

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 02 65 00 - Underground Storage Tank Removal
- .2 Section 31 23 33.01 Excavating, Trenching and Backfilling.

**1.2 MEASUREMENT AND PAYMENT**

- .1 Measurement Procedures.
  - .1 Measure removal of Portland cement concrete pavement in square metres for each thickness specified.
  - .2 Measure removal of base and sub-base pavement materials in square metres for each thickness specified.
  - .3 Measure removal of concrete slabs, regardless of thickness in square metres.
  - .4 Measure removal of wood parking curbs per unit.
  - .5 Payment for stockpiling, disposal, alternative disposal, excavating, backfilling and restoration will be included in above removal items.
  - .6 Payment for all items in Selective Demolition except for hazardous materials disposal will be on a lump sum basis under Site Demolition.
  - .7 Measure removal of waste or materials designated for alternate disposal from site in tonnes.

**1.3 REFERENCES**

- .1 Definitions:
  - .1 Demolition: rapid destruction of building following removal of hazardous materials.
  - .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.
  - .3 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.
    - .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
    - .2 Indicates quantities of reuse, recycling and landfill.
  - .4 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

- .5 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.
- .2 Reference Standards:
  - .1 Canadian Council of Ministers of the Environment (CCME)
  - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .3 Transport Canada (TC)
    - .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- .1 Site Meetings.
  - .1 Convene pre-demolition meeting one week prior to beginning work of this Section in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Co-ordination with other building subtrades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
  - .2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
  - .3 Hold project meetings every two weeks.
  - .4 Ensure key personnel, site supervisor, project manager, and subcontractor representatives attend.
  - .5 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.
  - .1 Notify Departmental Representative in writing when unforeseen delays occur.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province Alberta, Canada.
  - .2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.
- .3 Hazardous Materials:

- .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.
- .4 Waste Reduction Workplan:
  - .1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal and indicate:
    - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
    - .2 Schedule of selective demolition.
    - .3 Number and location of dumpsters.
    - .4 Anticipated frequency of tippage.
    - .5 Name and address of waste facilities and waste receiving organizations.
- .5 Certificates:
  - .1 Submit copies of certified weigh bills bills of lading receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on weekly basis upon request of Departmental Representative.
  - .2 Written authorization from Departmental Representative is required to deviate from facilities and receiving organizations listed in Waste Reduction Workplan.
- .6 Sustainable Design Submittals:
  - .1 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction.

## **1.6 QUALITY ASSURANCE**

- .1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, PCA, and applicable Provincial/Territorial regulations.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Storage and Protection.
  - .1 Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
  - .2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
  - .3 Remove and store materials to be salvaged, in manner to prevent damage.
  - .4 Store and protect in accordance with requirements for maximum preservation of material.
  - .5 Handle salvaged materials as new materials.
- .3 Develop Construction Waste Management Plan related to Work of this Section.

## **1.8 SITE CONDITIONS**

- .1 Site Environmental Requirements.
  - .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.
  - .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
  - .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
    - .1 Ensure proper disposal procedures are maintained throughout the project.
  - .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
  - .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities and as directed by the Departmental Representative.
  - .6 Protect trees, plants and foliage on site and adjacent properties where indicated.

## **Part 2 Products**

### **2.1 EQUIPMENT**

- .1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.
- .4 Disconnect and Cap Mechanical Services.
  - .1 Other Underground Services (abandoned Telus phone line): remove and dispose of as directed by Departmental Representative.
  - .2 Underground Storage Tanks: remove and dispose of in accordance with CCME PN1326 and directions of Departmental Representative and Section 02 65 00 - Underground Storage Tank Removal.

