

## **1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Division 1 - General Requirements
- .2 Section 02 41 99 Demolition for Minor Works
- .3 Section 04 03 07 Historic - Masonry Repointing
- .4 Section 09 03 61 Historic Repainting

### **1.02 REFERENCES**

- .1 Definitions:
  - .1 Low-pressure water soaking: less than 350 kPa (50 psi), measured at nozzle tip.
  - .2 Medium-pressure water soaking: minimum 350 kPa (50 psi) and maximum 2700 kPa (400 psi), measured at nozzle tip.
- .2 Reference Standards:
- .3 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
  - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 United States Department of Labor
  - .1 Mine Safety and Health Administration/National Institute for Occupational Safety and Health (MSHA/NIOSH) Standards
- .6 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).
- .7 CSA Group
  - .1 CAN/CSA-Z94.4-[11], Selection, Use, and Care of Respirators.

### **1.03 ADMINISTRATIVE REQUIREMENTS**

- .1 Provide time and allow attendance of relevant employees at environmental briefing session arranged by Departmental Representative prior to beginning work of this Section.

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

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide WHMIS MSDS - Material Safety Data Sheets documentation in accordance with Section 01 33 00 - Submittal Procedures.

- .3 Provide proposed cleaning method and type of protection from cleaning residue for in-place conditions.
- .4 Samples:
  - .1 Provide samples of cleaning materials for approval of Departmental Representative.
  - .2 Demonstrate machinery, tools and nozzles for approval by Departmental Representative.
- .5 Test and Evaluation Reports:
  - .1 Provide test results.
    - .1 Provide three (3) copies of test results describing cleaning method, compressor equipment, water pressure at compressor, tools, nozzle size and distance from masonry surface used for cleaning of test patches.
    - .2 Proceed with cleaning upon receiving written approval by Departmental Representative concerning tested cleaning methods.

#### **1.05 PERFORMANCE REQUIREMENTS**

- .1 The intent is to clean the existing interior paint and white wash from existing masonry to allow for the application of a white wash.
- .2 The fundamental consideration for selection of appropriate cleaning procedures shall be that the materials and techniques adopted do minimal or no damage to the masonry substrates and finishes while achieving the desired degree of cleaning.
  - .1 Do not damaged existing mortar.
  - .2 Do not etch face of existing stone masonry.

#### **1.06 QUALITY ASSURANCE**

- .1 Regulatory Requirements: ensure work is performed in compliance with CEPA, CEAA and regulations.
- .2 Comply with requirements of Workplace Hazardous Materials Information Sheet (WHMIS).
- .3 Comply with Transport Canada (TC), Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).
- .4 Personnel requirements
  - .1 Use only contractors competent to meet all performance criteria specified.
  - .2 Provide full-time supervision by a competent foreman-mason.
  - .3 Ensure that all supervisory works have read and understood the relevant Section of the specification before commencing work.
  - .4 Workers performing masonry cleaning mock-ups in this section must be the same individuals that will carry out the masonry cleaning for

this project.

- .4 Mock-ups:
  - .1 Do mock-ups tests in accordance with Section 01 45 00 - Quality Control.
  - .2 Notify Departmental Representative 72 hours before commencing cleaning of each test patch.
  - .3 Conduct tests to determine effectiveness of air pressures, time periods, flow rates, types of nozzles and spraying distances from wall surface.
  - .5 Start with lowest impact tests and stop testing at desired level of cleaning is achieved, stop testing immediately when damage is caused.
  - .6 Test pressure at each storey height to determine effect of "line drop" on effectiveness of air pressure jets.
  - .7 Test brushing and spraying as alternative to pressure washing. Consult to review test results. Use method approved by Departmental Representative.
  - .8 Areas to be test cleaned to include
    - .1 Interior lime washed and painted masonry and concrete walls**
  - .9 Locate test patches in inconspicuous places directed by Departmental Representative.
  - .10 Test patches: Micro-abrasive cleaning 1000mm by 1000mm interior walls low pressure with 4 types of grit.
  - .11 Conduct tests to determine best methods of protecting surrounding historic material, openings and plants during test cleaning procedure, and monitor for detrimental effects.
  - .12 Do not proceed with work without approval of mock-up.
  - .13 Allow 72 hours for inspection of mock-up by Departmental Representative.
  - .14 Accepted mock-up will demonstrate minimum standard for work. Mock-up may remain as part of finished work.

