

**Solicitation No. 5P201-19-0091
Reesor Forks Trail
Rouge National Urban Park
Parks Canada**

SPECIFICATION DOCUMENTS

SPECIFICATION TABLE OF CONTENTS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

SECTION	TITLE
00 82 00	Special Conditions
<u>DIVISION 1</u>	GENERAL REQUIREMENTS
01 11 00	Summary of Work
01 14 00	Work Restrictions
01 29 00	Payment Procedures
01 31 19	Project Meetings
01 33 00	Submittal Procedures
01 35 29_06	Health and Safety
01 45 00	Quality Control
01 52 00	Construction Facilities
01 56 00	Temporary Barriers and Enclosures
01 73 00	Execution
01 74 11	Cleaning
01 74 21	Construction-Demolition Waste Management
01 77 00	Closeout Procedures
01 78 00	Closeout Submittals
<u>DIVISION 6</u>	
06 10 00	Carpentry
06 61 10	Pultruded Fiberglass Structural Shapes
<u>DIVISION 31</u>	
31 00 99	Earthworks for Minor Works
31 05 16	Aggregate Materials
<u>DIVISION 32</u>	
32 11 23	Aggregate Base Courses
32 31 26	Wire Fences
32 37 00	Exterior Site Furnishings
32 92 19 13	Mechanical Seeding
<u>APPENDIX A</u>	
	Clean Equipment Protocol for Industry
<u>APPENDIX B</u>	
	Hazard Tree Assessment Report

END OF TABLE OF CONTENTS

SEALS PAGE

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 00 01 07
Page 1 of 1

1. OWNER:

Parks Canada
10725 Reesor Road,
Markham, ON., L6B 1A8

2. PROJECT:

Reesor Forks Trail
Rouge Urban National Park
Markham, Ontario, L6B 1A8

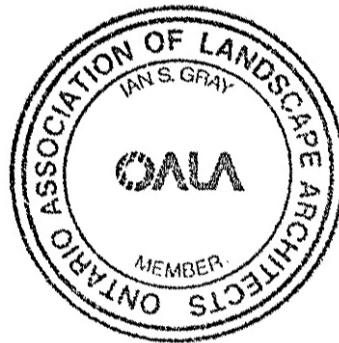
3. PROFESSIONAL SEALS AND SIGNATURES

1. Professional seals and signatures are provided as required by the Ontario Building Code (latest edition), Ontario Regulation 403/97 (**350/06**), Subsection 2.3.1 **Division C, Part 1, Subsection 1.2.2**) and all amendments thereto, for the Project stated above and apply only to those documents and specifications prepared by the respective Landscape Architect. The Professional seals and signatures stated above are as follows:

LANDSCAPE ARCHITECT OF RECORD

WSP CANADA GROUP LIMITED

Address: 100 Commerce Valley Drive W
Thornhill, ON., L3T 0A1



Ian Gray

Landscape Architect of Record

August 2019

Date

----- END OF SECTION -----

SPECIAL CONDITIONS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 00 82 00
Page 1 of 3

ARTICLE SC1 Acceptance of Site

The Contractor shall accept the site as it exists at the time of the tender call.

The successful Bidder must make careful examination of existing site surface conditions and topography and advise the PCA Representative of unsatisfactory site surface conditions and topography prior to commencement of construction. Commencement of construction will mean that the successful Bidder has accepted the existing site surface conditions and topography and no allowance will be made later for any expenses incurred through failure to note unsatisfactory existing site surface conditions and topography.

ARTICLE SC2 Limit of the Working Area

On the PCA Representative's land, the Contractor shall limit his operations to the trail corridor and limits of work indicated on drawings for proposed trails, limit of the material staging areas, boardwalk and observation platforms and associated silt and tree protection as indicated on the drawings, unless otherwise approved by the PCA Representative.

The Contractor must obtain all necessary permits for the Work.

The Contractor must notify the PCA Representative three (3) days prior to the start of construction activity.

ARTICLE SC3 Existing Utilities and Services

The Contractor shall be responsible for locating and adequately protecting all existing utilities and services and for permanently supporting utilities which cross over the services to be constructed under this Contract.

The utility companies require that their own forces are employed to repair any damages to these utilities. The Contractor shall reimburse the utility companies for any cost associated with these repairs.

ARTICLE SC4 Work Schedule

Within 7 days of Contract Award or receipt of a "letter of intent", the Contractor shall provide the PCA Representative with a detailed work schedule. It shall contain sufficient detail for the PCA Representative to monitor progress of the work. The schedule must also include the total number of working days required to complete the project.

The PCA Representative reserves the right to adjust the schedule to delay the start dates until all approvals are obtained. Any delay in the commencement of the project caused by the PCA Representative, will result in the contract schedule being extended by an equivalent period of time.

Delays in the completion of work due to additional work requested or inclement weather will result in the contract schedule being extended by a period of time agreed upon by all parties through signed change orders. The Contractor is responsible to report delays, provide time estimates, and request change orders through the PCA Representative.

SPECIAL CONDITIONS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 00 82 00
Page 2 of 3

The Contractor shall commence work and carry it on at whatever location or locations the PCA Representative may direct. No work shall be undertaken without the PCA Representative's approval and no work shall be suspended without his written permission except as described in the Contract Documents.

ARTICLE SC5 Warranty Periods

Notwithstanding the General Conditions, the following warranty periods apply to this contract:

Overall, the Warranty period for Works is one year, and is scheduled to commence on the date of Substantial Performance of the Work as accepted by the PCA Representative. Partial Substantial Performance Certificates will be issued upon request from of the contractor in writing and agreement of the PCA Representative for the following reasons:

- The Contractor completes a scheduled phase of construction;
- The PCA Representative requests the Contractor to stop work for a period of greater than two weeks.

Partially substantial completion for release of hold back shall not in anyway imply acceptance of any part of the work and the warranty period shall begin as noted above.

The Contractor guarantees and warrants that the Works shall, for the warranty period, remain in such a condition as will meet with the approval of the PCA Representative and make good in a manner satisfactory to the PCA Representative any imperfections therein due to materials used in the construction thereof or due to faulty workmanship.

The decision of the PCA Representative as to the nature, extent and cause of such imperfections and the necessity for remedying the same shall be final. Should the Contractor fail to comply with the direction of the PCA Representative may, after giving the Contractor seven (7) days' written notice, perform the necessary work, provided that in the event of an emergency, of which the PCA Representative shall be the sole judge, the PCA Representative may forthwith, without notice, perform the necessary work and the cost of such work in either event may be deducted or collected from the Contractor by the PCA Representative.

If the PCA Representative has notified the Contractor in writing of imperfections prior to the termination of the warranty period, the Contractor shall make good the imperfections as specified above notwithstanding that the work of making good may commence after or extend beyond the end of the warranty period. In such case, the warranty period shall expire on the date of final acceptance of the Work by the PCA Representative, on which date all known deficiencies and imperfections shall have been corrected. Inspection must be arranged by the Contractor with 72 hours written notification to all parties.

The warranty will not expire if the Contractor fails to notify the PCA Representative for a Final Acceptance meeting within the specified time limit.

ARTICLE SC6 Independent Testing

The Contractor will retain independent specialized testing companies to provide material quality control services. Contractor to provide a Testing Plan prior to the commencement of work. The Testing must outline the Contractor's approach, timing and frequency of testing in conformance with the OPSS 501, OPSS 1010 and in accordance with applicable specifications.

SPECIAL CONDITIONS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 00 82 00
Page 3 of 3

a) Gradation Tests

Provide gradation tests for granular or stone aggregates, backfill material and granular or stone base material as required to verify conformance with the applicable specifications.

ARTICLE SC7 - Substantial Performance

Upon written application by the Contractor, the PCA Representative will determine Substantial Performance in accordance with the Construction Lien Act.

When the Contractor considers that the Work is substantially performed, or if permitted by the lien legislation applicable to the Place of the Work a designated portion thereof which the PCA Representative agrees to accept separately is substantially performed, the Contractor shall prepare and submit to the PCA Representative comprehensive list of items to be completed or corrected and apply for a review by the PCA Representative to establish Substantial Performance of the Work or substantial performance of the designated portion of the Work. Failure to include an item on the list does not alter the responsibility of the Contractor Bidder to complete the Contract.

No later than ten (10) days after receipt of the Contractor list and application, the PCA Representative will review the Work to verify the validity of the application, and no later than seven (7) days after completing the review, will notify the successful Bidder whether the work or the designated portion of the work is substantially performed.

ARTICLE SC8 – Regular Meetings

The Contractor shall be required to attend regular meetings on site to review the progress of the Work with the PCA Representative.

ARTICLE SC9 – Licenses, Permits, Locates and Approvals

The Contractor shall comply with all applicable statutes, laws, by-laws, regulations, ordinances, notices and orders whether Federal, Provincial, Municipal or otherwise, at any time in effect during the execution of this contract, and all rules and requirements of the Police and Fire departments, or other governmental authorities, and procure all C.S.A. approvals, as required. The successful bidder shall obtain and pay for all necessary permits and licenses, and shall not do or suffer to be done anything in violation of any such laws, ordinances, rules or requirements. If the attention of the Contractor is called to any such violation on the part of the Contractor or of any person employed or engaged by the Contractor, the Contractor shall immediately desist from and correct such violation.

ARTICLE SC10 – Geotechnical Investigation

No soils investigation was carried out for this section of trail. The Contractor remains fully responsible for assessment of soil and site conditions and shall take any additional steps necessary to assure themselves of any such circumstances.

ARTICLE SC11 – Clean Equipment Protocol – Appendix A

All work shall conform to Ontario Invasive Plants – Clean Equipment Protocol for Industry 2016 - See Appendix A

----- END OF SECTION -----

SUMMARY OF WORK

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 11 00
Page 1 of 3

PART 1 - GENERAL

1. RELATED REQUIREMENTS
 1. Section 01 56 00 - Temporary Barriers and Enclosures.

2. WORK COVERED BY CONTRACT DOCUMENTS
 1. Work of this Contract comprises general construction of limestone aggregate trails, seeding, tree removal and pruning, fencing, boardwalks and observation platforms on lands owned by Parks Canada in the northern part of Rouge National Urban Park, (Markham, ON. for work in this Contract)
 2. The items as noted above may vary based upon portion of contract awarded to contractor.

3. CONTRACT METHOD
 1. Construct Work under single, stipulated price contract.

4. CONTRACTOR USE OF PREMISES
 1. Use of project site area until Substantial Performance is restricted to the limits of work, trail corridor footprint (4.2 to 6m width) area of proposed observation platforms and boardwalks and designated staging areas.

5. PCA REPRESENTATIVE FURNISHED ITEMS
 1. PCA Representative Responsibilities:
 - a. Review shop drawings, product data, samples, and other submittals.
 2. Contractor Responsibilities:
 - a. Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to the PCA Representative.
 - b. Deliver supplier's bill of materials to the PCA Representative.
 - c. Arrange and pay for delivery to site in accordance with Progress Schedule.
 - d. Designate submittals and delivery date for each product in progress schedule.
 - e. Review shop drawings, product data, samples, and other submittals. Submit to PCA Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
 - f. Receive and unload products at site.
 - g. Inspect deliveries; record shortages, and damaged or defective items.
 - h. Handle products at site, including uncrating and storage.

SUMMARY OF WORK

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 11 00
Page 2 of 3

- i. Protect products from damage.
- j. Assemble, install, connect, adjust, and finish products.
- k. Provide installation inspections required by public authorities.
- l. Repair or replace items damaged by Contractor or subcontractor on site (under Contractor's control).
- m. Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties to the PCA Representative.

