to this type of work in the marine environment must be put in place. A curtain of turbidity is required for the duration of works.

.8 The working methods must be approved by the Departmental Representative.

3.4 RETARDING AGENT FOR HORIZONTAL CONCRETE SURFACE

.1 From the start of work, produce and supply samples demonstrating the final appearance of concrete with exposed aggregates. as well as all tests allowing the Departmental Representative to make a choice as to the mixing formula. Refer to "03 30 00 – Cast-In-Place Concrete" for specific requirements related to these samples and test results to be provided

.2 Confirm to concrete supplier that the finish will be for concrete with exposed aggregates so that mixing is adequate for this type of finish.

.3 Confirm concrete degree of exposure and color of concrete as required.

.4 For finished concrete with exposed aggregates, application of the surface retarder shall be done with a vaporizer uniformly and at the recommended rate.

.5 Brushing the concrete surface to expose aggregates must be done 24 hours after the surface retarder has been applied with a brush and a water wash under the low tap pressure. . This operation must be carried out with great attention in order to obtain the desired result, that is to say aggregates exposed to a depth not exceeding 2 to 3mm. Do not brush too hard at first. Start with small areas to ensure that you have the desired level of wash-out.

3.5 SURFACE FINISH TYPE 1 (SWEPT FINISH)

.1 At the locations indicated, finish the concrete with a wooden trowel while taking care not to raise the paste (water-cement) to the surface. When the concrete has reached the correct consistency, the surface is then roughened using a brush-broom with stiff and fine bristles.

3.6 SURFACE FINISH TYPE 2 (WITH EXPOSED AGGREGATES)

.1 Finished concrete surfaces with exposed aggregates are shown on plans.

.2 The Contractor must foresee, plan, coordinate and organize a preparatory meeting with all involved parties prior to the commencement of concrete placement engraved or with exposed aggregates. This meeting will be scheduled by the Contractor but will be supervised by the Departmental Representative.

.3 Application of retarding agent

.1 Follow the manufacturer's recommendations for the application of the product to meet the requirements of the drawings and specifications.

.2 Mix thoroughly before application and after placing and leveling concrete, apply the product with a low pressure sprayer, according to the recommended rate, to cover the entire surface evenly. Avoid over-application of the product.

.3 Allow concrete to cure and harden in humidity in accordance with the other requirements of the specifitation Do not use chemicals.

.4 Curing blankets shall be securely held in place but shall not touch concrete in order not to affect the finish. A space of 25 to 50mm is recommended, but each end must be closed to avoid air circulation (tunnel effect).

.5 Refer also to sections "03 25 00" and "03 30 00" of the structural specification.

.4 Surface Finishing

.1 Schedule work so that curing time with product is almost always the same depending on ambient temperature and relative humidity.

.2 Remove the polyethylene one section at a time and remove the chemically retarded surface mortar with a stiff brush and rinse with a garden hose. Do not brush too hard at first. Start with small areas to ensure that the desired level of washout is achieved.

.3 Removal of mortar or cleaning of concrete must be done within 18 to 24 hours after placement of concrete, depending on temperature and hardness of the surface. Periodically check the surface to determine the desired delayed mortar depth and ensure that the underlying concrete hardens.

.4 This operation must be carried out with great care in order to obtain the desired result, ie the aggregates exposed to a depth not exceeding 2 to 3 mm.

.5 After this procedure, rinse the slab to remove any excess mortar, replacing the curing blankets as needed.

.6 Complete the water curing period with sufficient spray misters.

.7 Control cylinders shall be broken at 18 and 24 hours or earlier, if required, to determine the compressive strength of the concrete and to permit staff circulation for this washing operation.

.8 Light vehicles shall not drive on surfaces until the compressive strength reaches 70% of the specified strength. This requirement must be respected.

.9 Silane shall be applied by rolling in two perpendicular layers only when the concrete has reached 28 days at the recommended rates and in accordance with the manufacturer's recommendations.

.5 Return to Service

.1 Slabs may be washed with mild soap solution when joints are sealed and matured for 72 hours prior to full return to service.

.2 If temporary heaters are used during concrete installation and setting retarder, gas exhaust shall be ventilated to the outside.

3.7 SURFACE FINISH TYPE 3 (ENGRAVED CONCRETE)

.1 Specialized Contractor must provide a list of 5 similar projects completed in the past 5 years. The Departmental Representative reserves the right to refuse an Entrepreneur without adequate experience.

.2 At the request of the Departmental Representative, produce and pre-supply a sample demonstrating the final appearance of the engraving for approval by the Departmental Representative prior to the completion of the work.

.3 The logo of the engraving is detailed on the drawings. As the logo has a diameter of 3 meters, provide a concrete surface of 4m x 4m with a fairly smooth finish. (unfinished with exposed aggregates) in which the LOGO will be engraved

.4 Submit to the Departmental Representative a shop drawing of the engraving prior to production.

.5 Produce stencil cutting for engraving with a computerised cutter.

.6 Carry out sand-blast engraving 30/70 and a depth of approximately 3 mm.

.7 Use compressed air pressure of 100 psi.

.8 Apply « Litichrome » paint and sealant in engraving. The choice of the color of the paint will be made from a sample referring to the Pantone color chart, provided by the specialist in engraving on concrete.

.9 Thoroughly clean the surface of the concrete, leaving no traces of adhesive.

.10 Provide the application of sealant or water repellent.

3.8 VAPOUR BARRIERE

.1 Where applicable, provide and install two layers of vapor barrier membrane under concrete slabs on the floor as recommended by the Departmental Representative.

.2 Where joints are provided, overlap edges of polyethylene sheets at least 300 mm.

.3 Repair vapor barrier perforations before placing concrete.

.4 Use parts at least 150 mm wider than perforations in all directions.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All the sections of the Division 01 – General Requirements

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 20 00 – Concrete Reinforcing

.4 Section 03 25 00 0 – Accessories for Concrete

.5 Section 03 30 00 – Cast-in-Place Concrete

.6 Section 03 35 00 – Concrete Surfaces Finishing

.7 Section 03 41 00 – Precast Structural Concrete

.8 Section 05 50 00 – Metal Fabrications

.9 Section 31 62 16.13 – Steel Sheet Piling

.10 Section 31 62 16.19 – Unfilled Tubular Steel Piles

.11 Section 35 20 23A – Sediment

1.2 REFERENCE STANDARDS

.1 American Concrete Institute (ACI)

.1 ACI 304R-R2009, Guide for Measuring, Mixing, Transporting and Placing Concrete.

.2 CSA International

.1 CSA A23.1/A23.2-14 Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.3 DEFINITIONS

.1 Tremie concrete: concrete placed underwater through tube called tremie pipe.

.2 Tremie pipe: pipe has hopper at upper end and may have foot valve, plug or travelling plug to control flow of concrete. Pipe has diameter of 200 mm minimum, constructed from sections with flange couplings fitted with gaskets.

.1 Concrete is placed in hopper and sufficient head of concrete is maintained in tremie pipe to provide desired rate of flow.

.3 Pumped concrete method: method of placing concrete underwater uses concrete pump with discharge line used in similar manner to tremie pipe.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Concrete pre-placement meeting; conduct pre-placement meeting two (2) weeks minimum before tremie operation.

.1 Ensure meeting includes as minimum attendees as follows:

.1 General contractor.

.2 Ready-mix concrete supplier.

.3 Admixture supplier.

.4 Placing/formwork sub-contractor.

.5 Reinforcing sub-contractor.

.6 Testing agency representative.

.7 Structural engineer.

.8 Owner’s representative.

.2 Distribute minutes to attendees including copies of concrete mix designs, aggregate physical properties, placing schedule, rate of delivery, testing program, and, contingency plan for delay and breakdown.

1.5 DOCUMENTS/SAMPLES SUBMITTALS FOR APPROVAL/INFORMATION

.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 [concrete] and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submit also two (2) Material Safety Data Sheets (MSDS) required under the Workplace Hazardous Materials Information System (WHMIS), which must conform to the Workplace Hazardous Materials Information System ("WHMIS") under "01 33 00 - Documents and Samples to be Submitted". The records must indicate the VOC emission rate of the products during application and cure.

.4 Submit also samples of finished products; refer to Section 03 30 00 – Cast In Place Concrete, for sampling requirements.

1.6 QUALITY CONTROL AT SOURCE

.1 The quality of the finished product and the aesthetics (color, type of finish, etc.) of the anti-wash-out cast concrete must be the same or similar to other finishes of other types of mix. To this end, the Contractor must keep on site the samples previously approved by the Departmental Representative in order to be able to compare them to the actual concrete poured on site at any time.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and acceptance requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect concrete from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse in accordance with the directives of the construction waste management plan, Section « 01 74 21 - Construction/Demolition Waste Management and Disposal ».

PART 2 PRODUCTS

2.1 MATERIALS

.1 Concrete materials: to Section 03 30 00 - Cast-in-Place Concrete.

2.2 CONCRETE MIXES

.1 The concrete must conform to the following characteristics:

.1 Cement: Blend specially formulated to obtain

.1 70% de type GU

.2 30% de type GUb-SF

.2 Minimum compressive strength at 28 days: 35 MPa.

.3 Maximum water cement ratio by mass: 0.40.

.4 Nominal size of coarse aggregate: 2.5 to 10 mm (use the same aggregates as in all other mixtures).

.5 Cement content for mixtures: 450 kg/m^3 minimum.

.6 Slump at point and time of discharge: 200 to ±40 mm.

.7 Percentage of air (%) : 6%-9%

.8 $\underline{L}$ max (µm): 230

.9 Permeability to chloride ions (max coulombs) : 1 500

.2 The proportion of fine aggregate must be between 45% and 55%, calculated as a percentage of total aggregate.

.3 The limit of the alkali content of the binder shall be not more than 2.4 kg/m^3 maximum.

.4 An anti-washout agent should be used and only the superplasticizers recommended by the supplier of the adjuvant may be used

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete placement 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.

3.2 PREPARATION

.1 Where concrete must bond to existing surfaces, clean surfaces before starting concrete placement.

.1 Use water jets, mechanical scrapers or other means, and when quantities of mud or rock cuttings are present, remove by air lift.

3.3 INSTALLATION

.1 Do concrete work in accordance with Section « 03 30 00 - Cast-in-Place Concrete », Section « 03 20 00 - Concrete Reinforcing » and to CSA A23.1/A23.2. Testing for concrete to CSA A23.1/A23.2.

.2 Where concrete placement extends above water surface, protect concrete from direct contact with air until it reaches 80% of its capacity, if the temperature falls below $5^{o}C$.

.3 Place concrete in one continuous operation to full depth required.

.1 Supply complete equipment for every phase of operation.

.2 Provide sufficient supply of concrete to complete pour without interruption.

.4 Tremie method:

.1 Provide water-tight tremie pipe sized to allow free flow of concrete. Diameter of tremie pipe to be minimum 200 mm and minimum eight (8) times maximum size of coarse aggregate.

.2 Provide hopper at top of tremie pipe and means to raise and lower tremie pipe.

.3 Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially.

.4 Provide minimum of one tremie pipe for every 30 $m^2$of plan area and to maximum spacing of 6m centre to centre. Do not move tremie pipes laterally through concrete.

.5 Start placement with tremie pipe full of concrete. Keep bottom of pipe buried minimum 900mm in freshly placed concrete.

.6 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe, and continue placing as specified.

.7 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 to 36 hours and remove loose material by pumping or air lifting before placing next lift.

.8 Do not place concrete in flowing water when current exceeds 3 m/min. Do not vibrate, disturb or puddle concrete after placement.

.5 Pumped concrete method:

.1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.

.2 Pump discharge line diameter: 125 mm minimum.

.6 Bottom-dump bucket method:

.1 Not Used

.7 Bagged concrete method:

.1 Not Used

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section « 01 74 11 – Cleaning ».

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section « 01 74 11 – Cleaning ».

.3 Waste Management: separate waste materials for reuse or recycling in accordance with Section « 01 74 21 - Construction/Demolition Waste Management and Disposal ».

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of the Division 01 – General Requirements

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 20 00 – Concrete Reinforcing

.4 Section 03 25 00 – Accessories for Concrete

.5 Section 03 30 00 – Cast In Place Concrete

.6 Section 03 35 00 – Concrete Surfaces Finishing

.7 Section 03 37 26 – Underwater Placed Concrete

.8 Section 05 50 00 – Metal Fabrications

.9 Section 31 32 16.13 – Steel Sheet Piling

1.2 REFERENCES

.1 Unless otherwise indicated, the latest publication and amendments of the following standards prevailing on the effective date of the contract.

.2 American Society for Testing and Materials International, (ASTM)

.1 ASTM A775/A775M-01, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.2 ASTM D412-98a, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.

.3 ASTM D2240-02a, Standard Test Method for Rubber Property - Durometer Hardness.

.4 ASTM C494/C494M-05, Standard Specification for Chemical Admixtures for Concrete.

.3 Canadian General Standards Board (CGSB)

.1 CAN / CGSB 1.40 97, Paint for anti-corrosion primer, alkyd resins, for structural steel.

.2 CAN / CGSB 1.181 99, Zinc-rich coating, organic and prepared.

.4 Canadian Standards Association (CSA)/CSA International

.1 CSA-A23.1/A23.2 Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-A23.3-04, Design of Concrete Structures.

.3 CSA-A23.4-05, Precast Concrete - Materials and Construction.

.4 CSA-A251-M1982 (R1998), Qualification Rules for Manufacturers of Architectural Concrete and Prefabricated Structural Concrete.

.5 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.6 CSA-G30.15-M1983 (R1998), Welded mesh steel mesh for reinforcement of concrete

.

.7 CAN/CSA-G30.18-09 Billet-Steel Bars for Concrete Reinforcement.

.8 CAN/CSA-G40.20/G40.21-04], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.9 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.10 CSA-W47.1-03, Certification of Companies for Fusion Welding for Steel.

.11 CAN/CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.12 CSA-W59-03, Welded Steel Construction (Metal Arc Welding) (Metric version).

.13 CSA-W186-M1990 (C1998), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.5 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - March 1998(R2004).

.1 Produit MPI numéro 18, Organic Zinc Rich Primer.

.2 Produit MPI numéro 23, Oil Alkyd Primer.

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 CALCULATION CRITERIA AND DESIGN REQUIREMENTS

.1 The Contractor or his specialized subcontractor shall carry out the detailed design of the precast concrete elements.

.2 Calculate prefabricated components in accordance with CSA A23.3 CAN / CSA A23.4 / A251 to ensure that they can withstand load, storage, transportation and assembly constraints.

.3 Calculate prefabricated concrete elements so that they can withstand either specified loads or loads specified by the Departmental Representative in accordance with the National Building Code of Canada (NBC) and other applicable codes. Calculate the joints and fasteners of prefabricated concrete elements according to the loads and forces specified by the Departmental Representative.

.4 No openings in concrete facing panels shall be provided for access to an assembly part. The assembly parts must be at the back of the precast concrete panels.

1.4 PERFORMANCE REQUIREMENTS

.1 Tolerances to prefabricated components shall be in accordance with CAN / CSA A23.4 / A251.

1.5 DOCUMENTS/SAMPLES SUBMITTALS FOR APPROVAL/INFORMATION

.1 Submit workshop, design and manufacturing drawings required in accordance with « 01 33 00 - Submittal Procedures ».

.2 Submit shop drawings required in accordance with CAN / CSA A23.4 / A251 and CSA A23.3. The drawings shall indicate, show or include the following:

.1 The manufacturer's design brief for the components.

.2 Tables and bending diagrams for reinforcing steel and connecting elements.

.3 Camber if necessary.

.4 The nomenclature of finishes.

.5 Handling and installation procedures.

.6 Openings, sleeves, parts to be embedded and related reinforcements, including embedded handling devices.

.7 A general layout and assembly drawing showing the dimensions of each panel, details of connections and nesting, sheet pile surveys once installed, position of ladders, drainage openings, mooring cleats , weep holess and any other elements that may affect the installation of the panels.

.3 Each submitted shop drawing must bear the seal and signature of a qualified engineer recognized or licensed to practice in Canada, in the Province of Quebec, Canada.

.4 Submit required samples in accordance with « 01 33 00 - Submittal Procedures ».

.5 Prepare full size prefabricated concrete element with required details and showing prescribed quality and finish, and delivered to the site at the location specified by the Departmental Representative for approval of prior to starting to manufacture the required parts for the work.

.6 The Contractor shall provide preliminary shop drawings of the concept and final shop drawings after the on-site measurements to determine the dimensions of each of the panels.

.7 A factory visit will be carried out by the Departmental Representative at the beginning of the manufacturing of the panels.

1.6 QUALIFICATIONS OF MANUFACTURERS/INSTALLERS

.1 Prefabricated concrete elements shall be constructed and installed by manufacturers and installers certified by the Canadian Standards Association (CSA).

.2 Manufacturers of prefabricated concrete elements shall be accredited in accordance with the CSA certification requirements for manufacturers and installers of prefabricated concrete components prior to submitting their tenders. They must also accurately verify, at the time of preparation of their bid, that their accreditation is valid for the appropriate product categories, including structural concrete products, pre-stressed concrete products, architectural concrete products, cellular concrete products, concrete posts concrete sleepers, balcony slabs, stairs and stairwells, and cable pull boxes.

.3 Only prefabricated concrete elements produced by these certified manufacturers will be accepted by the Departmental Representative. In addition, accreditation of these manufacturers and installers must be maintained throughout the period of manufacture and installation of these components until the end of the warranty period.

1.7 QUALITY CONTROL IN FACTORY AND VISIT OF FACILITIES

.1 Allow and facilitate free access to the Departmenatl Representative at all times to the plant and site for the purpose of verifying, reviewing and monitoring the quality of materials and fabrication, as well as taking samples for the purpose of tests, trials and analyses. If necessary, provide all required assistance free of charge (labour, equipment and materials).

.2 When required or at the request of the Departmental Representative, a designated testing laboratory will inspect and test materials and work performed.

.3 The Owner will pay the cost of the inspection tests except in the case of a second inspection required by poor quality initial work which will then be borne by the Contractor.

.4 The Contractor shall collaborate free of charge in carrying out these tests by providing all the assistance required by the laboratory.

.5 Destructive tests may be required by the Departmental Representative for verification of tensile strength, bend strength or any other analysis that may have an impact on the strength of the panels.

.6 If required by Departmental Representative, keep at the factory all specified parts until Departmental Representative authorizes shipment to site.

.7 Provide samples in accordance with Section 03 30 00 - Cast-In-Place Concrete.

1.8 TRANSPORTATION, STORAGE AND HANDLING

.1 Transport, store and handle prefabricated components according to manufacturer's instructions.

.2 To prevent staining, ensure corners of elements do not come into contact with soil.

.3 Once delivered to the site, the panels will be inspected and must be free from any breaks, cracks, stains or other disorder that may have occurred during transportation. Otherwise, the panels will be returned and must be replaced immediately.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Sort waste for reuse and recycling in accordance with « 01 74 21 - Construction/Demolition Waste Management and Disposal ».

.2 Evacuate all packaging materials from site and send to appropriate recycling facilities.

.3 Recover and sort plastic, corrugated polystyrene, paper wrappers and place in appropriate waste bins disposed on site for recycling in accordance with waste management plan.

.4 Sort plastic waste steel waste for reuse and recycling and place in designated containers in accordance with waste management plan.

.5 Transport unused concrete and concrete components to quarry or local recycling facility approved by Departmental Representative.

.6 Transport unused paint products, sealants, plasticizers, water reducers and air-entraining agent to an approved hazardous materials collection site approved by the Departmental Representative.

.7 It is forbidden to dispose of unused paint products, sealants, plasticizers, water reducers and air-entraining agent into drains, watercourses, lakes, ground or any other place where this could pose a risk to health or the environment.

.8 Fold metal strapping straps, flatten and place in designated areas for recycling.

1.10 WARRANTY

.1 For the work described in this section, that is, « 03 41 00 – Precast Structural Concrete », the twelve (12) month warranty period shall be extended to five (5) years.

.2 The Contractor hereby certifies that the prefabricated components are warranted against spalling and against any other apparent cracking marks, with the exception of normal capillary cracks due to shrinkage, in accordance with GC 32.1 of the General Conditions « C ».

PART 2 PRODUCTS

2.1 MATERIALS/EQUIPMENT

.1 Reinforcement in accordance with « 03 20 00 - Concrete Reinforcement ».

.2 Concrete in accordance with « 03 30 00 – Cast In-Place Concrete ».

.3 Finish in accordance with « 03 35 00 - Concrete surfaces Finishing ».

.4 Color and composition: in order to ensure uniform coloring and composition of the mixture, the same product marks and the same source of supply shall be used for cement and aggregates used in the construction of the entire work.

.5 Formwork: Complies with CAN / CSA A23.4 / A251.

.6 Hardware and Miscellaneous Materials: Complies with CAN / CSA A23.1 / A23.2.

.7 Threaded HAS-R stainless steel anchor rods: conform to ASTM F593 316CW1.

.8 Galvanizing: hot-dip process covering the surface of a zinc layer of at least 610 g/m² thickness in accordance with CAN / CSA G164.

.9 Stainless steel spacer plates, shims and angles: in accordance with ASTM A269, grade 316, weld, without longitudinal seam, with AISI No. 4 finish. As described in « 05 50 00 - Metal Fabrication ».

.10 Retarding agent (if required): Complies with ASTM C494 / C494M Type B, water-based, low solvent VOC. The setting retarder film should not be exposed to moisture.

.11 Supporting pads (if required): Neoprene, Shore A hardness, measured to the durometer in accordance with ASTM D 2240, to be specified by the designer in accordance with design and construction parameters; The bearings must be molded to the appropriate dimensions or cut from molded sheets.

.12 Air-entraining agents: conform to ASTM C260.

.13 Chemical additives: as per manufacturer's specifications.

.14 Spacers: made of plastic.

.15 Exhaust nozzles: made of plastic, specially made.

.16 Weep holes: See section « 31 62 16.13 - Sheet piles ».

.17 Insulation: n/a.

.18 Curing Product: Not to be used without the prior approval of the Departmental Representative.

2.2 CONCRETE DOSING FORMULAS

.1 Normal density concrete shall be prepared in accordance with « 03 30 00 – Cast In-Place Concrete ».

2.3 PREFABRICATED ELEMENTS

.1 Prefabricated components shall be manufactured in accordance with CAN / CSA A23.4.

.2 Each prefabricated element shall bear the date of casting and the corresponding identification mark shown on the shop drawings and used to indicate its location. This date of casting and this identification mark must be affixed to a part of the element which will not be apparent, once the work has been completed.

.3 Parts to be embedded and anchors shall be designed and fixed to the prefabricated elements so that they can withstand the expected loads.

.4 Prefabricated panels shall have the following geometric characteristics:

.1 Thickness of panels: 150 mm.

.2 Height of panels: 1460 mm + 150 mm (base at 45º).

.3 Length of panels: maximum 9 metres; Lengths that are variable but as uniform as possible and in such a way as to provide the least possible vertical joints.

.4 Chamfer of 25 mm at the edge on the outer edge (4 faces).

.5 With a straight edge, 90 degrees, on the side of the inner side, for the top edges and for the ends adjacent to the cast-in-place concrete.

.6 Upper edges and ends adjacent to cast-in-place concrete with sealant glued at factory (see « 03 25 00 – Accessories for Concrete » for sealing strip specifications).

.7 Side edges with sealed overlaps for easy on-site connection to panels adjacent to other panels.

.8 Panel base made with 45 ° angle on basin side.

.9 With galvanized steel frame as specified on plans.

.10 With welded on-site (sheet-pile) connections for on-site adjustment.

.11 With bent renforcements allowing structural bonding with concrete fill, behind panels, in sheet piling cells.

.12 All details are specified on the plans.

.13 Minimum clearance of 10 mm between two (2) panels.

.5 Upon completion of the forming process, a primer paint shall be applied in shop to the steel anchors and steel parts to be embedded; the anchors must, after welding, be retouched with this same paint. No paint should be applied to the parts of the anchors or parts to be embedded, which must be pushed into the concrete.

.6 When completed, anchors and stainless steel parts to be embedded; must be retouched with a coating rich in zinc after welding.

2.4 FINISHES

.1 Finished prefabricated elements shall be the same as those of the sample preserved in the office of the Departmental Representative.

.2 The finish of prefabricated elements shall be as close as possible to the finish of the adjacent sections of in-situ concrete.

.3 Exposed aggregates finish: n /a

2.5 QUALITY CONTROL

.1 Provide the Departmental Representative certified copies of the quality control test reports for these works in accordance with CAN / CSA A23.4.

.2 Provide internal quality control program reports based on accreditation requirements for manufacturers and installers for review and verification by the Departmental Representative.

.3 Provide Departmental Representative, upon request, with a certified copy of the Factory Test Report showing the physical and chemical analysis results of the reinforcing steel bars provided.

.4 Manufacturers of prefabricated concrete components shall keep detailed records of the source of supply of materials used in the manufacture of concrete, reinforcing steel and pre-stressed steel and, upon request, make such records available to the Departmental Representative for audit purposes.

PART 3 EXECUTION

3.1 GENERAL

.1 Produce precast concrete structures in accordance with CAN / CSA A23.4 and CAN3 A23.3.

3.2 INSTALLATION

.1 Install assembly parts and lintels.

.2 Install prefabricated components within specified tolerances.

.3 Observe installation tolerances specified in CAN / CSA A23.4. These tolerances cannot be cumulated in any case.

.4 Prior to assembly, place prefabricated components according to the rated dimensions and alignments, within the permissible tolerances.

.5 Secure prefabricated panels according to approved shop drawings.

.6 Secure bolts with self-locking washers.

.7 Tighten bolted connections evenly using the specified torque.

.8 Do not weld or attach pads where sliding joints are located.

.9 Place items dry and use stainless steel spacers to give specified seams.

.10 Using a wire brush, clean the welds on the job site and touch-up the galvanized coating applied in shop with a zinc-rich coating.

.11 Unless otherwise indicated, apply sealant products and waterproofing products on prefabricated panels as directed by manufacturer.

3.3 WELDING

.1 Carry out welding work in accordance with CSA W59 for the welded steel structural members and CSA W186 for the reinforcements.

3.4 CLEANING

.1 Before cleaning the soiled surfaces of concrete prefabricated elements, have the Departmental Representative approve the proposed cleaning methods.

END OF SECTION

PART 1 GENERAL

1.1 GENERAL

.1 For this section, the Contractor shall design, manufacture, deliver and install a new ramp.

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 — Submittal Procedures

.2 Section 01 61 00 — Common Product Requirements

.3 Section 01 74 11 — Cleaning

.4 Section 01 74 21 — Construction/Demolition Waste Management and Disposal

1.3 REFERENCES

.1 Unless otherwise indicated, refer to the latest publication and the amendments to the following standards which prevail on the effective date of the contract.

.2 American Association for State Highway and Transportation Officials (AASHTO)

.1 AASHTO Standard Specifications for Highway Bridges.

.2 LFRD guide specifications for the pedestrian bridges.

.3 ASTM International

.1 ASTM B85M, Standard Specification for Aluminum-Alloy Die Castings.

.2 ASTM B108M, Standard Specification for Aluminum –Alloy Permanent Mold castings.

.3 ASTM B209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.4 ASTM B210M, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.

.5 ASTM B211M, Standard Specification for Aluminum and Aluminum Alloy Bar, Rod and Wire.

.6 ASTM B221M, Standard Specification for Aluminum and Aluminum –Alloy Extruded Bars, Rods, Wire, Profiles and tubes.

.7 ASTM F593, Standards Specification fort Stainless Steel Bolts, Hex Cap Screws, and Studs

.4 CSA International

.1 CSA/CAN S6, Canadian Code for the calculations of road bridges

.2 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.

.3 CSA W59.2, Welded Aluminum Construction.

.5 Aluminum Association (AA)

.1 AA DAF 45, Designation System for Aluminum Finishes.

1.4 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submit documents/samples required in accordance with Section 01 33 00 -Submittal Procedures.

.2 The Contractor shall provide for approval:

.1 New ramp to pleasure craft dock

.2 Full design brief of the ramp assembly, including the attachement and the guardrail.

.3 Plan view, elevations, sections and details

.3 The Contractor shall provide the Departmental Representative the shop drawings of the aluminum ramps, assembly drawings and calculations of the assembly process. These documents must be signed and sealed by an engineer member of the Ordre des ingénieurs du Québec.

.4 The number of the data sheet of the welding procedure and the non-destructive testing of welds type must be indicated on the shop drawings. Provide copy of welding procedure.

.5 The Contractor may not commence manufacturing prior to the entirety of the shop drawings being approved by the Departmental Representative.

.6 The Contractor must also provide to the Departmental Representative at least twenty-eight (28) days before the start of manufacturing, the documents concerning the transportation. These documents are:

.1 The manufacturing schedule,

.2 The list of those involved in the manufacture and qualification, including staff skill cards performing welding engineers, supervisors, welding inspectors welding, welders, pointers, welding machine operators and for auditing the quality,

.3 The company's certification for welding;

.4 The name of Welding Inspection laboratory to carry out non-destructive testing;

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Provide and implement protective wedges for transportation, lifting and storage of the elements.

.1 During the processing, transportation and installation, the necessary precautions must be taken to ensure that the ramps are not damaged.

.2 Do not encumber the shore with the elements.

.3 Do not subject the items to excessive stress

.3 Mark the mass on items that weigh more than (3) tonnes.

.4 Ensure that no aluminum parts come into contact with the ground.

1.6 QUALITY ASSURANCE

.1 Aluminum

.1 The Company realizing the manufacture and repair of the foot bridges must meet ISO 9001 standards.

.2 Certification of the Company and welding personnel.

.1 Welding work must be performed by companies approved by the Canadian Welding Bureau to the requirements of CSA Standard W47.2 "Certification of Companies for Fusion Welding of Aluminum», Division 1 or 2.

.2 The engineer responsible for the design of the welding procedures and executing welding work must be present at the factory, on request

.3 Certification must be obtained before the start of the fabrication and certification must be maintained throughout the manufacturing time

.4 Welders must have Competency cards according to the welding position, the type of electrodes used and the welding process used. These competency cards are issued by the Canadian Welding Bureau to the requirements of CSA Standard W47.2 "Certification of Companies for Fusion Welding of aluminum."

.3 Certificate of Conformity

.1 For each shipment of aluminum from the manufacturer, the Contractor must provide the Departmental Representative with a certificate of compliance containing the following information for each prodcution batch :

.1 Manufacturer's name;

.2 Date and place of manufacture;

.3 Alloy type and condition;

.4 Heat treatment chart;

.5 Nominal dimensions;

.6 Casting number;

.7 Analysis and test results;

.8 Production batch number.

.2 A production batch consists of aluminum pieces of the same casting having undergone the same transformation

.4 Reception check

.1 When a reception check is done by the Departmental Representative, the samples taken shall be at least 200 mm by 75 mm, the dimension of 200 mm must be in the direction of the roll.

.2 The dimension of the parts must be sufficient to allow for sampling.

1.7 DESIGN REQUIREMENTS

.1 Dimensions

.1 Length : refer to plans

.2 Interior clear width : 1 200 mm

.3 Height of railing : 1 070 mm

.4 The maximum opening of the railing must not allow for the passage of a round object of 100 mm or less.

.2 Design

.1 Evenly distributed use of overload (overall ramp design): 4,8 kPa

.2 Wind load : according to standard S6

.3 Horizontal load on top of each railing 0.75 kN/m or 1.0 kN concentrated at any point of the railing.

.4 Vertical load on the upper part of each railing is 1.5 kN/m and it is not necessary to consider that this charge applies along the horizontal load.

.5 Other loads: According to the S6 standard

.6 live load deflection: L/360

.7 Deflection load max. : L/300

.8 Horizontal deflection, max. : L/360

.3 When temporary structures for handling the ramps must be attached to them, they must be bolted without reducing the capacity of the ramps. These temporary structures must appear in the assembly drawings.

.4 Aluminum structures must be composed of parts without longitudinal welds.

.5 Lifting Lugs

.1 Each lifting lug attached to the gangway shall have a minimum capacity of 5 mt. The gangway must have a minimum of four (4) lifting rings.

PART 2 PRODUCTS

2.1 MATERIALS

.1 New materials

.1 All materials used and provided to this project will be new materials.

.2 Any element manufactured will be a new construction.

.3 No used items will be accepted in this project

.4 Minimum thickness of aluminum:

.1 For items (excluding the railing), the minimum thickness of aluminum is 6.4 mm.

.2 Aluminum Structure: extrusions, plates and gussets of 6005-T5 alloy 6061-T6.

.5 Welding materials:

.1 Steel Structures: complies with ACNOR W59-M;

.2 Articles of aluminum: complies with ACNOR W59.2-M.

.3 Fasteners: bolts, nuts, washers stainless steel 304.

.4 Decking screws: Stainless steel pedestal 304.

.5 Extrusions, round bars and steel plates: comply with the CAN / CSA-M G40.21, grade 300W

.6 Aluminum decking: « Grip Strut » aluminium type 5052 Length : 230 mm ; Height : 50 mm ; Thickness : min. 2 mm...

2.2 FORMING

.1 Items must be formed and assembled in the workshop so that they are square, aligned, plumb, the required precise dimensions, so that the joints are tight and securely attached.

.2 Exposed welds performed continuously over the entire length of the joint, filed or ground down.

.3 The elements must be formed in accordance with CAN/CSA-S6

.4 The junction between the ramp and the floating docks and the connection point with the stationary dock will be level. No steps will be accepted

.5 A transition plate, if required, must be provided between the ramp and its connections points to allow the passage without spacing of more than 25 mm.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: Before installing building elements, ensure that the state of the surfaces/materials previously implemented under other sections or contracts is acceptable and can perform the work in accordance with manufacturer's written instructions.

.1 Visually inspect surfaces materials in the presence of the Departmental Representative.

.2 Immediately inform the Departmental Representative of unacceptable conditions detected.

.3 Proceed with installation only after correcting the unacceptable conditions and written approval of the Departmental Representative.

3.2 SHAPING

.1 General

.1 Unless otherwise specified in this section or in the design, the manufacturing, must comply with CAN / CSA S6 "Canadian Code of Highway Bridge."

.2 Cutting

.1 Aluminum

.1 Cutting by aluminum cutting shear is permitted only on the plates with a thickness of 12 mm or less.

.2 Torch cutting is prohibited.

.3 At least 1 mm material must be removed by grinding along the entire edge of the arc-cut parts unless this edge is to be welded.

.4 When an access opening is cut out and stamped, at least 1.5 mm of material must be removed by grinding the entire stamped edge.

.5 In all cases, edge preparation must be made according to the requirements of CSA Standard W59.2 "welded aluminum construction." The sharp edges must be rounded and the surfaces coated with silicone wax.

.3 Drilling

.1 The tolerance for the distance of a hole to the free edge of a part is 0 to + 2 mm.

.4 Welds

.1 For steel structures, welds must comply with CSA W59 "Welded Steel Construction (Metal Arc Welding)".

.2 For articles of aluminum, welds must conform to CSA W59.2 "welded aluminum construction."

.3 Arc welding studs must include an automatic device; manual fillet weld is prohibited.

.4 The electrodes must be Basic coated or designated controlled hydrogen (HC).

.5 The dimensions of the sides of a fillet weld within the plans and specifications should not be reduced on the grounds that the manufacturer uses a submerged arc welding (SAW) process.

.6 The welds must be performed before galvanizing.

.7 Plates to be welded must be preheated immediately before the welding so as to remove moisture.

.8 Welds Testing

.1 Destructive testing may be required to know the limits in tension or bending of welded joints.

.2 Unless otherwise specified in the plans and specifications, nondestructive testing of welds must be executed by a registered laboratory certified by the Canadian Welding Bureau, according to the requirements of CSA W178.1 'organizations Qualification of Welding Inspection. "

.3 Unless otherwise specified plans and specifications, nondestructive testing of welds are made as follows:

.1 The visual check is made at 100% (before, during and after welding) according to the requirements of CSA W59.2 "welded aluminum construction" by a certified welding supervisor according to the requirements of CSA Standard W47";

.4 Inspection of welds must be made before galvanizing.

.5 Final Inspection

.1 A part cannot leave the factory before the manufacturer's dimensional reports, NDT reports of welds and aluminum smelter certificates are submitted to the Departmental Representataive and he has completed his final inspection and given a written acceptance to the Contractor.

3.3 PREPARATION

.1 Remove from steel or aluminum surfaces, dirt and unwanted deposits to the satisfaction of the Departmental Representative.

.2 Verify the location of the infrastructure components, the rating level of the connection points of the supporting elements and the location of the anchor bolts before mounting the ramp; if necessary, report any discrepancies to the Departmental Representative.

.3 Working near shores or fill embankments must be performed in accordance with written instructions of the Departmental Representative.

.4 During assembly, restrict pinning to the minimum necessary to bring the parts in position without enlarging or deforming the holes and without causing twisting, deformation or bending of the metal elements.

.1 Ream, if necessary, enlarge holes only if the Departmental Representative has given prior written authorization

.2 The diameter of the bore holes must not exceed by more than two (2) mm of the bolts used.

.5 Form and install the bearing elements as indicated.

3.4 DELIVERY, HANDLING AND ERECTION

.1 General

.1 The components of the structure must be handled carefully to avoid damage or deformation. The beams need to be raised by at least two (2) lifting points during handling and mounting operations.

.2 Aluminum structures must be cleaned of all dust and grease before leaving the factory.

.3 Unless otherwise specified in this Section or in the plans, assembly, installation of bolts and inspection of seams must be made in accordance with CAN/CSA S6 "Canadian Code of Highway Bridge calculations."

.4 The location and elevation of the bearings should be checked by the Contractor, and any discrepancies must be corrected. The Contractor shall provide the Departmental Representative, at least seven (7) days before the placing of the beams, a location survey showing the location (longitudinally and transversely of the work), the elevation and leveling of each support unit in place and the corresponding values required on the plans.

.5 To prevent water contacting unpainted steel surfaces and staining the seats and the adjacent surfaces of the foundation units, these units must be adequately protected before the installation of the work. All stains on the beams or foundation units, such as oil and grease stains, should be removed once the work is completed.

.6 Bolted joints

.7 Galvanized steel surfaces to come in contact with each other at the time of assembly must be manually cleaned with a wire brush so as to remove the glossy appearance without altering the zinc coating zinc.

3.5 GALVANIZATION

.1 Certificate of conformity

.1 For each delivery of items of galvanized steel, the Contractor shall provide to Departmental Representative a certificate of conformity with the following information:

.1 Name of the galvanizing company;

.2 Date and place of galvanizing;

.3 Coating thickness;

.4 Coating adhesion;

.5 Coating quality.

.2 Receiving inspection

.1 When receiving control is performed by the Departmental Representative, he is to make the tests for thickness, adhesion and coating quality according to the requirements of ASTM A123 / A123M "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."

.3 Surface preparation

.1 Surfaces to be galvanized must be clean, free of paint, grease, rust, etc. Deposits and residues from welding, carbon deposits and paint deposits or thick rust must be removed by an appropriate method. The final stripping must be done by immersion in a caustic solution followed by a clear water rinse and immersion in a bath of sulfuric or dilutied hydrochloric acid. After stripping, the parts must be immersed in an aqueous solution of zinc chloride and ammonium.

.4 Galvanizing process

.1 Galvanizing must be made according to ASTM A123 / A123M "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings is Iron and Steel Products."

.2 Steel surfaces of the bottom flange beams and bearings contacting the welds used to attach to the beams supporting devices must be ground after galvanizing.

.3 The minumum thickness of galvanisation is 100 µm, except in the case of HSS, where the minimum thickness is 75 µm.

.5 Protection of galvanized elements

.1 The contractor must protect galvanized parts against damage during handling and storage.

.2 Any element in contact with the lifting equipment, such as cables and chains, must be sufficiently protected.

.3 The storage of galvanized elements, with the exception of the reinforcements must be done so that air circulates between the parts, water does not accumulate and drains freely, and that there is no metal contact against galvanized metal parts. When installing galvanized elements of retainers, the Contractor has full responsibility to ensure that there is no white rust on these parts.

.6 Repair after galvanizing

.1 Damaged surfaces with a width less than 2.5 cm must be repaired by applying by brush two coats of zinc-rich coating with a minimum content of 87% metallic zinc in the dry film. Moreover, on the same workpiece, the total area to be repaired by zinc-rich coating should be less than 0.5% of the total surface thereof. Damaged surfaces must be cleaned beforehand according to the requirements of the standard SSPC-SP 11 "Power Tool Cleaning to Bare Metal." The minimum total thickness of the dry film coating should be 130 µm.

.2 Damaged surfaces with a width greater than 2.5 cm and the area of the damaged parts totaling more than 0.5% of the total surface of the part to be repaired or regalvanisées by metallization. In this, the damaged surfaces must be cleaned beforehand according to the requirements of SSPC-SP standard 5/NACE No. 1 "White Metal Blast Cleaning" or SSPC-SP standard 11 "Power Tool Cleaning to Bare Metal." The minimum thickness of the metallized coating should be 130 µm.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by structural aluminum for buildings installation.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01 - General Requirements

.2 Section 03 10 00 – Concrete Forming and Temporary Formwork

.3 Section 03 25 00 – Accessories for Concrete

.4 Section 03 30 00 – Cast-In-Place Concrete

.5 Section 03 35 00 – Concrete Surfaces Finishing

.6 Section 03 37 26 – Underwater Placed concrete

.7 Section 03 41 00 – Precast Structural Concrete

1.2 REFERENCES

.1 ASTM International

.1 ASTM A 36/A36M-01, Specification for Structural Steel.

.2 ASTM A48/A48M-03(2008), Standard Specification for Gray Iron Castings.

.3 ASTM A53/A53M-12 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.4 ASTM A269-15a - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for Generalities Service.

.5 ASTM A307-14 - Standard Specification for Carbon Steel Bolts and Studs and Threaded Rod, 60,000 PSI Tensile Strength.

.6 ASTM F3125/F3125M-15a, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.7 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.8 ASTM A 325-02, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.9 ASTM A 325M-05, Specification for High-Strength Bolts for Structural Steel Joints.

.10 ASTM A 490M-00, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).

.11 ASTM D2369 – 10(2015)e1, Standard Test Method for Volatile Content of Coatings.

.12 ASTM D2371 - 85(2010), Standard Test Method for Pigment Content of Solvent-Reducible Paints.

.13 ASTM E1475 – 13, Standard Guide for Data Fields for Computerized Transfer of Digital Radiological Examination Data.

.14 ASTM D562-10(2014), Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.

.15 ASTM D2621-87(2011), Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.

.16 ASTM D4414-95(2013) Standard Practice for Measurement of Wet Film Thickness by Notch Gages.

.17 ASTM D3359-09e2 Standard Test Methods for Measuring Adhesion by Tape Test.

.2 CSA International

.1 CSA G40.20/G40.21-f13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92 (C2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA S16-f14, Design of Steel Structures.

.4 CSA W48-f14, Filler Metals and Allied Materials for Metal Arc Welding.

.5 CSA W59-f13, Welded Steel Construction (Metal Arc Welding).

.3 Canadian Genaral Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.6 The Society for Protective Coatings (SSPC)

.1 SSPC SP-6/NACE No. 3-00, Commercial Blast Cleaning.

.7 ANSI/AWS D3.6, Specification for Underwater Welding.

.8 Environmental Choice Program

.1 PCE/CCd-047a-98, Paints, coatings.

.2 PCE/CCD-048- 98, Recycled Aqueous Suspension Coatings.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submit shop drawings and documents/samples required in compliance with section 01 33 00 – Submittal procedures.

.2 Shop drawings shall clearly indicate all details of shaping and assembly, including cuts, notches, holes, anchors and welds.

.3 Prepare shop drawings taking into account all related works. Conduct coordination to avoid conflict.

.4 Use symbols defined in CSA W59 to represent welds.

.5 Specialized Contractor shall undertake the fabrication and assembly of fabricated metals only when the shop drawings have been approved by the Departmental Representative

.6 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.7 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.8 Sample

.1 Submit a vintage bollard whose paint has been refreshed for approval, prior to starting the in-shop painting works.

.2 Also submit a sample of each type of work for the painted galvanised steel work for approval before commencing factory painting work (mooring cleats, guardrails, ladders, floating dock guides).

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties. These test reports must be certified by qualified metalworkers qualified to practice in Canada.

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Implementation meetings: Conduct meeting to review work requirements, manufacturer's installation instructions and warranty terms

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Transport and storing materials on site so as not to not be damaged or damage materials or equipement of other trades. Protect materials against marks, nicks and scratches.

.4 Handle parts in a manner to prevent permanent deformation.

.5 Protect and handle galvanized materials so as not to damage zinc plating.

.6 Handle steel parts exposed or specially finished at the factory to prevent damage to surfaces.

.7 Replace defective or damaged materials and equipment with new materials or equipment, if necessary.

.8 Mark mass on items weighing more than 3 metric tons.

.9 At least 7 days prior to shipment of items, submit to the Departmental Representative the delivery schedule

PART 2 PRODUCTS

2.1 MATERIALS

.1 Use materials free from dirt, rust and corrosion, scaling, pitting, delaminations or other defects. No used material will be accepted.

.2 Structural steel: in accordance with CAN/CSA G40.20/G40.21.

.1 "H" and "I" (W & S) profiles: 350W shade.

.2 Round or square tubular profiles (HSS): grade 345 W conforming to ASTM A500.

.3 Other standard profiles, angles, "C" profiles and plates: 300W shade.

.4 Base plates: grade 345 MPa (grade 50 Ksi)

.3 Guardrails:

.1 Galvanized steel pipes conforming to ASTM A53 / A53M, Class B series.

.2 All steel shall be galvanized steel painted black.

.3 .All welds must be factory ground before galvanizing.

.4 Provide openings for galvanizing.

.5 Concrete anchor bolts or rods: stainless steel threaded anchors or bolts, grade 316L, 16mm diameter (4 required + 2 additional per pole) and depth required in accordance with design details on plans:

.1 Provide nuts and washers, for isolation,of plastic or teflon.

.2 Anchors, nuts and washers shall be painted on site after installation.

.3 Provide a minimum of 203mm (8 ") of anchor depth in concrete.

.6 .Provide all bolts and winter protective plates for all removable equipment.

.7 Provide also an assembly/dismantling plan describing the installation and removal methods for the winter period of each element.

.8 Provide for chiseling to identify railing modules according to the installation dismantling plan provided by the Contractor.

.4 Vintage Bollards: Recovery

.1 Recover existing bollards.

.2 Repair bollards with sandblasting for surface preparation and repaint such as existing black (color number to be determined).

.3 Anchor bolts (or rods) for attachment of ancestral bollards: Do not retrieve the existing rod but instead provide a new M36 threaded bolt in painted galvanized steel in accordance with ASTM A325M and A490M.

.4 Provide that existing internal bollard nets may need to be rebuilt.

.5 Provide a minimum of 250 mm (10 ") of anchor depth in the concrete.

.6 Provide all bolts and winter protective plates for all removable equipment.

.7 Provide also an assembly/dismantling plan describing the installation and removal methods for the winter period of each element.

.8 Provide for chiseling to identify railing modules according to the assembly/dismantling plan provided by the Contractor.

.5 Channel grating

.1 The channel grating surrounding the wharf must be specially designed by the manufacturer of these structures. The design of this grating must be inspired by the grid pattern shown in the plans.

.2 The grating model to be proposed by the manufacturer must be approved during the period of submission and shop drawing approval. If necessary, the template will have to be modified according to the comments of the Departmental Representative. Shop drawings must be signed and sealed by an active member of the “Ordre des ingénieurs du Québec”.

.3 All costs related to the research and development of the grid model must be included in the price of the bid.

.4 In particular, the grating must meet the following criteria:

.1 The grating must be made to measure in cast aluminum and painted black;

.2 Grating attachments must be based on the details shown on the drawings and be of the "vandal-resistant" type;

.3 The grating sections must be at least 2.0 metres long to fit with the saw cuts in the slab (location of the grating joints to be in line with the saw cuts

.4 Apply zinc-rich prepared (ready-to-use) organic coating primer in accordance with CAN / CGSB-1.181-99;

.5 Subsequently apply two (2) layers of high solids, 200% elastic acrylic latex antirust coating to provide good surface adhesion and minimize risk of cracking and peeling. VOC content of 5 g/L and GS certified. Provide a color sample for approval;

.6 Maximum grating thickness: 35mm (to allow a minimum of 25mm of free flow at the bottom of the channel);

.7 Grating Width: 90mm (to allow 10mm adjustment for installation);

.8 The openings of the grating must be over the entire width; no floor grating type model will be accepted;

.9 Maximum width of grating surface openings: 20mm;

.10 Minimum grid opening percentage in relation to total area: 33%;

.11 The gratings must be able to withstand a CL3-625 type road live load (see design loads on drawings, apply a safety factor of 1.5);

.12 Channel grating support brackets shall be designed by the manufacturer and shall be made of the same material as the gratings i;

.13 Provide a minimum of 2 anchors per section of grating in accordance with the details shown on the plans. Anchors must fit into threaded sleeves cast in concrete at the bottom of the channel;

.14 Anchors must be stainless steel painted black and must be of the "vandal-resistant" type. Provide a minimum of 10% additional surplus anchorages;

.15 The design must meet all safety criteria as described in HSSE. applicable.

.6 Lamp post barrels: see electrical

.1 Anchor bolts (or rods) for light posts and lights: Use 19mm diameter anchor bolts or rods made of. grade AISI 316L, 800 mm depth of anchorage according to the details on the plans

.2 Bolts for closing plates during winter season: Use 16 mm diameter stainless steel bolts of AISI 316L grade.

.3 Winter Protective Plates: See Electrical.

.7 Vintage Marine Ladders: Reinforced galvanized ribbed bars, painted black, 25 mm diametre grade 400W, to standard G30.18

.8 Mooring cleats:

.1 Round or square tubular profiles (HSS): grade 345 W conforming to ASTM A500.

.2 Rods: in accordance with ASTM-A36 unless otherwise specified.

.3 Base plates: grade 345 MPa (grade 50 Ksi)

.4 Anchors: Galvanized steel and painted black in accordance with CAN/CSA G40.20/G40.21, 350W grade.

.9 Identification plates for the identification of the capacity of the mooring cleats and vintage bollards: made of stainless steel, of AISI 316L grade, of the dimensions indicated on the drawings.

.10 Anchors and recessed sleeves for attachment of removable furniture: AISI 316L stainless steel, according to dimensions, locations and other specifications indicated on drawings.

.11 All removable furniture anchors shall be of the tamper-proof type and installed so as not to be in sight and to ensure the safety of the public.

.12 Structural bolts: in accordance with ASTM A325M and A490M.

.13 Nuts: Complies with ASTM-A563.

.14 Washers: according to ASTM-F436. Use at least one washer on each nut.

.15 Shear studs: Cold formed carbon steel, grade 60 Ksi (Fy = 413 Mpa, Fu = 450 MPa), in accordance with ASTM-A108 and CSA W59, clause 5.5.6 and appendix H thereto.

.16 Rods: ASTM-A36 compliant unless otherwise specified.

.17 Steel Pipes: Complies with ASTM A53 / A53M unless otherwise specified.

.18 Stainless Steel Tubes: Complies with ASTM A269 unless otherwise specified.

.19 Welding Materials: Complies with CSA W48 and CSA W59 and approved by the Canadian Welding Bureau. Electrodes of grade E70XX, unless otherwise indicated.

.20 Underwater welds shall conform to ANSI / AWS D3.6. The welds must be type B.

.21 Mechanical Anchorages: Where required, use stainless steel anchors supplied by a recognized company that distributes products conforming to the standards in force in Canada for more than ten years, of dimensions and indentations shown on the drawings.

.22 Chemical Anchors: When required, use stainless steel anchor rods and high-strength, 2-component, high strength structural epoxy resin adhesive supplied by a recognized company that distributes compliant products To the standards in force in Canada for more than ten years, of the dimensions and indentations indicated in the plans.

.23 Hot dip galvanizing: The thickness of the zinc layer shall be in accordance with the table in ASTM-A123. Perform SSPC SP-6 cleaning before galvanizing. Carry out alterations with zinc-rich paint in accordance with ASTM-A780 and CAN / CGSB-1.181.

.24 Galvanization: the weight of the covering layer must exceed 600 g per square meter of surface area:

.1 Galvanizing of steel profiles and plates: in accordance with ASTM A -123.

.2 Galvanizing of pre-assembled steel parts: conforms to ASTM A-386.

.3 All surfaces to be coated should be "passivated".

.25 Touch-up paint for galvanized surfaces: zinc-rich primer, conforming to CGSB 1-GP-181a.

.26 Bituminous paint: For any surface of aluminum element in contact with concrete.

.27 Grout: non-shrink, non-metallic, fluid, with a strength of 25 MPa and a peel strength of 7.9 MPa at 24 hours.

2.2 INSULATION COATING

.1 Aluminum surfaces shall be coated with bituminous paint or separated from their support by means of neoprene so as to be insulated from the following materials:

.1 Metals of a different nature, with the exception of stainless steel, zinc and reduced-area white bronze.

.2 Concrete, mortar and other masonry materials.

.3 Wood.

2.3 FINISHING SHOP PAINTING AND GALVANISING

.1 The work consists of painting the iron, steel and galvanized steel surfaces of the remaining metal structures (DUPLEX system).

.2 Prepare all surfaces in accordance with ASTM A6386. The new galvanization must not undergo a chromate treatment in order not to impair the adhesion of the paint.

.3 As an example, abrasive blasting corresponding to the SSPC-SP 7 / NACE 4 degree of care "light sanding/blasting" must be carried out on all surfaces to be painted. An abrasive of medium to low hardness as well as controlled pressures are required to avoid damage to the galvanized surface.

.4 Galvanized bolts must meet all ASTM A153 requirements. The galvanized bolts must be cleaned beforehand so as to remove all the temporary protective wax as well as to obtain a certain surface roughness without deeply damaging the zinc film.

.5 When specified in the drawings, the steel and fabricated metal components shall be galvanized by hot dip. The thickness of the zinc layer must be in accordance with the table of ASTM A123. All components of the structure must be galvanized according to CAN/CSA-G164 at a rate of 600 g/m². Provide all constructional arrangements to allow the galvanization of the structure.

.6 All Steel Elements and Fabricated Metals The bollards will receive a black paint system (color number to be confirmed per customer).

.7 Layer paint shall be used as supplied by the manufacturer without modification. It should be applied on dry surfaces free of rust, grease and deposits at a temperature of at least 7 degrees Celsius.

.8 Painting of galvanized steel of steel and metal parts:

.1 Preparation of Recommended Steel SSPC-SP11 (pickling using mechanical tools - white metal), minimum profile 2-3mils (50-75 microns). If necessary, remove welds and sharp edges, eliminate welding spatter.

.2 Galvanized Steel Workshop Painting:

.1 Brush weld joints and sharp edges with brush before each coat for intermediate and finish coat.

.2 Hot dip galvanizing.

.3 Primer Coating: Pure, aluminum, abrasion resistant and light-colored epoxy coating with two components such as "Intershield 300". Apply a layer of 2.5 mils.

.4 Intermediate layer: Epoxy bonding layer without pitch between anti-corrosion system and an antifouling or finish to achieve the maximum holding and adhesion performance of the system applied to exterior surfaces such as "Intergard 263" or "Intergard 377 ". Apply 2.6 to 7 mils dry, epoxy, high solid level.

.5 One finish coat: High-performance, two-component, low VOC acrylic finish, such as "Interthane 990HS". Apply 4 to 6 dry mils, epoxy-based polysiloxane finish.

.3 Colour

.1 Intermediate: medium gray

.2 Finish: black (color number to be confirmed)

.9 The Contractor shall select a paint system equivalent to that described above, subject to approval by the Departmental Representative.

.10 Paint for in-shop printing layer: conforms to CAN / CGSB-1.40.

.11 Zinc Coating Paint: Zinc-rich, ready to apply paint conforming to CAN / CGSB-1.181.

.12 Paint in factory, steel blast cleaning (cleaned surface must be primed within 4 hours after cleaning).

.13 Primer is composed of Interchromate No. 72/019 for part no. 99/200 (specification 1GP121, followed by accelerator within a period of less than 12 hours by the application of an intermediate layer).

.14 Intermediate Layer (less than 12 hours after primer): Red Primer Chromate No. 729041, Specification 1GP40.

.15 First Coating (Factory Applied): Industrial Enamel Interkote No. 30/021, Specification 1GP61.

.16 Second coat will be applied. The minimum thickness after two (2) layers 60 λm.

.17 Application of paint coats shall be within the temperature and humidity standards required by the manufacturer.

.18 The Contractor shall take all packing precautions that it deems appropriate to protect the poles to their destination and, if necessary, assume the cost of repairs to the finish of the paint to the satisfaction of the Contractor. Departmental Representative.

2.4 GALVANISATION TOUCH-UPS

.1 Touching up with zinc-rich paint will be done on galvanized surfaces that have been damaged during the mountains.

.2 Accepted for zinc alterations when the elements are made of galvanized steel:

.1 METAFLUX distributed by BPB Chemicals BVBA with 98.5% - 99% pure zinc (recommended).

.2 ZINGA distributed by ZINGA GALVANIZATION with 96% ± 1% zinc content.

.3 Rust-Anode distributed by Galvatech 2000, with more than 90% zinc.

.3 The product « Galvicon » type is not accepted

2.5 ADDITIONAL FASTENERS

.1 Provide surplus, at the end of the work, of at least the equivalent of all the nuts and bolts and winter protection plates required for all parts and removable works as additional fasteners.

.2 All additional fasteners must be identified to correspond to the structures concerned.

PART 3 EXECUTION

3.1 METAL WORKS GENERAL

.1 Work shall be straight, square, properly aligned and in accordance with prescribed dimensions; The joints must be tightened and secured properly.

.2 Unless otherwise indicated, flat-headded, self-tapping screws shall be used for bolted joints.

.3 Where practicable, structures shall be adjusted and assembled in a workshop and delivered ready for installation.

.4 Exposed welds shall be continuous throughout the length of the joint; They must be filed or ground so as to have a smooth and unified surface.

3.2 EXAMINATION

.1 Verification of Conditions: verify conditions of surfaces/substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of the Departmental Representative.

.2 Inform the 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 the Departmental Representative.

3.3 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to the Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16 or as indicated.

.7 Deliver items over for casting into concrete and building into masonry together with setting templates.

.8 Give jigs and parts to be embedded in concrete or embedded in masonry to qualified trades.

.9 When finished, retouch with rivet paint, spot welds, bolts, burnt or scraped surfaces with a print coat paint.

.10 Using zinc-rich paint, retouch galvanized surfaces to burned areas during on-site welding.

.11 Remove dirt and unwanted deposits from steel surfaces to the satisfaction of the Departmental Representative.

.12 Verify position of infrastructure components, location of anchor bolts prior to assembly of structural steel; If applicable, report any discrepancies to the Departmental Representative.

.13 During assembly, minimize the effort required to bring the parts into position without expanding or deforming the holes and without causing twisting, deformation or pronounced flexing of the metal elements.

.14 Ream the holes if necessary to enlarge, only if pre-authorized by the Departmental Representative.

.15 The diameter of the reamed holes shall not exceed 2 mm greater than the bolts used.

.16 During the erection, the frame must be firmly assembled in order to withstand dead loads, construction loads, wind loads or other natural conditions and erection constraints.

.17 Modification or cutting of items on the site must be approved in advance by the Departmental Representative.

.18 Locate the appropriate anchor bolts at the level and indicated locations.

.19 Prevent water and foreign matter from entering holes.

.20 Provide heating and protection as directed by Departmental Representative and completely fill with grout free space around anchor bolts.

.21 At the end of assembly, clean with a mechanical brush and touch up bolts, rivets, welds, and surfaces with burnt or scraped paint or galvanizing.

3.4 TOLERANCES

.1 Permissible tolerances for bolt or rivet holes:

.1 Unless otherwise indicated by the Departmental Representative, the diameter of the finished holes shall not exceed 2 mm greater than the diameter of the bolts or rivets to be received.

.2 The center distance between two holes of the same group shall not vary by more than 1 mm from the specified center distance for these two holes.

.3 The spacing between the two groups of holes shall conform to the following requirements:

.1	Spacing (in metres)	Variation in plus or minus (mm)
.2	Less than 10	1
.3	From 10 to 20	2
.4	From 20 to 30	3

.4 Correct badly punched or poorly drilled parts on request and as directed by Departmental Representative only.

3.5 WELDING CONTROL AND INSPECTION

.1 Provide written description of welding procedures for approval to the Departmental Representative at least four (4) weeks prior to commencement of work.

.2 For underwater welds, welds shall be qualified by the Departmental Representative.

.3 Coupons and test fees shall be borne by the Contractor. Welders who do not meet the requirements will not be allowed to do the work.

.4 The Departmental Representative reserves the right to inspect welds made at the site. Examination costs will be at the expense of the Departmental Representative.

.5 The Contractor shall provide the Departmental Representative with all facilities and assistance necessary for the examination of welds, including an underwater video camera, at no cost to the Departmental Representative.

.6 If inspections reveal a defect to be repaired, the weld must be repaired and inspected again. The Contractor shall modify his method of welding so as to eliminate any defects found. Repairs and second inspection shall be at the expense of the Contractor.

.7 Permit the Departmental Representative to conduct inspections at the manufacturing, assembly and/or assembly plant.

.8 Report to the Departmental Representative any gaps in equipment or any assembly difficulties at the site. Corrections, if any, shall be made to the satisfaction of the Departmental Representative.

.9 For underwater welds, welds shall be qualified by the Departmental Representative. The coupons and the expenses of the tests shall be borne by the Contractor. Welders who do not meet the requirements will not be allowed to do the work.

3.6 GALVANIZING AND PAINTING

.1 General

.1 Implementation

.1 When the work is performed on site, the contractor shall provide the Departmental Representative a plan outlining the steps provided. The performance of metal surface protection work on a portion of the structure must not alter in any way the quality of that already carried out or in the process of being done on another part.

.2 The contractor must submit to the Departmental Representative a provisional work plan outlining the details of the design and construction of containment and the residue collection device from the surface preparation, paint services.

.3 The study of this plan by the Departmental Representative deals only with the verification of the charges loaded on the gangway structure by the confinement and not on the design of scaffolding and platforms which constitute the exterior.

.4 After the construction of the confinement and after inspection by an engineer member of the Ordre des ingénieurs du Québec, the contractor must submit to the Departmental Representative a written notice signed by the engineer indicating that the enclosure built complies with the submitted plan. This notice must be provided as each time the enclosure is moved or altered. The notice shall also state the date and time of the inspection.

.5 Containment fences should be designed to support the weight of residue that can accumulate on the floor and not to cause stresses due to the wind that exceed the capacity of the structural system studied.

.6 Provisional work plan should mention the vertical and lateral loads to support and the location of the fasteners on the platform deck

.7 Containment zones

.1 The Contractor shall build the containment zone so as to confine the emission of dust inside the containment zone and allow recovery of all residues, such as abrasives, rust, old paint, zinc and fresh paint surplus, generated by the work surface preparation or painting.

.2 Where a total containment zone is stipulated in the plans and specifications, the contractor must install a negative pressure system with a dust collector in order to control dust and particles inside the enclosure. The negative pressure system must be operational for all the work of cleaning and surface preparation, including the final cleaning of the surfaces immediately prior to application of a protective coating.

.3 The containment zone should be watertight. The fabrics used for containing should be adequately strengthened to prevent their displacement or tearing when subjected to construction loads, wind forces or other environmental factors.

.4 Auxiliary lighting must be available and used as needed to improve visibility inside the containment zone. The minimum level of lighting should be 500 lux in areas where the work is performed.

.5 If the wind speed is too high to effectively confine the stripping residues inside the containment zone, the Contractor shall suspend stripping work.

.6 The Contractor must prevent leakage of dust and loss of residues from the floor or other containment components when they are moved or dismantled. The floor, walls and joints of the containment zone should be cleaned with a vacuum cleaner before moving or dismantling of the containment system.

.7 When abrasives are recycled, no leakage is allowed during installation, recycling, cleaning and dismantling work of the recycling system.

.8 Residues accumulating inside the containment zone must be recovered before proceeding or painting

.9 Management of Residues

.1 Consecutive residues in the work surface preparation or painting must be collected in sealed containers, stored temporarily on site, transported and disposed.

.2 The residues characterized as hazardous materials must be shipped by the contractor to a transfer, recycling, treatment or disposal station of hazardous materials authorized by the Ministry of Sustainable Development, Environment, Wildlife and Parks. Transportation must be done by a licensee on the transport of hazardous materials. Hazardous materials must be accompanied by a shipping document compliant with the Regulations on the transport of hazardous materials. A copy of this document completed and signed by the shipper, the carrier and the recipient must be given to the Departmental Representative to confirm the shipment of waste from the site and receipt to the authorized recipient.

.3 Residues characterized as solid waste must be shipped by the contractor in a disposal or storage of solid waste authorized by the Ministry of Sustainable Development, Environment, Wildlife and Parks. A copy of the weighing coupons must be given to the Departmental Representative to confirm the receipt of residues to the authorised area.

.2 Galvanisation

.1 Certificate of Conformity

.1 For each delivery of galvanized steel elements, the Contractor must provide the Departmental Representative a certificate of conformity with the following information:

.1 name of the galvanizing company;

.2 date and place of galvanizing;

.3 Coating thickness;

.4 Coating adhesion;

.5 Coating quality

.2 Receiving inspection

.1 When receiving control is performed by the Departmental Representative, he is to make the tests for thickness, adhesion and coating quality according to the requirements of ASTM

A123 / A123M "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."

.3 Surface Preparation

.1 Surfaces to be galvanized must be clean, free of paint, grease, rust, etc. Deposits and residues from welding, carbon deposits and paint deposits or thick rust must be removed by an appropriate method. The final stripping must be done by immersion in a caustic solution followed by a clear water rinse and immersion in a bath of sulfuric or diluted hydrochloric acid. After stripping, the parts must be immersed in an aqueous solution of zinc chloride and ammonium.

.4 Galvanizing process

.1 Galvanizing must be done according to ASTM A123 / A123M "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings is Iron and Steel Products."

.2 Steel surfaces of the bottom flange beams and bearings in contact with welds used to attach to the beams supporting devices must be ground after galvanizing

.3 Minimal galvanizing thickness is 100 microns except in the case of HSS steel tubes, where the minimum thickness is 75 microns.

.5 Protection of galvanized elements

.1 The contractor must protect galvanized parts against damage during handling and storage. .

.2 Member contacting with the lifting equipment, such as cables and chains, must be protected adequately.

.3 The storage of galvanized elements, with the exception of the reinforcements must be done so that air circulates between the parts, water does not accumulate and drains freely, and that there is no metal contact against galvanized metal parts. When installing galvanized elements of retainers, the Contractor has full responsibility to ensure that there is no white rust on these parts.

.6 Repair after galvanizing

.1 Damaged surfaces with a width less than 2.5 cm must be repaired by applying by brush two coats of zinc-rich coating with a minimum content of 87% metallic zinc in the dry film. Moreover, on the same workpiece, the total area to be repaired by zinc-rich coating should be less than 0.5% of the total surface thereof. Damaged surfaces must be cleaned beforehand according to the requirements of the standard SSPC-SP 11 "Power Tool Cleaning to Bare Metal." The minimum total thickness of the dry film coating should be 130 µm..

.2 Damaged surfaces with a width greater than 2.5 cm and the area of the damaged parts totaling more than 0.5% of the total surface of the part to be repaired or re-galvanised by metallization. In this, the damaged surfaces must be cleaned beforehand according to the requirements of SSPC-SP standard 5/NACE No. 1 "White Metal Blast Cleaning" or SSPC-SP standard 11 "Power Tool Cleaning to Bare Metal." The minimum thickness of the metallized coating should be 130 µm.

.3 Painting of Steel Surfaces

.1 Materials

.1 Paints and paint systems based on zinc and high performance of which must be consistent with the standards.

.2 Paint and organic paints and maintenance systems must be respectively consistent with standards.

.2 Quality Assurance

.1 Certificate of conformity

.1 For each delivery of paint, the contractor must provide the Departmental Representative a certificate of conformity containing the following information for each production:

- The paint manufacturers name;
- The paint name;
- The lot number of production.

.2 Production batch corresponds to a batch number. In terms of the zinc powder, a production lot corresponding to a manufacturer's code. The results of the following tests:

- Non-volatile content (% by weight) according to the requirements of ASTM D2369 "Standard Test Method for Volatile Content of Coatings";
- Pigment content (mass%) according to the requirements of ASTM D2371 StandardTest Method for Pigment Content of Solvent reducible Paints";
- Density (kg / l) according to the requirements of ASTM D1475 ASTM D1475 « Standard Test Method for Density of Liquid Coatings, Inks, and Related Products »;
- Consistency (Stormer) (KU) according to the requirements of ASTM D562 « Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer Type Viscometer ».

.3 The compliance test results are verified by reference to the values appearing on the homologation approval of lists of paint systems. A tolerance is associated with each value for accreditation.

.4 As additional verification of painting, the Contractor shall, at the request of the Departmental Representative, provide the infrared spectra of the components of the paint according to the requirements of ASTM D2621 "Standard Test Method for Infrared Identification of Vehicle Solids From Solvent reducible Paints ".

.2 Reception

.1 The Departmental Representative performs an acceptance test on paints; sample collection consists of:

- one-component paints and thinners, two (2) samples of 1 L each;
- For paints of 2 constituents, two (2) samples of of 1 L each non-mixed component and collected in the proportions recommended by the paint manufacturer;
- When the paint system consists of paints with a moisture cure polyurethane resin component, the paint manufacturer must provide the Departmental Representative for each batch of samples two (2)1 L of each painting and diluent in the original unopened containers previously

.2 The samples are placed in 1 L, sealed, high-density polyethylene or metal containers with enamel interior.

.3 Implementation

.1 Preparation of steel surfaces

.1 Steel surfaces to be painted should be blasted by dry abrasive blasting without crystalline silica. According to the stipulations on the plans and specifications, the minimum degree of surface preparation must match one of the following types of care:

- SSPC-SP 10/NACE No. 2, described in the standard "Joint Surface Preparation Standard SSPC-SP 10/NACE No. 2 (Near-White Metal Blast Clearing) ";
- SSPC-SP6/NACE No. 3, described in the "Joint Surface Preparation Standard SSPC-SP6/NACE No. 3 (Commercial Blast Cleaning)" standard

.2 The degrees of rust on unpainted steel surfaces and degrees of preparation abrasive blasting of steel corresponding to these degrees of rust surfaces are illustrated by a series of photographs contained in the SSPC standard -Vis 1-02 "Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning". These photographs should be used as examples only, and only to supplement the written descriptions of the types of care, which are the only provisions to be observed.

.3 Inaccessible surfaces stripping by dry abrasive blasting must be stripped to obtain a minimum level of preparedness to meet the standard SSPC-SP 11 "Power Tool Cleaning to Bare Metal" if the type of care is stipulated in quotes SSPC-SP 10/NACE No. 2 or SSPC-SP standard 15 "Commercial Grade Power Tool Cleaning" if the type of care stipulated in the quote is SSPC-SP6/NACE No. 3. These degrees of preparation are shown through a series of photographs contained in SSPC-VIS Standard 3 "Visual Standard for Power and Hand Tool Cleaned Steel".

.4 Dust and other dirt on the surfaces to be covered as a result of stripping as well as the surfaces of floors, walls and joints of the painting containment zone should be removed using a compressed air jet or vacuum cleaner.

.2 Painting

.1 The contractor must submit to the Departmental Representative data sheets and MSDS of the paints and thinners he proposes to use

.2 The painting must be done according to the requirements of the technical data of the paint manufacturer. In the absence of indication in relation to a minimum surface profile of the steel to be respected, it must be between 38 microns is 75 microns.

.3 Application Deadline

.1 Any cleaned surface must be covered with a first coat of paint as soon as possible after the surface preparation and before the onset of surface rust, but not exceeding eight hours when a paint system zinc-based or high performance certified respectively according to standard is used, and 24 hours in the case of a system of certified organic or maintenance paints, respectively, according to standard

.2 The topcoat should be applied as specified by the manufacturer's product data, without exceeding a maximum period of 7 days following the application of the first coat of paint.

.4 Conditions of application

.1 The paint should be applied on a moisture-free, dust-free surface:

- The contractor must apply the paint when:
  - the air temperature and the surface to be coated is greater than 5 ° C;
  - The temperature of the surface to be coated is above the dew point plus 3;
  - The already applied paint layer is sufficiently hardened.

.2 When applying a paint hygroréactive (moisture-curing), the requirements for temperature and humidity must be those specified in the data sheets, and be confirmed by the manufacturer.

.3 When applying a zinc-based paint and inorganic binder, the percentage of relative humidity should be greater than 40%.

.5 Application

.1 Before applying each of the first two layers of the paint system, rivets, bolts and non-galvanized nuts, welds, joints of assembled parts and corners and sharp edges should be completely painted using a brush. The paints used for the brush painting must be the same as those used for the first two layers of the system. However, an organic zinc-based paint should be applied on the bolts if a zinc paint and inorganic binder is used as the first layer of the system.

.2 Each layer of paint should be applied uniformly with a spray gun. Where indicated in the data sheets, the paint must be continuously stirred during application. All streaks or other imperfections should be wiped away. All surfaces that cannot be adequately painted by spray gun must be brush painted.

.3 Contact surfaces of the parts to be bolted together must be painted with a primer only. The steel surfaces of the bottom flange beams contacting the welds used to attach devices to the support beams must not be painted.

.4 Where the main beams are shop painted, all surfaces of construction splice plates which will be exposed after assembly may only be coated with the primary coating (galvanizing or zinc-based paint of an approved system) in the fabrication shop.

.5 When horizontal and cross bracing diaphragms and curved bridges must be shop painted, all exposed surfaces of the assembly in contact and in the vicinity of the components of the assembled bolts (bolt, nut and washer) should only be coated with the primary coating (galvanizing or zinc-based paint of an approved system) at the factory.

.6 After assembly is completed and just before on-site painting, all surfaces covered in factory with a primary protection, and exposed surfaces of bolts, nuts and washers must be degreased and cleaned in order to have a clean surface, free of any contaminants, and according to paint manufacturer's recommendations, if necessary. When these surfaces are galvanized, preparation by abrasive blast in accordance with SSPC-SP standard 7/NACE No. 4 is required to obtain a minimum roughness. An abrasive low to medium hardness is required to avoid excessive damage to the zinc coating.

.7 The painting of all surfaces covered the factory with a primary protection, and exposed surfaces of bolts, nuts and washers must be completed on site in accordance with the requirements specified for the system to protect adjacent surfaces. The paint system and the color of the topcoat must be identical to those used in the factory.

.8 Surfaces of the metal parts in contact with the concrete must be painted over a 25 mm width around the entire perimeter.

.9 Dry film thickness of each layer of paint must in all respects, conform to minimum thickness specified by the paint manufacturer in the approval process.

.6 Thickness Determination

.1 The contractor must measure the thickness of the paint wet film during application to ensure obtaining, as the work progresses, the dry film thickness specified after drying.

.2 The thickness of the wet film of the different layers of paint should be determined according to the requirements of ASTM D4414 "Standard Practice for Measurement of Wet Film Thicknesses by Notch Gages".

.3 The thickness of the wet film thickness corresponding to the specified dry film is determined using the following formula:

$$H = T\ x\ \left(\frac{100 + D}{B}\right)$$

- H = T x ((100 + D) / B) H: wet film thickness (in µm)
- thickness specified dry film (in µm)
- Percentage volume of diluent added, if necessary
- volume percentage of non-volatile material material
- The dry film thickness of the various layers of paint should be determined according to requirements of the standard SSPC-PA 2 "Measurement of Dry Coating Thickness with Magnetic Gages".

.7 Adhesion

.1 The film of the paint system must have a minimum adhesion of 3A according to the adhesion test "Test Method A - X Cut Tape Test" described in ASTM D3359 "Standard Test Method for Measuring Adhesion by Tape Test."

.8 Delivery and Handling

.1 The contractor must take precautions so that the coating does not suffer any breakage during shipping and handling.

.9 Retouching

.1 The contractor must take every precaution to minimize paint surfaces to retouch. .

.2 Painted surfaces that are altered during the execution of the work must be cleaned so as to remove any damaged paint and other contaminants. After cleaning, dust and other dirt which cover the surface to be retouched must be removed.

.3 Retouching must be done on each altered layer by applying paint under the original system, the thickness specified. However, the alterations to be performed on a zinc-based paint and inorganic binder must done by applying a zinc-based layer and organic binder 65 .µm thick.

.4 Existing painted surfaces altered during the execution of works of alteration or repair of a steel structure must be retouched using the following procedure:

- Surfaces must be prepared by spraying dry abrasive-free crystalline silica or mechanical cleaning to obtain the minimum type of care SSPC-SP6/NACE No. 3 "Commercial Blast Cleaning" or SSPC-SP 15 "Commercial Grade Power Tool Cleaning ";
- After the preparation, dust and other dirt should be removed;
- Retouching is done by applying a system of hygroréactives paints, polyurethane resins to a component, to meet the following requirements :
  - a coat with polyurethane resins and aluminum pigments primer;
  - a coat with polyurethane resins topcoat; the color should be similar to that of the existing paint
  - a minimum total dry film thickness of 150 microns.-

.5 Where indicated in the data sheets, retouches to be made on paint with polyurethane resins beyond a period of 72 hours after application as a top coat require a light sanding to areas adjacent to the surfaces to retouch.

.6 Each layer must be dry before applying a subsequent layer.

3.7 CLEANING

.1 Clean metal fabrications after installation to remove dust generated by construction work or the surrounding environment.

.2 When finished, evacuate surplus materials, garbage, tools and barriers used to protect equipment from site.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with the Departmental Representatives instructions.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 35 29.06 - Health and Safety

.3 Section 01 45 00 – Quality Control

.4 Section 01 74 21 – Construction/Demolition Waste Management and Disposal

.5 Section 01 78 00 – Closeout Submittals

.6 Section 26 05 53 – Electrical Systems Identification

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.10-10, Québec Construction Code, Chapter V – Electricity – Canadian Electrical Code, Part I (21st Edition) with Québec Amendments, safety standards for electrical installation.

.2 CAN/CSA-C22.3 No.1-01 (Updated March 2005), Overhead Systems.

.3 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications and on drawings are those defined by IEEE SP1122.

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Command/Control/Regulation and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standards.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in French.

1.5 DOCUMENTS/SAMPLES SUBMITTALS FOR APPROVAL/INFORMATION

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Quality: provide original Shop Drawings by email in PDF format. Shop Drawings will not be accepted by fax for reasons of clarity.

.3 Submit WHMIS Material Safety Data Sheets.

.4 Shop Drawings

.1 Submit 1 reproducible original copy of Appendix B – Shop Drawings – Presentation Data completed and up to date for each Shop Drawing description provided in Appendix D – Record of Shop Drawings and summarizing following information:

.1 Project
.2 Owner (client)
.3 General Contractor (including email address)
.4 Subcontractor (including email address)
.5 Supplier/Distributor
.6 Specialty (discipline)
.7 Verification by the Departmental Representative (stamp)

.2 Submit one (1) reproducible original copy of each Shop Drawing listed in Appendix D – Record of Shop Drawings. Identification information found in plans and specifications must also be indicated on each Shop Drawing.

.5 Contractor will be responsible for reproducing Shop Drawing presentation data and Shop Drawings in sufficient quantities for all subcontractors and suppliers, and for providing an additional copy to the PWGSC and additional copies for operating and maintenance manuals.

.6 Shop Drawings will be reviewed only if submitted according to described procedure.

.7 The Departmental Representative will have 10 working days from date of receipt of documents at their office to verify Shop Drawings.

.8 List of Shop Drawings must include but is not limited to items described in Appendix D – Record of Shop Drawings that follows this section.

.9 Submit fabrication drawings stamped and signed by professional engieneer or licensed in province of Quebec, Canada.

.10 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork and other items that must be shown to ensure co-ordinated installation.

.11 Identify circuit terminals on wiring diagrams, and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.12 Indicate on drawings clearances for operation, maintenance and replacement of operating equipment devices.

.13 If changes are required, notify the Departmental Representative before making them.

.14 Before sending Shop Drawings to the Departmental Representative for verification, Contractor must:

.1 Number each page.

.2 Point out all equipment and/or accessories included in Shop Drawings.

.3 Verify that Shop Drawings are in accordance with plans and specifications with regard to quality, characteristics and physical size.

.15 Verification of Shop Drawings by the Departmenatal Representative is an intermediate quality control step and will not constitute a change order to Contract Documents.

.1 The Departmental Representative will verify drawings submitted by Contractor only with regard to overall layout of equipment. Contractor's or supplier's responsibility for accuracy of documents or their compliance with Contract Documents and Work site conditions is not relieved by the

Departmental Representative's review. Notes made by the Departmental Representative on drawings are not restrictive.

.16 Following 4 notes may be found on the Departmental Representative's verification stamp:

.1 NO CORRECTION NOTED means Contractor may proceed according to drawing.

.2 MAKE INDICATED CORRECTIONS means Contractor may proceed according to drawing, taking into consideration notes added by the Departmental Representative; copy of drawing becomes official copy, and Contractor is not required to resubmit drawing.

.3 RESUBMIT means information on drawing is incomplete or drawing is incomplete, illegible, etc., and information does not allow the Departmental Representative to determine compliance with plans and specifications; in such case, the Departmental Representative may indicate on drawing points that Contractor must specify or complete before resubmitting drawing.

.4 NOT ACCEPTED means drawing includes materials or structures that are not in compliance with plans and specifications; in such case, Contractor must provide the Departmental Representative with another drawing as per requirements of plans and specifications.

.17 Shop Drawings and product data must include:

.1 Mounting arrangements.

.2 Clearances required for equipment operation and maintenance as well as for moving access panels.

.3 Details of bases, supports and anchor bolts.

.4 Power data, where applicable.

.5 Certificates of compliance to applicable codes.

.18 Keep one (1) reviewed copy of Shop Drawings and Appendix B – Shop Drawings – Presentation Data, on site, and make available at all times for reference purposes.

1.6 REQUIRED CONTRACTOR DOCUMENTS

.1 List of documents required from Contractor over course of Work is found in Appendix A.

1.7 SUBSTANTIAL COMPLETION OF WORK

.1 Work is substantially complete when it is ready to be used for purpose intended, and the Departmental Representative will recognize Work is substantially complete when Contractor has proven for a period of 5 consecutive calendar days that condition of parts remains within performance criteria set out in specifications.

.2 To issue certificate of substantial completion (interim acceptance of Work), the Departmental Representative will require from Contractor all documents listed in Appendix A – Required Contractor Documents.

.3 Prior to issuing certificate of substantial completion, the Departmental Representative will require, among other things, that Contractor:

.1 Demonstrate to the Departmental Representative that all systems and networks function in accordance with performance criteria set out in specifications.

.2 Demonstrate to the Departmental Representative that all automatic control sequences set out in specifications are operational and can operate repeatedly.

1.8 FINAL ACCEPTANCES AND PAYMENTS

.1 To issue certificate of final acceptance, the Departmental Representative will require from Contractor all documents listed in Appendix A – Required Contractor Documents.

.2 Certificate of final acceptance will be issued to Contractor by the PWGSC once all Work has been completed in accordance with terms of Contract and to satisfaction of the PWGSC, meaning that all defects have been corrected and all acceptance certificates have been received from various authorities. Payments will be made in accordance with terms of Contract and after Contractor has satisfied requirements and paid all license and permit costs, etc.

.3 Installation is considered complete when everything is operational, controls function properly, equipment is identified, training has been completed and plans annotated by Contractor and instruction manuals have been submitted to the PWGSC.

1.9 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data as prescribed in section 01 78 00 – Closeout Submittals, for incorporation into operation and maintenance manual.

.2 Operation and maintenance data must be approved prior to final inspection by the Agency Representative, who will keep final copies.

.3 Operation and maintenance data to include:

.1 Control schematics for systems, including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads, together with reset schedules and seasonal variances.

.4 peration instructions for systems and components.

.1 Description of actions to be taken in event of equipment failure.

.2 Colour coding chart.

.4 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer’s performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance test results.

.3 Special performance data as specified.

.6 Approval

.1 Submit 2 copies of draft operation and maintenance manual for approval. Unless directed otherwise by the Departmental Representative , copies must be submitted together.

.2 Make required changes to operation and maintenance manual and resubmit as directed by the Departmental Representative .

.7 Additional data

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified training.

.2 For lamp posts and navigation lights, provide a maintenance manual with detailed installation, dismantling and storage procedures and the installation of the winter protection plate. This procedure should also include a list of tools and equipment required for handling to ensure the integrity of the components in the long term.

.8 Certificate of compliance

.1 Complete Certificate of Compliance in Appendix C and attach to each operation and maintenance manual.

1.10 FINAL DRAWINGS

.1 Site records:

.1 Provide 1 set of electrical drawings and mark changes as Work progresses. Follow same procedure for changes to systems and related wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show feeders and electrical systems as actually installed.

.3 Use different coloured ink for each service.

.4 Keep drawings on site and make available for reference purposes and inspection.

.2 As-built drawings:

.1 Before starting testing, adjusting and balancing of systems, finish as-built drawings.

.2 Identify each drawing in lower right-hand corner in letters at least 12 mm high as follows: AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED (Signature of Contractor) (Date).

.3 Submit drawings to the Departmental Representative for approval and make corrections as directed.

.4 Complete testing, adjusting and balancing of systems, equipment and networks as indicated in as-built drawings.

.5 Submit completed reproducible as-built drawings with operating and maintenance manual.

.6 Submit 1 copy of each as-built drawing and incorporate it into final report on testing, adjusting and balancing of systems and installations.

1.11 WARRANTY

.1 All new devices, accessories and equipment provided and installed under this project will have a parts and labour warranty of minimum one (1) year following final acceptance, unless otherwise indicated in another section of this specification.

1.12 QUALITY CONTROL

.1 Submit test results of installed electrical systems and instrumentation.

.2 Upon completion of Work, submit certificate of acceptance from authority having jurisdiction.

.3 Manufacturer's Field Reports: submit to the Departmental Representative manufacturer's written report, within 3 days of review verifying compliance of Work and electrical system and instrumentation testing, as described in each section.

1.13 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.

.2 Qualification: electrical work must be performed by qualified licensed electricians.

.1 Tasks Permitted: based on degree of training and abilities demonstrated for execution of specific tasks.

1.14 HEALTH AND SAFETY

.1 Health and Safety Requirements: ensure construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

.2 Perform all work in accordance with applicable Quebec occupational health and safety statutes.

1.15 LOCKOUT

.1 For the lockout procedure, take the required measures as described in section 01 35 29.06 – Health and Safety, paragraph 1.22.