#### **1.07 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Packaging Waste Management: remove for reuse and return packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

#### **1.08 AMBIENT CONDITIONS**

- .1 Do not use wet cleaning methods when there is threat of frost.
- .2 Do not use chemical cleaners when temperature is below 10 degrees C.
- .3 Follow manufacturer's written instructions on use of chemical cleaners in accordance with product's temperature range application.
- .4 Provide shading to wall to avoid cleaning in full, hot sunlight.

- .5 Do not clean if there is risk of chemical spray being blown onto surrounding historic material, publicly accessible areas or plants.
- .6 Contain and collect all water, liquids and residues within the work area for proper disposal.

## 1.09 SEQUENCE OF WORKS / CLEANING SCHEDULE

- .1 Submit method statements for Departmental Representatives review.
- .2 Complete mock-ups
- .3 For Paint / White wash coatings to be removed, the following methodology give initial guidance in the sequence of cleaning operations required to remove specific types of soiling. Final selection will be made by the Department Representative after testing.
  - .1 Scaling back
  - .2 Low-Pressure Vortex Grit-Blast
  - .3 Dry ice Cleaning
  - .4 Compressed Air System

## 2 PRODUCTS

### 2.01 MATERIALS

- .1 Use clean potable water free from contaminants.
- .2 Clean potable water to be shipped to site.
- .3 Use air free from oil or other contaminants.
- .4 Use masking material strippable masking to approval of Departmental Representative.
- .5 Dry ice extrusion to suite size of selected machine
- .6 The low-pressure vortex air abrasive and the sieve size of grit to be used during cleaning of masonry will be specified in writing after testing. For the purposes of estimation the following abrasives will be considered during testing
  - Olivine 120 Mesh
  - Corn 120 Mesh

### 2.02 TOOLS AND EQUIPMENT

- .1 Use brushes with natural or soft plastic bristles. Do not use ferrous-metal brushes.
- .2 Use scrapers of wood or plastic only.

- .3 Vacuum: industrial vacuum with 500mm hose.
- .4 Ploy sheeting: 0.15mm (6 mil poly) polyethylene sheeting.
- .5 Plastic buckets.
- .5 Low-Pressure Vortex Grit-Blast
  - .1 Use fitted with accurate pressure regulators and gauges capable of being preset and locked at maximum specified levels.
  - .2 Maximum pressure rating of 500 kPa.
  - .3 Modulised nozzle, which creates a gentle swirling vortex utilizing low volumes of water, fine inert granulate and air.
  - .4 Use nozzles with 9 mm opening.
  - .5 Use plastic or non-ferrous metal piping and fittings.
  - .6 Water Consumption - Max 60 litres per hours
  - .7 Components include, pressure pot, air coolor, pump
  - .8 Compressed air volume 125cfm
- .6 Compressed Air System
  - .1 On-line dry compressed air
  - .2 Compressed air to be clean and free from oil, moisture or any other contaminants.
  - .3 Provide an on-line filter with a manual drain at the manifold.
  - .4 Regulate the air pressure at the compressor and at the work face by an accurate press.
  - .5 Maximum pressure rating of 500 kPa.
  - .6 Use plastic or non-ferrous metal piping and fittings.
- .7 Dry ice cleaning machine
  - .1 Use fitted with accurate pressure regulators and gauges capable of being preset and locked at maximum specified levels.
  - .2 Hopper size 9.1 kg
  - .3 Feed rate of 0-0.5kg/min
  - .4 air consumption of 12-50 CFM
  - .5 Blast pressure range 138 to 965 KPA
  - .6 Use plastic or non-ferrous metal piping and fittings.

### **3 EXECUTION**

#### **3.01 SITE VERIFICATION OF CONDITIONS**

- .1 Record existing conditions, by means of photographs, before and after cleaning. Advise Departmental Representative of potential complications.
- .2 Report to Departmental Representative conditions of deteriorated masonry or pointing not noted on Contract Drawings found before and during cleaning.
- .3 Obtain written approval of Departmental Representative before cleaning areas of deteriorated masonry.

#### **3.02 PREPARATION**

- .1 Protect operatives and other site personnel from hazards.

- .1 Ensure good ventilation in work area.
- .2 Ensure workers wear protective equipment to MSHA/NIOSH standard.
- .2 Place safety devices and signs near work areas as indicated and directed.
- .3 Seal or repair openings and joints where there is potential risk of abrasive infiltration.