6. EXISTING SERVICES

1. Notify PCA Representative and utility companies of intended interruption of services and obtain required permission.
2. Provide alternative routes for pedestrian and vehicular traffic where necessary.
3. Provide signage and /or flag person in order to ensure safety of existing trail users, road users and site.
4. Establish location and extent of service lines in area of work before starting Work. Notify PCA Representative of findings.
5. Submit schedule to and obtain approval from PCA 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.
6. Where unknown services are encountered, immediately advise PCA Representative and confirm findings in writing.
7. Protect, relocate or maintain existing active services.
8. Record locations of maintained, re-routed and abandoned service lines.
9. Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

SUMMARY OF WORK

7. DOCUMENTS
REQUIRED

1. Maintain at job site, one copy of each document as follows:
 - a. Contract Drawings.
 - b. Specifications.
 - c. Addenda.
 - d. Reviewed Shop Drawings.
 - e. List of Outstanding Shop Drawings.
 - f. Change Orders.
 - g. Other Modifications to Contract.
 - h. Field Test Reports.
 - i. Copy of Approved Work Schedule.
 - j. Health and Safety Plan and Other Safety Related Documents.
 - k. Other documents as specified.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

----- END OF SECTION -----

WORK RESTRICTIONS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 14 00
Page 1 of 1

PART 1 - GENERAL

- | | |
|-------------------------------|--|
| 1. RELATED REQUIREMENTS | 1. Section 01 56 00 - Temporary Barriers and Enclosures. |
| 2. ACCESS AND EGRESS | 1. Design, construct and maintain temporary "access to" and "egress from" work areas in accordance with relevant municipal, provincial and other regulations. |
| 3. USE OF SITE AND FACILITIES | 1. Execute work with least possible interference or disturbance to normal use of the adjacent roadways. Make arrangements with PCA Representative to facilitate work as stated.

2. Accept liability for damage, safety of equipment and overloading of existing equipment.

3. Use of project site area until Substantial Performance is restricted to the trail corridor footprint (4.2 to 6m width) area of proposed parking lot and designated staging areas. |
| 4. EXISTING SERVICES | 1. Notify PCA Representative and utility companies of intended interruption of services and obtain required permission.

2. Where Work involves breaking into or connecting to existing services, give PCA Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

3. Provide for personnel, pedestrian and vehicular traffic.

4. Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures. |
| 5. SPECIAL REQUIREMENTS | 1. Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

2. Keep within limits of work and avenues of ingress and egress. |

PART 2 – PRODUCTS – not used

PART 3 – EXECUTION – not used

----- END OF SECTION -----

PAYMENT PROCEDURES

PART 1 - GENERAL

- 1. REFERENCES
 - 1. PCA/Contractor Agreement and Special Conditions 00 82 00

- 2. APPLICATIONS FOR PROGRESS PAYMENT
 - 1. Refer to PCA/Contractor Agreement and Special Conditions 00 82 00
 - 2. Make applications for payment on account as provided in Agreement as Work progresses.
 - 3. Date applications for payment last day of agreed payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.
 - 4. Submit to PCA Representative at least 14 days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Price, to facilitate evaluation of applications for payment.

- 3. SCHEDULE OF VALUES
 - 1. Refer to PCA/Contractor Agreement
 - 2. Provide schedule of values supported by evidence as PCA Representative may reasonably direct and when accepted by PCA Representative to be used as basis for applications for payment.
 - 3. Include statement based on schedule of values with each application for payment.
 - 4. Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as PCA Representative may reasonably require to establish value and delivery of products.

- 4. PROGRESS PAYMENT AND HOLDBACK
 - 1. Refer to PCA/Contractor Agreement and Special Conditions 00 82 00, and R2850D GC5 Terms of Payment

PART 2 – PRODUCTS
NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

PROJECT MEETINGS

PART 1 - GENERAL

- | | |
|-------------------------|---|
| 1. RELATED REQUIREMENTS | 1. Section 01 33 00 - Submittal Procedures
2. Section 01 56 00 - Temporary Barriers and Enclosures
3. Section 01 78 00 - Closeout Submittals |
| 2. ADMINISTRATIVE | 1. Schedule project meetings throughout the progress of the work at the call of PCA Representative.

2. Preside at meetings.

3. Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents. |

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION – Not used

----- END OF SECTION -----

SUBMITTAL PROCEDURES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 33 00
Page 1 of 4

PART 1 - GENERAL

- | | |
|-------------------------|--|
| 1. RELATED REQUIREMENTS | 1. Section 01 45 00 – Quality Control. |
| 2. REFERENCES | 1. Refer to PCA/Contractor Agreement |
| 3. ADMINISTRATIVE | <ol style="list-style-type: none">1. Submit to PCA Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.2. Do not proceed with Work affected by submittal until review is complete.3. Present shop drawings, product data, samples and mock-ups in SI Metric units.4. Where items or information is not produced in SI Metric units converted values are acceptable.5. Review submittals prior to submission to PCA Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.6. Notify PCA Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.7. Verify field measurements and that affected adjacent work is coordinated.8. Contractor's responsibility for errors and omissions in submission is not relieved by PCA Representative's review of submittals.9. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by PCA Representative's review.10. Keep one reviewed copy of each submission on site. |

SUBMITTAL PROCEDURES

4. SHOP DRAWINGS AND PRODUCT DATA
 1. Refer to PCA/Contractor Agreement
 2. 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.
 3. Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.
 4. Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
 5. Allow 5 days for PCA Representative's review of each submission.
 6. Adjustments made on shop drawings by PCA Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to PCA Representative prior to proceeding with Work.
 7. Make changes in shop drawings as PCA Representative may require, consistent with Contract Documents. When resubmitting, notify PCA Representative in writing of revisions other than those requested.
 8. Accompany submissions with transmittal letter, in duplicate, containing:
 - a. Date.
 - b. Project title and number.
 - c. Contractor's name and address.
 - d. Identification and quantity of each shop drawing, product data and sample.
 - e. Other pertinent data.
 9. Submissions include:
 - a. Date and revision dates.
 - b. Project title and number.
 - c. Name and address of:
 - i. Subcontractor.
 - ii. Supplier.
 - iii. Manufacturer.
 - d. Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - e. Details of appropriate portions of Work as applicable:
 - i. Fabrication.
 - ii. Layout, showing dimensions, including identified field dimensions, and clearances.

SUBMITTAL PROCEDURES

- iii. Setting or erection details.
 - iv. Performance characteristics.
 - v. Standards.
 - vi. Single line and schematic diagrams.
 - vii. Relationship to adjacent work.
10. After PCA Representative's review, distribute copies.
 11. Submit electronic copy of required project documents including but not necessarily limited to:
 - a. Work Schedule
 - b. Testing Plan
 - c. Health and Safety Plan
 12. Submit electronic copy of shop drawings for each requirement requested in specification Sections and as PCA Representative may reasonably request, including but not necessarily limited to:
 - a. Helical Pile Layout for 3 boardwalk sections and lookouts
 - b. Structural members
 - c. Pergola Structures
 13. Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by PCA Representative where shop drawings will not be prepared due to standardized manufacture of product, including but not necessarily limited to:
 - a. P-Gates
 - b. Bollards
 14. Submit electronic copies of test reports for requirements requested in specification Sections and as requested by PCA Representative.
 - a. Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 15. Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
 16. Supplement standard information to provide details applicable to project.
 17. If upon review by PCA Representative, no errors or omissions are discovered 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 of Work may proceed.

SUBMITTAL PROCEDURES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 33 00
Page 4 of 4

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

HEALTH AND SAFETY REQUIREMENTS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 35 29.06
Page 1 of 3

PART 1 - GENERAL

- | | |
|--|---|
| 1. RELATED REQUIREMENTS | 1. Section 01 33 00 – Submittal Procedures. |
| 2. REFERENCES | <ol style="list-style-type: none">1. Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations2. Health Canada/Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).3. Province of Ontario Occupational Health and Safety Act, R.S.O. 1990 Updated 2005. |
| 3. ACTION AND INFORMATIONAL SUBMITTALS | <ol style="list-style-type: none">1. Make submittals in accordance with Section 01 33 00 - Submittal Procedures.2. Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:<ol style="list-style-type: none">a. Results of site specific safety hazard assessment.b. Results of safety and health risk or hazard analysis for site tasks and operation found in work plan3. Submit electronic copy of Contractor's authorized representative's work site health and safety inspection reports to PCA Representative.4. Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.5. Submit copies of incident and accident reports.6. Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 – Submittal Procedures.7. PCA Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to PCA Representative within 7 days after receipt of comments from PCA Representative.8. PCA Representative review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.9. On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency |

HEALTH AND SAFETY REQUIREMENTS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 35 29.06
Page 2 of 3

situations.

4. FILING OF NOTICE
 1. File Notice of Project with Provincial authorities prior to beginning of Work.
5. SAFETY ASSESSMENT
 1. Perform site specific safety hazard assessment related to project.
6. MEETINGS
 1. Schedule and administer Health and Safety meeting with PCA Representative prior to commencement of Work.
7. GENERAL REQUIREMENTS
 1. Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
 2. PCA Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.
8. RESPONSIBILITY
 1. Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
 2. Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
9. COMPLIANCE REQUIREMENTS
 1. Comply with Ontario Health and Safety Act, R.S.O.
10. UNFORSEEN HAZARDS
 1. When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise PCA Representative verbally and in writing.
11. HEALTH AND SAFETY CO-ORDINATOR
 1. Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 - a. Have site-related working experience specific to activities associated with this project.
 - b. Have working knowledge of occupational safety and health regulations.
 - c. 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 site to perform Work.
 - d. Be responsible for implementing, enforcing daily and

HEALTH AND SAFETY REQUIREMENTS

- e. monitoring site-specific Contractor's Health and Safety Plan. Be on site during execution of Work and report directly to and be under direction of site supervisor.

12. POSTING OF DOCUMENTS

1. Ensure applicable items, articles, notices and orders are posted in conspicuous locations on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with PCA Representative. Post at four (4) access points to construction site.

13. CORRECTION OF NON-COMPLIANCE

1. Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by PCA Representative.
2. Provide PCA Representative with written report of action taken to correct non-compliance of health and safety issues identified.
3. PCA Representative may stop Work if non-compliance of health and safety regulations is not corrected.

14. WORK STOPPAGE

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

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

QUALITY CONTROL

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 45 00
Page 1 of 2

PART 1 - GENERAL

- | | |
|------------------------------------|---|
| 1. RELATED REQUIREMENTS | 1. Not applicable |
| 2. REFERENCES | 1. Refer to PCA/Contractor Agreement |
| 3. INSPECTION | 1. PCA Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. |
| 4. INDEPENDENT INSPECTION AGENCIES | 1. Independent Inspection/Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work.
2. Allocated costs: Paid by Contractor
3. Provide equipment required for executing inspection and testing by appointed agencies.
4. Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
5. If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by PCA Representative at no cost to PCA. Pay costs for retesting and re-inspection. |
| 5. ACCESS TO WORK | 1. Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
2. Co-operate to provide reasonable facilities for such access. |
| 6. PROCEDURES | 1. Notify appropriate agency and PCA 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 where applicable. |
| 7. REJECTED WORK | 1. Refer to PCA/Contractor Agreement
2. Remove defective Work, whether result of poor workmanship, use of |

QUALITY CONTROL

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

3. Make good other Contractor's work damaged by such removals or replacements promptly.
4. If in opinion of PCA Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, PCA Representative 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 PCA Representative.