1.16 WORK OF ELECTRICAL NATURE

.1 For electrical works, take the required measures as described in section 01 35 29.06 – Health and Safety, paragraph 1.22

1.17 ELECTRICAL DRAWINGS AND SPECIFICATIONS

.1 General and specific specifications, schedules, workforce regulations, PWGSC documents and other submission materials form an integral part of, and govern the work of, this Section.

.2 Drawings indicate approximate location of appliances and ducts; Their exact location will be determined by the Contractor on site. In addition, the Contractor shall verify on site the space available before installing the appliances and ducts and coordinating the works and spaces available with the other divisions.

.3 No architectural or structural data will be taken from electrical plans.

.4 No additional remuneration shall be granted for the movement of conduits and apparatus which may be deemed necessary because of structure, architecture or other normal considerations

.5 Prior to submitting the bid, the Contractor shall notify the Departmental Representative of any errors or omissions that may be found in the plans and specifications and any inconsistencies with those of architecture and structure. No supplement will be granted as a result.

.6 The detailed drawings that may be provided to the Contractor during the work will also form part of the electrical plans and specifications. If the Contractor requires detailed plans, the Contractor must request it in writing from the Departmental Representative at least fifteen (15) working days in advance.

.7 The Departmental Representative reserves the right to interpret electrical drawings and specifications. If there is a disagreement between the plans and the electrical specifications with respect to the quantity, quality, nature or price of certain works or materials, the Contractor shall use to prepare its bid The most

expensive solution and must submit its bid accordingly. A credit will be granted to PWGSC if another solution is adopted during construction.

1.18 RESPONSIBILITY FOR WORKS

.1 Any change made to plans and specifications, without the written permission of the Departmental Representative, shall render the Contractor concerned solely responsible for the malfunction of the systems. He shall be liable for any defects that may occur within one year of the date of the substantial completion of the work.

1.19 MATERIALS AND EQUIPMENT

.1 Unless otherwise indicated, use new materials and equipment.

.2 Unless otherwise specified, use the products of a single manufacturer for materials and equipment of the same type or class. The equipment supplied will be of the same manufacturer for maximum interchangeability between the elements, among others, for distribution panels, disconnectors, starters, lighting fixtures of the same type.

.3 In special areas, use appropriate products; Thus, in damp, dusty places, etc., the equipment must be watertight, dustproof, etc. Also, the ends of the conduits entering the boxes, boards and similar equipment must be sealed with a special compound for this purpose.

.4 Installation and Finishing

.1 The entire installation shall be carried out in such a manner as to facilitate inspections, repairs and maintenance.

.2 Unless otherwise indicated, the reference to a device always includes its supply with its accessories, and labor for installation, connection and commissioning.

.3 Carry out all the specified or non-specified works, plans and specifications, which are customary and necessary for the completion of the contract.

.4 Apply at least one coat of corrosion-resistant primer to ferrous metal fasteners, brackets, suspensions and on-site materials (CGSB-IGP-140).

.5 Prepare and retouch surfaces with damaged finish, to the satisfaction of the owner.

1.20 EXISTING SERVICES

.1 The location of certain existing services is for illustrative purposes only. Prior to commencement of work, the Contractor shall verify and locate all existing services that are apparent and/or hidden from the owner.

.2 Prior to commencing work, the Contractor shall verify with the owner the existing plans as well as the civil, structural, mechanical and electrical plans.

.3 Before undertaking excavation, demolition, capping and opening work, the Contractor shall perform all necessary verifications in order not to deteriorate existing hidden services.

1.21 SYSTEM START-UP

.1 Proceed with start-up of all systems. Ensure systems function properly and demonstrate that they perform in accordance with requirements in plans and specifications.

.2 Instruct operating personnel in operation, care and maintenance of systems and system equipment and components.

.3 If required, arrange and pay for services of manufacturer's factory service Departmental Representative to supervise start-up of installation; check, adjust, balance and calibrate components; and instruct operating personnel.

.4 Provide these services for such period and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with aspects of its care and operation.

1.22 OPERATING INSTRUCTIONS

.1 Provide for each principal system and item of equipment as specified in technical sections for use by operation and maintenance personnel. Operating instructions to include following:

.1 Wiring diagrams, control diagrams and control sequence for each principal system and item of equipment.

.2 Start-up, proper adjustment, operating, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.2 Print or engrave operating instructions and place in frame under glass or in approved laminated plastic.

.3 Post instructions where directed.

.4 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.5 Ensure operating instructions will not fade when exposed to sunlight.

1.23 TRANSPORTATION, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading

.1 Deliver, store and handle in accordance with manufacturer's written instructions. Deliver to site in original factory packaging.

.2 Storage and protection

.1 Protect from weather and construction traffic.

.2 Protect against damage.

.3 Store at temperatures and conditions required by manufacturer.

1.24 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in good condition, in intact, clearly identified containers from manufacturer, bearing brand, type and, where applicable, ULC or UL marks.

.2 Coordinate delivery based on scheduled installation date to minimize storage time at Work site.

.3 Protect from weather and construction traffic. Protect from weather and construction traffic, protect against damage and store at temperatures and conditions required by manufacturer.

.4 Comply with procedures, precautions and warnings set out in material safety data sheets.

.5 Do not use damaged or outdated materials.

1.25 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Handle and dispose of hazardous materials in accordance with regional and municipal regulations.

.4 Ensure emptied containers are sealed and stored safely, away from children, for disposal.

.5 Remove packaging materials from site and dispose of at appropriate recycling facilities.

PART 2 PRODUCTS

2.1 SUSTAINABLE DEVELOPMENT

.1 Materials, equipment and products must comply with sustainable requirements.

.2 Materials and items of equipment must be CSA certified unless indicated otherwise. In cases where CSA certified materials and items of equipment are not available, submit replacement materials and equipment to inspection authorities prior to delivering them to Work site.

.3 Factory-assemble control panels and component assemblies.

2.2 FINISHING

.1 Shop-finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two (2) coats of finish enamel.

.1 Paint outdoor electrical equipment in equipment green.

.2 Paint the lighting control panel enclosures in light gray to EEMAC 2Y-1.

.2 Clean and touch up surfaces of shop-finished equipment that were scratched or damaged during shipping and installation. Use colour of original paint.

.3 Clean and prime visible fasteners, frames and supports to prevent rust.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 and CSA 22.10-10 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

.2 Refer to Section 26 05 53 - Electrical Systems Identification for indications and ways of doing to comply with the identification of material and equipment.

3.3 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.4 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed and set to required values and settings.

3.5 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance, phase and neutral currents on panelboards, dry-core transformers and operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 Do all tests prescribed in each section.

.5 Submit a written test results to the the Departmental Representative .

3.6 TRAINING OF OPERATING AND MAINTENANCE PERSONNEL

.1 Supply tools, equipment and personnel to train operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing all systems and equipment during regular work hours, prior to acceptance.

.2 Submit training proposal complete with hour-by-hour schedule including brief overview of content of each segment to the Departmental Representative and the PWGSC 30 days prior to anticipated date of beginning of training.

.1 List name of trainer and type of visual and audio aids to be used.

.2 Show co-ordinated interface with other mechanical and electrical training programs.

.3 Submit reports at least one (1) week before anticipated start date of training program.

3.7 CLEANING

.1 Clean and touch up shop-coated surfaces that were scratched or damaged during delivery and installation. Use colour of original paint.

.2 Clean hooks, supports, fasteners and other visible ungalvanized fasteners, and apply primer to prevent rust.

.3 Right before final acceptance of facility, clean and restore all devices to new condition and leave in perfect working order.

END OF SECTION

PART 1 - Documents required at start of Work

*These requirements must be met prior to first application for payment.

		Submission Date
1.1	**Electricity**	
1.1.1	Licenses and qualifications	
1.1.2	List of subcontractors and their contact information	
1.1.3	List of suppliers with addresses and contact persons	
1.1.4	List of staff assigned to Project and their contact information (foreperson, appraiser, supervisor/project leader)	
1.1.5	Delivery deadlines for equipment to be supplied	
1.1.6	Proof of insurance	

PART 2 - Documents required while Work is in progress and until interim acceptance*

*These requirements must be met prior to application for interim acceptance (prerequisite for acceptance) for acceptance with reservations.

		Submission Date
2.1	**Electricity**	
2.1.1	Shop drawings (complete)	
2.1.2	Training programs as specified in Section 26 05 00	
2.1.3	Load balance reports as specified in Section 26 05 00	
2.1.4	Complete verification and start-up report for each piece of equipment	
2.1.5	WHMIS Material Safety Data Sheets as specified in Section 26 05 00	
2.1.6	Table summarizing tests to be performed as part of Project	
2.1.7	Tables of contents of operating and maintenance manuals	
2.1.8	Régie du bâtiment certificates	
2.1.9	Certificates signed by Contractor for all tests	
2.1.10	Megger cable insulation report as specified in Section 26 05 00	
2.1.11	Commissioning report for all electrical equipment	
2.1.12	Instrument calibration certificates	

PART 3 - Documents required for final acceptance of Work

*These requirements must be met prior to final acceptance of Work.

		Submission Dates
3.1	**General Contractor**	
	All lists of specialty contractor deficiencies completed and double-checked by Project foreperson. Important notes: Signature of project leader and foreperson will be required to certify that Work is completed. When General Contractor confirms that deficiencies have been fully remedied, Engineer will perform final inspection of Work with General Contractor and Owner. If other visits are required due to incomplete corrections, resulting costs will be borne by General Contractor.	
3.2	**Electricity**	
3.2.1	List of deficiencies 100% remedied and initialed by project leader	
3.2.2	Letter of guarantee	
3.2.3	Operating and maintenance manual completed and accepted by Engineer	
3.2.4	Duly signed certificate of compliance (Appendix C)	
3.2.5	As-built drawings	
3.2.6	List of replacement parts and proof of their delivery	
3.2.7	List of training sessions delivered, with date and signature of participants	
3.2.8	List of specialized tools	

END OF APPENDIX A

This document is meant to be completed electronically rather than by hand

GENERAL CONTRACTOR OR PROJECT MANAGER:	
Responsible person:	
Telephone: ( )	Email:

SPECIALTY CONTRACTOR: Address:	
Responsible person:	
Telephone: ( )	Email:

SPECIALTY (discipline):	
Shop drawing No.:	**No. of Pages:**
Deadline for delivery (after verification):	
DESCRIPTION OF SHOP DRAWING:	
Reference to the plan:	
Reference to the specifications: Section: Subsection: Page:	

DISTRIBUTOR: Address:	
Responsible person:	
Telephone: ( )	Fax: ( )

PRODUCT SUBMITTED:	**DRAWING ISSUED FOR:**
☐ As is ☐ Equivalent ☐ Substitution	☐ Verification ☐ Information ☐ Coordination ☐ Other:

REVISION	**DATE OF ISSUE**

NOTE:

VERIFICATION OF COMPLIANCE

Nature and scope of the verification

☐ Compliance with plans and specifications
☐ Other:

This verification does not constitute a complete and detailed verification of the design.

☐ No correction noted
☐ Make the indicated corrections
☐ Correct and resubmit
☐ Not accepted

Signature ☐ Engineer ☐ Other _____ Date _____

Name _____ OIQ member No. _____

The verification of this document is restricted to the indicated nature and scope. It does not release the person or business that prepared it from any obligations of any kind.

END OF APPENDIX B

PROJECT: _____

PROJECT ADDRESS: _____

DISCIPLINE: _____

SPECIFICATION SECTIONS: _____

We certify that any materials and equipment used, as well as any concealed or exposed work that we have performed or have had performed comply in all respects with the plans, specifications, addenda, changes and documents prepared by the engineers.

MADE AT _____ THIS _____ DAY OF _____ 20___.

COMPANY NAME: _____

ADDRESS: _____

_____

TELEPHONE NUMBER: _____

SIGNATURE: _____

TITLE OF THE SIGNATORY: _____

STAMP

END OF APPENDIX C

RECORD OF SHOP DRAWINGS

Section	Description
26 05 20	Connectors, double pole connector, junction box
26 05 21	RW90 and RWU90 conductors
26 05 34	Conduits, Conduit Fastenings, and Conduit Fittings
26 28 16.02	Circuit breakers
26 55 36	Obstruction lights type L1
26 56 19	Light fixture type L2
26 56 19	Device time Controller type L2
Plan E01/E02	Polymer concrete pull boxes

END OF APPENDIX D

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Proceedures

.2 Section 26 05 00 – Electrical – Common Work Results for Electrical

1.2 REFERENCES

.1 CSA International

.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper, copper alloy sized to fit copper conductors as required.

.2 Heat shrink sheaths for compression joints. The duct must be waterproof and designed for prolonged immersion.

.3 Double pole connector fuse holder for lighting fixture, 600V isulation, 30A maximum, waterproof. For 14awg to 6awg conductor.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and cables and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.2 Install insulation and sealing sheaths to ensure perfect sealing for prolonged submersion.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTION

.1 Section 26 05 00 – Electrical – Common Work Results for Electrical

1.2 SUMMARY

.1 This section deals with copper conductors, rated 0–1000 V, as well as isolation jackets, mineral jackets and most current electrical insulation. This section does not deal with submarine cables or cables used in hazardous locations, in mining, in instrumentation or in communications.

1.3 REFERENCES

.1 C22.10-10 Canadian Electrical Code, first part.

1.4 DOCUMENTS TO SUBMIT

.1 Product Datasheets

.1 Submit manufacturer's printed product literature, specifications and datasheets for each cable, and include product characteristics, performance criteria and physical size.

PART 2 PRODUCTS

2.1 BUILDING WIRES

.1 Conductors: stranded Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, RWU90 XLPE.

2.2 CONDUCTOR COLORS

.1 In system branch circuit, the phases colors will be black, red, blue, etc., and neutral be white.

.2 Neutral conductors of gauge No. 4/0 and smaller shall be insulated with white color and those of gauge No. 250 MCM and larger shall be painted white.

.3 Conductors used to ground equipments with specials outlet, specials outlet or isolated outlet will be green,and will be of required capacity according to the Electricity Code

2.3 CONDUCTOR SIZE

.1 The minimum size for copper conductors will be No. 12 AWG, unless otherwise stated.

.2 The size of conductors, whose dimensions are indicated on the plans, are minimal. When conductors size are not indicated on the plans, supply and install the type and size conductors that meet the requirements of the Canadian Electrical Code, latest edition.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Entrust the execution of tests by qualified personnel.

.1 Provide necessary tools and equipment.

.5 Verify phases sequence and individually identify the conductors of each phase of each feeding branch.

.6 Verify continuity of all power branchs; ensure that they are free of short circuits and ground faults.

.1 Verify that the resistance between earth and each circuit is not less than 50 megohms.

.7 Testing prior to receiving

.1 After laying the cables, but before splicing and connection, measure the insulation resistance of each phase conductor, using a Megger 1000 V.

.2 After the execution of each splice and/or wiring, check the insulation resistance to ensure that the cable network is ready for acceptance testing.

.8 Acceptance tests

.1 Ensure all terminations and all ancillary equipments are disconnected.

.2 Connect to the ground, shields, ground wires, metal armor and conductors not subject to testing.

.3 Dielectric strength tests

.1 Do dielectric strength testing, in accordance with the manufacturer's recommendations.

.4 Leakage current test

.1 Increase voltage levels from 0 to the maximum value prescribed by the manufacturer for the type of cable being tested.

.2 Maintain the maximum voltage for the time specified by the manufacturer.

.3 Note the value of the leakage current at each level.

.9 Provide a list of test results showing the location of each test point, the circuit tested and the result of each test.

.10 Remove and replace any full length of cable that does not meet the criteria of the tests.

3.2 GENERAL CABLE INSTALLATION

.1 Condutuctors installed in underground conduits to be type RWU90. Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.2 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Elsewhere in mechanical and electricity room and unless otherwise stated in plans, provide additional green insulated conductor of appropriate size to ensure continuity in each of the ground leads of thin wall conduit (LMA type).

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 26 05 00 – Common Work Results for Electrical

.3 Section 26 05 21 – Wires and Cables (0-1 000 V)

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.

.3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.

.6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 DOCUMENTS TO SUBMIT FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product data:

.1 Submit manufacturer's printed product literature, specifications and datasheets. Submit cable manufacturing data.

PART 2 PRODUCTS

2.1 CONDUITS

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.2 Rigid pvc conduit: to CSA C22.2 No. 211.2 most recent revision, for above-ground installations.

.3 The underground ducts for cables for power supply equipment to the dock will be PVC-type DB2/ES2 commonly called "type II" in accordance with standard C22.2 No. 211.1 latest revision ".

.4 Provide expansion joints as indicated in drawings or as recommended by manufacturer

.5 Use only conduits of 21 mm diameter or more. Conduits of 16 mm will not be accepted.

2.2 CONDUIT FASTENINGS

.1 Clamps 1-hole, steel, to secure the visible pipes with nominal diameter equal to or less than 53 mm.

.1 Clamps 2-hole, steel, to fix the pipes with nominal diameter greater than 53 mm.

.2 U-brackets to support several ducts.

.3 Threaded rods 6 mm in diameter to retain the hangers.

.4 Maximum spacing of duct fixings:

.1 Firmly attach all rigid metal conduits of the same size to supports or to a solid surface and the maximum spacing between the attachment points must be:

.1 1.5 m nominal size of ducts 21 (3/4 “).

.2 2 m nominal size of the conduits 27 (1) and 35 (1 ¼ ”).

.3 3 m nominal size of ducts 41 (1 ½ “) or more.

.2 If we group rigid metal pipes of different sizes, the maximum spacing of fasteners should be conducted that indicated in paragraph 1 for the smallest pipe.

.5 For underground installations embedded in concrete, use spacers to support the ducts. Attach the ducts to spacers with non-metallic fasteners

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 27 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

2.4 FISH CORD

.1 Polypropylene, 6 mm diameter.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 When the ducts are indicated on the plans, they are represented in schematic form only. Pose evident ducts so as not to decrease the clearance of the room. Before starting work, check the location of all ducts with the Departmental Representative.

.2 Arrange for cutting openings, piercing holes and other structural works required for the installation of electrical conduits, cables, pulling son, pull boxes and outlet boxes

.3 Openings in walls and floors must be approved by the Departmental Representative.

3.3 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in unfinished areas.

.3 Use electrical metallic tubing (EMT)

- .1 For interior installations, open to view.
- .2 In ceiling spaces and within drywalled walles.
- .3 In block walls and other similar walls.
- .4 For electricity distribution.
- .5 For fire alarm systems, red colored.
- .6 For telecommunication systems (telephone and computer)
- .7 For grounding systems.

.4 Use rigid pvc conduit underground.

.5 Use conduits of at least 21 mm for all connections

.6 Bend conduit cold:

- .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 19 mm diameter.

.8 Install 6 mm polypropylene fish cord in empty conduits for future needs in order to facilitate pulling wires and/or cables.

.9 Remove and replace blocked conduit sections.

- .1 Do not use liquids to clean out conduits.

.10 Dry out conduits before installing wire.

.11 Under no circumstances can the conduits touch equipment of mechanical services (excluding connections).

3.4 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Group conduits wherever possible on suspendedchannels.

.3 Unless indicated otherwise, conduits must not pass through structural elements

3.5 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not sink conduits into terrazzo or concrete works or in concrete pads or slabs-on-grade.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE OR CAST IN PLACECE CONCRETE

.1 Run conduits 53 mm and larger below slab and encase in 75 mm concrete envelope or in a 150 mm sand envelope.

.1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

.3 For underground conduits, install a polyethylene bande with the inscription “DANGER, UNDERGROUND ELECTRICAL LINES”.

.4 Underground conduits must have 150 mm of class A sand cover and 150 mm of class A sand bed.

3.8 CONCRETE BASES, OPENINGS AND SLEEVES

.1 Take responsablity for the location, size and setting of all openings and concrete foundations for the execution of his work.

.2 Notify with ample advance notice the General Contractors or any other subcontractor concerned so that all openings, concrete bases encavements or necessary for the proper installation of the devices are made within the required time. At a failure or negligence to inform the interested parties on time, conduct or commission this work at his own expense including any repairs which may become necessary thereafter.

.3 Where boring a floor is performed after pouring the concrete, place in the hole the right sleeve with three (3) supporting studs which prevents it from sliding in the hole. Water seal the space between it and the concrete with a suitable and approved product.

.4 Wherever any conduit, etc. passes through a seperation, a wall or a partition where fire resistance is required, provide and implement an appropriate metal sleeve. The outer sealing sleeve to be performed by the electrical subcontractor.

.5 If there is negligence or inability to provide and install these sleeves, inserts, time frames or they are not located precisely, bear the cost of drilling and the repairs following

.6 Consult the Departmental Representative before piercing floors, walls and ceilings, beams or any other part of the structure and obtain permission

.7 Unless otherwise indicated on the plans, all openings and holes Ø 150 mm and less will be performed by the subcontractor of the specialty and coordinated with the Contractor and the Departmental Representative. The openings or openings larger size will be performed by the Contractor.

.8 Provide all openings for the passage of conduits or troughs, so as to allow for expansion, contraction or insulation, as appropriate. In the case of an opening on the roof, take all necessary precautions to ensure tightness. Supply and install all the steel supports needed to install the equipment, pipes, etc.

.9 All executed openings that will not serve and unneeded openings must be filled by the contractor responsible to cast with concrete and/or materials having the same characteristics as the floors and/or walls they cross.

.10 The Contractor is responsible for damage to existing hidden services (pipes / telecommunications and electrical wiring, piping, structure or other) when required openings are being done . Make all checks required to prevent the deterioration of existing services. To this end:

.1 Consult the existing drawings (if available).

.2 Consult the Departmental Reprsentative and technical personnel with knowledge of the premises.

.3 Make some small openings to ensure that the major openings are located between the rebars and that they are not cut. Space the holes approximately 150 mm

.11 The contractor of each section will be responsible for locating and providing all the sleeves required for the implementation of this work, according to the preceding paragraph

.12 Locate, supply and install the crossing sleeves for the conduits at the following locations:

.1 Foundation wall and slab on grade: a steel sleeve with sealing collar welded o the sleeve, and compressible rubber rings. Dimensions of the sleeves according to the diameter of the conduits

.2 Floors (other than the ground slab): galvanized steel sleeves. Leave an annular free space of 6 mm between the sleeve and the pipe or between the sleeve and the insulation. Install the sleeves so that they are flush with the concrete and masonry surfaces as well as concrete floors cast directly on the ground and they exceed 25 mm all the other types of floors.

.3 Obstruct the annular space between the pipe and the sleeve (or between the insulation and the sleeve) with a firewall sealing product. In mechanical and electrical rooms the General Contractors must pour a concrete base with a thickness of 150 mm , exceeding the sleeve by 50 mm

.4 Roof: galvanized steel sleeves to be attached to the roof deck. The Contractor shall provide and install a curb and/or an appropriate installation at each exit to the roof. The Contractor shall provide and install all required sealing materiel as specified above.

.5 Masonry or gypsum walls: galvanized steel sleeves. Leave an annular free space of 6 mm between the sleeve and the pipe or between the sleeve and the insulation. Install the sleeves so that they are flush with the wall surfaces. Obstruct the space around the conduit and the sleeve (or between the insulation and the sleeve) with a firewall sealant. The General Contractor shall provide and install lintels and/or opening reinforcement (if their size requires) and block the space between the sleeve and the opening with a material compatible with that of crossed wall.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 61 00 – Common Product Requirements

.3 Section 01 74 11 – Cleaning

.4 Section 26 05 00 – Common Work Results for Electrical

.5 Section 26 05 21 – Wires and Cables (0-1000 V)

.6 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings

1.2 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 cables and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 PRODUCTS

2.1 EXAMINATION

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

.1 Visually inspect substrate

.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.

2.2 CABLE INSTALLATION IN DUCTS

.1 Before laying wiring in conduits and empty conduits, do the duct cleaning and rodding so that they are clear of any debris.

.2 Install cables as indicated in ducts.

.3 Do not pull spliced cables inside ducts.

.4 Install multiple cables in duct simultaneously.

.5 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.6 To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.

.7 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.8 After installation of cables, seal duct ends with duct sealing compound.

.9 For all empty ducts for future use, install a 6mm nylon pull cord.

2.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Perform tests using qualified personnel.

.1 Include necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds.

.1 Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Pre-acceptance tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Acceptance Tests:

.1 Ensure that terminations and accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

2.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

2.5 PROTECTION

.1 Repair damage to adjacent materials caused by cables installation.

PART 3 EXECUTION

3.1 Not Used

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTION

.1 Section 26 05 00 – Electrical-Common Work Results for Electrical

1.2 DOCUMENTS/SUBMITTALS

.1 Submit samples in accordance with Section 26 05 00 - Electrical - Common Work Results for Electrical.

.2 Submit samples and legend designations before engrave inscriptions.

2.1 IDENTIFICATION PLATES FOR ELECTRIC EQUIPMENTS

.1 Colors

.1 Normal network: white lettering on black background.

.2 Emergency network: white lettering on red background.

.2 Manufacturing

.1 General Characteristics: 3 mm thick plastic lamicoid or white anodized aluminum, matte finish, square corners, letters accurately aligned and etched to the machine into the core.

.2 Provide a maximum of 25 letters or digits per plate.

.3 Dimensions

.1 Comply with table below:

Size n°	Dimensions		Number of lines	Height of letters	
	(mm x mm)	(po x po)		(mm)	(po)
1	10 x 50	3/8 x 2	1	3	(1/8)
2	13 x 75	½ x 3	1	5	(3/16)
3	13 x 75	½ x 3	2	3	(1/8)
4	20 x 100	¾ x 4	1	8	(5/16)
5	20 x 200	¾ x 8	1	8	(5/16)
6	20 x 100	¾ x 4	2	5	(3/16)
7	25 x 125	1 x 5	1	12	(1/2)
8	25 x 125	1 x 5	2	8	(5/16)
9	35 x 200	1 3/8 x 8	1	20	(3/4)
10	40 x 125	1 ½ x 5	3	6	(1/4)
11	20 x 75	¾ x 3	1	6	(1/4)

2.2 IDENTIFICATION FOR ELECTRICAL OUTLETS AND SWITCHES

.1 Materials

.1 Normal network: ribbon type "P-Touch" transparent 9 mm wide with black lettering.

.2 Emergency Network: ribbon type "P-Touch" transparent 9 mm wide with red lettering.

2.3 IDENTIFICATION FOR ELECTRICAL EQUIPMENT

.1 Materials

.1 Normal network: ribbon type "P-Touch" transparent 12 mm wide with black lettering.

.2 Emergency Network: ribbon type "P-Touch" transparent 12 mm wide with red lettering.

2.4 INSCRIPTIONS UNILINGUAL/BILINGUAL

.1 Entries for identification systems and components must be written in French.

2.5 VERIFICATION AND IDENTIFICATION

.1 Identify all circuits in existing distribution panels that will be affected by the work.

.2 Provide detailed bill of materials for each existing distribution panel that will be affected by indicating for each circuit the circuit number, capacity and number of poles of the existing circuit breaker, loads connected in kilowatt and details of loads connected to circuit . The location of all loads connected to the existing distribution panel circuits shall appear on the final readout plans ("as built") with the corresponding circuit board number(s) of the existing distribution panels.

PART 3 EXECUTION

3.1 GENERAL

.1 Provide ULC registration plates and / or CSA required by each of the respective organizations.

.2 An identification procedure of the equipment will be provided by the owner. This procedure includes a logical set of identification that identifies the device type, location, etc. Identify the equipment under this procedure.

.3 The installation of circuit identification will be carried out from each device and / or outlet, and until the main power source.

.4 Before the identification of equipment and circuits, submit to the owner for approval legend designations.

.5 The circuit numbers must be indicated on all the lids of junction boxes with a black felt pen.

3.2 LOCATION IDENTIFICATION PLATES

.1 The plates must clearly identify the devices and must be put in places where they are conspicuous and easily legible from the work floor.

.2 Do not apply paint or heatproof on identification plates.

.3 Supply and install nameplates for substations with all circuit breakers, power centers with all circuit breakers, distribution centers with all the circuit breakers, power panels, distribution panels, transformers, gutters, distribution boxes, motor control centers with all starters, variable frequency drives, starters, contactors, boards, cabinets, boxes of main, main junction boxes.

3.3 ELECTRICAL EQUIPMENT

.1 Enter the source of electrical power and equipment at the following locations:

.1 Distribution panels: above breakers and behind the door, panel, pull box, junction box: the outer casing.

.2 Identify distribution boxes with identification marks.

3.4 EXISTING NETWORK

.1 Indicate circuit numbers on all junction boxes of existing circuits to retain or relocate with a black felt.

.2 When the wiring of a circuit is removed to a junction box, write on it the channel number with the inscription "RESERVÉ".

3.5 DESIGNATION OF WIRING

.1 The conductors will be identified by the color code ACNOR C22.10-2007.

.2 In all junction boxes, each conductor will be identified by number, and the circuit loop and using Electrovert identification of "Z" type suitable for the size of the wire used or stickers made from a printer designed for this purpose.

3.6 CONDUITS, BOXES AND CABLES DESIGNATION

.1 Assign a color code to the pipes and metal sheathed cables.

.2 Apply color pins (plastic tape or paint) on the cables or pipes every 15 m and at the points where they penetrate a wall, ceiling or floor.

.3 Permanently and indelible mark using a colored plastic tape drivers for each power circuit. The contractor shall identify phases according to the color codes indicated in the following table:

COLOR CODES OF WIRING OF THE BUILDING	
Phase A	Red
Phase B	Black
Phase C	Blue
Neutre	White
Ground	Green
Isolated ground	Green and yellow
Use the appropriate tape 3M brand at all points of the systems 600 V, 208/120 V and 240/120 V, normal and normal / emergency	

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 26 05 00 – Common Work Results for Electrical

1.2 REFERENCE STANDARDS

.1 CSA International

.1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

1.3 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 wiring devices and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

PART 2 PRODUCTS

2.1 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:

.1 Ivory urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and riveted grounding contacts.

.2 Standard waterproof, CSA L5-20R, 125 V, 20 A, 2-pole, 3-wire, CSA 22.2 compliant socket, number 42 and meeting NEMA WD-1, WD-6 and standards ANSI, IP67 having the following characteristics.

.1 Molded elastomeric thermoplastic casing.

.2 Nickel plated brass contacts.

.3 White nylon retainer.

.4 Waterproof lid.

.5 Black elastomer seal and seal.

.6 Screw on nickel-plated brass contacts.

.7 Manufacturers: HUBBELL, Leviton or Legrand, model 27W47 c / a model 26W47 plug.

.3 For the entire installation, use only outlets from one manufacturer.

2.2 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Stainless steel, vertically brushed, 1 mm thick cover plates for wiring devices mounted type FS or FD in flush-mounted outlet box.

2.3 SOURCE QUALITY CONTROL

.1 For the entire installation cover plates from one manufacturer throughout project.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate

.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.

3.2 INSTALLATION

.1 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height as indicated on drawings.

.3 Install locking sockets in boxes under type L1 and L2 luminaires.

.2 Cover plates:

.1 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTION

.1 Section 26 05 00 - Common Work Results for Electrical

1.2 REFERENCES

.1 CSA International

.1 CSA C22.2 No. 5-F02, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submit in accordance with Section 26 05 00 – Common Work Results for Electrical.

.2 Include time-current characteristic curves for breakers with ampacity of 60 A and over.

PART 2 PRODUCTS

2.1 AUTHENTICATION

.1 Before any installation of circuit breakers or in a new or existing installation, the electrical contractor must submit three (3) copies of a certificate of origin in French duly signed by the factory and local representative of manufacturer, certifying that all breakers are issued from the manufacturer, they are new ,and they meet standards and regulations. These certificates must be submitted to the Departmental Representative for approval.

.2 A delay in producing the certificate of authentication will not justify an extension of the contract or any additional compensation.

.3 All work of manufacturing, assembly or installation should begin only after the acceptance of the authentification certificate by the Departmental Representative. Failure to comply with this requirement, the Departmental Representative and/or PWGSC reserve the right to mandate the manufacturer listed on circuit breakers to authenticate all new circuit breakers under the contract, and at the expense of the electrical contractor.

.4 In general, the original authentication certificate must contain:

.1 The name and address of the manufacturer and the person responsible for authentication. The person in charge must date and sign the certificate.

.2 Name and contact information of the authorized distributor and the distributor’s person in charge of the contractor’s account.

.3 Name and address of the contractor and the person in charge of the project.

.4 Name and address of the building where the breakers will be installed.

.5 The project title (title on the quote or plans).

.6 Client reference number

2.2 BREAKERS - GENERAL

.1 Moulded-case circuit breakers, circuit breakers and ground-fault circuit-interrupters: to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 ^{o}C ambient.

.3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 ^{o}C ambient.

.4 Common-trip breakers: with single handle for multi-pole applications.

.5 Circuit breakers to have interrupting capacity rating as indicated.

2.3 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

.2 During the work, the contractor shall provide multipole breakers wherever replace the wiring of stranded wire cabling and even if the plans show a two-wire power supply with single-pole circuit breaker.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 45 00 – Quality Control

.2 Section 26 05 00 – Common Work Results for Electricity

.3 Section 26 56 19 – Roadway Lighting

1.2 REFERENCES

.1 Canadian Standards Association (CSA) International

.2 Underwriters Laboratories of Canada (ULC)

1.3 DOCUMENTS TO SUBMIT FOR APPROVAL/INFORMATION

.1 Provide submittals in accordance with Section 26 05 00 – Common Work Results for Electricity.

.2 Product Data :

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires

.3 Photometric data to include: VCP Table where applicable, spacing criterion.

.4 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, and cleaning procedures .

.3 Quality assurance submittals: provide following in accordance with Section 01 45 00 - Quality Control.

.4 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling and operating criteria.

.5 From the .dwg file provided by the Department, the lamp manufacturer shall provide a point-by-point computer calculation demonstrating the initial illuminance levels in LUX, all in a recognized and approved method.

1.4 CLOSEOUT DOCUMENTS

.1 Submit to Deparatmental Representative all the documentation related to the installation, maintenance (list of replacement parts and bulbs if required), and include in manual mentioned in section 26 05 00-Common Work Results for Electricity.

1.5 QUALITY ASSURANCE

.1 Provide mock-ups in accordance with Section 01 45 00 - Quality Control.

1.6 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Divert unused metal materials from landfill to metal recycling facility.

PARTIE 2 PRODUCTS

2.1 LAMPS

.1 LED lamps: color as shown, L70 lifetime, 100,000 hours

2.2 FINISHES

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

2.3 BALLASTS

.1 Ballasts for LED, unless otherwise indicated must be CSA approved with the following characteristics:

- .1 Rated voltage 40V according to drawings, 60 Hz
- .2 Class 1 UL ballasts must meet the UL1012 standard
- .3 Harmonic distortion shall not exceed 20%.
- .4 Service life higher or equal to the lifetime of the LED lighting modules, 100 000 hours
- .5 Short circuit protected
- .6 Open circuits or partial loads protected
- .7 Power surge protected
- .8 Noise emission inaudible to the human ear
- .9 Adequetly powered with the connected load
- .10 Power Factor greater than 0.9

2.4 OPTICAL CONTROL DEVICES

.1 As indicated in the section 26 56 19 - Roadway Lighting.

2.5 LUMINAIRES

.1 As per the list of lighting fixtures on the plan.

2.6 WARRANTY

.1 Provide written warranty of five (5) years from the time of installation against any manufacturers defect.

PARTIE 3 EXECUTION

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 The exact location of the light fixtures must be coordinated with the drawings. In the case of ambiguity, verify with the Departmental Representative.

3.2 WIRING

.1 Connect luminaires to lighting circuits:

.1 Install rigid conduit for luminaires as indicated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical

1.2 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Quebec.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures

1.3 CLOSEOUT SUBMITTALS

.1 Submit documents and samples according to section 26 05 00 – Common Work Results for Electrical.

.2 Provide operation and maintenance data sheets required to include in the manual mentioned section 01 78 00 – Closeout Submittals.

PART 2 PRODUCTS

2.1 BLUE OBSTUCTION LIGHTS

.1 Twin light units, complete with: two aviation blue globes

.2 LED 16W, continuous operation, uv stabilized abrasion resistant polycarbonate lens.

.3 Minimal visibility of 2 nautical miles

.4 Moulded aluminum support bracket, powder coated.

.5 Resistant to weather, corrosion, impact and vibration, NEMA-4X, IP66.

.6 Product as indicated on drawings.

2.2 POLES

.1 Aluminum post conforming to CSA Standard C22.2 No. 206 for underground power supply with the following characteristics:

.1 Mounting on concrete base without transformer base.

.2 Drum: 5 in tube. (127mm) round extruded aluminum 6061-T6, welded to the upper and lower part of the anchor plate.

.3 Wire: 12 AWG TEW / AWM 1015 or 1230 Gauge, exceeding 12 in (305 mm) at the base of the drum.

.4 Access Door: 2 in x 4 in 1/2 in (51 mm x 114 mm) opening with center 20 in (508 mm) from the top of the anchor plate, complete with a watertight door in aluminum and a copper grounding.

.5 Aluminum anchor base 25.4 mm, welded to base with ground.

.6 Aluminum base plate folded square in two sections of dimensions shown on the drawing, mechanically assembled using stainless steel screws.

.7 Tenon at end of drum for insertion of luminaire.

.8 Steel anchor bolts - galvanized with washers, shims, nuts. Include 2 nuts and 2 spare washers for each lamp post.

.9 Hardware: All externally accessible fasteners will be coated with ceramic sealant to reduce pick-up of parts with high corrosion resistance. All seals and gaskets shall be made of ethylene propylene EPDM and/or silicone and/or rubber.

.10 Finish: Textured black color RAL9005TX compliant with AAMA 2603. Application of minimum thermosetting polyester paint (4 mils/100 microns) with a tolerance of +/- 1 mil/24 microns. Thermosetting resins offer discoloration resistance in accordance with ASTM D2244, gloss retention according to ASTM D523 and are moisture impervious to ASTM D2247. Resistance to mists of 2000 hours minimum, tests carried out according to ASTM-B117.

.11 Winter base: Welded galvanized steel base, compatible with 1 in anchors on 17.7 in bolt circle. designed to receive a special cover to cover the concrete base. This cover is made of stainless steel, 1/2 in (12.7 mm) thick, mechanically attached to the base with 5/8 in stainless steel bolts of the antivandal type.

.12 3.05 meter (10 feet) post for type L1 fixture as shown on plan.

.13 The drum manufacturer shall be responsible for the complete design, anchorage base, access door, required reinforcements, luminaire supports and wall thickness to withstand environmental conditions at the location where the drum will be installed. The specification of this specification represents the finished product that the owner expects and does not relieve the manufacturer of any responsibility to provide a drum that meets the application described in the plans and specifications. The manufacturer must provide a signed and sealed shop drawing by an engineer who is a member of the Ordre des ingénieurs du Québec.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for obstruction lighting installation in accordance with manufacturer's written instructions.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

3.2 INSTALLATION

.1 Install the primary feeder cable in accordance with the drawings, following the route indicated.

.2 Install the poles

.3 Installer the obstacle lights in the area indicated.

.1 Mount the lights at the height specified.

.2 Make connections to lamp sockets and connect to secondary feeder.

.3 Adjust bulb height by setting receptacle support spacer as shown.

.4 Place (blue) globes on fixture collars and fasten securely

.5 Align units.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services

.1 Obtain written report from manufacturer verifying compliance of work, in handling, installing, applying, protecting and cleaning of product and submit.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 61 00 – Common Product Requirements

.3 Section 01 74 11 – Cleaning

.4 Section 01 74 21 – Construction/Demolition Waste Management and Disposal

.5 Section 26 05 00 – Common Work Results for Electrical

1.2 REFERENCES

.1 Canada Green Building Council (CaGBC)

.2 CSA Group

.1 CSA C22.2 No.206-13, Lighting Poles.

1.3 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 roadway lighting and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Quantity of recycled material (recycled content)

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect roadway lighting material from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse of pallets, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 ALUMINUM POLES

.1 Aluminum poles: to CSA C22.2 No.206 designed for underground wiring and:

.1 Mounting on concrete anchor base without transformer base.

.2 Drum: 5 "tube. (127mm) of extruded aluminum 6061-T6, with a wall thickness of 0.219 ". (5.6mm) thick, welded to the top and bottom of the anchor plate

.3 Wiring: 12 AWG TEW / AWM 1015 or 1230 Gauge, Exceeding 12 ". (305mm) at the bottom of the barrel

.4 Aluminium access door:. Opening of 2 " X 4 ½". (51mm x 114mm) with the center at 20 ". (508mm) from the top of the anchor plate, complete with an aluminum watertight door and a copper ground

.5 Aluminum sole anchor, 25.4mm, welded to the base with ground.

.6 Aluminum foldable base cover in two sections of dimensions shown on the drawing, mechanically assembled using stainless steel screws.

.7 Tenon at end of drum for insertion of luminaire.

.8 Steel anchor bolts - galvanized with washers, shims, nuts. Include 2 nuts and 2 spare washers for each light standard.

.9 Hardware: All externally accessible fasteners will be coated with ceramic sealant to reduce friction of parts with high corrosion resistance. All gaskets and seals shall be made of ethylene propylene EPDM and/or silicone and/or rubber.

.10 Finish: Textured black color RAL9005TX in accordance with AAMA 2603. Application of minimum thermosetting polyester paint (4 mils / 100 microns) with a tolerance of +/- 1 mil / 24 microns. Thermosetting resins offer discoloration resistance according to ASTM D2244, gloss retention according to ASTM D523 and are moisture proof according to ASTM D2247. Resistance to mists of 2000 hours minimum, tests carried out according to ASTM-B117

.11 Winter base: Welded galvanized steel base, compatible with 3/4 "anchors on 12 ½ "bolting circle. Designed to receive a special cover to cover the concrete base. This lid is made of 1/2 "stainless steel (12.7mm) thick, mechanically attached to the base with 5/8 "stainless steel bolts.

.12 4.57 meter (15 feet) poles for Type L2 appliances as shown on the plan.

.13 The drum manufacturer shall be responsible for the complete design, anchorage base, access door, required reinforcements, luminaire supports and wall thickness to withstand environmental conditions at the location where the drum will be installed. The requirements of this specification represents the finished product that the owner expects and does not in any way relieve the manufacturer of any responsibility to provide a drum that meets the application described in the plans and specifications. The manufacturer must provide a signed and sealed shop drawing by an engineer who is a member of the Ordre des ingénieurs du Québec

2.2 LUMINAIRES

.1 Luminaire with cast aluminum weatherproof housing and:

.1 LED module: Philips LED LUXEON T composed of 48 high-performance white LEDs. Color temperature according to ANSI / NEMA of 3000 degrees Kelvin nominal (3045K +/- 175K or 2870K to 3220K), IRC 75, power of 81 watts

.2 Regulator: High power factor of 90% minimum. Electronic regulator, frequency between 50 and 60Hz. Automatically adjusts to a voltage between 120 and 277 volts AC, Vlasse I, TDH of up to 20%. Ambient operating temperature from -40F (-40C) to 130F (55C) degrees. The controller will reduce the power output to the LEDs if the controller temperature is internally overheated, thus protecting LEDs and electrical components. The controller is equipped with short-circuit protection, overvoltage protection, over current protection and automatic recovery after correction. It has a 2.5kV integrated surge protector (min.)

.3 Overvoltage protection: Integrated surge protector tested according to ANSI/IEEE C62.45 ANSI/IEEE C62.41.2 Scenario I, category C, high exposure of combined 10kV/10kA waveforms for line-to-ground combination , Line-neutral and ground-neutral, and in accordance with the requirements of US DOE (Department of Energy), Municipal Solid-State Street Lighting Consortium (MSSLC) specification model for roadway LED luminaires for electrical immunity requirements for testing Of high level 10kV / 10kA.

.4 Compatible controller for 0 to 10 volt dimmer.

.5 Luminaire

.1 Sprocket: Aluminum cast aluminum decorative element, mechanically assembled to the luminaire

.2 Roof: Round molded aluminum A360.1 by injection, mechanically assembled to the luminaireCage: Round shape with 2 arms. The cage is molded in one piece from 356 aluminum and mechanically assembled on the sleeve.

.3 Closure System: The roof has two built-in hinges, a locking catch and a captive screw, allowing access to the lamp and the internal components of the luminaire. A shape memory joint ensures sealing

.4 Heat dissipator: In cast aluminum, optimizing the efficiency and life of LEDs, no cooling system with moving parts is used.

.5 Globe: Clear injection molded polycarbonate with no visible seams. The globe is assembled on the locking system.

.6 Sleeve: Aluminum 356 c/w 4 pressure screws 3/8-16 UNC. Fits on a 4 "post. (102mm) outside diameter x 4 ".(102mm) in length.

.7 Double detachable waterproof fuse holder with 2 fuses H.R.C. 15 A, breaking capacity of 10 kA R.M.S.

.8 Sealed IP66

.6 Light Distribution:

.1 Optical system: Type 5 (symmetrical) distribution according to IES. Equipped with high performance acrylic PMMA lenses. Photometric performance must be certified by an independent laboratory using LM-63, LM-79 and TM-15 (IESNA) standards.

.7 Factory wired including integral ballast terminated at terminal block.

2.3 SUPPLEMENTARY REPLACEMENT EQUIPMENT

.1 Additional post and luminaire

.1 Provide complete assembly, 4.57 m aluminum pole, L2 type light fitting, conductors, fuse holders, L6-20R IP67 plug, wireless dimming cap, identical to those installed on the dock and complete, ready for installation.

.2 Pack complete assembly to protect for storage. Provide the PWGSC representative to the work site.

.2 Additional Winter Closure Plates

.1 Provide five closure plates for winter protection including necessary hardware, bolts, nuts, etc. for storage.

.2 Pack complete assembly to protect for storage. Provide the PWGSC representative to the work site.

2.4 CONTROL OF GRADATION AND TIME PERIOD MANAGEMENT

.1 Control of illumination levels and schedules with the following characteristics :

.1 Operation at15VDC from a 120 volts power supply in an outlet

.2 Rechargeable Battery.

.3 IEEE 802.15.4 wireless connectivity with capsules on each light standard

.4 Wired and wireless connectivity for user and data..

.1 10/100 Mbit Ethernet Port

.2 USB 2.0 port

.3 RS-232 port (DB9 male connector)

.4 WiFi IEEE 802.11

.5 Operating Conditions: 32F-122F (0-50C); Relative humidity: 0-90%

.6 External Antenna 9dBi, 2.4 GHz

.7 30 foot LMR cable between base and outdoor antenna

.8 Training with Manufacturer Included

.9 On-site installation by manufacturer included

.10 Wireless capsule on each light standard

.11 Base Manufacturer: Legrand Wattstopper, Model 225CWS

.12 Manufacturer of wireless capsules: Legrand Wattstopper, NWTL-111-IP-V2

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for roadway lighting 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.

3.2 INSTALLATION

.1 Install poles true and plumb, complete with brackets in accordance with manufacturer's instructions.

.2 Install luminaires on pole and install lamps.

.3 Check luminaire orientation, level and tilt.

.4 Connect luminaire to lighting circuit.

.5 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section31 23 33.01 – Excavating, Trenching and Backfilling.

.3 Section 32 11 16.01 – Granular Sub-base and Non Frost-Susceptible Backfill

.4 Section 32 11 23 – Aggregate Base

1.2 REFERENCES

.1 ASTM International

.1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.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 aggregate materials.

.3 Samples:

.1 Submit one (1) sample per type of aggregate.

.2 Allow continual sampling by the Departmental Representative during production.

.3 Provide the Departmental Representative with access to source and processed material for sampling.

.4 Install sampling facilities at discharge end of production conveyor, to allow the Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by the Departmental Representative to permit full cross section sampling.

.5 Provide front end loader or other suitable equipment including trained operator for stockpile sampling as necessary. Move samples to storage place as directed by the Departmental Representative.

.6 Supply new or clean sample bags or containers according appropriate to aggregate materials.

.7 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

.8 Provide water, electric power and propane to the Departmental Representative laboratory trailer at production site.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed 5 times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.2 Reclaimed asphalt pavement.

.3 Reclaimed concrete material.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag and expanded shale.

.4 Reclaimed asphalt pavement.

.5 Reclaimed concrete material.

.5 Fill CG-14:

.1 Sand approved by Departmental representative from excavation or other sources and free from roots, stones more than 75 mm in diameter, construction debris, clinker, ash, grass slabs, waste or other harmful substances.

.2 Granulometry according to the following table:

Sieve opening size (mm)	**% passage (according to MTQ-2010)**
	CG 14
112 mm	n/a
31,5 mm	n/a
20 mm	100
14 mm	n/a
5 mm	35 - 100
1,25 mm	n/a.
0,315 mm	n/a.
0,160 mm	n/a.
0,080 mm	0 – 10,0

Note : not applicable means there are no requirements for the sieve concerned

.6 Fill MG 20 (Type 1):

.1 Granular foundation materials shall comply with the requirements of 31 05 16 "Aggregates".

.2 Crushed stone or gravel consisting of hard, resistant, angular particles free from clay, hydraulic, organic or frozen materials and any other deleterious substances.

.3 The physical and mechanical properties of aggregates of the lower and upper granular foundation shall meet the following requirements:

.1 Table of Requirements

Trials

BNQ Standards	Sub-foundation
Maximum petrographic number	200
Durability MGS04 - maximum percentage	20
Los Angeles - maximum percentage	50
Micro-Deval - maximum percentage	33
Fragmentation - minimum percentage	100
Organic matter - maximum percentage	0.8

.2 Los Angeles: "Aggregates, determination of abrasion resistance using the Los Angeles device", the maximum is 32 instead of 50 in the case of crushed limestone.

.3 Fragmentation: the percentage indicated is the percentage by mass of fragmented particles having at least one face fractured by crushing and retained on the 5 mm sieve.

.4 Organic matter; the test standard LC31-228.

.5 Materials shall not contain more than 3.5% particle size finer than 0.02 mm.

.6 Liquidity limit: in accordance with ASTM D4318-84, maximum 25.

.7 Plasticity index: according to ASTM D4318-84, maximum 6.

.8 In the tests carried out in accordance with ASTM C136-82 and ASTM C117-80, the particle size of the compacted materials shall remain within the following limits and the particle size curve plotted on a semi-logarithmic diagram shall be continuous and unbroken.

Sieve	% passage
31.5 mm	100
20 mm	90-100
14 mm	68-93
5 mm	35-60
1.25 mm	19-38
0.315 mm	9-17
0.08 mm	2-5

.7 Fill MG 112 (Type 2

.1 Borrow material MG-112 (type 2) shall meet the following requirements and requirements:

.1 Stone, gravel or sand crushed, quarry-run or sifted;

.2 The particle size of the material after compaction shall remain within the following limits and the granulometric curve drawn on a semi-logarithmic diagram shall be continuous and not broken:

Sieve	% passage
112 mm	100
20 mm	50-100
5.0 mm	12-70
0.08 mm	0-10

.2 Liquidity limits: maximum 25, in accordance with ASTM D4318-84A

.3 Plasticity index: maximum 6, according to ASTM D4318-84A.

.4 The physical and mechanical properties of aggregates of the granular sub-base shall meet the following requirements:

.1 Table of requirements

Trials

BNQ Standards	Sub-foundation
Maximum petrographic number	200
Durability MGS04 - maximum percentage	20
Los Angeles - maximum percentage	50
Micro-Deval - maximum percentage	33
Fragmentation - minimum percentage	100
Organic matter - maximum percentage	0.8

.2 Los Angeles: "Aggregates, determination of abrasion resistance using the Los Angeles appliance", the maximum is 32 instead of 50 in the case of crushed limestone.

.3 Fragmentation: the percentage indicated is the percentage by mass of fragmented particles having at least one face fractured by crushing and retained on the 5 mm sieve.

.4 Organic matter; the test standard LC31-228.

.8 Fill (Type 3): Material approved by Departmental Representative from excavation or other sources, and free from roots, rocks larger than 75 mm in diameter, construction debris, ashes, cinders, sods, refuse or other deleterious materials.

.9 Non-shrinkage fill (type 4) or dimensionally stabilized backfill material:

.1 maximum compressive strength of 0.4 MPa at 28 days;

.2 maximum Portland cement content of 25 kg/m³, consisting of 40% fly ash as replacement material: according to CAN / CSA-A3000 Type GU;

.3 minimum resistance of 0.07 MPa to 24 hours;

.4 concrete aggregates: according to CAN / CSA-A23.1 / A23.2-04;

.5 Portland cement: GU type;

.6 collapse: 160 to 200 mm.

.10 Borrow quarry run.

.11 Net stone 20 mm: Crushed stone from quarries and 20 mm caliber.

.12 All aggregates in accordance with "31 05 16 - Aggregates".

2.2 GRANULOMETRY OF REMOVAL MATERIALS MG112, CG14, NET STONE 20 MM.

.1 According to the following table :

Nominal size of sieves openings (mm).	**% passage**			
	CG 14	**MG 20**	**MG 112**	**Clean stone**
Characteristics	6	5e	3	
112 mm	s. o.	s. o.	100	s. o.
31,5 mm	s. o.	100	s. o.	100
20 mm	100	90 – 100	s. o.	90 – 100
14 mm	s. o.	68 – 93	s. o.	s. o.
5 mm	35 – 100	35 – 60	12 – 100	s. o.
1,25 mm	s. o.	15 – 38	s. o.	s. o.
0,315 mm	s. o.	5 – 17	s. o.	s. o.
0,160 mm	s. o.	s. o.	s. o.	s. o.
0,080 mm	0 – 10,0	2 – 7	0 - 10	s. o.

Notes :
- « n.a. » (not applicable) means there are no requirements for the sieve in question.
- The characteristics may vary depending on the intended use.

2.3 SOURCE QUALITY CONTROL

.1 Inform the Departmental Representative of the source of the materials for the aggregates and allow him access to that source for sampling purposes at least four (4) weeks prior to production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise the Departmental Representative four (4) weeks minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All sections of Divisions 01 - General Requirements and 02 - Existing Conditions

.2 Section 31 32 19.01 – Geotextiles

.3 Section 31 32 19.13 – Geogrid Soil Reinforcement

.4 All sections of Division 32 - Exterior Improvements

1.2 RÉFÉRENCES

.1 Always reference the most recent edition of the reference standards.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-03, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.5 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).

.6 ASTM D4318 – 10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.3 Canadian General Standards Bureau (CGSB)

.1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series

.2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric

.4 U.S. Environmental Protection Departmental (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

.5 MDDEP - Procedures for the discharge of wastewater into a watercourse.

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock : no rock excavation is planned.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Top Soil:

.1 Any material suitable for plant growth that may be used as top soil, for landscaping or for seeding.

.2 Any material reasonably free of subsurface material, clay sticks, brush, noxious weeds and other debris, and free from rocks, stumps, roots and other harmful materials of 25 mm.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Recycled backfill material: material considered neutral, from various sources and modified to respond to the needs of the fill area.

.7 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 D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136 : Sieve sizes to CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
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.

.8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

.9 The density of the backfill material placed shall be measured in relation to the maximum dry density determined in the Modified Proctor test carried out in accordance with the provisions of ASTM D1557-78.

1.4 MANAGEMENT OF CONTAMINATED MATERIALS

.1 In accordance with « Section 01 35 13.43 – Special Procedures for Contaminated Sites ».

1.5 RECYCLED, RECOVERED OR REUSED MATERIALS

.1 Under this project, given the large volume of concrete to be deconstructed and for sustainable development, the General Contractor will be able to consider, in his options, if he so requests, re-use certain materials for backfilling of excavations. For example, residues from concrete grinding could be reused for backfilling under certain conditions, unlimited.

.2 Such materials may be reused if and only if the backfill material is accompanied by a certificate of conformity established under the most current edition of NQ 2560-600 - Standard for Identification and use of materials recycled (RM) containing bituminous mix (CB) and cement concrete (CC) residues.

.3 In addition, materials may be re-used if and only if they comply with all relevant laws and regulations, including the Environmental Quality Act.

.4 All materials that the general contractor wishes to reuse or which are potentially recyclable must be previously characterized according to the requirements of NQ 2560-600 - Standard for Identification and use of materials recycled (RM) containing bituminous mix (CB) and cement concrete (CC) residues.

.5 All certificates of conformity of such materials shall be submitted to the Departmental Representative for prior approval.

1.6 LINES AND LEVELS OF BENCHMARK, IMPLANTATION

.1 Place all required survey markers at the work site in order to accurately mark the excavations to be carried out and the fill to be added.

.2 The General Contractor shall establish, at his own expense, the profiles and alignments necessary to carry out the work from the benchmarks shown on the plans or as indicated by the Departmental Representative.

.3 The General Contractor is responsible for the installation of the works. If there is insufficient information on plans to locate the works, inquire with the Departmental Representative on the benchmarks to be used.

.4 Concrete structures shall be laid out at all times and throughout the duration of concrete work using simple and verifiable methods on site and in such a way that the Departmental Representative can validate the work, accuracy of dimensions, levels and other markers using a tape measure.

1.7 PROTECTION OF EXISTING WORKS

.1 Underground utilities and networks:

.1 Details of the dimensions, location and depth of the specified utilities and utilities are given for information only and are not necessarily accurate or complete.

.2 Before commencing excavation and trenching work, notify the Departmental Representative and the authorities of the utility companies concerned and determine the location and condition of the underground structures and networks. Clearly identify locations to avoid service interruption during job completion.

.3 Confirm the location of underground systems by carefully performing test excavations. In the event of a breakage caused by the work, repair it promptly and as directed by the Departmental Representative.

.4 Maintain and protect water, sewer, gas, electricity, telephone and other identified networks or structures from damage. Assume the cost of this work.

.5 Obtain appropriate instructions from the Departmental Representative prior to moving or removing a utility line or work located in the excavation area.

.6 Take note of the location of the underground pipeline conserved, diverted or abandoned.

.2 Existing buildings and structures.

.1 In the presence of the Departmental Representative, check the condition of buildings, trees and other plants, lawns, fences, utility poles, cables, railway tracks, roadways, boundary markers, which could be damaged during the work.

.2 During construction, protect from damage any existing buildings and structures that may be damaged. If necessary, carry out repairs to the satisfaction of the Departmental Representative.

.3 If excavation work is required to cut roots or branches, perform this work as prescribed by the Departmental Representative.

.4 If it appears that the work may constitute a hazard to existing buildings or to adjacent works and services, stop them and notify the Departmental Representative. Properly support the works and restart the work only after obtaining the authorization of the Departmental Representative.

.5 If the Departmental Representative determines it is necessary, install reinforcement and shoring parts and carry out any necessary work to prevent displacement or subsidence of the works. Failure to comply with this order without notice, the work shall be carried out by the Departmental Representative at the expense of the General Contractor.

.6 Take responsibility for damages caused by weather, negligence, lack of coordination or precaution.

.3 Refer to and comply with all other requirements of the notes on the plans.

1.8 SUBMITTAL PROCEDURES

.1 Quality Control

.1 Submit documents and samples as required according to section 01 33 00 – Submittal procedures.

.2 Submit condition survey of existing conditions if requested by the Departmental Representative.

.3 Submit for review by the Departmental Representative proposed dewatering methods.

.4 Submit to the Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.

.5 Submit to the Departmental Representative written notice when bottom of excavation is reached.

.6 Submit to the Departmental Representative results, testing, report and inspection.

.2 Preconstruction Submittals:

.1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.

.2 Submit files concerning the location of underground utility networks, which include location drawings of existing utilities on the grounds.

.3 Samples

.1 Submit required samples as needed.

.2 At least 4 weeks prior to commencement of work, the General Contractor shall notify the Departmental Representative and the laboratory of the source of supply to which the Contractor intends to acquire the backfill materials and allow access for sampling purposes.

1.9 QUALITY ASSURANCE

.1 Retain the services of a professional engineer registered or licensed in Canada, in the province of Quebec to undertake the design and inspection shoring works, bracing and recovery in work used during the performance of work

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Divert excess aggregate materials from landfill to local quarry or recycling facility for reuse as directed by the Departmental Representative.

1.11 EXISTING CONDITIONS

.1 Examine soil report.

.2 Buried services:

.1 Before commencing Work, verify and establish location of buried services on and adjacent to site, and notify the Departmental Representative.

.2 Confirm locations of buried utilities by careful test excavations.

.3 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.4 Arrange with the Departmental Representative for relocation of buried services that interfere with execution of Work.

.5 Remove obsolete buried services within 2 m of foundations, and cap cut-offs.

.6 Record location of maintained, re-routed and abandoned underground lines.

.7 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.3 Existing buildings and surface features

.1 Conduct, with the 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 the Departmental Representative.

1.12 GEOTECHNICAL AND ENVIRONMENTAL CHARACTERIZATION STUDY

.1 A geotechnical study is in appendix to this specification. The Contractor is entirely responsible for the interpretation of the results and their application in determining the appropriate work methods.

.2 The General Contractor shall, where appropriate, engage or call upon his own experts to interpret all such soil studies and to assess the difficulties to be apprehended and the methods of construction to be implemented.

.3 The Contractor is responsible for carrying out additional surveys of the land if he feels they are necessary for verifying the exact nature of the soil in place.

1.13 ACCESS ROAD AND PUBLIC ROAD MAINTENANCE

.1 Keep public thoroughfares clean and relatively free of earthy deposits caused by the transportation of materials. Trucks will be loaded with care to prevent spills from vibration caused by transportation or wind. Temporary access roads on site will be kept clean and accessible throughout the construction period.

.2 Where necessary, clean up neighboring public thoroughfares to the satisfaction of the Departmental Representative when the earthy deposits caused by the transportation of materials become significant.

.3 The General Contractor shall first provide signage plans for approval and shall provide all signage required for the completion of the work in a safe manner throughout the duration of the work.

.4 At all times and throughout the duration of the work, keep all the peripheral access roads accessible to traffic.

.5 Refer also to « 01 55 26 - Traffic Control » for traffic management requirements.

1.14 WINTER CONDITIONS

Specific restrictions may apply to quarry operations during freezing. For example, compactable borrowed materials from sand and gravel quarries during the winter season must meet, but not be limited to, the following requirements:

.1 Materials must be from already damp piles and frozen crusts removed before being transported to site.

.2 The Contractor shall provide methods for the proper compaction of granular backfill material during the winter or cold weather. Compaction rates must meet the results required during compaction during winter or cold weather as well as after settlement during the preparation of the "final grade" of the infrastructure prior to concreting the wharf.

.3 If the compaction results of the granular materials do not meet the requirements, the Contractor shall provide and erect a temporary shelter and provide the necessary heating for the proper performance of the work.

.4 All compacted granular materials entering the site must be approved by the Departmental Representative before they can be used as backfill and the temperature of the material must be taken..

.5 When loading granular materials into the quarry in cold weather, materials shall be taken from the core of the reserves and no frozen material or snow or ice shall be permitted. Reserve temperatures must be transmitted on request. A Departmental Representative must be able to go to the quarry to check the loading methods. The temperature and the water content of the aggregates must allow adequate placement and compaction.

.6 Contractor must obtain written authorization from Departmental Representative prior to loading materials to site.

.7 No stone reserves may be stored at the site. The Departmental Representative may require that reserves stored at the site be evacuated off site.

.8 Once delivered to the site, the materials shall be immediately deposited on the unfrozen surface and compacted to the satisfaction of the Departmental Representative until the correct compactness is achieved.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Fill CG-14:

.1 Sand approved by Departmental representative from excavation or other sources and free from roots, stones more than 75 mm in diameter, construction debris, clinker, ash, grass slabs, waste or other harmful substances.

.2 Granulometry according to the following table:

Sieve opening size (mm)	% passage (according to MTQ-2010)
	CG 14
112 mm	n/a
31,5 mm	n/a
20 mm	100
14 mm	n/a
5 mm	35 - 100
1,25 mm	n/a.
0,315 mm	n/a.
0,160 mm	n/a.
0,080 mm	0 – 10,0

Note : not applicable means there are no requirements for the sieve concerned

.2 Fill MG 20 (Type 1):

.1 Granular foundation materials shall comply with the requirements of 31 05 16 "Aggregates".

.2 Crushed stone or gravel consisting of hard, resistant, angular particles free from clay, hydraulic, organic or frozen materials and any other deleterious substances.

.3 The physical and mechanical properties of aggregates of the lower and upper granular foundation shall meet the following requirements:

.1 Table of Requirements

Trials

BNQ Standards	Sub-foundation
Maximum petrographic number	200
Durability MGS04 - maximum percentage	20
Los Angeles - maximum percentage	50
Micro-Deval - maximum percentage	33
Fragmentation - minimum percentage	100
Organic matter - maximum percentage	0.8

.2 Los Angeles: "Aggregates, determination of abrasion resistance using the Los Angeles device", the maximum is 32 instead of 50 in the case of crushed limestone.

.3 Fragmentation: the percentage indicated is the percentage by mass of fragmented particles having at least one face fractured by crushing and retained on the 5 mm sieve.

.4 Organic matter; The test standard LC31-228.

.5 Materials shall not contain more than 3.5% particle size finer than 0.02 mm.

.6 Liquidity limit: in accordance with ASTM D4318-84, maximum 25.

.7 Plasticity index: according to ASTM D4318-84, maximum 6.

.8 In the tests carried out in accordance with ASTM C136-82 and ASTM C117-80, the particle size of the compacted materials shall remain within the following limits and the particle size curve plotted on a semi-logarithmic diagram shall be continuous and unbroken.

Sieve	% passage
31.5 mm	100
20 mm	90-100
14 mm	68-93
5 mm	35-60
1.25 mm	19-38
0.315 mm	9-17
0.08 mm	2-5

.3 Fill MG 112 (Type 2

.1 Borrow material MG-112 (type 2) shall meet the following requirements and requirements:

.1 Stone, gravel or sand crushed, quarry-run or sifted;

.2 The particle size of the material after compaction shall remain within the following limits and the granulometric curve drawn on a semi-logarithmic diagram shall be continuous and not broken:

Sieve	% passage
112 mm	100
20 mm	50-100
5.0 mm	12-70
0.08 mm	0-10

.2 Liquidity limits: maximum 25, in accordance with ASTM D4318-84A

.3 Plasticity index: maximum 6, according to ASTM D4318-84A.

.4 The physical and mechanical properties of aggregates of the granular sub-base shall meet the following requirements:

.1 Table of requirements

Trials

BNQ Standards	Sub-foundation
Maximum petrographic number	200
Durability MGS04 - maximum percentage	20
Los Angeles - maximum percentage	50
Micro-Deval - maximum percentage	33
Fragmentation - minimum percentage	100
Organic matter - maximum percentage	0.8

.2 Los Angeles: "Aggregates, determination of abrasion resistance using the Los Angeles appliance", the maximum is 32 instead of 50 in the case of crushed limestone.

.3 Fragmentation: the percentage indicated is the percentage by mass of fragmented particles having at least one face fractured by crushing and retained on the 5 mm sieve.

.4 Organic matter; the test standard LC31-228.

.4 Fill (Type 3): Material approved by Departmental Representative from excavation or other sources, and free from roots, rocks larger than 75 mm in diameter, construction debris, ashes, cinders, sods, refuse or other deleterious materials.

.5 Non-shrinkage fill (type 4) or dimensionally stabilized backfill material:

.1 maximum compressive strength of 0.4 MPa at 28 days;

.2 maximum Portland cement content of 25 kg / m3, consisting of 40% fly ash as replacement material: according to CAN / CSA-A3000 Type GU;

.3 minimum resistance of 0.07 MPa to 24 hours;

.4 concrete aggregates: according to CAN / CSA-A23.1 / A23.2-04;

.5 Portland cement: GU type;

.6 collapse: 160 to 200 mm.

.6 Quarry run Borrow material.

.7 Net stone 20 mm: Crushed stone from quarries and 20 mm caliber.

.8 All aggregates in accordance with "31 05 16 - Aggregates".

2.2 GRANULOMETRY OF REMOVAL MATERIALS MG 20, MG 112, CG 14, NET STONE 20 MM

.1 According to the following table:

Nominal size of sieve openings (mm)	**% passing**			
	CG 14	**MG 20**	**MG 112**	**Net Stone**
Charactéristics	6	5e	3	
112 mm	s. o.	s. o.	100	s. o.
31,5 mm	s. o.	100	s. o.	100
20 mm	100	90 – 100	s. o.	90 – 100
14 mm	s. o.	68 – 93	s. o.	s. o.
5 mm	35 – 100	35 – 60	12 – 100	s. o.
1,25 mm	s. o.	15 – 38	s. o.	s. o.
0,315 mm	s. o.	5 – 17	s. o.	s. o.
0,160 mm	s. o.	s. o.	s. o.	s. o.
0,080 mm	0 – 10,0	2 – 7	0 - 10	s. o.

Notes: - « s. o. » (Not applicable) means there are no requirements for the sieve in question.
- Specifications may vary according to intended use.

PART 3 EXECUTION

3.1 MEANS OF SEDIMENT EROSION CONTROL

.1 Set up temporary means to protect the loss of soil from rainwater runoff and erosion from wind, which could cause erosion and deposit of sediments into waterways. These means must comply with the requirements of applicable codes, standards and regulations.

.2 Inspect and maintain maintenance and repair if necessary, until permanent vegetation is established.

.3 Remove erosion control measures and timely recondition and stabilize the surfaces disturbed by this work.

3.2 PREPARATION WORK

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

.3 Obtain all necessary permits for operations, including but not limited to the disposal of waste by burning or other method.

3.3 PREPARATION/PROTECTION

.1 Protect existing features.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Departmental Representative's satisfaction.

.4 Protect natural and man-made features required to remain undisturbed.

.5 Protect buried services that are required to remain undisturbed.

3.4 STOCKPILING

.1 Stockpile fill materials in areas designated by the Departmental Representative.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 SHORING, STRUTS AND UNDERPINNING WORK

.1 Where required, support, bracket excavations, place sheet piles, construct temporary retaining walls, and inject concrete to prevent slippage in accordance with the Occupational Health and Safety Act and provincial and municipal regulations in force. Remove shoring when no longer required.

.2 To divert a watercourse, obtain the necessary permit from the competent authorities in this matter.

.3 Even if certain indications concerning the location of certain temporary support structures are present on the drawings, the General Contractor shall not consider these indications to be limiting and the latter must provide for all the support required for the completion of the work.

.4 The General Contractor shall bear the costs of constructing and maintaining the slopes of the excavations as required to ensure their stability.

.5 Assume responsibility for any accidents caused by poorly executed shoring, bracing and underpinning work.

.6 Retain the services of a qualified professional engineer recognized in the province of Quebec for the design and inspection of sheet piling and other temporary work, bracing and underpin work required for The work. The Engineer of the General Contractor shall provide the Departmental Representative with written confirmation of the conformity of the shoring and bracing structures constructed.

.7 At least 2 weeks prior to commencement of work, submit design and related technical data for verification.

.8 Design documents and associated technical data submitted must bear the seal and signature of a qualified professional engineer recognized in the province of Quebec.

.9 The Engineer responsible for the design of temporary structures shall provide evidence that he holds a professional liability insurance policy unless he is employed by the General Contractor. In such a case, the General Contractor must provide evidence that the work of his engineer is covered by the Contractor's insurance policy.

.10 Protect walls of excavations by appropriate methods and in accordance with the requirements on the Health and Safety Act of the Province of Quebec pursuant to the requirements of the contract documents.

.11 Obtain the appropriate license from the competent authorities if it is necessary to temporarily divert a watercourse.

.12 Construct temporary works in depth, in height and in locations authorized by the authorized authorities.

.13 Perform the following during backfilling:

.1 Except as otherwise directed by the Departmental Representative, removing temporary sheet piling and shoring excavation works.

.2 Do not remove the braces before the fill level is reached the level of the latter.

.14 Do the following, once the infrastructure construction is complete:

.1 Remove cofferdams and the shoring and bracing structures.

.2 Remove the surplus materials from the site and perform the work required to restore the original system of waterways.

3.6 DEWATERING OR EXCAVATIONS AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Where required, do snow removal and transport snow off-site.

.3 Submit to the Departmental Representative for his review, the details of the proposed dewatering methods of excavations and heave prevention, such as setting up dikes, establishments of well points and leveling of sheet piling.

.4 Engage the services of a recognized professional engineer in the province of Quebec for the design of the system for the lowering of the water table and the dewatering of excavations.

.5 Design documents and associated technical data submitted must bear the seal and signature of a qualified professional engineer recognized in the province of Quebec.

.6 The General Contractor shall be responsible for the costs of designing and constructing the excavation system and the lowering of the water table.

.7 If there is a risk of sinking or lifting, avoid excavating to below ground water where applicable. To avoid lifting pipes or the bottom of excavations, lower the water table, cut the upper end of the sheet piles or use other suitable means.

.8 Protect open excavations against flooding and damage due to surface run-off

.9 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures collection runoff areas 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.

.10 Regardless of the type of drainage (gravity or pumped), the water collected may not be discharged to municipal, provincial and/or existing watercourses or wetlands without installation and adequate operation of a treatment that reduces contaminants to the levels permitted by municipal and provincial regulations. In the event of a discharge into the city's networks and/or the Ministère des Transports du Québec, the General Contractor must obtain an official permit from the Competent Authority in this matter and provide a copy to the Departmental Representative.

.11 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.7 EXCAVATION

.1 It is understood that no special compensation will be paid to the General Contractor for the use of equipment necessary to break and excavate the rock, even if the nature of the work so requires. In addition, no special compensation will be paid to the General Contractor for excavation in quick sand, hard pan, silt layers or thin strata of pebbles agglomerated with clay, In broken or loose shale, in cemented gravel, or in any other material that may be encountered, such as for the extraction of large pebbles, frozen earth, etc.

.2 It is understood that no special compensation will be paid to the General Contractor for snow removal work when required.

.3 Advise the Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.

.4 Excavate to lines, grades, elevations and dimensions as indicated.

.5 Remove any other obstructions on site during the excavation work

.6 Excavation must not interfere with bearing capacity of adjacent foundations.

.7 Unless the Departmental Representative authorizes in writing, it is forbidden to dig more than 30 m of trench before installing the elements to bury and length of un-backfilled trench must not exceed 15 m at the end of a work day.

.8 Fill material and stockpiled material must be deposited at a sufficient distance from the trench, according to the Departmental Representative’s indications.

.9 Cuttings and deposited material shall be placed at a sufficient distance from the top of the existing wall in relation to the sections not previously excavated, as specified by the Departmental Representative.

.10 Do not disturb the soil under the branches of trees or shrubs that must remain in place.

.1 If excavations are to be made between the roots, dig by hand and cut the roots with a sharp ax or saw.

.11 Restrict vehicle operations directly adjacent to open trenches

.12 Dispose of unsuitable or surplus excavated material from the site at location designated by the Departmental Representative. In the case of dry materials (paving, concrete, pipes, strains, trees, shrubs, etc.), follow the descriptions in the Solid Waste Regulations (Q-2, r.14) and other applicable municipal or local by-laws.

.13 Avoid blocking run-off from natural runoffs or waterways. Ensure the control and evacuation of rainwater, snowmelt, groundwater, sewage and water from any other source on the site to enable the work to be carried out.

.14 Do not obstruct flow of surface drainage or natural watercourses.

.15 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.16 Notify the Departmental Representative when bottom of excavation is reached.

.17 Obtain the Departmental Representative's approval of completed excavation.

.18 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed the Departmental Representative.

.19 Profile excavations by hand, strengthen the walls and remove all non-adherent materials and debris found there.

.20 If the materials of the excavation base were bothered, compact them to a density at least equal to that of the undisturbed soil.

.21 Excavate and transport off-site, disused utility networks buried in the ground identified on plans, as well as debris from old foundations, reservoirs, etc. existing in the soil.

.22 Take the necessary precautions to eliminate dust production.

.23 Install geotextiles according to manufacturer's requirements.

.24 Comply with all Parks Canada specific requirements for archaeological monitoring. In the case where archaeological surveillance is not required for the works and an archaeological vestige (vestige of construction or development, object and fragment of object) is discovered accidentally during the excavations, The contractor shall suspend work in the immediate area of the discovery and notify the Parks Canada representative, who will then take the necessary steps to protect and conserve the said archaeological remains.

3.8 FILL MATERIAL AND COMPACTION

.1 Use fill material of the type indicated or prescribed in the drawings. The densities obtained by compacting are percentages of maximum densities calculated according to ASTM D1557.

.2 Refer to « 01 11 01 – Work Related General Information » for Refilling and Compaction Requirements in Cold Weather.

3.9 BEDDING AND SURROUNDING OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services.

.2 Bedding material and services surrounding materials must not be frozen.

3.10 ENVIRONMENTAL PROTECTION MEASURES

.1 Refer to and comply in all respects with section "01 35 43 - Environmental protection".

.2 Protective measures shall control and contain sediments within the site, protect slopes and deposits in heaps from erosion, promote natural water infiltration and Control runoff during and after the works.

.3 Measures to protect soil from aerial and hydraulic erosion

.1 Site surfaces shall be covered with a stable material such as grass, gravel or geotextile.

.2 Keep bulk material, such as sand, earth, gravel or other material, to a minimum. Materials placed in heaps greater than 2.0 m in height shall be protected against erosion by means of tarps or membranes.

.3 In dry weather, water the ground to create a dust suppressant.

.4 Protective measures against sediment discharge into the drainage system or the environment

.1 Slope surfaces to the interior of the site to prevent runoff from washing material outside of the site.

.2 Install geotextile membrane under catch basin grids affected by site operations.

.3 Provide 20-56 mm clear stone running surfaces to help clean vehicle wheels and construction machinery.

.4 Install sediment barriers to protect surrounding areas.

.5 Waste water from site should be pre-filtered.

.6 Clean the surrounding streets with a mechanical brush if necessary.

.5 Maintenance Activities

.1 Periodically inspect and clean after each period of rain or snow.

.2 Maintain entrances in good condition to prevent sediment traces or deposits on public roads. On the running surfaces, add or replace the 20-56 mm net stone according to the site conditions.

.6 Clean sediment that has fallen or been left on public roads.

3.11 BACKFILLING

.1 Where applicable, all materials must originate from sites authorized under the Quarrying and Sand Pits Regulations.

.2 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.

.2 Departmental Representative has inspected and approved of construction below finish grade.

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing.

.6 Removal voids are filled with satisfactory soil material.

.3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.4 Do not use backfill material which is frozen or contains ice, snow or debris unless authorized by the Departmental Representative.

.5 Proceed to filling with quarry run material avoiding impose undue pushed to the piles Proceed by spreading relatively uniform layers not exceeding one and a half times the maximum size of the biggest elements, to avoid any violent impact that could damage the works

.6 Apply the fill material in uniform layers not exceeding 150 mm compacted thickness up to specified levels. Compact each layer as indicated on the drawings.

3.12 RESTORATION

.1 Upon completion of Work, remove waste and debris materials as defined in 01 74 21 - Construction/Demolition Waste Management and Disposal, grading slopes and correcting defects as directed by Departmental Representative.

.2 Upon completion of Work, remove waste materials and debris.

.3 Replace topsoil as instructed by Departmental Representative.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.5 Clean and rehabilitate areas affected by work as instructed by Departmental Representative.

.6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

3.13 ON SITE QUALITY CONTROL

.1 Where tests or inspections by the testing laboratory indicate that the works or materials are not in conformity with the requirements of the contract, the Contractor shall be responsible for any additional testing that may be requested by the Departmental Representative, to verify the corrections made. The same applies to the tests required to check the materials in place after correction.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the section of divisions 01 – General Requirements and 02 – Existing Conditions

.2 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.3 Section 31 32 19.13 – Geogrid Soil Reinforcement

.4 All of the sections of division 32 – Exterior Improvements

1.2 REFERENCES

.1 Unless otherwise indicated, the latest publication and amendments of the following standards prevail on the date of the contract coming into force

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 Methods for Textile Testing.

.1 Issue 11.1 – M13, Bursting Resistance - Membrane Membrane Test

.2 Issue 12.2- M13, Tear Resistance - Trapezoidal Method

.2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.

.1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.

.2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.

.3 Numéro 4 M94, géotextiles – Perméabilité à l'eau dans un sens normal sans charge de compression.

.4 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.

.5 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.

.6 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

.3 American Society for Testing and Materials International, (ASTM)

.1 ASTM D4355 / D4355M – 14, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

.2 ASTM D4491-16, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.3 ASTM D4595-11, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.4 ASTM D4716/D4716M-14, Standard Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.5 ASTM D4751-16, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.6 ASTM D4833 / D4833M - 07(2013) e1, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

.7 ASTM D5199 – 12, Standard Test Method for Measuring the Nominal Thickness of Geosynthetics

.8 ASTM D5261 – 10, Standard Test Method for Measuring Mass per Unit Area of Geotextiles

.9 ASTM D6241 – 14, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Geotextiles must conform to recommended standards.

.3 The Contractor must provide, for the Departmental Representative's approval, the shop drawings for each type of geotextile membrane used in this project.

.4 Submit underwater installation methods to Departmental Representative for pre-approval.

1.4 DELIVERY, STORAGE AND HANDLING

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dust, debris and rodents.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling, in accordance with Waste Management Plan.

.4 Fold up metal banding, flatten and place in designated bins.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Geotextiles: non-woven needle-punched synthetic fibre, supplied in rolls, to the following requirements.

.2 Refer to drawings for the type of membrane to supply at the particular areas.

.1 Geotextile membrane Type 1:: Separation

.2 Geotextile membrane Type 2: Separation

.3 Geotextile membrane Type 3: Protection

.4 Geotextile membrane Type 4: Reinforcement

Property	Standard	Unit	Type 1	Type 2	Type 3	Type 4
Physical						
Product type	N/A	N/A	Separation	Separation	Protection	Reinforcement
Thickness	ASTM D5199	mm	-	-	3.5	4.5
Weight	ASTM D5261	g/m^2	-	-	407	54.4
Mechanical						
Tensile strength	CAN 148.1 no.7.3	N	550	1 200	1 470	1890
Elongation at break	Can 148.1 No.7.3	%	45 – 105	45 – 105	50 – 105	50-105
Trapezoid tear	CAN 4.2 No. 12.2	N	250	530	600	730
Mullen burst	CAN 4.2 No. 11.1	kPa	1 585	3 280	3 500	-
CBR puncture	ASTM D6241	N	1 570	3 450	4 000	5000
Puncture	ASTM D4833	N	-	-	850	-
UV resistance	ASTM D4355	% / 500h	50	50	50	70
Hydraulic						
Permeability	CAN 148.1 no.4	cm/s	0.230	0.180	0.190	0,250
Permittivity	CAN 148.1 No.10	s^{-1}	1.34	0.51	0.41	0,57
Overture de pores (FOS)	CAN 148.1 No.10	µm	180	130	40-110	40-80
Dimensions						
Width	N/A	m	3.50 / 4.57 / 5.25	3.50 / 4.57 / 5.25	3.50 / 4.57 / 5.25	4,57
Length	N/A	m	150	100	100	91,44

PART 3 EXECUTION

3.1 INSTALLATION

.1 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.2 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.3 Overlap each successive strip of geotextile 600 mm over previously laid strip.

.4 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.5 After installation, cover with overlying layer within four (4) hours of placement.

.6 Replace damaged or deteriorated geotextile to approval of the Departmental Representative.

.7 Use weights to hold down geotextiles along the existing wharf caissons when they must be installed under water.

.8 Where required, use stainless steel metal bands to attach the geotextile to solidly anchor the concrete in the upper part.

3.2 CLEANING

.1 Remove construction waste from site and dispose of in accordance with regulatory requirements.

3.3 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the section of division 1 – General Requirements and division 2 Existing Conditions

.2 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.3 Section 31 32 19.01 – Geotextiles

.4 All of the sections of division 32 – Exterior improvements

1.2 REFERENCES

.1 Unless otherwise indicated, the latest publications and amendments of the following standards prevail at the date of the contract's coming into force.

.2 ASTM International

.1 ASTM D1248-05 Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable.

.2 ASTM D4101-10, Standard Specification for Polypropylene Injection and Extrusion Materials.

.3 ASTM D4218-96(R2008), Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique.

.4 ASTM D4355 / D4355M – 14, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

.5 ASTM D5262-07, Standard Test Method for Evaluating the Unconfined Tension Creep Behaviour of Geosynthetics.

.6 ASTM D5617, Standard Test Method for Multi-Axial Tension Test for Geosynthetics

.7 ASTM D6637-10, Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.

.8 ASTM D7748, Standard Test Method for Flexural Rigidity of Geogrids, Geotextiles and Related Products

.3 Drexel University - Geosynthetic Research Institute (GRI)

.1 GRI GG2-87(R2005), Geogrid Junction Strength.

.4 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide in accordance with Section [01 33 00- Submittal Procedures].

.2 Samples:

.1 Submit samples four (4)weeks prior to beginning Work.

.1 One 3 m length from full roll width of geogrid material.

.3 Certificates:

.1 Submit copies of mill test data and certificate four (4) weeks prior to start of Work.

.4 Sustainable Design Submittals:

.1 Erosion and Sedimentation Control: Submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction EPA 832/R-92-2005.

.2 Construction Waste Management:

.1 Provide project Waste Management Plan highlighting recycling and salvage requirements.

.5 Recycled Content: N/A

.6 Regional Materials: N/A.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section [with manufacturer's written instructions] 01 61 00- Common Product Requirements.

.2 During delivery and storage, protect geogrids from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

.3 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Geogrid: of biaxial type with reinforced polypropylene strips of high tenacity extruded welded for horizontal reinforcement. Free from streaks, roughnesses, perforations, bubbles, undispersed raw materials or marks of contamination by foreign bodies

.2 Physical properties

.1 Roll width: at least 3.954 metres

.2 Roll length: at least 50 metres

.3 Strands thickness: 2.0 mm

.4 Strands width: 4.0 mm

.5 Aperture size: 39 x 39 mm

.6 Polymer: 100% polypropylene: to ASTM D4101 with inhibitors added to resist deterioration by ultra-violet and heat exposure.

.3 Mechanical Properties:

.1 Geotextile surface mass: N/A

.2 Tensile strength ultimate: according to ASTM D6637

.1 340.0 kN/m (in the direction of its length)

.2 30.KN/m (in the direction perpendicular)

.3 Tensile strength 1% elongation: N/A

.4 Tensile strength 2% elongation: according to ASTM D6637

.1 12.0 KN/m (in the direction of its length)

.2 12.0 KN/m (in the direction perpendicular)

.5 Tensile strength 5% elongation: according to ASTM D6637

.1 21.6 KN/m (in the direction of its length)

.2 22.0 KN/m (in the direction perpendicular)

.6 Bending stiffness: according to ASTM D7748

.1 1312 g-cm (in the direction of its length)

.2 875 g-cm (in the direction perpendicular)

.7 Joint efficiency: according to GRI GG2

.1 93% (in the direction of its length)

.2 93% (in the direction perpendicular)

.8 Structural Stability of mesh @ 20 kg-cm torque: 5.7 kg-cm/deg

.9 Radial stiffness @0.5% elongation: 384.9 KN/m

.10 Multi-axial tensile strength: in accordance with ASTM D5617

.1 Breaking Pressure: 91.0 Kpa

.2 Asymmetric failure at break: 8.2%

.3 Mean deflection at break: 107 mm

.11 4 Other Properties

.1 UV resistance: 100% according to ASTM D4355

.2 Minimum content of carbon black: 2% according to ASTM D4218

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for soil stabilization 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 precede Departmental Representative.