### **3.2 REMOVAL OF HAZARDOUS WASTES**

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

### **3.3 REMOVAL OPERATIONS**

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.
- .3 Removal of pavements, curbs and gutters:
  - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.
  - .2 Protect adjacent joints and load transfer devices.
- .4 Remove as many trees as required during demolition.
  - .1 Obtain written approval of Departmental Representative prior to removal of trees not designated.
- .5 Prior to tree removal the Owner reserves the right to collect trees for removal and identified by Departmental Representative to be healthy.
  - .1 Grind, chip, or shred other vegetation for mulching and composting.
- .6 Stockpile topsoil for final grading and landscaping:
  - .1 Provide erosion control and seeding if not immediately used.
- .7 Salvage:
  - .1 Dismantle items containing materials for salvage and stockpile salvaged materials at locations.
- .8 Disposal of Material:
  - .1 Dispose of materials not designated for salvage or reuse on site at authorized facilities approved in Waste Reduction Workplan.
  - .2 Trim disposal areas to approval of Departmental Representative.
- .9 Backfill:
  - .1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### **3.4 STOCKPILING**

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

### **3.5 REMOVAL FROM SITE**

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .3 Transport material designated for alternate disposal using approved receiving organizations in accordance with applicable regulations.
  - .1 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
  - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
  - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

### **3.6 RESTORATION**

- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.
- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

### **3.7 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
  - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
  - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.8 PROTECTION**

- .1 Repair damage to adjacent materials or property caused by selective site demolition.

**END OF SECTION**

Approved: 2010-12-31

**Part 1**  
**1.1 General**  
**RELATED REQUIREMENTS**

- .1 Section 01 31 19 - Project Meetings.
- .2 Section 01 35 43 - Environmental Procedures

**1.2 REFERENCES**

- .1 Definitions:
  - .1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.
  - .2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.
  - .3 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill.
  - .4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.
- .2 Reference Standards:
  - .1 Canadian Environmental Protection Act (CEPA)
    - .1 CCME PN 1326-2008, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems for Petroleum Products and Allied Petroleum Products.
  - .2 CSA International
    - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
  - .3 Department of Justice Canada (Jus)
    - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
    - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
      - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
      - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
      - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
  - .4 U.S. Environmental Protection Agency (EPA)
    - .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles.

- .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles.
- .3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-Installation Meetings:
  - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
    - .1 Verify project requirements.
    - .2 Verify existing site conditions adjacent to demolition work.
    - .3 Co-ordination with other construction subtrades.
  - .2 Ensure key personnel attend.
  - .3 WMC must provide written report on status of waste diversion activity at each meeting.
  - .4 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling:
  - .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.
    - .1 In event of unforeseen delay notify Departmental Representative in writing.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 74 21 - Construction/Demolition Waste Management Disposal.
- .2 WMC is responsible for fulfilment of reporting requirements.
- .3 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal and indicate:
  - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
  - .2 Schedule of selective demolition.
  - .3 Number and location of dumpsters.
  - .4 Anticipated frequency of tippage.
  - .5 Name and address of waste receiving organizations.
- .4 Submit copies of certified weigh bills bills of lading receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on a weekly basis upon request of Departmental Representative.
  - .1 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.



## **1.5 QUALITY ASSURANCE**

- .1 Regulatory Requirements: Ensure Work is performed in compliance with applicable Provincial/Territorial and Municipal regulations.

## **1.6 SITE CONDITIONS**

- .1 Environmental protection:
  - .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
  - .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
  - .3 Fires and burning of waste or materials is not permitted on site.
  - .4 Do not bury rubbish waste materials.
  - .5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
    - .1 Ensure proper disposal procedures are maintained throughout project.
  - .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
  - .7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.
  - .8 Protect trees, plants and foliage on site and adjacent properties where indicated.
  - .9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
  - .10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

## **1.7 EXISTING CONDITIONS**

- .1 If material resembling spray or trowel applied asbestos or other substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Departmental Representative immediately. Proceed only after receipt of written instructions have been received from Departmental Representative.
- .2 Structures to be demolished are based on their condition on date that tender is accepted,
  - .1 Remove, protect and store salvaged items as directed by Departmental Representative. Salvage items as identified by Departmental Representative. Deliver to Departmental Representative as directed.

## **Part 2 Products** **2.1 EQUIPMENT**

- .1 Equipment and heavy machinery:
  - .1 On-road vehicles to: CEPA-SOR/2003-2, On-Road Vehicle and Engine Emission Regulations and CEPA-SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
  - .2 Off-road vehicles to: EPA CFR 86.098-10 and EPA CFR 86.098-11.