8. REPORTS

1. Submit digital copy of inspection and test reports to PCA Representative.
2. Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

9. TESTS

1. Furnish test results as requested.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

CONSTRUCTION FACILITIES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 52 00
Page 1 of 3

PART 1 - GENERAL

- | | |
|--|--|
| 1. RELATED REQUIREMENTS | 1. Submittal Procedures |
| 2. REFERENCES | <ol style="list-style-type: none">1. Refer to PCA/Contractor Agreement2. Canadian General Standards Board (CGSB)<ol style="list-style-type: none">a. CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.b. CGSB 1.59-97, Alkyd Exterior Gloss Enamel.3. Canadian Standards Association (CSA International)<ol style="list-style-type: none">a. CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment. |
| 3. ACTION AND INFORMATIONAL SUBMITTALS | <ol style="list-style-type: none">1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. |
| 4. INSTALLATION AND REMOVAL | <ol style="list-style-type: none">1. Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, avenues of ingress/egress to fenced area and details of fence installation.2. Provide construction facilities in order to execute work expeditiously.3. Remove from site all such work after use. |
| 5. SITE STORAGE/LOADING | <ol style="list-style-type: none">1. Special Conditions 00 82 00 Article SC22. Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.3. Do not load or permit to load any part of Work with weight or force that will endanger Work. |
| 6. CONSTRUCTION PARKING | <ol style="list-style-type: none">1. Parking will be permitted on site provided it does not disrupt performance of Work.2. Provide and maintain adequate access to project site. |
| 7. EQUIPMENT, TOOL AND MATERIALS STORAGE | <ol style="list-style-type: none">1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities. |

CONSTRUCTION FACILITIES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 52 00
Page 2 of 3

-
- | | |
|-------------------------|--|
| 8. SANITARY FACILITIES | <ol style="list-style-type: none">1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary conditions |
| 9. CONSTRUCTION SIGNAGE | <ol style="list-style-type: none">1. Provide and erect project sign, within three weeks of signing Contract, in a location designated by PCA Representative.2. Indicate on sign, PCA, name of Contractor and Subcontractor.3. No other signs or advertisements, other than warning signs, are permitted on site.4. Locate project identification sign as directed by PCA Representative and construct as follows:<ol style="list-style-type: none">a. Build a secure foundation/buried posts, erect framework, and attach signboard to framing.5. Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.6. Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed PCA Representative. |
| 10. CLEAN-UP | <ol style="list-style-type: none">1. Remove construction debris, waste materials, 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. Stack stored new or salvaged material not in construction facilities.5. Remove and restore construction facilities site upon completion of work to equal or better condition than prior to construction. |

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

CONSTRUCTION FACILITIES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 52 00
Page 3 of 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 adjacent watercourses and properties.
2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
3. Remove erosion and sedimentation controls other than Filtrex Siltsoxx and restore and stabilize areas disturbed during removal.

----- END OF SECTION -----

TEMPORARY BARRIERS AND ENCLOSURES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 56 00
Page 1 of 1

PART 1 - GENERAL

- | | |
|--|---|
| 1. RELATED REQUIREMENTS | 1. Section 01 74 21 – Construction/Demolitions Waste Management and Disposal. |
| 2. INSTALLATION AND REMOVAL | 1. Provide temporary controls in order to execute Work expeditiously.
2. Remove from site all such work after use. |
| 3. HOARDING | 1. Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures. |
| 4. GUARD RAILS AND BARRICADES | 1. Provide secure, rigid guard rails and barricades around deep excavations. |
| 5. ACCESS TO SITE | 1. Provide and maintain access roads as may be required for access to Work. |
| 6. 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. |
| 7. PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY | 1. Protect surrounding private and public property from damage during performance of Work.
2. Be responsible for damage incurred. |
| 8. PROTECTION OF FINISHES | 1. Provide protection for finished and partially finished construction finishes and equipment during performance of Work.
2. Provide necessary screens, covers, and hoardings.
3. Confirm with PCA Representative locations and installation schedule 3 days prior to installation.
4. Be responsible for damage incurred due to lack of or improper protection. |
| 9. 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 – Not used

PART 3 – EXECUTION – Not used

----- END OF SECTION -----

EXECUTION

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 73 00
Page 1 of 2

PART 1 - GENERAL

- | | |
|--|---|
| 1. RELATED REQUIREMENTS | 1. Section 01 33 00 – Submittal Procedures
2. Section 01 74 21 – Construction/Demolition Waste Management and Disposal |
| 2. ACTION AND INFORMATIONAL SUBMITTALS | 1. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
2. Submit written request in advance of cutting or alteration which affects: <ul style="list-style-type: none">a. Structural integrity of elements of project.b. Efficiency, maintenance, or safety of operational elements.c. Visual qualities of sight-exposed elements.d. Other Work of PCA. 3. Include in request: <ul style="list-style-type: none">a. Identification of project.b. Location and description of affected Work.c. Statement on necessity for cutting or alteration.d. Description of proposed Work, and products to be used.e. Alternatives to cutting and patching.f. Effect on other Work of PCA.g. Date and time work will be executed. |
| 3. MATERIALS | 1. Required for original installation.
2. Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures. |
| 4. PREPARATION | 1. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
2. After uncovering, inspect conditions affecting performance of Work.
3. Beginning of cutting or patching means acceptance of existing conditions.
4. Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
5. Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water. |
| 5. EXECUTION | 1. Execute cutting, fitting, and patching including excavation and fill, to complete Work.
2. Fit several parts together, to integrate with other Work. |

EXECUTION

3. Uncover Work to install ill-timed Work.
 4. Remove and replace defective and non-conforming Work.
 5. Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
 6. Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
 7. Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
-
6. 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

NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

CLEANING

PART 1 - GENERAL

- | | |
|-------------------------|---|
| 1. RELATED REQUIREMENTS | 1. Section 01 74 21 - Construction/Demolition Waste Management and Disposal |
| 2. REFERENCES | 1. Refer to PCA/Contractor Agreement and Special Conditions 00 82 00 |
| 3. PROJECT CLEANLINESS | <ol style="list-style-type: none">1. Maintain Work in tidy condition, free from accumulation of waste products and debris caused by Contractor.2. Remove waste materials from site at regularly scheduled times or dispose of as directed by PCA Representative. Do not burn waste materials on site.3. Clear snow and ice from access to site, bank/pile snow in designated areas only or remove from site.4. Remove non-organic waste and debris within 10m either side of proposed trails corridors that is encountered during construction. This includes but is not limited to isolated pieces of metal, pieces of wire fence, glass and plastics.5. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.6. Provide on-site containers for collection of waste materials and debris.7. Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.8. Dispose of waste materials and debris at designated dumping areas off-site.9. Store any volatile waste in covered metal containers, and remove from premises at end of each working day. |
| 4. FINAL CLEANING | <ol style="list-style-type: none">1. Refer to PCA/Contractor Agreement and Special Conditions 00 82 002. When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.3. Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy. |

CLEANING

4. Prior to final review remove surplus products, tools, construction machinery and equipment.
 5. Remove waste products caused by Contractor.
 6. Remove waste materials from site at regularly scheduled times or dispose of as directed by PCA Representative. Do not burn waste materials on site.
 7. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 8. Remove stains, spots, marks and dirt from decorative work.
 9. Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
 10. Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
 11. Remove dirt and other disfiguration from exterior surfaces.
 12. Sweep and wash clean paved areas.
 13. Clean drainage systems.
 14. Sweep with metal detector to pick up loose metals.
5. 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

NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 74 21
Page 1 of 3

PART 1 - GENERAL

1. WASTE MANAGEMENT GOALS
 1. Accomplish maximum control of solid construction waste.
 2. Preserve environment and prevent pollution and environment damage.
2. RELATED REQUIREMENTS
 1. Section 01 33 00 – Submittal Procedures
3. DEFINITIONS
 1. Class III: non-hazardous waste - construction and demolition waste.
 2. Inert Fill: inert waste - exclusively asphalt and concrete.
 3. Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
 4. Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
 5. 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.
 6. Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - a. Returning reusable items including pallets or unused products to vendors.
 7. Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
 8. Separate Condition: refers to waste sorted into individual types.
 9. Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
4. ACTION AND INFORMATIONAL SUBMITTALS
 1. Submittals in accordance with Section 01 33 00 - Submittal Procedures.
5. STORAGE, HANDLING AND PROTECTION
 1. Store, materials to be reused, recycled and salvaged in locations as directed by PCA Representative.
 2. Unless specified otherwise, materials for removal do not become

CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 74 21
Page 2 of 3

-
- Contractor's property.
3. Protect, stockpile and store salvaged items.
 4. Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
 5. Protect surface drainage, mechanical and electrical from damage and blockage.
 6. Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - a. On-site source separation is recommended.
 - b. Remove co-mingled materials to off-site processing facility for separation.
 - c. Provide waybills for separated materials.
6. DISPOSAL OF WASTES
1. Do not bury rubbish or waste materials.
 2. Do not dispose of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers.
 3. Remove materials from deconstruction as deconstruction/disassembly Work progresses.
7. USE OF SITE AND FACILITIES
1. Execute work with least possible interference or disturbance to normal use of premises.
8. SCHEDULING
1. Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

1. APPLICATION
 1. Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
2. CLEANING
 1. Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
 2. Clean-up work area as work progresses.

CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 74 21
Page 3 of 3

- 3. DIVERSION OF MATERIALS
 - 1. Separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by PCA Representative, and consistent with applicable fire regulations.
 - a. Mark containers or stockpile areas.
 - b. Provide instruction on disposal practices.
 - 2. On-site sale of salvaged materials is not permitted.
- 3. Source separate materials to be reused/recycled into specified sort areas.

----- END OF SECTION -----

CLOSEOUT PROCEDURES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 77 00
Page 1 of 1

PART 1 - GENERAL

1. RELATED REQUIREMENTS
 1. Section 01 74 11 – Cleaning
 2. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

2. REFERENCES
 1. PCA/Contractor Agreement and Special Conditions 00 82 00

3. ADMINISTRATIVE REQUIREMENTS
 1. Acceptance of Work Procedures:
 - a. Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - i. Notify PCA Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - ii. Request PCA Representative inspection.
 - b. PCA Representative's Inspection:
 - i. PCA Representative and Contractor to inspect Work and identify defects and deficiencies.
 - ii. Contractor to correct Work as directed.

4. FINAL CLEANING
 1. Clean in accordance with Section 01 74 11 - Cleaning.
 - a. Remove surplus materials, excess materials, rubbish, tools and equipment.

 2. Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

CLOSEOUT SUBMITTALS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 01 78 00
Page 1 of 2

PART 1 - GENERAL

1. RELATED REQUIREMENTS
 1. Section 01 31 19 - Project Meetings
 2. Section 01 33 00 - Submittal Procedures
 3. Section 01 45 00 - Quality Control

2. REFERENCES
 1. Canadian Environmental Protection Act (CEPA)
 - a. SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

3. ADMINISTRATIVE REQUIREMENTS
 1. Pre-warranty Meeting:
 - a. Convene meeting one week prior to contract completion with Contractor's representative and PCA Representative in accordance with Section 01 31 19 - Project Meetings to:
 - i. Verify Project requirements.
 - ii. Review manufacturer's installation instructions and warranty requirements.
 - b. PCA Representative to establish communication procedures for:
 - i. Notifying construction warranty defects.
 - ii. Determine priorities for type of defects.
 - iii. Determine reasonable response time.
 - c. 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.
 - d. Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

4. ACTION AND INFORMATIONAL SUBMITTALS
 1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

5. RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS
 1. Record information neatly on set of black line opaque drawings, provided by PCA Representative.
 2. Record information concurrently with construction progress.
 - a. Do not conceal Work until required information is recorded.
 3. Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - a. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - b. Field changes of dimension and detail.
 - c. Changes made by change orders.