3.2 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 indications on the drawings or the erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and 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.

3.3 INSTALLATION

.1 Place geogrid material by unrolling onto graded surface in manner and locations indicated and retain in position in accordance with manufacturer's written recommendations.

.2 Place geogrid on sloping surfaces in one continuous length from toe of slope to upper extent of geogrid.

.3 Overlap each successive strip of geogrid 600 mm over previously laid strip.

.4 Join successive strips of geogrid as recommended by manufacturer.

.5 Protect geogrid from displacement, damage or deterioration before and during placement of overlaid aggregate, geotextiles and soil layers.

.6 Replace damaged or deteriorated geogrid to approval of Departmental Representative.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

3.5 PROTECTION

.1 Vehicular traffic not permitted directly on geogrid.

.2 Do not overload soil or aggregate covering on geogrid.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.2 REFERENCES

.1 European Standards

.1 EN 10248-1 (December 1995), Hot-Rolled Sheet Piling of Non-Alloy Steels, Part 1: Technical Delivery Conditions.

.2 EN 10248-2 (December 1995), Hot Rolled Sheet Piling of Non Alloy Steels, Part 2: Tolerances on Shape and Dimensions

.3 EN 10020 (September 2000), Definition and Classification of Grades of Steel

.4 EN 10021 (March 2007), General Technical Delivery Requirements for Steel and Steel Products

.5 EN 10027-1 (November 2005), Designation System for Steel, Part 1: Steel Names, Principal Symbols

.6 ENj 10027-2 (June 2015), Designation System for Steel, Part 2: Numerical System

.7 EN 12063(August 1000), Execution of Special Geotechnical Work – Sheet-Pile Walls

.8 ENV 1993-5 EUROCODE 3, Design of Steel Structures, Part 5: Piling

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A6/A6M-16, Standard Specification for Généralités Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

.2 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.3 ASTM A615/A615M-16, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

.4 ASTM A1011/A1011M-15, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

.5 ASTM A328/A328M-12 Standard Specification for Steel Sheet Piling

.6 ASTM A857/A857M-07-(2013) Standard Specification for Steel Sheet Piling, Cold Formed, Light Gage

.3 Canadian Standards Association (CSA)/CSA International.

.1 CAN/CSA G40.20/G40.21 -13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W59 - 13, Welded Steel Construction (Metal Arc Welding).

1.3 DOCUMENTS AND SAMPLES TO SUBMIT

.1 One week after the start-up meeting, the Contractor shall submit the shop drawings of the sheet pile

.2 Submit documents and samples required according to section 01 33 00 – Submital Procedures.

.3 Product Data: submit manufacturer's printed product literature, specifications and datasheet.

.4 Sub-surface investigation report: when site conditions differ from those indicated, submit written notification to the Departmental Representative and await further instructions.

.5 Certificates

.1 Two (2) weeks prior to commencement of installation, submit two (2) copies of certificates issued by the steel producer in accordance with ASTM A1011 and factory test reports in accordance with CSA G40.20 / G40.21.

.2 Provide a copy of the certificate for fusion welding in accordance with CSA W47.1

.6 Shop drawings: Submitted shop drawings must carry a seal and signature of a competent engineer, recognized to practice in the province of Quebec, Canada.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Transport, store and handle the materials and equipment according to section 01 61 00- Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect sheet piles from nicks, scratches, and blemishes.

.3 Replace damaged materials and equipment by new materials and equipment.

.4 Use slings for lifting piling make sure mass is evenly distributed and piling is not subjected to excessive bending stresses.

.5 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.

.1 Provide blocking at spacing not exceeding 5m so that there is no excessive sagging in piling.

.2 Overhang at ends not to exceed 0.5 m.

.3 Block between lifts directly above blocking in lower lift.

.6 If material is stock-piled on structure, ensure structure is not overloaded.

1.5 WORK METHOD

.1 Sheet piling shall be installed by vibrating. Pile driving is permitted only when the sheet pile is close to the bedrock. The duration of the installation (the sum of the time of all the work teams) cannot exceed 60 min per working day

.2 Submit the work method that the contractor intends to follow for the installation of sheet piles.

.3 Sheet piling will be installed to bedrock.

.4 The contractor must pay special attention in terms of requirements for environmental protection.

.5 Special Measure: Fish Habitat

.1 The measure consists of progressively starting the piling of the sheet piles and then stopping operations for a certain time.

.2 This measure allows fish the time to move away from the work site.

.3 The following parameters must be met:

.1 Duration of stopping period for piling operations: 30 minutes.

.2 Progressive mode duration: 5 minutes.

.3 Minimum power of hammer for 1 minute.

.4 Progressive 20% increase in maximum power per minute.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Vibrator-driver must conform to:

- Minimum driving force: 207 t
- Minimum weight: 5647 kg
- Minimum motor power: 595 HP

.2 Steel piles: comply with the requirements of EN 10248, including chemical and mechanical requirements, grade S355GP and the requirements listed below.

.3 Snap-core Z-profiles

.1 Section elastic modulus: at least 2600 cm^3/m (

.2 Minimum flange and web thickness (headwall): 12,2 mm.

.4 Sheet piling:

.1 Minimum resistance joints engaged in direct tension: 5500 kN/m.

.2 Locks: formed such that a section of the locking strip with a minimum length of 1 m must slide over the full length of a sheet pile without jamming.

.3 All four sheet pile wall elements must be legibly marked with a stencil or stamp to indicate the following information.

.1 The casting number.

.2 The manufacturer's name.

.3 The length and profile number.

.4 Lifting holes or sling holes should not be drilled in advance in the sheet piles

.5 Structural steel for ties, bearing plates, profiles for pile caps, lining, knees and various parts: conforms to CSA G40.21, grade 300W

.6 Tie rods and threaded couplings

.1 Tie Rods: conforming to ASTM A615, grade 517 MPa.

.2 Nuts and cylindrical bearing sleeves: must have a carrying capacity greater than the capacity of the tie rod.

.3 Assemblies of tie-rods, shop fabricated, marked and tested in advance; threaded connections aligned according to the following tolerances in the height of the nut and bearing sleeves: 1/80 of the normal diameter of the tie; axis deviation 1 in 160.

.7 Nuts and Bolts: hex nuts, bolts and washers conform to ASTM A325 standard.

.8 Weep Holes

.1 Weep holes 150 mm stainless steel.

.2 The product shall be manufactured and designed for use in steel sheet piles.

2.2 SOURCE QUALITY CONTROL: HOT LAMINATED STEEL SHEET PILING

.1 Forward the results of the following tests performed on steel used in the manufacture of sheet piles used for the present work.

.1 One (1) tensile test and one (1) bend test on the product of each casting providing less than 50 metric tons of finished materials

.2 Two (2) tensile tests and two (2) bend tests on the product of each casting providing more than 50 metric tons of finished materials.

.2 Tensile test: to CSA G40.20/G40.21 standard.

.1 Bend tests: according to ASTM A6/A6M standard

2.3 PILE DRIVING HAMMER

.1 Pile driving Hammer: Provide manufacturer's name, hammer type, nominal energy per stroke at normal driving rate, weight of striking mass and weight of pile cap, as well as type and Elastic properties of pile hammer and pile cushion.

.2 Pile drivers should be selected based on analysis of pile driving parameters.

.3 Analysis of pile driving parameters shall include, but not necessarily be limited to, the following information: details of pile driver, pile cap and pile cushion; static soil parameters; damping factors, total soil resistance, number of pile driving blows, forces applied to sheet piles and total energy applied to obtain specific indentations.

2.4 SHOE

.1 Each pile must be provided with a shoe (designed by the sheet pile manufacturer) to allow the sheet pile to be stuck in the rock without being damaged.

2.5 RETRACTABLE THERMO MEMBRANE

.1 This membrane shall be placed on the tensioner of each tie rod.

.2 Compliant product: Tensile strength: 17 Mpa min (ISO 37)

.1 Elongation at break: 350% min (ISO 37)

.2 Hardness: 50-70 D (ISO 868)

.3 Water absorption: 0.5% max (ISO 62)

.3 Installation must be in accordance with manufacturer's instructions.

2.6 PROTECTIVE TAPE

.1 All tie rods shall be covered with protective tape.

.2 The ribbon consists of a nonwoven synthetic fabric backing, fully impregnated with a neutral compound based on saturated petroleum jelly.

.3 Compliant product: NACE RP0375-2006

.1 AWWA C217 Standard

.2 Thickness (ASTM D1000): 46 mils min

.3 Breaking Strength (ASTM 1000): 22.5 PSI

.4 Elongation at break: 10%

.4 Installation must be in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.1 IMPLEMENTATION

.1 Do not begin pile installation until required quality control tests have been completed and test results approved by the Departmental Representative.

.2 Submit full details of method and sequence of installation of piling to the Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.

.3 When installing sheet piles in bulkhead wall, use procedure as follows:

.1 Provide temporary templates or bracing to hold piles in alignment during setting and driving.

.2 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.

.3 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.

.4 After one panel has been driven, place and drive succeeding panels in similar manner. Complete driving of end double pile of first panel after double piles of second panel have been driven.

.5 Piles must be driven down to bedrock. To avoid damage to the sheet piling, a shoe must be installed on each sheet pile. Do not proceed unduly into the bedrock.

.6 When pile driving is required, use a driving cap and driving cushions to protect the sheet piling.

.7 For a length of 300 mm, the sheet pile under the pile driving cap or the vibrator-driver shall not be retained in the final work.

.8 Sheet piles whose heads are deemed to be damaged by the Departmental Representative will be refused.

3.2 PILE DRIVING TOLERANCE

.1 The Contractor shall install the sheet piles in accordance with the reference line. The sheet piles must not exceed the reference line by more than or less than 50 mm. In addition, the sheet piles must be in a 100 mm planar space along the wharf. The eccentricity of a sheet pile must not exceed 1% of its length.

.2 Install weep holes as indicated.

3.3 OBSTRUCTIONS

.1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.

.2 Notify the Departmental Representative immediately if impossible to drive pile to full penetration, and await his direction on further steps required to complete Work.

3.4 HOLES

.1 Patch holes in sheet pile wall, except where permanent holes are indicated.

.1 Use a plate of material of equal thickness to that of piling to patch holes and overlap not less than hole diameter.

.2 Weld to develop full strength of plate.

.2 Drill any required holes in piling. Do not use flame cutting without permission of the Departmental Representative.

3.5 CUTTING

.1 When flame cutting tops of piles, and flame cutting holes in piles approved by the Departmental Representative, use following procedure:

.1 When air temperature is above 0 degrees C, no pre-heat is necessary.

.2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees C). Temperature indicating crayon marks may be used to measure temperature.

.3 Use torch guiding device to ensure smooth round holes or straight edges.

.4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

3.6 SPLICES

.1 Use full length piles, unless splicing is clearly indicated.

3.7 TIE ROD ANCHORAGE SYSTEM

.1 Do not place backfill behind anchored bulkhead or remove material from in front of bulkhead]until piles have been completely driven, adjusted and secured in final position by anchorage system.

.2 Support tie rods at intervals along their length as indicated.

.3 Fit and adjust tie rod systems so that connections at waling and anchor end of tie rods are tight before backfilling.

.4 Brace steel sheet pile with waling strips in accordance with shop drawings. Make wales one length between corners and bolt to piles.

.5 Where required, drill a hole in the existing concrete 500 mm larger than the diameter of the tie rod.

3.8 BACKFILLING

.1 Backfill in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling and as indicated.

.2 The system of struts and tie rods (including the anchor wall) must be completed before starting backfilling between the existing wharf and the new sheet pile wall.

.3 Protect piling tie rods and anchorage systems from damage or displacement during backfilling operations.

3.9 REPAIR / REPLACEMENT OF DEFECTIVE PANELS

.1 Remove rejected sheet piles and replace with new sheet piles.

.2 No additional amount shall be paid for the removal and replacement of defective sheet piles or for other work necessitated by their rejection.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 05 16 – Aggregate Materials

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.4 All of the sections of Division 31 – Earthwork

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C88-[05], Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C117-[04], Standard Test Method for Materials Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.3 ASTM C131-[06], Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.4 ASTM C136-[06], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.5 ASTM D140/D140M-[09], Standard Practice for Sampling Bituminous Materials.

.2 Public Services and Procurement Canada (PSPC)

.1 CAN / CGSB-8.1- 88, Nonmetric wire mesh screen.

.2 CAN / CGSB-8.2- M88, Wire mesh screen, metric.

.3 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ADMINISTRATIVE PROCEDURES

.1 Traffic Control: Manage vehicles on site with warning signs and signalers in accordance with « 01 55 26 - Traffic Control ».

.1 Prevent any traffic on roads freshly covered with bituminous binder.

.2 In order not to interrupt vehicular traffic, carry out work on one lane at a time, as directed by the Departmental Representative.

.3 Prohibit traffic on freshly treated areas until completion of rolling.

1.4 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION

.1 Submit required documents/samples in accordance with « 01 33 00 – Submittal Procedures ».

.2 Technical data sheets:

.1 Submit required data sheets and manufacturer's instructions and documentation for the proposed bituminous binder. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish.

.3 Samples:

.1 Two (2) weeks before commencing work, submit to the Departmental Representative 10 kilograms of proposed bituminous binder for the work.

.2 Provide Departmental Representative with access to tank truck to take samples of bituminous binder for execution of work in accordance with ASTM D140.

.3 Twelve (12) weeks prior to commencement of work, submit to the Departmental Representative ten (10) kilograms, aggregates for approval.

.4 Certificates: submit documents signed by the manufacturer, certifying that the products, materials and materials meet the requirements for physical characteristics and performance criteria.

.5 Manufacturer's instructions: Submit manufacturer's installation instructions, including any instructions for specific handling, application, and cleaning procedures.

.6 Documents/Samples for Sustainable Design: n/a.

.7 Construction Waste Management:

.1 Submit Construction Waste Management Plan established for the project, which shall specify the recycling and recovery requirements.

.2 Regional materials and equipment: n / a.

.3 Erosion and sediment control: submit an erosion and sediment control plan in accordance with EPA 832 / R-92-005 and the requirements of the competent authorities.

1.5 CLOSEOUT DOCUMENTS

.1 Submit required documents / elements in accordance with « 01 78 00 – Closeout Submittals».

.2 Operation and maintenance records: Provide instructions for the operation and maintenance of the surface coating, which will be incorporated into the service manual.

1.6 QUALITY ASSURANCE

.1 At the request of the Departmental Representative, submit the results of tests carried out by the manufacturer and the documents certifying that the proposed surface coating meets the requirements of this section.

1.7 TRANSPORTATION, STORAGE AND HANDLING

.1 Transportation, storage and handling of materials and equipment in accordance with « 01 61 00 – Common Product Requirements » and manufacturer's written instructions.

.2 Delivery and acceptance: deliver materials and materials to the site in their original packaging, which must be labeled with the name and address of the manufacturer.

.3 Storage and Handling:

.1 Store materials and equipment so that they do not rest on the ground in a clean, dry, well ventilated area as recommended by the manufacturer.

.2 Replace damaged materials and equipment with new materials and materials.

.4 Packaging Waste Management: Recover packaging waste for reuse/recycling of other packaging materials as per the Construction Waste Management Plan in accordance with « 01 74 21 - Construction/demolition Waste Management and Disposal ».

PART 2 PRODUCTS

2.1 MATERIALS

.1 Binder spreader, with dosing pump:

.1 Designed, equipped, maintained and operated so that the bituminous binder may be:

.1 maintained at a constant temperature;

.2 applied in uniform layers on surfaces up to 5 meters wide;

.3 applied at a controlled rate of 0.2 to 5.4 L/m², the allowable deviation not exceeding 0.1 L/m², whatever the prescribed rate of application;

.4 spread in a uniform, non-sprayed jet at the prescribed rate and temperature.

.2 Equipped with a meter to record the number of metres per minute in a conspicuous position and allowing the driver of the truck to maintain the speed required for the application of the product at the prescribed rate.

.3 Equipped with a pump equipped with a flow meter placed in the sight of the driver and graduated in units of no more than 5 liters of bituminous binder delivered to the nozzles per minute and operated by a self-contained power unit (independent of that of the truck).

.4 Provided with an accurate and readily readable device for recording the temperature of the liquid contained in the tank.

.5 Equipped with accurate volume measuring instruments, or calibrated tank.

.6 Equipped with sprinklers of the same make and size and adjustable according to the width and orientation of the desired jet.

.7 The machine must be cleaned if it has previously been used with bituminous material incompatible with the material to be spread.

.2 Spreader:

.1 Provided with controls to uniformly spread the desired amount of aggregate across the width of the deposited binder tape.

.2 Provided with self-propelled unit of model approved by Departmental Representative.

.3 Including at least four (4) wheels with tires, mounted on two (2) axles.

.3 Compactor rollers:

.1 Self-propelled rollers, pneumatic, with a pressure of not less than 7 tons per metre roll width, with at least seven (7) offset front and rear wheels and a-pressure of inflated tires of 415 kPa.

.2 Tandem steel roller or rubber coated steel roller vibrators, approved by the Departmental Representative.

.1 Minimum diameter of cylinders: 1 m.

.2 Minimum static pressure: 4.3 tons per metre of cylinder width.

.4 Mechanical sweeper: self-propelled, pneumatically operated, with precise angle adjustment in vertical and horizontal direction.

2.2 MATERIALS

Double surface treatment:

.1 Bituminous binder: bitumen emulsion, modified or unmodified with polymers, fast break, anionic, type RS-2. The application rates of the binder are approximately 2.0 L/m² for the first layer and 1.6 L/m² for the second layer.

.2 Aggregates: Consisting of materials in accordance with "31 05 16 - Aggregates" and the following requirements:

.1 Crushed stone or gravel. The aggregates must be the same as those used for the concrete in the slab on the wharf.

.2 Aggregates must meet the requirements of NQ 2560-114 for intrinsic hardness and manufacturing characteristics (cleanliness, shape and angularity).

.3 The aggregates used must also comply with the requirements of Standard 4301 of the Ministère des Transports du Québec. The categories of aggregates required are classes 1d, 2d or 3d.

.4 TS1: 14-20mm / TS2: 5-10mm.

.5 Los Angeles test (resistance to fragmentation): according to ASTM C131, mass loss of at most 25%.

.6 Magnesium sulfate stability: according to ASTM C88, mass loss of not more than 15%.

.7 Plates and needles with a length/thickness ratio greater than 5: maximum proportion by weight of 8%.

.3 Adhesiveness agent: Product approved by the Departmental Representative, heat stable.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of conditions: Before proceeding with the surface treatment, ensure that the condition of surfaces/substrates previously applied under other sections or contracts is acceptable and In accordance with the manufacturer's written instructions.

.1 Immediately notify Departmental Representative of any unacceptable conditions identified.

.2 Begin implementation work only after correcting unacceptable conditions and received written approval from Departmental Representative.

3.2 PREPARATION

.1 Temporary means of erosion and sediment control

.1 Establish temporary erosion and sediment control methods to prevent soil loss and to prevent deposition of adjacent paths and roads from runoff or dust, and of wind-driven particulate matter in accordance with the site specific erosion and sediment control plan, prepared in accordance with the most stringent requirements contained in 832/R-92-005 issued by the EPA and those established by the requirements of the competent authorities.

.2 Inspect, maintain and repair existing control methods until permanent vegetation is established.

.3 Remove the control methods and recondition and stabilise the surfaces disturbed during these works.

.2 Level granular base coat according to prescribed level and profile. Slightly flatten the surface, compact it and apply the impregnating bitumen.

.3 Dispose of the mud, dust, and other foreign matter in the hard-coated or impregnated bitumen. If necessary, immediately before applying the bituminous binder, sweep the surface or in any other way remove foreign matter.

3.3 IMPLEMENTATION

.1 Approve base coat and hard coating by Departmental Representative prior to application of coating binder.

.2 Apply bituminous binder when the existing substrate is dry, when the atmospheric temperature in the shade is greater than 10°C and higher, or higher than 15°C if it is decreasing, and time is clear and dry.

.3 Establish schedule of work to the satisfaction of the Departmental Representative.

.4 Mix adhesive agent with binder once bond has reached desired application temperature.

.5 Mix the adhesiveness agent and binder well by mechanical means or by circulating the mixture using a pump operating at maximum flow rate for at least 30 minutes.

.6 The spreader must travel in a straight line parallel to the roadway axis.

.7 Extend a protective cover of construction paper or other acceptable material over the width of the surface and a sufficient length upstream of the surface to be treated in order to operate the sprayer nozzles at full flow once they reach the surface to be coated.

.1 Remove protective cover when no longer required and disposed of as deemed acceptable by Departmental Representative.

.8 Apply materials in the following quantities. The Departmental Representative will determine the quantities of binder and aggregates to be applied.

.1 Two-ply surface coating: two applications with a total thickness of ± 12.5 mm, as follows:

	Bituminous binder per square metre	Aggregates per square metre
First application	2.00 L	18 kg/m²
Second application	1.60 L	14 kg/m²

.9 Using a dosing pump spreader, apply the binder at the prescribed application rate and application temperature specified in the CGSB standard that applies to the type and class of material used.

.10 Apply unfrozen aggregates immediately after application of bituminous binder. The binder must not be more than 30 meters behind the binder spreader. Do not apply more aggregates than the amount that can be properly incorporated into or absorbed by the binder.

.11 Proceed in such a manner that the tires of the spreader do not come into contact with the binder uncovered or freshly applied at any time.

.12 Immediately after spreading the aggregates, cover the stripped areas with an additional amount of aggregate.

.13 Adjust rate of application of binder and aggregates as directed by Departmental Representative.

.14 Roll surface immediately after spreading of aggregate with at least three (3) rollers compactors.

.1 At least two (2) of these rolls shall be on tires.

.15 Perform at least three (3) roll passes over the entire treated area.

.16 Once the binder has sufficiently hardened to the satisfaction of the Departmental Representative, apply the subsequent coat.

.17 Maintain the treated area as directed by the Departmental Representative for a period of four (4) days following rolling.

.1 Maintenance operations shall include the spreading of aggregates on the treated surface to absorb excess binder and the application of aggregates to the bare surfaces.

.18 Remove surplus materials from the treated surface by sweeping at times indicated by the Departmental Representative and at the end of the maintenance period.

.19 Be careful not to move coated materials during maintenance operations.

3.4 CLEANING

.1 Cleaning during work: perform cleaning operations in accordance with « 01 74 11 – Cleaning ».

.1 Clean area at the end of each working day.

.2 Final cleaning: After completion of work, dispose of surplus materials/materials, waste, tools and equipment in accordance with « 01 74 11 – Cleaning ».

.3 Dispose of surplus materials by sweeping at times indicated by the Departmental Representative and at the end of the maintenance period.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.3 Section 32 91 19.13 – Topsoil Placement and Grading

.4 Section 32 92 23 – Sodding

.5 Section 32 93 10 – Plantation of Trees, Shrubs and Plant Soil-Coverings

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A1064/A1064M-16b, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.2 CSA Group

.1 CSA G30.18-C2014, Carbon Steel Bars for Concrete Reinforcement.

.3 Health Canada - Pest Management Regulatory Agency (PMRA)

.1 National Standard for Pesticide Education, Training and Certification in Canada (1995).

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.2 Fertilizers Act (R.S. 1985, c. F-10).

.3 Fertilizers Regulations (C.R.C., c. 666).

.4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.3 DEFINITIONS

.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's instructions, printed product literature and data sheets for tree and shrub preservation materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide monthly written reports on maintenance during warranty period, to Departmental Representative identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

.3 Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 43- Environmental Procedures.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and section 01 61 00- Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

1.6 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 Apply pesticides in accordance with National Standard for Pesticide Education, Training and Certification in Canada, Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Departmental Representative prior to application.

.3 Apply fertilizer in early spring at manufacturer's suggested rate.

.4 Remove dead, broken or hazardous branches from plant material. Dispose of debris through ecological disposal.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Fill:

.1 Type (A): clean, natural river sand and gravel material, free from silt, clay, loam, friable or soluble materials and organic matter.

.2 Type (B): excavated soil, free from roots, rocks larger than 75 mm, building debris, and toxic ingredients (salt, oil, etc). Excavated material shall be approved by Departmental Representative before use as fill.

.2 Coarse washed stones: 35-75mm diameter clean round hard stone.

.3 Drain tile: 150mm diameter corrugated plastic perforated tubing complete with snap couplings

.4 Unamended Peatmoss:

.1 Derived from partially decomposed species of Sphagnum Mosses.

.2 Elastic and homogeneous.

.3 Free of wood and deleterious material which could prohibit growth.

.4 Shredded minimum particle size: 5mm.

.5 Fertilizer:

.1 To Canada Fertilizer Act and Fertilizers Regulations.

.2 Complete, commercial, slow release with 35% of nitrogen content in water-insoluble form.

.6 Anti-desiccant: commercial, wax-like emulsion.

.7 Filter Cloth:

.1 Type 1: 100 % non-woven needle punched polyester, 2.75 mm thick, 240 g/m2mass.

.2 Type 2: biodegradable burlap.

.8 Wood posts: 38x 89x 2400mm length, untreated wood.

.9 Welded wire fabric (WWF): 102 mm x 102 mm, size MW 13.3 X MW 13.3.

.10 Board Cladding: to consist of 50 x 100 mm lumber secured around the perimeter of tree trunks with plastic strapping or other means which will not damage the tree.

.11 Tree Barriers: steel T-rail posts 40 x 40 x 5 x 2440 mm, at 1800 mm o.c., with wood slat snow fencing attached to posts with 9 gauge wire, 13 per post.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for tree and shrub preservation 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.

3.2 IDENTIFICATION AND PROTECTION

.1 Tree protection to be installed prior to the start of any on site work.

.2 Identify plants and limits of root systems to be preserved as approved by Departmental Representative.

.3 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by Departmental Representative.

.4 Ensure no root pruning is done inside drip line. If pruning inside drip line is required consult an arborist or Canadian Certified Horticultural Technician (CCHT) as approved by Departmental Representative.

3.3 TRUNK PROTECTION

.1 Install board cladding vertically around the perimeter of designated deciduous trees within the active work zone.

3.4 PROTECTION OF THE ROOT SYSTEM OF EXISTING TREES NEAR WORK AND TRAFFIC

.1 Circulation of machinery around existing trees to be protected is prohibited. Machinery movements result in compaction of the soil and permanent deterioration of the root system. This type of stress is also fatal in most cases.

.1 The Contractor shall provide a fenced-in protection area around trees at the edges of the works or traffic areas in order to eliminate any possible damage.

.2 The protection zone shall be equivalent to the footprint of the tree foliage.

.3 Protective fencing shall be erected with a metal fence or a "snow fence" type fence. Plastic fencing is not allowed.

.2 The impact of traffic areas spanning the root system shall be minimized by physical protection consisting of:

.1 Short duration: ≤ 1 month with ramial chipped wood (RCW) over a minimum thickness of 150mm.

.2 Long life:> 1 month with a geotextile and a minimum of 150 mm of crushed aggregates.

3.5 ROOT CURTAIN SYSTEM

.1 Identify limits for required construction excavation as approved by Departmental Representative.

.2 Prior to construction excavation, dig trench minimum 500mm wide x 1500mm deep, along perimeter of excavation limits.

.3 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point

.4 Install wooden posts and welded wire fabric against construction edge of trench.

.5 Securely attach Type 2 filter fabric on plant side of wire mesh.

.6 Prepare homogeneous mixture of fertilizer, parent material and organic matter.

.1 Add organic matter to mixture to achieve 7-9% organic matter content by weight.

.2 Incorporate with mixture grade 2:12:8 ratio fertilizer (dry) at rate of 1.5kg/m^3.

.7 Backfill with homogeneous mixture between curtain wall and plants to be preserved in layers not exceeding 150mm in depth. Compact each layer to 85% Standard Proctor Density.

.8 Protect root curtain from damage during construction operations.

.9 Water plants and root curtain sufficiently during construction to maintain optimum soil moisture condition until backfill operations are complete.

.10 Remove root curtain before backfill operations. Ensure root curtain is cut down to 300mm below finished grade and remove cut material.

3.6 AIR LAYERING SYSTEM

.1 Using manual methods, carefully remove turf, plants, leaves and organic matter in area of root system, dispose of plant matter through compost site and slightly loosen topsoil surface. Avoid damage to root system.

.2 Lay horizontal system of perforated drain pipe on surface of existing grade.

.1 Slope drain tile minimum 3% for drainage away from trunk of tree.

.2 Connect system with general site drainage system or drain to low point on site.

.3 Install recycled content plastic vent pipes vertically over joints in horizontal pipe system or where indicated. Top of vent pipe to be 20mm above finished grade of fill. Keep top of vent pipe covered during construction.

.4 Cover joints with Type 1filter fabric and place coarse washed stone around joints and vertical pipes to secure their position.

.5 Construct drywell around trunk of tree.

.1 Ensure open ends of horizontal pipe system and vertical vent pipes are left exposed for air circulation to root system.

.2 Protect openings from blockage during construction.

.3 Install protective caps on exposed horizontal openings.

.6 Place 200mm depth of coarse washed stone on surface of original ground and horizontal pipe system to limits.

.7 Place Type 1 filter fabric over surface of granular layer.

.8 Place Type A fill over filter fabric to required depth without disturbing or damaging drain pipe system. Avoid damage to filter fabric.

.9 Complete topsoil and sodding over area of sub-surface system within 1 week of placing fill.

.10 Remove temporary protective covering from vent pipe openings. Install protective caps flush with finished grade.

3.7 TRENCHING AND TUNNELING FOR UNDERGROUND SERVICES

.1 Centre line location and limits of trench/tunnel excavation to be approved by Departmental Representative prior to excavation. Tunnel excavation to extend 2000 mm from edge of trunk on either side.

.2 Excavate manually within zone of root system. Do not sever roots greater than 40 mm diameter except at greater than 500 mm below existing grade. Protect roots, and cut roots cleanly with sharp disinfected tools.

.3 Excavate tunnel under centre of tree trunk using methods and equipment approved by Departmental Representative.

.4 Minimum acceptable depth to top of tunnel: 1000 mm.

.5 Backfill for tunnel and trench to 85% Standard Proctor Density. Avoid damage to trunk and roots of tree.

.6 Complete tunnelling and backfilling at tree within two (2) weeks of beginning Work.

3.8 LOWERING GRADE AROUND EXISTING TREE

.1 Begin Work in accordance with schedule approved by Departmental Representative.

.2 Cut slope not less than 500 mm from tree trunk to new grade level.

.3 Excavate to depths as indicated. Protect root zone designated to remain from damage.

.4 When severing roots at excavation level, cut roots with clean, sharp tools.

.5 Cultivate excavated surface manually to 15 mm depth.

.6 Prepare homogeneous soil mixture consisting by volume of:

.1 60% excavated soil cleaned of roots, plant matter, stones, debris.

.2 25% coarse, clean sterile sand.

.3 15% organic matter.

.4 Grade 2:12:8 fertilizer at rate of 1.5 kg/m^3.

.7 Place soil mixture over area of excavation to finished grade level. Compact to 85% Standard Proctor Density.

.8 Water entire root zone to optimum soil moisture level.

.9 Install surface cover of sodding in accordance with Section 32 92 19.13- Mechanical Seeding.

3.9 PRUNING

.1 Prune crown to compensate for root loss while maintaining general form and character of plant. Dispose of debris through mulching.

3.10 ANTI-DESICCANT

.1 Apply anti-desiccant to foliage where applicable and as directed by Departmental Representative.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for recycling or reuse in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENT

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 05 16 – Aggregate Materials

.3 Section 31 23 33.01 – Excavating, Trecnching and Backfilling

.4 Section 31 32 19.01 – Geotextiles

.5 All of the sections of division 32 – Exterior Improvements

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C117-13, Standard Test Methods for Material Finer Than 0.075 (No 200) mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.

.5 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.6 ASTM D1557-16, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).

.7 ASTM D1883-16, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.8 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 TRANSPORTATION, STORAGE AND HANDLING

.1 Transport, store and handle materials and equipment according to section 01 61 00 –Common Product Requirements.

PART 2. PRODUCTS

2.1 MATERIALS

.1 Sub-base material (MG-112) must comply to the following requirements.

.1 Crushed, pit run or screened stone, gravel or sand

.2 The granulometry of the materials after compaction must be within the following limits of the granulometric curve traced on semi-logarithmic paper and must be continuous and un-interrupted:

Sieve	% Passing
112 mm	100
5,0 mm	12 - 100
0,080 mm	0 – 10

.3 Liquid Limit : maximum 25, to ASTM D4318;

.4 Plasticity Limit: maximum 6, to ASTM D4318;

.5 Particles smaller than 0.02 mm: to ASTM D422, Maximum 3%.

.6 The physical and mechanical properties must meet the following requirements:

.1 Table of requirements

.2 Testing

BNQ Standards	Sub-base
Petrographic number -maximum	200
Durability $MgSO_4$–maximum percentage	25
Los Angeles – maximum percentage	50
Micro-Deval – maximum percentage	36
Fragmentation – maximum percentage	60
Organic materials – maximum percentage	0,8

.3 Los Angeles: "Aggregates determination of the abrasion resistance using the apparatus Los Angeles", the maximum is 32 instead of 50 in the case of crushed rocks limestone".

.4 Fragmentation: the percentage shown is the percentage by weight of the comminuted particles having at least one face fractured by crushing and retained on the sieve of 5 mm.

.5 Organic matter: LC-31-228 test standard.

PART 3. EXECUTION

3.1 PLACING

.1 Place granular sub-base above subgrade is inspected and approved by the Departmental Representative.

.2 Place granular backfill next to structure to be backfilled once approved by the Departmental Representative.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow or ice.

.5 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.6 Place material to full width in uniform layers not exceeding 300 mm compacted thickness. The Departmental Representative may authorize thicker lifts if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Equipment must be equipped with device that records hours of actual work, not motor running hours.

.3 Compact to density of not less than 90% maximum modified Proctor.

.4 Compact to density of not less than 95% maximum modified Proctor for the final 150 mm.

.5 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.6 Apply water as necessary during compaction to obtain specified density. If the soil is too humid, dry it by scarifying with appropriate equipment until the water content returns to normal.

.7 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.

.8 In some sensitive areas, dynamic compaction may be carried out only after written authorization has been received from the Departmental Representative.

3.3 PROOF COMPACTION

.1 For proof compaction, use standard roller of 45 400 kg gross mass with four pneumatic tires each carrying 11 350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.

.2 Obtain written approval from the Departmental Representative to use non-standard proof compaction equipment.

.3 Proof compaction at level in sub-base as indicated. If non-standard proof compaction equipment is approved, the Departmental Representative will determine level of proof rolling.

.4 Make sufficient passes with proof compactor to subject every point on surface to three separate passes of loaded tire.

.5 Where proof compaction reveals areas of defective subgrade:

.1 Remove sub-base and subgrade material to depth and extent as directed by the Departmental Representative.

.2 Backfill excavated subgrade with sub-base material and compact in accordance with this section.

.3 Replace sub-base material and compact.

.6 Where proof compaction reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.4 SITE TOLERANCES

.1 Finished sub-base surface to be within 20 mm of elevation as indicated but not uniformly high or low.

3.5 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by the Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 05 16 – Aggregate Materials

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.4 All of the sections of division 32 – Exterior Improvements

1.2 REFERENCE STANDARDS

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

.1 ASTM C117-13, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C131/C131M-14], Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136/C1136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft – 16 ft/ft^3) (600kN-m/m3).

.5 ASTM D4318-10e1, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-8.1-88, Sieves Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

1.4 TRANSPORTATION, STORAGE AND HANDLING

.1 Transport, store and handle the materials and equipment according to section 01 61 00 – Common Product Requirements

.2 Excess materials are to be diverted from landfill to site approved Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Granular base material: to Section 31 05 16- Aggregate Materials]and following requirements:

.1 Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material and other deleterious materials.

.2 In the tests carried out in accordance with ASTM C136 and ASTM C117, the particle size of the materials after compaction shall remain within the following limits and the particle size distribution drawn on a semi-logarithmic diagram shall be continuous and unbroken.

Screen	% passing	
	MG56	**MG20**
80 mm	100	100
56 mm	82-100	100
31,5 mm	50-80	100
20 mm	s.o.	90-100
14 mm	s.o.	68-93
5 mm	25-50	35-60
1,25 mm	s.o.	14-38
0,315 mm	4-18	9-17
0,080 mm	2-7	2-7

.3 Physical and mechanical properties of aggregates of lower and upper granular bases must meet following requirements:

.1 Table of Requirements

.2 Tests

BNQ Standards	Sub-fondation
Maximum petrographic number	200
Durability $MgSO_4$ – maximum percentage	20
Los Angeles –maximum percentage	50
Micro-Deval – maximum percentage	33
Fragmentation – minimum percentage	100
Organic matter – maximum percentage	0.8

.4 Los Angeles: “Granulates –Determination of the abrasion resistance using the Los Angeles device,” maximum 32 instead of 50 in case of limestone crushed stone.

.5 Degradation: percentage indicated is percent by mass of fragmented particles having at least one face fractured by crushing and retained on 5 mm sieve.

.6 Organic matter: to testing standard LC31-228.

.7 Materials must not contain over 3.5% particles finer than 0.02 mm.

.8 Liquid limit: to ASTM D4318-84, maximum 25.

.9 Plasticity index: to ASTM D4318-84, maximum 6.

PART 3 EXECUTION

3.1 SEQUENCE OF OPERATION

.1 Scarifying and reshaping:

.1 Scarify roadbed to width as indicated unless directed otherwise by Departmental Representative and to minimum depth of 100 mm.

.2 Blade and trim pulverized material to elevation and cross section dimensions as indicated unless directed otherwise by Departmental Representative.

.3 Where deficiency of material exists, add and blend in new granular base material as directed by Departmental Representative. Ensure no frozen material is used.

.2 Compaction equipment:

.1 Compaction equipment capable of obtaining required material densities.

.2 Provide Departmental Representative with proof of equipment efficiency for unspecified equipment.

.1 Efficiency of proposed equipment equal to specified equipment.

.2 Obtain approval Departmental Representative before use.

.3 Equip with device that records hours of actual work, not motor running hours.

.3 Compacting:

.1 Compact to 98% of modified maximum proctor density..

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compaction to obtain specified density.

.4 Use mechanical tampers to compact areas not accessible to rolling equipment to specified density.

.5 In certain sensitive areas, dynamic compaction may be carried out only after written authorization has been received from the Departmental Representative.

.4 Repair of soft areas:

.1 Correct soft areas by removing defective material to depth and extent directed by Departmental Representative. Replace with material acceptable to Departmental Representative and compact to specified density.

.2 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until acceptance by Departmental Representative.

3.2 SITE TOLERANCES

.1 Reshaped compacted surface within plus or minus 10 mm of elevation as indicated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 05 16 – Aggregate Materials

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.4 All of the sections of division 32 – Exterior Improvements

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C117-13, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3).

.5 ASTM D1557-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).

.6 ASTM D1883-16, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.7 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

1.3 TRANSPORTATION, STORAGE AND HANDLING

.1 Transport, store and handle the materials and equipment according to section 01 61 00 – Common Product Requirements

PART 2 PRODUCTS

2.1 MATERIALS

.1 Granular foundation: material in accordance with specifications and following requirements:

.1 Crushed stone or gravel consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Physical and mechanical properties of aggregates of lower and upper granular bases must meet following requirements:

.1 Table of Requirements

.2 Tests

BNQ Standards	**Sub-fondation**
Maximum petrographic number	200
Durability $MgSO_4$ – maximum percentage	20
Los Angeles –maximum percentage	50
Micro-Deval – maximum percentage	33
Fragmentation – minimum percentage	100
Organic matter – maximum percentage	0.8

.3 Los Angeles: “Granulates –Determination of the abrasion resistance using the Los Angeles device,” maximum 32 instead of 50 in case of limestone crushed stone.

.4 Degradation: percentage indicated is percent by mass of fragmented particles having at least one face fractured by crushing and retained on 5 mm sieve.

.5 Organic matter: to testing standard LC31-228.

.6 Materials must not contain over 3.5% particles finer than 0.02 mm.

.7 Liquid limit: to ASTM D4318-84, maximum 25.

.8 Plasticity index: to ASTM D4318-84, maximum 6.

2.2 GRANULAR FOUNDATION

.1 Gradations when compacted to be within limits specified below when tested to ASTM C136-82 and ASTM C117-80, and grading curve on semi-logarithmic chart must be continuous and unbroken.

Sieve	**% passing**	
	MG56	**MG20**
80 mm	100	100
56 mm	82-100	100
31, 5 mm	50-80	100
20 mm	n.a.	90-100
14 mm	n.a.	68-93
5 mm	25-50	35-60
1,25 mm	n.a.	14-38
0,315 mm	4-18	9-17
0,080 mm	2-7	2-7

PART 3 EXECUTION

3.1 SEQUENCE OF OPERATION

.1 Place granular base after sub-base is inspected and approved by the Departmental Representative.

.2 Installation

.1 Place the material of the foundation layer, once the sub-foundation layer is inspected and approved by the Departmental Representative.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

.4 Place material using methods which do not lead to segregation or degradation of aggregate.

.5 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. The Departmental Representative may authorize thicker layers if specified compaction can be achieved.

.6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.7 Remove and replace portion of layer in which material has become 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 98% maximum mass volume modified Proctor.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtain specified density. If soil is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.

.4 In certain sensitive areas, dynamic compaction may be carried out only after written authorization has been received from the Departmental Representative.

3.2 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.

3.3 PROTECTION

.1 Maintain finished base in condition conforming to this Section until acceptance by the Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 05 16 – Aggregate Materials

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.4 All of the sections of division 32 – Exterior Improvements

1.2 REFERENCE STANDARDS

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

.1 ASTM D140/D140M-16, Standard Practice for Sampling Asphalt Materials.

.2 ASTM D633-11 (2016), Standard Volume Correction Table for Road Tar.

.3 ASTM D1250-08 (2013)e1, Standard Guide for Use of the Petroleum Measurement Tables.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Submit two (2) 1 à 4 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth containers to Departmental Representative, at least two (2) weeks prior to beginning Work.

.3 Sample asphalt tack coat material to: ASTM D140.

.4 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work to ASTM D140.

1.4 QUALITY ASSURANCE

.1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with ASTM D140.

.2 Provide, maintain and restore asphalt storage area.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling or reuse in accordance with Section 01 74 21- Construction/Demolition Waste Management And Disposal or with the Waste Reduction Workplan.

.2 Send unused asphalt material to an appropriate recycling facility.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade:SS-1 or SS-1h.

.2 Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

.1 Pressure distributor: Designed, equipped, maintained and operated so that asphalt material can be:

.1 Maintained at even temperature.

.2 Applied uniformly on variable widths of surface up to 5 m.

.3 Applied at readily determined and controlled rates from 0.2to 5.4 L/m² with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m².

.4 Distribute in uniform spray without atomization at temperature required.

.2 Equipped with meter, registering travel in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.3 Equipped with pump having flow metre graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.

.4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.

.5 Equipped with accurate volume measuring device or calibrated tank.

.6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of are acceptable for asphalt tack coat 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.

3.2 APPLICATION

.1 Apply asphalt tack coat only on clean and dry surface.

.2 Dilute asphalt emulsion with water at 1:1ratio for application.

.1 Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply asphalt tack coat evenly to pavement surface at rate as directed by Departmental Representative but not to exceed 0.2 L/m².

.4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.5 Apply asphalt tack coat only when air temperature greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.

.6 Apply asphalt tack coat only on unfrozen surface.

.7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.9 Keep traffic off tacked areas until asphalt tack coat has set.

.10 Re-tack contaminated or disturbed areas as directed by Departmental Representative.

.11 Permit asphalt tack coat to set before placing asphalt pavement.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 05 16 – Aggregate Materials

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.4 All of the sections of division 32 – Exterior Improvements

1.2 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.

.2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.

.3 AASHTO T245-97(2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

.2 Asphalt Institute (AI)

.1 AI MS-2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

1.2.2 ASTM International

.1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.

.4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

.5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

.6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.7 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.8 ASTM C207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.

.9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.10 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.11 ASTM D3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 Conseil du bâtiment durable du Canada (CBDCa)

.1 LEED Canada-NC, version 1.0-2004, LEED (Leadership in Energy and Environmental Design) : Système d'évaluation des bâtiments écologiques pour nouvelles constructions et rénovations importantes (Trousse de référence) (y compris l'addenda [2007]).

.3 Office des normes générales du Canada (ONGC ou CGSB)

.1 CAN/CGSB-8.1-88, Tamis de contrôle en toile métallique, non métriques.

.2 CAN/CGSB-8.2-M88, Tamis de contrôle en toile métallique, métriques.

.4 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 SAMPLES

.1 Inform the Departmental Representative of proposed source of aggregates and provide access for sampling one (1) week prior to beginning Work.

.2 Submit samples of following materials proposed for use one (1) week prior to beginning Work.

.1 One 5 L container of asphalt cement.

1.4 MATERIAL CERTIFICATION

.1 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least one (1) week prior to beginning Work.

.2 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.

.3 Submit calibration charts for each hot load and each cold load.

1.5 SUBMITTAL OF MIX DESIGN

.1 Submit asphalt concrete mix design and trial mix test results to the Departmental Representative at least one (1) week prior to beginning Work

1.6 DELIVERY AND STORAGE

.1 Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.

.2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.3 When using a mixing drum dryer, stockpile fine aggregate separately from coarse aggregate.

.4 Provide approved storage, heating tanks and pumping facilities for asphalt cement, and have them approved.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Performance graded asphalt cement: to AASHTO M320, grade PG 28, 58 when tested to AASHTO R29.

.2 RAP

.3 Aggregates: in accordance with Section 31 05 16- Aggregate Materials and requirements as follows:

.1 Crushed stone or gravel.

.2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.

.3 Table

Seive Designation	% passing	
	EB-14	EB-10C
20 mm	100	
14 mm	95 -100	100
10 mm	75 – 90	94 – 100
5 mm	50 – 65	66 – 78
2,5 mm	29 – 47	45 – 65
1.25 mm	20 – 40	30 – 50
0,630 mm	14 – 34	20 – 40
0.315 mm	10 – 26	14 – 29
0.160 mm	5 – 17	7 – 18
0,080 mm	3,0 – 8,0	4,0 – 10,0

.4 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.

.5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.

.6 Separate stockpiles for coarse and fine aggregates not required for sheet asphalt.

.7 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.8 Sand equivalent: ASTM D2419. Min: 50.

.9 Magnesium Sulphate soundness: to ASTM C88. Max % loss by mass:

.1 Coarse aggregate: 12%.

.2 Fine aggregate: 16%.

.10 Los Angeles degradation: Grading B, to ASTM C131. Max % loss by mass:

.1 Coarse aggregate: 35%.

.11 Absorption: to ASTM C127. Max % by mass:

.1 Coarse aggregate: 2.00%.

.12 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:

.1 Coarse aggregate: 2.0%.

.13 Lightweight particles: to ASTM C123. Max % by mass less than 1.95 relative density:

.1 3.0%.

.14 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5): Max % by mass:

.1 Coarse aggregate: 15%.

.15 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have 1 minimum freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.

.16 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.4 Mineral filler:

.1 Ensure finely ground particles of limestone, hydrated lime, Portland cement or non-plastic mineral matter approved by Departmental Representative are thoroughly dry and free from lumps.

.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Departmental Representative to improve mix properties.

.3 Ensure mineral filler is dry and free flowing when added to aggregate.

.5 Anti-stripping agent: hydrated lime to ASTM C207 type N.

.1 Add lime at rate of approximately 2-3 % of dry weight of aggregate.

.6 Water: to approval of Departmental Representative.

2.2 EQUIPMENT

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:

.1 Drum diameter: 1200mm minimum.

.2 Amplitude of vibration (machine setting): 0.5 mm maximum for lifts less than 40 mm thick.

.4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

.1 Boxes with tight metal bottoms.

.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

.3 In cool weather or for long hauls, insulate entire contact area of each truck box.

.4 Use only trucks which can be weighed in single operation on scales supplied.

.5 Hand tools:

.1 Lutes or rakes with covered teeth for spreading and finishing operations.

.2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm2for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by , may be used instead of tamping irons.

.3 Straight edges, 4.5m in length, to test finished surface.

.6 Plant testing facility: provide laboratory space at plant site for exclusive use of Departmental Representative, for performing tests, keeping records and making reports.

2.3 MIX DESIGN

.1 Mix design to be [provided] [approved]in writing by Departmental Representative .

.2 Mix design to be developed by testing laboratory approved in writing by Departmental Representative.

.3 Design of mix: by Marshall method to requirements below.

.1 Compaction blows on each face of test specimens: 50.

.2 Mix physical requirements:

Property	Roads
Liant (% min) EB 14 EB 10.C	 4,7 5,2
Marshall Stability at 60 degrees C kN min	9,0
Flow Value mm	2-4
Air Voids in Mixture, %	2-45
Voids in Mineral Aggregate, % min	15
Index of Retained Stability % minimum	75

.3 Measure physical requirements as follows:

.1 Marshall load and flow value: to AASHTO T245.

.2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.

.3 Air voids: to ASTM D3203.

.4 Index of Retained Stability: measure in accordance with Section 32 12 10- Marshall Immersion Test for Bitumen.

.4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula [to be reviewed] [will be provided] [to be approved]by [Departmental Representative] [DCC Representative] [Consultant].

.5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

PART 3 EXECUTION

3.1 EQUIPMENT

.1 Pavers: mechanical grade controlled, self-powered pavers, capable of spreading mix within specified tolerances, true to line, grade and crown indicated. Hydraulic extensions on paver is not permitted unless it is equipped with an auger, heating plates and vibrators. Augers must be at least 0.5 m from the exterior edge of the extension.

.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

.3 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

.1 Boxes with tight metal bottoms.

.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

.3 In cool weather or for long hauls, insulate entire contact area of each truck box.

.4 Use only trucks which can be weighed in single operation on scales supplied.

.4 Hand tools:

.1 Lutes or rakes with covered teeth for spreading and finishing operations.

.2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm^2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by the Departmental Representative, may be used instead of tamping irons.

.3 Straight edges, 4.5 m in length, to test finished surface.

3.2 PREPARATION OF SURFACES TO COVER

.1 Apply layers of prime coat and tack coat prior to paving.

.2 Prior to laying mix, clean surfaces of loose and foreign material.

.3 When more than one layour of asphalt concrete is required, apply a layer of tack coat between the two (2) layers.

3.3 TRANSPORTATION OF MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required. Lift bucket to drain any excess solution.

.3 Schedule delivery of material for placing in daylight, unless the Departmental Representative approves artificial light for night placing.

.4 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as prescribed, but not less than 135 degrees C.

3.4 PLACING

.1 Obtain the Departmental Representatives approval of base, existing surface, tack coat prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines as indicated on the drawings or as directed by the Departmental Representative.

.3 Place asphalt mixtures only when air temperature is 5 degrees C minimum.

.4 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.

.5 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.6 Place asphalt concrete in compacted lifts of thickness as indicated on plans.

.1 Levelling course to thicknesses required but not exceeding 50 mm.

.2 Surface course in one layer 50 mm.

.7 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm. Verification of the profile must be done regularly by the Contractor with a 4.5 m straight edge.

.8 Where more than on layer of asphalt concrete is required, spread a fine skin of tack between the layers, according to the Agency Representatives directions.

.9 Place individual strips no longer than 500 m.

.10 Commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.

.11 Spread and strike off mixture with self-propelled mechanical finisher.

.1 Construct longitudinal joints and edges true to line markings. The Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.

.2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.

.3 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

.4 Correct irregularities in alignment left by paver by trimming directly behind machine.

.5 Correct irregularities in surface of pavement course directly behind paver. Remove excess material forming high spots using shovel or lute. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.

.6 Do not throw surplus material on freshly screed surfaces.

.12 When hand spreading is used:

.1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

.2 Distribute material uniformly without broad casting material.

.3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.

.4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.

3.5 COMPACTING

.1 Roll asphalt continuously using established rolling pattern for test strip and to density of not less than 98% of maximum density determined for blow Marshall test strip. Joints must be compacted to a minimum of 96% of the maximum density of the Marshal sample gathered of the mix used.

.2 General:

.1 Provide rollers and as many additional rollers as necessary to achieve specified pavement density, (1 roller must be pneumatic tired type with a minimum weight of 20 metric tonnes) and as many others as necessary to obtain the maximum density specified for the asphalt layer.

.2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface. Ensure that the temperature of the mix is within the specified limits for compacting as indicated on the asphalt certificate.

.3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and 8 km/h for pneumatic tired rollers.

.4 Overlap successive passes of roller by minimum of one-half width of the roller and vary pass lengths.

.5 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

.6 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

.7 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.

.8 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.

.9 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.

.10 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.11 The equipment and compaction work must not damage concrete slabs or other infrastructures adjacent to the asphalt.

.12 Do not drive on concrete slabs with a metal roller.

.3 Breakdown rolling:

.1 Begin breakdown rolling with static steel wheeled roller or vibratory roller immediately following rolling of transverse and longitudinal joint and edges.

.2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.

.3 Operate breakdown roller with drive roll or wheel nearest finishing machine except when working on steep slopes or super-elevated sections.

.4 Use only experienced roller operators.

.4 Intermediate rolling:

.1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.

.2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.5 Finish rolling:

.1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by the Agency Representative.

.2 Conduct rolling operations in close sequence.

3.6 JOINTS

.1 General:

.1 Prepare the vertical face to supply straight surfaces and profiles on which can be posed a new covering. Eliminate all non-adherent substances.

.2 All cold joints, when the temperature is less than 80°C, longitudal and transversal must be heated before the placing of asphalt concrete with an infrarouge heating device. The heating equipment must be installed on the paver and designed for the type of work. The equipment must heat the joints between 80°C and 120°C. The equipment must be approved by the Departmental Representative.

.3 Overlap by 100 mm on previous strip laid by the paver.

.4 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.

.5 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.

.6 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:

.1 Place and compact transverse joints to provide smooth riding surface.

.2 Offset joints by at least 2 m.

.3 Offset transverse joint in succeeding lifts by at least 600 mm.

.4 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.

.3 Longitudinal joints:

.1 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

.2 Roll longitudinal joints directly behind paving operation.

.3 During rolling with a static roller, overlap the new strip along a maximum width of 100 to 150 mm and then operate the roller to firmly pack fine particles across the width of the joint. Continue rolling until the seal is fully and properly compacted

.4 During rolling with a vibrating roller, place the roller so that substantially all of the drum is on the new path with no more than 100 to 150 mm wide overlapped on the previously laid and compacted strip.

.5 Shift of at least 150 mm, the longitudinal seal in successive layers.

.6 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint to ensure joint is smooth and without visible breaks in grade. Locate feather joints as indicated.

3.7 FINISH TOLERANCES

.1 Each layer, inferior and superior must have a uniform texture, a firm surface without segregation and pitting, be regular and compliant to the transvers and longitudinal profiles specified.

.2 After final rolling of each layer, the Departmenatl Representative will check the slopes and surfaces. Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low. Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5m straight edge placed in any direction. The thickness of each layer must not vary more than 5 mm the average thickness specified by the rate of placement specified per square meter, this being transformed to thickness with the help of the net average density obtained during the compaction measurement.

.3 The verification of these irregularities is done with a 4.5 m straight edge that the Contractor must have at all times at the work site.

3.8 DEFECTIVE WORK

.1 The Contractor shall correct deficiencies of Article 3.7 that occur before the end of compacting, by loosening the asphalt mixture and adding or removing materials as needed. If these irregularities or these defects remain, even after the final compaction, quickly remove the top layer and spread a new layer of material to obtain an even and smooth surface and compact immediately to the specified density.

.2 The Contractor shall, at his own expense, repair areas that have signs of cracking or undulations.

.3 All surfaces which present segregation are found to be defective and should be repaired at the expense of the Contractor.

.4 The Contractor shall, at his own expense, correct noncompliant level adjustments under Article 3.8 of the surface of the asphalt and the places that hold water surface.

.5 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

.6 The specifications concerning the physical characteristics mentioned in this specification must be met during production. The paving whose mixture does not meet the requirements of sections 3.1.4, 3.6.1 and the percentage of empty spaces will be judged defective and therefore rejected, unpaid and must be replaced by paving which conforms to the specifications, at the expense of the Contractor.

3.9 QUALITY CONTROL

.1 Control by laboratory

.1 Collect a minimum of two (2) samples of the mix. A comprehensive analysis should be performed on each sample. The briquettes (4) shall be made manually on site without heating the samples, applying 50 strokes / face. .

.2 The rate may be reduced if production is not stable.

.2 Control by the Contractor

.1 The Contractor shall provide at his expense the analysis results for at least one sample of the asphalt product. The sample must be taken together with the laboratory of Parks Canada Agency. A comprehensive analysis should be performed on this sample. .

.2 Briquettes (4) shall be made of manually on site by applying 50 strokes / face and without heating samples of asphalt concrete.

3.10 CLIMATIC CONDITIONS

.1 Install bituminous concrete when ambient temperature permits the construction of bituminous coatings in accordance with the requirements of drawings and specifications. The Departmental Representative reserves the right to stop work if the weather conditions do not seem favorable, especially when the surface temperature is less than 5 °C.

.2 It is prohibited to use bituminous concrete when the surface to be covered is covered with water or mud.

3.11 ALIGNMENTS AND PROFILES

.1 Implementation of bituminous concrete shall be carried out in accordance with the alignments, profiles and sections specified in the plans and specifications and/or instructions of the Departmental Representative. Implement this data in the field from the benchmarks provided to the plans.

3.12 REWORK

.1 Any paving considered by the Departmental Representative as unsuccessful (joints, mixtures, laying, profiles, etc.) shall be taken up by the Contractor to the satisfaction of the Departmental Representative without any additional charge.

3.13 TRAFFIC

.1 The movement of vehicles shall be controlled by the Contractor so that it does not occur on the fresh pavement as long as the surface has not hardened.

.2 Place appropriate signaling at the ends and on the work path to ensure proper control.

3.14 MACHINERIE

.1 The prime contractor reserves the right to require the replacement or modification of any part of machinery that he deems to be inadequate. Provide the appropriate machinery for the operations described in the drawings and specifications in order to obtain top quality work

3.15 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements

.2 Section 03 10 00 – Concrete Formating and Temporary Formwork

.3 Section 03 25 00 – Accessories for Concrete

.4 Section 03 20 00 – Concrete Reinforcing

.5 Section 03 30 00 – Cast-In-Place Concrete

.6 Section 31 05 16 – Aggregate Materials

.7 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.2 REFERENCES

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

.1 ASTM C 109/C109M-02, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).

.2 ASTM C117-13, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D260-86(2001), Standard Specification for Boiled Linseed Oil.

.5 ASTM C309-11 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.6 ASTM C882/C882M-13a Standard Test Method for Bond Strength of Epoxy-resin Systems Used with Concrete by Slant Shear.

.7 ASTM C 939-02, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

.8 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-3.3-99(February 2014), Kerosene, Amend. No. 1, National Standard of Canada.

.2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.3 Canadian Standards Association (CSA International)

.1 CSA-A23.1-F14/A23.2-F14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-A23.5-03, Ajouts cimentaires.

.3 CSA A283-06 (R2016)- Qualification Code for Concrete Testing Laboratories.

.4 CSA A3000-F13 - Compendium des matériaux liants (Contient A3001, A3002, A3003, A3004 et A3005).

.5 CAN/CSA-A5-93, Ciments Portland.

.6 CAN/CSA-A363-M88(R1996), Laitier hydraulique cimentaire.

.7 CAN3-A266.1-M78, Entraîneurs d'air pour le béton.

.8 CAN3-A266.2-M78, Adjuvants chimiques du béton.

.9 CAN3-A266.4-M78, Guide pour l'utilisation des adjuvants du béton.

.10 CAN3-A362-M89, Ciments hydrauliques composés.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Inform Departmental Representative of proposed source of materials and provide access for sampling at least four (4) weeks prior to commencing work.

.3 If materials have been tested by a testing laboratory within previous two (2) months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

.4 Except as provided in writing by the Departmental Representative, provide the Laboratory with a document signed by a recognized petrographer, certifying that none of the harmful alkali-aggregate reactions described in Appendix B of CAN / CSA A23.1 is likely to occur in concrete after its application.

.5 Provide mixing formulas for approval by the laboratory mandated by the Departmental Representative and a certificate stating that the selected dosage form will produce concrete with the required quality, strength and performance and that it meets the requirements of CSA-A23.1 / A23.2.

.6 Submit test results and reports to Departmental Representative for review and, in the event of deviations or discrepancies from the dosage form or the parameters prescribed for concrete mixing, do not proceed without prior written permission.

.7 Concrete mixtures: Submit accurate records of concrete batches, indicating the date and location of each mix, concrete quality, air temperature, and specimens taken as specified in item 3.6 On-site quality control.

.8 Concrete Transport Time: Submit to the Departmental Representative for review any discrepancies greater than the maximum allowable time of 105 minutes for delivery of the concrete to the site and the spillage of the mixes.

.9 Submit two (2) copies of WHMIS Material Safety Data Sheets.

1.4 QUALITY ASSURANCE AND CONTROL

.1 All concrete must be ready-mix ready and must be from a single dosing unit that must have ABQ-BNQ certification. The choice of this manufacturer is subject to approval by the Departmental Representative.

.2 The manufacturer of the ready-mix concrete shall be solely responsible for the dosage of the concrete and shall, at his own expense, take all necessary measures to ensure the quality and uniformity of his product.

.3 Provide a certificate that the mixing plant, equipment and materials to be used in the concrete production meet the requirements of CSA-A23.1 / A23.2.

.4 Provide a certificate that the selected dosage form will produce concrete with the required quality and performance, the strength of which will meet the requirements of CAN/CSA-A23.1 and the dosage formula has been modified to prevent problems likely to be caused by the aggregate-alkali reaction.

.5 Submit to the Departmental Representative, at least four (4) weeks prior to commencement of concreting, a valid and recognized certificate issued by the concrete plant.

.1 Provide test data, attestations of conformity, data sheets and certification issued by a recognized independent testing and inspection laboratory confirming that the materials used in the manufacture of the concrete mix as well as the formula meet the specified requirements.

.6 Carry out the following tests in accordance with "01 45 00 - Quality Control" and submit a report in accordance with "01 33 00 - Documents and samples to be submitted".

.1 Concrete mixes for prefabricated concrete panels where applicable.

.2 Sink tests, temperature and air content measurement for cast-in-place concrete.

.3 Removal of concrete test specimens on site for laboratory analysis.

.4 Ambient temperature readings during concreting.

.7 Inspection and testing of concrete and its constituents shall be carried out by the test laboratory designated by the Departmental Representative, to the satisfaction of the Departmental Representative in accordance with CSA A23.1 / A23.2.

.8 The test laboratory is certified to CSA A283.

.9 Ensure that test results are submitted to the Departmental Representative for review during the meeting preceeding the concrete pour.

.10 The laboratory will take additional test specimens during cold weather concreting.

.11 Curing of specimens shall be carried out at the site under the same conditions as the concrete mixes from which they are extracted.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse/recycling in accordance with Section 01 47 21 - Construction/Demolition Waste Management and Disposal.

.2 Delivery and Acceptance

.1 Transport time: Concrete shall be delivered to the site and discharged within 105 minutes maximum of mixing.

.1 Any changes to the maximum transport time shall be accepted in writing by the Departmental Representative and the concrete producer as specified in CSA A23.1 / A23.2.

.2 Variances must be submitted to the Departmental Representative for review.

.2 Delivery of concrete: Ensure that the concrete plant ensures continuous delivery of concrete in accordance with CSA A23.1 / A23.2.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 Curing Compound: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.4 Granular base: material to Section 31 05 16 - Aggregate Materials following requirements:

.1 Type :1, 2 or 3 fill material.

.2 Crushed stone or gravel.

.3 Gradations: within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.

.5 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.

.6 Fill material: to Section 31 05 16 - Aggregate Materials following requirements:

.1 Type : 1, 2 or 3 fill material.

.2 Crushed stone or gravel.

.3 Gradations: within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.

.7 Boiled linseed oil: to ASTM D260.

.8 Kerosene: to CAN/CGSB-3.3.

PART 3 EXECUTION

3.1 GRADE PREPARATION

.1 Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Construct embankments using excavated material free from organic matter or other objectionable materials.

.1 Dispose of surplus and unsuitable excavated material.

.3 When constructing embankment provide shoulders, where applicable, outside of neat lines of concrete.

.4 Place fill in maximum 150 mm layers and compact to at least 95% of maximum dry density to ASTM D698.

3.2 GRANULAR BASE

.1 Obtain Departmental Representative's approval of subgrade before placing granular base.

.2 Place granular base material to lines, widths, and depths as indicated.

.3 Compact granular base in maximum 150 mm layers to at least 95% of maximum density to ASTM D698.

3.3 CONCRETE

.1 Obtain Departmental Representative approval of granular base and reinforcing steel prior to placing concrete.

.2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.3 Immediately after passing the trowel, give the surface of the sidewalk a uniform brushed finish with regular grooves no more than 2 mm deep, passing the brush perpendicular to the curb axis.

.4 Provide edging as indicated with 10 mm radius edging tool.

3.4 TOLERANCES

.1 Finish surfaces to within 3 mm in 3m as measured with 3 m straightedge placed on surface.

3.5 EXPANSION AND CONTRACTION JOINTS

.1 Install expansion joints as indicated on the drawings, at a maximum interval of 6 m.

.2 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6 ISOLATION JOINTS

.1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

.2 Install joint filler in isolation joints.

.3 Seal isolation joints with approved.

3.7 CURING

.1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least one (1) day after placing, or sealing moisture in by curing compound as directed by Departmental Representative.

.2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

.3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.8 BACKFILL

.1 Allow concrete to cure for [7] days prior to backfilling.

.2 Backfill to designated elevations with material as directed by Departmental Representative.

.3 Compact and shape to required contours as indicated.

3.9 LINSEED OIL TREATMENT

.1 Apply two coats of linseed oil mixture uniformly to surfaces of curbs, walks and gutters, after concrete has cured for specified curing time and when surface of concrete is clean and dry.

.2 Linseed oil mixture to consist of 50% boiled linseed oil and 50% mineral spirits by volume.

.3 Apply treatment when air temperature above 10 degrees C.

.4 Apply first coat at 135 mL/m^2.

.5 Apply second coat at 90 mL/m^2 when first coat has dried.

3.10 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Not used

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.

.2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.

.3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.

.4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.

.5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 CSA International

.1 CAN/CSA G164-M92 (C2003), Hot-Dip Galvanising of Irregular Shaped Objects.

.2 CSA A23.1/A23.2-F09, Concrete - Components and workmanship / Standardized tests and practices for concrete.

.3 CAN/CSA-A3000-F08, Compendium of binder materials.

.4 Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.2 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION

.1 Submit required documents and samples in accordance with Section 01 33 00 - Documents / Samples to be submitted.

.2 Datasheets

.1 Submit required data sheets, manufacturer's instructions and documentation for concrete mixes, fences, posts and barriers. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Concrete mixes and materials:

.1 Nominal coarse aggregate size: 20-5.

.2 Compressive strength: 35 MPa minimum at 28 days.

.2 Chain-link fence, Type 1 category A, quality A-A , fabric: to CAN/CGSB-138.1.

.3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.

.4 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.

.5 Tie wire fasteners: steel wire.

.6 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel.

.7 Gates: to CAN/CGSB-138.4

.8 Gate frames: to ASTM A53/A53M, galvanized steel pipe, standard weight.

.1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.

.2 Fasten fence fabric to gate with twisted selvage at top.

.9 Size of chain link is 3.5 mm (#9).

.10 Galvanisation rate of chain link is 366 g/m² of zinc and galvanisation to CAN/CSA 164.

.11 Total height of fence, including the barbed wire, is 1.2 metres.

.12 Assembly and hardware parts in accordance with CAN / CGSB-138.2, galvanized steel.

.1 Flanges of galvanized steel of not less than 3 mm x 20 mm or of aluminum of not less than 5 mm x 20 mm.

.2 Water-tight post caps secured to posts and carrying upper cross member.

.3 Forged press tighteners.

.13 Zinc-rich Organic Coating: Complies with CAN / CGSB-1.181.

.14 Grounding rods: 3 m long copperweld rods.

PART 3 EXECUTION

3.1 GRADING

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

.2 Provide clearance between bottom of fence and ground surface of 51 mm maximum.

3.2 INSTALLATION OF THE CLOSURE

.1 Erect fence along indicated path and in accordance with CAN / CGSB-138.3.

.2 For posts, dig holes of specified dimensions as directed by the Departmental Representative.

.3 Install intermediate posts at 3 meters intervals measured parallel to ground.

.4 Place reinforcement posts at intervals of not more than 150 metres if the distance between end posts or corner posts is greater than 150 meters for all straight and continuous fence sections on a reasonably uniform ground level.

.5 Install additional reinforcement posts with significant gradients and locations designated by the Departmental Representative.

.6 Install corner posts when change of direction exceeds 10 degrees.

.7 Install end poles at end of fence and near buildings.

.8 Install barrier posts on opposite sides of barrier openings.

.9 Pour concrete into post holes, and insert post to specified depth.

.10 Bring the concrete to a height of 50 mm above grade the slope the finished surface to divert the water from the posts.

.11 Ground the posts to keep them level, in the correct alignment and level, until the concrete is set.

.12 Allow concrete to cure for at least five (5) days before fencing fence.

.13 Install spacers between end posts and gate posts and nearest intermediate pole, at indicated inclination, and placed in center of panel parallel to ground surface.

.14 Install the spacers in the same way on each side of the corner and reinforcement posts.

.15 Install overhanging fittings and post caps.

.16 Place the top rail between the posts and attach it securely to the posts; Attach overhang fittings and caps.

.17 Lay the lower tensioning wire, tighten it tightly and secure it to the end, corner, gate and reinforcement posts by means of tensioners and tension flanges.

.18 Extend fence wire, tighten strongly to manufacturer's recommended tension and attach to end, corner, gate and reinforcement posts, with tension bar attached to each pole by of flanges laid at 300 mm intervals.

.19 The folded edge should be at the bottom.

.20 The top edge wires must be twisted.

.21 Attach wire mesh to top rail, intermediate post, and bottom tension wire with fastening wire at 450 mm intervals.

.22 Tie wire must be twisted for at least two (2) turns.

.23 Install barbed wire if necessary and securely fastened to each extension.

.24 Install grounding rods as shown.

3.3 INSTALLING THE GATES

.1 Install gates at designated locations.

.2 Level the ground between the gate posts and place the lower end of the barrier approximately 40 mm from the ground.

.3 In the case of a double wing gate, determine the location of the central support.

.4 Anchor the substrate in concrete as directed.

.5 Bring concrete to above ground level and spread into dome to prevent build-up of water around support.

.6 Install gate bumpers at specified locations.

3.4 TOUCH-UPS

.1 Clean damaged surfaces with a wire brush to remove loose or cracked coating layers. Apply two (2) layers of zinc-rich organic paint on damaged surfaces.

.2 Before painting damaged surfaces, treat them according to the manufacturer's instructions for the application of zinc-rich paint.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All section of Division 01 – General Requirements

.2 Section 03 25 00 – Accessories for Concrete

.3 Section 03 30 00 – Cast In Place Concrete

.4 Section 05 50 00 – Metal Fabrications

.5 Section 31 32 19.01 – Geotextiles

.6 Section 32 93 10 – Trees, Shrubs and Ground cover Planting

1.2 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA-Z809-F08, Sustainable Forest Management.

.2 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.3 Sustainable Forestry Initiative (SFI)

.1 Standard SFI-2010-2014.

1.3 DOCUMENTS / SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION

.1 Submit required documents and samples in accordance with « 01 33 00 - Documents / Samples to be submitted ».

.2 Data Sheets:

.1 Submit required technical data sheets, furniture instructions and manufacturer's documentation about the furniture. The data sheets must indicate product characteristics, performance criteria, dimensions, limits and finish.

.3 Shop Drawings:

.1 Submit shop drawings showing dimensions, sizes, and method of assembly, anchoring and installation of each prescribed street furniture.

1.4 CLOSEOUT DOCUMENTS

.1 Submit instructions for maintenance and cleaning of street furniture and attach to the manual referred to in « 01 78 00 - Closeout Submittals ».

1.5 QUALITY ASSURANCE

.1 Sustainable Development Certification

.1 Use CSA-approved wood from Canadian sources.

.2 Certified Wood: Submit a list of wood products used that meets CAN/CSA-Z809 or FSC or SFI.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Transport, store and handle materials and equipment in accordance with the manufacturer's written instructions.

.2 Delivery and Acceptance: Deliver materials and equipment to the site in their original packaging, which must be labeled with the name and address of the manufacturer.

.3 Storage and Handling:

.1 Store materials and equipment in a clean, dry, well ventilated area as recommended by the manufacturer.

.2 Store furniture to protect it from marks, scratches and nicks.

.3 Replace defective or damaged materials and equipment with new materials and equipment.

.4 Packaging Waste Management: Recover packaging waste for reuse/recyling in accordance with section « 01 74 21 Construction/Demolition Waste Management and Disposal ».

PART 2 PRODUCT

2.1 GENERAL ARCHITECTURAL CHARACTERISTICS OF EXTERNAL FURNITURE

.1 Design:

.1 The design of furniture items shall conform to the shapes and proportions shown in the drawings.

.2 Quality of execution, assembly and finishing of furniture:

.1 The assembled components shall be uniform in quality, style, materials and workmanship and shall be clean and free from defects which may adversely affect their appearance, serviceability and performance, and their safety.

.2 Where parts are assembled, in all possible configurations, there shall be no unfinished edge or surface visible.

.3 Lubricated parts must be protected so that they do not come into contact with the user, the wearer's clothing or objects on the furniture.

.4 Wooden surfaces must be balanced and finished in order to avoid roughness, deformation, water infiltration and any buckling.

.5 Welds shall be solid, free from surface cracks and voids. They shall be clean, smooth, uniform in appearance and free from scale, flux, foreign matter or any other inclusion which may impair the application of the primer or finishing product.

.6 Molded components shall be smooth and continuous, well-formed and free from irregularities and unevenness. No molding lines or traces of the mold should be visible on the molded components. The Parks Canada Beaver logo, in raised relief, must be clearly defined and recognizable.

.7 When specified, the engraved Parks Canada beaver logos shall be clearly defined and recognizable. Before and after painting, the drawing of the engraving must be of constant width, of uniform depth and composed of fluid curves. The logo is available as a PDF file.

.8 Attached, removable or adjustable parts shall be constructed so as not to loosen, accidentally remove, or cause injury.

.9 Metal parts that may be touched by the user must have rounded corners and edges or be covered with protectors.

.10 Galvanized steel surfaces shall be smooth, free of residues from coating baths, slides, or rough surfaces that may catch clothing fibres or cause injury.

.11 Paint finishes must be UV-resistant and suitable for outdoor use in Canadian winter conditions (saline spray, freeze-thaw cycles, etc.).

.12 Paint and dye finishes shall be homogeneous, free of air bubbles and drips, applied so that the thickness of the coating is smooth, uniform and free from defects or roughness that may catch on clothing or cause injury.

.13 Colors of paints should refer to RAL numbers recognized by the industry.

2.2 BENCHES

.1 B1 –BENCH WITH BACKREST AND WITHOUT ARM RESTS

.1 Components:

.1 Side Supports: Two (2) cast aluminum side supports in 356.2 alloy sand cast with the Parks Canada beaver raised logo. One-piece side supports made of cast aluminum, cast in a single piece. The contour and the recessed parts of the support are encircled with a raised bead. The recessed portions of the support have rounded shapes in relation to the contour shape of the bench. The Parks Canada beaver logo is raised and appears in the center of each of the two bench side supports. The logo must be visible on each exterior side of the supports.

.2 Support strips: One (1) aluminum plate ± 6 mm contoured to the side support curve and attached to each wood lath.

.3 Seat and backrest:

.1 Fourteen (14) wooden laths of Ipe wood (Brazilien hardwood) ± 51 mm x ± 76 mm nominal, finished ± 38 mm x ± 64 mm with chamfer 10 mm.

.2 Exotic Ipe wood (Brazilien hardwood), whose natural properties make it resistant to external conditions and vandalism (dense, rot-proof, antifungal, flame retardant).

.2 Dimensions:

.1 Height: ± 813 mm.

.2 Length: ± 1,803 mm.

.3 Depth: ± 686 mm.

.4 Weight: ± 80 kg.

.3 Finish:

.1 Side supports and mid-support strip: Baked powder paint process, by electrostatic application with a minimum thickness of 0,102 mm. Polyester powder coat for outdoor use UV-resistant black semi-gloss color.

.2 Seat: Ipe wood shall be coated with a protective oil layer resistant to the U.V. of the company: Messmer's OR PENOFIN OR approved equivalent approved.

.3 Sample of wood and finish to be approved by Departmental Representative.

.2 B2 –WITH BACKREST AND WITH ARM RESTS

.1 Components:

.1 Side supports: Two (2) cast aluminum side supports in 356.2 alloy sand cast with the Parks Canada beaver raised logo. One-piece side supports made of cast aluminum, cast in a single piece. The contour and the recessed parts of the supports are encircled with a raised bead. The recessed portions of the support have rounded shapes in relation to the contour shape of the bench. The Parks Canada beaver logo is raised and appears in the center of each of the two supportS on the bench. The logo must be visible on each side of the side supports.

.2 Support strips: One (1) aluminum plate ± 6 mm contoured to the side support curve and attached to each wood lath.

.3 Armrests: Two (2) aluminum plates ± 6 mm curved and painted.

.4 Seat and backrest :

.1 Twelve (12) wooden laths of ± 51 mm x 76 mm nominal, finished ± 38 mm x 64 mm with 10 mm chamfer.

.2 Two (2) wooden laths Ipe of ± 51 mm x 76 mm nominal, finished ± 38 mm x 64 mm with 10 mm chamfer including two recessed sections for the insertion of the armrests.

.3 Exotic Ipe wood, whose natural properties make it resistant to external conditions and vandalism (dense, rot-proof, antifungal, flame retardant).

.2 Dimensions:

.1 Height: ± 813 mm.

.2 Length: ± 1,803 mm.

.3 Depth: ± 686 mm.

.4 Weight: ± 80 kg.

.3 Finish:

.1 Side supports, support strip and armrest: Baked powder paint process, by electrostatic application with a minimum thickness of 0,102 mm. Polyester powder coat for outdoor use UV-resistant black semi-gloss color.

.2 Seat and backrest :

.1 Ipe wood shall be coated with a layer of protective oil resistant to the U.V. of Messmer's Company OR PENOFIN OR equivalent approved.

.2 Required wood and finish sample for type B1 is valid for this item.

.3 B3 BENCH WITHOUT BACKREST

.1 Components:

.1 Side supports: Two (2) cast aluminum side supports in 356.2 alloy sand cast with the Parks Canada beaver raised logo. One-piece side supports made of cast aluminum, cast in a single piece. The contour and the recessed parts of the supports are encircled with a raised bead. The recessed portions of the support have rounded shapes in relation to the contour shape of the bench. The Parks Canada beaver logo is raised and appears in the center of each of the two supportS on the bench. The logo must be visible on each side of the side supports.

.2 Support strips: One (1) aluminum plate ± 6 mm contoured to the side support curve and attached to each wood lath.

SEAT:

.1 Ten (10) wood slats Ipe of ± 51 mm x ± 76 mm nominal, finished ± 38 mm x ± 64 mm with chamfer 10 mm.

.2 Exotic Ipe wood, whose natural properties make it resistant to external conditions and vandalism (dense, rot-proof, antifungal, flame retardant).

.2 Dimensions:

.1 Height: ± 435 mm.

.2 Length: ± 1,803 mm.

.3 Depth: ± 572 mm.

.4 Weight: ± 59 kg.

.3 Finish:

.1 Side supports, support strip and armrest: Baked powder paint process, by electrostatic application with a minimum thickness of 0,102 mm. Polyester powder coat for outdoor use UV-resistant black semi-gloss color.

SEAT:

.1 Ipe wood shall be coated with a layer of protective oil resistant to the U.V. of Messmer's Company OR PENOFIN OR equivalent approved.

.2 Required wood and finish sample for type B1 is valid for this item.

2.3 WASTE AND RECYCLING BINS

.1 Base construction material: aluminum and cast aluminum.

Capacity of 32 gallons.

.1 Frame: Reinforced extruded aluminum square tubes. The top and bottom mounting rings are made of cast aluminum. Hinges allow lateral opening of the basket for easy maintenance.

.2 Lid: Dome lid is made of cast aluminum, with two openings on each side.

.3 Rigid plastic inner container.

.4 Provide anchoring of the can onto a concrete surface.

.5 Dimensions:

.1 Total height including lid: ± 997 mm.

.2 Cover: Diameter of ± 635 mm x ± 209.5 mm high.

.3 Top container diameter: ± 609.6 mm.

.4 Container bottom diameter: ± 546.1 mm.

.6 Finish:

WASTE BINS:

STRUCTURE:

.1 Baked powder painting process, by electrostatic application. Polyester powder resistant resin for UV-resistant outdoor use in beige - brown with a ribbed pattern.

.2 Finished sample to be approved by Departmental Representative.

COVER:

.1 Baked powder painting process, by electrostatic application. Polyester powder coating resin for UV-resistant exterior use in black semi-gloss color.

.2 Finished sample to be approved by Departmental Representative.

RECYCLING BINS:

STRUCTURE:

.1 Baked powder painting process, by electrostatic application. Polyester powder resin for outdoor use UV resistant, ocean blue colour.

.2 Finished sample to be approved by Departmental Representative.

COVER:

.1 Baked powder painting process, by electrostatic application. Polyester powder resin for outdoor use UV resistant, ocean blue colour.

.2 Finished sample to be approved by Departmental Representative.

2.4 BICYCLE RACKS

.1 Seven (7) place bicycle (bike) racks accessible from both sides.

.1 Architectural Features:

.1 Bike rack must be accessible from both sides (Four (4) places on one side and three (3) places on opposite side).

.2 Components:

.1 Rectangular tubes ± 38 mm x ± 76 mm pre-drilled for anchoring to ground.

.2 Round tubes ± 38 mm Ø in fully welded steel.

.3 Dimensions:

.1 Height: ± 737 mm.

.2 Length: ± 1,397 mm.

.3 Width of support: ± 381 mm.

.4 Width at base between hoops: ± 70 mm and ± 203 mm.

.5 Top width between hoops: ± 140 mm.

.6 Weight: ± 32 kg.

.4 Finish:

.1 Hot dip galvanizing with a layer of at least 600 gr/m² and painted by powder coating process by electrostatic application of a black thermoplastic topcoat for a minimum thickness of 0.127 mm. The inside of the tubes are galvanized.

2.5 TABLES

WOODEN PICNIC TABLE (WITHOUT EXTENSION FOR WHEELCHAIRS)

.1 Architectural Features:

.1 The tubular support consists of two modules placed in parallel.

.2 Components:

.1 Structure:

.1 Support: tubes ± 60 mm outside diameter and ± 3 mm thick.

.2 Bench support: Steel plates of ± 6 mm.

.2 Table top and seats:

TABLE:

.1 Five (5) boards of ± 51 mm x ± 152 mm nominal, finished ± 38 mm x ± 140 mm with chamfer ± 10 mm.

SEATS:

.2 Four (4) boards of ± 51 mm x ± 152 mm nominal, finished ± 38 mm x ± 140 mm with chamfer ± 10 mm - two boards per seat.

.3 Exotic Ipe wood, the natural properties of which make it resistant to external conditions and vandalism (dense, rot-proof, antifungal, flame retardant).

.3 Dimensions:

.1 Height: ± 784 mm table and ± 454 mm seats.

.2 Length: ± 1,803 mm.

.3 Width: ± 1,511 mm.

.4 Weight: ± 103 kg.

.4 Finish:

.1 Structure:

.1 Hot-dip galvanized with a layer of at least 600 gr m² and painted with a powdered paint process by electrostatic application of a zinc-enriched primer with a minimum thickness of 0.076 to 0.089 mm. Followed by a finishing coat of a minimum thickness of 0.102 mm in polyester powder resin for outdoor use UV-resistant semi-gloss black color. The insides of the tubes are galvanized.

.2 Finish and color sample to be approved by Departmental Representative.

.2 Table top and seats:

.1 Ipe wood is coated with a coat of Messmer's U.V. protective oil Or Penofin OR equivalent approved.

.2 Sample timber and finish to be approved by Departmental Representative.

PICNIC TABLE WITH EXTENSION AT ONE END FOR WHEELCHAIR

.1 Architectural Features:

.1 The tubular support consists of two modules placed in parallel.

.2 Table top protrudes one side for wheelchair access to table.

.2 Components:

.1 Structure:

.1 Support: tubes ± 60 mm outside diameter and ± 3 mm thick.

.2 Bench support: Steel plates of ± 6 mm.

.2 Table top and seats:

.1 Table: five (5) boards of ± 51 mm x ± 152 mm nominal, finished ± 38 mm x ± 140 mm with chamfer ± 10 mm.

.2 Seats: four (4) boards of ± 51 mm x ± 152 mm nominal, finished ± 38 mm x ± 140 mm with chamfer ± 10 mm - two boards per seat.

.3 Exotic Ipe wood, the natural properties of which make it resistant to external conditions and vandalism (dense, rot-proof, antifungal, flame retardant).

.3 Dimensions:

.1 Height: ± 784 mm table and ± 454 mm seats.

.2 Length: ± 2,425 mm.

.3 Width: ± 1,511 mm.

.4 Weight: ± 125 kg.

.4 Finish:

.1 Structure:

.1 Hot-dip galvanized with a layer of at least 600 gr/m² and painted with a powdered paint process by electrostatic application of a zinc-enriched primer with a minimum thickness of 0.076 to 0.089 mm. Followed by a topcoat of a minimum thickness of 0.102 mm in polyester powder resin for UV-resistant outdoor use of semi-gloss black color. The inside of the tubes is galvanized.

.2 The sample provided for the standard table is valid for this item.

.2 Table top and seats:

.1 Ipe wood is coated with a coat of Messmer's U.V. protective oil or PENOFIN OR equivalent approved.

.2 The sample provided for the standard table is valid for this item.

2.6 DISPLAY BOARD COLUMN

.1 Architectural Features:

.1 Small circular display column, with hexagonal roof and Lexan doors, allowing posters and information sheets to be posted.

.2 Structural base material of column: aluminum with a minimum thickness of 3.17 mm.