- .2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

**Part 3**  
**3.1 Execution**  
**PREPARATION**

- .3 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: requirements of authorities having jurisdiction and sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.
- .4 Protection of in-place conditions:
  - .1 Work in accordance with Section 01 35 43 - Environmental Procedures and Erosion and Sedimentation Control Plan.
  - .2 Prevent movement, settlement or damage of adjacent structures, trees, landscaping, adjacent grades.
    - .1 Repair damage caused by demolition as directed by Departmental Representative.
  - .3 Support affected structures and, if safety of structure being demolished adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.
  - .4 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.
- .5 Surface Preparation:
  - .1 Disconnect electrical and telephone service lines entering buildings to be demolished.
    - .1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.
  - .2 Disconnect and cap mechanical services.
    - .1 Other underground services: remove and dispose of as directed by Departmental Representative.
  - .3 Septic Tanks:
    - .1 Pump out buried septic tanks, left in place. Fill with sand.
    - .2 Remove tanks within area of new construction or under paved areas and slabs.
    - .3 Removal in accordance with CCME, Code of Practice PN 1326.
  - .4 Underground storage tanks and piping: remove and dispose in accordance with as directed.

- .5 Do not disrupt active or energized utilities designated to remain undisturbed.
  - .6 Remove rodent and vermin as required by Departmental Representative.
- 3.2 DEMOLITION**
- .6 Do demolition work in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
  - .7 Blasting operations not permitted during demolition without permission from Departmental Representative.
  - .8 Do blasting operations in accordance with CSA S350.
  - .9 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.
  - .10 Prior to start of Work remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of in approved manner.
  - .11 Demolish structures.
  - .12 Crush concrete generated due to demolition of foundations to size as directed.
    - .1 Dispose of crushed concrete products by burying on site.
  - .13 Demolish foundation walls and footings, and concrete floors below or on grade within areas of new construction.
  - .14 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.
  - .15 At end of each day's work, leave Work in safe and stable condition.
  - .16 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.
  - .17 Demolish masonry and concrete walls.
  - .18 Remove structural framing.
  - .19 Contain fibrous materials to minimize release of airborne fibres while being transported within facility.
  - .20 Only dispose of material specified by selected alternative disposal option as directed by Departmental Representative.
    - .1 Additional disposal options to be provided by Departmental Representative on-site waste diversion representative prior to disposal.
  - .21 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.
  - .22 Remove following materials and equipment, store, protect, and leave ready for installation by other sections of Work:
    - .1 Information kiosk.
  - .23 Remove following materials and equipment and dispose:
    - .1 Telephone + booth.
    - .2 Information kiosk slab

- .3 Existing washroom and tanks – to be carefully removed and brought to 1 Compound Road (Parks Canada facility).
- .4 Existing washroom slab
- .5 Existing wheel stops – concrete blocks can be buried, timber to be disposed off site.
- .6 Existing picnic table - dispose
- .24 Use natural lighting to do Work where possible.
- .1 Shut off lighting except those required for security purposes at end of each day.
- 3.3 CLEANING**
- .25 Develop Construction Waste Management Plan related to Work of this Section
- .26 Divert excess materials from landfill to site approved Departmental Representative.
- .27 Designate appropriate security resources / measures to prevent vandalism, damage and theft.
- .28 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible.
- .29 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.
- .1 Label stockpiles, indicating material type and quantity.
- .30 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project construction.
- .31 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .32 Transport material designated for alternate disposal using approved receiving organizations listed in Waste Reduction Workplan and in accordance with applicable regulations.
- .1 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.
- .33 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
- .1 Disposal facilities must be those approved of and listed in Waste Reduction Workplan.
- .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