CLOSEOUT SUBMITTALS

- d. Details not on original Contract Drawings.
 - e. References to related shop drawings and modifications.
-
- 4. Specifications: mark each item to record actual construction, including:
 - a. Manufacturer, trade name, and catalogue number of each product actually installed.
 - b. Changes made by Addenda and change orders.
 - 5. Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
 - 6. Provide digital photos, if requested, for site records.
-
- 6. WARRANTIES AND BONDS
 - 1. Conduct 11-month warranty inspection, measured from time of acceptance, by PCA Representative.
 - 2. Include information contained in warranty management plan as follows:
 - a. 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.
 - b. Contractor's plans for attendance at 11-month post-construction warranty inspections.
 - 3. Respond in timely manner to oral or written notification of required construction warranty repair work.
 - 4. Written verification to follow oral instructions. Failure to respond will be cause for the PCA Representative to proceed with action against Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

----- END OF SECTION -----

PART 1 - GENERAL

1. REFERENCES

1. ASTM International
 - a. ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. ASTM D 1761-06, Standard Test Methods for Mechanical Fasteners in Wood.
 - c. ASTM F 1941, Standard Specification for Zinc Plated Steel Fasteners.
2. CSA International
 - a. CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - b. CSA O141-05(R2009), Softwood Lumber.
3. Forest Stewardship Council (FSC)
 - a. FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - b. FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
 - c. FSC Accredited Certified Bodies.
4. National Lumber Grades Authority (NLGA)
 - a. Standard Grading Rules for Canadian Lumber 2007.

2. QUALITY ASSURANCE

1. Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

3. 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. Storage and Handling Requirements:
 - a. Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - b. Replace defective or damaged materials with new.

PART 2 - PRODUCTS

1. FRAMING, DECKING AND FENCE BOARDS

1. Lumber: Rough sawn Ontario White Cedar for all visible components/surfaces except the pergola members. Rough

CARPENTRY

sawn Douglas Fir for all pergola members. Contractor to provide cedar samples to PCA Representative for approval prior ordering and delivery to site:

- a. CSA O141.
- b. NLGA Standard Grading Rules for Canadian Lumber.

2. Framing and board lumber: in accordance with NBC.

2. ACCESSORIES

1. Nails, spikes and staples: to CSA B111.
 - a. 75mm (3") galvanized spikes
 - b. 100mm (4") galvanized spikes
2. Bolts: galvanized 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
3. Screws:
 - a. 75mm (3") coated deck screws
4. Fastener Finishes:
 - a. Galvanizing: to ASTM A 123/A 123M, use galvanized fasteners

PART 3 - EXECUTION

1. EXAMINATION

1. Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
 - a. Visually inspect substrate in presence of PCA Representative.
 - b. Inform PCA Representative of unacceptable conditions immediately upon discovery.
 - c. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from PCA Representative.

2. INSTALLATION

1. Install members true to line, levels and elevations, square and plumb.
2. Construct continuous members from pieces of longest practical length.
3. Install spanning members with "crown-edge" up.
4. Select exposed framing for appearance. Install lumber so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
5. Install wood cants, fascia backing, nailers, curbs and other

CARPENTRY

wood supports as required and secure using galvanized steel fasteners.

6. Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
7. Apply end cut preservative to all cut ends of pressure treated framing materials.
8. Sanding: Top of railings to be lightly sanded to remove any splinters. Provide sanded sample area of a 600mm long section of railing top for approval by PCA Representative.
9. Predrill holes for all applications where large screws are utilized to prevent splitting.

3. CLEANING

1. Progress Cleaning: clean in accordance with contract requirements.
 - a. Leave Work area clean at end of each day.
2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with contract requirements.
3. Waste Management: separate waste materials for reuse and recycling in accordance with contract requirements.

4. PROTECTION

1. Protect installed products and components from damage during construction.
2. Repair damage to adjacent materials caused by carpentry installation.

----- END OF SECTION -----

PART 1 - GENERAL

1. REFERENCES

The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS
(ASTM) Test
Methods:

ASTM D-638-Tensile Properties of Plastics

ASTM D-790-Flexural Properties of Unreinforced and
Reinforced Plastics

ASTM D-2344-Apparent Interlaminar Shear Strength of
Parallel Fiber Composites by Short Beam Method

ASTM D-696-Coefficient of Linear Thermal Expansion
for Plastics

ASTM E-84-Surface Burning Characteristics of Building
Materials

NSF/ANSI STANDARD 61

2. CONTRACTOR
SUBMITTALS

1. The CONTRACTOR shall furnish shop drawings of all fabricated structural systems and accessories in accordance with the provisions of this Section.
2. The CONTRACTOR shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication of and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details sealed by a Professional Engineer.
3. The CONTRACTOR shall submit the manufacturer's published literature including structural design data, structural properties data, corrosion resistance tables, certificates of compliance, test reports as applicable, and design calculations for systems not sized or designed in the contract documents, sealed by a Professional Engineer.
4. The CONTRACTOR may be requested to submit sample pieces of each item specified herein for acceptance by the ENGINEER as to quality and color. Sample pieces shall be manufactured by the method to be used in the WORK.

PULTRUDED FIBERGLASS STRUCTURAL SHAPES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Sect 06 61 10
Page 2 of 4

3. QUALITY ASSURANCE

1. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten (10) years experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided.
2. Manufacturer shall offer a 3 year limited warranty on all FRP products against defects in materials and workmanship.
3. Manufacturer shall be certified to the ISO 9001-2008 standard.
4. Manufacturer shall provide proof of certification from at least two other quality assurance programs for its facilities or products (DNV, ABS, USCG, AARR).
5. Manufacturer shall provide proof, via independent testing, that materials proposed as a solution do not contain heavy metals in amounts greater than that allowed by current EPA requirements.

4. PRODUCT DELIVERY AND STORAGE

1. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
2. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, and other types of damage. Store adhesives, resins and their catalysts and hardeners in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

PART 2 - MATERIALS

1. MANUFACTURER

1. Structural shapes shall be similar to those components indicated on the structural drawings as manufactured by:

Fibergrate Composite Structures Inc.
5151 Belt Line Road, Suite 1212
1000 Thornton Road South, Unit E
Oshawa, ON L1J 7E2
(877)771-7764

PULTRUDED FIBERGLASS STRUCTURAL SHAPES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Sect 06 61 10
Page 3 of 4

Website: www.fibergrate.com

E-mail: info@fibergrate.com

2. Contractor may propose alternative manufacturer to the Engineer for approval. The products shall have similar size and equal or better strength than those fabricated by Fibergrate.
 3. The resin of fiberglass components shall have dark color.
2. GENERAL
1. All structural shapes are to be manufactured by the pultrusion process with a glass content minimum of 45%, maximum of 55% by weight. The structural shapes shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
 2. Fiberglass reinforcement shall be a combination of continuous roving, continuous strand mat, and surfacing veil in sufficient quantities as needed by the application and/or physical properties required.
 3. Resins shall be ISOFR, fire retardant isophthalic polyester or VEFR, fire retardant vinyl ester, with chemical formulation necessary to provide the corrosion resistance, strength and other physical properties as required.
 4. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
 5. All pultruded structural shapes shall be further protected from ultraviolet (UV) attack with 1) integral UV inhibitors in the resin and 2) a synthetic surfacing veil to produce a resin rich surface.
 6. All fire retardant FRP products shall have a tested flame spread rating of 25 or less per ASTM E-84 Tunnel Test.

PULTRUDED FIBERGLASS STRUCTURAL SHAPES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Sect 06 61 10
Page 4 of 4

2.3 Pultruded structural shapes are to have the minimum longitudinal mechanical properties listed below:

Property	ASTM Method	Value	Units
Tensile Strength	D-638	30,000 (206)	psi (MPa)
Tensile Modulus	D-638	2.5×10^6 (17.2)	psi (GPa)
Flexural Strength	D-790	30,000 (206)	psi (MPa)
Flexural Modulus	D-790	1.8×10^6 (12.4)	psi (GPa)
Flexural Modulus (Full Section)	N/A	2.8×10^6 (19.3)	psi (GPa)
Short Beam Shear (Transverse)	D-2344	4,500 (31)	psi (MPa)
Shear Modulus (Transverse)	N/A	4.5×10^5 (3.1)	psi (GPa)
Coefficient of Thermal Expansion	D-696	4.4×10^{-6} (8.0×10^{-6})	in/in/°F (cm/cm/°C)
Flame Spread	E-84	25 or less	N/A

PART 3 - EXECUTION

1. FABRICATION

1. Measurements: Structural Shapes supplied shall meet the minimum dimensional requirements as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by manufacturer to complete the work. Determine correct size and locations of required holes or coping from field dimensions before structural shape fabrication.
2. Sealing: All shop fabricated cuts or drilling shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated cuts or drilling shall be coated similarly by the contractor in accordance with the manufacturer's instructions.
3. Hardware: Type 316 stainless steel bolts shall be provided.

2. INSPECTION

1. Shop inspection is authorized as required by the Owner and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided. The structural shapes shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits.

----- END OF SECTION -----

EARTHWORK FOR MINOR WORKS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 31 00 99
Page 1 of 3

PART 1 - GENERAL

- | | |
|--|---|
| 1. RELATED REQUIREMENTS | 1. Section 32 11 23 - Aggregate Base Courses |
| 2. REFERENCES | 1. ASTM International <ul style="list-style-type: none">a. ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600kN-m/m³). 2. Ontario Provincial Standard Specifications (OPSS) <ul style="list-style-type: none">a. OPSS 1004-[05], Material Specification for Aggregates-Miscellaneous.b. OPSS SP 110F13-03, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material. |
| 3. ACTION AND INFORMATIONAL SUBMITTALS | 1. Submit in accordance with Section 01 33 00 - Submittal Procedures. |

PART 2 - PRODUCTS

- | | |
|--------------|---|
| 1. MATERIALS | 1. Select Subgrade to OPSS SP 1010F13. Sand to OPSS 1004. |
|--------------|---|

PART 3 - EXECUTION

- | | |
|----------------|---|
| 1. EXAMINATION | 1. Verification of Conditions: <ul style="list-style-type: none">a. Before commencing work verify locations of buried services on and adjacent to site. 2. Evaluation and Assessment: <ul style="list-style-type: none">a. Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.b. Testing of materials and compaction of backfill and fill will be carried out by testing laboratory approved by PCA Representative.c. Not later than 48 hours before backfilling or filling with approved material, notify PCA Representative so that compaction tests can be carried out by designated testing agency.d. Before commencing work, conduct, with PCA Representative, condition survey of existing structures, trees |
|----------------|---|

EARTHWORK FOR MINOR WORKS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 31 00 99
Page 2 of 3

and plants, lawns, fencing, service poles, wires, and paving, survey bench marks and monuments which may be affected by work.

2. PREPARATION

1. Temporary Erosion and Sedimentation Control:

- a. Use 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, in accordance with sediment and erosion control plan.
- b. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- c. Remove erosion and sedimentation controls other than Filtrexx Siltsoxx and restore and stabilize areas disturbed during removal.

2. Protection of in-place conditions:

- a. Protect excavations from freezing.
- b. Keep excavations clean, free of standing water, and loose soil.
- c. Where soil is subject to significant volume change due to change in moisture content, cover and protect to PCA Representative's approval.
- d. Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- e. Protect buried services that are to remain undisturbed.

3. Removal:

- a. Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- b. Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.
- c. Carefully remove soil around roots of trees to remain.

3. EXCAVATION

1. Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.

2. Topsoil stripping:

- a. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
- b. Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.
- c. Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.