.2 Components:

.1 Aluminum hexagonal roofing consisting of six triangular panels of ± 759 mm per side.

.2 Three doors with Lexan faced panels capable of receiving images of ± 1560 mm x ± 735 mm. Provide an anti-theft lock system.

.1 Sample material and finish to be approved by Departmental Representative.

.3 Anchor flanges (4) for mounting column on concrete surface.

.4 3M Digital Impressions of the Parks Canada beaver logo (3) embedded in the top of the column and positioned opposite the center of each panel.

.1 Samples to be approved by Departmental Representative.

.3 Size:

.1 Total column height including roof: ± 3,000 mm.

.2 Base of column: ± 690 mm high

.3 Roof: ± 1,518 mm x ± 500 mm high.

.4 Diameter: ± 914 mm.

.4 Finish:

.1 Baked powder painting process, by electrostatic application. Polyester powder resistant resin for outdoor use, black textured UV resistant.

.1 Sample material and finish to be approved by Departmental Representative.

2.7 RECTANGULAR PLANTER

.1 Architectural Features:

.1 Aluminum and wood planter must conform to drawings. The planter must be able to anchor to the ground.

.2 Components:

.1 Structure:

.1 Aluminum square tubes ± 51 mm and ± 5 mm thick.

.2 Extremities: Aluminum plates ± 405 mm x ± 248 mm.

.3 Fasteners: Stainless steel.

.2 Internal container:

.1 140 liter galvanized expanded steel with 4 handles.

.3 Siding:

.1 Wood slats: Ten (10) laths (5 per side) /
± 1,213 mm long x ± 51 mm x ± 76 mm nominal, finished ± 38 mm x ± 64 mm.

.2 Slats: Four (4) laths (2 per side) / ± 406 mm long x ± 51 mm x ± 76 mm nominal, finished ± 38 mm x ± 64 mm.

.3 Exotic Ipe wood, the natural properties of which make it resistant to external conditions and vandalism (dense, rot-proof, antifungal, flame retardant).

.3 Dimensions:

.1 Height: ± 524 mm

.2 Length: ± 1,321 mm.

.3 Depth: ± 513 mm.

.4 Weight: ± 37 kg.

.4 Finish:

.1 Structure: Painted with a baked powder coating process, by electrostatic application of a zinc-enriched primer with a minimum thickness ranging from 0.076 to 0.089mm. Followed by a finishing coat of a minimum thickness of 0.102 mm in polyester powder resin for outdoor use UV-resistant semi-gloss black color.

.1 Finish and color sample to be approved by Departmental Representative.

.2 Wood laths: Ipe wood is coated with a layer of protective oil resistant to U.V. of Messmer's Company OR ORPOFIN OR equivalent approved.

.1 Sample of wood and finish to be approved by Departmental Representative.

2.8 REMOVABLE BOLLARD

.1 Architectural Features:

.1 Removable bollard shall conform to plans and drawings. The bollard must be fitted with a sleeve and a sheath for insertion into the slab. The bollard must be able to be locked in place with a wrench. A cover plate must be integrated into the system to close the hole when the bollard is removed.

.2 Components:

.1 Bollard:

.1 Galvanized steel construction tube: ± 168 mm Ø.

.2 Tube with key lock for bollard locking.

.3 Bollard head made of cast aluminum: ± 194 mm Ø.

.4 Bollard head with five horizontal beads spaced equally and creating an enlarged relief at the top of the bollard.

.5 Insertion sleeve ± 306 mm high.

.2 Bollard Insertion Sleeve into the slab:

.1 Galvanized steel sheath of ± 455 mm high.

.2 PVC cap at bottom of sleeve.

.3 Equipped with two steel rods of ± 16 mm Ø.

.3 Aluminum finishing ring of ± 273 mm Ø for covering the sleeve and hide the anchor bolts.

.4 Cover plate to close opening when bollard is removed.

.1 Two-section cover plate installed on slab surface when bollard is removed. The plate is retained by a chain. The cover plate and chain are stored in the base of the bollard when the bollard is in place.

.3 Dimensions:

.1 Total height, including insert sleeve: ± 1144 mm

.2 Above-ground bollard height (without insertion sleeve): ± 838 mm

.3 Diameter: ± 152 mm

.4 Weight: ± 75 lbs

.4 Finish:

.1 Bollard and finishing ring: Painted with a powder coating process, by Pangard electrostatic application for UV-resistant exterior use in semi-gloss black color.

.1 Finish and color sample to be approved by Departmental Representative.

2.9 DOUBLE ADIRONDACK CHAIRS (QTY: 2)

.1 Retrieval of chairs:

.1 Chairs are provided by Parks Canada Agency and will be preassembled by Parks Canada teams.

.2 The Contractor shall collect the pre-assembled chairs at the Parks Canada Workshops in Chambly, located at 1840 Burgundy Street.

.3 The Contractor shall install the chairs as recommended by the manufacturer.

.4 See data sheet in appendix of this section.

.2 Dimensions:

.1 Overall height: ± 1040 mm

.2 Seat height: ± 410 mm

.3 Depth: ± 810 mm

.4 Width: ± 790 mm

.5 Weight: ± 58 lbs

2.10 FASTENING AND ASSEMBLY HARDWARE

.1 Fastening and assembly hardware must be corrosion and anti-theft resistant. Use only stainless steel parts. All hardware and tools required for the pre-assembly and final assembly of the furniture must be provided by the contractor. For each type of fastener, submit a technical data sheet for approval by the Departmental Representative.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of conditions: Before installing the urban furniture, ensure that the condition of surfaces/supports previously installed under other sections or contracts is acceptable and permits work to be carried out in accordance with written instructions of the manufacturer.

.1 Perform visual inspection of surfaces/supports in the presence of the Departmental Representative.

.2 Immediately notify Departmental Representative of any unacceptable conditions identified.

.3 Begin installation work only after correcting unacceptable conditions and receiving written approval from Departmental Representative.

3.2 PREPARATION

.1 Identify and protect utility lines.

.2 Notify and obtain written approval from authorities responsible for utilities prior to commencing work.

3.3 INSTALLATION

.1 Assemble furniture in accordance with manufacturer's written recommendations.

.2 Install street furniture so that it is firmly supported, straight, plumb and well anchored, as directed by Departmental Representative.

.3 Rework, to the satisfaction of the Departmental Representative, the finished surfaces that have been damaged.

.4 Furniture shall be anchored to a concrete slab using internal threaded sealing sleeves and stainless steel anti-theft bolts or as recommended by the manufacturer.

3.4 CLEANING

.1 Cleaning during work: perform cleaning operations in accordance with « 01 74 11 – Cleaning ».

.2 Leave premises clean at the end of each working day.

.3 Final Cleaning: Dispose of surplus materials/materials, waste, tools and equipment in accordance with « 01 74 11 – Cleaning ».

.4 Waste Management: Sort waste for recycling in accordance with « 01 74 21 - Construction/Demolition Waste Management and Disposal ».

.1 Remove bins and recycling bins from site and dispose of materials at appropriate facilities.

3.5 PROTECTION

.1 Protect installed equipment and components from damage during construction.

.2 Repair adjacent materials and equipment damaged by installation of street furniture.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All the sections of division 01 – General Requirements

.2 Section 31 23 33.01 – Excavating, Trenching and Backfilling.

.3 Section 31 32 19.01 - Geotextiles

.4 Section 32 33 00 –Outdoor Furniture

.5 Section 32 92 23 – Sodding

.6 Section 32 93 10 – Plantation of Trees, Shrubs and Plant Soil-Coverings

1.2 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada

.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment

.1 PN1340-2005, Guidelines for Compost Quality

1.3 DEFINITIONS

.1 Compost

.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.

.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.

.3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminates.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

1.5 QUALIY CONTROL

.1 The Departmental Representative may request the sampling and analysis of soil samples or mixtures of soil at source or on site.

.2 Notify Departmental Representative of Proposed Sources of Soil for at least fifteen (15) days prior to commencing work to permit testing. Only one source of supply is accepted.

.3 Contractor is responsible for soil testing and must determine the need for soil products in order to promote growth. He must provide, at his own expense, an analysis from an independent and recognized soil laboratory accompanied by agronomic recommendations, if required. All is required at least fifteen (15) days prior to commencement of work.

.4 Approval of topsoil and certificate of compliance prior to spreading topsoil. All works of soil amendment and necessary to meet the requirements of the topsoil are at the expense of the Contractor.

.5 Topsoil must meet CCME Residential and Parks or less than A of MDDELCC. an eco-toxicological analysis will be carried out by the Laboratory designated by the Departmental Representative.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard

PART 2 PRODUCTS

2.1 TOPSOIL

.1 Topsoil for planting beds seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7% clay, and contain 2 to 10% organic matter by weight.

.2 Contain no toxic elements or growth inhibiting materials.

.3 Finished surface free from:

.1 Debris and stones over 50 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Consistence: friable when moist.

.2 The mixture must be sieved, free from contaminants (pesticides, hydrocarbons, etc.), pebbles or root balls exceeding 50 mm in diameter, woody debris and living plant material such as quackgrass, thistle etc.

.3 All mix will be from outside the work site and must be screened beforehand from a recognized site. No black soil will be accepted.

.4 Chemical element :

.1 Phosphorus: 50-150 kg/ha;

.2 Potassium. : 250-350 kg/ha;

.3 Calcium: 6 000-9 000 kg/ha;

.4 Magnesium: 250-350 kg/ha.

.5 Standard field soil analysis.

.6 Add to soil at least 4 kg/70 m^2 of 3-4-3 natural composted fertilizer and incorporate into soil with rake.

.7 For flowerbeds/planting areas and lawns, apply the soil improver and mix thoroughly. Observe the proportions specified by the manufacturer.

2.2 SEIVED PLANTING SOIL

.1 The mixture must have:

.1 Organic matter between 3% à 5% (dry base).

.2 pH water between 6.4 and 9.5.

.3 Basic exchange capacity basic (B.E.C.) between 10 and 20 meq/100 gr of ground.

.4 Consolidation and compaction 20%

.5 P (Phosphorus) : 70ppm.

.6 K (Potasium) : 40ppm.

.7 Mg (Magnesium) : 100ppm.

.8 Ca (Calcium) : 800ppm.

2.3 SOIL AMENDMENTS

.1 Fertilizer:

.1 Fertility: major soil nutrients present in following amounts:

.2 Nitrogen (N): 20 to 40micrograms of available N per gram of topsoil.

.3 Phosphorus (P): 40 to 50micrograms of phosphate per gram of topsoil.

.4 Potassium (K): 75 to 110micrograms of potassium per gram of topsoil.

.5 Calcium, magnesium, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

.6 Ph value: 6.5 to 8.0.

.2 Peatmoss:

.1 Derived from partially decomposed species of Sphagnum Mosses.

.2 Elastic and homogeneous, brown in colour.

.3 Free of wood and deleterious material which could prohibit growth.

.4 Shredded particle minimum size: 5mm.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Organic matter: compost Category A, in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.

.6 Limestone:

.1 Ground agricultural limestone.

.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.7 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

2.4 SOURCE QUALITY CONTROL

.1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

.3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

.4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.

.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 EXECUTION

3.1 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 watercourse, according to requirements of authorities having jurisdiction.

.2 Inspect, repair, and 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.

3.2 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as indicated after area has been cleared of brush and removed from site.

.2 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.3 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by the Departmental Representative.

.4 Protect stockpiles from contamination and compaction.

3.3 PREPARATION OF EXISTING FOUNDATION SOIL

.1 Verify that grades are correct.

.1 If discrepancies occur, notify the Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Ensure proper depth of excavation and, for this purpose, the contractor must take into account that the thickness of the topsoil, after compaction, must be 150 mm.

.3 Level the ground by eliminating troughs and rough edges and by giving it a slope which promotes good water flow, according to the elevations shown in the drawings. Surface runoff occurs in the direction of existing slopes unless otherwise stated. All granular surfaces where paving was present will be scarified and excavated to a depth of at least 150 mm.

.2 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.

.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

.2 Remove debris which protrudes more than 75 mm above surface.

.3 Dispose of removed material off site.

.3 Cultivate entire area which is to receive topsoil to minimum depth of 150 mm.

.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

.4 If, for climatic or traffic reasons, wrinkles, depressions or furrows occur, the contractor shall restore the surfaces.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after the Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 Topsoil should be recovered for replacement.

.4 Spread the topsoil and planting compost according to the following minimum layer thicknesses after settlement:

- .1 150 mm for grassed areas;
- .2 450 mm for shrubs;
- .3 900 mm for the trees

.5 Bring level of topsoil to 15 mm from final soil level to apply sod tiles to the correct elevation.

.6 Spread the topsoil and soil around trees, shrubs and obstacles by hand.

.7 Any form of seeding is prohibited.

.8 The topsoil must be tapped down but not compacted.

.9 The topsoil is tapped down using a hand roller weighing approximately 150 kg. Never correct the wrinkles or depressions with the roller. Take into account a settlement of approximately 25% by volume when the topsoil is placed.

3.5 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.

- .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 All this finishing work is done manually with the rake.

.2 Consolidate topsoil to leave surfaces smooth, uniform and firm against deep foot printing.

.3 Install sod tiles as soon as possible after finishing.

3.6 ACCEPTANCE

.1 The Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.7 SURPLUS MATERIAL

.1 Dispose of materials except topsoil not required where directed by the Departmental Representative.

3.8 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements

.2 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.3 Section 32 33 00 –Outdoor furniture

.4 Section 32 91 19 13 – Topsoil Placement and Grading

.5 Section 32 93 10 – Plantation of Trees, Shrubs and Plant Soil-Coverings

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Schedule sod installation to coincide with preparation of soil surface.

.2 Schedule sod installation when frost is not present in ground.

.3 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 – Project Meetings.

1.3 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 sod, geotextile and fertilizer. Product documentation must include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29 06 – Health and Safety Requirements.

.3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

.4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.4 COMPETENCIES

.1 Subcontractor in landscaping: must be a member in good standing of the horticultural trade association.

.2 Plantation Supervisor: Landscape technician certified in plantation of plants.

.3 Landscaping Supervisor: Landscaping technician certified for the maintenance of grassed areas.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Sod tiles shall be delivered within 24 hours of collection and shall be placed within 36 hours of the same time.

.3 Small, asymmetric or broken sod tiles are prohibited.

.4 In wet weather, allow sod tiles to dry sufficiently so that they do not break when they are collected and handled.

.5 In dry weather, protect sod tiles so that they do not dry completely and water them sufficiently to maintain vitality and prevent soil from loosening during handling. Dry sod tiles will be refused.

.6 Transport, store and handle materials and equipment in accordance with manufacturer's written instructions.

.7 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer’s name and address.

.8 Storage and Handling Requirements:

.1 Store materials in accordance with supplier’s recommendations.

.2 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Number one turf grass nursery sod: sod that has been specially sown and cultivated in nursery fields as turf grass crop.

.1 Turf grass nursery sod types:

.1 Conventional sod tiles, Kentucky bluegrass, fescue number one: grown solely from seed mixtures of Kentucky bluegrass cultivars and red-flowing fescues or tracery red fescues, and containing at least 40% cultivars Kentucky bluegrass and 30% turfgrass or tracer, in width of 450 mm.

.2 Number One Named Cultivars: Nursery Sod grown from certified seed.

.2 Turf Grass Nursery Sod quality:

.1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.

.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.

.3 Mowing height limit: 35 to 65 mm.

.4 Soil portion of sod: 6 to 15 mm in thickness.

.3 Commercial grade cultivated turf:

.1 Grass shall be mowed at the specified height within 36 hours prior to collection; The mowing residue must be removed.

.2 Grass containing not more than five (5) dicotyledones (broadleaved weeds) and up to 20% native grasses per area of 40 square meters.

.2 Sod establishment support:

.1 Geotextile fabric: biodegradable, square mesh.

.2 Wooden pegs: 17 x 8 x 200 mm.

.3 Biodegradable starch pegs: 17 x 8 x 200 mm.

.3 Water:

.1 Supplied by the Departmental Representative at designated location.

.4 Fertilizer:

.1 To Canada Fertilizers Act and Fertilizers Regulations.

.2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

.1 Obtain written approval from the Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from the Departmental Representative.

PART 3 EXECUTION

3.1 INSTALLERS

.1 Use member installers in good standing of the Horticultural Trades Association.

3.2 EXAMINATION

.1 Verification of conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for sod installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in the presence of the Departmental Representative.

.2 Inform the 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 the Departmental Representative.

3.3 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 19 13 – Topsoil Placement and Grading. If discrepancies occur, notify the Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated to tolerance of plus or minus 15 mm, surface draining naturally.

.4 Remove and dispose of weeds, debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials, off site.

.5 Adjust soil pH between 6 and 7. If necessary, loosen soil 50 mm deep and incorporate lime.

3.4 SOD PLACEMENT

.1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.

.2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.

.3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.4 Roll sod as directed by the Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

.5 Water abundantly throughout laying.

.6 Install sod on same day as receiving it.

.7 After laying the sod, water thoroughly until soaked. (± 5 liters/m²).

.8 Water regularly after installation in accordance with local bylaws.

3.5 INSTALLATION OF SOD TILES ON SLOPES AND STAKING

.1 Place geotextile in place and secure according to manufacturer's instructions.

.2 Begin laying sod tiles at the bottom of slopes by placing them perpendicular to slopes.

.3 Planting stakes on sod tiles on steep slopes with a gradient greater than 1 : 3 and in tiles less than 1 m from sewer inlets and Less than 1 m from canals and evacuation ditches. Arrange the stakes as follows:

.1 200 mm center distance, 100 mm from the top edge of the first tiles covering the profile of the slope;

.2 at least three (3) to six (6) stakes per square meter;

.3 at least six (6) to nine (9) stakes per square meter in the case of surfaces adjacent to storm drains;

.4 plant the stakes so that they project 20 mm above the ground surface.

3.6 FERTILIZATION PROGRAM

.1 Apply fertilizer during lawn establishment and guarantee periods as detailed below.

.1 beginning of May: 2.4 kg / 100 m² of a 21-3-9 fertilizer;

.2 mid-June: 2.4 kg / 100 m²of type 21-3-9 fertilizer;

.3 End of August: 3.0 kg / 100 m² of fertilizer type 10-25-10.

3.7 CLEANING

.1 Progress cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Keep pavement and area adjacent to site clean and free of mud, dirt, and debris at all times.

.2 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.1 Clean and reinstate areas affected by Work.

3.8 PROTECTION BARRIERS

.1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by the Departmental Representative.

.2 Remove protection two (2) weeks after installation following inspection as directed by the Departmental Representative.

3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.

.1 Immediately irrigate the sod tiles after laying until the first 25 mm of soil under the tile is completely wet.

.2 Keep the soil moist at all times during the first week following installation;

.3 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

.4 Cut grass to 50 mm when or before it reaches a height of 75 mm.

.5 Maintain sodded areas weed free 95%.

.6 Fertilize sodded areas in accordance with supplier's recommendations. Spread half of required amount of fertilizer in one direction and remainder at right angles, and water in well.

.7 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.10 ACCEPTANCE

.1 Surfaces covered with cultivated sod will be accepted by the Departmental Representative provided that:

.1 Sodded areas are properly established.

.2 Sod is free of bare and dead spots.

.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.

.4 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

.3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

3.11 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period. The period of warranty and maintenance is 1 year starting from the final acceptance of the works.

.1 Water sodded Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.

.2 Repair and re-sod dead or bare spots to satisfaction of the Departmental Representative.

.3 Cut grass and remove clippings that will smother grass as directed by the Departmental Representative to height as follows:

.1 Turf Grass Nursery Sod: cut to 50 mm during normal growing conditions.

.2 Cut grass at 2 week intervals or as directed by the Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.

.3 Eliminate weeds by mechanical means to extent acceptable to the Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01- General Requirements and 02 – Existing Conditions

.2 Section 31 23 33.01 – Excavating, Trecnching and Backfilling

.3 All of the sections of division 32 – Exterior Improvements

1.2 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada (AAFC).

.1 Plant Hardiness Zones in Canada - Latest Edition.

.2 Canadian Nursery Landscape Association (CNLA)

.1 Canadian Standards for Nursery Stock- Latest Edition.

.3 Standard NQ 0605-100 "Landscaping with Plants".

.1 All work described in this section shall be carried out in accordance with best practices and in accordance with the latest standards of the Bureau de Normalization du Québec (BQQ).

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DEFINITIONS

.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling: obtain approval from Departmental Representative in advance of shipment of plant material.

.2 Submit for approval by Departmental Representative a detailed delivery schedule and coordinated planting with supplier. The method and time of planting must be submitted for approval and integrated with other activities on the site. Transplantation work is performed when conditions are favorable to the health and good growth of the plants.

.3 Schedule to include:

.1 Shipping dates.

.2 Planting Dates.

1.5 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 [trees, shrubs, ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and mulch]and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit samples of mulch – 1 litre sac.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Landscape Contractor: with qualifications and expertise in the domain.

.2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.

.3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Ornamental Maintenance designation.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

.2 Protect plant material from damage during transportation:

.1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.

.2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.

.3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

.3 All plants must be protected from solar radiation, wind and the danger of sudden changes in temperature during delivery and storage.

.4 Contractor to unload seedlings and assume sole responsibility for destruction or damage to plants.

.5 Contractor also coordinates delivery and planting operations to minimize the time between excavation and planting.

.6 Any injury to the plant caused by transport or handling may result in the plant being rejected before, during and after planting.

.2 Storage and Handling Requirements:

.1 Immediately store and protect plant material which will not be installed within a reasonable delay in accordance with supplier's written recommendations and after arrival at site in storage location approved by Departmental Representative. Plant clumps and containers should be covered with mulch and kept moist until planting

.2 Protect stored plant material from frost, wind and sun and as follows:

.1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.

.2 For pots and containers, maintain moisture level in containers..

.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

1.8 WARRANTY

.1 For all plant material, the warranty period is 12 months starting from the provisional acceptance of works.

.2 The Contractor shall replace, at his own expense and in accordance with the specifications of the drawings and specifications, all dead, non-vigorous and defective plants until final acceptance. Replanting plants must be of the same species, size, quality and guarantee as for original plants

.3 The Contractor shall remove the dead plants within ten consecutive days on the advice of the Departmental Representative and replace them immediately or if the period is not favorable in the following planting season.

.4 End-of-warranty inspection will be conducted by Departmental Representative.

.5 Contractor's warranty includes materials, labor, equipment and tools required to replace all plants that do not meet the growth requirements of this section.

.6 Departmental Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

PART 2 PRODUCTS

2.1 PLANT MATERIAL

.1 All plants will be nursery-grown and will have the characteristics of the species.

.2 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.

.3 Departmental Representative must approve plants in nursery or delivered to site prior to planting. If the contractor fails to comply with this directive, the plants may be refused after planting.

.4 All plants will be inspected and selected at the main production and storage nursery. The supplier must organize and participate in the visit of the nursery (s) in such a way as to facilitate the work of the Departmental Representative to locate the plants to be verified.

.5 Source of plant supply: plants grown nearby according to the hardiness zone applicable in Chambly. Refer to the hardiness zones for plants in Canada.

.6 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.7 No substitute shall be accepted without the approval of the Departmental Representative.

.8 One (1) month after notification of acceptance of the bid, the Contractor shall notify the Departmental Representative of the source (s) of supply and provide proof of its order (S) corresponding to the bid list.

.9 All planting material must be of the highest quality and meet BNQ standard, NQ 0605-300-2001. All plants must correspond to drawings and specifications.

.10 Plants in containers shall be acceptable if grown for at least one season, but not more than two seasons, in the same container. The plants must have a sufficiently developed root system to maintain the entire root ball when leaving the containers.

.11 Native Plants:

.1 During collection, ensure 10% maximum seed crop (or plants) are collected from healthy population of many individuals, and from several plants of same species.

.2 Leave remainder for natural dispersal and as food for dependent organisms.

2.2 WATER

.1 Free of impurities that would inhibit plant growth.

2.3 MULCH

.1 Bark chip: varying in size from 25to 50mm in diameter, from bark of coniferous trees.

2.4 FERTILIZER

.1 Fertilizers in accordance with the Fertilizers Act and the Fertilizers Regulations of Canada.

.2 Commercial fertilizer based on soil test results and manufacturer's recommendations based on period and season. Forms must be registered for planting and maintenance and validated by the Departmental Representative.

.3 Bonemeal, 100% natural, formulation 2-11-0.

.4 Mycorise provégétalisation.

.1 Ensure new root growth is in contact with mycorrhiza.

.2 Use mycorrhiza as recommended by manufacturer's written recommendations.

2.5 PLANTING SOIL

.1 Refer to specifications given in « 32 91 19.13 – Topsoil Placement and Grading ».

2.6 ACCESSORIES FOR PLANT BOXES

.1 Bottom drain: stainless steel, with anti-debris grilles.

.2 Flexible sleeves: commercial grade, designed for 100mm diameter PVC pipe

2.7 SOURCE QUALITY CONTROL

.1 Obtain approval from Departmental Representative of plant material prior to planting.

.2 Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting 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.

3.2 PRE-PLANTING PREPARATION

.1 Remove damaged roots and branches from plant material.

.2 Locate and protect utility lines.

.3 Notify and acquire written acknowledgement from utility authorities before beginning excavation of planting pits for trees and shrubs.

.4 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 requirements of authorities having jurisdiction.

.2 Inspect, repair, and 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.

3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 Preparation of planting beds in accordance with Section 32 91 19.13- Topsoil Placement and Grading.

.2 For individual planting holes:

.1 Stake out location and obtain approval from Departmental Representative prior to excavating.

.2 Excavate to depth and width as indicated.

3.4 PLANTING

.1 Normal planting periods are spring and fall, even if they are grown in containers. In the case of planting during the growing season, care must be taken to ensure recovery; It is necessary to avoid days of high heat, as well as hours of intense sunshine. Water abundantly and regularly.

.2 For bare root stock, place [50]mm backfill soil in bottom of hole.

.1 Plant trees and shrubs with roots placed straight out in hole.

.3 For jute bur lapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.

.1 Do not pull burlap or rope from under root ball.

.4 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.5 Plant vertically in locations as indicated.

.1 Orient plant material to give best appearance in relation to structure, roads and walks.

.6 For trees and shrubs:

.1 Backfill soil in 150 mm lifts.

.1 Tamp each lift to eliminate air pockets.

.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.

.3 After water has penetrated into soil, backfill to finish grade.

.2 Form watering saucer as indicated.

.7 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.8 Water plant material thoroughly.

.9 After soil settlement has occurred, fill with soil to finish grade.

3.5 MULCHING

.1 Ensure soil settlement has been corrected prior to mulching.

.2 Spread mulch as indicated.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.2 Remove weeds monthly.

.3 Replace or respreads damaged, missing or disturbed mulch.

.4 For non-mulched areas, cultivate as required to keep top layer of soil friable.

.5 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

.6 Remove dead or broken branches from plant material.

.7 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.7 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance Departmental Representative to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 Reform damaged watering saucers.

.3 Remove weeds monthly.

.4 Replace or respreads damaged, missing or disturbed mulch.

.5 For non-mulched areas, cultivate monthly to keep top layer of soil friable.

.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

.7 Apply fertilizer in early spring as indicated by soil test.

.8 Remove dead, broken or hazardous branches from plant material.

.9 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

.10 Submit monthly written reports to Departmental Representative identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

3.9 CLOSEOUT ACTIVITIES

.1 Submit maintenance reports for trees, shrubs, and other plantings.

3.10 PROVISIONAL ACCEPTANCE OF PLANTING WORK

.1 Upon completion of planting, provisional acceptance is given after verification and satisfaction of the Departmental Representative.

.2 Provisional acceptance of plantation work shall be granted, provided that:

.1 All plants on site are in good health and meet normal growing conditions;

.2 Comply with planting list requirements for species and size;

.3 They are free of insects and diseases.

.3 Identification labels are removed after provisional acceptance.

3.11 FINAL ACCEPTANCE OF PLANTING WORK

.1 Final acceptance of the work will be at the end of the warranty period following the provisional acceptance of the final step, provided all conditions are met.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 All of the sections of Division 01 – General Requirements

.2 Section 31 32 33.01 – Excavation, Trenching and Backfilling

1.2 REFERENCES

.1 The following standards, laws, regulations and references apply:

.1 Canadian Environmental Protection Act (SC 1999, c.33)

.2 Canadian Environmental Assessment Act (SC 1999, c.19, s.52)

.3 Environmental Quality Act (RSQ, c. Q-2)

.4 Historic Canals Regulations (SOR / 93-220)

.5 Solid Waste Regulations (Q-2, r 13)

.6 Contaminated Soil Disposal Regulations (Q-2, r 18)

.7 Contaminated Soil Transfer and Storage Regulations (Q-2, r.46)

.8 Canadian Environmental Quality Guidelines (CCME)

.9 Response Guide - Soil Protection and Remediation of Contaminated Sites, MDDELCC, latest edition

.10 Surface Water Quality Criteria, MDDELCC, Latest Edition

.11 Regulation 2008-47 on the Clean-up of the Metropolitan Community of Montreal (municipality of Chambly, subject)

.12 BPH Environment, 2017. Complete rehabilitation of the federal wharf at Chambly Canal, Basic Impact Analysis Report, prepared for Public Works and Procurement Canada on behalf of the Parks Canada Agency, February 2017.

.13 SNC-Lavalin, 2016, Environmental Characterization Study Report No. 634206-rap-1

.2 Ministère du Développement durable, de l'Environnement, et de la Lutte contre les changements climatiques (MDDELCC). 2016. Politique de protection des sols et de réhabilitation des terrains contaminés. En ligne. http://www.mddelcc.gouv.qc.ca/sol/terrains/politique/.

.3 Ministère du Développement durable, de l'Environnement, et de la Lutte contre les changements climatiques (MDDELCC). 2016. Règlement sur le stockage et les centres de transfert de sols contaminés, Direction du suivi de l'état de l'environnement.

.4 Ministère du Développement durable, de l'Environnement, et de la Lutte contre les changements climatiques (MDDELCC). 2016. Règlement sur l'enfouissement des sols contaminés, Direction du suivi de l'état de l'environnement.

.5 Ministère du Développement durable, de l'Environnement, et de la Lutte contre les changements climatiques (MDDELCC). 2013. Critères de qualité de l'eau de surface, 3e édition. Direction du suivi de l'état de l'environnement.

1.3 SEDIMENT MANAGEMENT

.1 This section covers the soils under the existing wharf and the sediments to excavate (or dredge if required) in the water basin.

.2 The nature of excavated or dredged sediments do not allow their reuse for the rehabilitation of the Chambly Federal Wharf, they will be managed on land. In this context, the dredged sediment should be considered as soil and its management must be done compliant to the *Politique de protection des sols et de réhabilitation des terrains contaminés*. The dredged and excavated soil materials under the docks will be removed and stored on land.

.3 The contaminated sediments and soils are managed in compliance to section 01 35 13.43 Special Procedures – Contaminated Sites.

.1 The marine sediments managed on land must be drained prior to disposal off site. The method of drying (dehydration) by temporary filter tank should be preferred. It involves the use of a temporary basin mounted on metal structures, adjustable to the desired volume, and provided with a geo-membrane which acts as a filter to drain sediment. Sediments settle in the basin formed while the supernatant is discarded. If space permits, a temporary pond can be created with an earth embankment and covered with a membrane. A watertight basin is also arranged to collect the filtered water. The filtrate is sampled and analyzed by the Contractor in the early drying operations. The leachate from the dehydration of the sediments is assumed to be uncontaminated. If necessary, a treatment system should be set up. This will need to be confirmed first. The water discharged during the drying must meet the applicable criteria indicated in les *critères de qualité d'eau de surface* du MDDELCC (MDDELCC, 2013). and CCME recommendations. Truck boxes shall be sealed in such a manner as to prevent the flow of water on the roads and a tarpaulin shall be stretched over the top of the truck box which will transport the dredged material. Standard dump trucks will not be accepted for sediment transport between the wharf and the sediment settling basins.

.4 The materials will be sent to a authorised disposal site according to their level of contamination.

.5 Some excavated or dredged sediments and some soils under and adjacent to the wharf may have PAH (polyclinic aromatic hydrocarbon) concentrations in the A-B range or greater of the criteria of *Politique de protection des sols et de réhabilitation des terrains contaminés*. The excavated or dredged soil and sediments within the AB range of the policy should be segregated and managed according to the Grid of contaminated soil excavated Management Policy *(Grille intérimaire de gestion des sols contaminés excavés de la Politique).* The disposal of sediments must respect the policy and municipal regulations. Ultimately, this material will be directed, after approval of Departmental Representative, to an engineered landfill (LET).

.6 .

.7 Also comply with specific environmental protection requirements, as specified in the "01 35 13.43 – Special Procedures – Contaminated Sites and the section 01 35 43 - Environmental Protection of the specifications, during excavation of sediments.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 All of the sections of Division 01 - General Requirements and 02

.2 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.3 Section 31 32 19.01 – Geotextiles

1.2 REFERENCES

.1 Not used

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Shop Drawings

.1 Submit drawings stamped and signed by professional engineer registered or licensed in province of Quebec, Canada.

.3 Samples

.1 Inform Departmental Representative of proposed source of materials and provide access for sampling, minimum 3 weeks before commencing Work.

.2 Submit 20 to 70 kg samples representative of quarry, minimum 3 weeks before commencing Work.

.3 Ship samples prepaid to Departmental Representative for approval.

.4 Handling

.1 Submit for review by Departmental Representative proposed method of handling precast concrete armour units. Submission to cover phases of handling, from removal from form to final position at breakwater.

.5 Replace defective or damaged materials with new.

PART 2 PRODUCT

2.1 MATERIALS

.1 Rock materials

.1 Obtain from quarry.

.2 Free from cracks, seams and other defects which may impair durability; relative density (formally specific gravity) minimum 2.64; slate and shale not acceptable.

.2 Geotextiles: in accordance with Section 31 32 19.01 – Geotextiles.

.3 The stones must be quarried stone from blasting or sand pit stones from crushing. .

.4 When the stones come from a quarry, crushing ratio must be equal or greater than 4.

.5 Crushing ratio (Rc) is determined from the following equation:

$$Rc = \frac{D_{50} \text{ original material}}{D_{50} \text{ produced material}}$$

as

D_{50}: sieve size through which passes 50% by weight of the material. .

.6 Except for igneous rocks and granite type, the reserve of stones should be subject to a qualitative analysis by a geologist or an engineer in geology. The test report must confirm that the stone is massive, crushed (by demonstrating that the requirement for the crushing ratio is met) and, because of sharp edges. The report must also confirm that the stone does not contain frost susceptible materials (eg. Shale, slate, phyllage, argillaceous limestone, dolomite, clay, clayey sandstone pelite clay) or weakening elements (eg. Microlits clay, joints, etc.) which may cause the fragmentation of the stone as a result of weathering or at the time of implementation. The report must present the approximate dimensions of the reserve having:

Additional characteristics for riprap stones and protective coating		
Characteristics	**Requirements**	**Testing Methods**
Absorption (%max.)	1,5	LC 21-067
Apparent density (min.)	2,6	LC 21-067

PART 3 EXECUTION

3.1 BEDDING

.1 Rock armour toe must be on a firm foundation.

3.2 ARMOUR STONE

.1 Place armour stone to lines, grades and dimensions as indicated.

.2 Place armour stone to total layer thickness indicated in plans.

.3 Place each armour stone in stable position.

.4 Place stones from base and continue, row by row, to top. Stones must overlap.

3.3 CLEANING

.1 Leave Work area clean at end of each day.

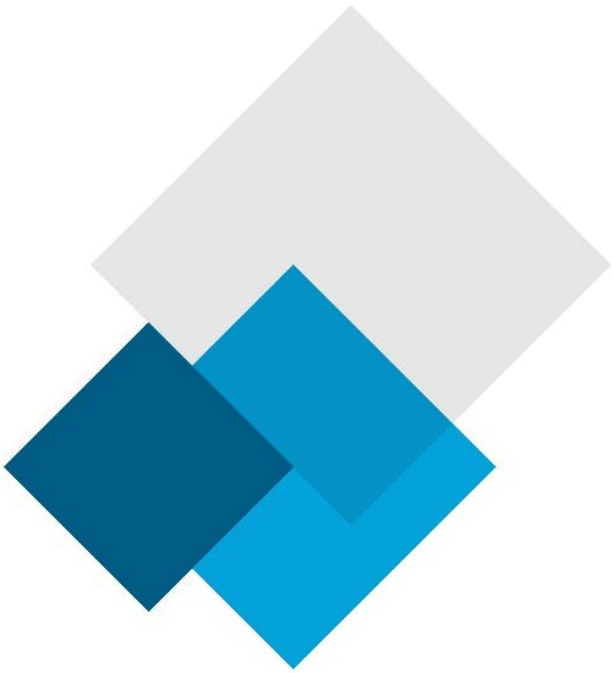
.2 Final Cleaning: upon completion, remove surplus materials, rubbish, tools and equipment from Work site.

END OF SECTION

CCHM-895 Rehabilitation of Federal Wharf, Chambly, Quebec-
Chambly Canal National Historic Site

Project R.077244.001

Appendix A – Rehabilitation of the Federal Wharf at Chambly Canal National Historic Site, Geotechnical Study, SNC-Lavalin GEM Québec inc. File MTC-5-38252 R.0077244.001 – 634206 (rep-2) Revision 02, 02 March 2017.



SNC·LAVALIN

Réhabilitation du quai Fédéral
Lieu historique national du Canal-de-Chambly

Étude géotechnique

Travaux publics et services gouvernementaux Canada

Infrastructures

02 | 03 | 2017

Rapport > Ref. Client V/Dossier n°: MTC-5-38252 - N/Référence n°: R.077244.001
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Étude géotechnique

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Mars 2017

Distribution : M. Francis Villeneuve – SNC-Lavalin (1 copie)
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Table des matières

Table des matières (suite)

Liste des tableaux

Liste des annexes

Table des matières (suite)

1 Introduction

Les services de SNC-Lavalin inc. (SNC-Lavalin) ont été retenus par Travaux publics et Services gouvernementaux Canada (TPSGC) pour effectuer une étude géotechnique et une caractérisation environnementale dans le cadre du projet de réhabilitation du quai Fédéral situé dans l'emprise du lieu historique national du Canal-de-Chambly, à Chambly. Les travaux ont été effectués selon les spécifications du document intitulé « *Plan de travail* », préparé par SNC-Lavalin, portant le numéro de dossier 610133-1557, Révision 03 et émis le 25 novembre 2015.

Les objectifs de l'étude géotechnique étaient de déterminer la nature et les propriétés mécaniques des sols et du roc à l'endroit du quai et dans la rivière, soit au pied des faces du quai, de façon à orienter dans une perspective géotechnique les consultants pour la préparation des plans et devis pour la réhabilitation du quai. Les travaux de reconnaissance avaient également pour but de déterminer, de façon exploratoire, la qualité environnementale des sols, des sédiments et du bois des caissons. Aussi, une expertise technique sur le béton échantillonné dans le mur de couronnement a été effectuée dans le but de déterminer la qualité du béton dudit mur de couronnement.

Le présent rapport comprend une brève description de la méthode utilisée pour la reconnaissance géotechnique et une description détaillée des résultats obtenus (géotechnique, béton et environnement). Finalement, une section du rapport est consacrée à la discussion des résultats et aux recommandations géotechniques relatives à la réhabilitation du quai.

Ce rapport a été préparé spécifiquement et seulement pour TPSGC et ses consultants. Toute modification au projet doit être signalée à SNC-Lavalin, afin que la portée et la pertinence de la reconnaissance géotechnique et des recommandations contenues dans ce rapport puissent être réexaminées et, le cas échéant, modifiées.

La portée du rapport est présentée à l'annexe 1.

2 Méthode de l'étude

2.1 Travaux de chantier

Les travaux de reconnaissance sur le terrain ont été effectués du 8 au 14 décembre 2015. Ils ont consisté en l'exécution de 7 forages (F-1 à F-7), d'un puits d'exploration (S-1), d'un forage vertical dans le béton du mur de couronnement (V-1) et de 4 carottages horizontaux du béton (C-1 à C-3 et C-6). Tous les travaux ont été effectués sous la surveillance constante d'un géologue spécialisé en géotechnique et en géoenvironnement de SNC-Lavalin.

2.1.1 Forages

Les forages ont été exécutés à l'aide d'une foreuse hydraulique de marque Boyles-Brothers, modèle BBS-15, montée sur patins. Pour les forages dans le bassin, la foreuse a été placée sur une plate-forme en porte-à-faux. Dans les sols, l'avancement des forages a été effectué par la rotation simultanée des tubes de calibre « NW » et d'un carottier diamanté de calibre « NQ ». Entre les descentes de tubes, les échantillons de sol ont été prélevés au moyen d'un carottier fendu normalisé de 51 mm de diamètre extérieur et de 610 mm de longueur, conformément aux exigences de la norme ASTM D 1586, décrivant l'essai de pénétration standard (SPT). Cette procédure permet de déterminer l'indice de pénétration « N » qui indique l'état de compacité des sols pulvérulents. Toutefois, certains échantillons ont été prélevés à l'aide d'un carottier fendu de calibre N de 64 mm de diamètre extérieur et de 610 mm de longueur afin de permettre une meilleure récupération lors de la prise d'échantillon.

Tous les échantillons de sols ont été prélevés selon les indications du *Guide d'échantillonnage à des fins d'analyses environnementales*, du ministère du *Développement durable, de l'Environnement, et de la Lutte contre les changements climatiques du Québec* (MDDELCC).

Le roc rencontré dans les forages F-4 à F-7, a été échantillonné à l'aide d'un carottier diamanté de calibre « NQ », sur des longueurs comprises entre 1,55 et 2,20 m. L'indice de qualité du roc (RQD) a été déterminé sur les carottes récupérées, selon les exigences de la norme ASTM D 6032.

Les 3 forages exécutés dans le quai, soit les forages F-1 à F-3, ont atteint des profondeurs comprises entre 5,49 m et 6,76 m, tandis que les forages exécutés dans le bassin, soit les forages F-4 à F-7, ont atteint des profondeurs comprises entre 9,72 m et 12,12 m.

Les rapports individuels de forage, précédés de notes explicatives, sont joints à l'annexe 2.

2.1.2 Puits d'exploration

Le puits d'exploration S-1 a été creusé à l'aide d'une rétrocaveuse de marque John Deere modèle 410J.

Le puits d'exploration a atteint une profondeur de 2,1 m, suite à son exécution, le puits d'exploration a été remblayé avec les sols excavés, lesquels ont été densifiés sommairement à l'aide du godet de la pelle. Toutefois, il convient de mentionner que le recouvrement en enrobé bitumineux a été éliminé hors site et n'a pas été utilisé pour le remblayage de la tranchée.

Dans le puits, des échantillons ont été prélevés en vrac dans chacune des couches de sol identifiées. Aussi, des échantillons du bois des caissons du quai ont été prélevés. Une description visuelle des sols a été effectuée dans le puits et les informations pertinentes relatives aux infiltrations d'eau souterraine ont été notées.

L'échantillonnage des sols dans le puits d'exploration a été effectué selon les indications du *Guide d'échantillonnage à des fins d'analyses environnementales*, du MDDELCC.

Le rapport individuel du puits d'exploration, précédé des notes explicatives, est joint à l'annexe 2.

2.1.3 Carottage du béton

Au total, 4 carottes de béton ont été prélevées horizontalement (après l'excavation du remblai pour dégager le mur) sur toute l'épaisseur du mur et une carotte a été prélevée verticalement dans le mur de couronnement est. Les carottes identifiées C-1 à C-3 ont été prélevées dans le mur de couronnement est, alors que la carotte C-6 a été prélevée dans le mur de couronnement ouest du quai. Pour ce qui est de la carotte identifiée V-1, elle a été prélevée verticalement dans le mur de couronnement est. Un plan de localisation montrant l'emplacement des carottages est présenté à l'annexe 12, tandis que des photos prises lors de leur exécution sont jointes à l'annexe 5. Les trous de carottage dans le béton ont été colmatés avec un mortier à prise rapide et à haute performance (MasterEmaco T1060).

2.1.4 Levé de géoradar

SNC-Lavalin a mandaté la firme Géophysique GPR International inc. (GPR) pour effectuer un levé de géoradar dans le but de localiser des anomalies pouvant être associées à la présence de vides sous le revêtement en enrobé bitumineux du quai. Le rapport produit par GPR est présenté à l'annexe 10 du présent rapport.

2.2 Travaux d'arpentage

Les sondages ont initialement été implantés sur le site par le personnel de SNC-Lavalin en fonction des informations comprises sur le plan intitulé « *FORAGE.DWG* ».

Suite à leur exécution, leur position exacte a été relevée par le personnel de SNC-Lavalin à l'aide d'un récepteur de géopositionnement par satellite (GPS) de marque Trimble, modèle R8-GNSS, utilisant la technologie des stations de référence virtuelles (VRS) et permettant une précision en plan et en élévation de plus ou moins 15 mm.

Tous les niveaux donnés dans ce rapport sont altimétriques et sont basés sur le système de référence CGVD28, communément appelé « géodésique ». Les coordonnées planimétriques sont en référence au système SCoPQ (NAD 83).

Les emplacements des sondages sont indiqués sur le dessin de localisation joint à l'annexe 12.

2.3 Travaux en laboratoire

Tous les échantillons récupérés dans les sondages ont été apportés au laboratoire de géotechnique de SNC-Lavalin à des fins d'examen visuel, d'analyses et de classification.

Certains échantillons de sol, jugés représentatifs, ont été soumis au programme d'essais en laboratoire indiqué aux tableaux 1 et 2 respectivement pour les essais géotechniques et les analyses chimiques.

Tableau 1 Essais géotechniques en laboratoire

Essai	Nombre
Analyse granulométrique par tamisage et lavage au tamis de 80 µm	7
Sédimentométrie	7
Résistance à la compression du roc	2

Les résultats des analyses granulométriques et des sédimentométries sont présentés sous forme graphique sur les figures jointes à l'annexe 3. Les résultats de la résistance à la compression et du poids volumique du roc apparaissent dans la colonne appropriée des rapports de forage joints à l'annexe 2.

Tableau 2 Analyses chimiques en laboratoire

Analyse chimique sur sols	Nombre	Duplicata	Total
Biphényles polychlorés (BPC)	12	1	13
Carbone organique total	4	1	5
Composés phénoliques	12	1	13
Hydrocarbures aromatiques polycycliques (HAP)	12	1	13
Hydrocarbures pétroliers (HP C_{10}-C_{50})	12	1	13
Métaux (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	12	1	13
Analyse chimique sur le bois	**Nombre**	**Duplicata**	**Total**
Biphényles polychlorés (BPC)	1	-	1
Composés phénoliques	1	-	1
Hydrocarbures aromatiques polycycliques (HAP)	1	-	1
Hydrocarbures pétroliers (HP C_{10}-C_{50})	1	-	1
Métaux (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	1	-	1

Le programme analytique du volet environnemental a été approuvé par TPSGC afin de vérifier les concentrations dans les sols de remblai, le bois constituant les encaissements de bois ainsi que les sédiments présents au fond de la rivière pour les paramètres de dépistage usuels. Les analyses chimiques ont été effectuées par AGAT Laboratoires (AGAT), une firme indépendante accréditée par le MDDELCC pour l'ensemble des analyses chimiques effectuées. Le certificat d'analyse chimique produit par AGAT est présenté à l'annexe 4.

Finalement, les essais et analyses suivants ont été effectués sur les carottes de béton.

Tableau 3 Essais et analyses sur béton

Essai	Nombre
Résistance à la compression	6
Caractérisation du réseau d'air entrainé	3
Absorption et masse volumique	4
Examens des signes de réactivité alcalis-granulats	3
Analyse DRX	1

Les échantillons prélevés dans les sondages et n'ayant pas servi aux essais en laboratoire seront conservés jusqu'au mois de juillet 2016, après quoi, ils seront éliminés à moins d'un avis contraire spécifique de la part de TPSGC.

3 Résultats de l'étude

3.1 Nature et propriétés des sols et du roc

La description détaillée des sols et du roc rencontrés dans les sondages est indiquée sur les rapports individuels joints à l'annexe 2. La stratigraphie est résumée au tableau 4.

Tableau 4 Résumé de la stratigraphie

Forage n°	Structure de chaussée/Béton		Remblai hétérogène		Sédiments		Argile silteuse		Till		Roc	
	Niveau sup. (m)	Épaisseur (m)	Niveau sup.[1] (m)	Épaisseur (m)	Niveau sup. (m)	Épaisseur (m)	Niveau sup. (m)	Épaisseur (m)	Niveau sup. (m)	Épaisseur (m)	Profondeur (m)	Niveau sup. (m)
Sondages sur le quai												
F-1	9,08	3,17	5,91	1,71	--	--	--	--	4,20	> 1,22	--	--
F-2	8,95	0,05	8,90	> 5,44	--	--	--	--	--	--	--	--
F-3	8,89	0,05	8,84	5,49	--	--	--	--	3,35	> 1,22	--	--
S-1	9,08	0,40	8,68	> 1,70	--	--	--	--	--	--	--	--
Forages dans la rivière												
F-4	--	--	--	--	5,45	2,43	--	--	3,02	2,04	8,00	0,98
F-5	--	--	--	--	6,14	2,83	--	--	3,31	2,53	8,25	0,78
F-6	--	--	--	--	5,95	1,09	--	--	4,73	4,72	8,90	0,01
F-7	--	--	--	--	4,24	0,61	3,63	1,83	1,80	3,02	10,05	-1,22

La nature et les propriétés des différentes unités stratigraphiques rencontrées dans les sondages sont décrites dans les paragraphes qui suivent.

3.1.1 Structure de chaussée et béton

Les forages F-1 à F-3 ainsi que le puits d'exploration ont été effectués dans le tablier du quai. Une couche de 50 mm d'enrobé bitumineux a été rencontrée à la surface de ces 3 sondages. Sous la couche d'enrobé bitumineux au forage F-1, une couche de pierre concassée d'une

épaisseur de 70 mm a été observée, suivi d'une masse de béton d'une épaisseur de 3,05 m, soit jusqu'à la profondeur 3,17 m.

Le puits d'exploration S-1 a aussi été effectué dans le tablier du quai. Sous la couche d'enrobé bitumineux, une couche de pierre concassée de calibre 20-0 mm a été rencontrée sur une épaisseur de 0,40 m.

3.1.2 Remblai hétérogène

Sous la structure de chaussée du tablier, une couche de remblai hétérogène a été rencontrée dans les forages F-1 à F-3 ainsi qu'au puits d'exploration S-1. Le remblai hétérogène a été rencontré sur une épaisseur de 1,71 m et 5,49 m respectivement aux forages F-1 et F-3. Par contre, l'épaisseur totale de la couche de remblai hétérogène n'a pu être déterminée à l'emplacement du forage F-2 et du puits S-1, car ces sondages ont été terminés à des profondeurs respectives de 5,49 m et 2,10 m sans l'avoir complètement traversée.

Sur la base de l'examen visuel effectué sur les échantillons, la composition des sols de remblai varie entre celle d'un gravier avec un peu de sable et des traces de silt du côté grossier et celle d'un silt avec un peu d'argile et de sable et des traces de gravier du côté fin. Des débris hétéroclites variés (béton, enrobé bitumineux, bois, etc.), dans des proportions variant entre 1 % et 5 %, ont été observés dans les sols de remblai au puits d'exploration S-1, ainsi qu'au forage F-3. De plus, des cailloux, dans des proportions variant entre 1 % à 5 %, ont aussi été observés dans le remblai hétérogène au puits d'exploration S-1.

Il convient de mentionner qu'une poutre de bois a été rencontrée dans le remblai hétérogène, entre les profondeurs de 1,60 m et 1,80 m, dans le puits d'exploration S-1. Aussi, un morceau de bois a été rencontré sous la couche de remblai hétérogène au forage F-1, soit entre les profondeurs de 3,96 m et 4,88 m.

Par ailleurs, la couche de remblai hétérogène est de compacité lâche à très dense, avec un indice de pénétration « N » mesuré à 8 occasions qui varie entre 4 et 55.

3.1.3 Sédiments

Les forages F-4 à F-7 ont été effectués dans la rivière Richelieu, à partir d'une plate-forme en porte-à-faux mise en place sur le tablier du quai. Le niveau de la rivière Richelieu au moment des travaux de sondage a varié entre 7,04 m et 7,12 m. Le fond de la rivière a été trouvé à des profondeurs variant entre 2,89 m et 4,59 m, correspondant à des niveaux compris entre 4,24 m et 6,14 m. Le fond de la rivière Richelieu consiste en une couche de sédiments, dont la composition varie entre d'un sable et gravier avec des traces de silt du côté grossier et celle d'un silt avec un peu d'argile et de sable et des traces de gravier du côté fin. Il convient de mentionner qu'un madrier de bois a été rencontré au sein de la couche de sédiments entre les profondeurs de 4,00 m et 5,11 m, dans le forage F-5.

La couche de sédiments a été rencontrée sur une épaisseur variant entre 0,61 m et 2,83 m.

Les sédiments sont de compacité généralement lâche à moyenne, avec un indice de pénétration « N », mesuré à 4 occasions, qui varie entre 2 et 23.

3.1.4 Argile silteuse

Un dépôt d'argile silteuse avec des traces de sable, a été observé sous la couche de sédiments au forage F-7, à une profondeur de 5,20 m et sur une épaisseur 1,83 m.

Une détermination des limites d'Atterberg et une mesure de teneur en eau ont été effectuées sur un échantillon provenant du dépôt d'argile silteuse. Les résultats sont présentés au tableau 5.

Tableau 5 Propriétés physiques de l'argile silteuse

Forage n°	Échantillon n°	Profondeur (m)		Teneur en eau w (%)	Limites d'Atterberg			Indice de liquidité I_L	Classification ASTM D 2487
		de	à		Limite de liquidité w_L (%)	Limite de plasticité w_p (%)	Indice de plasticité I_p (%)		
F-7	CF-4	6,42	7,03	19	25	14	11	0,5	CL

Les résultats des limites d'Atterberg indiquent qu'il s'agit d'une argile de plasticité faible (CL). Les résultats sont également présentés sur la figure 5 de l'annexe 3.

3.1.5 Till

Un dépôt de till a été rencontré sous le remblai hétérogène aux forages F-1 et F-3 à des profondeurs respectives de 4,88 m et 5,54 m, sous les sédiments du fond de la rivière aux forages F-4 à F-6 à des profondeurs variant entre 4,18 m et 5,96 et finalement sous le dépôt d'argile silteuse au forage F-7 à une profondeur de 7,03 m. Le dépôt de till a été rencontré sur une épaisseur comprise entre 2,04 m et 4,72 m aux forages F-4 à F-7 et repose directement sur le roc. Par contre, l'épaisseur du dépôt de till n'a pu être déterminée à l'emplacement des forages F-1 et F-3, car ces forages ont été terminés à des profondeurs respectives de 6,10 m et 6,76 m sans l'avoir complètement traversée

Des analyses granulométriques ont été effectuées sur 7 échantillons prélevés dans le dépôt de till et les résultats sont présentés sous forme graphique aux figures 1 à 4 de l'annexe 3. En se basant sur ces résultats et sur l'examen visuel des autres échantillons, il ressort que la composition de la matrice du dépôt de till (particules < 35 mm) varie entre celle d'un sable graveleux avec un peu de silt et des traces d'argile du côté grossier et celle d'un sable silteux avec un peu de gravier et des traces d'argile du côté fin.

L'indice de pénétration « N » a été mesuré à 14 occasions dans le dépôt de till dans l'ensemble des forages. Mis à part une valeur de 7 mesurée dans le forage F-6, les résultats sont compris entre 16 et 100 et sont indicatifs de sols de compacité moyenne à très dense.

Compte tenu de l'origine glaciaire du dépôt, il est probable que des cailloux et même des blocs soient présents ailleurs, même si aucun de ces éléments n'a été rencontré dans les forages.

3.1.6 Roc

Le roc a été foré dans les forages F-4 à F-7 sur des longueurs comprises entre 1,55 et 2,20 m.

Le roc consiste en un shale gris avec des passages de mudstone et des interlits de siltstone et de grès. L'indice de qualité (R.Q.D.) a été déterminé à 5 reprises sur les carottes de roc de calibre NQ de 48 mm de diamètre. Les valeurs RQD mesurées varient entre 0 % et 34 % et sont caractéristiques d'un roc de qualité très mauvaise à mauvaise.

3.2 Caractéristiques environnementales des sols

Les résultats détaillés des analyses chimiques effectuées sur les échantillons de sols et de sédiments sont présentés sur les certificats d'analyses et le tableau 4-1 joints à l'annexe 4. Les résultats sont comparés avec les critères génériques A, B et C de la *Politique de protection des sols et de réhabilitation des terrains contaminés* (la Politique) ainsi qu'avec les valeurs limites de l'annexe I du *Règlement sur l'enfouissement des sols contaminés* (RESC). Les résultats ont également été comparés aux valeurs limites du *Règlement sur le stockage et les centres de transfert de sols contaminés* (RSCTSC) et du *Règlement sur la protection et la réhabilitation des terrains* (RPRT). Il est important de noter que le RSCTSC et le RPRT adoptent les critères B (annexe I) et C (annexe II) de la Politique comme valeurs limites réglementaires, bien qu'ils n'y réfèrent pas sous ce vocable. Ainsi, pour faciliter la compréhension du lecteur, l'expression « critères B et C » est conservée dans ce document pour désigner à la fois les critères génériques de la Politique et les valeurs indiquées aux annexes I et II du RPRT et du RSCTSC. Les valeurs du critère A utilisées pour l'interprétation des concentrations en métaux correspondent à celles suggérées pour la province géologique des Basses-Terres du Saint-Laurent.

L'examen du tableau 4-1 révèle que la grande majorité des concentrations dans les sols sont inférieures au critère A.

Un échantillon prélevé dans les sédiments de la rivière (F-7/CF-1), ainsi qu'un échantillon prélevé dans les sols de remblai hétérogène prélevés dans le quai (S-1/VR-R4) ont présenté des concentrations en métaux situées dans la plage A-B. Aussi, l'échantillon prélevé dans les sédiments de la rivière (F-7/CF-1) a présenté des concentrations en HAP situées dans la plage A-B dans le cas de 2 éléments analysés (fluoranthène et pyrène).

Les résultats obtenus de l'échantillon de bois analysé sont également présentés sur le tableau 4-1 de l'annexe 4. Bien qu'il ne s'agisse pas d'un échantillon de sol, à la demande du représentant de TPSGC, ces résultats ont été comparés aux mêmes normes et critères. Les concentrations mesurées sont inférieures au critère A mis à part pour les hydrocarbures pétroliers (HP C_{10}-C_{50}) qui se situes dans la plage > C mais inférieure à la valeur limite du RESC.

Les résultats du programme de contrôle de la qualité interne d'AGAT sont présentés sur les certificats d'analyses inclus à l'annexe 4. Les résultats de ces contrôles sont rapportés conformes aux critères internes d'AGAT, lesquels sont approuvés par le MDDELCC. De plus, les limites de détection rapportées sont inférieures ou égales au critère A pour tous les paramètres analysés.

Afin d’évaluer la précision des résultats, les écarts relatifs ont été calculés entre les concentrations du duplicata de terrain et celles de son échantillon correspondant lorsqu’au moins une des 2 concentrations est supérieure à 10 fois la limite de détection rapportée. Les écarts relatifs calculés sont nuls ou inférieurs à la valeur maximale de 30 % suggérée par le MDDELCC. La précision des résultats est donc jugée adéquate aux fins du présent mandat.

3.3 Eau souterraine

Pendant la période des travaux de forage, soit du 8 au 14 décembre 2015, le niveau de la rivière Richelieu, à la hauteur du quai, a varié entre les niveaux géodésiques de 7,04 m et 7,12 m.

Il est important de souligner que le niveau de l'eau souterraine peut fluctuer et se situer à des profondeurs différentes selon les années, les saisons et les conditions climatiques (pluies abondantes, fonte des neiges, période de sécheresse, etc.).

4 Commentaires et recommandations

4.1 Description du projet

Les travaux de réhabilitation proposés par SNC-Lavalin comprennent le rehaussement du niveau du quai actuel, la mise en place d'une nouvelle surface de roulement ainsi que la construction de nouvelles parois de quai. Deux variantes sont actuellement envisagées pour la construction de ces nouvelles parois, soit un mur-rideau en palplanches d'acier, ou encore un mur-rideau de type berlinois.

Selon les informations transmises, le rehaussement prévu pourrait atteindre une hauteur d'environ 2 m et par conséquent, le tablier pourrait atteindre le niveau approximatif de 11 m. Ainsi, la hauteur totale du mur-rideau serait d'environ 5 à 7 m.

D'après les résultats des forages, les dépôts meubles dans la rivière consistent généralement en une couche superficielle de sédiments de compacité lâche à moyenne, suivie d'un dépôt de till, sur une épaisseur variant entre 2 et 5 m, de compacité dense à très dense. Le roc a été rencontré à une profondeur variant entre 8 et 10 m à partir du fond de la rivière. Compte tenu de la nature glaciaire du dépôt de till, il est probable que des cailloux et des blocs soient présents dans ce dépôt même si aucun élément de cette nature n'a été rencontré dans les forages

4.2 Nouvelles parois du quai

Selon les résultats des forages effectués dans la rivière, la longueur potentielle de la fiche des nouveaux murs-rideaux varie entre 4,5 m et 5,8 m. Toutefois, compte tenu de la compacité dense à très dense du dépôt de till, il pourrait s'avérer difficile d'enfoncer d'éventuelles palplanches d'acier jusqu'au niveau de la surface du roc et par conséquent, la longueur de la fiche potentielle pourrait être réduite. Dans le cas où on néglige l'enfoncement des palplanches dans le dépôt de till, la longueur potentielle de la fiche serait réduite entre un minimum de 1,0 m et un maximum de 2,8 m. Alternativement à une paroi de quai en palplanches d'acier, un mur-rideau de type berlinois pourrait être retenu. Toutefois, compte tenu de la présence d'un dépôt de till dense à très dense contenant possiblement des cailloux et des blocs, les pieux soldats devront être de type « forés » plutôt que « battus ». Les pieux « forés » devront pénétrer le roc sur une longueur minimale de 0,5 m.

Peu importe l'option retenue, des tirants adéquatement dimensionnés devront être prévus pour retenir la partie supérieure du mur-rideau. Le remplissage derrière le mur-rideau devra être fait avec un matériau drainant, telle une pierre nette de calibre 20-5 mm.

4.3 Poussée et butée s'exerçant sur les murs

Le mur-rideau devra être conçu pour résister à la poussée des terres en incluant les surcharges potentielles (véhicules). Les paramètres présentés dans le tableau 6 ci-après sont recommandés pour la conception du mur-rideau. Il est recommandé de négliger le premier 0,5 m de dépôts meubles dans le calcul de la butée.

Tableau 6 Paramètres de conception du mur-rideau

Type de sol	Poids volumique	Angle de frottement	Résistance au cisaillement non drainé	Coefficient de poussée ou butée
Sédiments lâches à compacts	16 kN/m^3	30 °	-	K_p = 3,0
Argile silteuse	17 kN/m^3	-	50 kPa	-
Till	21 kN/m^3	38 °	-	K_p = 4,2
Remblai de pierre concassée nette 20-5 mm	19 kN/m^3	33°	-	K_o = 0,45 K_a = 0,29

Afin de limiter les mouvements horizontaux du mur-rideau, on pourra utiliser le coefficient de poussée au repos du remblai de pierre concassée nette plutôt que le coefficient de poussée active.

4.4 Capacité et déformation latérale des pieux soldats forés

Les charges latérales sur un pieu foré peuvent être engendrées par diverses sollicitations comme le vent, les efforts sismiques, les forces de freinage des véhicules, etc. La capacité des pieux à résister aux charges latérales dépend de plusieurs paramètres dont la rigidité du pieu, ainsi que l'épaisseur et les caractéristiques de déformation du sol et du roc entourant le pieu.

L'expérience a montré que la déflexion latérale pour un pieu foré muni d'une emboîture dans le roc est beaucoup plus faible que celle d'un pieu prenant appui sur le roc.

Les coefficients de réaction horizontale dans les différents sols et le roc rencontrés sur le site et qui pourraient être nécessaires pour la conception sont présentés ci-après.

4.4.1 Coefficient de réaction horizontale dans le dépôt de till

Le coefficient de réaction horizontale dans un sol pulvérulent (K_{hs}), comme les sédiments et le dépôt de till, peut être déterminé par la relation empirique suivante proposée par Broms, B.B., 1964[1]:

1 Broms, B.B. « Lateral Resistance of Piles in Cohesionless Soils » Journal of the Soil Mechanics and Foundation Division, ASCE, vol. 90, n° SM3, May 1964, pp. 123-156.

$$K_{hs} = F_A \times (n_h \times z) / B_s.$$

où :

K_{hs} : coefficient de réaction horizontale dans un sol pulvérulent (kN/m^3);

F_A : facteur d'ajustement déterminé au point 3 de l'annexe 11;

n_h : coefficient de réaction déterminé en fonction de la profondeur de la nappe et de l'état de compacité du sol;

z : profondeur (m);

B_s : diamètre du caisson (m).

La valeur n_h à utiliser dans ce projet est liée au type de sédiment et de till rencontré. Dans le cas des sédiments, une valeur n_h de 1 300 kN/m³ peut être utilisé et dans le cas du till, une valeur n_h de 11 000 kN/m³.

Les différentes étapes de calcul de la réaction horizontale dans un sol pulvérulent sont présentées à l'annexe 11 de ce rapport.

4.4.2 Coefficient de réaction horizontale par unité de surface dans le roc

Les caractéristiques physiques et géomécaniques du roc rencontré sur le site ont été déterminées dans cette étude et sont présentées à la section 3 de ce rapport. Tenant compte de ces caractéristiques, la valeur du coefficient de réaction horizontale du roc « K_r » a été estimée à partir de la méthode décrite par Reese et al.[2]. L'équation suivante peut être utilisée :

$$K_r = \frac{10}{B_s} \; GN/m/m^2$$

où :

B_s : diamètre du pieu.

Il convient de mentionner que le déplacement latéral des pieux devra être limité à 0,004 fois le diamètre du pieu (B_s).

4.5 Gestion environnementale des déblais

D'après les informations disponibles, aucune excavation des sols ni aucun dragage des sédiments ne sont prévus pour le projet. Si toutefois, une partie des sols devait être excavée ou si une partie des sédiments devait être draguée, des mesures de gestion environnementale des déblais pourraient être requises.

2 Reese, L.C., Isenhower, W. M. and Wand, S-T. Analysis and Design of Shallow and Deep Foundations, John Wiley and Sons, 2006

La gestion environnementale des sols contaminés excavés ou des sédiments dragués est encadrée par la Politique, de même que par divers règlements, notamment le RSCTSC, le RESC et le *Règlement sur l'enfouissement et l'incinération de matières résiduelles* (REIMR).

D'après les résultats obtenus dans cette étude, une partie importante des sols et sédiments caractérisés présente des concentrations inférieures au critère A. Ces concentrations n'imposent donc aucune restriction particulière pour l'élimination hors site de ces déblais.

En ce qui concerne les sols et sédiments ayant des concentrations dans la plage A-B, plusieurs options pourront être envisagées. Parmi celles-ci, mentionnons l'élimination dans un lieu d'enfouissement de débris de construction et de démolition (LEDCD) ou un lieu d'enfouissement technique (LET). Il est toutefois important de mentionner que ces lieux peuvent imposer certaines restrictions quant à la granulométrie des déblais, leur perméabilité et le pourcentage de débris qu'ils contiennent.

Enfin, compte tenu d'une part, de l'hétérogénéité d'une partie des sols caractérisés, et d'autre part, de la précision des concentrations mesurées, il pourrait être difficile de bien ségréguer les sols ou les sédiments avec des concentrations inférieures au critère A de ceux ayant des concentrations dans la plage A-B. Par conséquent, s'il s'avérait onéreux de considérer l'ensemble des déblais comme ayant des concentrations dans la plage A-B, il pourrait être avantageux d'entreposer temporairement au chantier les déblais afin de les caractériser de nouveau.

Annexe 1

Portée du rapport

1. Utilisation du rapport

a. Utilisation du rapport

Le présent rapport a été préparé, et les travaux qui y sont mentionnés ont été réalisés par SNC-Lavalin GEM Québec inc. (SNC-Lavalin) exclusivement à l'intention du client (le Client) auquel le rapport est adressé, qui a pris part à l'élaboration de l'énoncé des travaux et en comprend les limites. La méthodologie, les conclusions, les recommandations et les résultats cités au présent rapport sont fondés uniquement sur l'énoncé des travaux et assujettis aux exigences en matière de temps et de budget, telles que décrites dans l'offre de services et/ou dans le contrat en vertu duquel le présent rapport a été émis. L'utilisation de ce rapport, le recours à ce dernier ou toute décision fondée sur son contenu par un tiers est la responsabilité exclusive de ce dernier. SNC-Lavalin n'est aucunement responsable de tout dommage subi par un tiers du fait de l'utilisation de ce rapport ou de toute décision fondée sur son contenu. Les conclusions, les recommandations et les résultats cités au présent rapport (i) ont été élaborés conformément au niveau de compétence normalement démontré par des professionnels exerçant des activités dans des conditions similaires de ce secteur, et (ii) sont déterminés selon le meilleur jugement de SNC-Lavalin en tenant compte de l'information disponible au moment de la préparation du présent rapport. Les services professionnels fournis au Client et les conclusions, les recommandations et les résultats cités au présent rapport ne font l'objet d'aucune autre garantie, explicite ou implicite. Les conclusions et les résultats cités au présent rapport sont valides uniquement à la date du rapport et peuvent être fondés, en partie, sur de l'information fournie par des tiers. En cas d'information inexacte, de la découverte de nouveaux renseignements ou de changements aux paramètres du projet, des modifications au présent rapport pourraient s'avérer nécessaires. Les résultats de cette étude ne constituent en aucune façon une garantie que le terrain à l'étude est exempt de toute contamination. Le présent rapport doit être considéré dans son ensemble, et ses sections ou ses parties ne doivent pas être vues ou comprises hors contexte. Si des différences venaient à se glisser entre la version préliminaire (ébauche) et la version définitive de ce rapport, cette dernière prévaudrait. Rien dans ce rapport n'est mentionné avec l'intention de fournir ou de constituer un avis juridique. Le contenu du présent rapport est de nature confidentielle et exclusive. Il est interdit à toute personne, autre que le Client, de reproduire ou de distribuer ce rapport, de l'utiliser ou de prendre une décision fondée sur son contenu, en tout ou en partie, sans la permission écrite expresse du Client et de SNC-Lavalin.

b. Modifications au projet

Les données factuelles, les interprétations et les recommandations contenues dans ce rapport ont trait au projet spécifique tel que décrit dans le rapport et ne s'appliquent à aucun autre projet ni autre site. Si le projet est modifié du point de vue conception, dimensionnement, emplacement ou niveau, SNC-Lavalin devra être consulté de façon à confirmer que les recommandations déjà données demeurent valides et applicables.

c. Nombre de sondages

Les recommandations données dans ce rapport n'ont pour but que de servir de guide à l'ingénieur en conception. Le nombre de sondages pour déterminer toutes les conditions souterraines qui peuvent affecter les travaux de construction (coûts, techniques, matériel, échéancier), devrait normalement être plus élevé que celui pour les besoins du dimensionnement. Le nombre de points d'échantillonnage et d'analyses chimiques ainsi que la fréquence d'échantillonnage et le choix des paramètres peuvent influencer la nature et l'envergure des actions correctives ainsi que les techniques et les coûts de traitement ou de disposition. Les entrepreneurs qui soumissionnent ou qui sous-traitent le travail, devraient compter sur leurs propres études ainsi que sur leurs propres interprétations des résultats factuels des sondages pour apprécier de quelle façon les conditions souterraines peuvent affecter leur travail et les coûts des travaux.

d. Interprétation des données, commentaires et recommandations

À moins d'avis contraire, l'interprétation des données et des résultats, les commentaires et les recommandations contenus dans ce rapport sont fondés, au mieux de notre connaissance, sur les politiques, les critères et les règlements environnementaux en vigueur à l'emplacement du projet et à la date de production du rapport. Si ces politiques, critères et règlements font l'objet de modifications après la soumission du rapport, SNC-Lavalin devra être consulté pour réviser les recommandations à la lumière de ces changements. Lorsqu'aucune politique, critère ou réglementation n'est disponible pour permettre l'interprétation des données et des résultats analytiques, les commentaires ou recommandations exprimés par SNC-Lavalin sont basés sur la meilleure connaissance possible des règles acceptées dans la pratique professionnelle. Les analyses, commentaires et recommandations contenus dans ce rapport sont fondés sur les données et observations recueillies sur le site, lesquelles proviennent de travaux d'échantillonnage effectués sur le site. Il est entendu que seules les données directement recueillies à l'endroit des sondages, des sites d'échantillonnage et à la date de l'échantillonnage sont exactes et que toute interpolation ou extrapolation de ces résultats à l'ensemble ou à une partie du site comporte des risques d'erreurs qui peuvent elles-mêmes influencer la nature et l'ampleur des actions requises sur le site.

2. Rapports de sondage et interprétation des conditions souterraines

a. Description des sols et du roc

Les descriptions des sols et du roc données dans ce rapport proviennent de méthodes de classification et d'identification communément acceptées et utilisées dans la pratique de la géotechnique. La classification et l'identification du sol et du roc font appel à un jugement. SNC-Lavalin ne garantit pas que les descriptions seront identiques en tout point à celles faites par un autre géotechnicien possédant les mêmes connaissances des règles de l'art en géotechnique, mais assure une exactitude seulement à ce qui est communément utilisé dans la pratique de la géotechnique.

b. Conditions des sols et du roc à l'emplacement des sondages

Les rapports de sondage ne fournissent que des conditions du sous-sol à l'emplacement des sondages seulement. Les limites entre les différentes couches sur les rapports de sondage sont souvent approximatives, correspondant plutôt à des zones de transition, et ont donc fait l'objet d'une interprétation. La précision avec laquelle les conditions souterraines sont indiquées, dépend de la méthode de sondage, de la fréquence et de la méthode d'échantillonnage ainsi que de l'uniformité du terrain rencontré. L'espacement entre les sondages, la fréquence d'échantillonnage et le type de sondage sont également le reflet de considérations budgétaires et de délais d'exécution qui sont hors du contrôle de SNC-Lavalin

c. Conditions des sols et du roc entre les sondages

Les formations de sol et de roc sont variables sur une plus ou moins grande étendue. Les conditions souterraines entre les sondages sont interpolées et peuvent varier de façon significative autant en plan qu'en profondeur des conditions rencontrées à l'endroit des sondages. SNC-Lavalin ne peut en effet garantir les résultats qu'à l'endroit des sondages effectués. Toute interprétation des conditions présentées entre les sondages comporte des risques. Ces interprétations peuvent conduire à la découverte de conditions différentes de celles qui étaient prévues. SNC-Lavalin ne peut être tenu responsable de la découverte de conditions de sol et de roc différentes de celles décrites ailleurs qu'à l'endroit des sondages effectués.

d. Niveaux de l'eau souterraine

Les niveaux de l'eau souterraine donnés dans ce rapport correspondent seulement à ceux observés à l'endroit et à la date indiqués dans le rapport ainsi qu'en fonction du type d'installation piézométrique utilisé. Ces conditions peuvent varier de façon saisonnière ou suite à des travaux de construction sur le site ou sur des sites adjacents. Ces variations sont hors du contrôle de SNC-Lavalin.

3. Niveaux de contamination

Les niveaux de contamination décrits dans ce rapport correspondent à ceux détectés à l'endroit et à la date indiqués dans le rapport. Ces niveaux peuvent varier selon les saisons ou par suite d'activités sur le site à l'étude ou sur des sites adjacents. Ces variations sont hors de notre contrôle. Les niveaux de contamination sont déterminés à partir des résultats des analyses chimiques effectuées sur un nombre limité d'échantillons de sol, d'eau de surface ou d'eau souterraine. La nature et le degré de contamination entre les points d'échantillonnage peuvent varier de façon importante de ceux à ces points. La composition chimique des eaux souterraines à chaque point échantillonnage est susceptible de changer en raison de l'écoulement souterrain, des conditions de recharge par la surface, de la sollicitation de la formation investiguée (i.e. puits de pompage ou d'injection à proximité du site) ainsi que de la variabilité saisonnière naturelle. La précision des niveaux de contamination de l'eau souterraine dépend de la fréquence et du nombre d'analyses effectuées. La liste des paramètres analysés est basée sur notre meilleure connaissance de l'historique du site et des contaminants susceptibles d'être trouvés sur le site et est également le reflet de considérations budgétaires et de délais d'exécution. Le fait qu'un paramètre n'ait pas été analysé n'exclut pas qu'il soit présent à une concentration supérieure au bruit de fond ou à la limite de détection de ce paramètre.

4. Suivi de l'étude et des travaux

a. Vérification en phase finale

Tous les détails de conception et de construction ne sont pas connus au moment de l'émission du rapport. Il est donc recommandé que les services de SNC-Lavalin soient retenus pour apporter toute la lumière sur les conséquences que pourraient avoir les travaux de construction sur l'ouvrage final.

b. Inspection durant l'exécution

Il est recommandé que les services de SNC-Lavalin soient retenus pendant la construction, pour vérifier et confirmer d'une part que les conditions souterraines sur toute l'étendue du site ne diffèrent pas de celles données dans le rapport et d'autre part, que les travaux de construction n'auront pas un effet défavorable sur les conditions du site.

5. Changement des conditions

Les conditions de sol décrites dans ce rapport sont celles observées au moment de l'étude. À moins d'indication contraire, ces conditions forment la base des recommandations du rapport. Les conditions de sol peuvent être modifiées de façon significative par les travaux de construction (trafic, excavation, etc.) sur le site ou sur les sites adjacents. Une excavation peut exposer les sols à des changements dus à l'humidité, au séchage ou au gel. Sauf indication contraire, le sol doit être protégé de ces changements ou remaniements pendant la construction. Lorsque les conditions rencontrées sur le site diffèrent de façon significative de celles prévues dans ce rapport, dues à la nature hétérogène du sous-sol ou encore à des travaux de construction, il est du ressort du Client et de l'utilisateur de ce rapport de prévenir SNC-Lavalin des changements et de fournir à SNC-Lavalin l'opportunité de réviser les recommandations de ce rapport. Reconnaître un changement des conditions de sol demande une certaine expérience. Il est donc recommandé qu'un ingénieur géotechnicien expérimenté soit dépêché sur le site afin de vérifier si les conditions ont changé de façon significative.

6. Drainage

Le drainage de l'eau souterraine est souvent requis aussi bien pour des installations temporaires que permanentes du projet. Une conception ou exécution impropre du drainage peut avoir de sérieuses conséquences. SNC-Lavalin ne peut en aucun cas prendre la responsabilité des effets du drainage à moins que SNC-Lavalin ne soit spécifiquement impliqué dans la conception détaillée et le suivi des travaux de construction du système de drainage.

7. Caractérisation environnementale – Phase I (Phase I)

Ce rapport a été rédigé suite à des activités de recherche diligentes et à partir d'une évaluation de sources de données ponctuelles ou des renseignements obtenus auprès de tiers et qui peuvent comporter des incertitudes, lacunes ou omissions. Ces sources d'informations sont sujettes à des modifications au fil du temps, par exemple, selon l'évolution des activités sur le terrain à l'étude et ceux environnants. La Phase I n'inclut aucun essai, échantillonnage ou analyse de caractérisation par un laboratoire. Sauf exception, la Phase I s'appuie sur l'observation des composantes visibles et accessibles sur la propriété et celles voisines et qui pourraient porter un préjudice environnemental à la qualité du terrain à l'étude. Les titres de propriété mentionnés dans ce rapport sont utilisés pour identifier les anciens propriétaires du site à l'étude et ils ne peuvent en aucun cas être considérés comme document officiel pour reproduction ou d'autres types d'usages. Enfin, tout croquis, vue en plan ou schéma apparaissant dans le rapport ou tout énoncé spécifiant des dimensions, capacités, quantités ou distances sont approximatifs et sont inclus afin d'assister le lecteur à visualiser la propriété.

Annexe 2

Rapports de sondage

SNC·LAVALIN

NOTES EXPLICATIVES
RAPPORT DE SONDAGE

Un rapport de sondage permet de résumer la stratigraphie des sols et du roc, leurs propriétés ainsi que les conditions d'eau souterraine. Cette note a pour but d'expliquer la terminologie, les symboles et abréviations utilisés.

COUPE STRATIGRAPHIQUE

1. PROFONDEUR – NIVEAU

La profondeur et le niveau des différents contacts stratigraphiques sont donnés par rapport à la surface du terrain à l'endroit des sondages au moment de leur exécution. Les niveaux sont indiqués en fonction du système indiqué dans l'entête du rapport de sondage.

2. DESCRIPTION DES SOLS

Les sols sont décrits selon leur nature et leurs propriétés géotechniques.

Les dimensions des particules constituant un sol sont les suivantes :

NOM	DIMENSION (mm)		
Argile		<	0,002
Silt	0,002	-	0,08
Sable	0,08	-	5
Gravier	5	-	80
Caillou	80	-	300
Bloc		>	300

La proportion des divers éléments de sol, définis selon la dimension des particules, est donnée d'après la terminologie descriptive suivante :

TERMINOLOGIE DESCRIPTIVE	PROPORTION DE PARTICULES (%)		
Traces	1	-	10
Un peu	10	-	20
Adjectif (ex. : sableux, silteux)	20	-	35
Et (ex. : sable et gravier)		>	35
Présence : Élément rencontré dont la proportion ne peut être précisée			

2.1 COMPACITÉ DES SOLS PULVÉRULENTS

La compacité des sols pulvérulents est évaluée à l'aide de l'indice de pénétration « N » obtenu par l'essai de pénétration standard :

COMPACITÉ	INDICE DE PÉNÉTRATION « N » (coups / 300 mm)		
Très lâche		<	4
Lâche	4	-	10
Compacte ou moyenne	10	-	30
Dense	30	-	50
Très dense		>	50

2.2 CONSISTANCE ET PLASTICITÉ DES SOLS COHÉRENTS

La consistance des sols cohérents est évaluée à partir de la résistance au cisaillement. La résistance au cisaillement non drainé de l'argile intacte (s_u) et de l'argile remaniée (s_r) est mesurée en chantier ou en laboratoire.

CONSISTANCE	RÉSISTANCE AU CISAILLEMENT, s_u (kPa)		
Très molle		<	12
Molle	12	-	25
Ferme	25	-	50
Raide	50	-	100
Très raide	100	-	200
Dure		>	200

PLASTICITÉ	LIMITE DE LIQUIDITÉ, W_L %		
Faible		<	30
Moyenne	30	-	50
Élevée		>	50

3. DESCRIPTION DU ROC

Le roc est décrit en fonction de sa nature géologique, de ses caractéristiques structurales et de ses propriétés mécaniques.

L'indice de qualité du roc (RQD) est déterminé selon la norme ASTM D 6032.

CLASSIFICATION	INDICE DE QUALITÉ RQD (%)		
Très mauvaise qualité		<	25
Mauvaise qualité	25	-	50
Qualité moyenne	50	-	75
Bonne qualité	75	-	90
Excellente qualité	90	-	100

JOINTS	ESPACEMENT MOYEN (mm)		
Très rapprochés	0	-	60
Rapprochés	60	-	200
Moyennement espacés	200	-	600
Espacés	600	-	2000
Très espacés		>	2000

RÉSISTANCE	RÉSISTANCE À LA COMPRESSION UNIAXIALE, q_u (MPa)		
Extrêmement faible		<	1
Très faible	1	-	5
Faible	5	-	25
Moyennement forte	25	-	50
Forte	50	-	100
Très forte	100	-	250
Extrêmement forte		>	250

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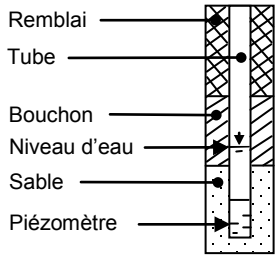
NOTES EXPLICATIVES
RAPPORT DE SONDAGE
(page 2 de 2)

NIVEAU D'EAU

La colonne « Niveau d'eau » indique le niveau de l'eau souterraine mesuré dans un tube d'observation, un piézomètre, un puits d'observation ou directement dans un sondage. La date du relevé est également indiquée dans cette colonne. Le croquis ci-contre illustre les différents symboles utilisés.



ÉCHANTILLONS

1. TYPE ET NUMÉRO

La colonne « Type et numéro » correspond à la numérotation de l'échantillon. Il comprend deux lettres identifiant le type d'échantillonnage, suivi d'un chiffre séquentiel. Les types d'échantillonnage sont les suivants :

CF :	carottier fendu	CR :	carottier diamanté
CG :	carottier grand diamètre	PM :	prélèvement manuel
TM :	tube à paroi mince	ET :	tarière
TU :	tube échantillonneur en plastique (Geoprobe)		

2. ÉTAT

La profondeur, la longueur et l'état de chaque échantillon sont indiqués dans cette colonne. Les symboles suivants illustrent l'état de l'échantillon :

3. RÉCUPÉRATION

La récupération de l'échantillon correspond à la longueur récupérée de l'échantillon par rapport à la longueur de l'enfoncement de l'échantillonneur, exprimée en pourcentage.

ESSAIS IN SITU ET EN LABORATOIRE

Les résultats des essais effectués en chantier et en laboratoire sont indiqués dans les colonnes « Essais in situ et en laboratoire » à la profondeur correspondante.

La liste d'abréviations suivante sert à identifier ces essais.