**END OF SECTION**

Approved: 2008-06-30

- Part 1**
- 1.1 General  
RELATED REQUIREMENTS**
- .34 Section 01 33 00 - Submittal Procedures
  - .35 Section 31 22 13 - Rough Grading
  - .36 Section 31 23 10 - Excavating, Trenching and Backfilling
- 1.2 REFERENCES**
- .37 Canadian Council of Ministers of the Environment (CCME)
    - .1 CCME PN 1299-2006, Canadian Environmental Quality Guidelines.
      - .1 Chapter 7-2006, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.
  - .38 Canadian Federal Legislation
    - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
    - .2 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
    - .3 Canada Labour Code (R.S. 1985, c. L-2).
      - .1 Part II (September 2000) - Occupational Health and Safety.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS**
- .39 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .40 Provide written storage tank description in accordance with Section 01 33 00 - Submittal Procedures.
  - .41 Provide the following information on storage tank:
    - .1 Former contents.
    - .2 Location.
    - .3 Reason for removal.
  - .42 Provide Departmental Representative with copy of vapour removal test results.
  - .43 Forward affidavit of destruction of underground storage tank to authority having jurisdiction.
- 1.4 QUALITY ASSURANCE**
- .44 Contractor must be licensed/certified by Province/Territorial authorities having jurisdiction for removal of underground storage tanks.
    - .1 License/certificate, title and number must be provided prior to start of work.
    - .2 Regulatory Requirements: ensure Work is performed in compliance with CEPA and applicable Provincial/Territorial regulations.
- 1.5 DELIVERY, STORAGE AND HANDLING**
- .45 Divert metal materials from landfill to metal recycling facility approved by Departmental Representative.

- .46 Segregate and deliver non-salvageable or non-recyclable materials, including waste liquids and sludges to Provincially/Territorially licensed waste facility.

**Part 2**  
**2.1**            **Products**  
                  **NOT USED**

- .47 Not Used.

**Part 3**  
**3.1**            **Execution**  
                  **PREPARATION SAFETY AND SECURITY**

- .48 Conform to or exceed Federal, Provincial and Territorial codes, local municipal by-laws, by-laws, and codes and regulations of utility authorities having jurisdiction.
- .49 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .50 Protection:
  - .1 Meet safety requirements of Occupational Safety and Health, Canada Labour Code Part II and Regulations for Construction Projects.
  - .2 Disconnect or remove source of ignition from vicinity of tank.
  - .3 Provide temporary protection for safe movement of personnel and vehicle traffic.
  - .4 Cut, braze or weld metal only in monitored areas established to be free of ignitable vapour concentrations.
  - .5 Ground and bond metal equipment, including tanks and transfer pipes, before operating equipment or transferring flammable materials.
  - .6 Use non-sparking tools and intrinsically safe electrical equipment.
  - .7 Smoking is not permitted.

**3.2**            **DRAINING**

- .51 Drain and flush piping into tank.
- .52 Pump out liquid from tank
  - .1 Use explosion proof, air driven or hand pump.
- .53 Remove sludge from tank bottom.
  - .1 Dispose of product and sludge in accordance with local, Provincial and Territorial regulations using waste disposal carrier licensed by Provincial/Territorial Environmental Agency having jurisdiction.

**3.3**            **EXCAVATION TRENCHING AND BACKFILL**

- .54 Do work in accordance with Section 31 23 10 - Excavation, Trenching and Backfilling.
- .55 Provide protective material around excavation.
- .56 Provide constant supervision during excavation and backfilling.
- .57 Excavation:
  - .1 Excavate until top of tank and connections and openings are exposed.
  - .2 Disconnect piping:

- .1 Remove fill tube.
- .2 Disconnect fill gauge, product and vent lines.
- .3 Cap or plug open ends of lines that are not to be used further.
- .4 Remove piping from ground.
- .3 Temporarily plug tank openings.
- .4 Continue excavation until tank is completely exposed.
- .5 Temporarily stockpile on site soil in vicinity of tank, until waste classification can be established prior to final disposal.

- .58 Prevent movement, settlement or damage of adjacent trees, landscaping, and adjacent grades.

### **3.4 TANK REMOVAL**

- .59 Remove tank in accordance with CCME Code of Practice PN 1326 and/or applicable provincial standards and regulations, and place in secure location.
- .60 Block tank to prevent movement.
- .61 Contact Departmental Representative immediately if there is evidence of contamination in tank excavation, stop Work until further notice.
- .62 Remove and replace contaminated soil and accumulated flammable or combustible liquid with clean fill common to local area in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

### **3.5 VAPOUR REMOVAL**

- .63 Purging:
  - .1 Purge vapours to less than 10% of lower explosive limit (LEL).
  - .2 Verify with combustible gas metre.
- .64 Inverting:
  - .1 Displace oxygen to levels below necessary to sustain combustion.
  - .2 Verify with combustible gas metre.
- .65 Water Method:
  - .1 Fill tank with water to expel vapours.
  - .2 Remove and dispose of contaminated water in accordance with regulations after tank is removed from site.
  - .3 Verify with combustible gas metre.
- .66 Dry Ice Method:
  - .1 Add 1.85 gm of solid carbon dioxide (dry ice) for each 100 litre capacity.
  - .2 Crush and distribute ice evenly over greatest area to secure rapid evaporation. Avoid skin contact.
  - .3 Verify dry ice has vapourized.
- .67 Air Method:
  - .1 Ventilate tank with air using small gas exhaustor operated with compressed air.