EARTHWORK FOR MINOR WORKS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 31 00 99
Page 3 of 3

3. Excavate as required to carry out work
4. BACKFILLING
 1. Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from PCA Representative.
 2. Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
 3. Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
 4. Compaction of subgrade: compact existing subgrade under trails to same compaction as specified for fill. Fill excavated areas with selected subgrade material compacted as specified for fill.
 5. Placing:
 - a. Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.
 6. Under seeded areas: use site excavated material.
5. GRADING
 1. Grade to ensure that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by PCA Representative. Grade to be gradual between finished spot elevations as indicated.
6. CLEANING
 1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - a. Dispose of cleared and grubbed material daily.
 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 and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

----- END OF SECTION -----

AGGREGATE MATERIALS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 31 05 16
Page 1 of 3

PART 1 - GENERAL

- | | |
|----------------------------------|---|
| 1. RELATED REQUIREMENTS | 1. Section 32 11 23 – Aggregate Base Courses |
| 2. REFERENCES | 1. American Society for Testing and Materials (ASTM)
a. ASTM D 4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate. |
| 3. SAMPLES | 1. Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
2. Provide PCA Representative with access to source and processed material for sampling. |
| 4. WASTE MANAGEMENT AND DISPOSAL | 1. Divert unused granular materials from landfill to local quarry facility as approved by PCA Representative. |

PART 2 - PRODUCTS

- | | | | | | | | | | | | | | |
|-------------------|--|-------------------|-----------|--------|-------|---------|----------|---------|---------|----------|---------|----------|--------|
| 1. MATERIALS | 1. Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, invasive plants, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
2. Flat and elongated particles of coarse aggregate: to ASTM D 4791.
a. Greatest dimension to exceed five times least dimension.
3. Fine aggregates (Limestone Screenings) satisfying requirements of applicable section to be the following:
a. Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117.
<table border="0" style="margin-left: 40px;"><tr><td style="padding-right: 20px;">Sieve Designation</td><td>% Passing</td></tr><tr><td>9.5 mm</td><td>[100]</td></tr><tr><td>4.75 mm</td><td>[50-100]</td></tr><tr><td>2.00 mm</td><td>[30-65]</td></tr><tr><td>0.425 mm</td><td>[10-30]</td></tr><tr><td>0.075 mm</td><td>[5-10]</td></tr></table>
4. Coarse aggregates (Granular A & Granular B Type II) satisfying requirements of applicable section to be one of or blend of following:
a. Crushed rock.
b. Gravel and crushed gravel composed of naturally formed particles of stone. | Sieve Designation | % Passing | 9.5 mm | [100] | 4.75 mm | [50-100] | 2.00 mm | [30-65] | 0.425 mm | [10-30] | 0.075 mm | [5-10] |
| Sieve Designation | % Passing | | | | | | | | | | | | |
| 9.5 mm | [100] | | | | | | | | | | | | |
| 4.75 mm | [50-100] | | | | | | | | | | | | |
| 2.00 mm | [30-65] | | | | | | | | | | | | |
| 0.425 mm | [10-30] | | | | | | | | | | | | |
| 0.075 mm | [5-10] | | | | | | | | | | | | |

AGGREGATE MATERIALS

c. Granular A and Granular B Type II to: OPSS.MUNI 1010

2. SOURCE QUALITY CONTROL

1. Inform PCA Representative of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.
2. If, in opinion of PCA Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
3. Advise PCA Representative 1 week 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

1. PREPARATION

1. Topsoil stripping
 - a. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 - b. Begin topsoil stripping of areas as indicated after area has been cleared of weeds and grasses and removed from site.
 - c. Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.
 - d. Stockpile in locations as on site for reuse. Stockpile height not to exceed 2 m.
2. Processing
 - a. Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - b. Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by PCA Representative.
 - c. Wash aggregates, if required to meet specifications. Use only equipment approved by PCA Representative.
3. Handling
 - a. Handle and transport aggregates to avoid segregation, contamination and degradation.
4. Stockpiling
 - a. Stockpiled aggregate is to be moved from staging areas within 48 hours maximum.

AGGREGATE MATERIALS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 31 05 16
Page 3 of 3

2. CLEANING

1. It will be Contractor's responsibility to remove any unused aggregate onsite.

----- END OF SECTION -----

AGGREGATE BASE COURSES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 32 11 23
Page 1 of 3

PART 1 - GENERAL

- | | |
|------------------------------------|--|
| 1. RELATED REQUIREMENTS | 1. Section 31 05 16 Aggregate Materials. |
| 2. REFERENCES | <ol style="list-style-type: none">1. American Society for Testing and Materials (ASTM)<ol style="list-style-type: none">a. ASTM C 117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.b. ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.c. ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.d. ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).e. ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).f. ASTM D 4318-[00], Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.2. Canadian General Standards Board (CGSB)<ol style="list-style-type: none">a. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.b. CAN/CGSB-8.2-M8, Sieves, Testing, Woven Wire, Metric. |
| 3. DELIVERY, STORAGE, AND HANDLING | 1. Deliver and stockpile aggregates in accordance with Section 31 05 16 – Aggregate Materials |
| 4. WASTE MANAGEMENT AND DISPOSAL | 2. Separate and recycle waste materials accordance with contract requirements. |

PART 2 - PRODUCTS

- | | |
|--------------|--|
| 1. MATERIALS | 1. Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements: <ol style="list-style-type: none">a. Crushed stone or gravel.b. Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2. |
|--------------|--|

AGGREGATE BASE COURSES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 32 11 23
Page 2 of 3

PART 3 - EXECUTION

1. SEQUENCE OF OPERATION
 1. Place granular base after subgrade surface is inspected and approved by PCA Representative.
 2. Placing
 - a. Construct granular base to depth and grade in areas indicated.
 - b. Ensure no frozen material is placed.
 - c. Place material only on clean unfrozen surface, free from snow and ice.
 - d. Begin spreading base material on crown line or on high side of one-way slope.
 - e. Place material using methods which do not lead to segregation or degradation of aggregate.
 - f. Place material to full width in uniform layers not exceeding 150 mm compacted thickness. PCA Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
 - g. Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - h. Remove and replace that portion of layer in which material becomes segregated during spreading.
 3. Compaction Equipment
 - a. Compaction equipment to be capable of obtaining required material densities.
 - b. Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from PCA Representative before use.
 - c. Equipped with device that records hours of actual work, not motor running hours.
 4. Compacting
 - a. Shape and roll alternately to obtain smooth, even and uniformly compacted base.
 - b. Apply water as necessary during compacting to obtain specified density.
 - c. Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
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. PROTECTION
 1. Maintain finished base in condition conforming to this Section until succeeding material is applied or until

AGGREGATE BASE COURSES

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 32 11 23
Page 3 of 3

acceptance by PCA Representative.

----- END OF SECTION -----

WIRE FENCE

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 32 31 26
Page 1 of 2

PART 1 - GENERAL

1. RELATED REQUIREMENTS
 1. Section 01.33.00 Submittals
 2. Section 01.45.00 Quality Control
 3. Section 01.73.00 Execution

2. MEASUREMENT AND PAYMENT
 1. Measure supply and erection of wire fence in metres erected

3. REFERENCES
 1. American Society for Testing and Materials International, (ASTM).
 - a. ASTM A 121, Specification for Zinc-Coated (Galvanized) Steel Wire.
 2. Canadian Standards Association (CSA International).
 - a. CSA G42- Galvanized (Zinc-Coated) Steel Farm-Field Wire Fencing.

4. INFORMATIONAL SUBMITTALS
 1. Product Data:
 - a. Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

5. QUALITY ASSURANCE
 1. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

6. WASTE MANAGEMENT AND DISPOSAL
 1. Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
 2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
 3. Collect and separate for disposal any packaging material for recycling.
 4. Divert unused metal materials from landfill to approved metal recycling facility.

WIRE FENCE

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 32 31 26
Page 2 of 2

PART 2 - PRODUCTS

1. MATERIALS
 1. Wire fence:
 - a. Farm-field type: to CSA G42, standard.
 2. Timber posts:
 - a. Sound, seasoned wood peeled cedar with ends cut square or as indicated.
 - b. Intermediate posts: 2.5 m long and minimum 125 mm diameter at small end.
 - c. Corner, end, and anchor posts: 2.5 m long and minimum 200 mm diameter at small end
 - d. Braces for end and corner and gate posts: 89 x 89 mm 3 m long.

PART 3 - EXECUTION

1. MANUFACTURER'S INSTRUCTIONS
 1. Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
2. GRADING
 1. Level ground along fence line in order that bottom wire of fence between posts can be maintained at not more than 300mm above ground.
3. ERECTION OF FENCE
 1. Erect fence along lines as indicated and directed by PCA Representative.
 - a. Slant of post tops to be perpendicular to fence line and facing outward.
 - b. Install cleats for anchoring at corner, gate, end and anchor posts as indicated.
 - c. Erect wires and stretch to have uniform tension. Splice wires with standard wire splices.
 - d. Attach top wires to posts with minimum two staples. Fasten other wires to posts and cross braces with at least two staples. Staple wires securely at end, anchor and gate posts.
4. CLEANING
 1. Perform cleaning as soon as possible after installation.
 2. Clean and trim areas disturbed by operations. Dispose of surplus as directed by PCA Representative.
 3. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

----- END OF SECTION -----

EXTERIOR SITE FURNISHINGS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 32 37 00
Page 1 of 2

PART 1 - GENERAL

- | | |
|--|---|
| 1. RELATED REQUIREMENTS | 1. Section 03 30 00 Cast-in-Place Concrete |
| 2. ACTION AND INFORMATIONAL SUBMITTALS | <ol style="list-style-type: none">1. Submit product data in accordance with contract requirements.2. Submit shop drawings in accordance with contract requirements.3. Submit colour sample in accordance with contract requirements.4. Indicate dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.5. Provide maintenance data for care and cleaning of site furnishings for incorporation into manual. |
| 3. WASTE MANAGEMENT AND DISPOSAL | <ol style="list-style-type: none">1. Separate waste materials for reuse and recycling in accordance with contract requirements.2. Remove from site and dispose of packaging materials at appropriate recycling facilities.3. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.4. Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan.5. Fold up metal banding, flatten and place in designated area for recycling. |

PART 2 - PRODUCTS

- | | |
|-------------|--|
| 1. BOLLARDS | <ol style="list-style-type: none">1. Maglin – 650 Series Bollard<ol style="list-style-type: none">a. Manufacturer: Maglin (phone: 1-800-716-5506) or approved equal;b. Model: MTB650-B4;c. Material: H.S. steel tube capped with cast aluminum parts;d. Colour: Black;e. Installation as per manufacturer's instructions;f. Contractor to provide product data and shop drawings. |
|-------------|--|

EXTERIOR SITE FURNISHINGS

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Section 32 37 00
Page 2 of 2

2. P-GATES

1. P-Gates

- a. P Offset Walkway Gate by Roma Fence Ltd. (905-794-0416), or approved equal.
- b. All pipe weights to be schedule 40.
- c. Contractor to padlock gate immediately following installation. Keys shall be provided to PCA upon award of Substantial Completion.

PART 3 - EXECUTION

1. INSTALLATION

1. Assemble furnishings in accordance with manufacturer's instructions.
2. Install furnishings true, plumb, anchored and firmly supported, as directed by Contract Administrator.
3. Touch-up damaged finishes to approval of Contract Administrator.

----- END OF SECTION -----

MECHANICAL SEEDING

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Sect 32 92 19.13
Page 1 of 3

PART 1 - GENERAL

1. RELATED REQUIREMENTS
 1. Section 32 91 19.13 Topsoil Placement and Grading.
2. ACTION AND INFORMATIONAL SUBMITTALS
 1. Product Data:
 - a. Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
 - b. Provide product data for:
 - i. Seed.
3. QUALITY ASSURANCE
 1. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
4. WASTE MANAGEMENT AND DISPOSAL
 1. Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 2. Divert unused fertilizer from landfill to official hazardous material collections site approved by PCA Representative

PART 2 - PRODUCTS

1. SEED
 1. Canada certified seed in accordance with Government of Canada Seeds Act and Seeds Regulations.
 - a. Mixture compositions as indicated on drawings.
 2. In packages individually labelled in accordance with Seeds Regulations and indicating name of supplier, product name and composition.
2. WATER
 1. Free of impurities that would inhibit germination and growth.
 2. Supplied by contractor at designated source.