ABRÉVIATIONS

A	Absorption, L/min-m (essai d'eau sous pression)
AC	Analyses chimiques
C	Essai de consolidation
s_u	Résistance au cisaillement à l'état intact, mesurée au scissomètre de chantier, kPa
s_r	Résistance au cisaillement à l'état remanié, mesurée au scissomètre de chantier, kPa
s_{us}	Résistance au cisaillement à l'état intact, mesurée au pénétromètre à cône (cône suédois), kPa
s_{rs}	Résistance au cisaillement à l'état remanié, mesurée au pénétromètre à cône (cône suédois), kPa
s_{up}	Résistance au cisaillement à l'état intact, mesurée au scissomètre portatif, kPa
s_{rp}	Résistance au cisaillement à l'état remanié, mesurée au scissomètre portatif, kPa
D_r	Densité relative des particules solides
E_M	Module pressiométrique, kPa ou MPa
G	Analyse granulométrique par tamisage et lavage
I_L	Indice de liquidité
I_p	Indice de plasticité, %
k_c	Coefficient de perméabilité (conductivité hydraulique) mesuré en chantier, m/s
k_L	Coefficient de perméabilité (conductivité hydraulique) mesuré en laboratoire, m/s
N_{dc}	Indice de pénétration (essai de pénétration dynamique au cône, DCPT)
N	Indice de pénétration (essai de pénétration standard, SPT)
P_{80}	Analyse granulométrique par lavage au tamis 80 μm
P_L	Pression limite de l'essai pressiométrique, kPa
P_r	Essai Proctor
γ	Poids volumique, kN/m^3
γ'	Poids volumique déjaugé, kN/m^3
q_u	Résistance à la compression uniaxiale du roc, MPa
R	Refus à l'enfoncement du carottier fendu
S	Analyse granulométrique par sédimentométrie
S_t	Sensibilité (s_u/s_r)
T.A.S.	Taux d'agressivité du sol
w	Teneur en eau, %
w_L	Limite de liquidité, %
w_p	Limite de plasticité, %

RAPPORT DE PUITS D'EXPLORATION

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

PUITS : S-1

DATE : 2014-12-14

COORDONNÉES : SCoPQ NAD 83

E : 321 726 **N** : 5 034 313

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ESSAIS IN SITU ET EN LABORATOIRE — TENEUR EN EAU ET LIMITES D'ATTERBERG (%) (W_P, W, W_L) 20 40 60 80	ESSAIS IN SITU ET EN LABORATOIRE — AUTRES ESSAIS
	9,08					
0,05	9,03	**Enrobé bitumineux**.				
		Remblai : pierre concassée 20-0 mm.	VR-1			
0,40	8,68	**Remblai hétérogène :** sable et gravier, traces de silt. Présence d'une motte d'argile de 1 à 5 % de cailloux et de 1 à 5 % débris hétéroclite (fragments de béton et d'enrobé bitumineux).	VR-2			
1,60	7,48	**Poutre de bois.**	VR-3			
1,80	7,28	**Remblai hétérogène :** sable et gravier, traces de silt. Présence de cailloux.	VR-4			
2,10	6,98	**Fin du puits d'exploration**				

REMARQUES : Infiltration d'eau souterraine observée à partir de la profondeur de 2,0 m lors de l'excavation du puits.

TYPE D'ÉQUIPEMENT : Rétrocaveuse de marque John Deere, modèle 410J.

DIMENSIONS DU PUITS EN SURFACE : 1,0 x 2,0 m

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RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : V-1

DATE : 2015-12-11

COORDONNÉES : SCoPQ NAD 83

E : 321 720,5 **N** : 5 034 342,2

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	ESSAIS IN SITU ET EN LABORATOIRE S_u (kPa) S_{us} (kPa) S_r (kPa) S_{rs} (kPa) N_{dc} (coups/300 mm)
	9,06	**Béton**.		CR-1		75	-			
				CR-2		0	-			
				CR-3		100	-			
				CR-4		100	-			
2,95	6,11	**Fin du forage**								

REMARQUES :

MÉTHODE DE FORAGE : Carottier diamanté de calibre HQ,

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RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-1

DATE : 2015-12-14

COORDONNÉES : SCoPQ NAD 83

E : 321 729,3 **N** : 5 034 308,5

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	ESSAIS IN SITU ET EN LABORATOIRE S_u (kPa) S_{us} (kPa) S_r (kPa) S_{rs} (kPa) N_{dc} (coups/300 mm)
	9,08	**Surface du quai**						W_P W W_L 20 40 60 80		20 40 60 80
0,05	9,03	**Enrobé bitumineux**.								
0,12	8,96	**Pierre concassée.**								
		Béton.		CR-A		7	-			
				CR-B		92	-			
3,17	5,91	**Remblai hétérogène :** sable, un peu de gravier, traces de silt.		CF-1		31	*			
3,96	5,12	**Bois.**		CF-2		73	77			
				CF-3		57	*			
4,88	4,20	**Till :** sable silteux, traces de gravier et d'argile. Compacité dense.		CF-4		25	*			
				CF-5		39	44			
6,10	2,98	**Fin du forage**								

REMARQUES : * Échantillons prélevés avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ.

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RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-2

DATE : 2015-12-09

COORDONNÉES : SCoPQ NAD 83

E : 321 708,4 **N** : 5 034 366,9

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	ESSAIS IN SITU ET EN LABORATOIRE S_u (kPa) S_{us} (kPa) S_r (kPa) S_{rs} (kPa) N_{dc} (coups/300 mm)
	8,95							W_P W W_L 20 40 60 80		20 40 60 80
0,05	8,90	**Enrobé bitumineux**.								
		Remblai hétérogène : sable et gravier, traces de silt et d'argile.		CF-1		16	*			
		Compacité moyenne.		CF-2		16	12			
				CF-3		20	*			
				CF-4		4	R			
2,44	6,51	**Remblai hétérogène :** sable, un peu de silt et de gravier, traces d'argile variant à silt, un peu d'argile et de sable, traces de gravier.		CF-5		43	*			
		Compacité lâche à moyenne.		CF-6		4	*			
				CF-7		49	4			
				CF-8		33	*			
				CF-9		16	12			
5,49	3,46	**Fin du forage**								

REMARQUES : * Échantillons prélevés avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ.

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RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-3

DATE : 2015-12-08

COORDONNÉES : SCoPQ NAD 83

E : 321 704,4 **N** : 5 034 402,2

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	ESSAIS IN SITU ET EN LABORATOIRE ▲s_u (kPa) ▼s_{us} (kPa) △s_r (kPa) ▽s_{rs} (kPa) ●N_{dc} (coups/300 mm)
	8,89							W_P W W_L 20 40 60 80		20 40 60 80
0,05	8,84	**Enrobé bitumineux**.								
		Remblai hétérogène : gravier, un peu de sable, traces de silt variant à sable, un peu de silt, traces de gravier.		CF-1		20	*			
				CF-2		20	16			
		Présence de débris (fragments d'enrobé bitumineux, de béton et de bois).		CF-3		21	*			
				CF-4		25	20			
		Compacité lâche à moyenne.		CF-5		20	14			
				CF-6		13	*			
				CF-7		25	55			
				CF-8		13	*			
				CF-9		25	8			
5,54	3,35	**Till :** sable silteux, un peu de gravier, traces d'argile.		CF-10		13	*			
		Compacité très dense.		CF-11		49	91			
6,76	2,13	**Fin du forage**								

REMARQUES : * Échantillons prélevés avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ.

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RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-4

DATE : 2015-12-11

COORDONNÉES : SCoPQ NAD 83

E : 321 722,3 **N** : 5 034 312,2

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	S_u (kPa) S_{us} (kPa) S_r (kPa) S_{rs} (kPa) / N_{dc} (coups/300 mm)
	8,98	**Surface du quai**						W_P W W_L 20 40 60 80		20 40 60 80
		Vide.								
1,86	7,12	Eau.								
		Fond de la rivière.								
3,53	5,45	**Sable et gravier,** traces de silt. Compacité moyenne.		CF-1		20	10			
				CF-2		16	*			
				CF-3		20	14			
				CF-4		34	*			
5,96	3,02	**Till :** sable silteux, un peu de gravier, traces d'argile variant à sable graveleux et silteux, traces d'argile. Compacité très dense.		CF-5		66	92		G S	
				CF-6		59	94		G S	
				CF-7			R			
8,00	0,98	**Roc :** shale gris avec des passages de mudstone et des interlits de siltstone et de grès. Qualité du roc (RQD) très mauvaise.		RC-8		88	24			
9,72	-0,74	**Fin du forage**								

REMARQUES : * Échantillons prélevés avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ; carottier diamanté de calibre NQ dans le roc.

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RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-5

DATE : 2015-12-10

COORDONNÉES : SCoPQ NAD 83

E : 321 721,2 **N** : 5 034 342,1

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	ESSAIS IN SITU ET EN LABORATOIRE S_u (kPa) S_{us} (kPa) S_r (kPa) S_{rs} (kPa) N_{dc} (coups/300 mm)
	9,03	**Surface du quai**						W_P W W_L 20 40 60 80		20 40 60 80
		Vide.								
1,92	7,11	Eau.								
		Fond de la rivière.								
2,89	6,14	**Silt,** un peu d'argile et de sable, traces de gravier.		CF-1		46	*			
		Présence de fragments de bois.		CF-2		4	2			
4,00	5,03	Compacité moyenne.								
		Madrier en bois.		CF-3		83	*			
				CF-4		0	R			
5,11	3,92	**Silt,** un peu de sable, traces de gravier et d'argile.		CF-5		18	23			
5,72	3,31	Présence de fragments de bois. Compacité moyenne.								
		Till : sable silteux, un peu de gravier, traces d'argile.		CF-6		67	*		G S	
		Compacité dense.		CF-7		56	53			
				CF-8		46	53		G S	
8,25	0,78	**Roc :** shale gris avec des passages de mudstone et des interlits de siltstone et de grès.		CF-9		48	R			
		Qualité du roc (RQD) mauvaise.		CR-10		100	34		γ = 27,0 kN/m^3 q_u = 159 MPa	
9,80	-0,77	**Fin du forage**								

REMARQUES : * Échantillons prélevés avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ; carottier diamanté de calibre NQ dans le roc.

SNC·LAVALIN

RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-6

DATE : 2015-12-09

COORDONNÉES : SCoPQ NAD 83

E : 321 708,5 **N** : 5 034 395,4

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	S_u (kPa) S_{us} (kPa) S_r (kPa) S_{rs} (kPa) / N_{dc} (coups/300 mm)
	8,91	**Surface du quai**						20 40 60 80		20 40 60 80
		Vide.								
1,87	7,04	Eau.								
		Fond de la rivière.								
2,96	5,95	**Silt,** un peu d'argile, traces de sable et de gravier. Présence de coquillages		CF-1		20	*			
				CF-2		30	*			
4,18	4,73	**Till :** sable silteux, traces de gravier et d'argile variant à sable graveleux, un peu de silt, traces d'argile. Présence de fragments de bois entre les profondeurs de 5,40 et 6,10 m (CF-5). Compacité lâche à moyenne jusqu'à la profondeur de 7,23 m; compacité très dense par la suite.		CF-3		13	16			
				CF-4		30	7			
				CF-5		33	*			
				CF-6		25	24			
				CF-7		23	*			
				CF-8		49	60		G S	
				CF-9		49	*			
				CF-10		67	R		G S	
8,90	0,01	**Roc :** shale gris avec des passages de mudstone et des interlits de siltstone et de grès. Qualité du roc (RQD) mauvaise.								

REMARQUES : * Échantillons prélevés avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ; carottier diamanté de calibre NQ dans le roc.

SNC·LAVALIN

RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-6

DATE : 2015-12-09

COORDONNÉES : SCoPQ NAD 83

E : 321 708,5 **N** : 5 034 395,4

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	ESSAIS IN SITU ET EN LABORATOIRE ▲s_u (kPa) ▼s_{us} (kPa) △s_r (kPa) ▽s_{rs} (kPa) ●N_{dc} (coups/300 mm)
	-1,09							W_P W_L W 20 40 60 80		20 40 60 80
11,10	-2,19	**Roc :** shale gris avec des passages de mudstone et des interlits de siltstone et de grès. Qualité du roc (RQD) mauvaise. **Fin du forage**		CR-11		88	28		γ = 26,6 kN/m^3 q_u = 95 MPa	

REMARQUES : * Échantillons prélevés avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ; carottier diamanté de calibre NQ dans le roc.

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RAPPORT DE FORAGE

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-7

DATE : 2015-12-08

COORDONNÉES : SCoPQ NAD 83

E : 321 698,9 **N** : 5 034 419,0

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	S_u (kPa) S_{us} (kPa) S_r (kPa) S_{rs} (kPa) / N_{dc} (coups/300 mm)
	8,83	**Surface du quai**						W_P W W_L ; 20 40 60 80		20 40 60 80
		Vide.								
1,71	7,12	Eau.								
		Fond de la rivière.								
4,59	4,24	**Sable,** un peu de gravier, traces de silt et d'argile. Présence de coquillages et de débris (fragments de plastique).		CF-1		30	*			
5,20	3,63	**Argile silteuse,** traces de sable. Plasticité faible (CL).		CF-2		23	3			
				CF-3		100	2			
				CF-4		100	4	14 25 19		
7,03	1,80	**Till :** sable silteux et graveleux, traces d'argile. Présence de fragments de bois entre les profondeurs de 5,40 et 6,10 m (CF-5). Compacité dense à très dense.		CF-5		41	33			
				CF-6		66	43			
				CF-7		66	86		G S	
				CF-8		67	100			
				CF-9		100	R			

REMARQUES : * L'échantillon CF-1 a été prélevé avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ; carottier diamanté de calibre NQ dans le roc.

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RAPPORT DE FORAGE

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PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206

FORAGE : F-7

DATE : 2015-12-08

COORDONNÉES : SCoPQ NAD 83

E : 321 698,9 **N** : 5 034 419,0

PROFONDEUR (m)	NIVEAU (m) GÉODÉSIQUE	DESCRIPTION	NIVEAU D'EAU	ÉCHANTILLONS TYPE ET NUMÉRO	ÉCHANTILLONS ÉTAT	ÉCHANTILLONS RÉCUPÉRATION (%)	ESSAIS IN SITU ET EN LABORATOIRE N ou RQD (%)	TENEUR EN EAU ET LIMITES D'ATTERBERG (%)	AUTRES ESSAIS	ESSAIS IN SITU ET EN LABORATOIRE S_u (kPa), S_{us} (kPa), S_r (kPa), S_{rs} (kPa), N_{dc} (coups/300 mm)
	-1,17							W_P W W_L 20 40 60 80		20 40 60 80
10,05	-1,22	**Roc :** shale gris avec des passages de mudstone et des interlits de siltstone et de grès.								
11		Qualité du roc (RQD) très mauvaise.		CR-10		67	0			
				CR-11		71	0			
12										
12,12	-3,29	**Fin du forage**								
13										
14										
15										
16										
17										
18										
19										
20										

REMARQUES : * L'échantillon CF-1 a été prélevé avec un carottier fendu de calibre N de 64 mm de diamètre extérieur.

MÉTHODE DE FORAGE : Rotation simultanée de tubes de calibre NW et d'un carottier de calibre NQ; carottier diamanté de calibre NQ dans le roc.

Annexe 3

Essais de laboratoire

SNC·LAVALIN

ANALYSE GRANULOMÉTRIQUE

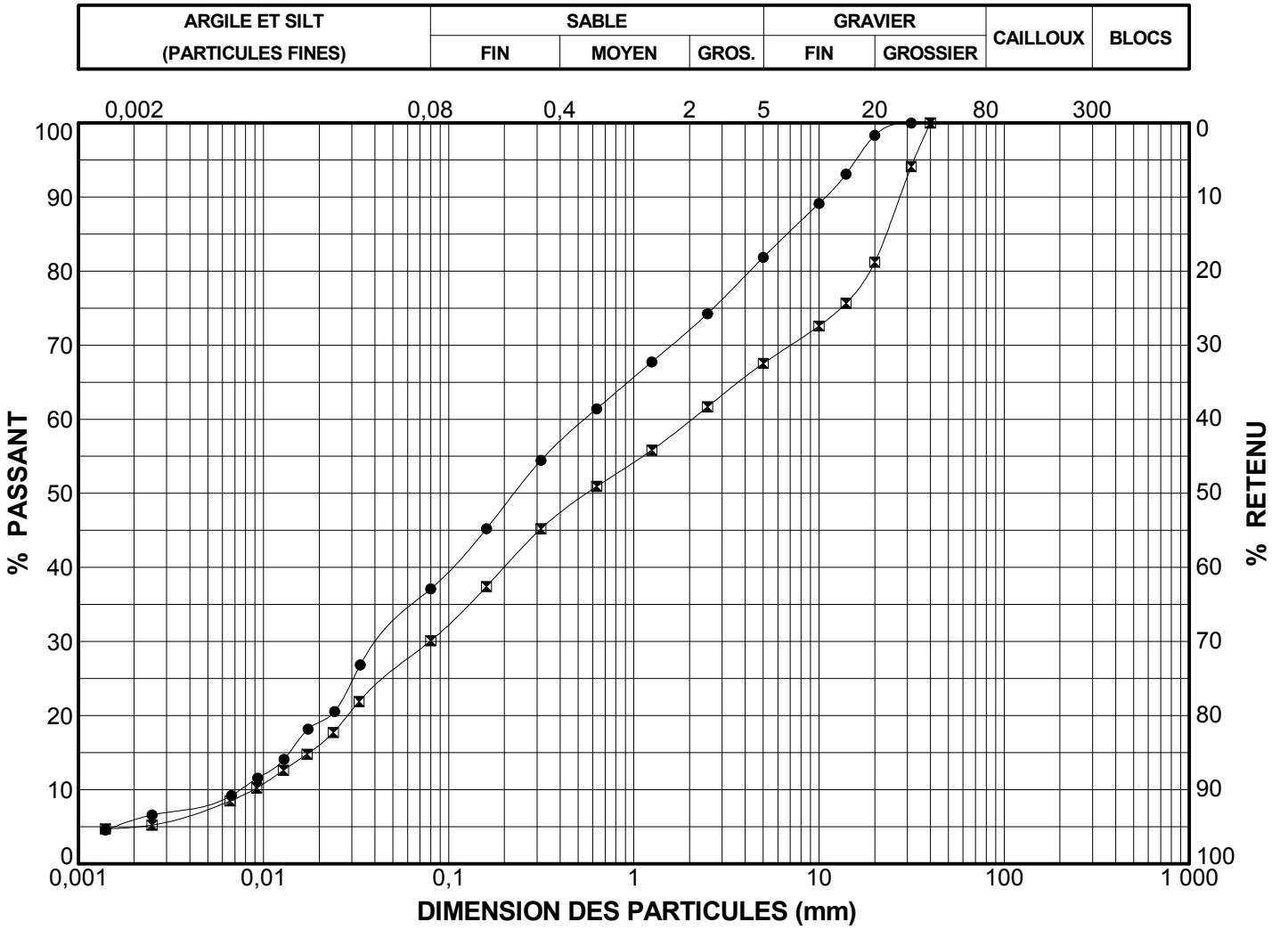
Figure 1

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206



	Sondage	Éch.	Profondeur (m) de	Profondeur (m) à	Gravier (%)	Sable (%)	Silt et argile (%)		Description
●	F-4	CF-5	5,97	6,58	18	45	31,3	5,8	**Till :** sable silteux, un peu de gravier, traces d'argile.
⊠	F-4	CF-6	6,58	7,19	32	37	25,1	5,0	**Till :** sable graveleux et silteux, traces d'argile.

REMARQUES :

SNC·LAVALIN

ANALYSE GRANULOMÉTRIQUE

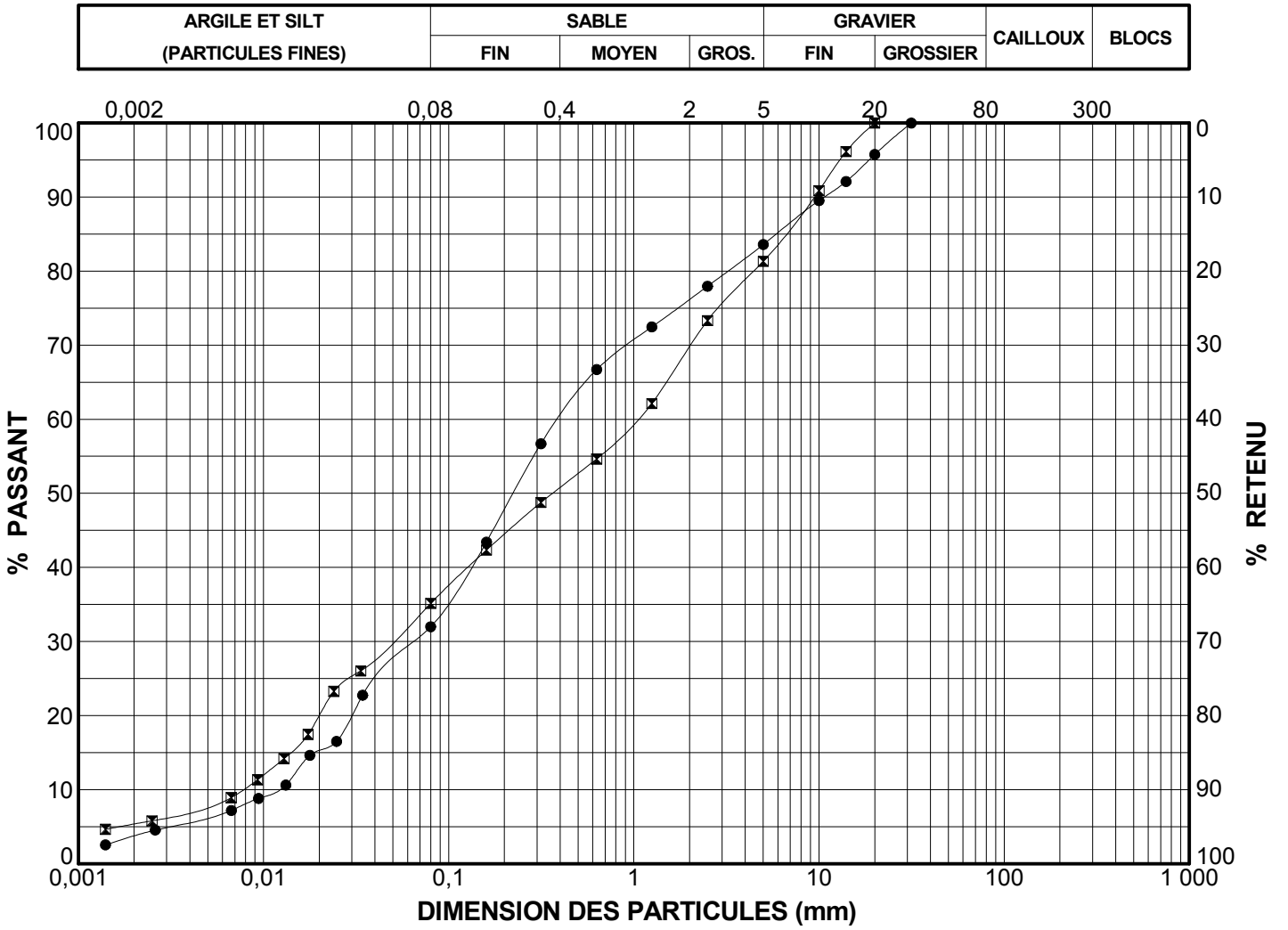
Figure 2

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206



	Sondage	Éch.	Profondeur (m) de	Profondeur (m) à	Gravier (%)	Sable (%)	Silt et argile (%)		Description
●	F-5	CF-6	5,72	6,33	16	52	28,3	3,7	**Till :** sable silteux, un peu de gravier, traces d'argile.
⊠	F-5	CF-8	7,24	7,85	19	46	29,8	5,3	**Till :** sable silteux, un peu de gravier, traces d'argile.

REMARQUES :

SNC·LAVALIN

ANALYSE GRANULOMÉTRIQUE

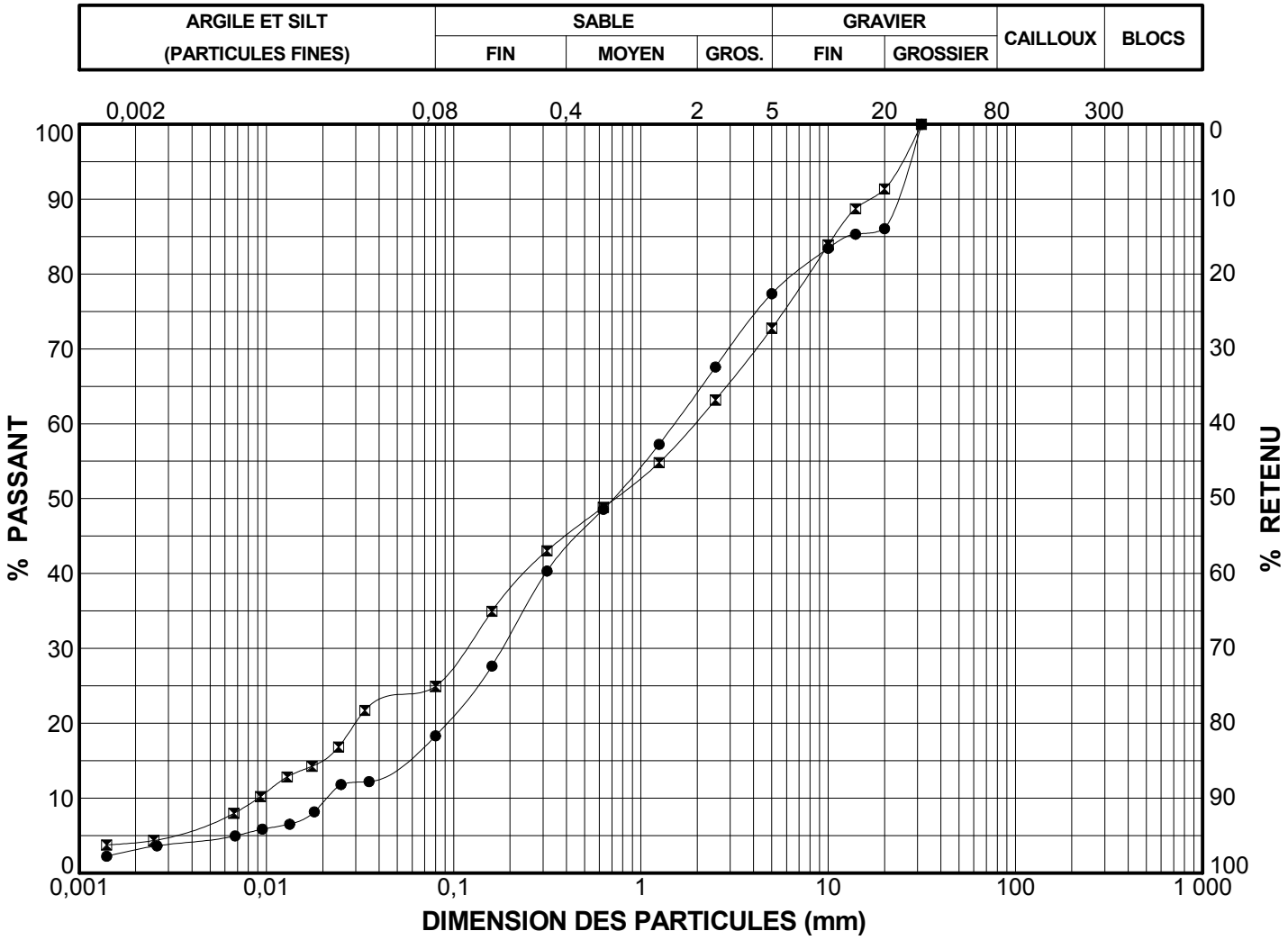
Figure 3

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206



	Sondage	Éch.	Profondeur (m) de	Profondeur (m) à	Gravier (%)	Sable (%)	Silt et argile (%)		Description
●	F-6	CF-8	7,23	7,84	23	59	15,3	3,0	**Till :** sable graveleux, un peu de silt, traces d'argile.
⊠	F-6	CF-10	8,45	8,90	27	48	20,8	4,1	**Till :** sable graveleux et silteux, traces d'argile.

REMARQUES :

ANALYSE GRANULOMÉTRIQUE

SNC·LAVALIN

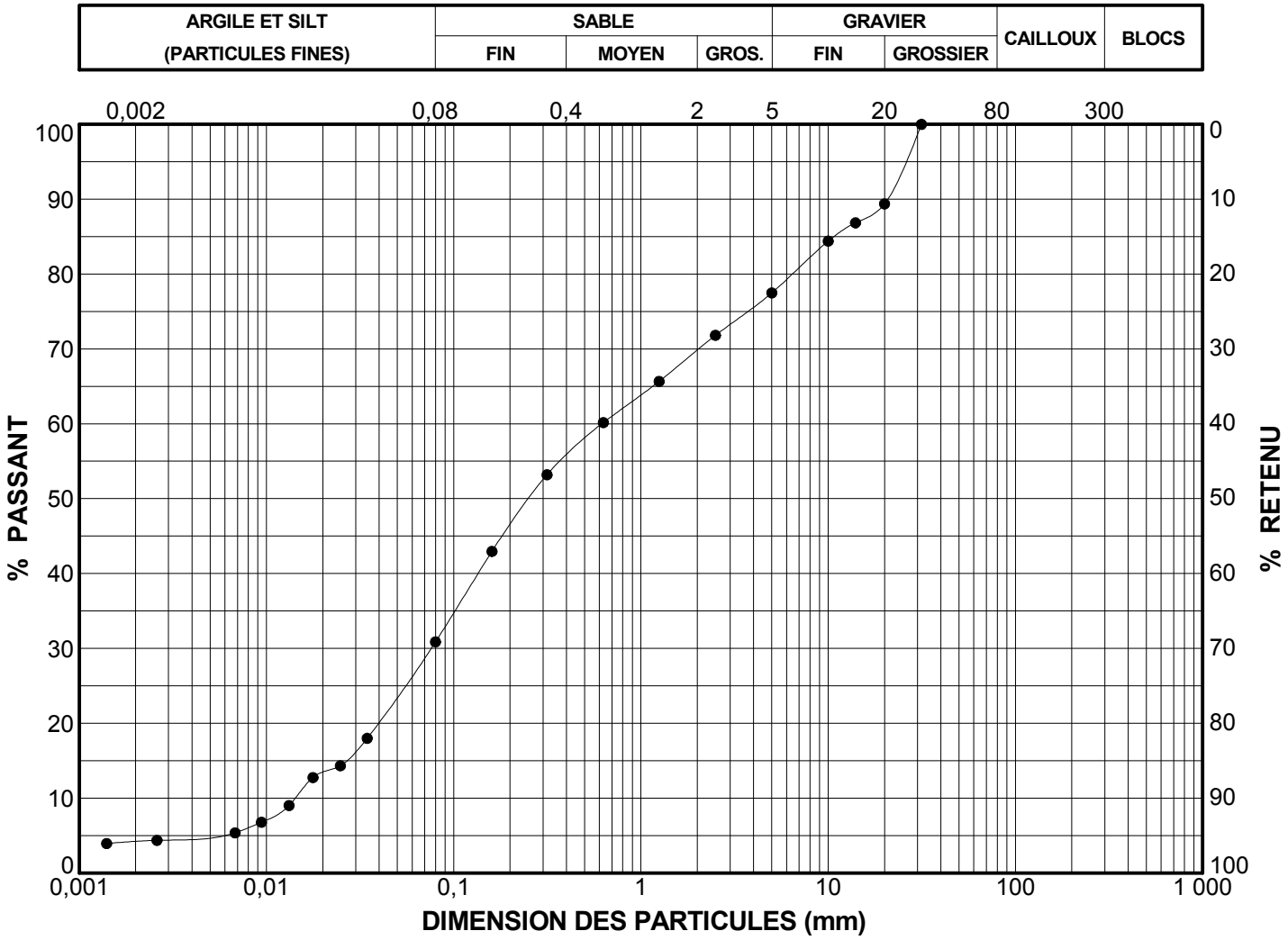
Figure 4

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206



	Sondage	Éch.	Profondeur (m) de	Profondeur (m) à	Gravier (%)	Sable (%)	Silt et argile (%)		Description
●	F-7	CF-7	8,25	8,86	23	47	26,7	4,2	**Till :** sable silteux et gravaleux, traces d'argile.

REMARQUES :

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ABAQUE DE PLASTICITÉ

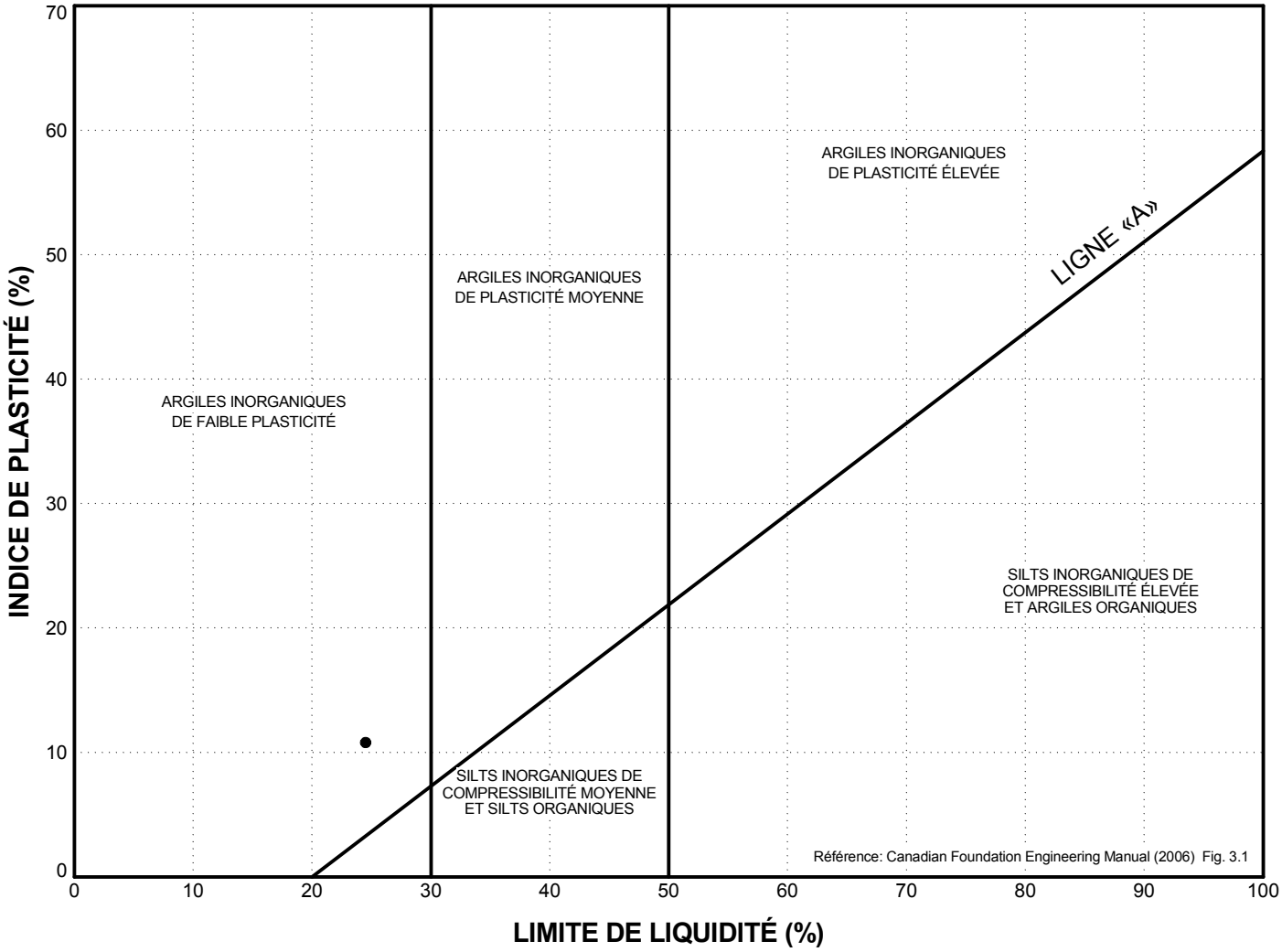
Figure 5

CLIENT : Travaux publics et Services gouvernementaux du Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

DOSSIER : 634206



	Sondage	Éch.	Profondeur (m) de	Profondeur (m) à	w (%)	w_L (%)	w_P (%)	I_P (%)	I_L	DESCRIPTION
●	F-7	CF-4	6,42	7,03	19	25	14	11	0,5	**Argile silteuse** de faible plasticité (CL).

REMARQUES :

SNC·LAVALIN

275, rue Benjamin-Hudon
Montréal (Québec) H4N 1J1
Tél : (514) 331-6910
Fax : (514) 331-7632

BÉTON (CAROTTES)
ESSAIS DE RÉSISTANCE À LA COMPRESSION - CSA A23.2-14C

Soumis à : M. Carol Roy ,ing.
SNC-Lavalin inc. Division transport, infrastructures et bâtiment
5500, boulevard des Galeries, Bureau 200
Québec, Québec, G2K 2E2

Dossier N° : 634206
Date : 2016-01-20

Entrepreneur : -
Projet : Réhabilitation du quai Fédéral
Lieu historique national du Canal-de-Chambly
Localisation : Chambly, Québec

Numéro échantillon : 16-PB-0001
Type de produit : Carottes de béton
Fournisseur : -
Résistance spécifiée à 28 jours (MPa) : -
Dimension maximum du granulat (mm) : -

Prélevé par :
Date de la coulée : -
Date de prélèvement : 2015-12-14
Date de l'essai : -
Conditionnement : À l'humidité

RÉSULTATS

Numéro du client	V1	V1			
Numéro d'éprouvette	A	B			
Localisation du prélèvement	1180-1300	2530-2650			
Âge à la rupture (jours)	n.d.	n.d.			
Angle entre le sens d'application de la charge et le sens du tassement du béton dans l'ouvrage	-	-			
Diamètre moyen (mm)	63,0	62,8			
Hauteur coiffée (mm)	115,3	119,8			
Type de coiffe	soufre	soufre			
Hauteur / diamètre (H/D)	1,83	1,91			
Facteur de correction	0,99	0,99			
Charge à la rupture (N)	65 573	61 137			
Résistance corrigée (MPa)	20,9	19,5			

REMARQUES :

Approuvé par : Alain Gagnon

Chargé de projet : Christine Vigneault

275, rue Benjamin-Hudon
Montréal (Québec) H4N 1J1
Tél : (514) 331-6910
Fax : (514) 331-7632

SNC·LAVALIN

BÉTON (CAROTTES)
ESSAIS DE RÉSISTANCE À LA COMPRESSION - CSA A23.2-14C

Soumis à : M. Carol Roy ,ing.
SNC-Lavalin inc. Division transport, infrastructures et bâtiment
5500, boulevard des Galeries, Bureau 200
Québec, Québec, G2K 2E2

Dossier N° : 634206
Date : 2016-01-20

Entrepreneur : -
Projet : Réhabilitation du quai Fédéral
Lieu historique national du Canal-de-Chambly
Localisation : Chambly, Québec

Numéro échantillon : 16-PB-0002
Type de produit : Carottes de béton
Fournisseur : -
Résistance spécifiée à 28 jours (MPa) : -
Dimension maximum du granulat (mm) : -

Prélevé par :
Date de la coulée : -
Date de prélèvement : 2015-12-14
Date de l'essai : -
Conditionnement : À l'humidité

RÉSULTATS

Numéro du client	C1	C2	C3	C6	
Numéro d'éprouvette	A	B	C	D	
Localisation du prélèvement	0-200	870-1070	960-1060	920-1030	
Âge à la rupture (jours)	n.d.	n.d.	n.d.	n.d.	
Angle entre le sens d'application de la charge et le sens du tassement du béton dans l'ouvrage	-	-	-	-	
Diamètre moyen (mm)	94,1	94,3	94,1	106,3	
Hauteur coiffée (mm)	184,2	181,5	101,2	110,4	
Type de coiffe	soufre	soufre	soufre	soufre	
Hauteur / diamètre (H/D)	1,96	1,93	1,08	1,04	
Facteur de correction	1,00	0,99	0,89	0,88	
Charge à la rupture (N)	316 212	153 743	149 861	214 880	
Résistance corrigée (MPa)	45,4	21,8	19,2	21,3	

REMARQUES :

Approuvé par : Alain Gagnon

Chargé de projet : Christine Vigneault

SNC·LAVALIN

3420, boul. St-Joseph Est
Montréal (Québec) H1X 1W6
Tél.: (514) 331-6910
Téléc.: (514) 255-1400

ESSAIS DE MASSE VOLUMIQUE ET D'ABSORPTION DU BÉTON
NORME ASTM C642

Soumis à : M. Carol Roy, ing.
SNC-Lavalin inc. Division transport, infrastructure et bâtiment
5500, boulevard des Galeries, bureau 200, Québec (Qc) G2K 2E2

Dossier n° : 634206
Date : 2016-01-22

Fournisseur :
Projet : Réhabilitation du quai fédéral
Lieu historique national du canal de Chambly
Localisation : Chambly, Québec

RENSEIGNEMENTS GÉNÉRAUX

Numéro d'échantillon : 15-PB-0995
Votre n° d'échantillon : C (1-2-6)
Type d'échantillon : Carotte

Date de prélèvement : 2015-12-14
Date de réception : 2015-12-14
Date des essais : 2016-01-18

RÉSULTATS D'ESSAIS

Échantillon n°	A	B	C			Moyenne
Carotte n° (profondeur)	C1(300-400)	C2(0-180)	C6(300-500)			
Masse sèche (g)	1622,0	1329,9	3614,6			
Masse SSS après 24h (g)	1704,4	1485,3	3979,9			
Masse dans l'eau (g)	1019,7	833,7	2246,6			
Masse eau bouillante (g)	1708,5	1490,9	4001,0			
Absorption						
Eau froide (%)	5,1	11,7	10,1			**9,0**
Eau bouillante (%)	5,3	12,1	10,7			**9,4**
Coefficient de saturation	0,95	0,97	0,95			**0,95**
Masse volumique* (kg/m^3)	2355	2024	2060			**2146**

REMARQUE :
* Calcul fait avec la masse eau bouillante comme masse SSS (ASTM C642)

Vérifié par : Alain Gagnon

Chargé de projet : Mohamed Sabri, ing., M. Ing.

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ESSAIS DE MASSE VOLUMIQUE ET D'ABSORPTION DU BÉTON
NORME ASTM C642

Soumis à : M. Carol Roy, ing.
SNC-Lavalin inc. Division transport, infrastructure et bâtiment
5500, boulevard des Galeries, bureau 200, Québec (Qc) G2K 2E2

Dossier n° : 634206
Date : 2016-01-22

Fournisseur :
Projet : Réhabilitation du quai fédéral
Lieu historique national du canal de Chambly
Localisation : Chambly, Québec

RENSEIGNEMENTS GÉNÉRAUX

Numéro d'échantillon : 15-PB-0996
Votre n° d'échantillon : V1
Type d'échantillon : Carotte

Date de prélèvement : 2015-12-14
Date de réception : 2015-12-14
Date des essais : 2016-01-18

RÉSULTATS D'ESSAIS

Échantillon n°	A					Moyenne
Carotte n° (profondeur)	V1(1320-1500)					
Masse sèche (g)	1172,3					
Masse SSS après 24h (g)	1283,4					
Masse dans l'eau (g)	735,2					
Masse eau bouillante (g)	1289,7					
Absorption						
Eau froide (%)	9,5					9,5
Eau bouillante (%)	10,0					10,0
Coefficient de saturation	0,95					0,95
Masse volumique* (kg/m^3)	2114					2114

REMARQUE :
* Calcul fait avec la masse eau bouillante comme masse SSS (ASTM C642)

Vérifié par : Alain Gagnon

Chargé de projet : Mohamed Sabri, ing., M. Ing.

SNC·LAVALIN

3420, boul. St-Joseph Est
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Tél.: (514) 331-6910
Téléc.: (514) 255-1400

DÉTERMINATION MICROSCOPIQUE DES PARAMÈTRES DU RÉSEAU DE VIDES DANS LE BÉTON DURCI NORME ASTM C457 PROCÉDURE B

Soumis à : M. Carol Roy, ing.
SNC-Lavalin inc. Division transport, infrastructure et bâtiment
5500, boulevard des Galeries, bureau 200, Québec (Qc) G2K 2E2

Dossier n° : 634206
Date : 2016-01-15

Fournisseur de béton : -
Projet : Réhabilitation du quai fédéral
Lieu historique national du canal de Chambly
Localisation : Chambly, Québec

RENSEIGNEMENTS GÉNÉRAUX

Numéro d'échantillon : 15-PB-997
Votre n° d'échantillon : C1 (200-300 mm)
Formule de mélange : -
Date de prélèvement : 2015-12-14

Type d'échantillon : Carotte
Orientation de la plaque : Vertical
Date de réception : 2015--12-14
Date de l'essai : 2016-01-15

Type de béton : Catégorie C-2 (CSA)
Classe à 28j : -
Ciment : -
Sable : -
Pierre : -
Diamètre max du granulat (mm) : 28

Réducteur d'eau : -
Superplastifiant : -
Agent entraîneur d'air : -
Retardateur : -
Accélérateur de prise : -
Autre : -

Arrêts totaux	Arrêts sur pâte	Nombre de vides	Arrêts sur vides	Nombre de lignes
1540	461	178	31	55

(Le pas de la table de travail est de 1,59 mm, microscope grossissement 110X)

Teneur en air (%)		Volume de pâte (%)	
béton frais	béton durci	théorique	béton durci
	2,0		29,9

Facteur espac. (µm)	Surface spé. (mm^{-1})	Corde moy. (µm)	Rapport P/A	Longueur trav. (mm)	Nombre de vides par mm
523	14,4	277	14,871	2449	0,07

Paramètres	Résultats	Exigence	Norme réf.
Surface observée (cm^2)	91	77	ASTM C 457
Longueur totale traversée (mm)	2449	2413	ASTM C 457
Nombre d'arrêts	1540	1425	ASTM C 457
Teneur en air (%)	2,0	3 min	CSA-A23.1
Facteur d'espacement, $\overline{L}$ (µm)	523	260 max	CSA A23.1

Essai réalisé par : Mostafa Tahery

Remarque :

Approuvé par : Alain Gagnon

Chargé de projet : Mohamed Sabri, ing., M. Ing.

SNC·LAVALIN

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Tél.: (514) 331-6910
Téléc.: (514) 255-1400

DÉTERMINATION MICROSCOPIQUE DES PARAMÈTRES DU RÉSEAU DE VIDES DANS LE BÉTON DURCI NORME ASTM C457 PROCÉDURE B

Soumis à : M. Carol Roy, ing.
SNC-Lavalin inc. Division transport, infrastructure et bâtiment
5500, boulevard des Galeries, bureau 200, Québec (Qc) G2K 2E2

Dossier n° : 634206
Date : 2016-01-18

Fournisseur de béton : -
Projet : Réhabilitation du quai fédéral
Lieu historique national du canal de Chambly
Localisation : Chambly, Québec

RENSEIGNEMENTS GÉNÉRAUX

Numéro d'échantillon : 15-PB-998
Votre n° d'échantillon : C2 (560-670mm)
Formule de mélange : -
Date de prélèvement : 2015-12-14

Type d'échantillon : Carotte
Orientation de la plaque : Vertical
Date de réception : 2015--12-14
Date de l'essai : 2016-01-15

Type de béton : Catégorie C-2 (CSA)
Classe à 28j : -
Ciment : -
Sable : -
Pierre : -
Diamètre max du granulat (mm) : 20

Réducteur d'eau : -
Superplastifiant : -
Agent entraîneur d'air : -
Retardateur : -
Accélérateur de prise : -
Autre : -

Arrêts totaux	Arrêts sur pâte	Nombre de vides	Arrêts sur vides	Nombre de lignes
1540	490	305	88	55

(Le pas de la table de travail est de 1,59 mm, microscope grossissement 110X)

Teneur en air (%)		Volume de pâte (%)	
béton frais	béton durci	théorique	béton durci
	5,7		31,8

Facteur espac. (µm)	Surface spé. (mm^{-1})	Corde moy. (µm)	Rapport P/A	Longueur trav. (mm)	Nombre de vides par mm
558	8,7	459	5,568	2449	0,12

Paramètres	Résultats	Exigence	Norme réf.
Surface observée (cm^2)	83	71	ASTM C 457
Longueur totale traversée (mm)	2449	2286	ASTM C 457
Nombre d'arrêts	1540	1350	ASTM C 457
Teneur en air (%)	5,7	3 min	CSA-A23.1
Facteur d'espacement, $\overline{L}$ (µm)	558	260 max	CSA A23.1

Essai réalisé par : Mostafa Tahery

Remarque :

Approuvé par : _____
Alain Gagnon

Chargé de projet : _____
Mohamed Sabri, ing., M. Ing.

SNC·LAVALIN

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DÉTERMINATION MICROSCOPIQUE DES PARAMÈTRES DU RÉSEAU DE VIDES DANS LE BÉTON DURCI NORME ASTM C457 PROCÉDURE B

Soumis à : M. Carol Roy, ing.
SNC-Lavalin inc. Division transport, infrastructure et bâtiment
5500, boulevard des Galeries, bureau 200, Québec (Qc) G2K 2E2

Dossier n° : 634206
Date : 2016-01-18

Fournisseur de béton : -
Projet : Réhabilitation du quai fédéral
Lieu historique national du canal de Chambly
Localisation : Chambly, Québec

RENSEIGNEMENTS GÉNÉRAUX

Numéro d'échantillon : 15-PB-999
Votre n° d'échantillon : V1 (2400-2500 mm)
Formule de mélange : -
Date de prélèvement : 2015-12-14

Type d'échantillon : Carotte
Orientation de la plaque : Vertical
Date de réception : 2015--12-14
Date de l'essai : 2016-01-15

Type de béton : Catégorie C-2 (CSA)
Classe à 28j : -
Ciment : -
Sable : -
Pierre : -
Diamètre max du granulat (mm) : 28

Réducteur d'eau : -
Superplastifiant : -
Agent entraîneur d'air : -
Retardateur : -
Accélérateur de prise : -
Autre : -

Arrêts totaux	Arrêts sur pâte	Nombre de vides	Arrêts sur vides	Nombre de lignes
1500	445	165	49	60

(Le pas de la table de travail est de 1,59 mm, microscope grossissement 110X)

Teneur en air (%)		Volume de pâte (%)	
béton frais	béton durci	théorique	béton durci
	3,3		29,7

Facteur espac. (µm)	Surface spé. (mm^{-1})	Corde moy. (µm)	Rapport P/A	Longueur trav. (mm)	Nombre de vides par mm
717	8,5	472	9,082	2385	0,07

Paramètres	Résultats	Exigence	Norme réf.
Surface observée (cm^2)	116,4	77	ASTM C 457
Longueur totale traversée (mm)	2385	2413	ASTM C 457
Nombre d'arrêts	1500	1425	ASTM C 457
Teneur en air (%)	3,3	3 min	CSA-A23.1
Facteur d'espacement, $\overline{L}$ (µm)	717	260 max	CSA A23.1

Essai réalisé par : Mostafa Tahery

Remarque :

Approuvé par : Alain Gagnon

Chargé de projet : Mohamed Sabri, ing., M. Ing.

Annexe 4

Résultats et certificats d’analyses chimiques

SNC·LAVALIN

Tableau 4-1 : Résultats des analyses chimiques - Sols (mg/kg)

Paramètres	Politique[1] A	Politique[1] B	Politique[1] C	RESC[2] Annexe I	Sondage	F-1		F-2		F-3		F-4	F-5		F-6	F-7	S-1	
					Échantillon	CF-1	CF-2A	CF-4	CF-1	CF-2	CF-1	CF-2	CF-1	CF-1	DUP-5	CF-1	CF-1	VR-3	VR-4
					Profondeur (m)	3,17 à 3,78	3,78 à 4,00	4,88 à 5,49	0,05 à 0,66	0,66 à 1,27	0,00 à 0,66	0,66 à 1,27	3,53 à 4,14	2,89 à 3,51		2,96 à 3,57	4,59 à 5,20	1,6 à 1,8	1,8 à 2,1
					Description	Remblai hétérogène		Till	Remblai hétérogène		Remblai hétérogène		Sédiments	Sédiments		Sédiments	Sédiments	Bois	Remblai hétérogène
Métaux extractibles totaux																			
Arsenic (As)	**6**	**30**	**50**	**250**		<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	5,5	5,9	<5,0	<5,0	<5,0	5,8	<5,0	**6,4**
Cadmium (Cd)	**1,5**	**5**	**20**	**100**		<0,9	<0,9	<0,9	0,9	<0,9	<0,9	<0,9	1,1	<0,9	<0,9	1,1	1,1	<0,9	1
Chrome (Cr)	**85**	**250**	**800**	**4 000**		<45	<45	<45	48	<45	<45	<45	<45	<45	<45	46	<45	<45	<45
Cuivre (Cu)	**40**	**100**	**500**	**2 500**		<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	**43**	<40	<40
Mercure (Hg)	**0,2**	**2**	**10**	**50**		<0,2	<0,2	< 0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	< 0,2	<0,2
Nickel (Ni)	**50**	**100**	**500**	**2 500**		<30	<30	<30	45	<30	<30	<30	42	32	33	43	36	<30	34
Plomb (Pb)	**50**	**500**	**1 000**	**5 000**		<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	**146**	<30	**60**
Zinc (Zn)	**110**	**500**	**1 500**	**7 500**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	109	<100	<100
Autres composés inorganiques																			
Carbone organique total	-[3]	-[3]	-[3]	-[3]		--	--	--	--	--	--	--	<0,3	<0,3	<0,3	0,4	0,6	--	--
Composés phénoliques																			
Crésol (ortho)	**0,1**	**1**	**10**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Crésol (meta)	**0,1**	**1**	**10**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Crésol (para)	**0,1**	**1**	**10**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Diméthyl-2,4 phénol	**0,1**	**1**	**10**	**140**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Nitro-2 phénol	**0,5**	**1**	**10**	**130**		<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<5,0	<0,5
Nitro-4 phénol	**0,5**	**1**	**10**	**290**		<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<5,0	<0,5
Phénol	**0,1**	**1**	**10**	**62**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Chloro-2 phénol	**0,1**	**0,5**	**5**	**57**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Chloro-3 phénol	**0,1**	**0,5**	**5**	**57**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Chloro-4 phénol	**0,1**	**0,5**	**5**	**57**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Dichloro-2,3 phénol	**0,1**	**0,5**	**5**	**140**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Dichloro-2,4 phénol	**0,1**	**0,5**	**5**	**140**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Dichloro-2,5 phénol	**0,1**	**0,5**	**5**	**140**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Dichloro-2,6 + 3,5 phénol[5]	**0,1**	**0,5**	**5**	**140**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Dichloro-3,4 phénol	**0,1**	**0,5**	**5**	**140**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Pentachlorophénol (PCP)	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Tétrachloro-2,3,4,5 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Tétrachloro-2,3,4,6 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Tétrachloro-2,3,5,6 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Trichloro-2,3,4 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Trichloro-2,3,5 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Trichloro-2,3,6 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Trichloro-2,4,5 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Trichloro-2,4,6 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Trichloro-3,4,5 phénol	**0,1**	**0,5**	**5**	**74**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,5	<0,1
Hydrocarbures aromatiques polycycliques (HAP)																			
Acénaphtène	**0,1**	**10**	**100**	**100**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Acénaphtylène	**0,1**	**10**	**100**	**100**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Anthracène	**0,1**	**10**	**100**	**100**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (a) anthracène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (a) pyrène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (b) fluoranthène	-[3]	**1**	**10**	-[3]		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (j) fluoranthène	-[3]	**1**	**10**	-[3]		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (k) fluoranthène	-[3]	**1**	**10**	-[3]		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (b + j + k) fluoranthène	**0,1**	-[4]	-[4]	**136**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (c) phénanthrène	**0,1**	**1**	**10**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Benzo (g,h,i) pérylène	**0,1**	**1**	**10**	**18**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Chrysène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	0,1	<0,2	<0,1
Dibenzo (a,h) anthracène	**0,1**	**1**	**10**	**82**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Dibenzo (a,i) pyrène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Dibenzo (a,h) pyrène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Dibenzo (a,l) pyrène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Diméthyl-7,12 Benzo (a) anthracène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Fluoranthène	**0,1**	**10**	**100**	**100**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	**0,2**	<0,2	<0,1
Fluorène	**0,1**	**10**	**100**	**100**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Indéno (1,2,3-cd) pyrène	**0,1**	**1**	**10**	**34**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Méthyl-3 cholanthrène	**0,1**	**1**	**10**	**150**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Naphtalène	**0,1**	**5**	**50**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Phénanthrène	**0,1**	**5**	**50**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	0,1	0,1	<0,2	<0,1
Pyrène	**0,1**	**10**	**100**	**100**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	**0,2**	<0,2	<0,1
Méthyl-1 naphtalène	**0,1**	**1**	**10**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Méthyl-2 naphtalène	**0,1**	**1**	**10**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Diméthyl-1,3 naphtalène	**0,1**	**1**	**10**	**56**		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,2	<0,1
Triméthyl-2,3,5 naphtalène	**0,1**	**1**	**10**	**56**		<0,1	<0,1		<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1		<0,1
Biphényles polychlorés (BPC)																			
Sommation des congénères	**0,05**	**1**	**10**	**50**		<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,080	<0,010
Hydrocarbures pétroliers																			
HP C_{10}-C_{50}	**300**	**700**	**3 500**	**10 000**		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**9560**	<100

NOTES EXPLICATIVES
ANALYSES CHIMIQUES - SOLS

---	Aucune analyse effectuée.
123	Concentration inférieure ou égale au critère A ou à la limite de détection.
123	Concentration située dans la plage A-B.
123	Concentration située dans la plage B-C.
123	Concentration supérieure au critère C et inférieure à la valeur limite du RESC.
123	Concentration égale ou supérieure à la valeur limite du RESC.
Note 1 :	*Politique de protection des sols et de réhabilitation des* Les critères B et C correspondent aux valeurs limites des annexes I et II du Les valeurs du critère A utilisées pour les métaux correspondent à celles indiquées pour la province géologique des Basses-Terres du Saint-Laurent.
Note 2 :	*Règlement sur l'enfouissement des sols contaminés* (RESC).
Note 3 :	Aucun critère ou valeur limite disponible.
Note 4 :	Seules les concentrations des composés individuels ont été comparées aux critères de la Politique.
Note 5 :	Les critères correspondent à ceux des composés individuels.

AGAT Laboratoires

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ST. LAURENT, QUEBEC
CANADA H4S 1V9
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NOM DU CLIENT: GROUPE QUALITAS INC.
275 BENJAMIN-HUDON
MONTREAL, QC H4N1J1
(514) 331-6910

À L'ATTENTION DE: Christine Vigneault

N° DE PROJET: 634206

N° BON DE TRAVAIL: 15M055832

ANALYSE DES SOLS VÉRIFIÉ PAR: Alain Fauteux, chimiste

ORGANIQUE DE TRACE VÉRIFIÉ PAR: Robert Roch, Chimiste

DATE DU RAPPORT: 2016-01-05

VERSION*: 1

NOMBRE DE PAGES: 31

Si vous désirez de l'information concernant cette analyse, S.V.P. contacter votre chargé de projets au (514) 337-1000.

*NOTES

Nous disposerons des échantillons dans les 30 jours suivants les analyses. S.V.P. Contactez le laboratoire si vous désirez avoir un délai d'entreposage.

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

6 Métaux Extractibles Totaux

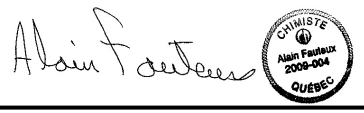
DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

						IDENTIFICATION DE L'ÉCHANTILLON:	F-1A-CF-1 (3, 17-3,78)	F-1A-CF-2A (3,78-4,00)	F-2 CF-1 (0, 05-0,66)	F-2 CF-2 (0, 66-1,27)	F3 CF-1(0, 00-0,66)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14	2015-12-09	2015-12-09	2015-12-08
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	7307358	7307359	7307360	7307361	7307362
Cadmium	mg/kg	1.5	5	20	100	0.9	<0.9	<0.9	0.9[<A]	<0.9	<0.9
Chrome	mg/kg	85	250	800	4000	45	<45	<45	48[<A]	<45	<45
Cuivre	mg/kg	40	100	500	2500	40	<40	<40	<40	<40	<40
Nickel	mg/kg	50	100	500	2500	30	<30	<30	45[<A]	<30	<30
Plomb	mg/kg	50	500	1000	5000	30	<30	<30	<30	<30	<30
Zinc	mg/kg	110	500	1500	7500	100	<100	<100	<100	<100	<100
Arsenic	mg/kg	6	30	50	250	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Mercure	mg/kg	0.2	2	10	50	0.2	<0.2	<0.2	<0.2	<0.2	<0.2

						IDENTIFICATION DE L'ÉCHANTILLON:	F-3 CF-2 (0, 66-1,27)	S1 VR-4 (1, 8-2,1)	F-4 CF-1 (3, 53-4,14)	F-5 CF-1 (2, 89-3,51)	F-6 CF-1 (2, 96-3,57)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-08	2015-12-14	2015-12-11	2015-12-10	2015-12-09
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	7307363	7307365	7307381	7307382	7307383
Cadmium	mg/kg	1.5	5	20	100	0.9	<0.9	1.0[<A]	1.1[<A]	<0.9	1.1[<A]
Chrome	mg/kg	85	250	800	4000	45	<45	<45	<45	<45	46[<A]
Cuivre	mg/kg	40	100	500	2500	40	<40	<40	<40	<40	<40
Nickel	mg/kg	50	100	500	2500	30	<30	34[<A]	42[<A]	32[<A]	43[<A]
Plomb	mg/kg	50	500	1000	5000	30	<30	60[A-B]	<30	<30	<30
Zinc	mg/kg	110	500	1500	7500	100	<100	<100	<100	<100	<100
Arsenic	mg/kg	6	30	50	250	5.0	5.5[<A]	6.4[A-B]	5.9[<A]	<5.0	<5.0
Mercure	mg/kg	0.2	2	10	50	0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Certifié par:



AGAT Laboratoires

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CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

6 Métaux Extractibles Totaux

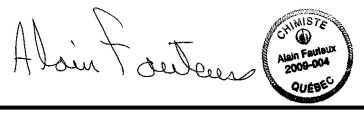
DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

IDENTIFICATION DE L'ÉCHANTILLON:							DUP-5	F-7 CF1 (4, 59-5,20)
MATRICE:							Sol	Sol
DATE D'ÉCHANTILLONNAGE:							2015-12-14	2015-12-08
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7307384	7307385
Cadmium	mg/kg	1.5	5	20	100	0.9	<0.9	1.1[<A]
Chrome	mg/kg	85	250	800	4000	45	<45	<45
Cuivre	mg/kg	40	100	500	2500	40	<40	43[A-B]
Nickel	mg/kg	50	100	500	2500	30	33[<A]	36[<A]
Plomb	mg/kg	50	500	1000	5000	30	<30	146[A-B]
Zinc	mg/kg	110	500	1500	7500	100	<100	109[<A]
Arsenic	mg/kg	6	30	50	250	5.0	<5.0	5.8[<A]
Mercure	mg/kg	0.2	2	10	50	0.2	<0.2	<0.2

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

Certifié par:



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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyses Inorganiques (sol)

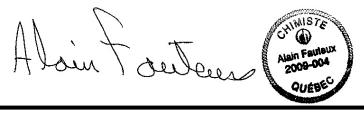
DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-4 CF-1 (3,	F-5 CF-1 (2,	F-6 CF-1 (2,		F-7 CF1 (4,
						IDENTIFICATION DE L'ÉCHANTILLON:	53-4,14)	89-3,51)	96-3,57)	DUP-5	59-5,20)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-11	2015-12-10	2015-12-09	2015-12-14	2015-12-08
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	**7307381**	**7307382**	**7307383**	**7307384**	**7307385**
Carbone organique total	%					0.3	<0.3	<0.3	0.4	<0.3	0.6

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

Certifié par:



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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-1A-CF-1 (3,	F-1A-CF-2A	F-2 CF-1 (0,	F-2 CF-2 (0,	F3 CF-1(0,
						IDENTIFICATION DE L'ÉCHANTILLON:	17-3,78)	(3,78-4,00)	05-0,66)	66-1,27)	00-0,66)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14	2015-12-09	2015-12-09	2015-12-08
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7307358	7307359	7307360	7307361	7307362
Cl-3 IUPAC #17+18	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-3 IUPAC #28+31	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-3 IUPAC #33	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #52	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #49	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #44	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #74	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #70	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #95	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #101	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #99	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #87	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #110	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #82	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #151	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #149	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #118	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #153	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #132	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #105	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #158+138	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #187	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #183	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #128	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #177	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #171	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #156	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Certifié par:

AGAT Laboratoires

9770 ROUTE TRANSCANADIENNE
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FAX (514)333-3046
http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-1A-CF-1 (3,	F-1A-CF-2A	F-2 CF-1 (0,	F-2 CF-2 (0,	F3 CF-1(0,
						IDENTIFICATION DE L'ÉCHANTILLON:	17-3,78)	(3,78-4,00)	05-0,66)	66-1,27)	00-0,66)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14	2015-12-09	2015-12-09	2015-12-08
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	7307358	7307359	7307360	7307361	7307362
Cl-7 IUPAC #180	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #191	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #169	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #170	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #199	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-9 IUPAC #208	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #195	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #194	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #205	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-9 IUPAC #206	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-10 IUPAC #209	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sommation BPC congénères (ciblés et non-ciblés)	mg/kg	0.05	1	10	50	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Étalon de recouvrement	**Unités**			**Limites**							
Cl-3 IUPAC #16	%			40-140			101	93	99	98	100
Cl-4 IUPAC #65	%			40-140			106	99	104	107	107
Cl-6 IUPAC #166	%			40-140			105	101	104	109	107
Cl-8 IUPAC #200	%			40-140			111	104	106	110	110

Certifié par:

Robert Roch

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDEFP. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDEFP.

AGAT Laboratoires

9770 ROUTE TRANSCANADIENNE
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CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-3 CF-2 (0,	S1 VR-4 (1,	F-4 CF-1 (3,	F-5 CF-1 (2,	F-6 CF-1 (2,
						IDENTIFICATION DE L'ÉCHANTILLON:	66-1,27)	8-2,1)	53-4,14)	89-3,51)	96-3,57)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-08	2015-12-14	2015-12-11	2015-12-10	2015-12-09
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7307363	7307365	7307381	7307382	7307383
Cl-3 IUPAC #17+18	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-3 IUPAC #28+31	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-3 IUPAC #33	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #52	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #49	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #44	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #74	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-4 IUPAC #70	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #95	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #101	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #99	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #87	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #110	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #82	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #151	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #149	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #118	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #153	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #132	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-5 IUPAC #105	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #158+138	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #187	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #183	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #128	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #177	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #171	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #156	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Certifié par:

AGAT Laboratoires

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ST. LAURENT, QUEBEC
CANADA H4S 1V9
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http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-3 CF-2 (0,	S1 VR-4 (1,	F-4 CF-1 (3,	F-5 CF-1 (2,	F-6 CF-1 (2,
						IDENTIFICATION DE L'ÉCHANTILLON:	66-1,27)	8-2,1)	53-4,14)	89-3,51)	96-3,57)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-08	2015-12-14	2015-12-11	2015-12-10	2015-12-09
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	7307363	7307365	7307381	7307382	7307383
Cl-7 IUPAC #180	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #191	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-6 IUPAC #169	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-7 IUPAC #170	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #199	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-9 IUPAC #208	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #195	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #194	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-8 IUPAC #205	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-9 IUPAC #206	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cl-10 IUPAC #209	mg/kg					0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sommation BPC congénères (ciblés et non-ciblés)	mg/kg	0.05	1	10	50	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Étalon de recouvrement	**Unités**			**Limites**							
Cl-3 IUPAC #16	%			40-140			111	105	76	103	104
Cl-4 IUPAC #65	%			40-140			117	107	80	108	107
Cl-6 IUPAC #166	%			40-140			119	111	81	107	103
Cl-8 IUPAC #200	%			40-140			121	113	80	111	105

Certifié par:

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDEFP. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDEFP.

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

IDENTIFICATION DE L'ÉCHANTILLON:							DUP-5	F-7 CF1 (4, 59-5,20)
MATRICE:							Sol	Sol
DATE D'ÉCHANTILLONNAGE:							2015-12-14	2015-12-08
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7307384	7307385
Cl-3 IUPAC #17+18	mg/kg					0.010	<0.010	<0.010
Cl-3 IUPAC #28+31	mg/kg					0.010	<0.010	<0.010
Cl-3 IUPAC #33	mg/kg					0.010	<0.010	<0.010
Cl-4 IUPAC #52	mg/kg					0.010	<0.010	<0.010
Cl-4 IUPAC #49	mg/kg					0.010	<0.010	<0.010
Cl-4 IUPAC #44	mg/kg					0.010	<0.010	<0.010
Cl-4 IUPAC #74	mg/kg					0.010	<0.010	<0.010
Cl-4 IUPAC #70	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #95	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #101	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #99	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #87	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #110	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #82	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #151	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #149	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #118	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #153	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #132	mg/kg					0.010	<0.010	<0.010
Cl-5 IUPAC #105	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #158+138	mg/kg					0.010	<0.010	<0.010
Cl-7 IUPAC #187	mg/kg					0.010	<0.010	<0.010
Cl-7 IUPAC #183	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #128	mg/kg					0.010	<0.010	<0.010
Cl-7 IUPAC #177	mg/kg					0.010	<0.010	<0.010
Cl-7 IUPAC #171	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #156	mg/kg					0.010	<0.010	<0.010

Certifié par:

Robert Roch

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDEFP. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDEFP.

AGAT Laboratoires

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FAX (514)333-3046
http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

				IDENTIFICATION DE L'ÉCHANTILLON:			DUP-5	F-7 CF1 (4, 59-5,20)
				MATRICE:			Sol	Sol
				DATE D'ÉCHANTILLONNAGE:			2015-12-14	2015-12-08
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	**7307384**	**7307385**
Cl-7 IUPAC #180	mg/kg					0.010	<0.010	<0.010
Cl-7 IUPAC #191	mg/kg					0.010	<0.010	<0.010
Cl-6 IUPAC #169	mg/kg					0.010	<0.010	<0.010
Cl-7 IUPAC #170	mg/kg					0.010	<0.010	<0.010
Cl-8 IUPAC #199	mg/kg					0.010	<0.010	<0.010
Cl-9 IUPAC #208	mg/kg					0.010	<0.010	<0.010
Cl-8 IUPAC #195	mg/kg					0.010	<0.010	<0.010
Cl-8 IUPAC #194	mg/kg					0.010	<0.010	<0.010
Cl-8 IUPAC #205	mg/kg					0.010	<0.010	<0.010
Cl-9 IUPAC #206	mg/kg					0.010	<0.010	<0.010
Cl-10 IUPAC #209	mg/kg					0.010	<0.010	<0.010
Sommation BPC congénères (ciblés et non-ciblés)	mg/kg	0.05	1	10	50	0.010	<0.010	<0.010
Étalon de recouvrement	**Unités**			**Limites**				
Cl-3 IUPAC #16	%			40-140			98	112
Cl-4 IUPAC #65	%			40-140			103	115
Cl-6 IUPAC #166	%			40-140			102	114
Cl-8 IUPAC #200	%			40-140			108	112

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

Certifié par:

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-1A-CF-1 (3,	F-1A-CF-2A	F-2 CF-1 (0,	F-2 CF-2 (0,	F3 CF-1(0,
						IDENTIFICATION DE L'ÉCHANTILLON:	17-3,78)	(3,78-4,00)	05-0,66)	66-1,27)	00-0,66)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14	2015-12-09	2015-12-09	2015-12-08
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	7307358	7307359	7307360	7307361	7307362
Acénaphtène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acénaphtylène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo (b) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo (j) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo (k) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(c)phénanthrène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)pérylène	mg/kg	0.1	1	10	18	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracène	mg/kg	0.1	1	10	82	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,i)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,l)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diméthyl-7,12benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indéno(1,2,3-cd)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Méthyl-3cholanthrène	mg/kg	0.1	1	10	150	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphtalène	mg/kg	0.1	5	50	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phénanthrène	mg/kg	0.1	5	50	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Méthyl-1naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Méthyl-2naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diméthyl-1,3naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Triméthyl-2,3,5naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

			IDENTIFICATION DE L'ÉCHANTILLON:	F-1A-CF-1 (3, 17-3,78)	F-1A-CF-2A (3,78-4,00)	F-2 CF-1 (0, 05-0,66)	F-2 CF-2 (0, 66-1,27)	F3 CF-1(0, 00-0,66)
			MATRICE:	Sol	Sol	Sol	Sol	Sol
			DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14	2015-12-09	2015-12-09	2015-12-08
Étalon de recouvrement	**Unités**	**Limites**		7307358	7307359	7307360	7307361	7307362
Acénaphtène-D10	%	40-140		81	78	87	80	78
Fluoranthène-D10	%	40-140		85	77	79	83	74
Pérylène-D12	%	40-140		86	93	76	92	84

Certifié par:

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-3 CF-2 (0,	S1 VR-4 (1,	F-4 CF-1 (3,	F-5 CF-1 (2,	F-6 CF-1 (2,
						IDENTIFICATION DE L'ÉCHANTILLON:	66-1,27)	8-2,1)	53-4,14)	89-3,51)	96-3,57)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-08	2015-12-14	2015-12-11	2015-12-10	2015-12-09
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	7307363	7307365	7307381	7307382	7307383
Acénaphtène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acénaphtylène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo (b) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo (j) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo (k) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(c)phénanthrène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)pérylène	mg/kg	0.1	1	10	18	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracène	mg/kg	0.1	1	10	82	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,i)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,l)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diméthyl-7,12benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indéno(1,2,3-cd)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Méthyl-3cholanthrène	mg/kg	0.1	1	10	150	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphtalène	mg/kg	0.1	5	50	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phénanthrène	mg/kg	0.1	5	50	56	0.1	<0.1	<0.1	<0.1	<0.1	0.1[A]
Pyrène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Méthyl-1naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Méthyl-2naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diméthyl-1,3naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Triméthyl-2,3,5naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Certifié par:

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

			IDENTIFICATION DE L'ÉCHANTILLON:	F-3 CF-2 (0, 66-1,27)	S1 VR-4 (1, 8-2,1)	F-4 CF-1 (3, 53-4,14)	F-5 CF-1 (2, 89-3,51)	F-6 CF-1 (2, 96-3,57)
			MATRICE:	Sol	Sol	Sol	Sol	Sol
			DATE D'ÉCHANTILLONNAGE:	2015-12-08	2015-12-14	2015-12-11	2015-12-10	2015-12-09
Étalon de recouvrement	**Unités**	**Limites**		7307363	7307365	7307381	7307382	7307383
Acénaphtène-D10	%	40-140		84	81	69	80	86
Fluoranthène-D10	%	40-140		84	84	68	77	88
Pérylène-D12	%	40-140		99	93	69	82	96

Certifié par:

AGAT Laboratoires

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N° BON DE TRAVAIL: 15M055832

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NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

IDENTIFICATION DE L'ÉCHANTILLON:							DUP-5	F-7 CF1 (4, 59-5,20)
MATRICE:							Sol	Sol
DATE D'ÉCHANTILLONNAGE:							2015-12-14	2015-12-08
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	**7307384**	**7307385**
Acénaphtène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1
Acénaphtylène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1
Anthracène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1
Benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1
Benzo(a)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1
Benzo (b) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1
Benzo (j) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1
Benzo (k) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	<0.1
Benzo(c)phénanthrène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1
Benzo(g,h,i)pérylène	mg/kg	0.1	1	10	18	0.1	<0.1	<0.1
Chrysène	mg/kg	0.1	1	10	34	0.1	<0.1	0.1[A]
Dibenzo(a,h)anthracène	mg/kg	0.1	1	10	82	0.1	<0.1	<0.1
Dibenzo(a,i)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1
Dibenzo(a,h)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1
Dibenzo(a,l)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1
Diméthyl-7,12benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1
Fluoranthène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2[A-B]
Fluorène	mg/kg	0.1	10	100	100	0.1	<0.1	<0.1
Indéno(1,2,3-cd)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	<0.1
Méthyl-3cholanthrène	mg/kg	0.1	1	10	150	0.1	<0.1	<0.1
Naphtalène	mg/kg	0.1	5	50	56	0.1	<0.1	<0.1
Phénanthrène	mg/kg	0.1	5	50	56	0.1	<0.1	0.1[A]
Pyrène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2[A-B]
Méthyl-1naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1
Méthyl-2naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1
Diméthyl-1,3naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1
Triméthyl-2,3,5naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1

Certifié par:

CHIMISTE Robert Roch 90-032 QUÉBEC

Robert Roch

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

		IDENTIFICATION DE L'ÉCHANTILLON:	DUP-5	F-7 CF1 (4, 59-5,20)
		MATRICE:	Sol	Sol
		DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-08
Étalon de recouvrement	**Unités**	**Limites**	**7307384**	**7307385**
Acénaphtène-D10	%	40-140	91	90
Fluoranthène-D10	%	40-140	79	95
Pérylène-D12	%	40-140	90	102

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

Certifié par:

CHIMISTE Robert Roch 90-032 QUÉBEC

Robert Roch

AGAT Laboratoires

9770 ROUTE TRANSCANADIENNE
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FAX (514)333-3046
http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures pétroliers C10-C50 (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

						IDENTIFICATION DE L'ÉCHANTILLON:	**F-1A-CF-1 (3, 17-3,78)**	**F-1A-CF-2A (3,78-4,00)**	**F-2 CF-1 (0, 05-0,66)**	**F-2 CF-2 (0, 66-1,27)**	**F3 CF-1(0, 00-0,66)**
						MATRICE:	**Sol**	**Sol**	**Sol**	**Sol**	**Sol**
						DATE D'ÉCHANTILLONNAGE:	**2015-12-14**	**2015-12-14**	**2015-12-09**	**2015-12-09**	**2015-12-08**
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	**7307358**	**7307359**	**7307360**	**7307361**	**7307362**
Hydrocarbures pétroliers C10 à C50	mg/kg	300	700	3500	10000	100	<100	<100	<100	<100	<100
Étalon de recouvrement	**Unités**			**Limites**							
Nonane	%			40-140			112	105	115	85	108

						IDENTIFICATION DE L'ÉCHANTILLON:	**F-3 CF-2 (0, 66-1,27)**	**S1 VR-4 (1, 8-2,1)**	**F-4 CF-1 (3, 53-4,14)**	**F-5 CF-1 (2, 89-3,51)**	**F-6 CF-1 (2, 96-3,57)**
						MATRICE:	**Sol**	**Sol**	**Sol**	**Sol**	**Sol**
						DATE D'ÉCHANTILLONNAGE:	**2015-12-08**	**2015-12-14**	**2015-12-11**	**2015-12-10**	**2015-12-09**
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	**7307363**	**7307365**	**7307381**	**7307382**	**7307383**
Hydrocarbures pétroliers C10 à C50	mg/kg	300	700	3500	10000	100	<100	<100	<100	<100	<100
Étalon de recouvrement	**Unités**			**Limites**							
Nonane	%			40-140			96	84	70	92	91

						IDENTIFICATION DE L'ÉCHANTILLON:	**DUP-5**	**F-7 CF1 (4, 59-5,20)**
						MATRICE:	**Sol**	**Sol**
						DATE D'ÉCHANTILLONNAGE:	**2015-12-14**	**2015-12-08**
Paramètre	**Unités**	**C / N: A**	**C / N: B**	**C / N: C**	**C / N: D**	**LDR**	**7307384**	**7307385**
Hydrocarbures pétroliers C10 à C50	mg/kg	300	700	3500	10000	100	<100	<100
Étalon de recouvrement	**Unités**			**Limites**				
Nonane	%			40-140			92	116

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

Certifié par:

CHIMISTE Robert Roch 90-032 QUÉBEC

Robert Roch

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-1A-CF-1 (3,	F-1A-CF-2A	F-2 CF-1 (0,	F-2 CF-2 (0,	F3 CF-1(0,
						IDENTIFICATION DE L'ÉCHANTILLON:	17-3,78)	(3,78-4,00)	05-0,66)	66-1,27)	00-0,66)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14	2015-12-09	2015-12-09	2015-12-08
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7307358	7307359	7307360	7307361	7307362
o-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diméthyl-2,4 phénol	mg/kg	0.1	1	10	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitro-2 phénol	mg/kg	0.5	1	10	130	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitro-4 phénol	mg/kg	0.5	1	10	290	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phénol	mg/kg	0.1	1	10	62	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloro-2 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloro-3 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloro-4 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,3 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,6+3,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-3,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tétrachloro-2,3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tétrachloro-2,3,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tétrachloro-2,3,5,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,3,4 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,3,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,3,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Certifié par:

CHIMISTE Robert Roch 90-032 QUÉBEC

Robert Roch

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDEFP. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDEFP.

AGAT Laboratoires

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http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

			F-1A-CF-1 (3,	F-1A-CF-2A	F-2 CF-1 (0,	F-2 CF-2 (0,	F3 CF-1(0,
		IDENTIFICATION DE L'ÉCHANTILLON:	17-3,78)	(3,78-4,00)	05-0,66)	66-1,27)	00-0,66)
		MATRICE:	Sol	Sol	Sol	Sol	Sol
		DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14	2015-12-09	2015-12-09	2015-12-08
Étalon de recouvrement	Unités	Limites	7307358	7307359	7307360	7307361	7307362
Phénol-D5	%	40-140	102	97	94	98	88
2-Fluorophénol	%	40-140	96	91	88	93	82
2,6-dibromophénol	%	40-140	78	75	73	77	68
2,4,6-Tribromophénol	%	40-140	80	75	72	80	67

Certifié par:

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

							F-3 CF-2 (0,	S1 VR-4 (1,	F-4 CF-1 (3,	F-5 CF-1 (2,	F-6 CF-1 (2,
						IDENTIFICATION DE L'ÉCHANTILLON:	66-1,27)	8-2,1)	53-4,14)	89-3,51)	96-3,57)
						MATRICE:	Sol	Sol	Sol	Sol	Sol
						DATE D'ÉCHANTILLONNAGE:	2015-12-08	2015-12-14	2015-12-11	2015-12-10	2015-12-09
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7307363	7307365	7307381	7307382	7307383
o-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diméthyl-2,4 phénol	mg/kg	0.1	1	10	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitro-2 phénol	mg/kg	0.5	1	10	130	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitro-4 phénol	mg/kg	0.5	1	10	290	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phénol	mg/kg	0.1	1	10	62	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloro-2 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloro-3 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloro-4 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,3 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-2,6+3,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloro-3,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tétrachloro-2,3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tétrachloro-2,3,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tétrachloro-2,3,5,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,3,4 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,3,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,3,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-2,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloro-3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Certifié par:

CHIMISTE Robert Roch 90-032 QUÉBEC

Robert Roch

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

			F-3 CF-2 (0,	S1 VR-4 (1,	F-4 CF-1 (3,	F-5 CF-1 (2,	F-6 CF-1 (2,
		IDENTIFICATION DE L'ÉCHANTILLON:	66-1,27)	8-2,1)	53-4,14)	89-3,51)	96-3,57)
		MATRICE:	Sol	Sol	Sol	Sol	Sol
		DATE D'ÉCHANTILLONNAGE:	2015-12-08	2015-12-14	2015-12-11	2015-12-10	2015-12-09
Étalon de recouvrement	Unités	Limites	7307363	7307365	7307381	7307382	7307383
Phénol-D5	%	40-140	97	93	107	90	86
2-Fluorophénol	%	40-140	90	86	101	84	81
2,6-dibromophénol	%	40-140	76	73	86	72	72
2,4,6-Tribromophénol	%	40-140	75	74	93	72	74

Certifié par:

CHIMISTE Robert Roch 90-032 QUÉBEC

Robert Roch

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Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

IDENTIFICATION DE L'ÉCHANTILLON:							DUP-5	F-7 CF1 (4, 59-5,20)
MATRICE:							Sol	Sol
DATE D'ÉCHANTILLONNAGE:							2015-12-14	2015-12-08
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7307384	7307385
o-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1
m-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1
p-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	<0.1
Diméthyl-2,4 phénol	mg/kg	0.1	1	10	140	0.1	<0.1	<0.1
Nitro-2 phénol	mg/kg	0.5	1	10	130	0.5	<0.5	<0.5
Nitro-4 phénol	mg/kg	0.5	1	10	290	0.5	<0.5	<0.5
Phénol	mg/kg	0.1	1	10	62	0.1	<0.1	<0.1
Chloro-2 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1
Chloro-3 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1
Chloro-4 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	<0.1
Dichloro-2,3 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1
Dichloro-2,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1
Dichloro-2,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1
Dichloro-2,6+3,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1
Dichloro-3,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	<0.1
Pentachlorophénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Tétrachloro-2,3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Tétrachloro-2,3,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Tétrachloro-2,3,5,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Trichloro-2,3,4 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Trichloro-2,3,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Trichloro-2,3,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Trichloro-2,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Trichloro-2,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1
Trichloro-3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	<0.1

Certifié par:

CHIMISTE Robert Roch 90-032 QUÉBEC

Robert Roch

AGAT Laboratoires

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FAX (514)333-3046
http://www.agatlabs.com

Certificat d'analyse

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2015-12-23

DATE DU RAPPORT: 2016-01-05

		IDENTIFICATION DE L'ÉCHANTILLON:	DUP-5	F-7 CF1 (4, 59-5,20)
		MATRICE:	Sol	Sol
		DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-08
Étalon de recouvrement	**Unités**	**Limites**	**7307384**	**7307385**
Phénol-D5	%	40-140	82	90
2-Fluorophénol	%	40-140	74	85
2,6-dibromophénol	%	40-140	64	74
2,4,6-Tribromophénol	%	40-140	63	74

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

7307358-7307385 Le blanc est contaminé en phénol, il a été soustrait de l'échantillon.

Certifié par:

AGAT Laboratoires

9770 ROUTE TRANSCANADIENNE
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TEL (514)337-1000
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http://www.agatlabs.com

Contrôle de qualité

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

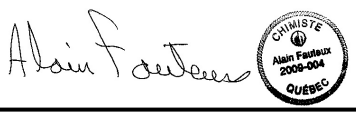
LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse des Sols

Date du rapport: 2016-01-05

PARAMÈTRE	Lot	N° éch.	DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
			Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
6 Métaux Extractibles Totaux															
Cadmium	7307358	7307358	<0.9	<0.9	0.0	< 0.9	109%	80%	120%	105%	80%	120%	102%	80%	120%
Chrome	7307358	7307358	<45	<45	0.0	< 45	109%	80%	120%	104%	80%	120%	102%	80%	120%
Cuivre	7307358	7307358	<40	<40	0.0	< 40	104%	80%	120%	101%	80%	120%	99%	80%	120%
Nickel	7307358	7307358	<30	<30	0.0	< 30	112%	80%	120%	107%	80%	120%	104%	80%	120%
Plomb	7307358	7307358	<30	<30	0.0	< 30	104%	80%	120%	102%	80%	120%	103%	80%	120%
Zinc	7307358	7307358	<100	<100	0.0	< 100	106%	80%	120%	107%	80%	120%	97%	80%	120%
Arsenic	7307358	7307358	<5.0	<5.0	0.0	< 5.0	98%	80%	120%	101%	80%	120%	103%	80%	120%
Mercure	7307358	7307358	<0.2	<0.2	0.0	< 0.2	109%	80%	120%	106%	80%	120%	116%	80%	120%
Analyses Inorganiques (sol)															
Carbone organique total	1	7307385	0.6	0.6	NA	< 0.3	90%	80%	120%	NA	80%	120%	NA	80%	120%

Certifié par:



La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDEFP. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDEFP.