- .2 Air to enter opening at one end and to exit opening at other end to quickly remove vapour.

- .3 Test interior of tank to determine when tank is free of vapour.

### 3.6

#### **CAPPING**

- .68 Cap holes after tank has been freed of vapours and before tank is moved from site.

- .1 Leave vents open.

- .69 Plug corrosion leak holes using screwed (boiler) plugs.

- .70 Leave 3 mm vent hole in one plug to prevent tank from being subjected to excessive pressure differential caused by extreme temperature change.

### 3.7

#### **SECURING AND REMOVAL FROM SITE**

- .71 Check vapour levels prior to transport:

- .1 Remove vapour if required.

- .72 Dispose of tank in accordance with local, Provincial, Federal or Territorial regulations.

- .73 Truck removal:

- .1 Secure tank on truck for transport to disposal site.

- .2 Cut suitable openings in tank sides to render tank unusable.

- .3 Ensure 3 mm vent hole located at uppermost point on tank.

### 3.8

#### **SITE REMEDIATION**

- .74 To CCME PN 1299.

- .75 Repair/replace finish grade to match surrounding area, including but not limited to sods as specified in Section 31 22 13 - Rough Grading.

### 3.9

#### **WORKMANSHIP AND DISPOSAL**

- .76 Tanks destined for disposal:

- .1 Dismantle, cut sufficient openings or otherwise render unusable.

**END OF SECTION**



Approved: 2006-09-30

**Part 1**

**General**

**1.1 RELATED REQUIREMENTS**

- .77 Section 03 20 00 Concrete Reinforcing
- .78 Section 03 30 00 Cast in Place Concrete
- .79 Section 07 92 00 - Joint Sealants

**1.2 REFERENCES**

- .80 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3 CSA O121-M1978(R2003), Douglas Fir Plywood.
  - .4 CSA O151-04, Canadian Softwood Plywood.
  - .5 CSA O153-M1980(R2003), Poplar Plywood.
  - .6 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
  - .7 CSA O437 Series-93(R2006), Standards for OSB and Waferboard.
  - .8 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
  - .9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada
- .81 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .82 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .83 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .84 Waste Management and Disposal:
  - .1 Place materials defined as hazardous or toxic in designated containers.
  - .2 Divert plastic materials from landfill to a recycling facility as approved by Departmental Representative.
  - .3 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

**Part 2**

**Products**

**2.1 MATERIALS**

- .85 Formwork materials:

- .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series, or CSA-O153.
- .2 Rigid insulation board: to CAN/ULC-S701.
- .86 Form ties:
  - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .87 Form liner:
  - .1 Plywood: high density overlay, medium density overlay Douglas Fir to CSA O121. Thickness as required to maintain tolerances.
- .88 Form release agent: non-toxic, biodegradable, low VOC.
- .89 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .90 Falsework materials: to CSA-S269.1.
- .91 Sealant: to Section 07 92 00 - Joint Sealants.

**Part 3**  
**3.1**

**Execution**  
**FABRICATION AND ERECTION**

- .92 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .93 Obtain Departmental Representative approval for use of earth forms framing openings not indicated on drawings.
- .94 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .95 Fabricate and erect falsework in accordance with CSA S269.1.
- .96 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .97 Do not place shores and mud sills on frozen ground.
- .98 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .99 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .100 Align form joints and make watertight.
  - .1 Keep form joints to minimum.
- .101 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .102 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