MECHANICAL SEEDING

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Sect 32 92 19.13
Page 2 of 3

PART 3 - EXECUTION

1. QUALITY OF WORK
 1. Do not perform work under adverse field conditions as determined by PCA Representative.
 2. Remove and dispose of non-organic materials in topsoil and other deleterious materials; off site.
2. SEED BED PREPARATION
 1. Verify that grades are correct. If discrepancies occur, notify PCA Representative and do not commence work until instructed by PCA Representative.
 2. Fine grade surface free of humps and hollows to smooth, even grade, to tolerance of plus or minus 25 mm, surface draining naturally.
 3. Cultivate fine grade approved by PCA Representative to 25mm depth immediately prior to seeding.
3. SEED PLACEMENT
 1. For manual seeding:
 - a. Use "Cyclone" type manually operated seeder.
 2. Refer to drawings for seed sowing rate.
 3. Blend applications into adjacent grass/meadow/wetland/woodland areas to form uniform surfaces.
 4. Sow half of required amount of seed in one direction and remainder at right angles as applicable.
 5. Incorporate seed by light raking in cross directions.
4. MAINTENANCE DURING ESTABLISHMENT PERIOD
 1. Perform following operations from time of seed application until acceptance by PCA Representative:
 - a. Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
5. FINAL ACCEPTANCE
 1. Seeded areas will be accepted by PCA Representative provided that:
 - a. Areas are uniformly established and free of rutted, eroded, bare or dead spots.
6. MAINTENANCE DURING WARRANTY PERIOD
 1. Perform following operations from time of acceptance until end of warranty period.
 - a. Repair and reseed dead or bare spots to satisfaction of PCA Representative.

MECHANICAL SEEDING

Reesor Forks Trail: Rouge National Urban Park
Fall 2019

Sect 32 92 19.13
Page 3 of 3

7. CLEANING

1. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

----- END OF SECTION -----

Solicitation No. 5P201-19-0091
Reesor Forks Trail: Rouge National Urban Park
Parks Canada

SPECIFICATIONS

APPENDIX A

Clean Equipment Protocol for Industry

Inspecting and cleaning equipment for the purposes of invasive species prevention



Catalyst for research and response



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Inquiries regarding this document can be directed to the Ontario Invasive Plant Council

PO Box 2800, 4601 Guthrie Drive

Peterborough, ON

K9J 8L5

Phone: (705) 748-6324

Email: info@ontarioinvasiveplants.ca

For more information on invasive plants in Ontario, visit www.ontario.ca/invasivespecies, www.ontarioinvasiveplants.ca, www.invadingspecies.com, or www.invasivespeciescentre.ca.

Table Of Contents

Introduction	1
Why Cleaning Vehicles and Equipment is Important	3
Impacts of Invasive Species on Industry.....	4
Construction.....	4
Forestry/Agriculture	4
Land Management (Trail Use/Maintenance).....	4
Roadsides/Utilities	4
Steps to Prevent the Unintentional Introduction of Invasive Species from Equipment	5
When to Inspect.....	5
How to Inspect	5
When to Clean.....	6
Where to Clean	6
How to Clean Inside	6
How to Clean Outside	6
Final Inspection Checklist	7
Equipment Required	7
Inspection and Cleaning Diagrams and Checklists	8
2WD and 4WD Vehicles.....	8
Excavator	9
Backhoe.....	10
Bulldozer	11
Contacts and Resources	12
Appendix A: Identification of Invasive Plants Found in Ontario	13

Introduction

Why Invasive Plants are a Problem

Invasive alien species are “a growing environmental and economic threat to Ontario. Alien species are plants, animals and microorganisms that have been accidentally or deliberately introduced into areas beyond their normal range. Invasive species are defined as harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health (Government of Canada 2004).” (Ontario Invasive Species Strategic Plan, 2012). The great majority of plant invasions occur in habitats that have been disturbed either naturally or by humans (Rejmanek 1989; Hobbs and Huenneke 1992; Hobbs 2000).

The ecological effects of invasive species are often irreversible and, once established, they are extremely difficult and costly to control or eradicate. According to Pimental et al. (1999), invasive species in the U.S. cause economic and environmental damages totalling over \$138 billion per year, with agricultural weed control and crop losses totalling approximately \$34 billion per year. Exact figures for the total economic and environmental damages are not available for Canada. In Ontario however, the costs of dealing with just one invasive species is astonishing; Zebra Mussels cost Ontario power producers who draw water from the lake \$6.4 million per year in increased control/operating costs and about \$1 million per year in research costs (Colautti et al. 2006).

Invasive species can spread to new areas when contaminated mud, gravel, water, soil and plant material are unknowingly moved by equipment used on different sites. This method of spread is called an unintentional introduction, and is one of the four major pathways for invasive species introduction into a new area of Ontario (Ontario Invasive Species Strategic Plan, 2012).



Buckthorn removal, Lynde Shores Conservation Area.
Photo by: Central Lake Ontario Conservation Authority

Invasive plant seed and other propagules (plant material, i.e. rhizomes) have the ability to travel sight unseen in mud attached to or lodged in various parts and spaces between parts of vehicles, machinery and other mechanical equipment. A recent study at Montana State University found that most seeds (99% on paved roads and 96% on unpaved roads) stayed attached to the vehicle after traveling 160 miles (257 km) under dry conditions.

Invasive plant species are commonly transported on or in vehicles and construction equipment when they are moved to new locations. Those vehicles include four-wheel drives, excavators, tractors, loaders, water trucks and all-terrain vehicles. Failure to properly clean vehicles and machinery of soils, mud, and contaminated water that may contain invasive species seed and propagules can result in permanent, irreversible environmental impacts. These impacts can mean substantial cost to the landowner, land manager and/or the user. Businesses may also face liability issues for activities and operations that result in the introduction of invasive species.

Some of the invasive species in Ontario which have been known to spread through equipment transfer include:

- **Common Buckthorn** (*Rhamnus cathartica*)
- **Dog-strangling Vine** (*Cynanchum rossicum*)
- **Garlic Mustard** (*Alliaria petiolata*)
- **Giant Hogweed** (*Heracleum mantegazzianum*)
- **Glossy Buckthorn** (*Frangula alnus*)
- **Japanese Knotweed** (*Polygonum cuspidatum*)
- **Miscanthus or Chinese Silver Grass** (*Miscanthus sinensis*)
- **Invasive Phragmites or Common Reed** (*Phragmites australis subsp. australis*)
- **Reed Canary Grass** (*Phalaris arundinacea*)
- **Wild Parsnip** (*Pastinaca sativa*)
- **Wild Chervil** (*Anthriscus sylvestri*)



Dog-strangling Vine
(*Cynanchum rossicum*)
Photo by: Hayley Anderson



Garlic Mustard
(*Alliaria petiolata*)
Photo by: Ken Towle



Invasive Phragmites
(*Phragmites australis subsp. australis*)
Photo by: Michael Irvine

These plants impact biodiversity by out-competing native species for space, sunlight, and nutrients. They can also have impacts on road and driver safety by physically blocking intersection sightlines, and in the case of invasive *Phragmites* and *Miscanthus*, may fuel intense grass fires if ignited, which can damage utility stations and hydro lines.

The harmful effects of invasive species include:

- Physical and structural damage to infrastructure
- Human health hazards (i.e. giant hogweed and wild parsnip exposure)
- Delays and increased cost in construction activities
- Environmental damage (i.e. erosion)
- Aesthetic degradation
- Loss of biodiversity
- Reduced property values
- Loss of productivity in woodlots and agriculture

Why Cleaning Vehicles and Equipment is Important

Passenger and recreational vehicles as well as heavy machinery are major vectors for spreading terrestrial invasive species into new areas.

Preventing the spread of invasive species has proven to be considerably more cost effective than controlling established populations. The spread of invasive species through unintentional introduction can be minimized significantly by the diligent cleaning of vehicles and equipment when leaving one site and moving to the next. In the case of large properties, cleaning before moving to a new site is recommended, even if it is within the same property.

This guide has been developed for the construction, agriculture, forestry, and other land management industries, to provide equipment operators and practitioners with tools and techniques to identify and prevent the unintentional introduction of invasive species. It establishes a standard for cleaning vehicles and equipment and provides a guide where current codes of practice, industry standards or other environmental management plans are not already in place.

Passenger and recreational vehicles include:

- 2WD and 4WD cars
- 2WD and 4WD trucks
- All Terrain Vehicles (ATV's)
- Motorbikes
- Snowmobiles

Heavy machinery includes:

- Trucks
- Tractors
- Mowers
- Slashers
- Trailers
- Backhoes
- Graders
- Dozers
- Excavators
- Skidders
- Loaders
- Water Tankers and Trucks



Dog-strangling Vine plants attached to ATV.

Photo by: Francine Macdonald



Plant material attached to bobcat.

Photo by: TH9 Outdoor Services

Impacts of Invasive Species on Industry

Construction

In the UK, Japanese Knotweed (*Polygonum cuspidatum* or *Fallopia japonica*) is classified as a hazardous material. When construction occurs in established Japanese Knotweed stands workers sift the soil to remove root fragments and institute treatment plans to ensure that the Knotweed does not re-sprout, as it can damage housing foundations by growing through concrete and asphalt. The contractors must also thoroughly clean their equipment, and dispose of the contaminated soil at biohazard waste sites. While we do not have these requirements in Ontario, Japanese Knotweed is present here.

Invasive plant species can also increase site preparation and weed control costs, and reduce property values. For example, in Vermont the presence of the aquatic invasive plant Eurasian Watermilfoil (*Myriophyllum spicatum*) depressed shoreline residence property value by as much as 16.4% (Zhang and Boyle, 2010).

Forestry/Agriculture

Invasive plant species which become established in forests will out-compete native species and prevent forest re-generation after logging or natural disturbance. Dog-strangling Vine (*Cynanchum rossicum*) is of particular concern in conifer plantations. This species thrives in the filtered light and open soils of mature plantations, and suppresses seedling establishment of native hardwoods. If its invasion continues, very few juvenile trees will survive to fill the shrinking canopy of over-mature pines. Reforestation sites are also susceptible; the thick mats of vegetation and aggressive competition from Dog-strangling Vine decrease available planting space and increase costs as more mature vegetation needs to be planted in order to ensure the new vegetation can outcompete the invasive plant. As a result, expensive control programs are often required.

Land Management (Trail Use/Maintenance)

Recreational trail use and the maintenance of trails can facilitate the transport of invasive plant material and seeds, and create open and disturbed sites that are prime locations for the establishment of invasive species. Studies have proven that trails act as corridors which assist in the spread of invasive plant species. Humans, their pets, and vehicles such as ATV's can be vectors of invasion along trails because seeds and plant pieces can be carried on equipment and clothing. In addition, frequent trampling along trails alters soil properties, limits the growth of some native species, and creates conditions that may favour the growth of non-native species (Kuss et al. 1985; Marion et al. 1985; Yorks et al. 1997).

Roadsides/Utilities

Invasive species can increase the cost of roadside and utility maintenance by requiring additional maintenance and control efforts. The presence of invasive species can also provide a safety hazard. In the case of Phragmites and Miscanthus (invasive grass species), along with interrupting sight lines, the dead stalks which remain standing each autumn also provide combustible material. Fires in these stands burn intensely, and can damage utilities and hydro lines. Phragmites along roadsides is generally assumed to be spread through the transport and burial of rhizome fragments through ditching, ploughing, and other human activities that transport rhizomes on machinery. Studies have shown that vehicles and road-fill operations can transport invasive plant seeds into uninfested areas, and road construction and maintenance operations provide optimal disturbed sites for seed germination and seedling establishment (Schmidt 1989; Lonsdale & Lane 1994; Greenberg et al. 1997; Trombulak & Frissell 2000).