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Contrôle de qualité

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse organique de trace

Date du rapport: 2016-01-05

PARAMÈTRE	Lot	N° éch.	DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
			Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
Hydrocarbures pétroliers C10-C50 (sol)															
Hydrocarbures pétroliers C10 à C50	1	7307358	< 100	< 100	0.0	< 100	104%	70%	130%	NA	70%	130%	93%	70%	130%
Nonane	1	7307358	105	94	11.1	104	91%	40%	140%	NA	40%	140%	81%	40%	140%
Hydrocarbures aromatiques polycycliques (HAP) (sol)															
Acénaphtène	1	7307359	<0.1	<0.1	0.0	<0.1	88%	70%	130%	NA	70%	130%	87%	70%	130%
Acénaphtylène	1	7307359	<0.1	<0.1	0.0	<0.1	79%	70%	130%	NA	70%	130%	73%	70%	130%
Anthracène	1	7307359	<0.1	<0.1	0.0	<0.1	91%	70%	130%	NA	70%	130%	92%	70%	130%
Benzo(a)anthracène	1	7307359	<0.1	<0.1	0.0	<0.1	91%	70%	130%	NA	70%	130%	82%	70%	130%
Benzo(a)pyrène	1	7307359	<0.1	<0.1	0.0	<0.1	82%	70%	130%	NA	70%	130%	91%	70%	130%
Benzo (b) fluoranthène	1	7307359	<0.1	<0.1	0.0	<0.1	91%	70%	130%	NA	70%	130%	87%	70%	130%
Benzo (j) fluoranthène	1	7307359	<0.1	<0.1	0.0	<0.1	93%	70%	130%	NA	70%	130%	119%	70%	130%
Benzo (k) fluoranthène	1	7307359	<0.1	<0.1	0.0	<0.1	91%	70%	130%	NA	70%	130%	89%	70%	130%
Benzo(c)phénanthrène	1	7307359	<0.1	<0.1	0.0	<0.1	81%	70%	130%	NA	70%	130%	81%	70%	130%
Benzo(g,h,i)pérylène	1	7307359	<0.1	<0.1	0.0	<0.1	91%	70%	130%	NA	70%	130%	83%	70%	130%
Chrysène	1	7307359	<0.1	<0.1	0.0	<0.1	92%	70%	130%	NA	70%	130%	103%	70%	130%
Dibenzo(a,h)anthracène	1	7307359	<0.1	<0.1	0.0	<0.1	101%	70%	130%	NA	70%	130%	96%	70%	130%
Dibenzo(a,i)pyrène	1	7307359	<0.1	<0.1	0.0	<0.1	78%	70%	130%	NA	70%	130%	53%	70%	130%
Dibenzo(a,h)pyrène	1	7307359	<0.1	<0.1	0.0	<0.1	96%	70%	130%	NA	70%	130%	83%	70%	130%
Dibenzo(a,l)pyrène	1	7307359	<0.1	<0.1	0.0	<0.1	86%	70%	130%	NA	70%	130%	77%	70%	130%
Diméthyl-7,12benzo(a)anthracène	1	7307359	<0.1	<0.1	0.0	<0.1	91%	70%	130%	NA	70%	130%	89%	70%	130%
Fluoranthène	1	7307359	<0.1	<0.1	0.0	<0.1	90%	70%	130%	NA	70%	130%	91%	70%	130%
Fluorène	1	7307359	<0.1	<0.1	0.0	<0.1	93%	70%	130%	NA	70%	130%	83%	70%	130%
Indéno(1,2,3-cd)pyrène	1	7307359	<0.1	<0.1	0.0	<0.1	81%	70%	130%	NA	70%	130%	74%	70%	130%
Méthyl-3cholanthrène	1	7307359	<0.1	<0.1	0.0	<0.1	90%	70%	130%	NA	70%	130%	89%	70%	130%
Naphtalène	1	7307359	<0.1	<0.1	0.0	<0.1	71%	70%	130%	NA	70%	130%	102%	70%	130%
Phénanthrène	1	7307359	<0.1	<0.1	0.0	<0.1	85%	70%	130%	NA	70%	130%	93%	70%	130%
Pyrène	1	7307359	<0.1	<0.1	0.0	<0.1	87%	70%	130%	NA	70%	130%	89%	70%	130%
Méthyl-1naphtalène	1	7307359	<0.1	<0.1	0.0	<0.1	76%	70%	130%	NA	70%	130%	91%	70%	130%
Méthyl-2naphtalène	1	7307359	<0.1	<0.1	0.0	<0.1	66%	70%	130%	NA	70%	130%	56%	70%	130%
Diméthyl-1,3naphtalène	1	7307359	<0.1	<0.1	0.0	<0.1	99%	70%	130%	NA	70%	130%	94%	70%	130%
Triméthyl-2,3,5naphtalène	1	7307359	<0.1	<0.1	0.0	<0.1	78%	70%	130%	NA	70%	130%	73%	70%	130%
Acénaphtène-D10	1	7307359	78	80	3.0	78	98%	40%	140%	NA	40%	140%	88%	40%	140%
Fluoranthène-D10	1	7307359	77	80	4.0	92	95%	40%	140%	NA	40%	140%	89%	40%	140%
Pérylène-D12	1	7307359	93	79	16.0	101	106%	40%	140%	NA	40%	140%	103%	40%	140%
BPC congénères (sol)															
Cl-3 IUPAC #17+18	1	7307359	< 0.010	< 0.010	0.0	< 0.010	106%	70%	130%	NA	70%	130%	101%	70%	130%
Cl-3 IUPAC #28+31	1	7307359	< 0.010	< 0.010	0.0	< 0.010	100%	70%	130%	NA	70%	130%	97%	70%	130%
Cl-3 IUPAC #33	1	7307359	< 0.010	< 0.010	0.0	< 0.010	120%	70%	130%	NA	70%	130%	99%	70%	130%
Cl-4 IUPAC #52	1	7307359	< 0.010	< 0.010	0.0	< 0.010	106%	70%	130%	NA	70%	130%	108%	70%	130%
Cl-4 IUPAC #49	1	7307359	< 0.010	< 0.010	0.0	< 0.010	104%	70%	130%	NA	70%	130%	103%	70%	130%
Cl-4 IUPAC #44	1	7307359	< 0.010	< 0.010	0.0	< 0.010	104%	70%	130%	NA	70%	130%	104%	70%	130%
Cl-4 IUPAC #74	1	7307359	< 0.010	< 0.010	0.0	< 0.010	92%	70%	130%	NA	70%	130%	101%	70%	130%

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Contrôle de qualité

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse organique de trace (Suite)

Date du rapport: 2016-01-05

PARAMÈTRE	Lot	N° éch.	DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
			Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
Cl-4 IUPAC #70	1	7307359	< 0.010	< 0.010	0.0	< 0.010	113%	70%	130%	NA	70%	130%	111%	70%	130%
Cl-5 IUPAC #95	1	7307359	< 0.010	< 0.010	0.0	< 0.010	113%	70%	130%	NA	70%	130%	112%	70%	130%
Cl-5 IUPAC #101	1	7307359	< 0.010	< 0.010	0.0	< 0.010	94%	70%	130%	NA	70%	130%	99%	70%	130%
Cl-5 IUPAC #99	1	7307359	< 0.010	< 0.010	0.0	< 0.010	96%	70%	130%	NA	70%	130%	101%	70%	130%
Cl-5 IUPAC #87	1	7307359	< 0.010	< 0.010	0.0	< 0.010	95%	70%	130%	NA	70%	130%	98%	70%	130%
Cl-5 IUPAC #110	1	7307359	< 0.010	< 0.010	0.0	< 0.010	99%	70%	130%	NA	70%	130%	103%	70%	130%
Cl-5 IUPAC #82	1	7307359	< 0.010	< 0.010	0.0	< 0.010	94%	70%	130%	NA	70%	130%	95%	70%	130%
Cl-6 IUPAC #151	1	7307359	< 0.010	< 0.010	0.0	< 0.010	98%	70%	130%	NA	70%	130%	101%	70%	130%
Cl-6 IUPAC #149	1	7307359	< 0.010	< 0.010	0.0	< 0.010	111%	70%	130%	NA	70%	130%	113%	70%	130%
Cl-5 IUPAC #118	1	7307359	< 0.010	< 0.010	0.0	< 0.010	93%	70%	130%	NA	70%	130%	102%	70%	130%
Cl-6 IUPAC #153	1	7307359	< 0.010	< 0.010	0.0	< 0.010	88%	70%	130%	NA	70%	130%	102%	70%	130%
Cl-6 IUPAC #132	1	7307359	< 0.010	< 0.010	0.0	< 0.010	117%	70%	130%	NA	70%	130%	120%	70%	130%
Cl-5 IUPAC #105	1	7307359	< 0.010	< 0.010	0.0	< 0.010	95%	70%	130%	NA	70%	130%	101%	70%	130%
Cl-6 IUPAC #158+138	1	7307359	< 0.010	< 0.010	0.0	< 0.010	109%	70%	130%	NA	70%	130%	111%	70%	130%
Cl-7 IUPAC #187	1	7307359	< 0.010	< 0.010	0.0	< 0.010	106%	70%	130%	NA	70%	130%	108%	70%	130%
Cl-7 IUPAC #183	1	7307359	< 0.010	< 0.010	0.0	< 0.010	102%	70%	130%	NA	70%	130%	102%	70%	130%
Cl-6 IUPAC #128	1	7307359	< 0.010	< 0.010	0.0	< 0.010	102%	70%	130%	NA	70%	130%	105%	70%	130%
Cl-7 IUPAC #177	1	7307359	< 0.010	< 0.010	0.0	< 0.010	96%	70%	130%	NA	70%	130%	99%	70%	130%
Cl-7 IUPAC #171	1	7307359	< 0.010	< 0.010	0.0	< 0.010	107%	70%	130%	NA	70%	130%	109%	70%	130%
Cl-6 IUPAC #156	1	7307359	< 0.010	< 0.010	0.0	< 0.010	85%	70%	130%	NA	70%	130%	94%	70%	130%
Cl-7 IUPAC #180	1	7307359	< 0.010	< 0.010	0.0	< 0.010	97%	70%	130%	NA	70%	130%	103%	70%	130%
Cl-7 IUPAC #191	1	7307359	< 0.010	< 0.010	0.0	< 0.010	110%	70%	130%	NA	70%	130%	117%	70%	130%
Cl-6 IUPAC #169	1	7307359	< 0.010	< 0.010	0.0	< 0.010	106%	70%	130%	NA	70%	130%	99%	70%	130%
Cl-7 IUPAC #170	1	7307359	< 0.010	< 0.010	0.0	< 0.010	100%	70%	130%	NA	70%	130%	104%	70%	130%
Cl-8 IUPAC #199	1	7307359	< 0.010	< 0.010	0.0	< 0.010	101%	70%	130%	NA	70%	130%	105%	70%	130%
Cl-9 IUPAC #208	1	7307359	< 0.010	< 0.010	0.0	< 0.010	97%	70%	130%	NA	70%	130%	99%	70%	130%
Cl-8 IUPAC #195	1	7307359	< 0.010	< 0.010	0.0	< 0.010	108%	70%	130%	NA	70%	130%	112%	70%	130%
Cl-8 IUPAC #194	1	7307359	< 0.010	< 0.010	0.0	< 0.010	102%	70%	130%	NA	70%	130%	107%	70%	130%
Cl-8 IUPAC #205	1	7307359	< 0.010	< 0.010	0.0	< 0.010	115%	70%	130%	NA	70%	130%	120%	70%	130%
Cl-9 IUPAC #206	1	7307359	< 0.010	< 0.010	0.0	< 0.010	83%	70%	130%	NA	70%	130%	85%	70%	130%
Cl-10 IUPAC #209	1	7307359	< 0.010	< 0.010	0.0	< 0.010	85%	70%	130%	NA	70%	130%	85%	70%	130%
Sommation BPC congénères (ciblés et non-ciblés)	1	7307359	< 0.010	< 0.010	0.0	< 0.010	105%	70%	130%	NA	70%	130%	104%	70%	130%
Cl-3 IUPAC #16	1	7307359	93	94	NA	103	102%	40%	140%	NA	40%	140%	101%	40%	140%
Cl-4 IUPAC #65	1	7307359	99	97	NA	103	105%	40%	140%	NA	40%	140%	104%	40%	140%
Cl-6 IUPAC #166	1	7307359	101	102	NA	100	103%	40%	140%	NA	40%	140%	108%	40%	140%
Cl-8 IUPAC #200	1	7307359	104	107	NA	109	105%	40%	140%	NA	40%	140%	104%	40%	140%
Phénols (sol)															
o-Crésol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	102%	70%	130%	NA	70%	130%	93%	70%	130%
m-Crésol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	105%	70%	130%	NA	70%	130%	95%	70%	130%
p-Crésol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	104%	70%	130%	NA	70%	130%	95%	70%	130%
Diméthyl-2,4 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	101%	70%	130%	NA	70%	130%	91%	70%	130%

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Contrôle de qualité

NOM DU CLIENT: GROUPE QUALITAS INC.

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À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse organique de trace (Suite)

Date du rapport: 2016-01-05

PARAMÈTRE	Lot	N° éch.	DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
			Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
Nitro-2 phénol	1	7307359	< 0.5	< 0.5	0.0	< 0.5	82%	70%	130%	NA	70%	130%	74%	70%	130%
Nitro-4 phénol	1	7307359	< 0.5	< 0.5	0.0	< 0.5	81%	70%	130%	NA	70%	130%	69%	70%	130%
Phénol	1	7307359	0.1	0.1	0.0	0.1	113%	70%	130%	NA	70%	130%	102%	70%	130%
Chloro-2 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	100%	70%	130%	NA	70%	130%	89%	70%	130%
Chloro-3 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	98%	70%	130%	NA	70%	130%	89%	70%	130%
Chloro-4 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	112%	70%	130%	NA	70%	130%	101%	70%	130%
Dichloro-2,3 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	101%	70%	130%	NA	70%	130%	89%	70%	130%
Dichloro-2,4 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	90%	70%	130%	NA	70%	130%	80%	70%	130%
Dichloro-2,5 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	106%	70%	130%	NA	70%	130%	94%	70%	130%
Dichloro-2,6+3,5 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	101%	70%	130%	NA	70%	130%	91%	70%	130%
Dichloro-3,4 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	95%	70%	130%	NA	70%	130%	84%	70%	130%
Pentachlorophénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	92%	70%	130%	NA	70%	130%	74%	70%	130%
Tétrachloro-2,3,4,5 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	85%	70%	130%	NA	70%	130%	73%	70%	130%
Tétrachloro-2,3,4,6 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	83%	70%	130%	NA	70%	130%	72%	70%	130%
Tétrachloro-2,3,5,6 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	84%	70%	130%	NA	70%	130%	71%	70%	130%
Trichloro-2,3,4 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	94%	70%	130%	NA	70%	130%	83%	70%	130%
Trichloro-2,3,5 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	89%	70%	130%	NA	70%	130%	77%	70%	130%
Trichloro-2,3,6 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	88%	70%	130%	NA	70%	130%	77%	70%	130%
Trichloro-2,4,5 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	90%	70%	130%	NA	70%	130%	77%	70%	130%
Trichloro-2,4,6 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	86%	70%	130%	NA	70%	130%	77%	70%	130%
Trichloro-3,4,5 phénol	1	7307359	< 0.1	< 0.1	0.0	< 0.1	88%	70%	130%	NA	70%	130%	78%	70%	130%
Phénol-D5	1	7307359	97	109	NA	107	97%	40%	140%	NA	40%	140%	90%	40%	140%
2-Fluorophénol	1	7307359	91	103	NA	100	92%	40%	140%	NA	40%	140%	84%	40%	140%
2,6-dibromophénol	1	7307359	75	91	NA	82	82%	40%	140%	NA	40%	140%	72%	40%	140%
2,4,6-Tribromophénol	1	7307359	75	95	NA	85	84%	40%	140%	NA	40%	140%	75%	40%	140%

Certifié par:

Robert Roch

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDEFP. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDEFP.

AGAT Laboratoires

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Sommaire de méthode

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Analyse des Sols					
Cadmium	2016-01-05	2016-01-05	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Chrome	2016-01-05	2016-01-05	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Cuivre	2016-01-05	2016-01-05	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Nickel	2016-01-05	2016-01-05	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Plomb	2016-01-05	2016-01-05	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Zinc	2016-01-05	2016-01-05	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Arsenic	2016-01-05	2016-01-05	MET-101-6105F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/MS
Mercure	2016-01-05	2016-01-05	MET-101-6102F	MA. 200 Hg 1.1	COMBUSTION
Carbone organique total	2016-01-05	2016-01-05	INOR-101-6057F	MA. 405-C 1.1	TITRAGE

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Sommaire de méthode

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Analyse organique de trace					
Cl-3 IUPAC #17+18	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-3 IUPAC #28+31	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-3 IUPAC #33	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #52	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #49	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #44	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #74	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #70	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #95	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #101	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #99	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #87	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #110	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #82	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #151	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #149	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #118	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #153	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #132	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #105	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #158+138	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #187	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #183	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #128	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #177	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #171	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #156	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #180	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #191	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #169	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #170	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #199	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-9 IUPAC #208	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #195	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #194	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #205	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-9 IUPAC #206	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-10 IUPAC #209	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Sommation BPC congénères (ciblés et non-ciblés)	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-3 IUPAC #16	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #65	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #166	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #200	2015-12-30	2015-12-30	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Acénaphtène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Acénaphtylène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Anthracène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(a)anthracène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(a)pyrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS

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Sommaire de méthode

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Benzo (b) fluoranthène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo (j) fluoranthène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo (k) fluoranthène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(c)phénanthrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(g,h,i)pérylène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Chrysène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,h)anthracène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,i)pyrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,h)pyrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,l)pyrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Diméthyl-7,12benzo(a)anthracène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Fluoranthène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Fluorène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Indéno(1,2,3-cd)pyrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Méthyl-3cholanthrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Naphtalène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Phénanthrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Pyrène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Méthyl-1naphtalène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Méthyl-2naphtalène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Diméthyl-1,3naphtalène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Triméthyl-2,3,5naphtalène	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Acénaphtène-D10	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Fluoranthène-D10	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Pérylène-D12	2015-12-30	2015-12-30	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Hydrocarbures pétroliers C10 à C50	2015-12-31	2016-05-01	ORG-100-5104F	MA. 400-HYD. 1.0	GC/FID
Nonane	2015-12-31	2016-01-04	ORG-100-5104F	MA. 400-HYD. 1.0	
o-Crésol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-PHE 1.0	GC/MS
m-Crésol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
p-Crésol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Diméthyl-2,4 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Nitro-2 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Nitro-4 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Chloro-2 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Chloro-3 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Chloro-4 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,3 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,4 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,5 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,6+3,5 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-3,4 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Pentachlorophénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Tétrachloro-2,3,4,5 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Tétrachloro-2,3,4,6 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Tétrachloro-2,3,5,6 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,3,4 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,3,5 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,3,6 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,4,5 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS

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Sommaire de méthode

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 15M055832

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Trichloro-2,4,6 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-3,4,5 phénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Phénol-D5	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
2-Fluorophénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
2,6-dibromophénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
2,4,6-Tribromophénol	2015-12-30	2015-12-30	ORG-100-5103F	MA.400-Phé 1.0	GC/MS

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NOM DU CLIENT: GROUPE QUALITAS INC.
275 BENJAMIN-HUDON
MONTREAL, QC H4N1J1
(514) 331-6910

À L'ATTENTION DE: Christine Vigneault

N° DE PROJET: 634206

N° BON DE TRAVAIL: 16M059877

ANALYSE DES SOLS VÉRIFIÉ PAR: Amar Bellahsene, chimiste

ORGANIQUE DE TRACE VÉRIFIÉ PAR: Félix Brasseur, chimiste

DATE DU RAPPORT: 2016-01-20

VERSION*: 1

NOMBRE DE PAGES: 17

Si vous désirez de l'information concernant cette analyse, S.V.P. contacter votre chargé de projets au (514) 337-1000.

*NOTES

Nous disposerons des échantillons dans les 30 jours suivants les analyses. S.V.P. Contactez le laboratoire si vous désirez avoir un délai d'entreposage.

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

6 Métaux Extractibles Totaux

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

							IDENTIFICATION DE L'ÉCHANTILLON:	F1A-/CF4	S1/VR-3A
							MATRICE:	Sol	Bois
							DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR		7328070	7328082
Arsenic	mg/kg	6	30	50	250	5.0		<5.0	<5.0
Cadmium	mg/kg	1.5	5	20	100	0.9		<0.9	<0.9
Chrome	mg/kg	85	250	800	4000	45		<45	<45
Cuivre	mg/kg	40	100	500	2500	40		<40	<40
Mercure	mg/kg	0.2	2	10	50	0.2		< 0.2	< 0.2
Nickel	mg/kg	50	100	500	2500	30		<30	<30
Plomb	mg/kg	50	500	1000	5000	30		<30	<30
Zinc	mg/kg	110	500	1500	7500	100		<100	<100

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

Certifié par:

CHIMISTE
Amar Bellahsene
2011-214
QUÉBEC

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

IDENTIFICATION DE L'ÉCHANTILLON:							F1A-/CF4		S1/VR-3A
MATRICE:							Sol		Bois
DATE D'ÉCHANTILLONNAGE:							2015-12-14		2015-12-14
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7328070	LDR	7328082
Cl-3 IUPAC #17+18	mg/kg					0.010	<0.010	0.080	<0.080
Cl-3 IUPAC #28+31	mg/kg					0.010	<0.010	0.080	<0.080
Cl-3 IUPAC #33	mg/kg					0.010	<0.010	0.080	<0.080
Cl-4 IUPAC #52	mg/kg					0.010	<0.010	0.080	<0.080
Cl-4 IUPAC #49	mg/kg					0.010	<0.010	0.080	<0.080
Cl-4 IUPAC #44	mg/kg					0.010	<0.010	0.080	<0.080
Cl-4 IUPAC #74	mg/kg					0.010	<0.010	0.080	<0.080
Cl-4 IUPAC #70	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #95	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #101	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #99	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #87	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #110	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #82	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #151	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #149	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #118	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #153	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #132	mg/kg					0.010	<0.010	0.080	<0.080
Cl-5 IUPAC #105	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #158+138	mg/kg					0.010	<0.010	0.080	<0.080
Cl-7 IUPAC #187	mg/kg					0.010	<0.010	0.080	<0.080
Cl-7 IUPAC #183	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #128	mg/kg					0.010	<0.010	0.080	<0.080
Cl-7 IUPAC #177	mg/kg					0.010	<0.010	0.080	<0.080
Cl-7 IUPAC #171	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #156	mg/kg					0.010	<0.010	0.080	<0.080
Cl-7 IUPAC #180	mg/kg					0.010	<0.010	0.080	<0.080

Certifié par:

Félix Brasseur 1997-012 CHIMISTE QUÉBEC

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AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

BPC congénères (sol)

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

						IDENTIFICATION DE L'ÉCHANTILLON:	F1A-/CF4		S1/VR-3A
						MATRICE:	Sol		Bois
						DATE D'ÉCHANTILLONNAGE:	2015-12-14		2015-12-14
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7328070	LDR	7328082
Cl-7 IUPAC #191	mg/kg					0.010	<0.010	0.080	<0.080
Cl-6 IUPAC #169	mg/kg					0.010	<0.010	0.080	<0.080
Cl-7 IUPAC #170	mg/kg					0.010	<0.010	0.080	<0.080
Cl-8 IUPAC #199	mg/kg					0.010	<0.010	0.080	<0.080
Cl-9 IUPAC #208	mg/kg					0.010	<0.010	0.080	<0.080
Cl-8 IUPAC #195	mg/kg					0.010	<0.010	0.080	<0.080
Cl-8 IUPAC #194	mg/kg					0.010	<0.010	0.080	<0.080
Cl-8 IUPAC #205	mg/kg					0.010	<0.010	0.080	<0.080
Cl-9 IUPAC #206	mg/kg					0.010	<0.010	0.080	<0.080
Cl-10 IUPAC #209	mg/kg					0.010	<0.010	0.080	<0.080
Sommation BPC congénères (ciblés et non-ciblés)	mg/kg	0.05	1	10	50	0.010	<0.010	0.080	<0.080
Étalon de recouvrement	Unités			Limites					
Cl-3 IUPAC #16	%			40-140			84		NA
Cl-4 IUPAC #65	%			40-140			82		60
Cl-6 IUPAC #166	%			40-140			92		104
Cl-8 IUPAC #200	%			40-140			92		108

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

7328082 La limite de détection a été augmentée en raison d'un taux d'humidité élevé dans l'échantillon.
Un des pourcentages de récupération n'est pas applicable en raison d'une interférence de matrice.

Certifié par:

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

IDENTIFICATION DE L'ÉCHANTILLON:							F1A-/CF4		S1/VR-3A
MATRICE:							Sol		Bois
DATE D'ÉCHANTILLONNAGE:							2015-12-14		2015-12-14
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7328070	LDR	7328082
Acénaphtène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2	<0.2
Acénaphtylène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2	<0.2
Anthracène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2	<0.2
Benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Benzo(a)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Benzo (b) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	0.2	<0.2
Benzo (j) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	0.2	<0.2
Benzo (k) fluoranthène	mg/kg	0.1	1	10	-	0.1	<0.1	0.2	<0.2
Benzo(c)phénanthrène	mg/kg	0.1	1	10	56	0.1	<0.1	0.2	<0.2
Benzo(g,h,i)pérylène	mg/kg	0.1	1	10	18	0.1	<0.1	0.2	<0.2
Chrysène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Dibenzo(a,h)anthracène	mg/kg	0.1	1	10	82	0.1	<0.1	0.2	<0.2
Dibenzo(a,i)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Dibenzo(a,h)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Dibenzo(a,l)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Diméthyl-7,12benzo(a)anthracène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Fluoranthène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2	<0.2
Fluorène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2	<0.2
Indéno(1,2,3-cd)pyrène	mg/kg	0.1	1	10	34	0.1	<0.1	0.2	<0.2
Méthyl-3cholanthrène	mg/kg	0.1	1	10	150	0.1	<0.1	0.2	<0.2
Naphtalène	mg/kg	0.1	5	50	56	0.1	<0.1	0.2	<0.2
Phénanthrène	mg/kg	0.1	5	50	56	0.1	<0.1	0.2	<0.2
Pyrène	mg/kg	0.1	10	100	100	0.1	<0.1	0.2	<0.2
Méthyl-1naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	0.2	<0.2
Méthyl-2naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	0.2	<0.2
Diméthyl-1,3naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	0.2	<0.2
Triméthyl-2,3,5naphtalène	mg/kg	0.1	1	10	56	0.1	<0.1	0.2	<0.2

Certifié par:

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures aromatiques polycycliques (HAP) (sol)

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

			IDENTIFICATION DE L'ÉCHANTILLON:	F1A-/CF4	S1/VR-3A
			MATRICE:	Sol	Bois
			DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14
Étalon de recouvrement	Unités	Limites		7328070	7328082
Acénaphtène-D10	%	40-140		93	89
Fluoranthène-D10	%	40-140		84	78
Pérylène-D12	%	40-140		93	97

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

7328082 L'échantillon contient un sol grossier contenant des morceaux de bois, un plus grand volume de solvant a été utilisée pour l'extraction. La limite de détection a été augmentée. La limite de détection a été augmentée en raison d'un taux d'humidité élevé dans l'échantillon.

Certifié par:

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Hydrocarbures pétroliers C10-C50 (sol)

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

						IDENTIFICATION DE L'ÉCHANTILLON:	F1A-/CF4	S1/VR-3A
						MATRICE:	Sol	Bois
						DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7328070	7328082
Hydrocarbures pétroliers C10 à C50	mg/kg	300	700	3500	10000	100	<100	9560[C-D]
Étalon de recouvrement	Unités			Limites				
Nonane	%			40-140			88	78

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

Certifié par:

AGAT Laboratoires

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

IDENTIFICATION DE L'ÉCHANTILLON:							F1A-/CF4		S1/VR-3A
MATRICE:							Sol		Bois
DATE D'ÉCHANTILLONNAGE:							2015-12-14		2015-12-14
Paramètre	Unités	C / N: A	C / N: B	C / N: C	C / N: D	LDR	7328070	LDR	7328082
o-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	0.5	<0.5
m-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	0.5	<0.5
p-Crésol	mg/kg	0.1	1	10	56	0.1	<0.1	0.5	<0.5
Diméthyl-2,4 phénol	mg/kg	0.1	1	10	140	0.1	<0.1	0.5	<0.5
Nitro-2 phénol	mg/kg	0.5	1	10	130	0.5	<0.5	5.0	<5.0
Nitro-4 phénol	mg/kg	0.5	1	10	290	0.5	<0.5	5.0	<5.0
Phénol	mg/kg	0.1	1	10	62	0.1	<0.1	0.5	<0.5
Chloro-2 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	0.5	<0.5
Chloro-3 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	0.5	<0.5
Chloro-4 phénol	mg/kg	0.1	0.5	5	57	0.1	<0.1	0.5	<0.5
Dichloro-2,3 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	0.5	<0.5
Dichloro-2,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	0.5	<0.5
Dichloro-2,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	0.5	<0.5
Dichloro-2,6+3,5 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	0.5	<0.5
Dichloro-3,4 phénol	mg/kg	0.1	0.5	5	140	0.1	<0.1	0.5	<0.5
Pentachlorophénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Tétrachloro-2,3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Tétrachloro-2,3,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Tétrachloro-2,3,5,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Trichloro-2,3,4 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Trichloro-2,3,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Trichloro-2,3,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Trichloro-2,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Trichloro-2,4,6 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5
Trichloro-3,4,5 phénol	mg/kg	0.1	0.5	5	74	0.1	<0.1	0.5	<0.5

Certifié par:

Félix Brasseur 1997-012 CHIMISTE QUÉBEC

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Certificat d'analyse

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

NOM DU CLIENT: GROUPE QUALITAS INC.

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

Phénols (sol)

DATE DE RÉCEPTION: 2016-01-14

DATE DU RAPPORT: 2016-01-20

			IDENTIFICATION DE L'ÉCHANTILLON:	F1A-/CF4	S1/VR-3A
			MATRICE:	Sol	Bois
			DATE D'ÉCHANTILLONNAGE:	2015-12-14	2015-12-14
Étalon de recouvrement	Unités	Limites		7328070	7328082
Phénol-D5	%	40-140		105	107
2-Fluorophénol	%	40-140		95	98
2,6-dibromophénol	%	40-140		77	76
2,4,6-Tribromophénol	%	40-140		79	75

Commentaires: LDR - Limite de détection rapportée; C / N - Critères Normes: A se réfère QC PTC (Critère A), B se réfère QC PTC (Critère B), C se réfère QC PTC (Critère C), D se réfère QC RESC (Annexe 1)

7328070 Le blanc est contaminé en phénol, il a été soustrait de l'échantillon.

7328082 Le blanc est contaminé en phénol, il a été soustrait de l'échantillon.
La limite de détection a été augmentée en raison d'un taux d'humidité élevé dans l'échantillon.

Certifié par:

AGAT Laboratoires

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Contrôle de qualité

NOM DU CLIENT: GROUPE QUALITAS INC.
N° BON DE TRAVAIL: 16M059877
N° DE PROJET: 634206
À L'ATTENTION DE: Christine Vigneault
PRÉLEVÉ PAR:Client
LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse des Sols

Date du rapport: 2016-01-20			DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
PARAMÈTRE	Lot	N° éch.	Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
6 Métaux Extractibles Totaux															
Arsenic	7326029		7.6	7.7	0.0	< 5.0	98%	80%	120%	101%	80%	120%	98%	80%	120%
Cadmium	7326029		<0.9	<0.9	0.0	< 0.9	109%	80%	120%	109%	80%	120%	108%	80%	120%
Chrome	7326029		<45	<45	0.0	< 45	105%	80%	120%	104%	80%	120%	103%	80%	120%
Cuivre	7326029		<40	<40	0.0	< 40	97%	80%	120%	96%	80%	120%	100%	80%	120%
Nickel	7326029		<30	<30	0.0	< 30	109%	80%	120%	105%	80%	120%	106%	80%	120%
Plomb	7326029		<30	<30	0.0	< 30	107%	80%	120%	105%	80%	120%	106%	80%	120%
Zinc	7326029		<100	<100	0.0	< 100	116%	80%	120%	112%	80%	120%	111%	80%	120%
6 Métaux Extractibles Totaux															
Arsenic	7328082	7328082	<5.0	<5.0	0.0	< 5.0	102%	80%	120%	101%	80%	120%	95%	80%	120%
Cadmium	7328082	7328082	<0.9	<0.9	0.0	< 0.9	117%	80%	120%	93%	80%	120%	100%	80%	120%
Chrome	7328082	7328082	<45	<45	0.0	< 45	81%	80%	120%	92%	80%	120%	85%	80%	120%
Cuivre	7328082	7328082	<40	<40	0.0	< 40	92%	80%	120%	90%	80%	120%	98%	80%	120%
Mercure	7329657		< 0.2	< 0.2		< 0.2	88%	80%	120%	87%	80%	120%	81%	80%	120%
Nickel	7328082	7328082	<30	<30	0.0	< 30	91%	80%	120%	96%	80%	120%	103%	80%	120%
Plomb	7328082	7328082	<30	<30	0.0	< 30	87%	80%	120%	91%	80%	120%	90%	80%	120%
Zinc	7328082	7328082	<100	<100	0.0	< 100	88%	80%	120%	94%	80%	120%	96%	80%	120%

Certifié par:

CHIMISTE Amar Bellahsene 2011-214 QUÉBEC

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AGAT Laboratoires
9770 ROUTE TRANSCANADIENNE
ST. LAURENT, QUEBEC
CANADA H4S 1V9
TEL (514)337-1000
FAX (514)333-3046
http://www.agatlabs.com

Contrôle de qualité

NOM DU CLIENT: GROUPE QUALITAS INC.
N° BON DE TRAVAIL: 16M059877
N° DE PROJET: 634206
À L'ATTENTION DE: Christine Vigneault
PRÉLEVÉ PAR:Client
LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse organique de trace

Date du rapport: 2016-01-20			DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
PARAMÈTRE	Lot	N° éch.	Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
Hydrocarbures pétroliers C10-C50 (sol)															
Hydrocarbures pétroliers C10 à C50	1	NA	NA	NA	0.0	< 100	92%	70%	130%	NA	70%	130%	75%	70%	130%
Nonane	1	NA	NA	NA	0.0	87	72%	40%	140%	NA	40%	140%	63%	40%	140%
Hydrocarbures aromatiques polycycliques (HAP) (sol)															
Acénaphtène	1	NA	NA	NA	0.0	< 0.1	97%	70%	130%	NA	70%	130%	NA	70%	130%
Acénaphtylène	1	NA	NA	NA	0.0	< 0.1	91%	70%	130%	NA	70%	130%	NA	70%	130%
Anthracène	1	NA	NA	NA	0.0	< 0.1	113%	70%	130%	NA	70%	130%	NA	70%	130%
Benzo(a)anthracène	1	NA	NA	NA	0.0	< 0.1	105%	70%	130%	NA	70%	130%	NA	70%	130%
Benzo(a)pyrène	1	NA	NA	NA	0.0	< 0.1	109%	70%	130%	NA	70%	130%	NA	70%	130%
Benzo (b) fluoranthène	1	NA	NA	NA	0.0	< 0.1	87%	70%	130%	NA	70%	130%	NA	70%	130%
Benzo (j) fluoranthène	1	NA	NA	NA	0.0	< 0.1	115%	70%	130%	NA	70%	130%	NA	70%	130%
Benzo (k) fluoranthène	1	NA	NA	NA	0.0	< 0.1	97%	70%	130%	NA	70%	130%	NA	70%	130%
Benzo(c)phénanthrène	1	NA	NA	NA	0.0	< 0.1	102%	70%	130%	NA	70%	130%	NA	70%	130%
Benzo(g,h,i)pérylène	1	NA	NA	NA	0.0	< 0.1	102%	70%	130%	NA	70%	130%	NA	70%	130%
Chrysène	1	NA	NA	NA	0.0	< 0.1	101%	70%	130%	NA	70%	130%	NA	70%	130%
Dibenzo(a,h)anthracène	1	NA	NA	NA	0.0	< 0.1	126%	70%	130%	NA	70%	130%	NA	70%	130%
Dibenzo(a,i)pyrène	1	NA	NA	NA	0.0	< 0.1	128%	70%	130%	NA	70%	130%	NA	70%	130%
Dibenzo(a,h)pyrène	1	NA	NA	NA	0.0	< 0.1	140%	70%	130%	NA	70%	130%	NA	70%	130%
Dibenzo(a,l)pyrène	1	NA	NA	NA	0.0	< 0.1	104%	70%	130%	NA	70%	130%	NA	70%	130%
Diméthyl-7,12benzo(a)anthracène	1	NA	NA	NA	0.0	< 0.1	99%	70%	130%	NA	70%	130%	NA	70%	130%
Fluoranthène	1	NA	NA	NA	0.0	< 0.1	101%	70%	130%	NA	70%	130%	NA	70%	130%
Fluorène	1	NA	NA	NA	0.0	< 0.1	102%	70%	130%	NA	70%	130%	NA	70%	130%
Indéno(1,2,3-cd)pyrène	1	NA	NA	NA	0.0	< 0.1	113%	70%	130%	NA	70%	130%	NA	70%	130%
Méthyl-3cholanthrène	1	NA	NA	NA	0.0	< 0.1	93%	70%	130%	NA	70%	130%	NA	70%	130%
Naphtalène	1	NA	NA	NA	0.0	< 0.1	87%	70%	130%	NA	70%	130%	NA	70%	130%
Phénanthrène	1	NA	NA	NA	0.0	< 0.1	92%	70%	130%	NA	70%	130%	NA	70%	130%
Pyrène	1	NA	NA	NA	0.0	< 0.1	104%	70%	130%	NA	70%	130%	NA	70%	130%
Méthyl-1naphtalène	1	NA	NA	NA	0.0	< 0.1	90%	70%	130%	NA	70%	130%	NA	70%	130%
Méthyl-2naphtalène	1	NA	NA	NA	0.0	< 0.1	67%	70%	130%	NA	70%	130%	NA	70%	130%
Diméthyl-1,3naphtalène	1	NA	NA	NA	0.0	< 0.1	108%	70%	130%	NA	70%	130%	NA	70%	130%
Triméthyl-2,3,5naphtalène	1	NA	NA	NA	0.0	< 0.1	81%	70%	130%	NA	70%	130%	NA	70%	130%
Acénaphtène-D10	1	NA	NA	NA	0.0	99	92%	40%	140%	NA	40%	140%	NA	40%	140%
Fluoranthène-D10	1	NA	NA	NA	0.0	94	93%	40%	140%	NA	40%	140%	NA	40%	140%
Pérylène-D12	1	NA	NA	NA	0.0	105	110%	40%	140%	NA	40%	140%	NA	40%	140%
BPC congénères (sol)															
Cl-3 IUPAC #17+18	1	NA	NA	NA	0.0	< 0.010	91%	70%	130%	NA	70%	130%	102%	70%	130%
Cl-3 IUPAC #28+31	1	NA	NA	NA	0.0	< 0.010	82%	70%	130%	NA	70%	130%	86%	70%	130%
Cl-3 IUPAC #33	1	NA	NA	NA	0.0	< 0.010	101%	70%	130%	NA	70%	130%	104%	70%	130%
Cl-4 IUPAC #52	1	NA	NA	NA	0.0	< 0.010	87%	70%	130%	NA	70%	130%	99%	70%	130%
Cl-4 IUPAC #49	1	NA	NA	NA	0.0	< 0.010	88%	70%	130%	NA	70%	130%	94%	70%	130%
Cl-4 IUPAC #44	1	NA	NA	NA	0.0	< 0.010	88%	70%	130%	NA	70%	130%	92%	70%	130%
Cl-4 IUPAC #74	1	NA	NA	NA	0.0	< 0.010	79%	70%	130%	NA	70%	130%	91%	70%	130%

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N° DE PROJET: 634206
PRÉLEVÉ PAR:Client

N° BON DE TRAVAIL: 16M059877
À L'ATTENTION DE: Christine Vigneault
LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse organique de trace (Suite)

Date du rapport: 2016-01-20			DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
PARAMÈTRE	Lot	N° éch.	Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
Cl-4 IUPAC #70	1	NA	NA	NA	0.0	< 0.010	97%	70%	130%	NA	70%	130%	93%	70%	130%
Cl-5 IUPAC #95	1	NA	NA	NA	0.0	< 0.010	94%	70%	130%	NA	70%	130%	101%	70%	130%
Cl-5 IUPAC #101	1	NA	NA	NA	0.0	< 0.010	76%	70%	130%	NA	70%	130%	86%	70%	130%
Cl-5 IUPAC #99	1	NA	NA	NA	0.0	< 0.010	80%	70%	130%	NA	70%	130%	87%	70%	130%
Cl-5 IUPAC #87	1	NA	NA	NA	0.0	< 0.010	75%	70%	130%	NA	70%	130%	83%	70%	130%
Cl-5 IUPAC #110	1	NA	NA	NA	0.0	< 0.010	80%	70%	130%	NA	70%	130%	100%	70%	130%
Cl-5 IUPAC #82	1	NA	NA	NA	0.0	< 0.010	80%	70%	130%	NA	70%	130%	82%	70%	130%
Cl-6 IUPAC #151	1	NA	NA	NA	0.0	< 0.010	81%	70%	130%	NA	70%	130%	89%	70%	130%
Cl-6 IUPAC #149	1	NA	NA	NA	0.0	< 0.010	90%	70%	130%	NA	70%	130%	100%	70%	130%
Cl-5 IUPAC #118	1	NA	NA	NA	0.0	< 0.010	77%	70%	130%	NA	70%	130%	88%	70%	130%
Cl-6 IUPAC #153	1	NA	NA	NA	0.0	< 0.010	73%	70%	130%	NA	70%	130%	88%	70%	130%
Cl-6 IUPAC #132	1	NA	NA	NA	0.0	< 0.010	91%	70%	130%	NA	70%	130%	97%	70%	130%
Cl-5 IUPAC #105	1	NA	NA	NA	0.0	< 0.010	76%	70%	130%	NA	70%	130%	87%	70%	130%
Cl-6 IUPAC #158+138	1	NA	NA	NA	0.0	< 0.010	86%	70%	130%	NA	70%	130%	99%	70%	130%
Cl-7 IUPAC #187	1	NA	NA	NA	0.0	< 0.010	87%	70%	130%	NA	70%	130%	97%	70%	130%
Cl-7 IUPAC #183	1	NA	NA	NA	0.0	< 0.010	84%	70%	130%	NA	70%	130%	92%	70%	130%
Cl-6 IUPAC #128	1	NA	NA	NA	0.0	< 0.010	83%	70%	130%	NA	70%	130%	91%	70%	130%
Cl-7 IUPAC #177	1	NA	NA	NA	0.0	< 0.010	79%	70%	130%	NA	70%	130%	89%	70%	130%
Cl-7 IUPAC #171	1	NA	NA	NA	0.0	< 0.010	84%	70%	130%	NA	70%	130%	93%	70%	130%
Cl-6 IUPAC #156	1	NA	NA	NA	0.0	< 0.010	74%	70%	130%	NA	70%	130%	81%	70%	130%
Cl-7 IUPAC #180	1	NA	NA	NA	0.0	< 0.010	79%	70%	130%	NA	70%	130%	90%	70%	130%
Cl-7 IUPAC #191	1	NA	NA	NA	0.0	< 0.010	90%	70%	130%	NA	70%	130%	104%	70%	130%
Cl-6 IUPAC #169	1	NA	NA	NA	0.0	< 0.010	76%	70%	130%	NA	70%	130%	95%	70%	130%
Cl-7 IUPAC #170	1	NA	NA	NA	0.0	< 0.010	80%	70%	130%	NA	70%	130%	92%	70%	130%
Cl-8 IUPAC #199	1	NA	NA	NA	0.0	< 0.010	84%	70%	130%	NA	70%	130%	93%	70%	130%
Cl-9 IUPAC #208	1	NA	NA	NA	0.0	< 0.010	82%	70%	130%	NA	70%	130%	91%	70%	130%
Cl-8 IUPAC #195	1	NA	NA	NA	0.0	< 0.010	88%	70%	130%	NA	70%	130%	100%	70%	130%
Cl-8 IUPAC #194	1	NA	NA	NA	0.0	< 0.010	83%	70%	130%	NA	70%	130%	95%	70%	130%
Cl-8 IUPAC #205	1	NA	NA	NA	0.0	< 0.010	94%	70%	130%	NA	70%	130%	106%	70%	130%
Cl-9 IUPAC #206	1	NA	NA	NA	0.0	< 0.010	75%	70%	130%	NA	70%	130%	78%	70%	130%
Cl-10 IUPAC #209	1	NA	NA	NA	0.0	< 0.010	77%	70%	130%	NA	70%	130%	85%	70%	130%
Sommation BPC congénères (ciblés et non-ciblés)	1	NA	NA	NA	0.0	< 0.010	87%	70%	130%	NA	70%	130%	93%	70%	130%
Cl-3 IUPAC #16	1	NA	NA	NA	0.0	84	86%	40%	140%	NA	40%	140%	94%	40%	140%
Cl-4 IUPAC #65	1	NA	NA	NA	0.0	80	86%	40%	140%	NA	40%	140%	95%	40%	140%
Cl-6 IUPAC #166	1	NA	NA	NA	0.0	77	83%	40%	140%	NA	40%	140%	92%	40%	140%
Cl-8 IUPAC #200	1	NA	NA	NA	0.0	91	87%	40%	140%	NA	40%	140%	95%	40%	140%
Phénols (sol)															
o-Crésol	1	NA	NA	NA	0.0	< 0.1	117%	70%	130%	NA	70%	130%	101%	70%	130%
m-Crésol	1	NA	NA	NA	0.0	< 0.1	123%	70%	130%	NA	70%	130%	109%	70%	130%
p-Crésol	1	NA	NA	NA	0.0	< 0.1	122%	70%	130%	NA	70%	130%	107%	70%	130%
Diméthyl-2,4 phénol	1	NA	NA	NA	0.0	< 0.1	92%	70%	130%	NA	70%	130%	80%	70%	130%

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Contrôle de qualité

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PRÉLEVÉ PAR:Client

N° BON DE TRAVAIL: 16M059877
À L'ATTENTION DE: Christine Vigneault
LIEU DE PRÉLÈVEMENT:Quai Chambly

Analyse organique de trace (Suite)

Date du rapport: 2016-01-20			DUPLICATA			MATÉRIAU DE RÉFÉRENCE				BLANC FORTIFIÉ			ÉCH. FORTIFIÉ		
PARAMÈTRE	Lot	N° éch.	Dup #1	Dup #2	% d'écart	Blanc de méthode	% Récup.	Limites		% Récup.	Limites		% Récup.	Limites	
								Inf.	Sup.		Inf.	Sup.		Inf.	Sup.
Nitro-2 phénol	1	NA	NA	NA	0.0	< 0.5	99%	70%	130%	NA	70%	130%	87%	70%	130%
Nitro-4 phénol	1	NA	NA	NA	0.0	< 0.5	89%	70%	130%	NA	70%	130%	76%	70%	130%
Phénol	1	NA	NA	NA	0.0	0.1	130%	70%	130%	NA	70%	130%	118%	70%	130%
Chloro-2 phénol	1	NA	NA	NA	0.0	< 0.1	114%	70%	130%	NA	70%	130%	100%	70%	130%
Chloro-3 phénol	1	NA	NA	NA	0.0	< 0.1	114%	70%	130%	NA	70%	130%	103%	70%	130%
Chloro-4 phénol	1	NA	NA	NA	0.0	< 0.1	130%	70%	130%	NA	70%	130%	109%	70%	130%
Dichloro-2,3 phénol	1	NA	NA	NA	0.0	< 0.1	115%	70%	130%	NA	70%	130%	102%	70%	130%
Dichloro-2,4 phénol	1	NA	NA	NA	0.0	< 0.1	102%	70%	130%	NA	70%	130%	90%	70%	130%
Dichloro-2,5 phénol	1	NA	NA	NA	0.0	< 0.1	112%	70%	130%	NA	70%	130%	110%	70%	130%
Dichloro-2,6+3,5 phénol	1	NA	NA	NA	0.0	< 0.1	116%	70%	130%	NA	70%	130%	100%	70%	130%
Dichloro-3,4 phénol	1	NA	NA	NA	0.0	< 0.1	107%	70%	130%	NA	70%	130%	95%	70%	130%
Pentachlorophénol	1	NA	NA	NA	0.0	< 0.1	104%	70%	130%	NA	70%	130%	79%	70%	130%
Tétrachloro-2,3,4,5 phénol	1	NA	NA	NA	0.0	< 0.1	95%	70%	130%	NA	70%	130%	79%	70%	130%
Tétrachloro-2,3,4,6 phénol	1	NA	NA	NA	0.0	< 0.1	93%	70%	130%	NA	70%	130%	77%	70%	130%
Tétrachloro-2,3,5,6 phénol	1	NA	NA	NA	0.0	< 0.1	93%	70%	130%	NA	70%	130%	76%	70%	130%
Trichloro-2,3,4 phénol	1	NA	NA	NA	0.0	< 0.1	107%	70%	130%	NA	70%	130%	92%	70%	130%
Trichloro-2,3,5 phénol	1	NA	NA	NA	0.0	< 0.1	101%	70%	130%	NA	70%	130%	86%	70%	130%
Trichloro-2,3,6 phénol	1	NA	NA	NA	0.0	< 0.1	98%	70%	130%	NA	70%	130%	84%	70%	130%
Trichloro-2,4,5 phénol	1	NA	NA	NA	0.0	< 0.1	99%	70%	130%	NA	70%	130%	85%	70%	130%
Trichloro-2,4,6 phénol	1	NA	NA	NA	0.0	< 0.1	98%	70%	130%	NA	70%	130%	85%	70%	130%
Trichloro-3,4,5 phénol	1	NA	NA	NA	0.0	< 0.1	100%	70%	130%	NA	70%	130%	86%	70%	130%
Phénol-D5	1	NA	NA	NA	0.0	107	111%	40%	140%	NA	40%	140%	102%	40%	140%
2-Fluorophénol	1	NA	NA	NA	0.0	97	103%	40%	140%	NA	40%	140%	94%	40%	140%
2,6-dibromophénol	1	NA	NA	NA	0.0	81	86%	40%	140%	NA	40%	140%	77%	40%	140%
2,4,6-Tribromophénol	1	NA	NA	NA	0.0	89	90%	40%	140%	NA	40%	140%	79%	40%	140%

Certifié par:

La procédure des Laboratoires AGAT concernant les signatures et les signataires se conforme strictement aux exigences d'accréditation ISO 17025:2005 comme le requiert, lorsque applicable, CALA, CCN et MDDEFP. Toutes les signatures sur les certificats d'AGAT sont protégées par des mots de passe et les signataires rencontrent les exigences des domaines d'accréditation ainsi que les exigences régionales approuvées par CALA, CCN et MDDEFP.

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À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Analyse des Sols					
Arsenic	2016-01-20	2016-01-21	MET-101-6105F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/MS
Cadmium	2016-01-20	2016-01-21	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Chrome	2016-01-20	2016-01-21	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Cuivre	2016-01-20	2016-01-21	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Mercure	2016-01-19	2016-01-19	MET-101-6102F	MA. 200 Hg 1.1	VAPEUR FROIDE/AA
Nickel	2016-01-20	2016-01-21	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Plomb	2016-01-20	2016-01-21	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES
Zinc	2016-01-20	2016-01-21	MET-101-6107F	MA. 200 - Mét 1.2 ; MA. 203 - Mét 3.2	ICP/OES

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PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Analyse organique de trace					
Cl-3 IUPAC #17+18	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-3 IUPAC #28+31	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-3 IUPAC #33	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #52	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #49	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #44	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #74	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #70	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #95	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #101	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #99	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #87	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #110	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #82	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #151	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #149	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #118	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #153	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #132	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-5 IUPAC #105	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #158+138	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #187	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #183	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #128	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #177	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #171	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #156	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #180	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #191	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #169	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-7 IUPAC #170	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #199	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-9 IUPAC #208	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #195	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #194	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #205	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-9 IUPAC #206	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-10 IUPAC #209	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Sommation BPC congénères (ciblés et non-ciblés)	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-3 IUPAC #16	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-4 IUPAC #65	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-6 IUPAC #166	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Cl-8 IUPAC #200	2016-01-18	2016-01-18	ORG-100-5107F.001	MA.400-BPC 1.0	GC/MS
Acénaphtène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Acénaphtylène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Anthracène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(a)anthracène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(a)pyrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS

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Sommaire de méthode

NOM DU CLIENT: GROUPE QUALITAS INC.
N° BON DE TRAVAIL: 16M059877
N° DE PROJET: 634206
À L'ATTENTION DE: Christine Vigneault
PRÉLEVÉ PAR:Client
LIEU DE PRÉLÈVEMENT:Quai Chambly

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Benzo (b) fluoranthène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo (j) fluoranthène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo (k) fluoranthène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(c)phénanthrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Benzo(g,h,i)pérylène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Chrysène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,h)anthracène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,i)pyrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,h)pyrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Dibenzo(a,l)pyrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Diméthyl-7,12benzo(a)anthracène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Fluoranthène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Fluorène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Indéno(1,2,3-cd)pyrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Méthyl-3cholanthrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Naphtalène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Phénanthrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Pyrène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Méthyl-1naphtalène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Méthyl-2naphtalène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Diméthyl-1,3naphtalène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Triméthyl-2,3,5naphtalène	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Acénaphtène-D10	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Fluoranthène-D10	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Pérylène-D12	2016-01-15	2016-01-19	ORG-100-5102F	MA.400-HAP 1.1	GC/MS
Hydrocarbures pétroliers C10 à C50	2016-01-18	2016-01-18	ORG-100-5104F	MA. 400-HYD. 1.0	GC/FID
Nonane	2016-01-18	2016-01-18	ORG-100-5104F	MA. 400-HYD. 1.0	
o-Crésol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-PHE 1.0	GC/MS
m-Crésol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
p-Crésol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Diméthyl-2,4 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Nitro-2 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Nitro-4 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Chloro-2 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Chloro-3 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Chloro-4 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,3 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,4 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,5 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-2,6+3,5 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Dichloro-3,4 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Pentachlorophénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Tétrachloro-2,3,4,5 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Tétrachloro-2,3,4,6 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Tétrachloro-2,3,5,6 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,3,4 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,3,5 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,3,6 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-2,4,5 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS

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Sommaire de méthode

NOM DU CLIENT: GROUPE QUALITAS INC.

N° BON DE TRAVAIL: 16M059877

N° DE PROJET: 634206

À L'ATTENTION DE: Christine Vigneault

PRÉLEVÉ PAR:Client

LIEU DE PRÉLÈVEMENT:Quai Chambly

PARAMÈTRE	PRÉPARÉ LE	ANALYSÉ LE	AGAT P.O.N.	RÉFÉRENCE DE LITTÉRATURE	TECHNIQUE ANALYTIQUE
Trichloro-2,4,6 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Trichloro-3,4,5 phénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
Phénol-D5	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
2-Fluorophénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
2,6-dibromophénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS
2,4,6-Tribromophénol	2016-01-19	2016-01-19	ORG-100-5103F	MA.400-Phé 1.0	GC/MS

Annexe 5

Photographies des travaux de chantier

PHOTO 1

Vue générale du quai fédéral du canal de Chambly.

PHOTO 2

Vue de la surface du quai.

PHOTO 3

Excavation du remblai pour accéder aux forages horizontaux.

PHOTO 4

Mur à l'endroit du prélèvement de la carotte C1.

PHOTO 5

Trou de forage de la carotte C1, traversant complètement le mur.

PHOTO 6

Vue du mur à l'endroit du prélèvement de la carotte C2

PHOTO 7

Trou de forage de la carotte C2 avec une fissure horizontale dans le mur.

PHOTO 8

Vu de l'opération du carottage, carotte C3.

PHOTO 9

Vue du mur déplacé à l'endroit de prélèvement de la carotte C3.

PHOTO 10

Vue du béton éclaté et dégradé à l'endroit de prélèvement de la carotte C3.

PHOTO 11

Photo prise dans le trou de la carotte C3.

PHOTO 12

Vue de l'endroit de prélèvement de la carotte C6.

PHOTO 13

Vue de l'équipement utilisé pour le carottage vertical dans le mur.

PHOTO 14

Vue du béton de réparation à la partie supérieure du mur.

Annexe 6

Fiches de description visuelle des carottes de béton

NON DISPONIBLE

Annexe 7

Photographies prises lors de l’examen visuel des carottes de béton

NON DISPONIBLE

Annexe 8

Examen macroscopique des carottes de béton

NON DISPONIBLE

Annexe 9

Résultats de l’analyse DRX (Dépôt sondage V-1)

NON DISPONIBLE

Annexe 10

Levé géophysique (Géophysique GPR International inc.)

NON DISPONIBLE

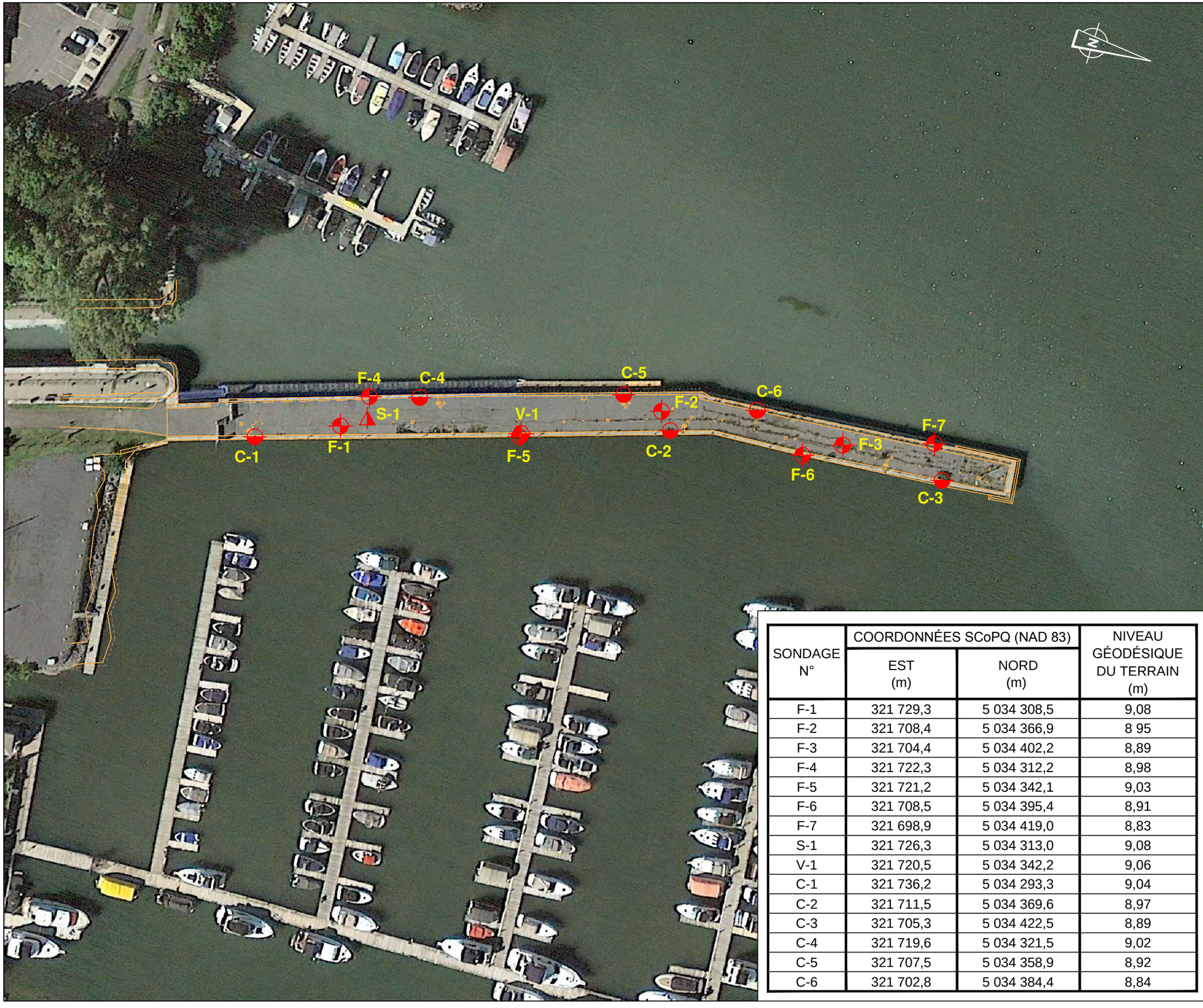
Annexe 11

Résistance géotechnique latérale pondérée (sols pulvérulents)

NON DISPONIBLE

Annexe 12

Plan de localisation des sondages



PLAN CLÉ

LÉGENDE :

- F-1 — Forage
- S-1 — Puits d'exploration
- V-1 — Carottage vertical du mur de couronnement
- C-1 — Carottage horizontal du mur de couronnement

NOTES :

Ce dessin a été préparé à partir d'une photographie aérienne obtenue de la base de données Google Earth Pro. La position des forages montrée sur l'image peut être imprécise, notamment à cause d'une certaine distorsion dans la photographie. Pour l'emplacement exact des forages, il est recommandé de se référer au tableau des coordonnées.

SONDAGE N°	COORDONNÉES SCoPQ (NAD 83)		NIVEAU GÉODÉSIQUE DU TERRAIN (m)
	EST (m)	NORD (m)	
F-1	321 729,3	5 034 308,5	9,08
F-2	321 708,4	5 034 366,9	8 95
F-3	321 704,4	5 034 402,2	8,89
F-4	321 722,3	5 034 312,2	8,98
F-5	321 721,2	5 034 342,1	9,03
F-6	321 708,5	5 034 395,4	8,91
F-7	321 698,9	5 034 419,0	8,83
S-1	321 726,3	5 034 313,0	9,08
V-1	321 720,5	5 034 342,2	9,06
C-1	321 736,2	5 034 293,3	9,04
C-2	321 711,5	5 034 369,6	8,97
C-3	321 705,3	5 034 422,5	8,89
C-4	321 719,6	5 034 321,5	9,02
C-5	321 707,5	5 034 358,9	8,92
C-6	321 702,8	5 034 384,4	8,84

SNC·LAVALIN

CLIENT : Travaux publics et Services gouvernementaux Canada / Public Works and Government Services Canada

PROJET : Réhabilitation du Quai Chambly

ENDROIT : Quai Chambly, Chambly, Québec

TITRE : Localisation des sondages

ÉCHELLE : 0 10 20 30 m — 1 : 750

DATE :	DOSSIER :	DIV.	DESSIN :
Mars 2017	634206	00	1 de 1

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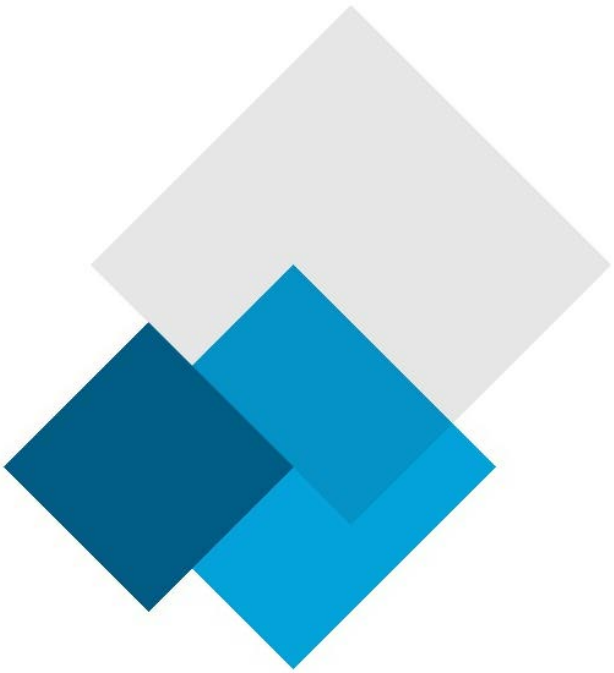
FORMAT 11x17

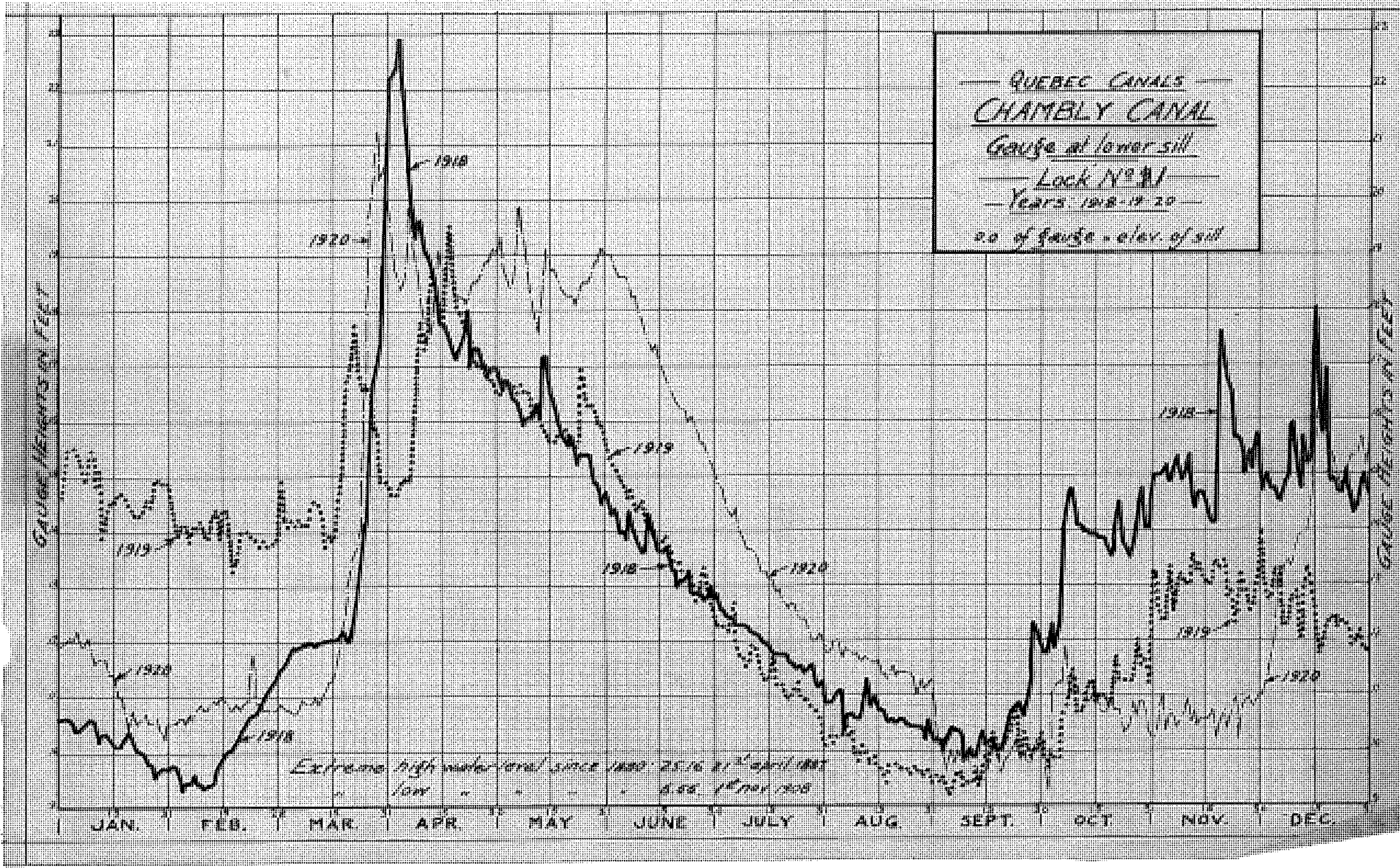
SNC·LAVALIN
275, rue Benjamin-Hudon
Montréal (Québec) H4N 1J1
514 331-6910

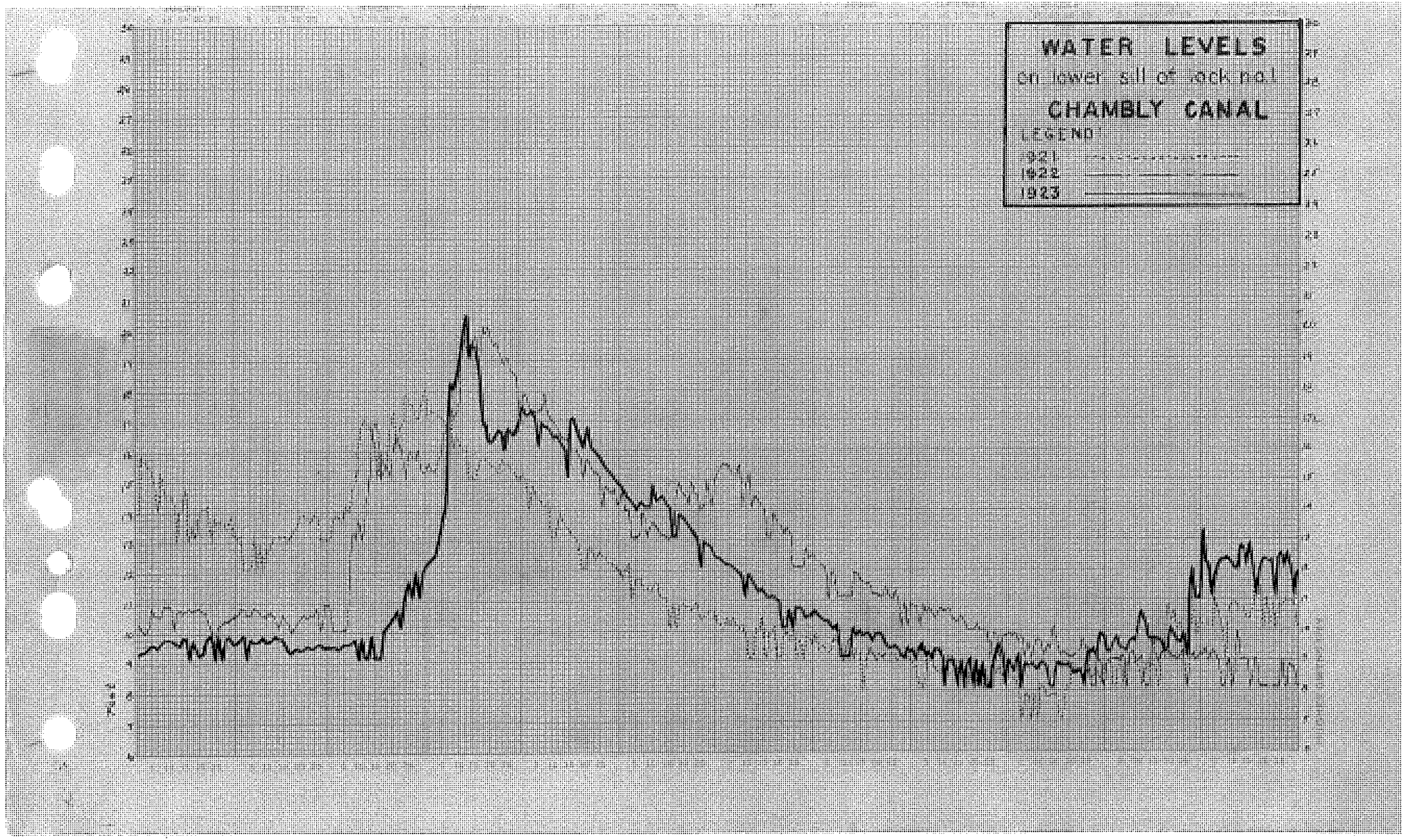
CCHM-895 Rehabilitation of Federal Wharf, Chambly, Quebec-
Chambly Canal National Historic Site

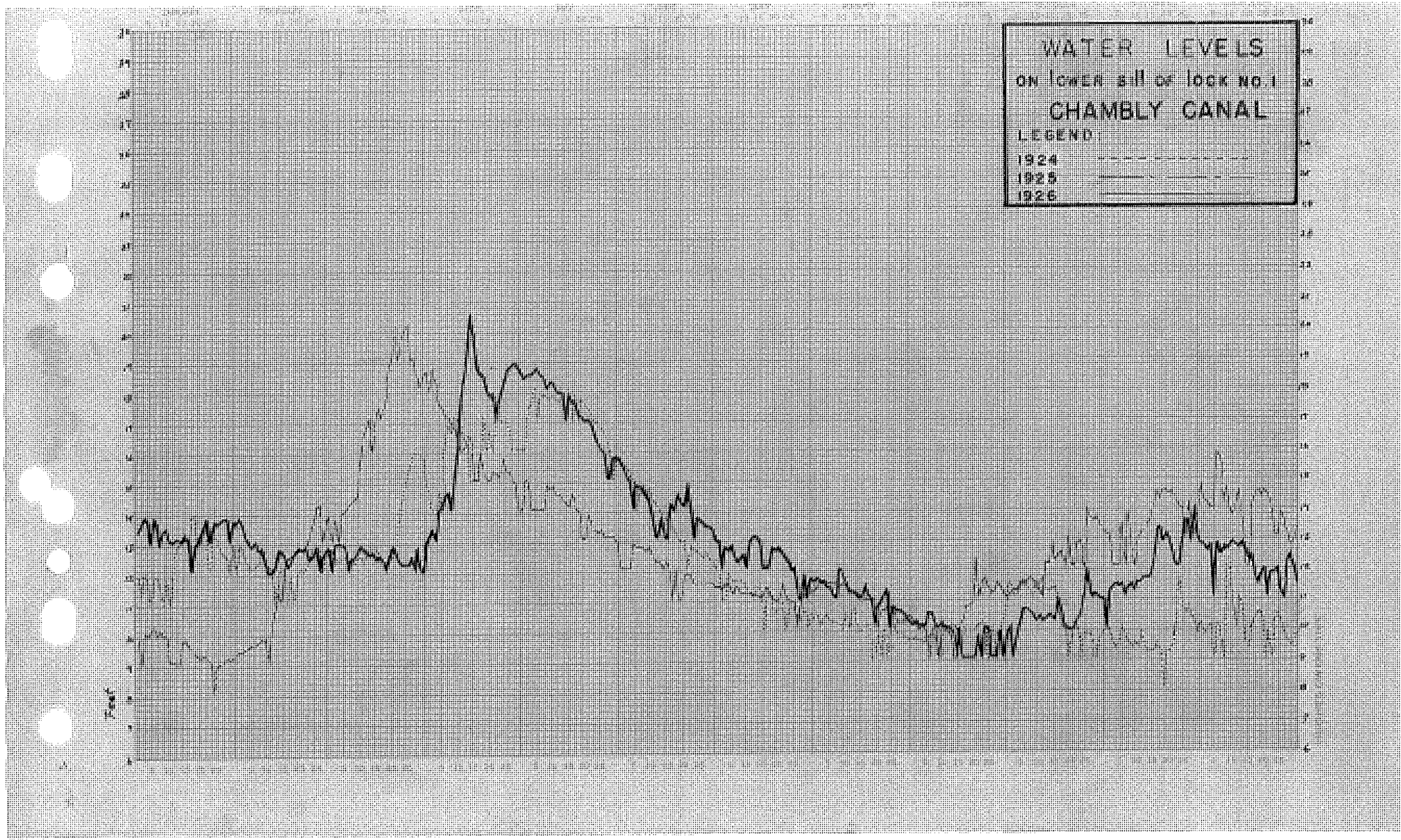
Project R.077244.001

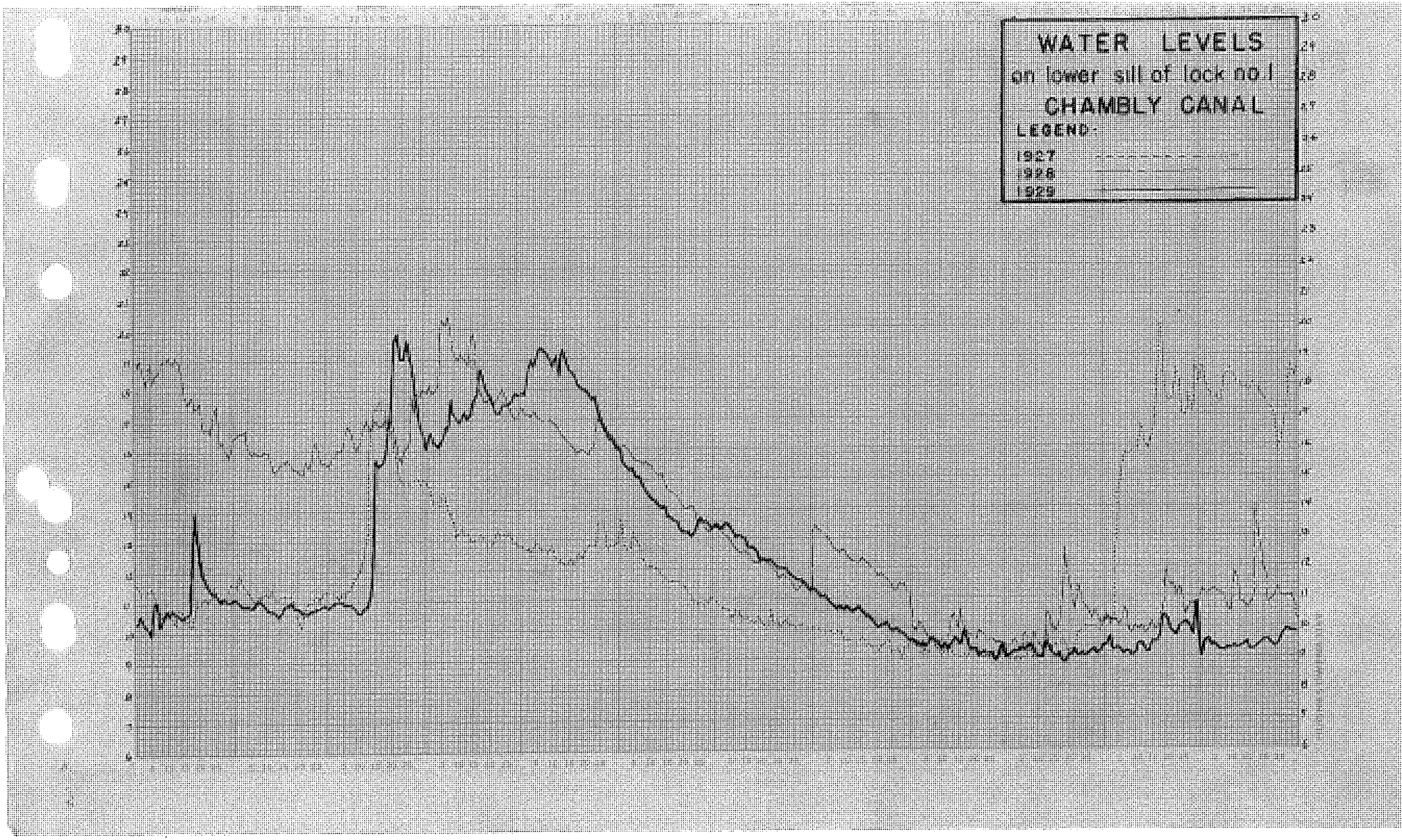
Annexe B – Water Levels

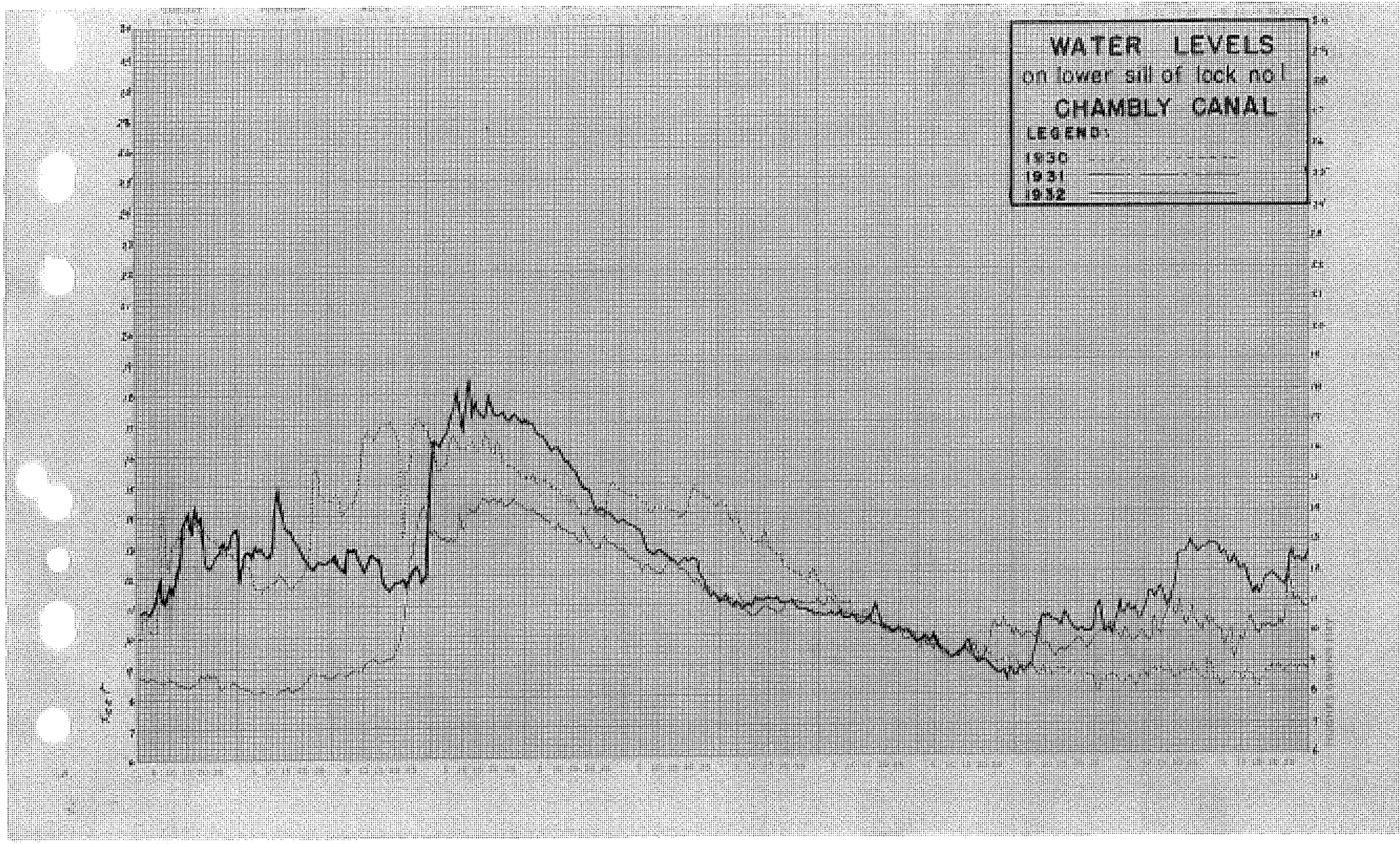


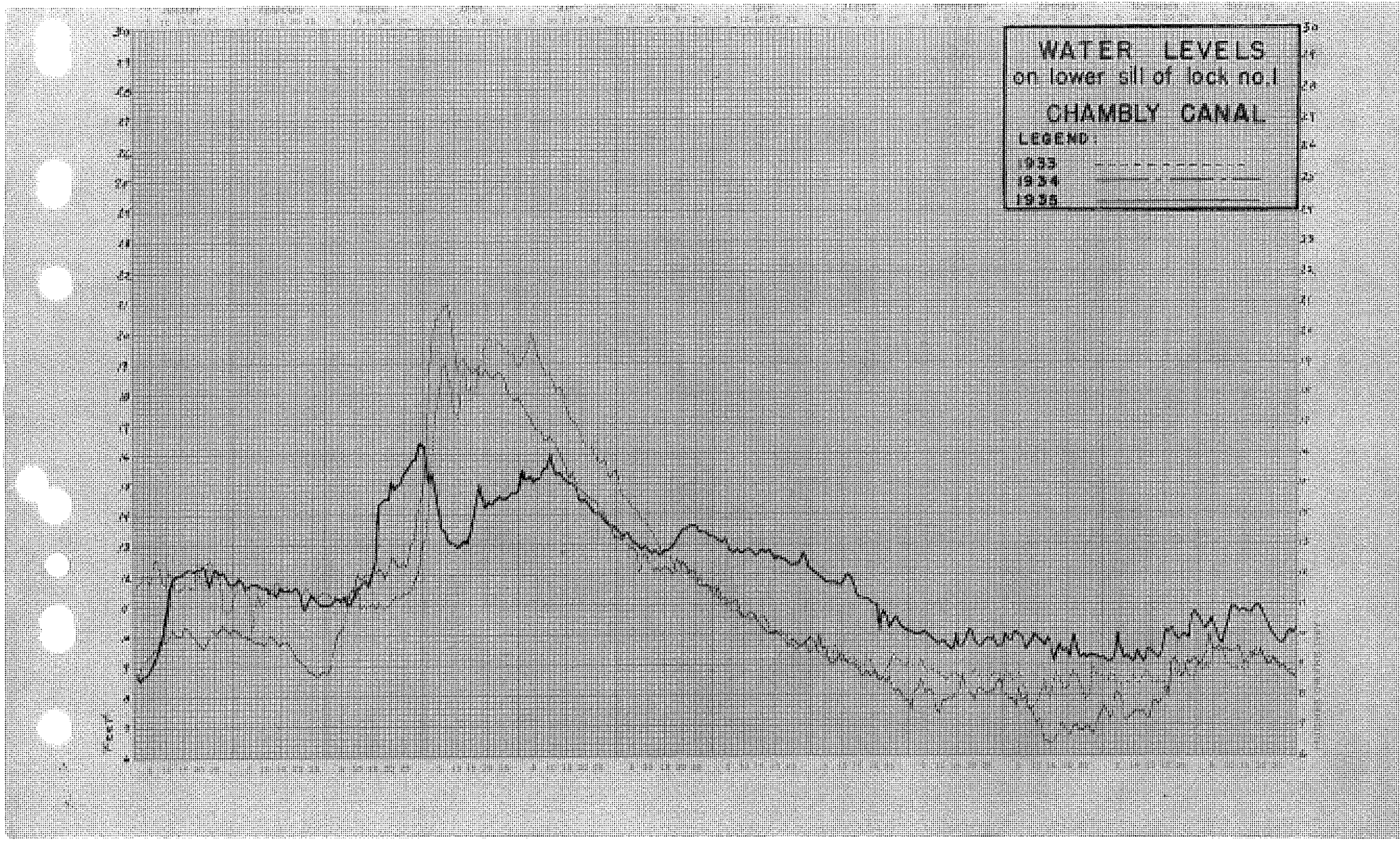

QUEBEC CANALS
CHAMBLY CANAL
Gauge at lower sill
Lock No. 1
Years: 1918-19-20
0.0 of gauge = elev. of sill
GAUGE HEIGHTS IN FEET
1918
1919
1920
Extreme high water level since 1850 · 25.16
low · 8.56
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.