- .103 Construct forms for architectural concrete, and place ties as directed.
  - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .104 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
  - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .105 Line forms for following surfaces:
  - .1 Outer face of outside walls, curbs and vertical edge of bridge sidewalk slab.
  - .2 Exposed faces of abutments, wingwalls, piers and pylons: do not stagger joints of form lining material and align joints to obtain uniform pattern.
  - .3 Secure lining taut to formwork to prevent folds.
  - .4 Pull down lining over edges of formwork panels.
  - .5 Ensure lining is new and not reused material.
  - .6 Ensure lining is dry and free of oil when concrete is poured.
  - .7 Application of form release agents on formwork surface is prohibited where drainage lining is used.
  - .8 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
  - .9 Cost of textile lining is included in price of concrete for corresponding portion of Work.
- .106 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

### **3.2 REMOVAL AND RESHORING**

- .107 Leave formwork in place for following minimum periods of time after placing concrete.
  - .1 2 days for walls and sides of beams.
  - .2 7 days for beam soffits, slabs, decks and other structural members, or 2 days when replaced immediately with adequate shoring to standard specified for falsework.
  - .3 2 days for footings and abutments.
- .108 Remove formwork when concrete has reached 75 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .109 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .110 Space reshoring in each principal direction at not more than 3000 mm apart.
- .111 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

**END OF SECTION**



Approved: 2009-12-31

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .112 Section 03 10 00 - Concrete Forming and Accessories
- .113 Section 03 30 00 - Cast in Place Concrete

**1.2 PRICE AND PAYMENT PROCEDURES**

- .114 Measurement and Payment:
  - .1 No measurement will be made under this Section.
  - .1 Include reinforcement costs in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

**1.3 REFERENCES**

- .115 American Concrete Institute (ACI)
  - .1 SP-66-04, ACI Detailing Manual 2004.
- .116 ASTM International
  - .1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .2 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  - .3 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .
- .117 CSA International
  - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
  - .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
  - .4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .118 Reinforcing Steel Institute of Canada (RSIC)
  - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .119 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .120 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.

- .121 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
    - .1 Indicate placing of reinforcement and:
      - .1 Bar bending details.
      - .2 Lists.
      - .3 Quantities of reinforcement.
      - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
      - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
  - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3.
    - .1 Provide type unless otherwise indicated.
- .122 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by Departmental Representative prior to its use.

## **1.5 QUALITY ASSURANCE**

- .123 Submit as described in PART 2 - SOURCE QUALITY CONTROL.
  - .1 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .124 Deliver, store and handle materials in accordance with with manufacturer's written instructions.
- .125 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .126 Storage and Handling Requirements:
  - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **Part 2**

### **2.1 Products**

### **MATERIALS**

- .127 Substitute different size bars only if permitted in writing by Departmental Representative.
- .128 Reinforcing steel: billet steel, grade 300, deformed bars to CSA-G30.18, unless indicated otherwise.
- .129 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.
- .130 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
- .131 Welded steel wire fabric: to ASTM A185/A185M.

- .132 Welded deformed steel wire fabric: to ASTM A82/A82M.
- .133 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.
- .134 Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m<sup>2</sup>.
  - .1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
  - .2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.
    - .1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.
  - .3 If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.
    - .1 In this case, no restriction applies to temperature of solution.
  - .4 Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.
    - .1 Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .135 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .136 Mechanical splices: subject to approval of Departmental Representative.
- .137 Plain round bars: to CSA-G40.20/G40.21.

## **2.2 FABRICATION**

- .138 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, SP-66.
  - .1 SP-66 unless indicated otherwise.
- .139 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .140 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .141 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

## **2.3 SOURCE QUALITY CONTROL**

- .142 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
- .143 Upon request inform Departmental Representative of proposed source of material to be supplied.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .144 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

.145 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

### **3.2 FIELD BENDING**

.146 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.147 When field bending is authorized, bend without heat, applying slow and steady pressure.

.148 Replace bars, which develop cracks or splits.

### **3.3 PLACING REINFORCEMENT**

.149 Place reinforcing steel in accordance with CSA-A23.1/A23.2.

.150 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

.2 When paint is dry, apply thick even film of mineral lubricating grease.

.151 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.152 Ensure cover to reinforcement is maintained during concrete pour.

.153 Protect paint coated portions of bars with covering during transportation and handling.

### **3.4 FIELD TOUCH-UP**

.154 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

### **3.5 CLEANING**

.155 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.156 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.157 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 35 21 - LEED Requirements.