Steps to Prevent the Unintentional Introduction of Invasive Species from Equipment

Inspection and cleaning of all machinery and equipment should be performed in accordance with the procedures, checklists and diagrams provided in this protocol.

When visiting more than one site, always schedule work in the sites that are the least disturbed and free of known invasive species first, and visit sites with known invasive species infestations last. This will greatly reduce the risk of transferring plants to new locations.

When to Inspect

Inspection should be done before:

- Moving vehicles out of a local area of operation
- Moving machinery between properties or sites within the same property where invasive species may be present in one area, and not in another
- Using machinery along roadsides, in ditches, and along watercourses
- Vehicles using unformed dirt roads, trails or off road conditions
- Using machinery to transport soil and quarry materials
- Visiting remote areas where access by vehicles is limited

Inspection should be done after:

- Operating in areas known to have terrestrial invasive plants or are in high risk areas (i.e. recently disturbed areas near known invaded areas)
- Transporting material (i.e. soil) that is known to contain, or has the potential to contain, invasive species
- Operating in an area or transporting material that you are uncertain contain invasive species
- In the event of rain. If mud contains seeds, they can travel indefinitely until it rains or the road surface is wet, allowing for long distance transport. This may result in transporting seeds to areas where those species did not previously exist

How to Inspect

- Inspect the vehicle thoroughly inside and out for where dirt, plant material and seeds may be lodged or adhering to interior and exterior surfaces.
- Remove any guards, covers or plates that are easy to remove.
- Attention should be paid to the underside of the vehicle, radiators, spare tires, foot wells and bumper bars.

If clods of dirt, seed or other plant material are found, removal should take place immediately, using the techniques outlined below.

When to Clean

Vehicles and heavy equipment that stay on formed and sealed roads have a low risk of spreading invasive species. Cleaning is only required when inspection identifies visible dirt clods and plant material or when moving from one area to another.

Depending on the invasive species present, vehicles may need to be cleaned even when deep snow is present. Invasive *Phragmites*, for example, can still be spread, even in packed snow because the seed heads are usually above the surface of the snow. Other plants, such as dog-strangling vine, will be contained beneath deep snow.

**Regular inspection of vehicles and machinery will identify if any soil or plant material has been collected on or in vehicles and machinery.*

Where to Clean

Clean the vehicle/equipment in an area where contamination and seed spread is not possible (or limited). The site should be:

- Ideally, mud free, gravel covered or a hard surface. If this option is not available, choose a well maintained (i.e. regularly mowed) grassy area.
- Gently sloping to assist in draining water and material away from the vehicle or equipment. Care should be taken to ensure that localized erosion will not be created, and that water runs back into the area where contamination occurred.
- At least 30m away from any watercourse, water body and natural vegetation.
- Large enough to allow for adequate movement of larger vehicles and equipment.

**Safely locate the vehicle and equipment away from any hazards. If mechanized, ensure engine is off and the vehicle or equipment is immobilized.*

How to Clean Inside

Clean the interior of the vehicle by sweeping, vacuuming or using a compressed air device. Particular attention should be paid to the floor, foot wells, pedals, seats, and under the seats.

How to Clean Outside

Knock off all large clods of dirt. Use a pry bar or other device if necessary.

Identify areas that may require cleaning with compressed air rather than water such as radiators and grills. Clean these areas first prior to using water.

Clean the vehicle with a high pressure hose in combination with a stiff brush and/or pry bar to further assist the removal of dirt clods.

Start cleaning from the top of the vehicle and work down to the bottom.

Emphasis should be placed on the undersides, wheels, wheel arches, guards, chassis, engine bays, radiator, grills, and other attachments.

When the cleaning is finished avoid driving through the waste water when removing the vehicle or equipment from the cleaning site.

For equipment such as water trucks that may be exposed to aquatic invasive species, trucks should be disinfected with bleach solution before conducting work in a new area. For further information please refer to the Invading Species Awareness Program's Technical Guidelines listed under Contacts and Resources.



Hosing down a vehicle in Queensland, Australia

Photo by: TH9 Outdoor Services

Final Inspection Checklist

Conduct a final inspection to ensure the following general clean standard has been achieved:

- No clods of dirt should be visible after wash down.
- Radiators, grills, and the interiors of vehicles should be free of accumulations of seed, soil, mud and plant material parts including seeds, roots, flowers, fruit, and or stems.

Diagrams have been provided to assist in quickly identifying key areas to inspect and clean on a variety of vehicles associated with the targeted industries. These can be used in combination with vehicle checklists to ensure all areas of the vehicles have been inspected and cleaned.

Equipment Required

- A pump and high pressure hose OR high pressure water unit
- Minimum water pressure for vehicle cleaning should be at least 90 pounds per square inch. Water can be supplied as high volume/low pressure or low volume/high pressure (NOAA Fisheries Service).
- Air compressor and blower OR vacuum
- Shovel
- Pry bar
- Stiff brush or broom



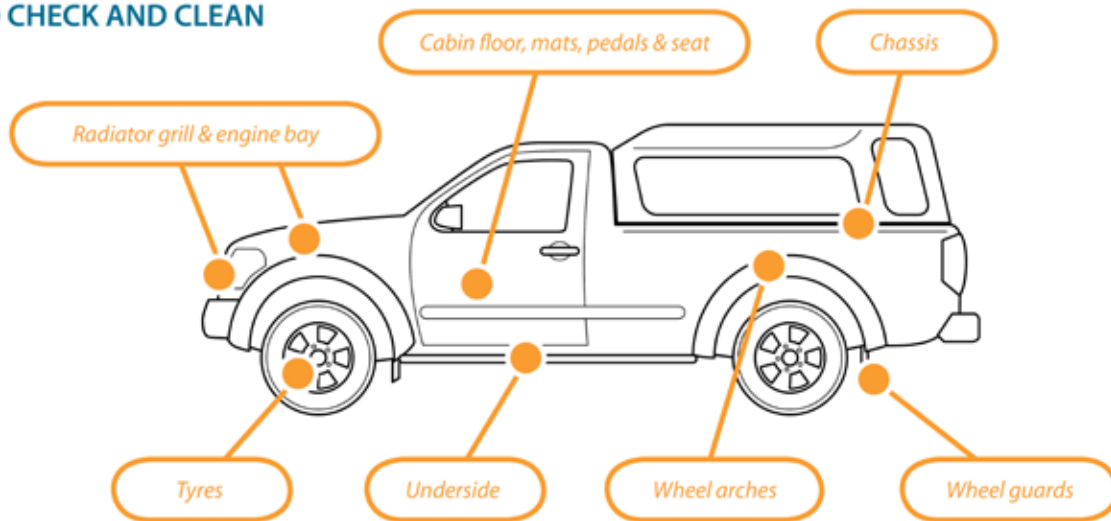
Cleaning station at construction site.

Photo by: Mark Heaton, OMNR

Inspection and Cleaning Diagrams and Checklists

2WD and 4WD Vehicles

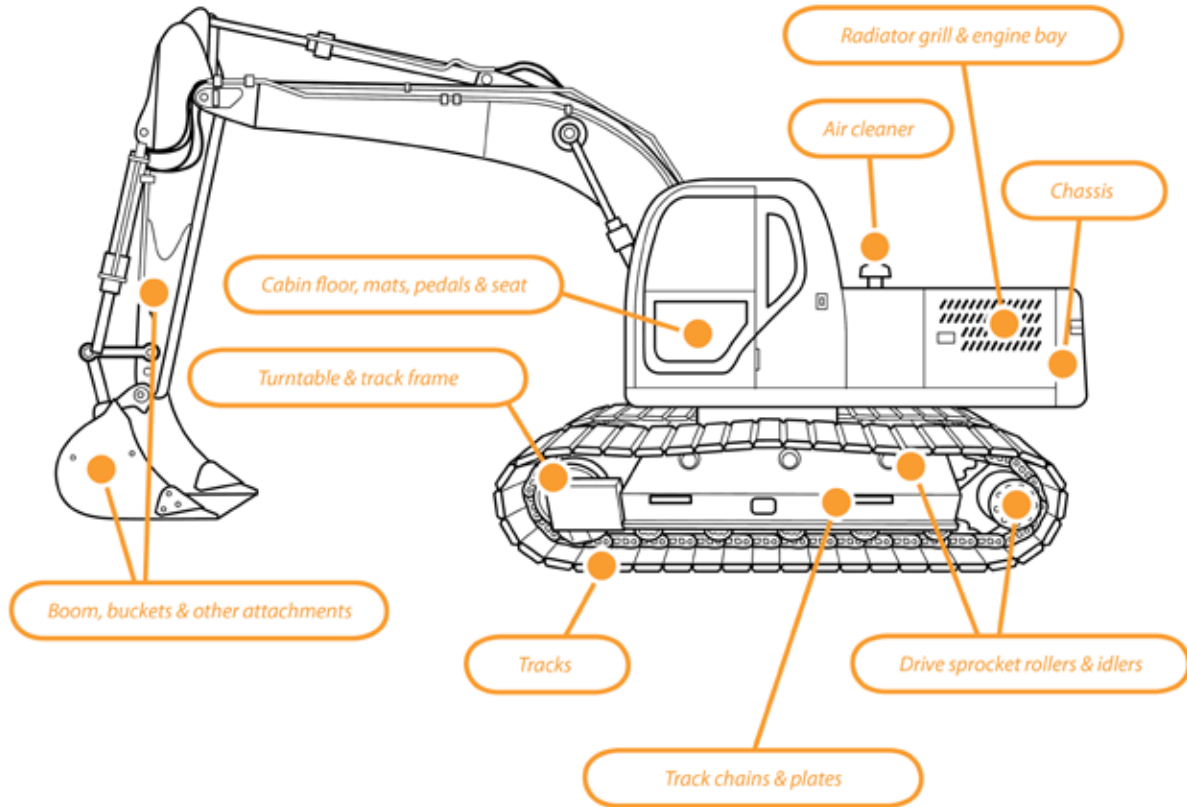
4WD VEHICLE WITH KEY SPOTS TO CHECK AND CLEAN



		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill	
Body	Underside, chassis, crevices, ledges, bumper bars	
Wheels	All wheels (including spare), wheel arches, guards	
Tray	Floor, canopy (if included)	

Excavator

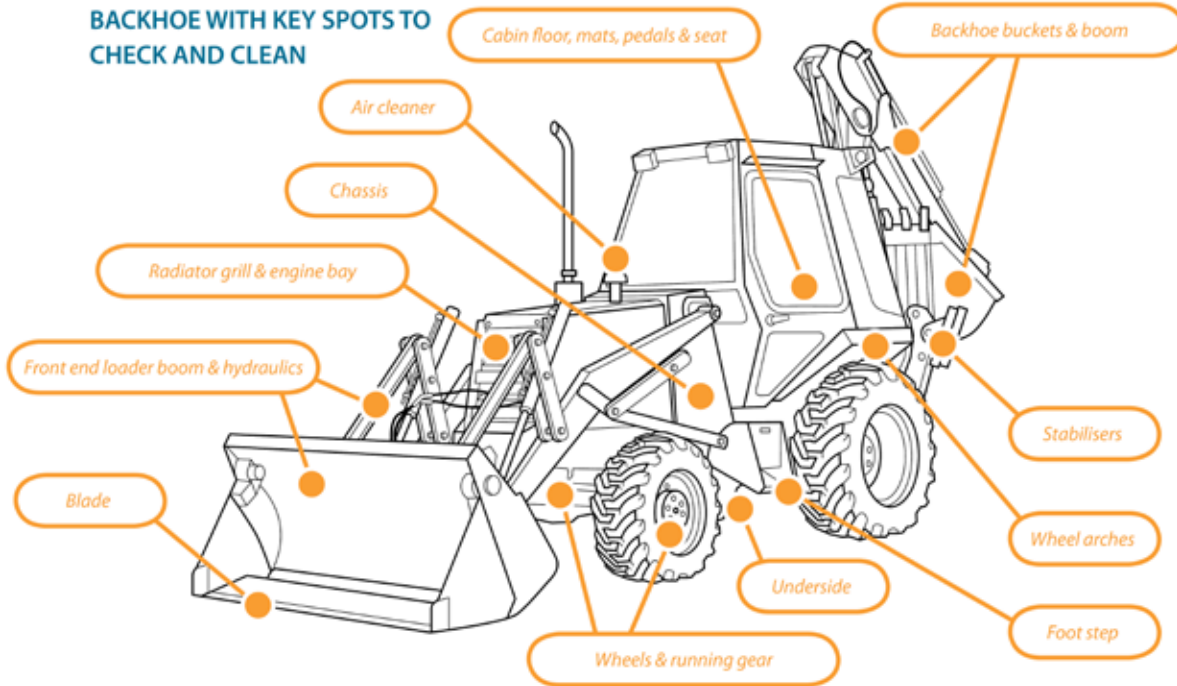
EXCAVATOR WITH KEY SPOTS TO CHECK AND CLEAN



		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill, air cleaner	
Tracks	Tracks, track frame, drive sprocket rollers, idlers	
Body Plates	Plates of cabin	
Body	Ledges, channels	
Bucket		
Booms		
Turret Pivot		