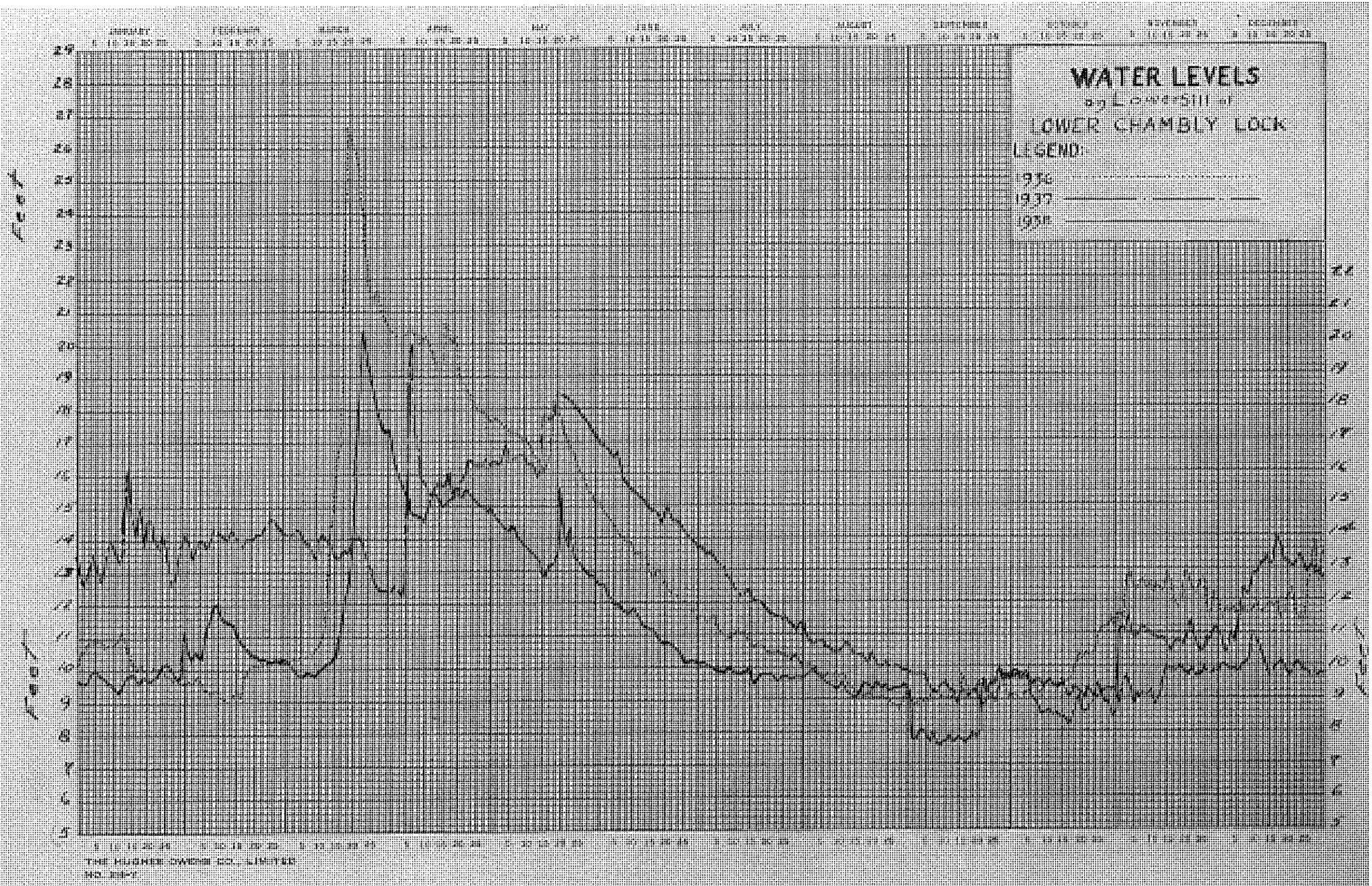

WATER LEVELS
on lower sill of rock cut
CHAMBLY CANAL
LEGEND
1921
1922
1923

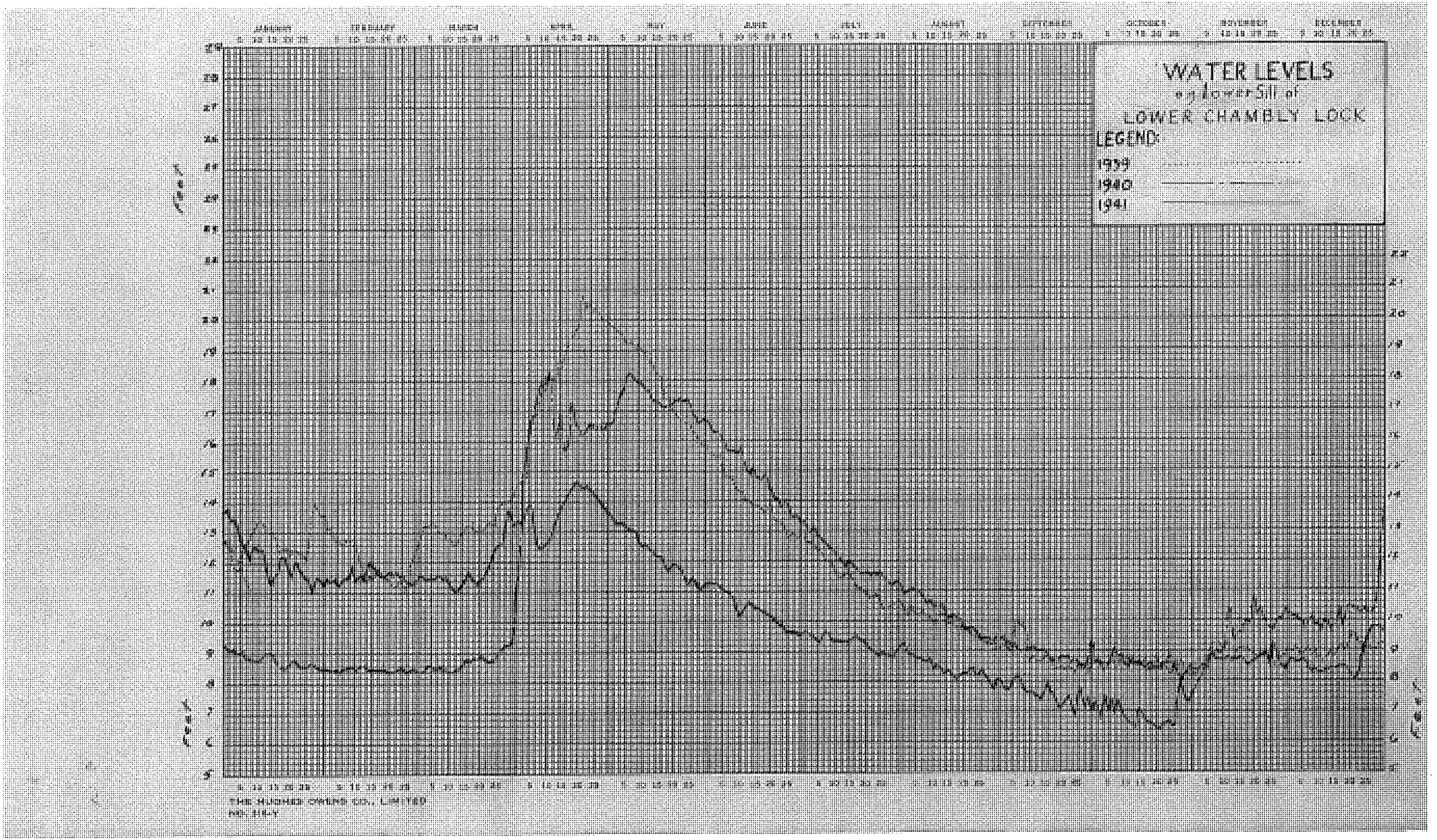

WATER LEVELS
ON LOWER SILL OF LOCK NO. 1
CHAMBLY CANAL
LEGEND:
1924
1925
1926

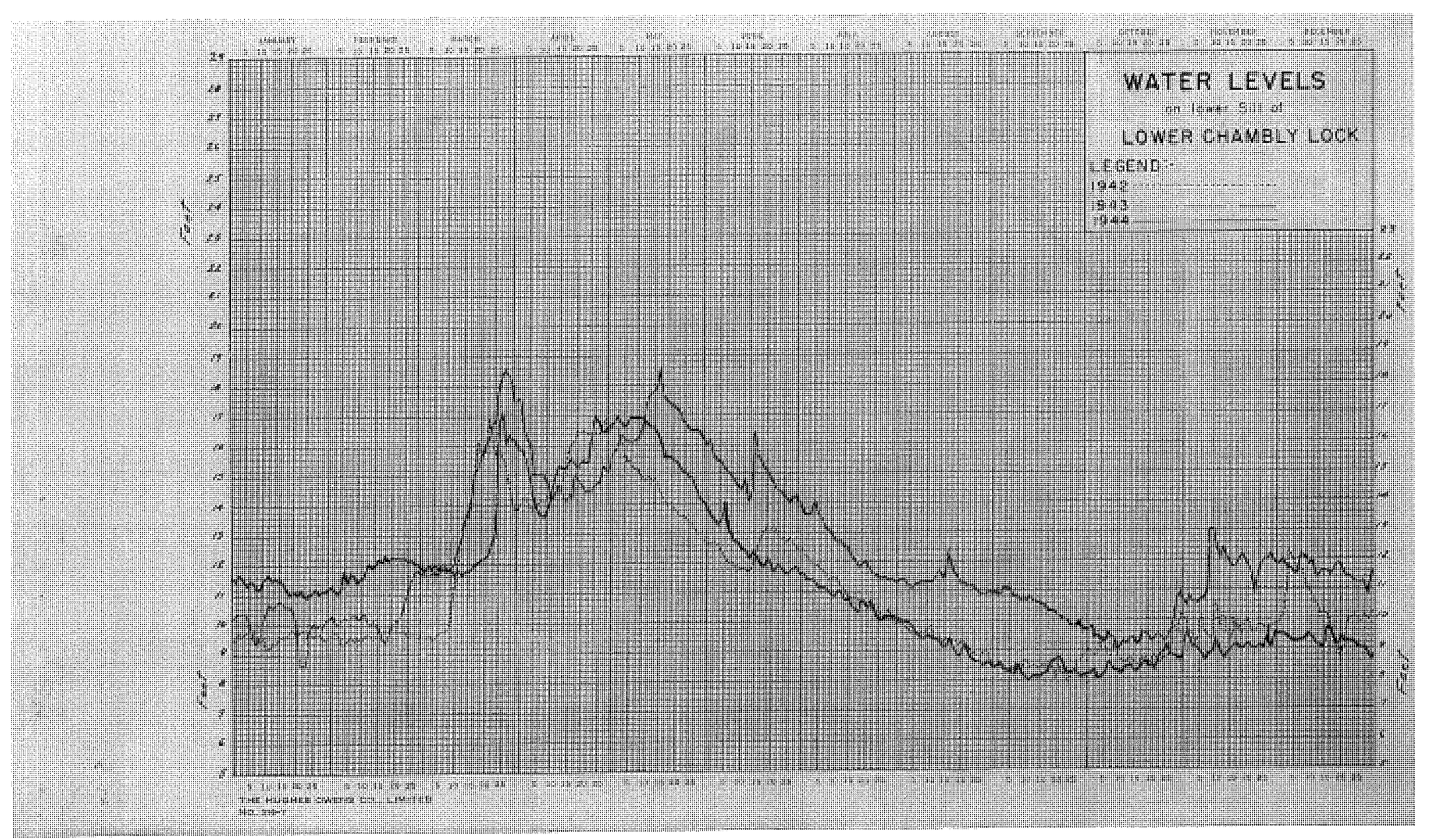

WATER LEVELS
on lower sill of lock no.1
CHAMBLY CANAL
LEGEND:
1927
1928
1929

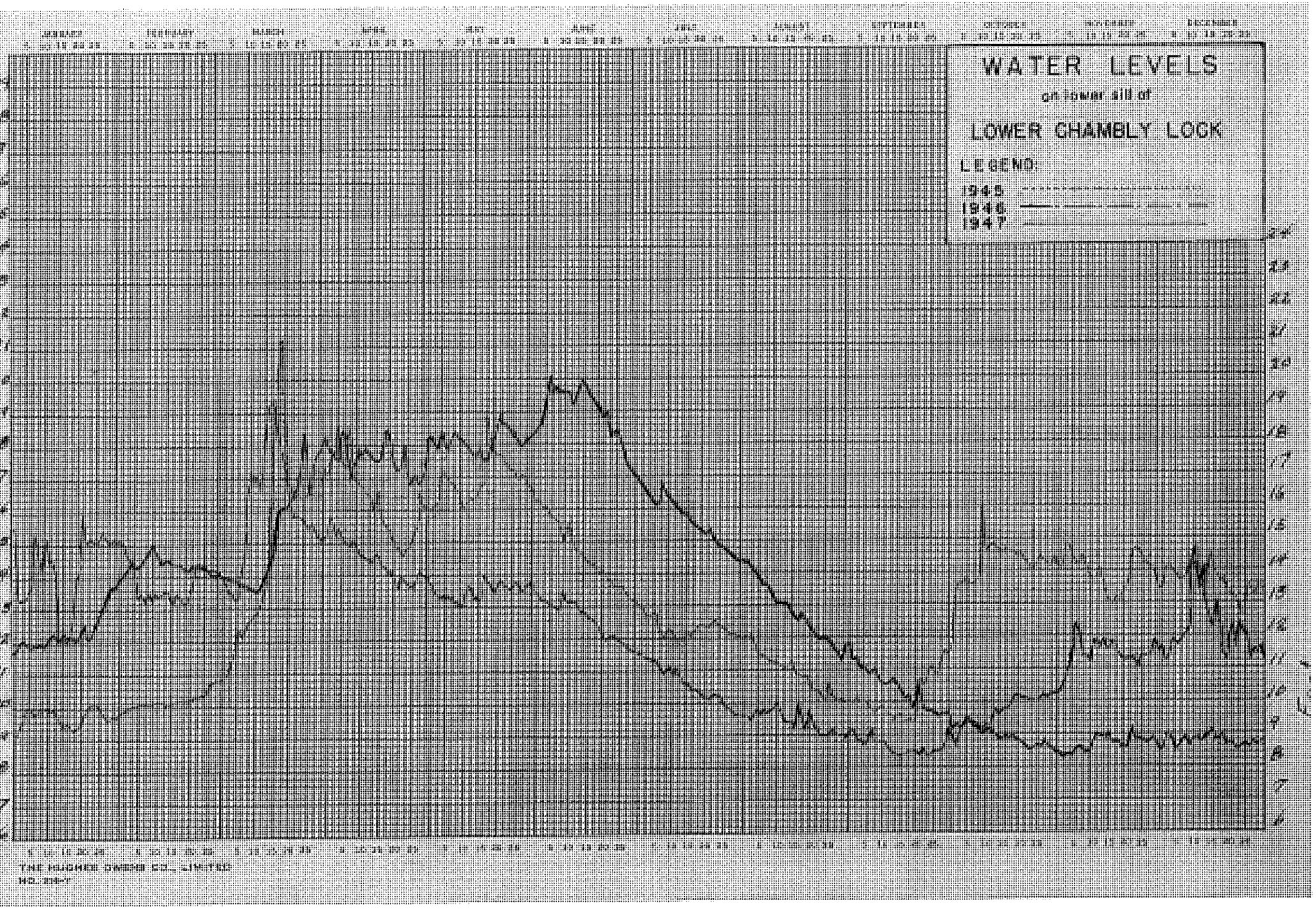

WATER LEVELS
on lower sill of lock no 1
CHAMBLY CANAL
LEGEND:
1930
1931
1932

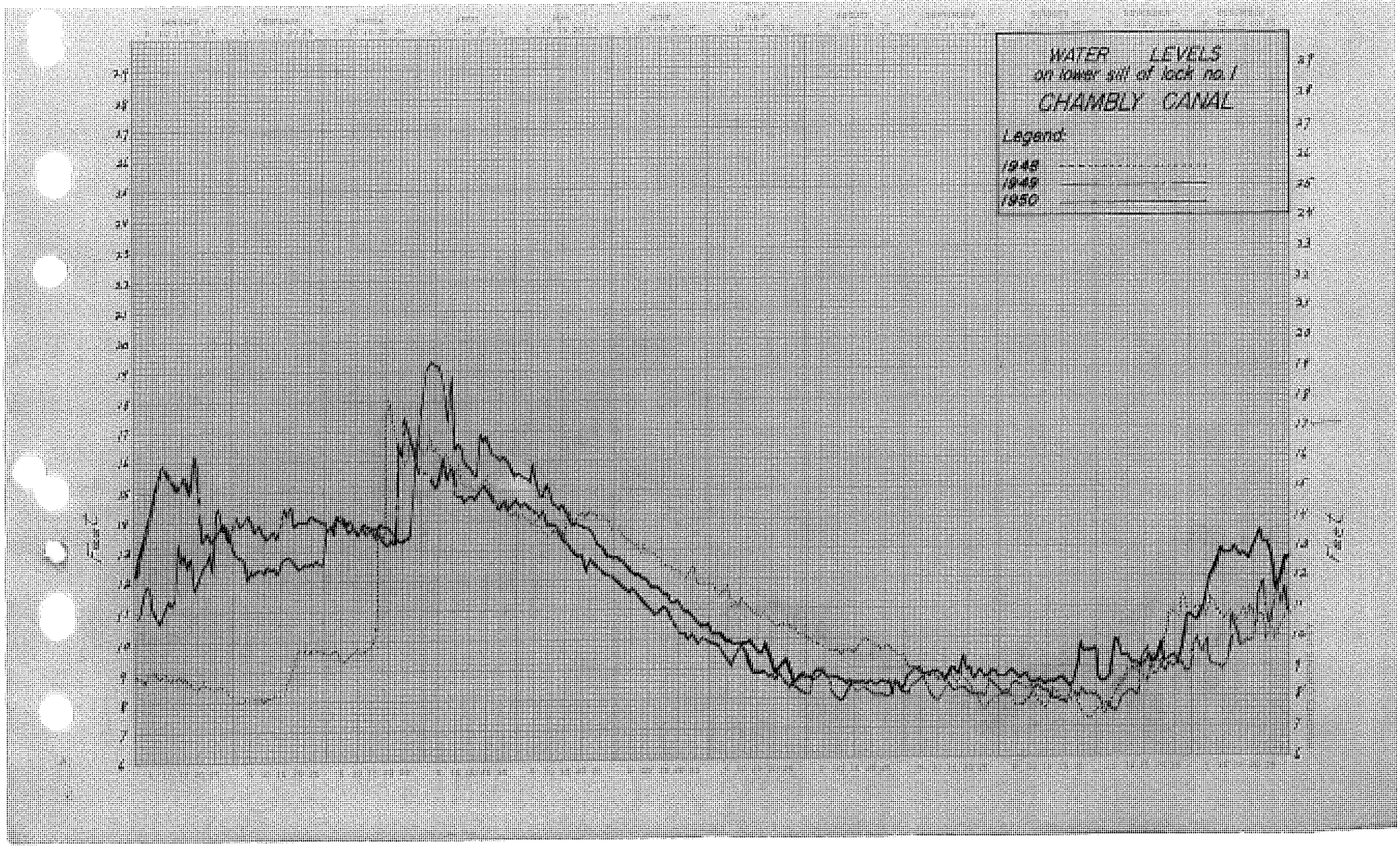

WATER LEVELS
on lower sill of lock no.1
CHAMBLY CANAL
LEGEND:
1933
1934
1938

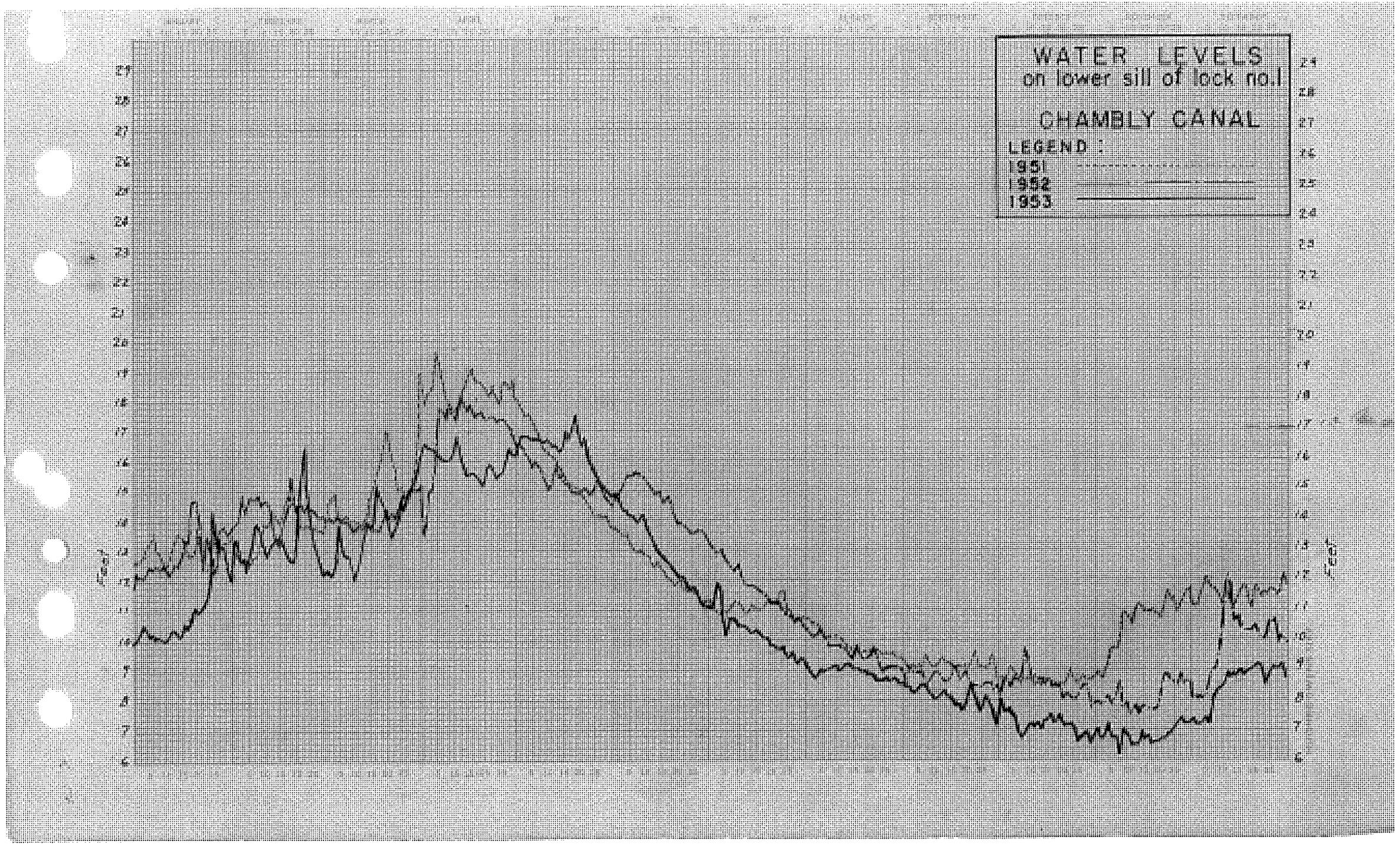

WATER LEVELS
LOWER CHAMBLY LOCK
LEGEND:
1936
1937
1938
THE HUGHES OWENS CO., LIMITED

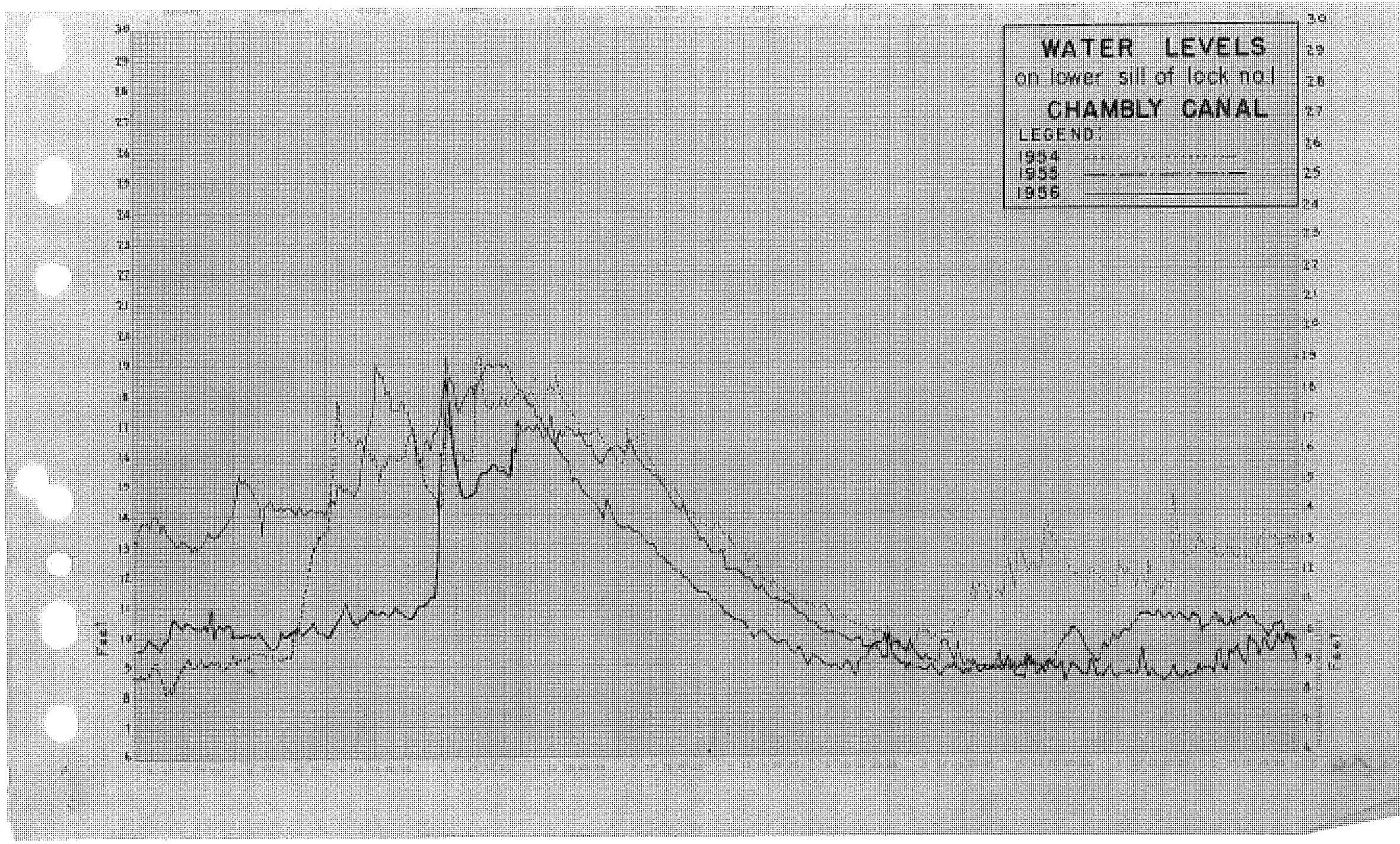

WATER LEVELS
on Lower Sill of
LOWER CHAMBLY LOCK
LEGEND:
1939
1940
1941

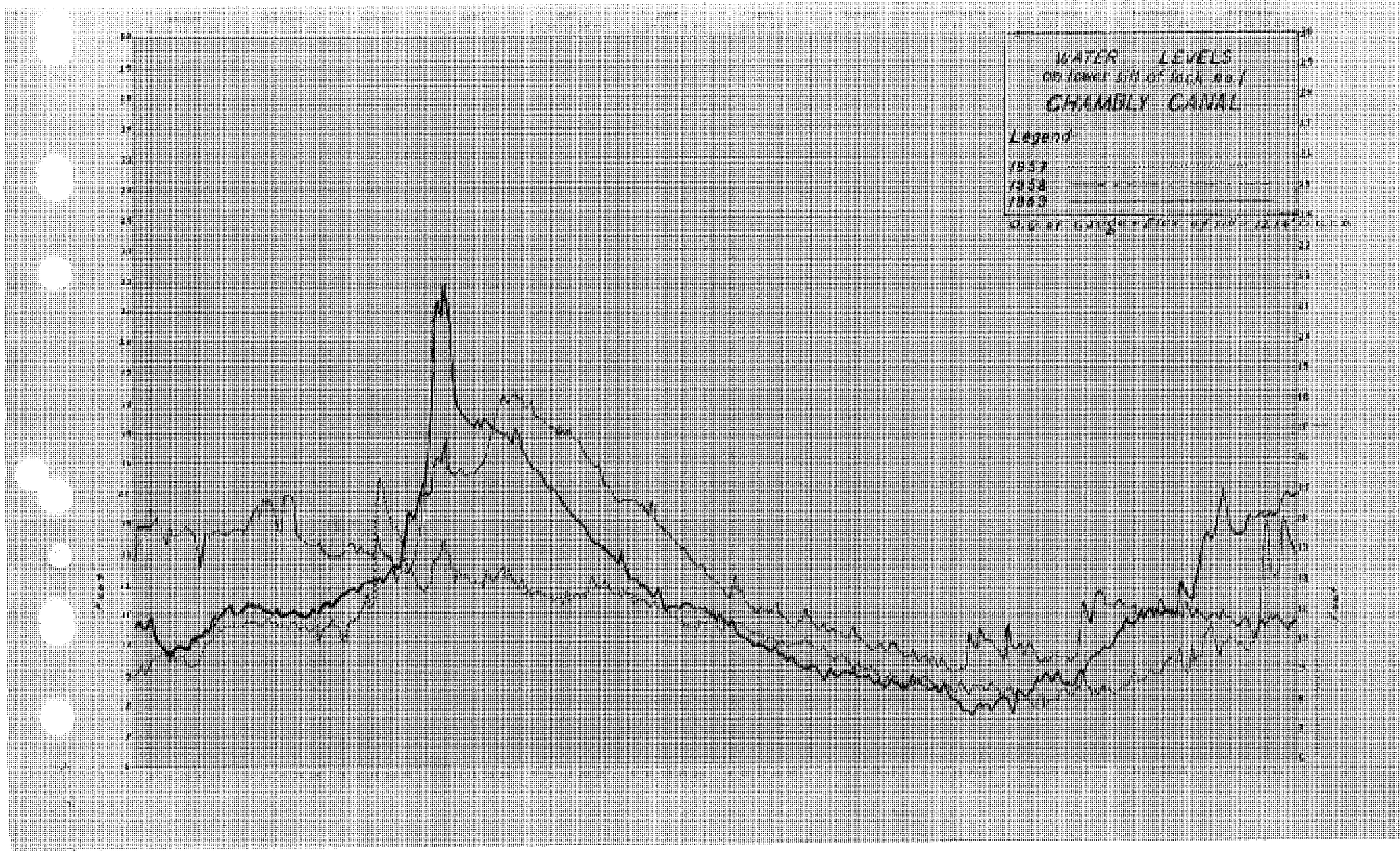

WATER LEVELS
on lower Sill of
LOWER CHAMBLY LOCK
LEGEND:-
1942
1943
1944

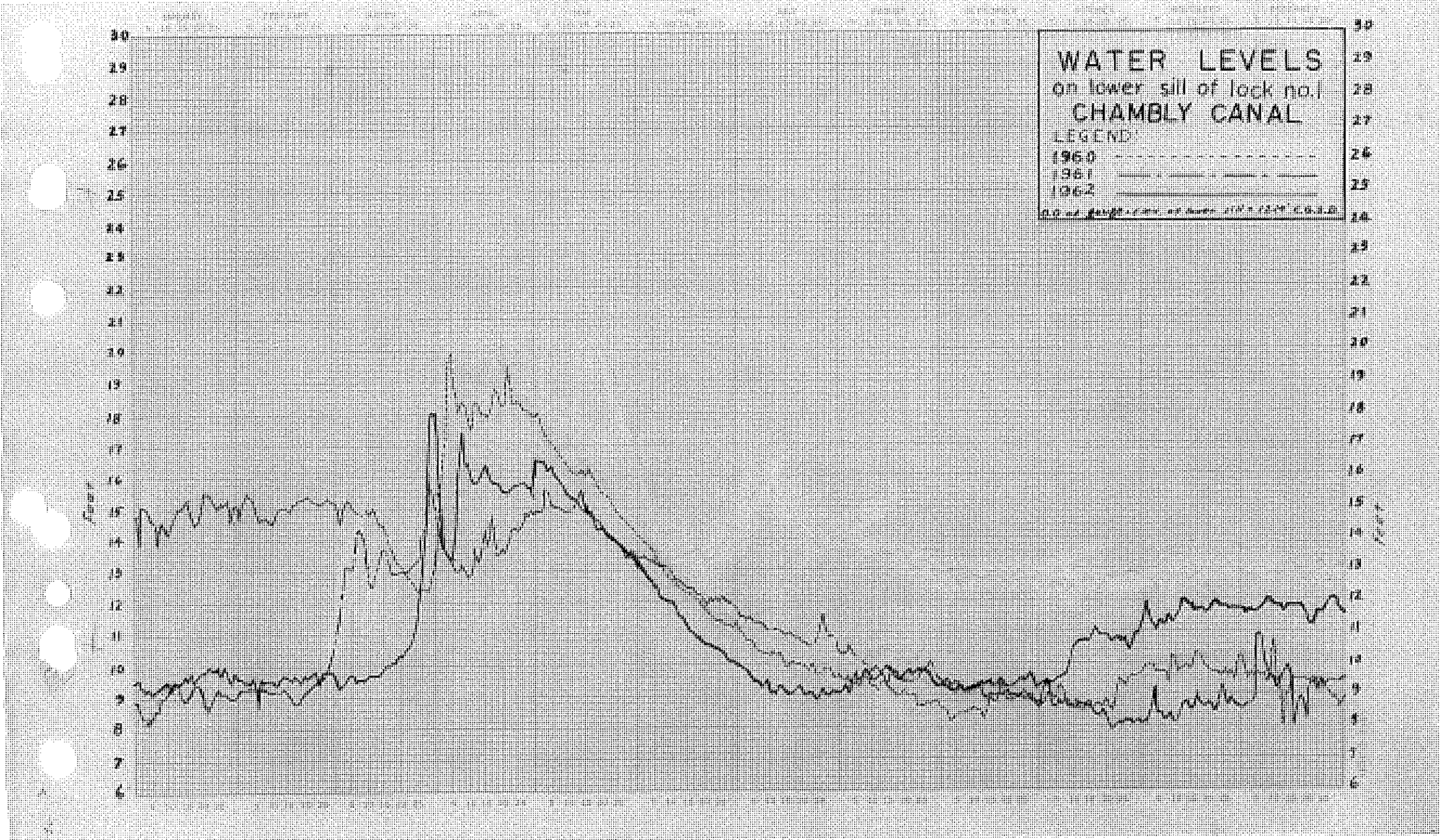

WATER LEVELS
on lower sill of
LOWER CHAMBLY LOCK
LEGEND
1945
1946
1947
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
THE HUGHES OWENS CO., LIMITED


WATER LEVELS
on lower sill of lock no. 1
CHAMBLY CANAL
Legend:
1948
1949
1950


WATER LEVELS
on lower sill of lock no.1
CHAMBLY CANAL
LEGEND :
1951
1952
1953


WATER LEVELS
on lower sill of lock no.1
CHAMBLY CANAL
LEGEND
1954
1955
1956


WATER LEVELS
on lower sill of lock No 1
CHAMBLY CANAL
Legend
1957
1958
1959


WATER LEVELS
on lower sill of lock no.1
CHAMBLY CANAL
LEGEND
1960
1961
1962
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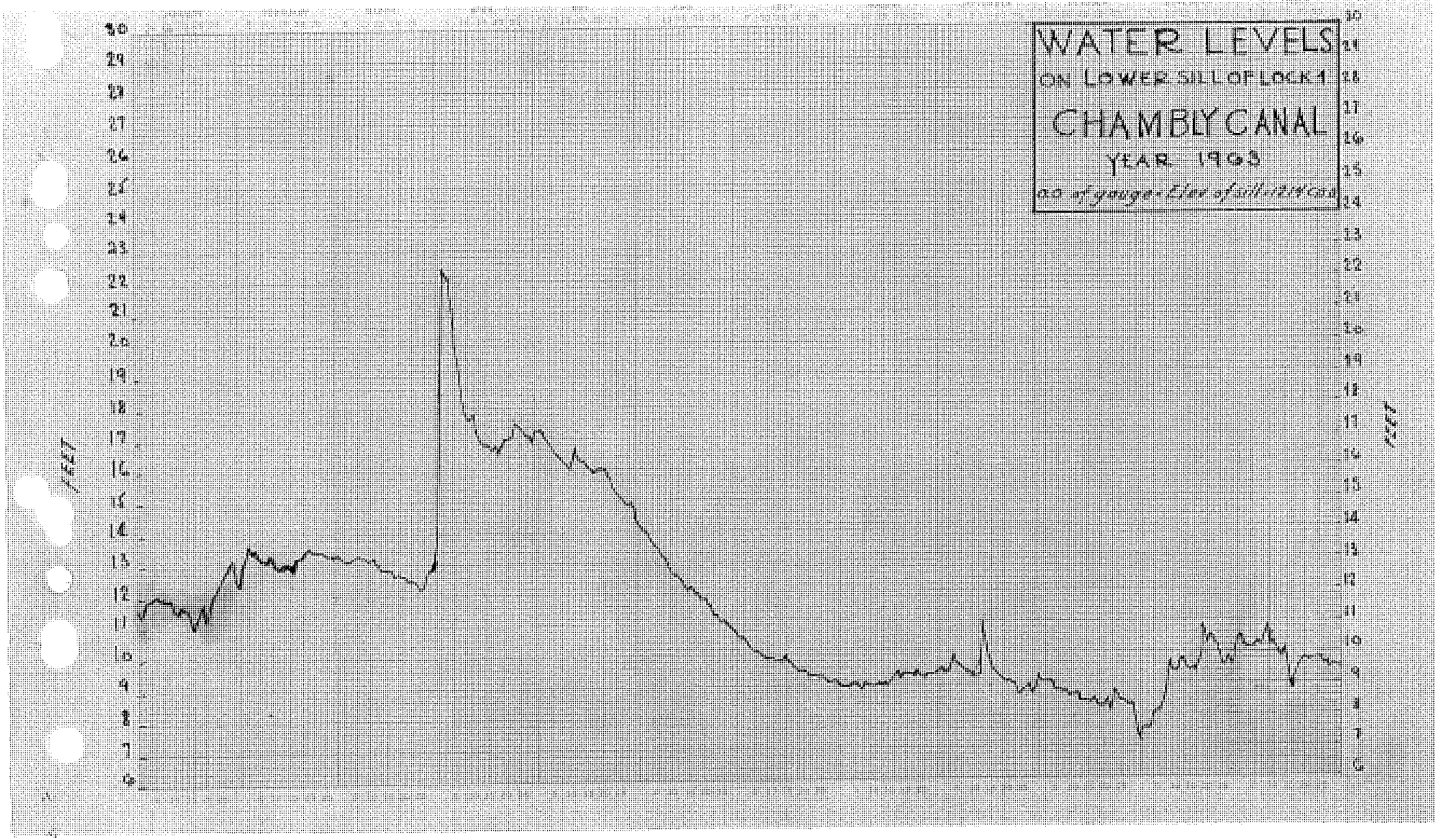
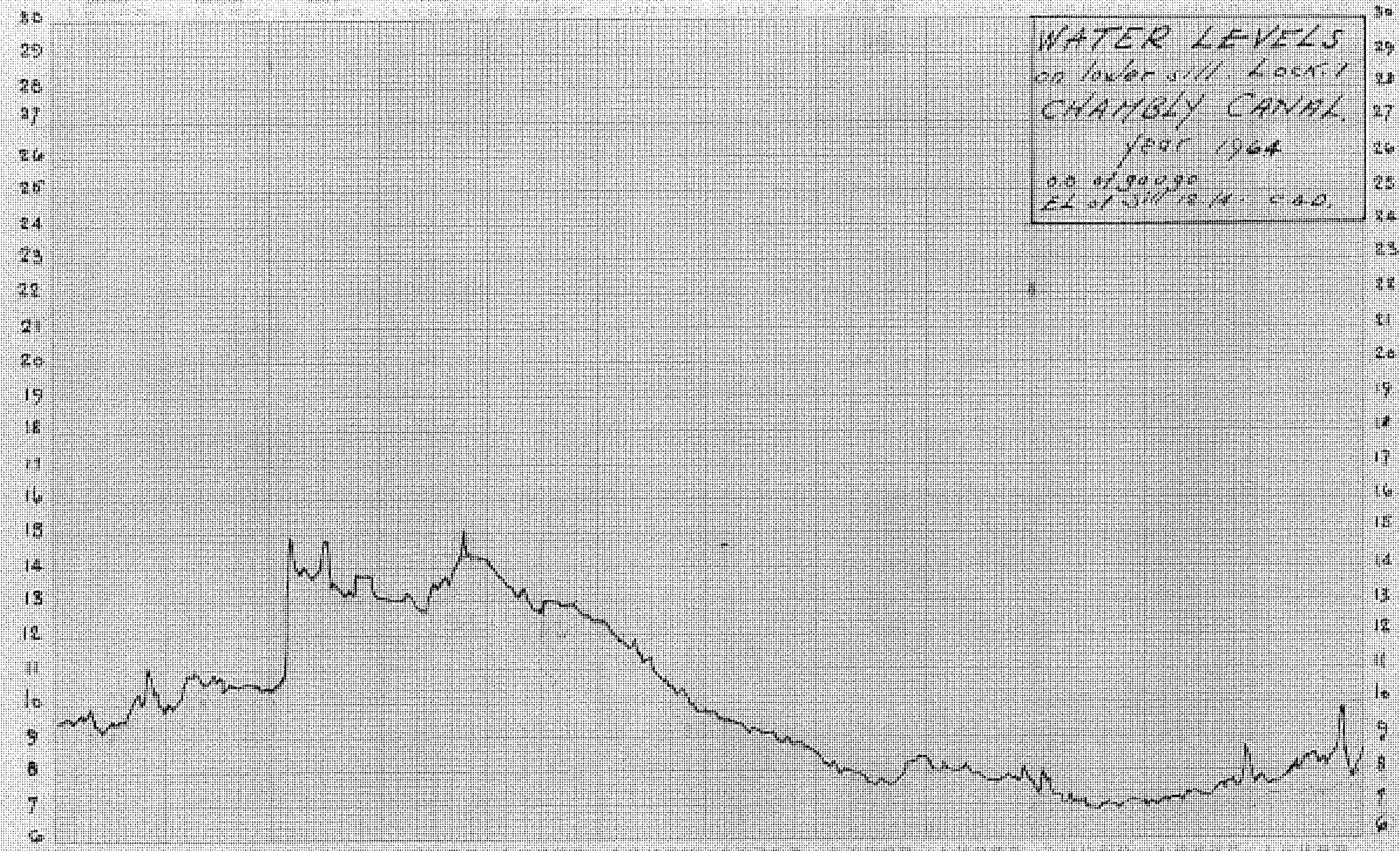

WATER LEVELS
ON LOWER SILL OF LOCK 1
CHAMBLY CANAL
YEAR 1903
30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6


WATER LEVELS
on lower sill Lock 1
CHAMBLY CANAL
year 1964
0.0 of gauge
El. of sill 12.14 - c.a.o.
30
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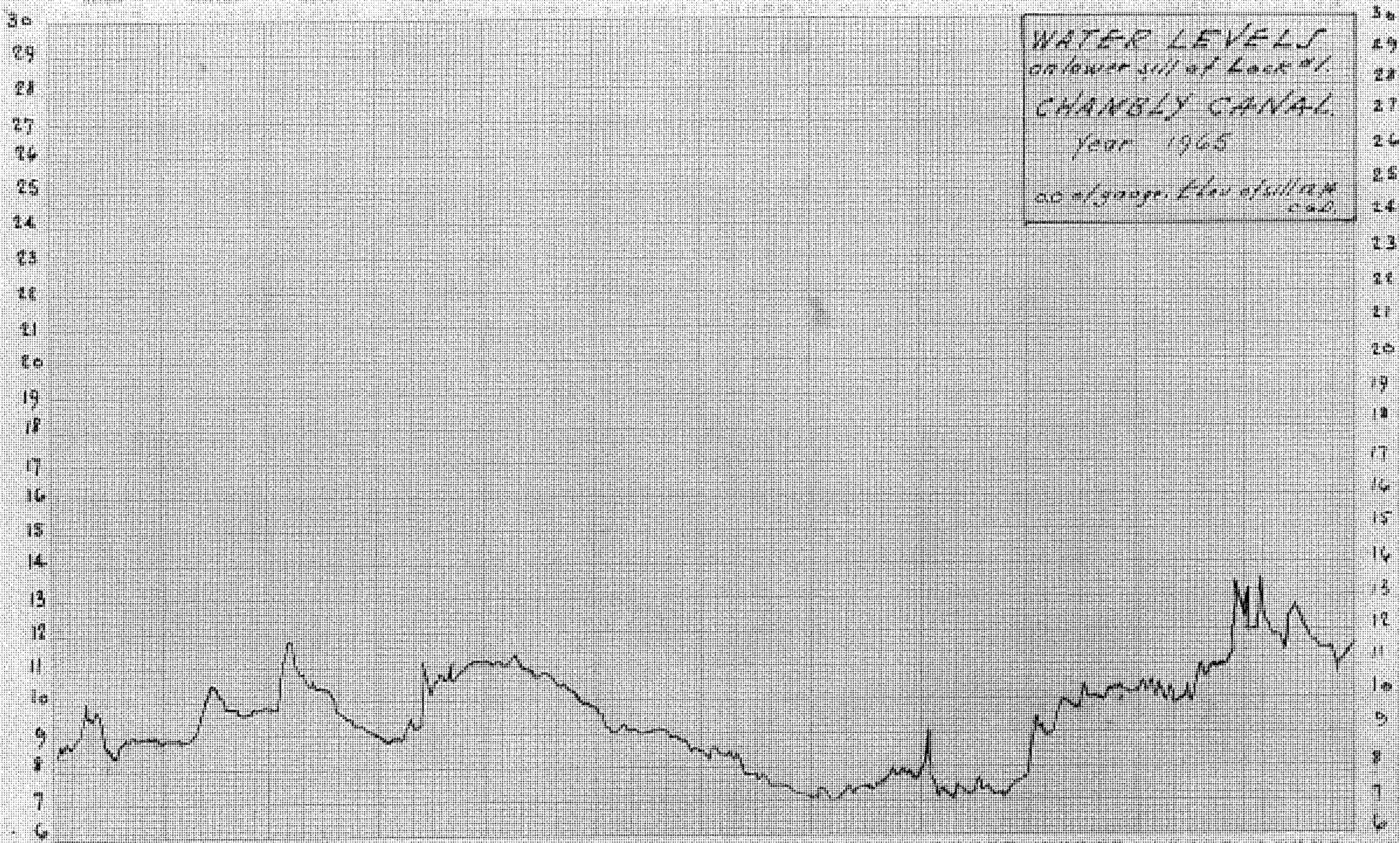
WATER LEVELS
on lower sill of Lock #1.
CHAMBLY CANAL.
Year 1965
30
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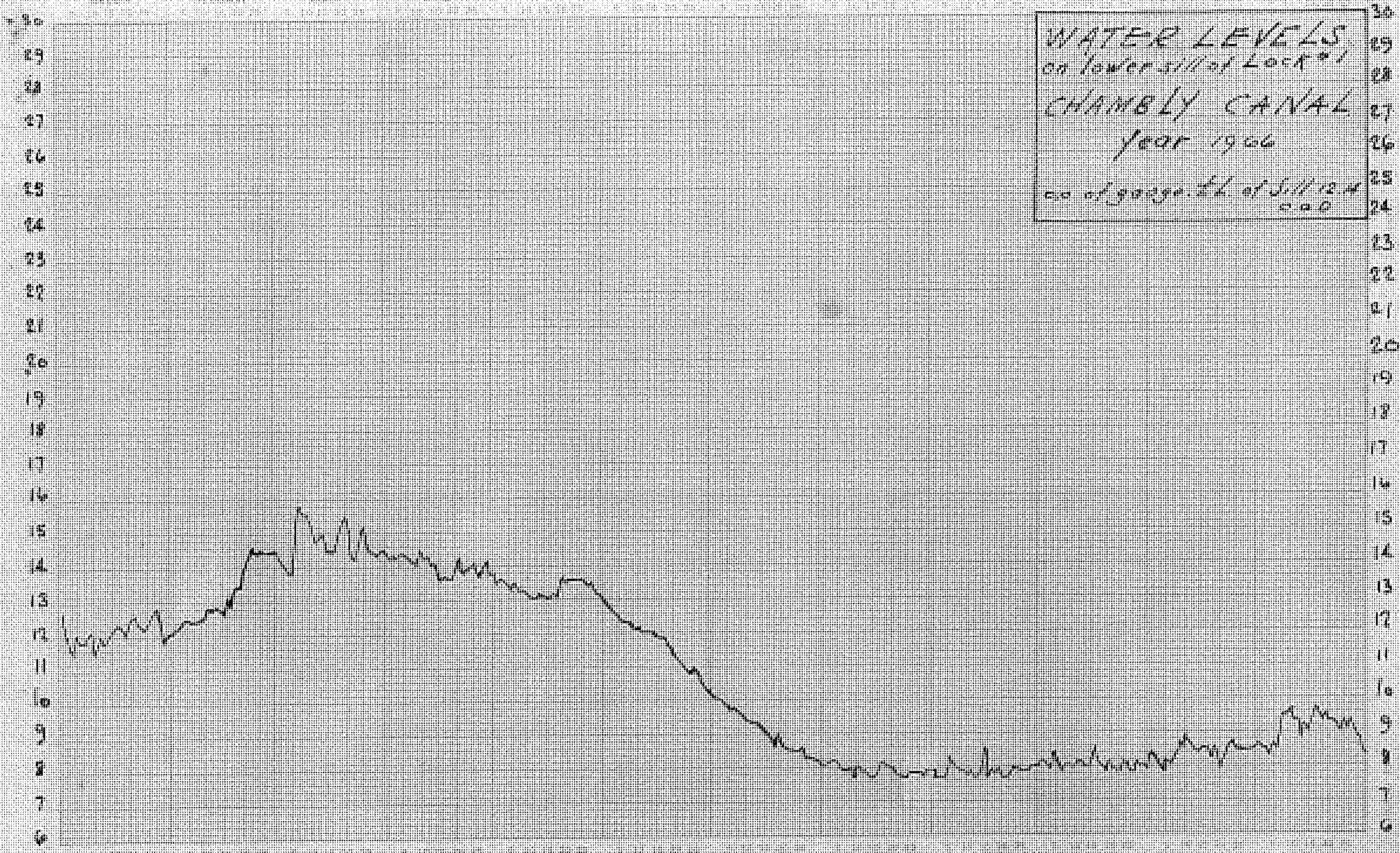

WATER LEVELS
on lower sill of Lock #1
CHAMBLY CANAL
year 1906
0.0 of gauge. EL. of Sill 12.0
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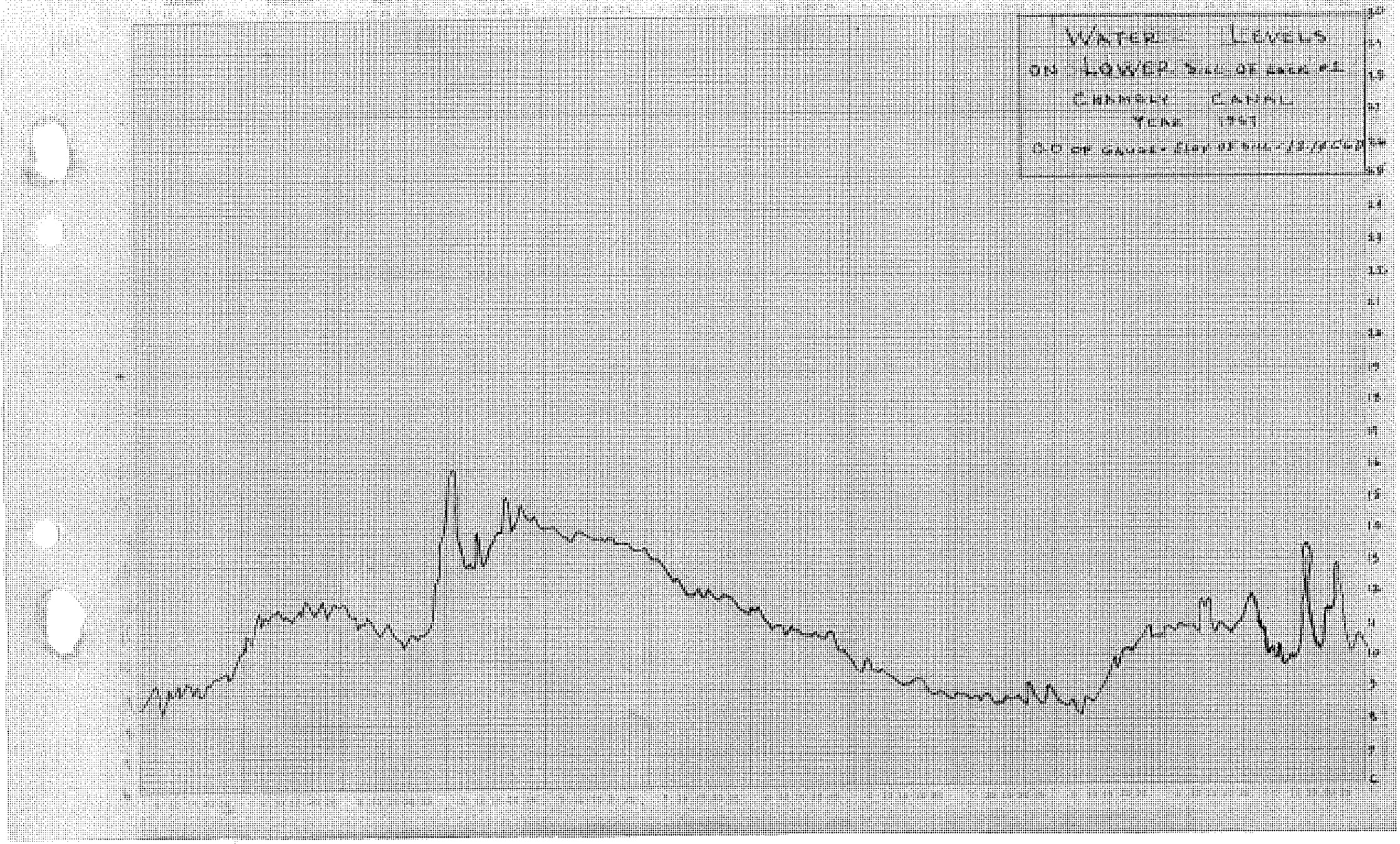
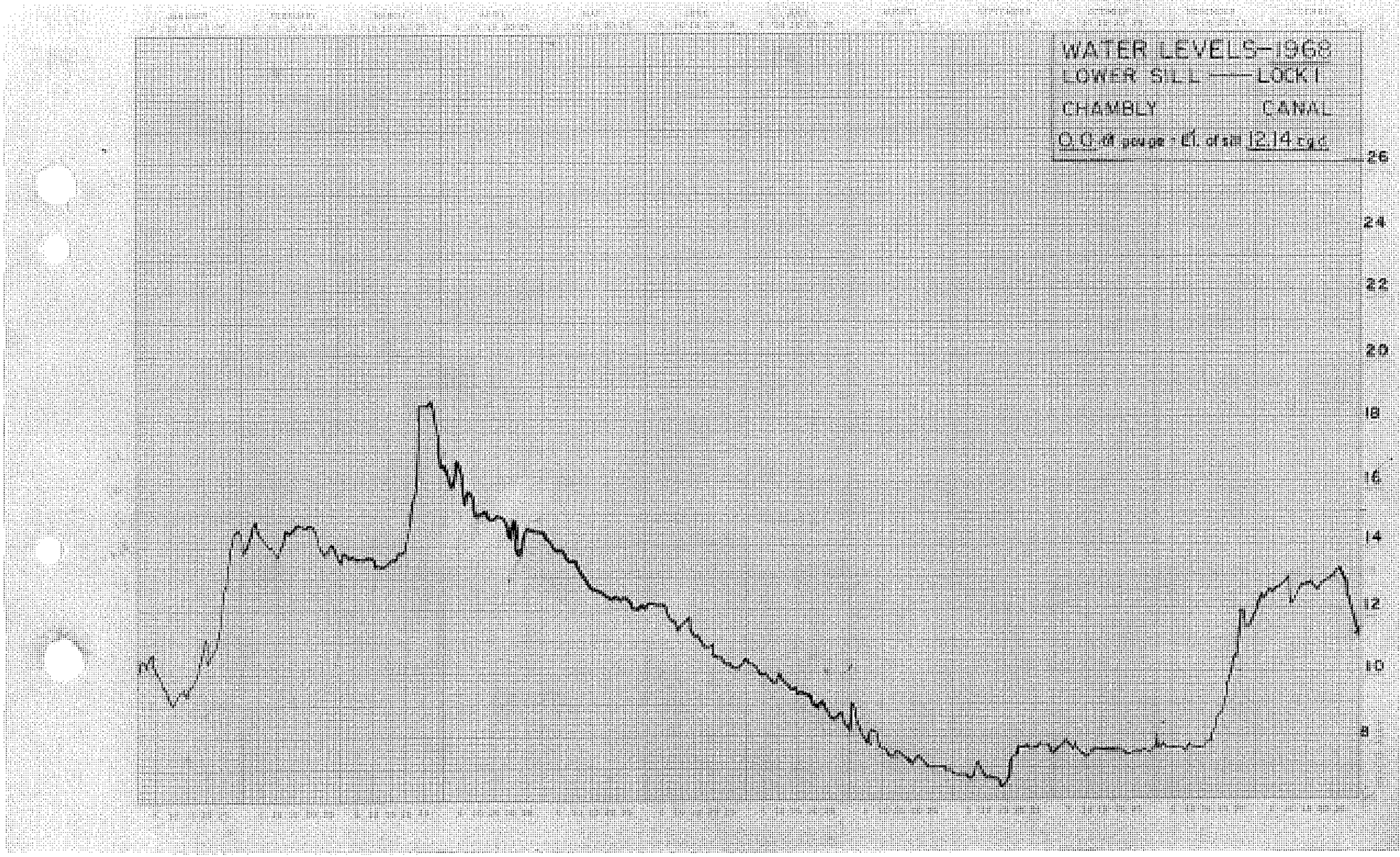
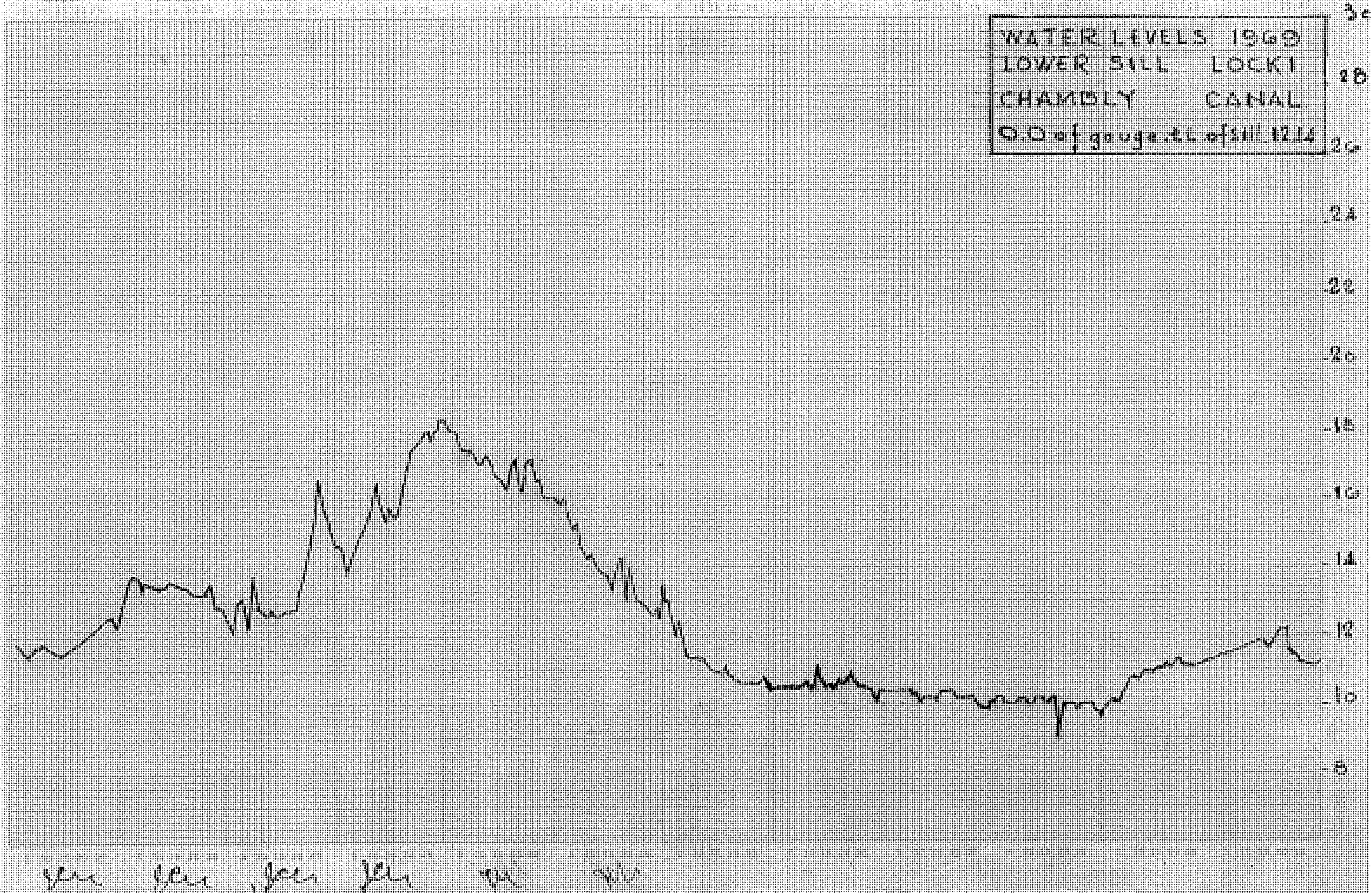

WATER LEVELS
ON LOWER SIL OF LOCK #2
CHANNEL CANAL
YEAR 1967


WATER LEVELS–1968
LOWER SILL —— LOCK 1
CHAMBLY CANAL
G.C. of gauge : El. of sill 12.14 c.g.c.
26
24
22
20
18
16
14
12
10
8



WATER LEVELS 1969
LOWER SILL LOCK 1
CHAMBLY CANAL
0.0 of gauge EL of sill 12.14
30
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18
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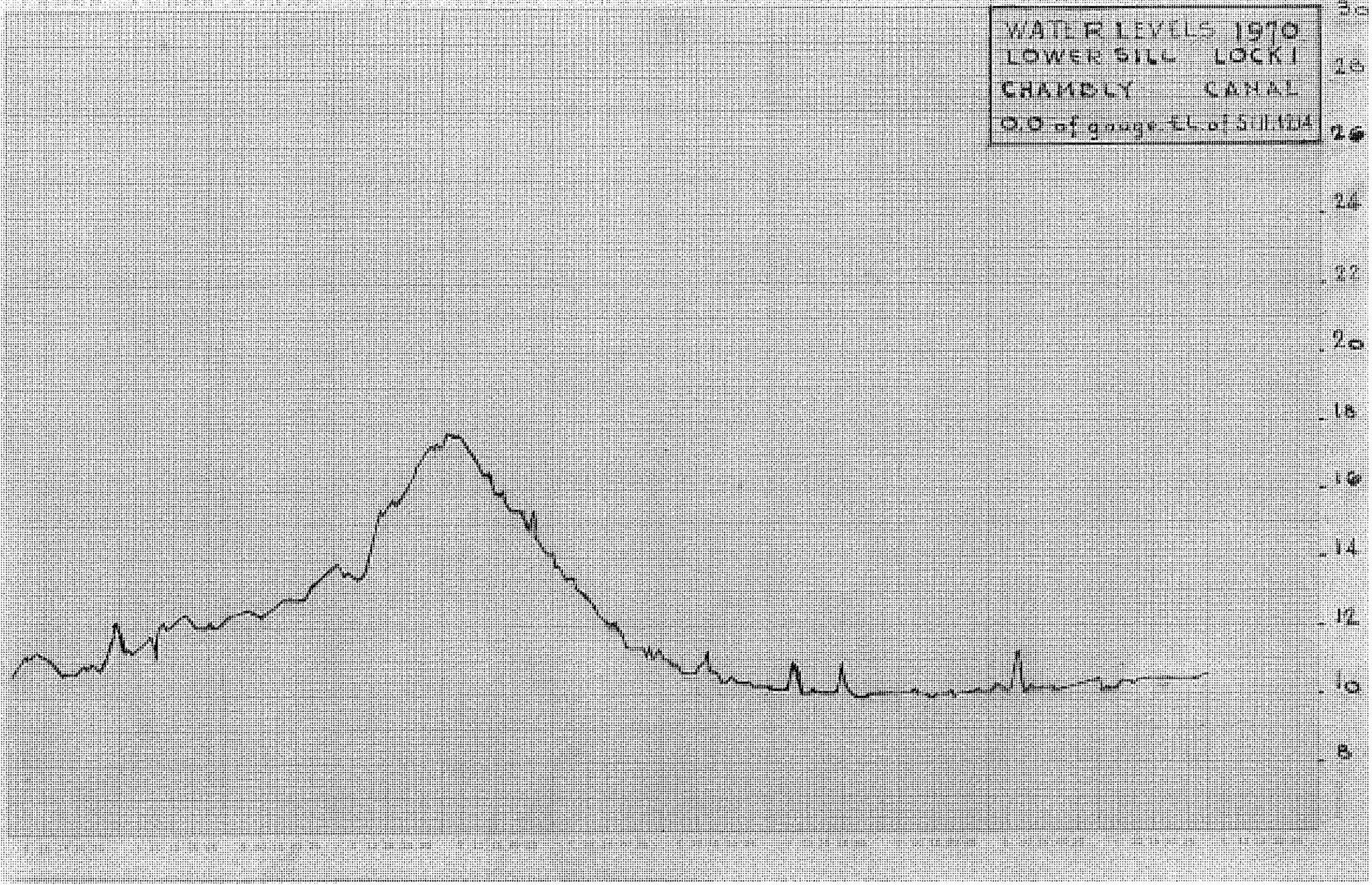
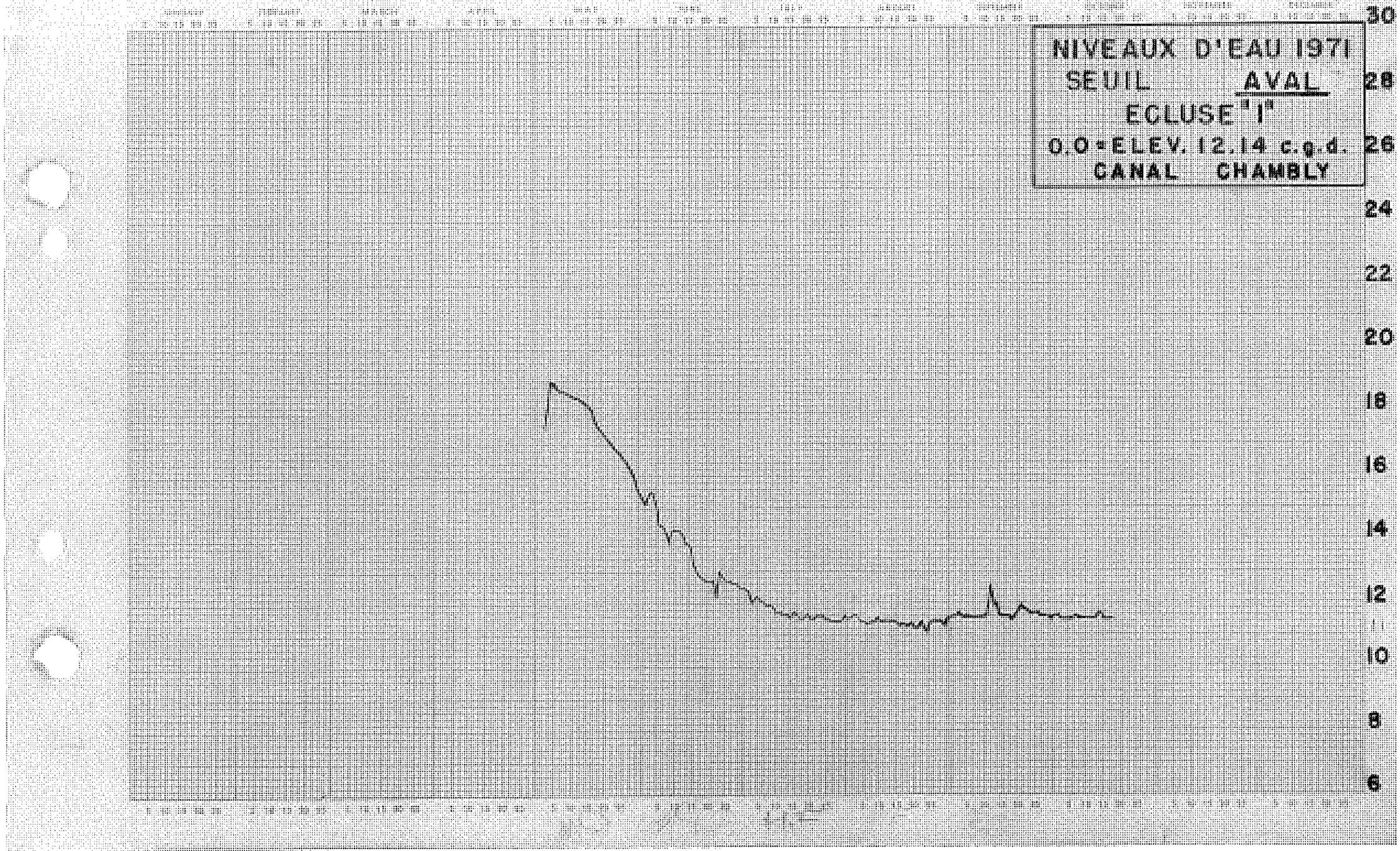
10
8

WATER LEVELS 1970
LOWER SILL LOCK 1
CHAMBLY CANAL
O.O of gauge = E.L of Sill 104




NIVEAUX D'EAU 1971
SEUIL AVAL
ECLUSE "1"
0.0 = ELEV. 12.14 c.g.d.
CANAL CHAMBLY
30
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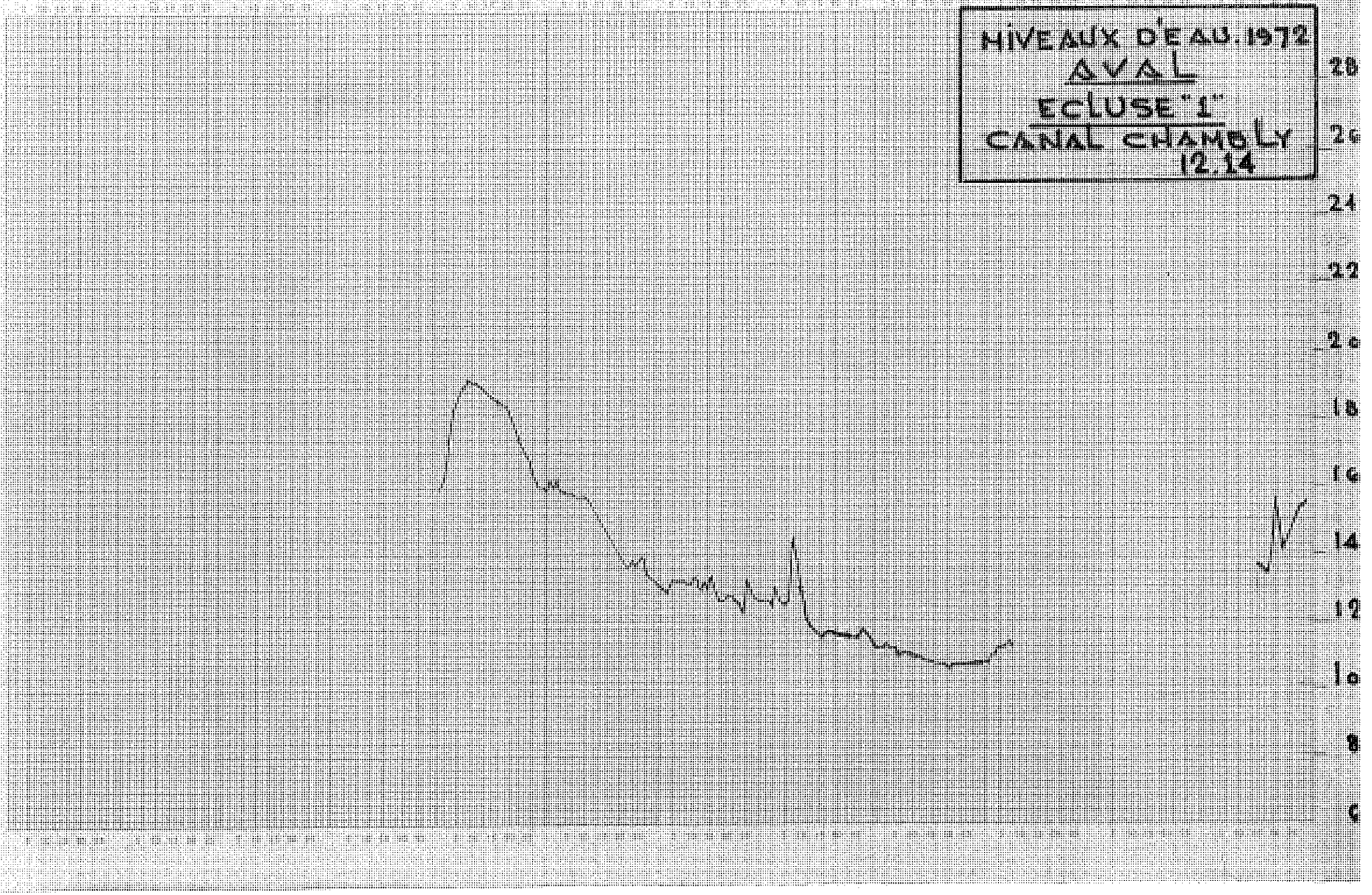
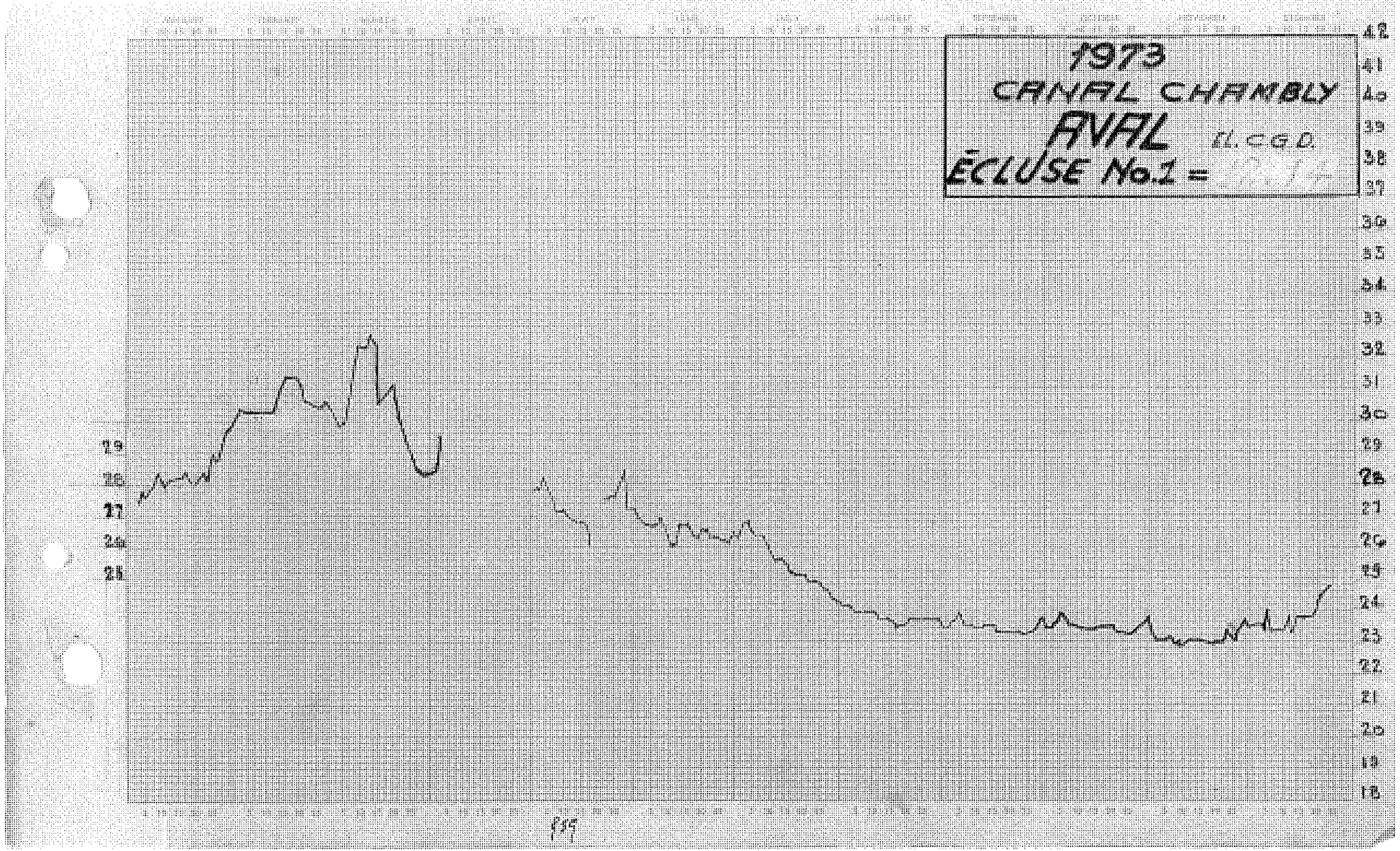
8
6

1972.