**END OF SECTION**



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**Part 1 General**

**1.2 RELATED REQUIREMENTS**

- .1 Section 03 10 00 - Concrete Forming and Accessories
- .2 Section 03 20 00 - Concrete Reinforcing

**1.1 PRICE AND PAYMENT PROCEDURES**

- .3 Measurement and Payment:
  - .1 Measurement Procedures: in accordance with Section 01 29 00 - Payment Procedures.
  - .2 Measure cast-in-place concrete in cubic metres calculated from neat dimensions as indicated.
    - .1 Concrete placed beyond dimensions indicated will not be measured.
  - .3 No deductions will be made for volume of concrete displaced by reinforcing steel, structural steel, or piles.
  - .4 No deductions will be made for volume of concrete less than 0.1 m<sup>2</sup> in cross sectional area displaced by individual drainage openings.
  - .5 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.

**1.2 REFERENCES**

- .4 Abbreviations and Acronyms:
  - .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
    - .1 Type GU, GUb and GUL - General use cement.
    - .2 Type MS and MSb - Moderate sulphate-resistant cement.
    - .3 Type MH, MHb and MHL - Moderate heat of hydration cement.
    - .4 Type HE, HEb and HEL - High early-strength cement.
    - .5 Type LH, LHb and LHL - Low heat of hydration cement.
    - .6 Type HS and HSb - High sulphate-resistant cement.
  - .2 Fly ash:
    - .1 Type F - with CaO content less than 15%.
    - .2 Type CI - with CaO content ranging from 15 to 20%.
    - .3 Type CH - with CaO greater than 20%.
  - .3 GGBFS - Ground, granulated blast-furnace slag.
- .5 Reference Standards:
  - .1 ASTM International
    - .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

- .2 ASTM C309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM C1017/C1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- .5 ASTM D412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .6 ASTM D624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .7 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .8 ASTM D1752-04a(2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 CSA International
  - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.
  - .3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-installation Meetings: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart, convene pre-installation meeting one week prior to beginning concrete works.
  - .1 Ensure key personnel, site supervisor, and Departmental Representative attend.
  - .1 Verify project requirements.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least 4 weeks prior to beginning Work, provide Departmental Representative with concrete mix design, aggregates and admixtures proposed for use in writing for approval.
- .3 Provide testing results for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .5 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
- .6 Provide two copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures.

### **1.5 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
  - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
  - .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Curing.
  - .5 Finishes.
  - .6 Formwork removal.
  - .7 Joints.
- .4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Delivery and Acceptance Requirements:
  - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
    - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
    - .2 Deviations to be submitted for review by Departmental Representative.

## **Part 2 Products**

### **2.1 DESIGN CRITERIA**

- .1 Alternative 1 - Performance : to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

### **2.2 PERFORMANCE CRITERIA**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

### **2.3 MATERIALS**

- .1 Portland Cement: to CSA A3001, Type GU.
- .2 Portland-limestone cement: Type GUL to CSA A23.1.
- .3 Water: to CSA A23.1.

- .4     Aggregates: to CSA A23.1/A23.2.
- .5     Admixtures:
  - .1     Air entraining admixture: to ASTM C260.
  - .2     Chemical admixture: to ASTM C494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .6     Shrinkage compensating grout: premixed compound consisting of metallic or non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
  - .1     Compressive strength: 56 MPa at 28 days.
  - .2     Net shrinkage at 28 days: maximum 2%.
- .7     Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 56 MPa at 28 days.
- .8     Curing compound: to CSA A23.1/A23.2 , Type 1-chlorinated rubber.
- .9     Premoulded joint fillers:
  - .1     Bituminous impregnated fiber board: to ASTM D1751.
  - .2     Sponge rubber: to ASTM D1752, Type I, firm grade.
  - .3     Standard cork: to ASTM D1752, Type II.
- .10    Weep hole tubes: plastic.