Backhoe

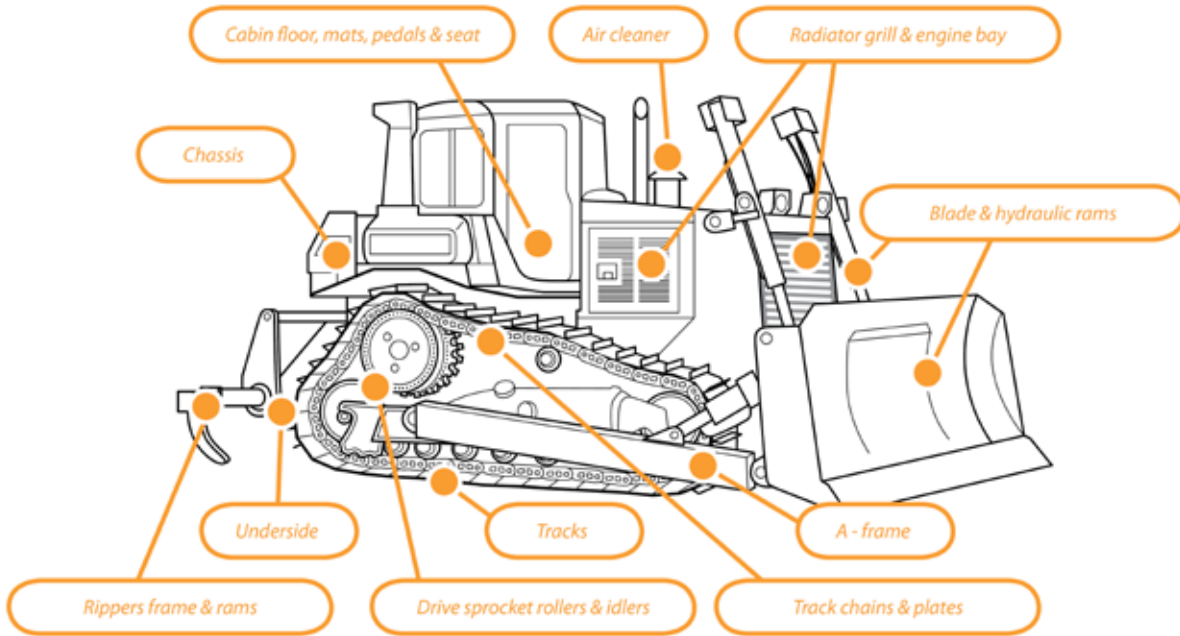
BACKHOE WITH KEY SPOTS TO CHECK AND CLEAN



		✓
Cabin	Floor, mats, pedals, seats, foot step	
Engine	Radiators, engine bay, grill, air cleaner	
Wheels	All wheels (including spare), wheel arches, guards	
Front end loader	Blade, hydraulics, booms	
Backhoe	Buckets, boom, hydraulics, stabilisers	

Bulldozer

BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill, air cleaner	
Tracks	Tracks, track frame, drive sprocket rollers, idlers	
Body Plates	Belly plates, rear plates	
Body	Ledges, channels	
Blade	Pivot points, hydraulic rams, a-frame	
Ripper	Ripper frame, ripper points	

Contacts and Resources

Ontario Invasive Species Strategic Plan 2012. Government of Ontario. Online, accessed May 8, 2012.

http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@biodiversity/documents/document/stdprod_097634.pdf

Invasive Species Management for Infrastructure Managers and the Construction Industry 2008. Wade, M. Booy, O. and White, V. Online, accessed April 27, 2012.

http://www.ciria.org/service/Web_Site/AM/ContentManagerNet/ContentDisplay.aspx?Section=Web_Site&ContentID=9001

T.I.P.S (Targeted Invasive Plant Solutions) Highway Operations. British Columbia Invasive Species Council. Online, accessed May 8, 2012.

http://www.bcinvvasiveplants.com/iscbc/publications/TIPS/Highways_Operations_TIPS.pdf

Invading Species Awareness Program Workshop Manual: Aquatic Invasive Species: An Introduction to Identification, Collection and Reporting of Aquatic Invasive Species in Ontario Waters (includes information on decontaminating equipment).

<http://www.invadingspecies.com/download/publications/manuals/WorkshopManual.pdf>

Reporting Invasive Species

To report invasive species, or view maps of existing records, visit the Invading Species Awareness Program website www.invadingspecies.com/report/ or www.eddmaps.org/Ontario.

Or call the OFAH/MNR Invading Species Awareness Program Hotline at **1-800-563-7711**.

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Clean Equipment Protocol Working Group:

Diana Shermet, Central Lake Ontario Conservation Authority; Paula Berketo, Ontario Ministry of Transportation; Travis Cameron, Ontario Ministry of Natural Resources; Jennifer Hoare, Ontario Parks; Michael Irvine, Ontario Ministry of Natural Resources; Alison Kirkpatrick, OFAH/MNR Invading Species Awareness Program; Erika Weisz, Ontario Ministry of Natural Resources; Amanda Chad, Ontario Power Generation; Nancy Vidler, Lambton Shores Phragmites Community Group; Nigel Buffone, Du Pont Canada Company; Ewa Bednarczuk, Lower Trent Conservation Authority

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More Information:

Ontario Invasive Plant Council: www.ontarioinvasiveplants.ca

Appendix A: Identification of Invasive Plants Found in Ontario

- **Common Buckthorn** (*Rhamnus cathartica*) and **Glossy Buckthorn** (*Frangula alnus*)
- **Dog-strangling Vine** (*Cynanchum rossicum*)
- **Garlic Mustard** (*Alliaria petiolata*)
- **Japanese Knotweed** (*Polygonum cuspidatum*)
- **Phragmites or Common Reed** (*Phragmites australis subsp. australis*)
- **Giant Hogweed** (*Heracleum mantegazzianum*)

common & glossy buckthorn

(*Rhamnus cathartica* & *R. frangula*)



Plant type: Shrub/small tree

Arrangement: Common buckthorn are sub-opposite (almost opposite). Glossy buckthorn are alternate.

Leaf: The common buckthorn leaf is egg shaped, edge of the leaf is “pebbled” (small rounded teeth). Veins converging toward leaf top. The glossy buckthorn leaf is more slender (tear drop shaped) and smooth margined.

Bark: Smooth, young bark with prominent raised patches or lenticels; rough texture and peeling bark when mature.

Seed/Flowers: Flowers are green-yellowish, small and inconspicuous. Green berries becoming purplish/black in late summer, berry > 1 cm in diameter.

Buds/Twigs: Common buckthorn has thorn-like tip on many twigs. Glossy buckthorn buds have no bud scales and lack thorny tips to twigs.

Habitat: Various - forest, thickets, meadows, dry to moist soils.

Similar native species: Native dogwoods, which lack the thorny “tip”. Native dogwoods are truly opposite in arrangement of twigs; only alternate leaved (pagoda) dogwood has alternate branching.



dog-strangling vine

(*Cynanchum rossicum* & *C. nigrum*)



Plant type: Herb, twining vine

Arrangement: Opposite

Leaf: Lance shaped, smooth margin (edge)

Bark: n/a

Seed/Flowers: Bean shaped seed pod with seeds attached to downy 'umbrellas'. Flowers - pink (*C. rossicum*) or purple (*C. nigrum*) with five petals.

Buds/Twigs: n/a

Habitat: Dry to moist soils; more dominant in meadows and woodland edges.

Similar native species: Swamp milkweed (*Asclepias incarnata* spp.), is an upright plant, typically found in wetland habitats.

garlic mustard

(*Alliaria petiolata*)



Plant type: Herb

Arrangement: Alternate

Leaf: Saw tooth like edge, elongated heart shape. Garlic/onion smell when crushed. Leaves are kidney shaped with prominent veins.

Bark: n/a

Seed/Flowers: Cluster of small white flowers with four petals. Small black < 1 mm rounded seed found in elongated 'tube-like' seed pods (similar to a bean pod).

Buds/Twigs: n/a

Habitat: Various – dry to moist soils, in all habitat types, less often in meadows.

Similar native species: n/a

japanese knotweed

(*Polygonum cuspidatum*)



Plant type: Herb, 2 - 4 m in height.

Arrangement: Alternate

Leaf: Tear drop shaped, sharp pointed, dark green, flattened at base.

Bark: n/a

Seed/Flowers: Flowering stalk of many small greenish-white flowers.

Buds/Twigs: Large plant with a 'bamboo-like' stem. Stem light green maturing to tan colour.

Habitat: Moist to wet soils found in wetlands, water-courses and roadside ditches.

Similar native species: None.

common reed

(*Phragmites australis*)



Plant type: Grass

Arrangement: Alternate

Leaf: Broad leaf > 1 cm wide.

Bark: n/a

Seed/Flowers: Dense cascading 'broom-like' flower head. 'Cottony' in appearance when mature.

Buds/Twigs: Stems rough and ridged, ligule a densely hairy band. Mature plants > 3 m tall.

Habitat: Moist to wet soils. Found in wetlands, water-courses and road side ditches.

Similar native species: Species of mannagrass (*Glyceria* sp) including tall northern, eastern and rattlesnake grass. A native common reed exists but has a smooth stem and the ligule is not hairy. It is also quite rare.

giant hogweed

(*Heracleum mantegazzianum*)



Plant type: Herb. Mature plants can be over 3m tall.

Arrangement: Alternate

Leaf: Lobed leaf 1-2 m wide, lobes sharp-pointed.

Bark: n/a

Seed/Flowers: Small, white flowers in a large umbrella-shaped cluster, .75 m wide.

Buds/Twigs: Hairy stem with purple spots.

Habitat: Fresh to wet soils in forests, swamps, meadows, marshes.

Similar native species: Cow parsnip (*Heracleum maximum*) – has smaller flowers, no purple spots on stems. Angelica (*Angelica atropurpurea*) has a rounded-topped flower cluster and leaves divided into many leaflets.

Do not touch this plant because it is poisonous. If you do, wash your skin immediately in cool soapy water and do not expose the area to sunlight.

Seek professional advice before removing.

Identification of Invasive Plants found in Ontario Photos by:

Credit Valley Conservation, Greg Bales, Ken Towle, Patrick Hodge,
Ontario Federation of Anglers and Hunters, Francine Macdonald, Matt Smith