NIVEAUX D'EAU. 1972
AVAL
ECLUSE "1"
CANAL CHAMBLY
12.14




1973
CANAL CHAMBLY
AVAL
ECLUSE No.1 =
EL. C.G.D.
42
41
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31
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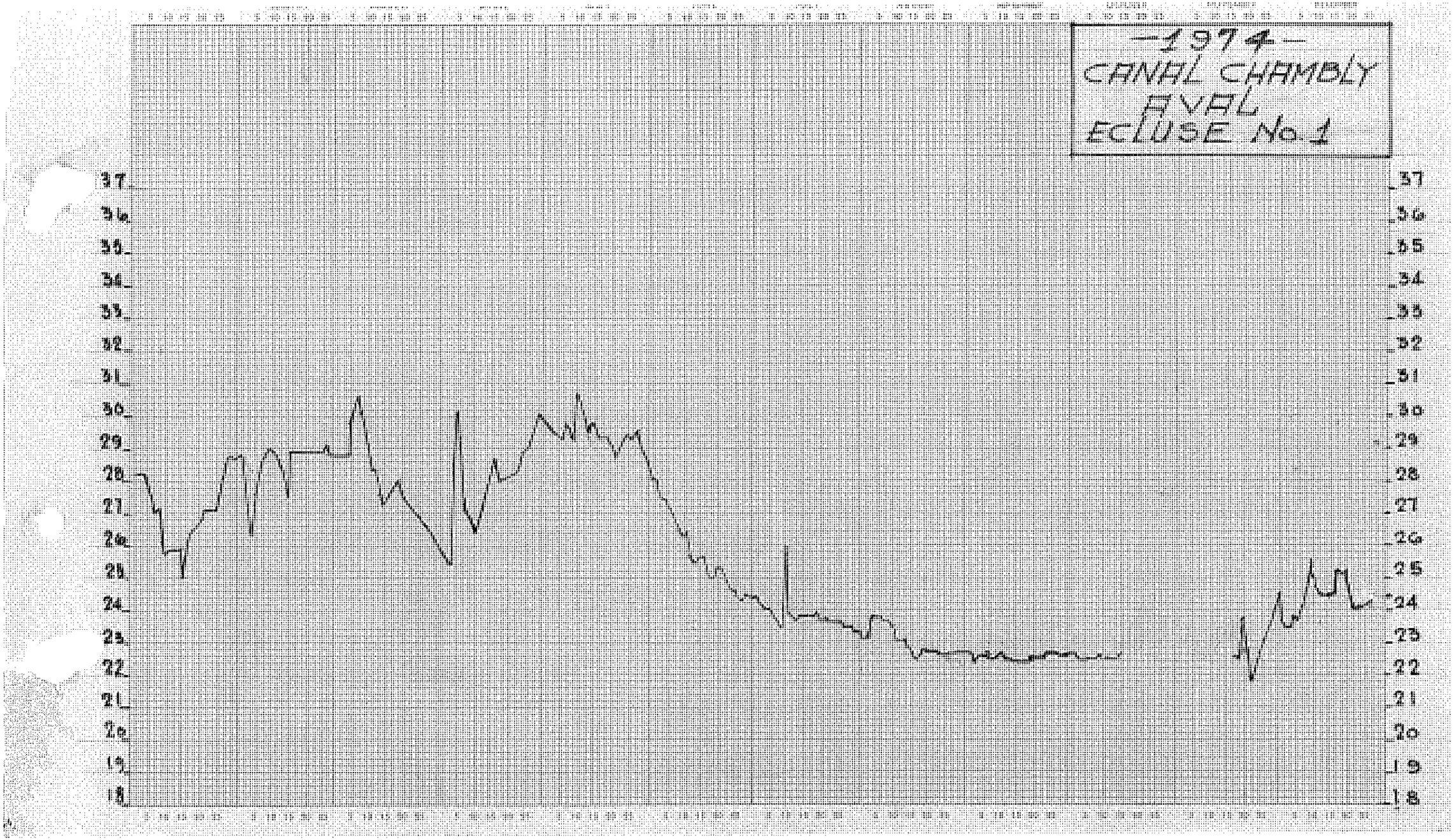
-1974-
CANAL CHAMBLY
AVAL
ECLUSE No 1
37
36
35
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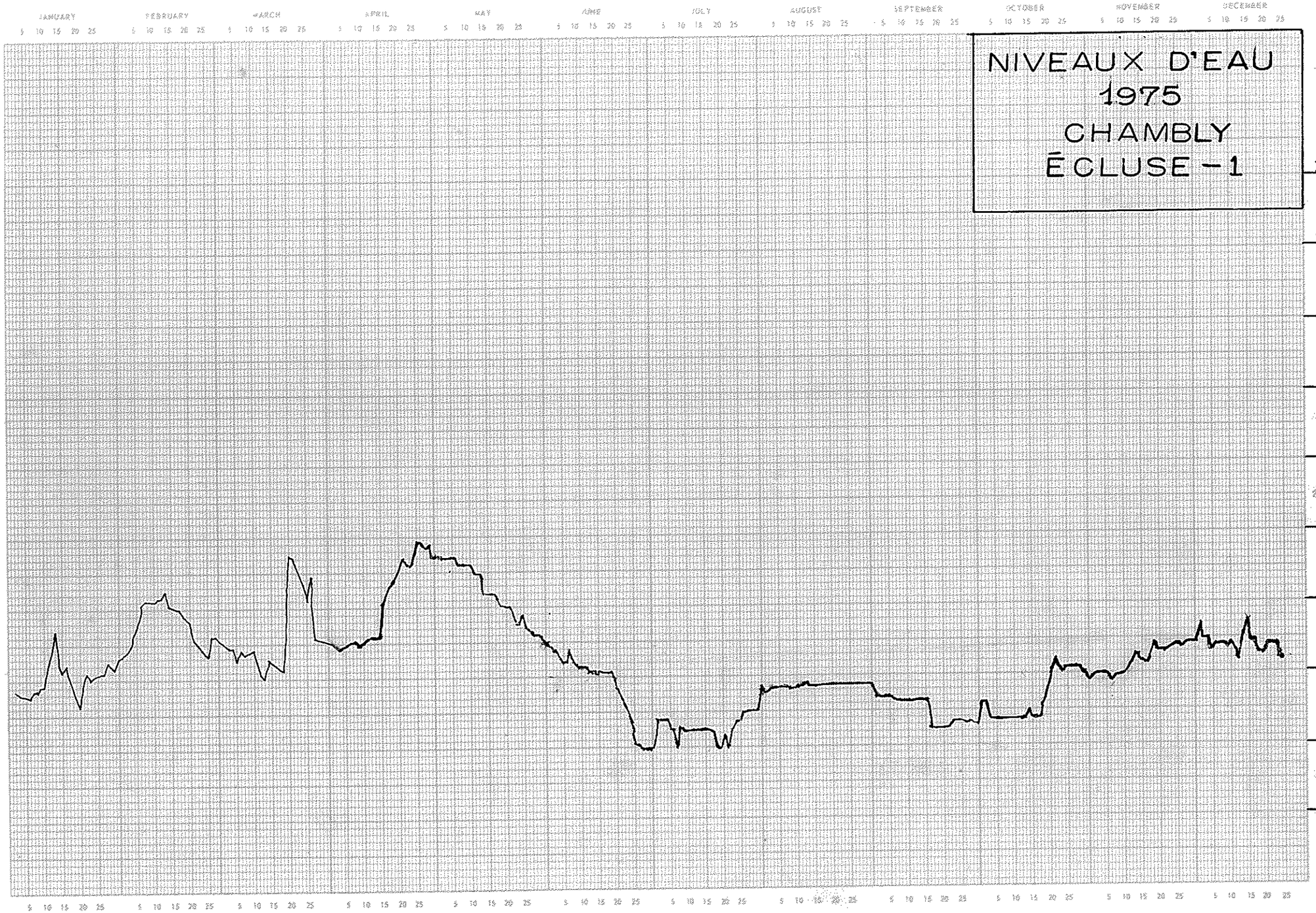
19
18


NIVEAUX D'EAU
1975
CHAMBLY
ÉCLUSE – 1
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
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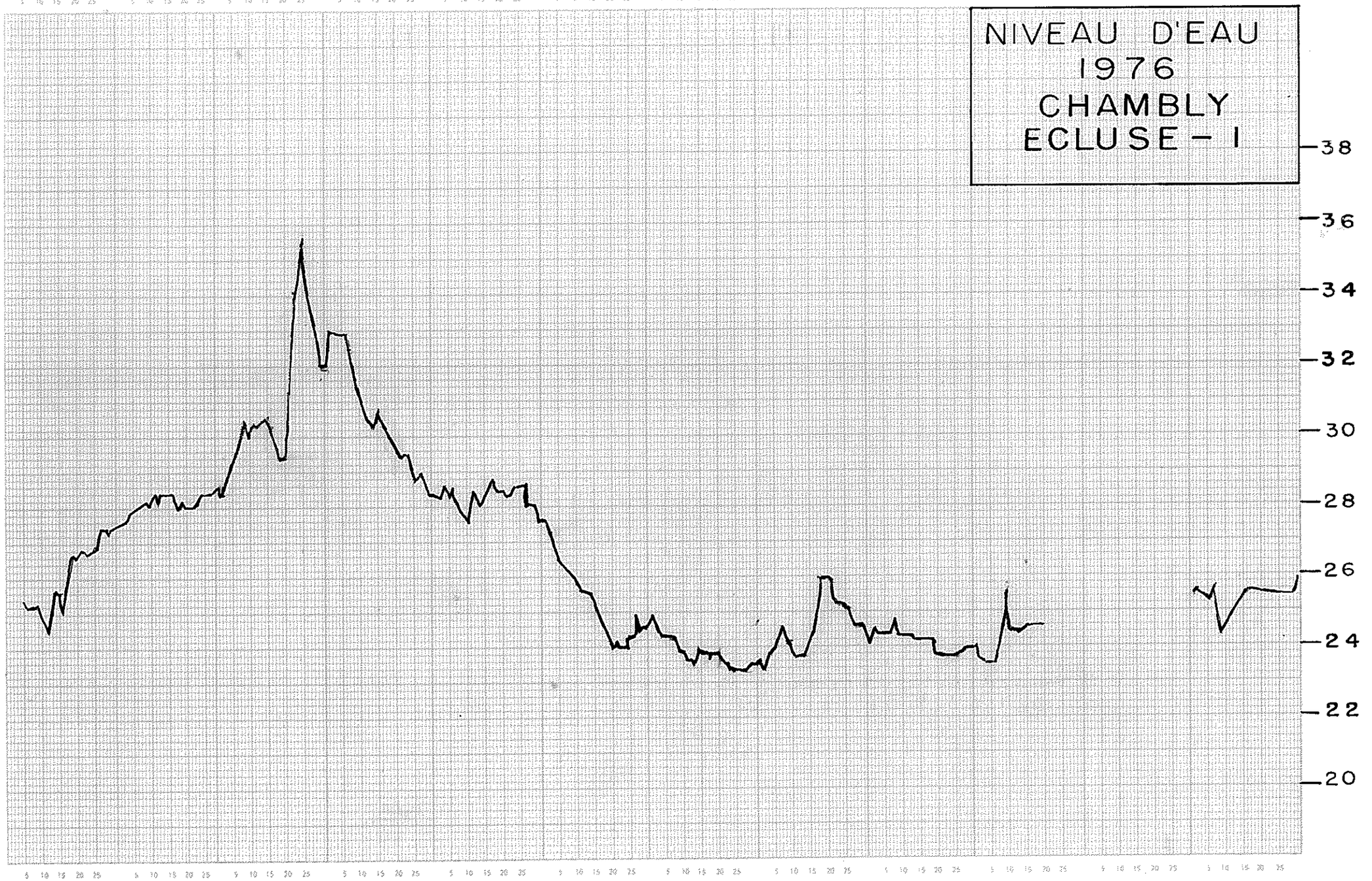
NIVEAU D'EAU
1976
CHAMBLY
ECLUSE - 1
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
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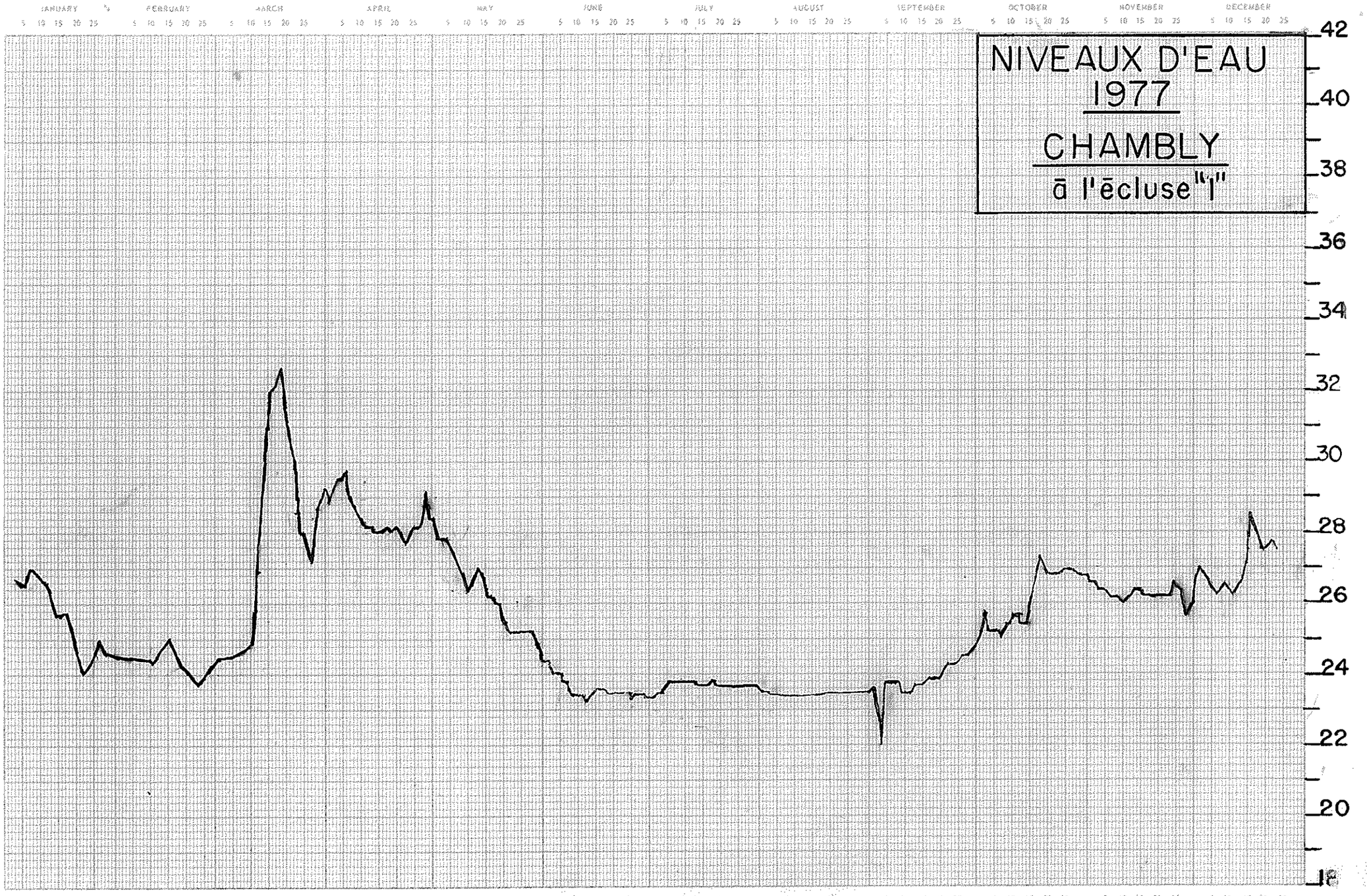
NIVEAUX D'EAU
1977
CHAMBLY
à l'écluse "1"
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
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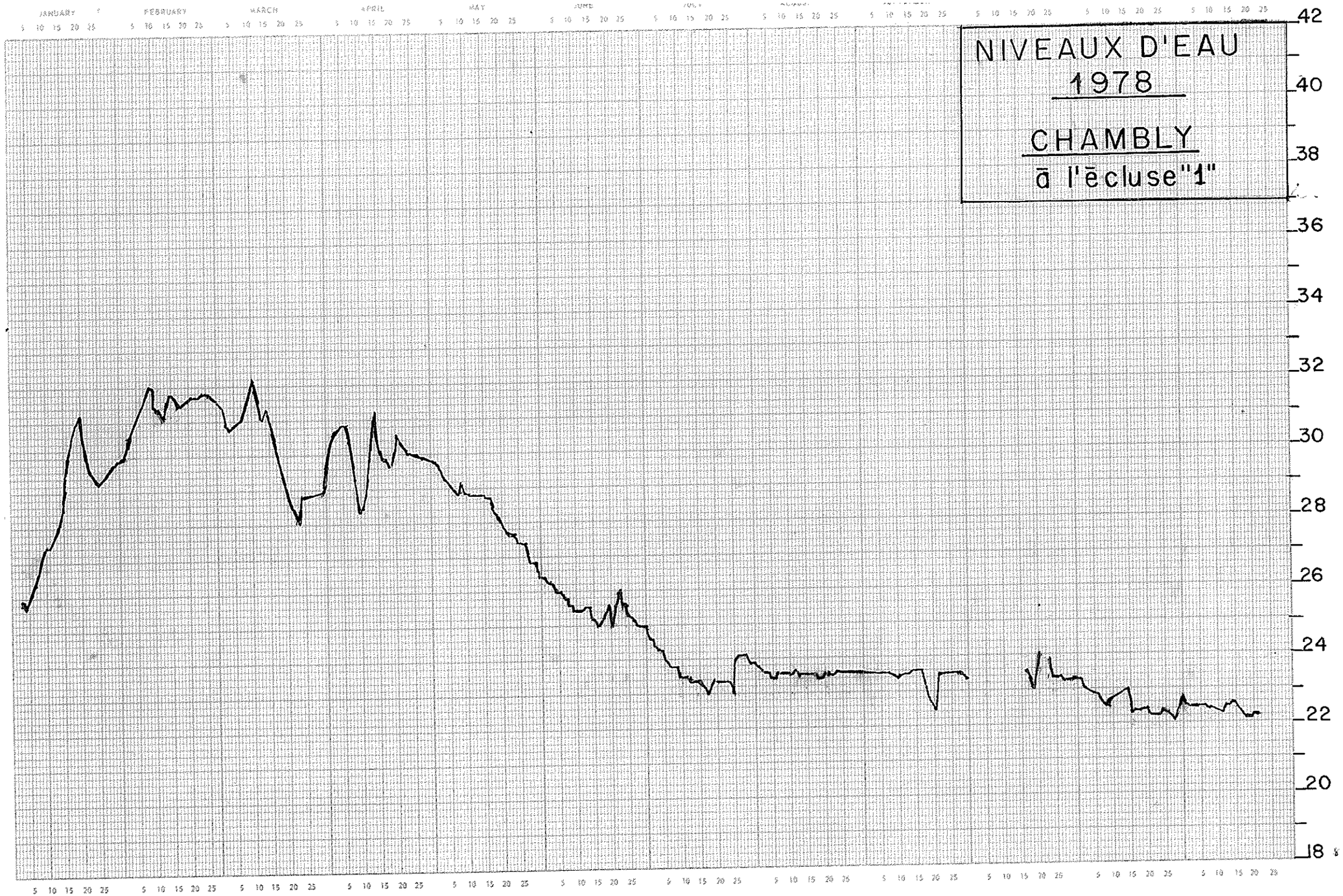
NIVEAUX D'EAU
1978
CHAMBLY
à l'écluse "1"
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
42
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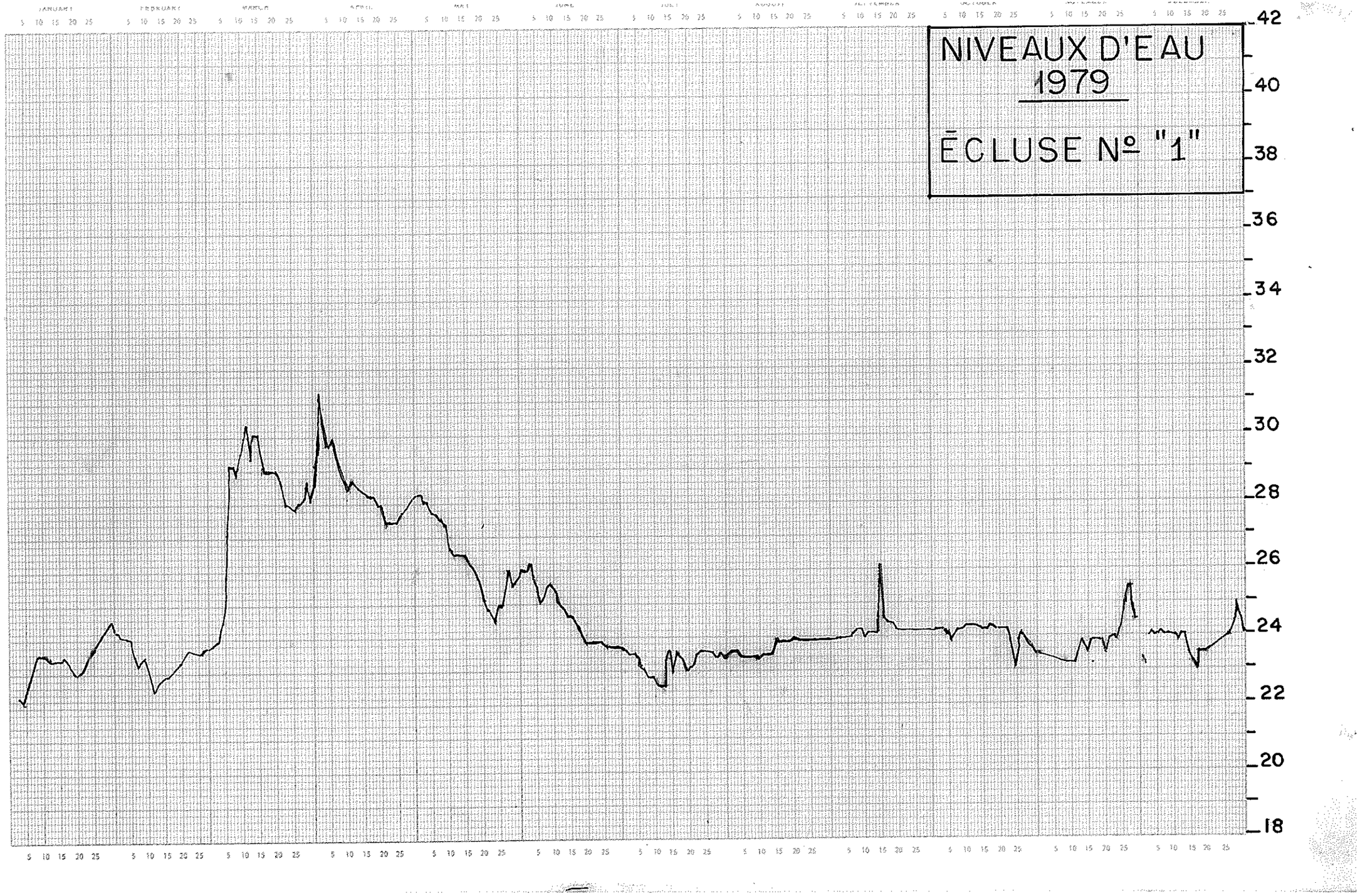
NIVEAUX D'EAU
1979
ÉCLUSE Nº "1"
42
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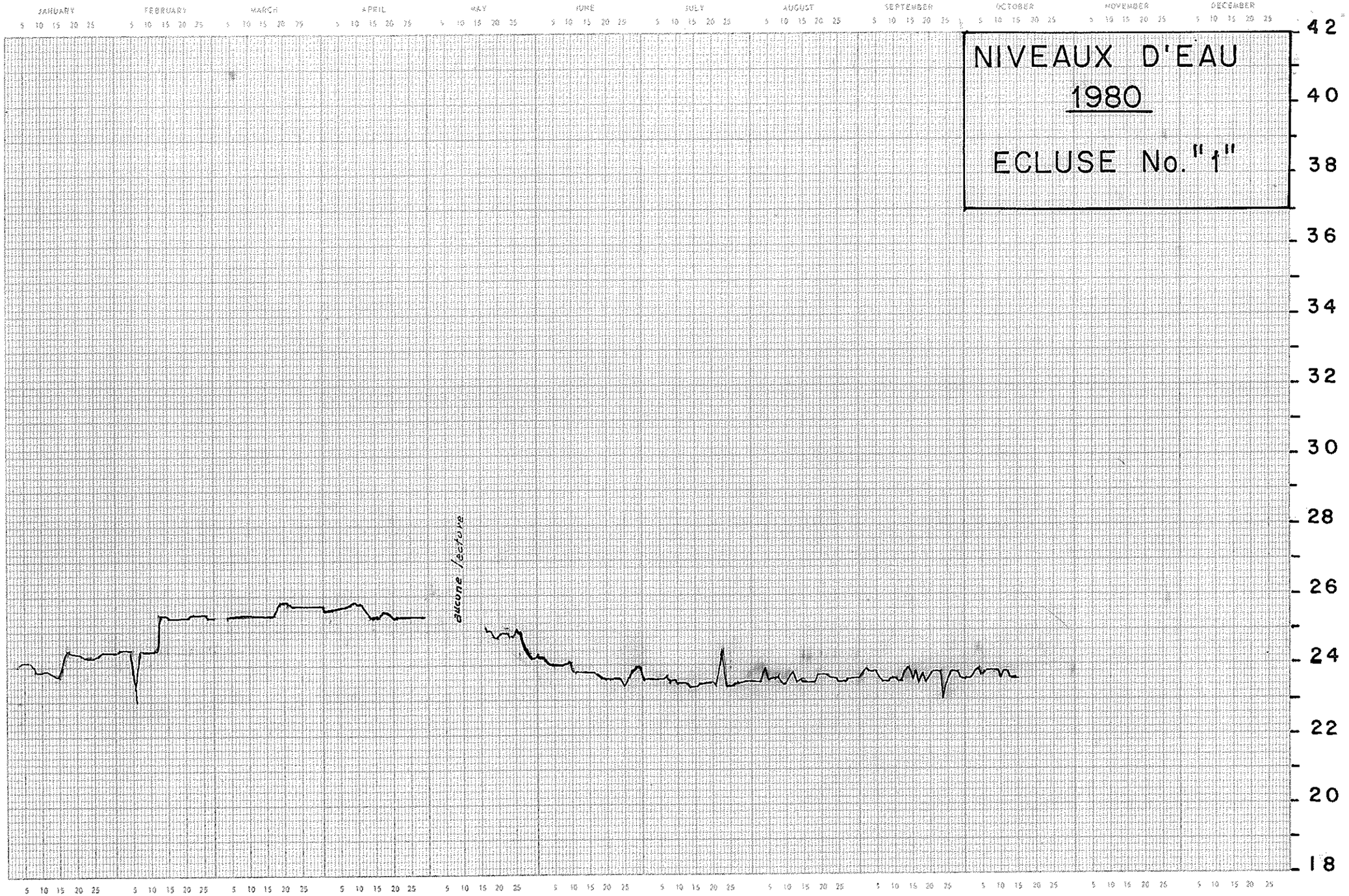
NIVEAUX D'EAU
1980
ECLUSE No."1"
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
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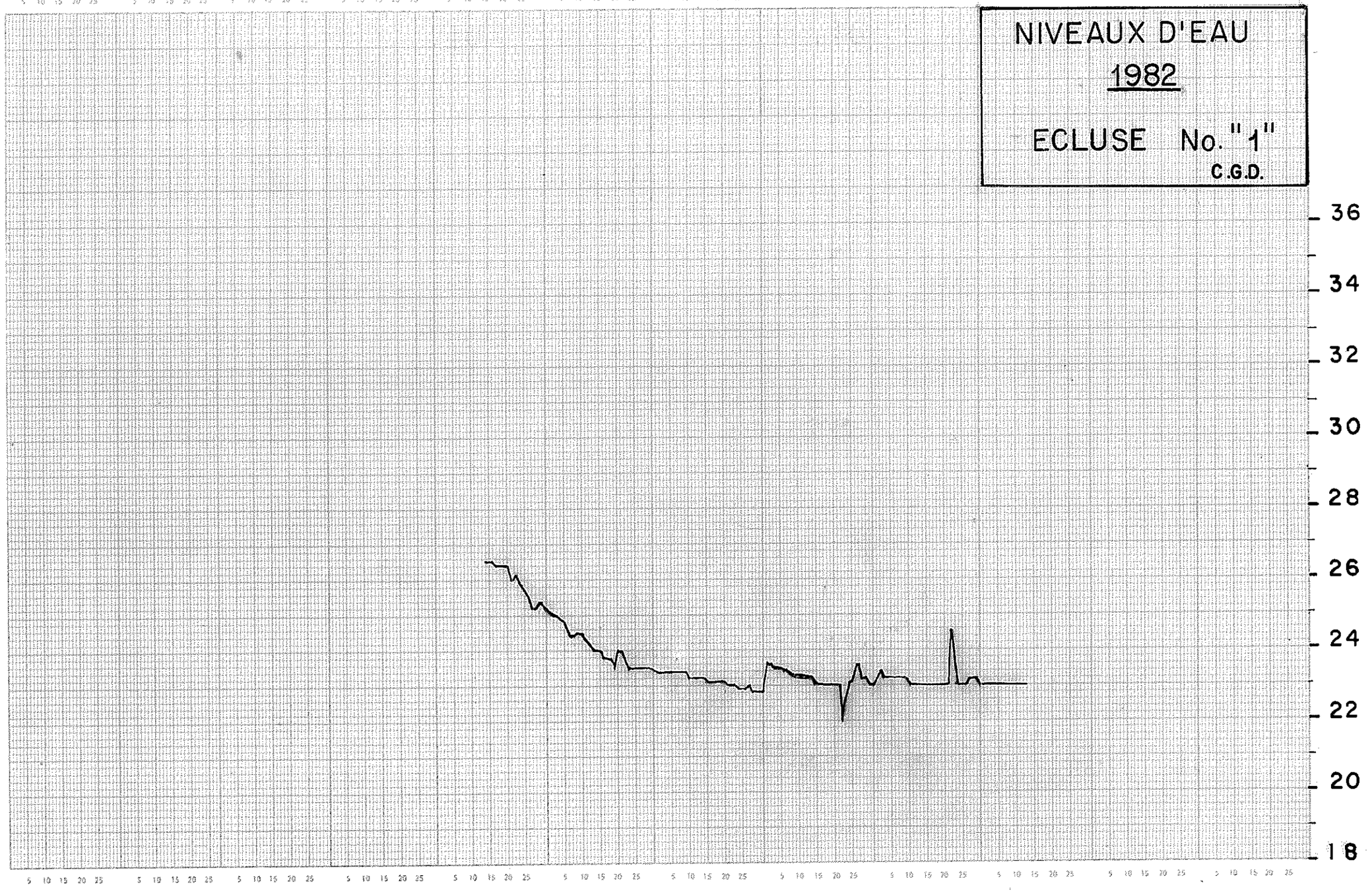
aucune lecture


JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
NIVEAUX D'EAU
1982
ECLUSE No. "1"
C.G.D.
36
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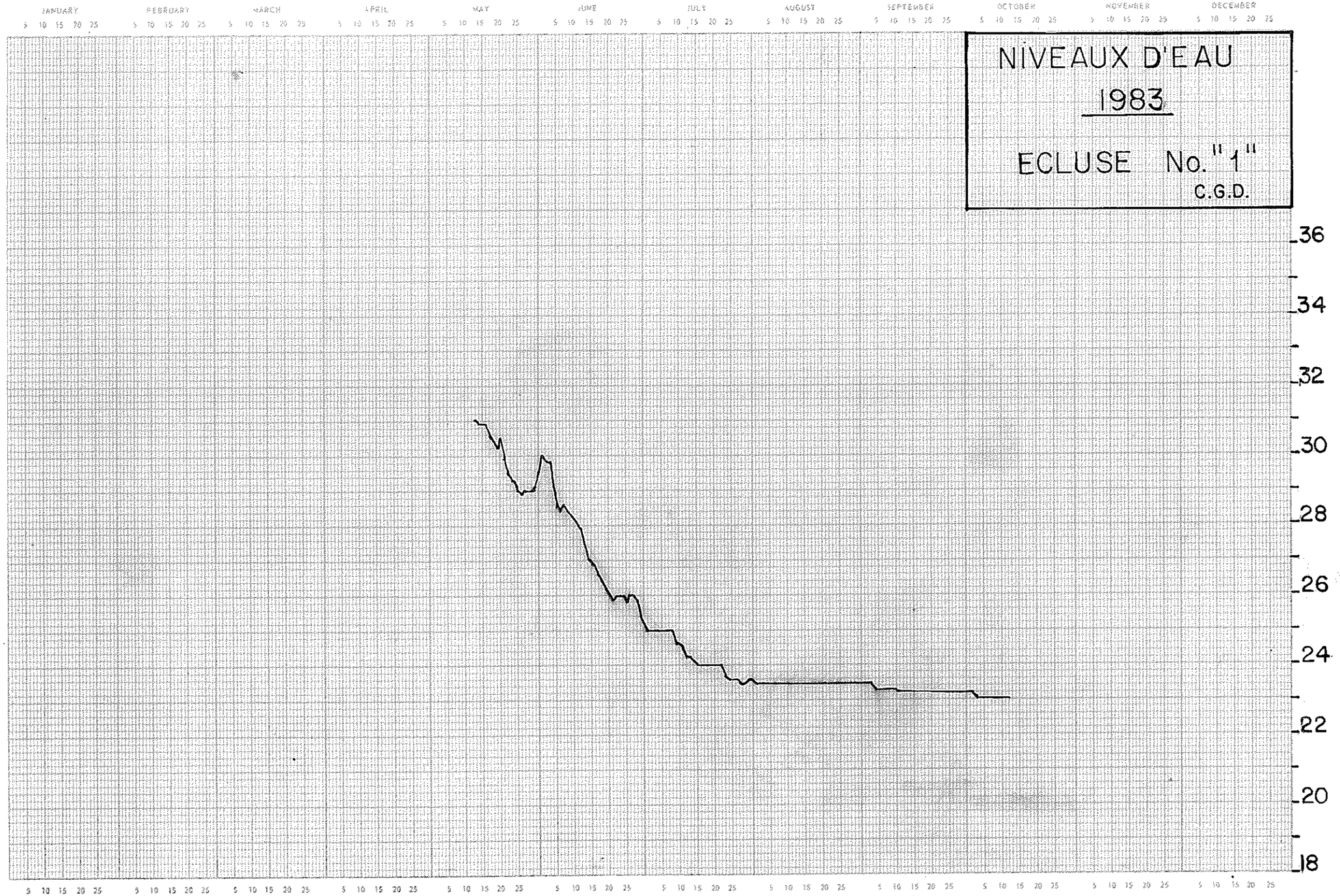
18

NIVEAUX D'EAU
1983
ECLUSE No. "1"
C.G.D.

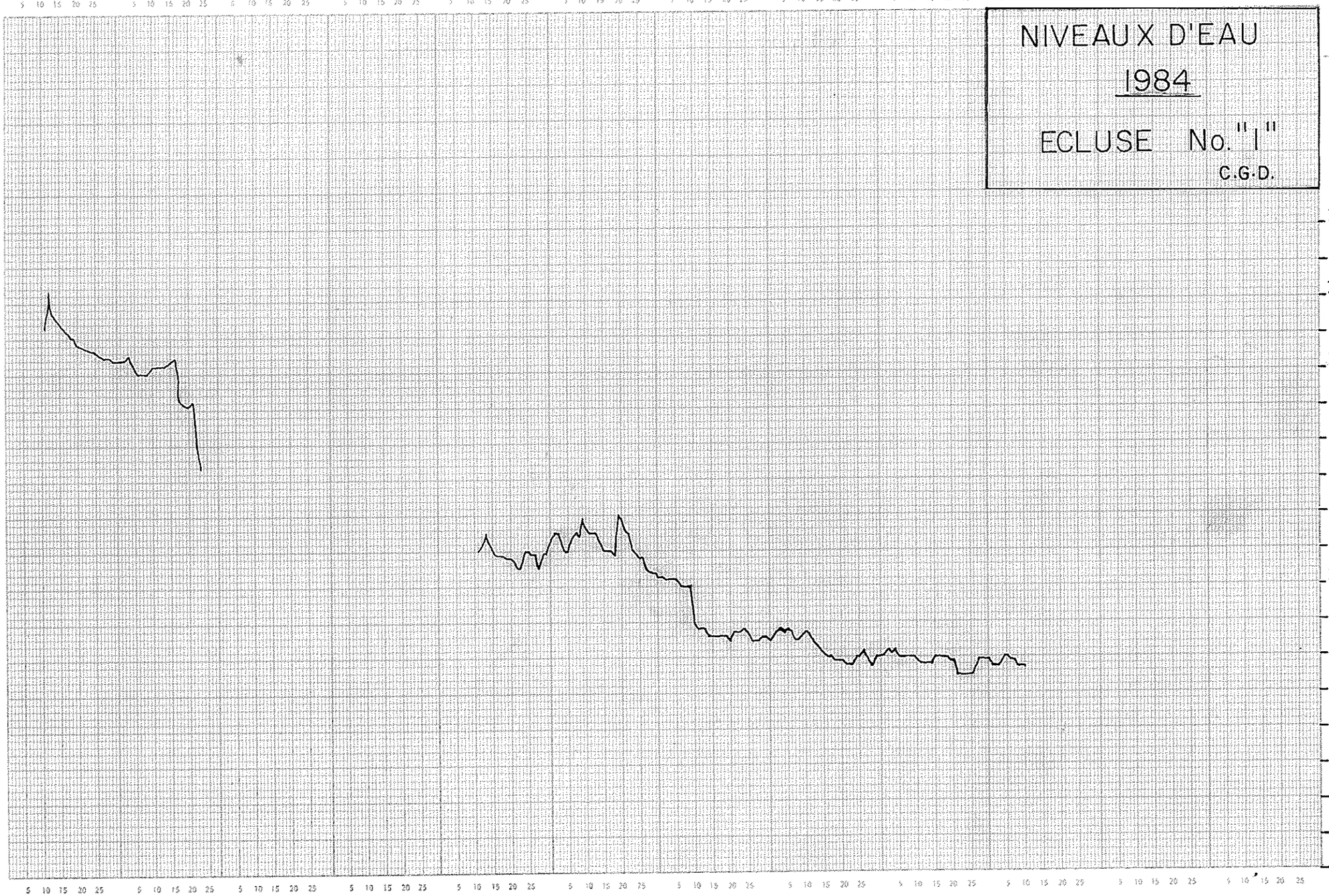


NIVEAUX D'EAU

1984

ECLUSE No. "I"

C.G.D.



NIVEAU D'EAU SUR LA RÈGLE De TILLAGE

CANAL CHAMBLY-BASSIN DE CHAMBLY

niveau zéro des cartes @ 6,7m

Pont beloeil (McMasterville) tirant d'air = 31,68' @ 9,6m

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
MAI										07-04 = 8.1	26-04 = 7.81	8,35						
10-mai	###	###	###	###	###	###	7,96	###	###	11-04 =8.28	05-05 = 7.68	8,38						
11-mai	###	###	###	###	###	###	7,94	###	###	19-04 = 8.01								
12-mai	###	###	###	###	###	###	7,94	###	###	25-04 = 8.51								
13-mai	###	###	###	###	###	###	7,92	###	###	27-04 = 8.52								
14-mai	###	###	###	###	###	8,30	7,90	8,18	7,67	8,15	7,80					10,86		
15-mai	###	###	7,90	###	###	8,30	8,00	8,18	7,67	8,15	7,80	8,50	8,21	7,72		10,79		
16-mai	###	###	7,90	###	###	8,28	8,10	8,16	7,64	8,10	7,85	8,48	8,12	7,79		10,74		
17-mai	9,10	8,18	7,90	7,30	###	8,26	8,00	8,10	7,60	8,00	7,92	8,45	8,15	7,92		10,69		
18-mai	9,06	8,17	7,90	7,32	###	8,24	8,10	8,02	7,58	8,00	8,20	8,38	8,12	7,88		10,64		
19-mai	9,20	8,16	7,80	7,30	9,25	8,20	8,10	8,03	7,56	8,00	8,74	8,31	8,09	7,86		10,59	7,70	
20-mai	9,30	8,10	7,78	7,30	9,10	8,14	8,00	8,00	7,58	7,90	8,74	8,27	8,05	7,84		10,54	7,68	
21-mai	9,00	8,06	7,76	7,28	9,00	8,13	8,00	8,00	7,54	7,90	8,42	8,25	8,00	7,82		10,49	7,66	
22-mai	9,10	8,04	7,76	7,28	8,95	8,01	8,00	7,88	7,50	7,80	8,42	8,20	7,98	7,78		10,44	7,68	
23-mai	9,00	8,00	7,60	7,28	8,95	8,00	8,00	7,86	7,50	7,80	8,35	8,17	7,91	7,76		10,39	7,68	
24-mai	8,90	8,00	7,60	7,29	8,82	7,96	8,00	7,84	7,62	7,80	8,30	8,15	7,87	7,76		10,34	7,65	
25-mai	8,90	7,96	7,58	7,28	8,90	7,94	7,92	7,88	7,70	7,80	8,22	8,14	7,85	7,76		10,29	7,65	
26-mai	8,80	7,90	7,56	7,28	8,80	7,92	7,90	7,86	7,74	7,80	8,20	8,10	7,82	7,68		10,24	7,60	
27-mai	8,77	7,88	7,54	7,28	8,75	7,90	7,90	7,86	7,78	7,80	8,18	8,08	7,80	7,76		10,19	7,55	
28-mai	8,70	7,86	7,50	7,28	8,65	7,80	7,90	7,88	7,78	7,85	8,18	8,05	7,80	7,82		10,14	7,55	
29-mai	8,60	7,86	7,46	7,23	8,60	7,80	7,91	7,88	7,74	7,85	8,16	8,00	7,80	7,85		10,09	7,60	
30-mai	8,55	7,80	7,44	7,21	8,56	7,78	8,00	7,84	7,73	7,85	8,14	7,98	7,65	7,80		10,04	8,10	
31-mai	8,50	7,74	7,46	7,20	8,54	7,60	8,00	7,76	7,73	7,85	8,20	7,94	7,76	7,76		9,98		
JUIN																		
01-juin	8,50	7,68	7,40	7,19	8,50	7,68	8,20	7,76	8,40	7,80	8,24	7,88	7,97	7,72		9,90	7,55	
02-juin	8,45	7,64	7,40	7,19	8,48	7,65	8,00	7,80	8,90	7,80	8,22	7,82	7,82	7,68		9,86	7,56	
03-juin	8,40	7,62	7,40	7,18	8,30	7,65	7,85	7,76	8,88	7,60	8,20		7,74	7,64		9,84	7,59	
04-juin	8,30	7,62	7,38	7,17	8,25	7,20	7,85	7,76	8,82	7,20	8,20		7,74	7,62		9,73		
05-juin	8,25	7,64	7,36	7,18	8,28	7,65	7,80	7,75	8,80	7,00	8,20		7,73	7,60		9,62		
06-juin	8,20	7,60	7,30	7,18	8,28	7,65	7,80	7,70	7,78	7,50	8,20		7,56	7,58		9,51		
07-juin	8,20	7,60	7,30	7,18	8,20	7,67	8,00	7,69	7,76	7,50	8,16		7,40	7,56		9,46		
08-juin	8,25	7,58	7,28	7,06	8,20	7,64	8,20	7,66	7,74	7,50	8,16	7,78	7,25	7,56		9,38	7,47	
09-juin	8,20	7,52	7,28	7,07	8,20	7,62	8,00	7,58	7,70	7,50	8,30		7,88	7,54		9,30	7,47	
10-juin	8,18	7,48	7,28	7,06	8,18	7,60	7,76	7,56	7,64	7,50	8,50	7,68	7,68	7,60		9,21	7,45	
11-juin	8,15	7,48	7,24	7,04	8,16	7,80	7,75	7,55	7,60	7,48	8,50	7,65	7,68	7,50		9,13		
12-juin	8,15	7,48	7,24	7,03	8,14	7,72	7,88	7,55	7,60	7,48	8,40	7,59	7,65	7,52	7,39	9,05		
13-juin	8,15	7,44	7,38	7,02	8,11	7,64	8,00	7,54	7,60	7,48	8,30	7,57	7,65	7,52	7,39	8,97		
14-juin	8,16	7,44	7,26	7,02	8,08	7,60	8,10	7,76	7,70	7,48		7,55	7,62	7,50	7,40	8,89	7,37	
15-juin	8,17	7,40	7,28	7,02	8,20	7,55	8,12	7,74	7,60	7,48	8,22	7,50	7,62	7,50	7,39	8,83	7,36	
16-juin	8,17	7,38	7,36	7,01	8,08	7,50	8,40	7,70	7,54	7,52	8,21	7,51	7,62	7,48	7,40	8,77	7,35	
17-juin	8,17	7,36	7,38	7,00	7,95	7,58	8,83	7,65	7,48	7,60	8,21	7,50	7,60	7,48	7,50	8,71	7,35	
18-juin	8,17	7,30	7,36	6,98	7,92	7,56	8,83	7,65	7,48	7,70	8,20	7,49	7,60	7,48	7,36	8,66		
19-juin	8,17	7,30	7,42	6,97	7,90	7,55	8,83	7,57	7,46	7,80	8,18	7,47	7,58	7,46	7,38	8,61		
20-juin	8,00	7,28	7,46	6,96	7,88	7,46	8,00	7,52	7,46	7,80	8,16		7,55	7,46	7,34	8,54		
21-juin	7,96	7,26	7,48	6,96	7,88	7,40	8,10	7,50	7,46	7,80	8,10	7,40	7,55	7,50	7,34	8,47		
22-juin	7,89	7,30	7,46	6,96	7,88	7,42	8,04	7,46	7,36	7,80	8,05	7,37	7,58	7,44	7,30	8,39	7,20	
23-juin	7,85	7,28	7,48	6,95	7,80	7,44	8,02	7,45	7,36	7,80	8,00	7,33	7,58	7,38	7,27	8,35	7,20	
24-juin	7,80	7,20	7,48	6,96	7,79	7,56	8,02	7,40	7,36	7,75	7,98	7,33	7,58	7,37	7,29	8,31	7,20	
25-juin	7,80	7,20	7,46	6,96	7,78	7,49	8,00	7,38	7,32	7,75	7,90	7,34	7,56	7,36	7,31	8,27	7,18	
26-juin	7,80	7,16	7,50	6,92	7,76	7,40	7,98	7,35	7,34	7,60	7,88	7,34	7,55	7,35	7,28	8,23	7,18	
27-juin	7,70	7,11	7,50	6,92	7,68	7,38	7,96	7,35	7,32	7,60	7,90	7,32	7,54	7,35	7,22	8,19	7,19	
28-juin	7,67	7,10	7,50	6,92	7,68	7,36	7,94	7,30	7,32	7,60	8,00	7,30	7,51	7,35	7,32	8,15	7,19	
29-juin	7,76	7,08	7,55	6,91	7,65	7,36	7,92	7,28	7,32	7,60	8,02	7,28	7,50	7,40	7,40	8,14	7,18	
30-juin	7,79	7,08	7,85	6,95	7,60	7,24	7,90	7,28	7,32	7,60	8,11	7,25	7,48	7,56	7,28	8,12	7,17	
JUILLET																		
01-juil	7,74	7,06	7,90	6,96	7,60	7,32	7,90	7,20	7,32	7,60	8,20	7,20	7,45	7,40	7,26	8,10	7,18	
02-juil	7,72	7,00	7,94	6,92	7,60	7,36	7,90	7,18	7,30	7,60	8,30	7,20	7,45	7,40	7,21	8,10	7,18	
03-juil	7,72	7,00	8,10	6,94	7,60	7,38	7,85	7,15	7,30	7,60	8,18	7,20	7,40	7,37	7,20	8,08	7,18	
04-juil	7,67	7,04	8,04	6,96	7,40	7,34	7,85	7,18	7,28	7,60	8,16	7,20	7,38	7,40	7,20	8,07	7,18	
05-juil	7,60	7,04	8,04	6,98	7,40	7,30	7,60	7,15	7,28	7,60	8,16	7,20	7,35	7,40	7,20	8,03	7,17	
06-juil	7,60	7,08	8,00	6,98	7,40	7,24	7,50	7,15	7,28	7,60	8,10	7,22	7,34	7,40	7,20	8,00	7,17	
07-juil	7,60	7,08	7,98	6,99	7,40	7,22	7,77	7,12	7,25	7,60	8,00	7,20	7,34	7,40	7,18	7,96	7,17	
08-juil	7,60	7,06	8,00	6,95	7,36	7,22	7,70	7,10	7,25	7,55	8,00	7,20	7,32	7,42	7,18	7,91	7,15	
09-juil	7,58	7,06	8,00	6,95	7,36	7,22	7,70	7,10	7,20	7,55	7,90	7,20	7,31	7,42	7,18	7,87	7,15	
10-juil	7,58	7,06	8,00	7,00	7,38	7,25	7,65	7,12	7,20	7,50	7,92	7,22	7,29	7,40	7,20	7,82	7,12	
11-juil	7,58	7,06	8,20	7,07	7,38	7,34	7,65	7,10	7,28	7,48	7,80	7,25	7,28		7,18	7,77	7,10	
12-juil	7,57	7,06	8,19	6,96	7,31	7,24	7,65	7,10	7,28	7,40	7,80	7,27	7,26	7,95	7,17	7,74	7,08	
13-juil	7,46	7,06	8,08	6,96	7,30	7,16	7,65	7,08	7,18	7,40	7,70	7,28	7,25	7,50	7,19	7,71	7,07	
14-juil	7,44	7,58	8,06	6,96	7,30	7,15	7,62	7,08	7,24	7,40	7,70	7,29	7,24	7,50	7,18	7,69	7,09	
15-juil	7,48	7,54	8,02	6,94	7,30	7,13	7,60	7,09	7,24	7,40	7,72	7,30	7,23	7,42	7,15	7,66	7,08	
16-juil	7,46	7,50	8,00	6,94	7,28	7,10	7,40	7,10	7,10	7,40	7,72	7,28	7,22	7,42	7,14	7,63	7,06	
17-juil	7,44	7,50	8,00	6,93	7,26	7,10	7,52	7,08	7,15	7,40	7,72	7,25	7,21	7,40	7,14	7,60	7,10	
18-juil	7,43	7,46	8,00	6,96	7,25	7,10	7,60	7,06	7,10	7,40	7,70	7,25	7,25	7,40	7,15	7,56	7,08	
19-juil	7,60	7,50	8,01	6,95	7,24	7,08	7,65	7,02	7,15	7,40	7,70	7,24	7,24	7,38	7,13	7,52	7,07	
20-juil	7,54	7,40	7,94	6,94	7,24	7,05	7,52	7,03	7,18	7,40	7,70	7,24	7,22	7,38	7,13	7,50	7,04	
21-juil	7,54	7,30	7,86	6,92	7,26	7,05	7,50	7,04	7,10	7,40	7,70	7,24	7,25	7,40	7,12	7,49	7,02	
22-juil	7,48	7,20	7,84	6,90	7,26	7,05	7,40	7,06	7,00	7,38	7,50	7,24	7,28	7,39	7,14	7,45	7,01	
23-juil	7,49	7,16	7,80	6,92	7,25	7,04	7,42	7,06	7,16	7,38	7,50	7,20	7,32	7,39	7,16	7,40	7,00	
24-juil	7,47	7,10	7,76	6,94	7,25	7,00	7,36	7,06		7,36	7,55	7,20	7,35	7,36	7,14	7,38	7,11	
25-juil	7,58	7,08	7,74	6,91	7,23	7,00	7,36	7,02	7,16	7,36	7,61	7,20	7,37	7,36	7,12	7,35	7,04	
26-juil	7,54	7,06	7,68	6,95	7,20	6,98	7,32	7,02	7,14	7,32	7,60	7,20	7,41	7,35	7,10	7,49	7,02	
27-juil	7,46	7,08	7,68	6,90	7,20	6,98	7,30	7,06	7,12	7,32	7,60	7,19	7,48	7,48	7,09	7,43	7,01	31,488
28-juil	7,42	7,08	7,68	6,90	7,20	6,96	7,32	7,04	7,16	7,27	7,60	7,17	7,52	7,53	7,09	7,39	7,01	
29-juil	7,42	7,08	7,66	6,95	7,19	6,95	7,36	7,04	7,14	7,26	7,60	7,15	7,56	7,53	7,09	7,37	7,00	
30-juil	7,44	7,10	7,64	6,95	7,19	6,92	7,30	7,02	7,14	7,26	7,60	7,15	7,54	7,69	7,09	7,36	7,00	
31-juil	7,48	7,08	7,64	6,90	7,19	6,90	7,28	7,00	7,14	7,26	7,54	7,15	7,53	7,38	7,08	7,34	7,02	
AOÛT																		
01-août	7,46	7,06	7,60	6,95	7,20	6,90	7,25	7,00	7,30	7,26	7,50	7,12	7,52	7,38	7,09	7,31	7,02	
02-août	7,43	7,04	7,60	6,90	7,20	6,90	7,40	7,02	7,26	7,26	7,60	7,12	7,55	7,38	7,10	7,36	7,00	
03-août	7,42	7,04	7,58	6,94	7,20	6,95	7,35	7,05	7,14	7,26	7,65	7,13	7,56	7,48	7,12	7,31	6,99	
04-août	7,40	7,00	7,56	6,90	7,18	6,97	7,18	7,00	7,14	7,26	7,65	7,12	7,56	7,40	7,22	7,28	6,99	
05-août	7,44	7,00	7,52	6,90	7,15	6,96	7,15	7,06	7,14	7,26	7,65	7,10	7,63	7,40	7,20	7,26	7,00	
06-août	7,46	6,98	7,50	6,90	7,15	6,95	7,15	7,04	7,15	7,22	7,62	7,10	7,90	7,40	7,19	7,26	6,98	
07-août	7,30	6,96	7,47	6,90	7,15	6,95	7,10	7,02	7,12	7,22	7,61	7,12	8,07	7,40	7,18	7,26	6,60	
08-août	7,30	6,96	7,45	6,90	7,15	6,94	7,10	7,08	7,12	7,22	7,56	7,15	7,91	7,40	7,18	7,26		
09-août	7,35	6,96	7,44	6,88	7,15	6,94	7,08	7,05	7,12	7,18	7,60	7,08	7,85	7,39	7,19	7,20		
10-août	7,33	6,96	7,44	6,92	7,14	6,93	7,06	7,05	7,14	7,18	7,60	7,10	7,85	7,39	7,21	7,27		
11-août	7,30	6,96	7,42	6,92	7,14	6,92	7,06	7,02	7,16	7,18	7,54	7,10	7,82	7,40	7,19	7,22		
12-août	7,30	6,90	7,40	6,91	7,14	6,92	7,02	7,02	7,16	7,15	7,50	7,10	7,82	7,38	7,18	7,19		
13-août	7,29	6,90	7,50	6,96	7,14	6,90	7,05	7,12	7,15	7,15	7,46	7,10	7,82	7,36	7,17	7,17		
14-août	7,32	6,90	7,50	6,95	7,12	6,90	7,05	7,10	7,15	7,15	7,40	7,06	7,82	7,34	7,17	7,16		
15-août	7,24	6,96	7,54	6,96	7,14	6,88	7,05	7,08	7,15	7,15	7,40	7,06	7,82	7,34	7,16	7,16		
16-août	7,25	6,96	7,50	6,96	7,10	6,86	7,00	7,06	7,15	7,10	7,40	7,06	7,81	7,32	7,15	7,15		
17-août	7,25	6,96	7,50	6,91	7,08	6,86	7,00	7,04	7,20	7,10	7,40	7,08	7,81	7,30	7,14	7,16		
18-août	7,20	6,96	7,50	6,90	7,00	6,84	6,97	7,02	7,22	7,10	7,40	7,08	7,80	7,30	7,14	7,16		
19-août	7,21	6,96	7,44	6,91	7,00	6,84	7,00	7,02	7,23	7,12	7,42	7,07	7,79	7,28	7,13	7,17		
20-août	7,20	6,96	7,42	6,90	7,00	6,84	6,98	7,01	7,23	7,10	7,44	7,05	7,79	7,28	7,12	7,17		
21-août	7,18	6,96	7,42	6,90	7,00	6,84	6,96	7,00	7,22	7,08	7,40	7,09	7,78	7,27	7,10	7,17		
22-août	7,16	6,96	7,42	6,91	7,00	6,84	7,00	7,00	7,50	7,05	7,40	7,10	7,78	7,27	7,10	7,18		
23-août	7,14	6,96	7,38	6,91	7,01	6,84	6,98	7,01	7,30	7,05	7,40	7,06	7,77	7,26	7,13	7,17		
24-août	7,14	6,96	7,38	6,91	7,01	6,84	6,96	7,01	7,30	7,05	7,40	7,06	7,75	7,24	7,13	7,15		
25-août	7,14	6,98	7,38	6,90	7,04	6,84	6,96	7,00	7,30	7,03	7,40	7,06	7,75	7,22	7,13	7,22		
26-août	7,10	6,98	7,38	6,91	7,04	6,84	6,96	7,10	7,32	7,03	7,40	7,01	7,70	7,20	7,11	7,11		
27-août	7,10	6,98	7,38	6,90	7,01	6,84	7,01	7,06	7,30	7,00	7,40	7,00	7,65	7,20	7,10	7,10		
28-août	7,08	6,98	7,38	6,90	7,01	6,84	7,04	7,10	7,30	7,05	7,41	7,00	7,64	7,20	7,10	Irène		
29-août	7,06	6,98	7,42	6,90	7,02	6,84	7,02	7,10	7,30	7,05	7,34	7,01	7,63	7,20	7,10	8,15		
30-août	7,06	6,98	7,46	6,90	7,02	6,84	7,01	7,11	7,35	7,02	7,28	7,00	7,63	7,26	7,10	7,81		
31-août	7,03	6,98	7,46	6,90	7,01	6,86	7,00	7,10	7,35	7,10	7,30	7,00	7,60	7,20	7,10	7,71		

NIVEAU D'EAU SUR LA RÈGLE De TILLAGE

CANAL CHAMBLY-BASSIN DE CHAMBLY

niveau zéro des cartes @ 6,7m

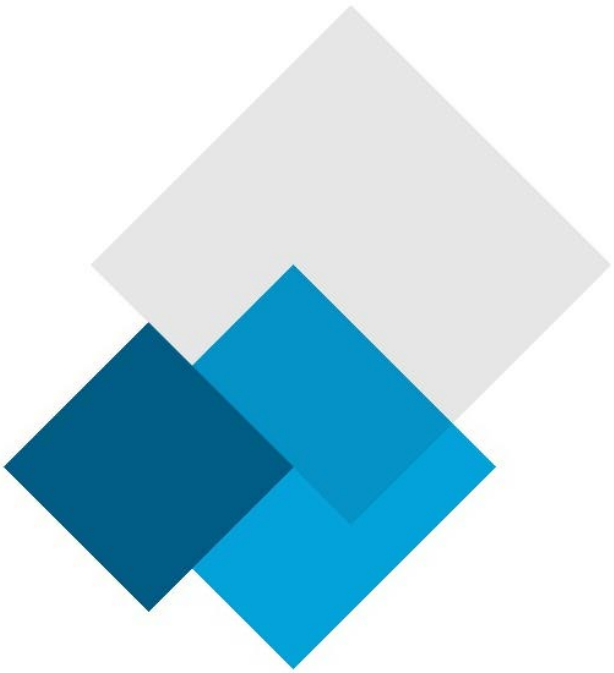
Pont beloeil (McMasterville) tirant d'air = 31,68' @ 9,6m

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SEPTEMBRE																	
01-sept	7,02	6,98	7,30	6,90	7,01	6,87	7,01	7,06	7,42	7,25	7,28	7,00	7,58	7,18	7,08	7,69	
02-sept	7,03	6,98	7,30	6,82	7,01	6,90	7,00	7,05	7,44	7,10	7,28	7,00	7,58	7,18	7,08	7,70	
03-sept	7,02	6,98	7,30	6,82	7,00	6,90	7,00	7,06	7,45	7,10	7,28	7,00	7,55	7,18	7,08	7,73	
04-sept	7,00	6,98	7,26	6,86	7,00	6,90	7,00	7,10	7,46	7,09	7,28	7,00	7,50	7,18	7,06	7,76	
05-sept	7,00	7,00	7,22	6,86	6,95	6,90	6,98	7,10	7,48	7,08	7,25	7,00	7,49	7,18	7,06	8,00	
06-sept	7,00	7,00	7,22	6,86	6,95	6,90	6,98	7,10	7,50	7,06	7,25	7,00	7,50	7,16	7,05	8,00	
07-sept	7,00	7,00	7,22	6,82	6,95	6,90	6,98	7,09	7,50	7,05	7,22	7,00	7,45	7,16	7,05	8,00	
08-sept	7,00	7,00	7,22	6,84	7,00	6,90	6,99	7,07	7,50	7,10	7,22	7,00	7,41	7,16	7,02	7,98	
09-sept	7,08	7,00	7,22	6,84	7,00	6,90	6,98	7,06	7,48	7,12	7,22	7,02	7,40	7,16	7,02	7,98	
10-sept	7,08	7,00	7,20	6,83	7,00	6,90	6,98	7,06	7,49	7,10	7,20	7,02	7,39	7,16	7,00	7,98	
11-sept	7,08	7,00	7,20	6,85	7,00	6,90	6,96	7,06	7,70	7,10	7,20	7,02	7,38	7,16	6,98	7,96	
12-sept	7,06	7,00	7,22	6,85	6,95	6,90	6,96	7,05	7,68	7,08	7,20	7,02	7,37	7,14	7,05	7,99	
13-sept	7,06	7,00	7,20	6,85	7,00	6,92	6,96	7,06	7,64	7,08	7,20	7,02	7,39	7,13	7,00	8,01	
14-sept	7,06	6,98	7,20	6,85	6,98	6,92	6,98	7,02	7,62	7,08	7,18	7,02	7,35	7,10	7,00	8,16	
15-sept	7,06	6,98	7,24	6,85	6,96	6,92	6,98	7,02	7,66	7,06	7,20	7,02	7,32	7,10	7,00	8,10	
16-sept	7,06	6,98	7,24	6,85	6,94	6,92	7,00	7,00	7,65	7,08	7,20	7,01	7,31	7,10	7,00	8,06	
17-sept	7,06	6,98	7,24	6,92	6,94	6,90	7,00	7,00	7,62	7,23	7,20	7,00	7,30	7,10	7,04	7,98	
18-sept	7,06	6,98	7,24	6,88	6,94	6,90	6,98	7,00	7,46	7,20	7,20	7,00	7,30	7,10	7,04	7,96	
19-sept	6,98	6,98	7,24	6,88	6,96	6,90	6,98	7,00	7,50	7,10	7,16	7,00	7,29	7,09	7,04	7,96	
20-sept	6,98	7,01	7,24	6,88	6,96	6,90	7,00	6,90	7,52	7,10	7,16	7,00	7,32	7,09	7,00	7,96	
21-sept	6,98	7,01	7,22	6,95	6,96	6,90	6,98	6,99	7,56	7,10	7,10	7,00	7,30	7,09	7,00	7,90	
22-sept	7,00	7,01	7,22	7,00	6,94	6,90	7,00	6,99	7,54	7,10	7,10	7,00	7,30	7,08	7,00	7,88	
23-sept	7,00	7,01	7,23	7,03	6,98	6,90	7,00	7,00	7,50	7,08	7,10		7,29	7,08	7,00	7,82	
24-sept	7,00	7,01	7,20	7,04	7,00	6,90	7,00	7,00	7,50	7,08	7,14		7,28	7,08	7,00	7,76	
25-sept	7,00	7,01	7,19	7,01	7,00	6,90	7,00	7,00	7,51	7,10	7,14		7,27	7,08	7,05	7,73	
26-sept	6,94	7,01	7,19	7,01	6,95	6,90	6,98	7,02	7,50	7,50	7,14		7,25	7,07	7,05	7,70	
27-sept	6,94	7,01	7,20	7,02	6,95	6,90	6,99	7,00	7,48	7,20	7,14		7,22	7,12	?	7,70	
28-sept	6,94	7,01	7,20	7,03	6,95	6,90	7,00	7,00	7,47	7,10	7,12			7,10	?	7,68	
29-sept	6,94	7,01	7,20	7,04	6,91	6,92	7,00	7,00	7,42	7,10	7,12			7,10	?	7,74	
30-sept	6,94	7,01	7,20	7,10	6,90	6,92	7,02	7,00	7,41	7,10	7,12			7,10	?	7,78	
OCTOBRE																	
01-oct	7,00	6,98	7,20	7,10	6,93	6,92	7,00	7,00	7,40	7,09	7,10			7,10	7,81	7,76	
02-oct	7,00	6,98	7,22	7,06	6,92	6,91	7,00	7,00	7,39	7,09	7,10			7,08	7,35	7,76	
03-oct	7,00	6,98	7,24	7,06	6,92	6,92	7,00	7,00	7,41	7,09	7,10			7,12	7,35	8,30	
04-oct	6,93	6,98	7,24	7,05	6,92	6,92	7,01	7,12	7,39	7,08	7,10			7,10	7,35	7,90	
05-oct	6,93	6,98	7,24	7,03	6,91	6,92	7,10	7,10	7,36	7,08	7,14			7,10	7,38	7,90	
06-oct	6,94	6,98	7,23	7,02	6,93	6,92	7,02	6,99	7,35	7,08	7,14			7,00	7,4	7,87	
07-oct	6,96	6,98	7,30	7,04	6,94	6,92	7,00	7,00	7,34	7,08	7,14			7,12	7,4	7,85	
08-oct	6,94	6,98	7,25	7,06	6,94	6,92	7,00	6,98	7,35	7,16	7,14			7,14	7,4	7,81	
09-oct	6,94	6,96	7,22	7,15	6,94	6,92	7,00	7,00	7,34	7,16	7,14			7,14	7,42	7,80	
10-oct	6,92	6,98	7,18	7,06	6,94	6,92	7,04	7,00	7,30	7,16	7,14			7,10	7,42	7,76	
11-oct	6,90	6,98	7,20	7,06	fermé	6,92	7,04	7,00	7,28	7,18	7,16				7,42	7,71	
12-oct	6,94	7,00	7,20	fermé	fermé	6,92	7,00	7,00	7,24	7,18	7,18				fermé	7,71	
13-oct	6,93	7,00	fermé	fermé	fermé	6,92	7,00	7,00	7,20	7,18	7,18			fermé		7,71	
14-oct	6,93	7,00	fermé	fermé	fermé	fermé	7,00	7,00	7,20	7,18	7,18						
15-oct	6,90	7,00	fermé	fermé	fermé	fermé	fermé	fermé	fermé	7,22	fermé						
16-oct										27 oct = 8.10						7,9	
17-oct										23 nov = 8.18							
18-oct										24 nov = 8.20						7,8	
19-oct										25 nov = 8.16							
20-oct										30 nov = 8.46						7,8	
21-oct										1 déc = 8.36							
22-oct										2 déc = 8.28							
23-oct										14 déc = 8.00						7,81	
24-oct																	
25-oct																	
26-oct																	
27-oct																7,7	
28-oct																	
29-oct																	
30-oct																7,6	
31-oct																	
	9,30	8,18	8,20	7,32	9,25	8,30	8,83	8,18	8,90	8,15	8,74	8,50	8,21	7,95	7,81	10,86	8,10

CCHM-895 Rehabilitation of Federal Wharf, Chambly, Quebec-
Chambly Canal National Historic Site

Project R.077244.001

Appendix C – Archaeological Report



Compte rendu
LHNC du Canal-de-Chambly – Quai Fédéral
510G Sous-opérations 13A à 13D
Activité : 2017-030

Titre : ***Compte rendu de la surveillance archéologique effectuée les 20 et 21 septembre 2017 au Quai Fédéral du Canal de Chambly.***
Par André Miller

Nature de l'intervention : Surveillance archéologique de tranchées exploratoires effectuée dans le cadre du projet de réhabilitation partielle du Quai Fédéral au LHN du Canal-de-Chambly. Ce projet de réhabilitation du Quai Fédéral fait partie du programme d'investissement d'infrastructure fédérale (IIF) portant le numéro de projet 895.

Les sous-opérations 13A et 13B ont été enregistrés le 20 septembre suite à l'excavation mécanique de deux tranchées exploratoires mesurant 3 mètres par 3 mètres lors de cette phase préliminaire pour les travaux de réhabilitation dans la portion nord du Quai Fédéral. Les lots enregistrés dans ces sous-opérations, 13A1-2-3-4 et 13 B1-2-3-4, correspond aux niveaux de sol observés et les vestiges d'un bollard et sa base de béton en place, lors des excavations mécaniques dans cette partie du Quai Fédéral.

Les sous-opérations 13C et 13 D ont été enregistrés le 21 septembre et correspondent à deux excavations effectuées mécaniquement par l'entrepreneur pour vérifier les niveaux de sols et les vestiges potentiels dans le Quai Fédéral, dans la partie sud du quai. Ces sous-opérations comportent de 2 à 4 lots arbitraires, qui correspondent respectivement aux niveaux de sols, vestiges en place du bollard et à une dalle de béton mis au jour dans la sous-opération 13D, dalle associée probablement à une réhabilitation récente du quai fédéral.

Résultats de l'intervention :
Les zones de la surveillance archéologique situées sur le Quai Fédéral présentent sensiblement les mêmes horizons, soit l'horizon B composé de gravier ¾ et de poussière de pierre sur un horizon C composé de remblais et de matériaux divers : pierres, béton, briques et mélange de sols provenant de précédentes réhabilitations du quai. Par-dessus l'horizon B, se trouvent par endroits des remblais récents, soit du concassé mélangé avec du sable. Le quai est recouvert d'asphalte en grande partie.

Par ailleurs, l'excavation de la sous-opération 13D, celle plus au sud du quai comporte une stratigraphie qui se distingue aisément des autres excavations, par sa dalle de béton mis au jour sous 15 cm de gravier et d'asphalte. Aucun artéfact n'a été mis au jour dans ce niveau de sol, outre un bollard avec sa base à même la dalle de béton qui a été enregistré. Ce niveau pourrait correspondre à une portion intacte du quai reconstruite précédemment.

Les interventions archéologiques de 2017 précédant les travaux de réhabilitation du quai Fédéral au lieu historique national du Canal-de-Chambly.

Le quai Fédéral lors de travaux en 1931 (Archives de Parcs Canada, Québec, Canaux du Québec no. n.d, 1931)

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Direction générale des affaires autochtones et du patrimoine culturel, Parcs Canada
Décembre 2017

RÉSUMÉ

En 2017, l'Unité des voies navigables au Québec, dans le cadre du Programme d'investissement pour les infrastructures fédérales de Parcs Canada, proposait la réalisation d'un projet pour la réhabilitation partielle du quai Fédéral du Canal-de-Chambly. Comme ces travaux étaient susceptibles de mettre au jour, de perturber ou de détruire des vestiges archéologiques, Parcs Canada a confié un mandat de surveillance archéologique à André Miller, archéologue de Parcs Canada. Cette intervention a permis d'enregistrer divers éléments concernant l'évolution générale

du quai Fédéral près des écluses 1, 2 et 3 du canal de Chambly, et des différents aménagements associés principalement au transport maritime.

1. Bref historique de Chambly et évolution du secteur du quai

La découverte de ressources archéologiques sur les rives du bassin de Chambly et sur le site du fort de Chambly confirme la présence d'occupations paléohistoriques dans ce secteur. Les berges du bassin de Chambly ont été occupées à plus d'une reprise depuis plus de 5000 ans (Miller 2016a, 5 ; Cloutier 2000a, 1). La construction d'un premier fort à Chambly, en 1665, marque les débuts de l'occupation française du territoire actuel de Chambly. *Dès sa construction, ce fort est relié à Montréal par un chemin dont le parcours longe le côté sud du bassin de Chambly. La construction d'un nouveau fort en pierre à Chambly, en 1711, pour faire face à la menace d'une invasion anglo-américaine, entraîne l'édification d'une zone libre de toutes constructions autour du fort, que l'on nomme la banlieue. La limite ouest de cette banlieue correspond grossièrement, le long du bassin de Chambly, à la limite ouest des propriétés du canal de Chambly. Malgré la présence de cette réserve, des constructions civiles furent tout de même érigées directement à l'ouest de la petite ravine qui se trouvait à l'intérieur de la limite ouest de la banlieue. D'ailleurs, lors de l'installation du vaste complexe militaire de Chambly pendant la Guerre de 1812-1814, certaines de ces constructions furent utilisées par les militaires* (Cloutier 2000a, 2).

2. Aperçu historique du Canal-de-Chambly

L'objectif de commémoration du Canal-de-Chambly s'énonce comme suit : *« Le canal de Chambly s'inscrit dans le réseau national des canaux du Canada. Situé sur la rivière Richelieu, il commémore, de pair avec le canal de Saint-Ours, le rôle joué par cette voie navigable aux XIXe et XXe siècles, à l'intérieur d'un réseau de canaux reliant Montréal à New York, via la rivière Richelieu, le lac Champlain et la rivière Hudson. »* (Parcs Canada

2004). L'importance stratégique de la rivière Richelieu comme voie de pénétration de l'est du continent s'est imposée dès le début de la colonie française au XVII[e] siècle. C'est pour contrôler le territoire, et cette rivière, que les Français construisent une série de forts le long du Richelieu : les premiers forts Chambly, Ste-Thérèse et Saint-Jean sont des témoins importants de cette époque. Par ailleurs, afin de contourner les rapides entre Saint-Jean et Chambly, rapides qui imposent de difficiles portages, les marchands de la seconde moitié du XXVIII[e] siècle rêvent d'un canal permettant d'éviter ces obstacles. Mais il faut attendre le XIX[e] siècle pour que la construction d'une voie navigable reliant le lac Champlain au bassin de Chambly soit autorisée. Bien que le gouvernement du Bas-Canada autorise la construction de cette voie d'eau dès 1818, ce n'est qu'en 1829, que le projet de construction du canal est confié à des commissaires, tous des gens d'affaires de la région du Richelieu. Des difficultés surgissent et ce n'est que le 5 septembre 1831 que les commissaires du canal accordent le contrat de construction à un groupe d'hommes d'affaires formé d'Américains et de Canadiens. La première phase de construction du canal de Chambly se situe entre 1831 et 1835. Les premiers travaux d'excavation et d'arpentage débutent le 1[er] octobre 1831. L'ingénieur en charge de ces travaux se nomme William R. Hopkins.[i] Vers la fin de l'année 1832, les tranchées des écluses et celle du canal sont presque complétées, malgré les épidémies de choléra qui font alors rage dans toute la province. Dès 1833, des bateaux peuvent naviguer entre Saint-Jean et la première écluse de Chambly. La pierre destinée aux travaux de maçonnerie provient de l'île La Motte dans le lac Champlain (GRHQ 1997, 4). Mais en 1834, en raison de problèmes financiers, les travaux sont interrompus. En 1841, les travaux reprennent pour se terminer en 1843 par l'ouverture officielle du canal de Chambly.[ii] Terminées en 1842, les trois écluses combinées de cette partie du canal

permettent l'ouverture à la navigation en novembre 1843 sur toute sa longueur. Un certain nombre de constructions associées au fonctionnement des écluses et du canal furent érigées de part et d'autre des écluses dès 1842. La plupart d'entre elles furent reconstruites ou remplacées depuis. Certaines ont survécu jusqu'à aujourd'hui dont le poste d'éclusier. Le canal jouera un rôle commercial sans cesse croissant jusqu'au début du XX^{e} siècle, époque où le commerce canado-américain sur le Richelieu connaît son apogée. La Première Guerre mondiale et la crise économique de 1929 marque les premiers signes du déclin de la navigation commerciale sur le canal de Chambly. La navigation commerciale cesse presque complètement à l'aube des années soixante-dix et est graduellement remplacée par la navigation de plaisance. Les barges et les bateaux de l'époque font place aux bateaux de plaisance, voiliers et pontons. Historiquement, le canal a contribué à l'essor économique de la ville de Chambly et, particulièrement, de la ville de Saint-Jean-sur-Richelieu, qui constituait la plaque tournante des transports maritimes, routiers et ferroviaires au XIX^{e} siècle. Le canal de Chambly est long de 19,5 kilomètres et est ponctué de neuf écluses mesurant 37 m de long et 7 m de large; la profondeur de l'eau sur les seuils de ces écluses est d'environ 2 m. Ce sont là des dimensions qui convenaient aux embarcations au moment de la construction de la voie navigable. Cependant, en 1840, les barges à voiles ou petites goélettes du début du siècle avaient fait place à des bateaux toujours plus gros et ce, depuis quelques décennies déjà. Des travaux de réfection et de consolidation eurent lieu de 1850 à 1858[iii]. Outre les travaux de dragage, le canal a été élargi à plusieurs endroits, puis de nombreuses pentes ont été remplacées par des murs de soutènement verticaux en béton, des murs en pierres de taille ou des murs de gabions. L'apparence originale du canal de Chambly et son chemin de halage ont été transformés tout au long de son parcours entre

St-Jean-sur-Richelieu et le bassin de Chambly. *« Bien que le canal ait conservé son tracé originel jusqu'à nos jours, son prisme et sa largeur ont été modifiés sur une partie de son parcours au cours des années 1880-1900, ainsi que dans les années 1960. L'ampleur de ces modifications demeure toutefois imprécise. »* (Piédalue, LeBrun 2001, 4). En plus des aménagements directement associés à la construction du canal, à son fonctionnement et à son entretien, les terrains avoisinant le canal furent occupés par diverses installations portuaires, industrielles, particulièrement dans les villes de Saint-Jean-sur-Richelieu et Chambly.

2.1 Le site du quai Fédéral

Le quai Fédéral est situé en aval de l'écluse no. 1 du canal de Chambly (Fig. 1). Baignant dans le bassin de Chambly, cette jetée fait partie intégrante des infrastructures du canal de Chambly. La mise en place du quai fût entreprise probablement dès le début de la deuxième phase de construction du canal de Chambly en 1841. À cette époque, seulement une partie du quai actuel avait été mise en place. Le prolongement du quai fut effectué en 1875 et 1879. (Fig. 2).

Figure 1 – Le secteur du Canal-de-Chambly – quai fédéral - Écluse 1-2-3 – Maison du surintendant - Pont 1 - Parc Migneault – Parc des Ateliers. Les terrains de Parcs Canada sont délimités en rouge.

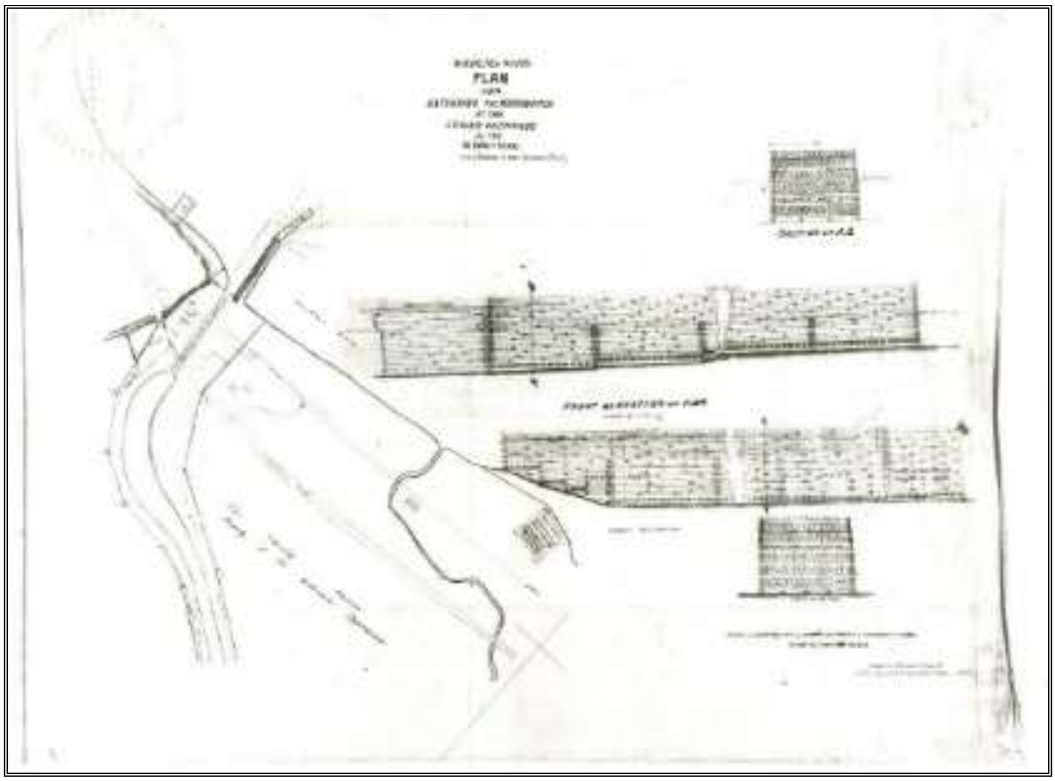

Figure 2 – Richelieu River, Plan for extending the mooring pier at the lower entrance of the Chambly canal (Archives de Parcs Canada, Québec, Canaux du Québec no. 156/00/iC-555 av.1925)

L'objectif principal de la réhabilitation du quai Fédéral du canal de Chambly vise à assurer la sécurité des usagers et le maintien des activités de plaisance qui lui sont associées. Les travaux de réhabilitation prévus comprennent notamment la mise en place d'un nouveau tablier ainsi que la construction d'un mur-rideau en palplanches d'acier et mur de couronnement. Aussi, ces interventions faciliteront l'installation de quais d'attente et d'aménagements avant le début de la saison de navigation. Ce quai est interdit d'accès et d'utilisation depuis de nombreuses années en raison de son état de dégradation. De nouvelles informations pour la réhabilitation étaient requises et permettaient d'effectuer une analyse d'impact archéologique pour préparer les plans et devis. En 2017, l'intervention archéologique était donc d'effectuer des puits d'exploration sur la structure du quai Fédéral pour permettre de documenter ses composantes, de déterminer les enjeux archéologiques lors des travaux de réhabilitation et les mesures d'atténuation que nous pourrions proposer. Les ressources existantes ou potentielles dans ce secteur se situent également de part et d'autre des chemins d'accès, dont le potentiel archéologique a été souligné à plus d'une reprise par les archéologues de Parcs Canada.

3. Méthodes d'intervention sur le terrain

Les conditions météorologiques pour cette intervention archéologique étaient idéales. L'archéologue de Parcs Canada était accompagné par Matthieu Paradis, conseiller en gestion des ressources culturelles du bureau national/ UVNQ et de l'opérateur de la rétro-caveuse pour les excavations. L'intervention archéologique au quai Fédéral consistait principalement à surveiller les travaux d'excavation mécanique planifiés lors de l'extraction des niveaux de sols. Quatre (4) excavations mécaniques ont été effectuées, à des emplacements définies par l'archéologue de terrain, sur le quai afin de permettre une

représentation des couches de sols et de potentiellement découvrir les vestiges des caissons de bois et les palplanches qui en formaient l'ossature lors des phases de sa construction. Afin d'effectuer l'enregistrement des données pour Parcs Canada, une adaptation du système Tikal a été utilisé. Ce système alphanumérique de Parcs Canada consiste à identifier par un chiffre une aire de recherche à l'intérieur de laquelle chaque sous-opération est identifiée par une lettre. Les différents lots, couches ou structures, observés à l'intérieur d'une sous-opération, sont identifiés par un autre chiffre. Dans le but de faire concorder les données au corpus de données de Parcs Canada, au quai Fédéral, la sous-opération 510G13A a été utilisée pour l'identification de la première excavation tandis que la sous-opération 510G13D (Fig.3) a servi pour la dernière excavation. Le numéro de site archéologique 510G a été utilisé selon les données de Parcs Canada. Les relevés nécessaires (mesures, localisation, photos, descriptions) ont été effectués pour faire les interprétations qui s'imposent. De plus, le dégagement manuel des vestiges entourant les bollards ayant été découvert, des relevés planimétriques et photographiques de l'ensemble des éléments archéologiques complètent, avec les descriptions des artéfacts mis au jour, l'intervention sur le terrain. La création d'un plan des interventions archéologiques (Figure 3) et l'analyse des données historiques et archéologiques forment un ensemble de données qui enrichissent notre connaissance de l'utilisation des lieux.

Figure 3 – Localisation des excavations/sous-opérations sur le quai Fédéral. À noter la localisation du tirant de mur dans l'excavation/sous-opération 510G13C (André Miller, ArcGIS, Parcs Canada, Gatineau).

4. Le potentiel archéologique du secteur des écluses 1, 2 et 3 (Chambly)

Le secteur des écluses 1, 2 et 3 comprend, entre autre, les éléments suivants : le quai Fédéral, trois écluses, une logette d'éclusiers, la maison du Surintendant et le pont no. 1. La plupart de ces ouvrages font partie des éléments d'importance qui caractérisent cette portion du canal de Chambly. D'autre part, le parc des Ateliers, situé à proximité de la zone des travaux, possèdent également un fort potentiel archéologique (Fig. 1). Le parc des Ateliers et le secteur des écluses étaient occupés, jadis, par des ateliers et bâtiments pour la maintenance et le fonctionnement du canal. Ces ateliers et bâtiments connexes construits au XIXe siècle comprenaient, entre autre : un atelier pour charpentiers, une forge, un entrepôt pour les portes d'écluses, des étables, un bâtiment pour le bois d'œuvre et une remise pour les outils. Plus d'un de ces bâtiments furent la proie des flammes, d'autres démolis ou déplacés. Les écluses 1, 2 et 3 du canal de Chambly datent déjà d'un siècle et demi et renferment, derrière leurs murs, des vestiges présumés d'une dizaine de ressources archéologiques dont certaines remontent à plus de 175 ans. Un grand nombre de ces ressources archéologiques est directement lié à la présence du canal de Chambly comme axe de transport maritime, alors que d'autres ressources sont plutôt associées aux bâtiments et voies de transport de Chambly avant la mise en place du canal. Les ressources culturelles recensées témoignent d'un secteur militaire, portuaire et commercial situés jadis dans la partie sud du bassin de Chambly. Plusieurs plans et photos historiques présentent l'évolution du secteur du quai Fédéral depuis la fin du XIX^{e} siècle. Une analyse approfondie des plans d'archives et photos anciennes permet de saisir la richesse des vestiges archéologiques potentiels du secteur.

5. Interventions archéologiques antérieures

Les interventions archéologiques datant des années soixante et soixante-dix dans de nombreux secteurs du canal ont permis la découverte de vestiges, dont un site archéologique datant de la période paléohistorique (Clermont 1974), de la construction du canal et des travaux subséquents. Les interventions archéologiques effectuées au Canal-de-Chambly au cours des dernières décennies sont localisées plus spécifiquement dans le secteur de la voie navigable à St-Jean-sur Richelieu (Archéotec 2017; Cloutier 2000b; Bernier 2008) et sur le site du fort Chambly (Perry 2016; Cloutier 2016; Bernier 2015a; Bernier 2015b; Piédalue 1997). En 2016 et 2017, plus d'une évaluation du potentiel et avis archéologiques ont été soumis à l'UVNQ pour ce secteur. Voici des exemples d'évaluations : pour le réaménagement du parc Migneault (Miller 2016a), l'aménagement d'un lien piétonnier entre l'écluse no.4 et le parc Migneault (Miller 2016b), la réhabilitation des gabions et les berges du canal (Miller 2016c), puis une évaluation archéologique pour la réhabilitation partielle du quai Fédéral (Miller 2017). En bref, ces évaluations ont permis de documenter les ressources archéologiques de ce secteur et de proposer des interventions archéologiques sous la forme de surveillance archéologique lors de travaux d'excavation.

6. Résultats de l'intervention archéologique de 2017 au quai Fédéral (510G)

Les sous-opérations 510G13A et 510G13B ont été enregistrées le 20 septembre 2017 lors de l'excavation mécanique de tranchées exploratoires mesurant 3 m x 3 m, dans la portion nord du quai Fédéral. Les lots enregistrés dans la première sous-opération (Tableau 1) correspondent aux niveaux de sol observés et les vestiges d'un bollard et sa base (510G13A101), puis des vestiges/artefacts découverts. Les sous-opérations 510G13C et 510G13D ont été enregistrées le 21 septembre 2017 et correspondent à deux excavations

effectuées pour documenter les niveaux de sols et les vestiges potentiels dans la partie sud-est du quai. La sous-opération 510G13C mesure 3 X 3 m en surface, tandis que la sous-op. 510G13D a une dimension de 2 X 4 m en surface. Ces sous-opérations comportent également de 2 à 4 lots arbitraires, dont le vestige en place d'un bollard (510G13D101) et d'une dalle de béton (510G13D102).

Tableau 1. Tableau descriptif de la sous-opération 510G13A

Lot	Sous la surface (m)	Épaisseur (m)	Description	Interprétation	Datation
13A1	0.00	0.10	Asphalte	Surface	XX^{e}
13A2	0.10	0.30	Gravier 3/4 et poussière de pierres	Remblais de nivellement	XX^{e}
13A3	0.30	1.00	Remblais et débris du quai	Débris de la surface du quai	XX^{e}
13A4	1.00	-	Remblai de grosses pierres en calcaire et grès, sable	Comblement des caissons en bois?	XX^{e}

Les niveaux de sols présentent sensiblement les mêmes horizons, soit l'horizon A constitué d'asphalte, l'horizon B composé de gravier ¾ et de poussière de pierre sur un horizon C composé de remblais et de matériaux divers : pierres, béton, fragments de briques et mélange de sols provenant de précédentes réhabilitations du quai. En ce qui a trait à l'horizon D, les remblais sont composés de fragments de grosses pierres calcaires et de grès mélangé avec du concassé et du sable brun gris meuble. Par ailleurs, l'excavation de la sous-opération 510G13D, celle la plus au sud-est de la jetée comporte une stratigraphie qui se distingue des autres par sa dalle de béton mise au jour sous 15 cm d'asphalte et de gravier. Aucun artéfact n'a été mis au jour dans ce niveau de sol. Cependant, le bollard (511G13D101) se trouvant à même la dalle de béton a été enregistré. Ce niveau avec la dalle de béton pourrait bien correspondre à une portion du quai réhabilitée récemment.

7. Les découvertes archéologiques de 2017 du quai Fédéral

Le quai Fédéral fût érigé pour le mouillage des barges et bateaux en attente d'emprunter le canal, au XIXe siècle. Cette jetée qui relie la terre ferme et l'accès aux écluses du côté Est n'existait pas en 1835. Un plan du projet du canal de 1835 illustre deux caissons d'amarrage à l'endroit du quai Fédéral. Un autre plan, daté cette fois de 1851 présente clairement la présence de cette jetée dans sa première configuration (Fig. 4). Davantage, un plan de 1881 ainsi qu'une série de photos prises entre 1894 et 1936 démontrent l'évolution de la structure. En 1894, le quai servait d'amarrage aux bateaux à vapeur (Fig.5).

Figure 4 – Plan of property situate at Chambly, District of Montreal commonly called Fort Pont Chartrain (Archives de Parcs Canada, Québec, Canaux du Québec no. 118/02/ic-34 1851)

Figure 5 – Bateau à vapeur – Chambly – amarré au quai Fédéral en 1894. (Archives de Parcs Canada, Québec, Canaux du Québec no. n.d, 1894)

En ce qui a trait aux artefacts et vestiges découverts dans les quatre puits excavés, ils se résument essentiellement : des coins en pierres, des tiges de fer, un ancrage (Fig.6), et clous rouillés récents, un tirant de mur dans la sous-opération 510G13C, fragment de bouteilles de verre récent et une bouteille de Coca-Cola. En termes de vestiges : trois bollards et leurs bases (Fig.7, 8, 9) ainsi que des dalles de bétons relativement récentes ont été mis au jour. Les dalles observées dans les sous-opérations sont semblables en épaisseur mais d'une technique de fabrication distincte. Certains fragments de dalle étaient couverts de peinture,

d'un enduit de couleur rouge (Fig.9) et différait de la dalle de béton encore en place (Fig.10) dans la partie la plus au sud-est, près des écluses.

Figure 6 –Coins en pierre, pieux, ancrage (lot 510G13A3), petite base carrée en béton (lot 510G13B3) découverts dans les excavations du quai Fédéral (Photo Matthieu Paradis, Parcs Canada).

Figure 7 – Bollard et sa base de béton à deux niveaux (510G13A101) localisés à l'extrémité nord-est du quai Fédéral (Photo Matthieu Paradis, Parcs Canada).

Figure 8 – Dimensions de l'excavation, bollard, base de béton massif; et tirant fixé au mur est (510G13C102) localisée dans la partie sud-est du quai Fédéral (Photo Matthieu Paradis, Parcs Canada).

Figure 9 – Dimensions de l'excavation et fragments de dalle de béton, peints en rouge, extraits du niveau de sol (lot 510G13B3). Localisée à la jonction de la jetée (Photo Matthieu Paradis, Parcs Canada).

Figure 10 – Dimension de l'excavation de surface, dalle de béton avec le bollard (510G13D101) localisée dans la partie sud-est du quai Fédéral (Photo Matthieu Paradis, Parcs Canada).

CONCLUSION ET RECOMMANDATIONS

Les interventions archéologiques réalisées en 2017, au quai Fédéral du lieu historique national du Canal-de-Chambly, ont permis de recueillir un certain nombre de données archéologiques qui améliorent notre connaissance sur l'utilisation des lieux. Quoique sommaire, la découverte d'éléments appartenant à divers aménagements liés à la structure du quai Fédéral, sont autant de vestiges qui illustrent les transformations physiques de cette jetée du secteur des écluses de Chambly. La collection d'artefacts du site, témoigne de l'entretien, des transformations et des opérations du quai au XX^{e} siècle. Ces découvertes illustrent la richesse du potentiel archéologique des aménagements historiques liés au canal et permettent d'entrevoir des avenues d'interprétation qu'offrent les berges du canal de Chambly. Plus d'une recommandation a été faite précédemment par des firmes de consultants et archéologues de Parcs Canada dans le secteur des écluses de Chambly. Suite aux interventions archéologiques de 2017, nous proposons d'effectuer une surveillance archéologique lors des travaux de réhabilitation subséquents et de réaliser une étude du potentiel archéologique, si possible, de l'évolution du secteur sur les propriétés fédérales et d'entreprendre une recherche documentaire sur les installations aux abords du quai Fédéral, du lieu Historique National du Canal-de-Chambly.

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[i] La plupart des données historiques sont tirées des rapports inédits de Robert W. Passfield. 1988 Assessment of Canal Structures: Chambly Canal. Historical Research Branch, National Historic Parks and Sites Directorate, Environment Canada, Canadian Parks Service et celui de Sandra J. Gillis. 1975, *The Chambly Canal: A structural history of the locks*, Parcs Canada, Direction des Parcs et des Lieux Historiques, Ministère des Affaires Indiennes et du Nord, p: 3 à 91.

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Canal Chambly
Quai fédéral

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Quai fédéral

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Canal Chambly
Quai fédéral

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Project R.077244.001

Appendix C – Desired Finish for Concrete Slabs with Exposed Aggregates