### 3.03 PROTECTION OF IN-PLACE CONDITIONS

- .1 Cover and protect surfaces and non-masonry finishes not to be cleaned.
  - .1 Obtain approval of protection method from Departmental Representative before commencing cleaning procedure.
- .2 Protect vents, windows, and other openings, to prevent abrasive entry.
  - .1 Protect masonry openings from abrasive infiltration with polyethylene during cleaning.
- .3 Protect wood, glass, and metal adjacent to masonry.
- .8 Protect adjacent Work from spread of dust and dirt beyond work areas.

### 3.04 EXECUTION

#### .1 Mechanical Cleaning

- .1 Proceed with cleaning in accordance with written instructions of methods, systems, tools and equipment approved by Departmental Representative.
- .2 Stop work when cleaning has detrimental effect on surrounding material and plants.
- .3 Soften and loosen heavy deposits with prolonged spray, then brush. Remove thick incrustations with wooden or plastic scrapers.
- .4 Employ one skilled operator for all low-pressure cleaning work in the project.
- .5 Follow all relevant safe regulations.
  - .1 Wear hand, eye, breathing and ear protection.
  - .2 When blasting in an enclosed area ensure proper ventilation, by providing exhaust fan.
- .6 Scaling-back
  - .1 Dry brush or scrape accumulations from walls and ledges.
  - .2 Remove loose, scaling, or friable stone, cementitious slurries, drips, stains, and mortar droppings by light dressing with pneumatic chisels and stiff brushes.
  - .2 Remove tool marks caused by this procedure using hand held carborundum rubbing blocks.

- .3 Finish surface using low-pressure air abrasive cleaning techniques where appropriate.
- .4 Obtain written review and acceptance of test procedures from Departmental Representative (Site Conservator) before commencing work.
- .5 Scaling back may be required on more than one occasion if the stone delaminates further during the course of the treatment due to wetting and drying cycling and the action of salts.
- .7 Low-Pressure Vortex Grit-Blast
  - .1 Use an accepted hand-controlled trigger head for low pressure grit-blast cleaning.
  - .2 Commence cleaning using 0.1 - 0.2 MPA (15-25 psi) air-pressure. Use lowest pressure that will remove surface soiling. Multiple cleaning passes will be required depending upon the level of soiling. Do not exceed si 0.4 MPa (50 psi)line pressure
  - .4 Do not exceed maximum pressure at nozzle or have nozzle closer to masonry than approved by Departmental Representative at tests.
  - .5 Keep nozzle minimum 450 mm distance away from masonry surface as approved by Departmental Representative.
  - .6 Do not use abrasive coarser than 70 mesh (200µm). Use 100 mesh (150µm) grit as standard for work. Provide range of materials and grades of grit for testing purposes. Provide approved grade of grit for the work.
  - .4 Use 100 mesh grit as standard for work. Provide range of materials and grades of grit for testing purposes. Provide approved grade of grit for the work.
- .8 Dry ice Blasting
  - .1 Use an accepted hand-controlled trigger head for low pressure grit-blast cleaning.
  - .2 Commence cleaning using 0.1 - 0.2 MPA (15-25 psi) air-pressure. Use lowest pressure that will remove surface soiling. Multiple cleaning passes will be required depending upon the level of soiling. Do not exceed si 0.4 MPa (50 psi)line pressure
  - .4 Do not exceed maximum pressure at nozzle or have nozzle closer to masonry than approved by Departmental Representative at tests.
  - .5 Keep nozzle minimum 450 mm distance away from masonry surface as approved by Departmental Representative.

### 3.05 CLEANING

- .1 Rinse from bottom to top and from top to bottom.
- .2 Clean up work area as work progresses. At end of each work day remove debris and waste from site.
- .3 Upon completion, clean and restore areas used for work to condition equal to that previously existing.
- .4 Collect, neutralize and dispose of water and chemicals in accordance with contract requirements, applicable regulations and Canadian Environmental Protection Act, (CEPA).
- .5 Remove all spent grit from the site at the end of the working day. Wet down and dispose of the waste in closed containers.
- .6 Blast all cleaned areas with a light compressed air blast (100 psi max) to remove dust and grit from the masonry after cleaning.
- .7 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### 3.06 PROTECTION OF WORK

- .1 Protect finished Work from damage until take-over.

**END OF SECTION**