## **2.4     MIXES**

- .1     Alternative 1 - Performance Method for specifying concrete: to meet performance criteria to CSA A23.1/A23.2.
  - .1     Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
  - .2     Provide concrete mix to meet following plastic state requirements:
    - .1     Uniformity: to CSA A223.1/A23.2
    - .2     Workability: free of surface blemishes, loss of mortar, colour variations, and segregation.
    - .3     Finishability: minimal amount of bleeding.
    - .4     Set time: 4 hours maximum.
  - .3     Provide concrete mix to meet following hard state requirements:
    - .1     Durability and class of exposure: F-1.
    - .2     Compressive strength at 28days: 30 Mpa minimum.
    - .3     Intended application: bases for site furnishings and structures.
    - .4     Aggregate size 20mm maximum.
  - .4     Provide quality management plan to ensure verification of concrete quality to specified performance.
  - .5     Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

**Part 3**  
**3.1 Execution**  
**PREPARATION**

- .1 Obtain Departmental Representative written approval before placing concrete.
  - .1 Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete will not be permitted.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Departmental Representative approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 Do not place load upon new concrete until authorized by Departmental Representative.

**3.2 INSTALLATION/APPLICATION**

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Sleeves and inserts:
  - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.
  - .2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
  - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.
  - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
  - .5 Confirm locations and sizes of sleeves and openings shown on drawings.
  - .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor bolts:
  - .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
  - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.

- .1 Formed holes: 100 mm minimum diameter.
    - .2 Drilled holes: to manufacturers' recommendations.
  - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
  - .4 Set bolts and fill holes with epoxy grout.
  - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Drainage holes and weep holes:
  - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
  - .2 Install weep hole tubes and drains as indicated.
- .5 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .6 Finishing and curing:
  - .1 Finish concrete to CSA A23.1/A23.2.
    - .1 Schedule:
      - .1 Formed Surfaces
        - .1 Smooth rubbed finish: Remove the forms while the concrete is green, patch immediately, and complete the rubbing not later than the following day. Wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture are produced. Do not provide cement grout other than the paste drawn from the green concrete by the rubbing process.
      - .2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
      - .3 Use curing compounds compatible with applied finish on concrete surfaces.
      - .4 Finish concrete floor to CSA A23.1/A23.2. Class A
      - .5 Provide magnesium float finish for interior work, or broom finish for exterior work unless otherwise indicated.
      - .6 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.
- .7 Joint fillers:
  - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
  - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
  - .3 Locate and form isolation, construction and expansion joints as indicated.
  - .4 Install joint filler.
  - .5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

**3.3 SURFACE TOLERANCE**

- .1 Concrete tolerance to CSA A23.1 Straightedge Method = +/-8mm.

**3.4 FIELD QUALITY CONTROL**

- .1 Site tests: conduct tests as follows and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
  - .1 Concrete pours.
  - .2 Slump.
  - .3 Air content.
  - .4 Compressive strength at 7 and 28 7 and 56 days.
  - .5 Air and concrete temperature.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.
  - .1 Ensure testing laboratory is certified to CSA A283.
- .3 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

**3.5 CLEANING**

- .1 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.
- .2 Provide appropriate area on job site where concrete trucks and be safely washed.
- .3 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.
- .4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .5 Prevent admixtures and additive materials from entering drinking water supplies or streams.
- .6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.
- .7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

**END OF SECTION**

Approved: 2011-12-31

**Part 1**  
**1.1 General**  
**RELATED REQUIREMENTS**

- .1 Section 03 30 00 Cast in Place Concrete.
- .2 Section 01 35 43 - Environmental Procedures.

**1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
  - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
  - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
  - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
  - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 General Services Administration (GSA) - Federal Specifications (FS)
  - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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



- .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
    - .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures.
  - .3 Samples:
    - .1 Submit 2 samples of each type of material and colour.
    - .2 Cured samples of exposed sealants for each colour where required to match adjacent material.
  - .4 Manufacturer's Instructions:
    - .1 Submit instructions to include installation instructions for each product used.
- 1.4 CLOSEOUT SUBMITTALS**
- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
- 1.5 DELIVERY, STORAGE AND HANDLING**
- .3 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .4 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .5 Storage and Handling Requirements:
    - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Store and protect joint sealants from nicks, scratches, and blemishes.
    - .3 Replace defective or damaged materials with new.
  - .6 Develop Construction Waste Management Plan related to Work of this Section.
- 1.6 SITE CONDITIONS**
- .1 Ambient Conditions:
    - .1 Proceed with installation of joint sealants only when:
      - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
      - .2 Joint substrates are dry.
      - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
  - .2 Joint-Width Conditions:
    - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
  - .3 Joint-Substrate Conditions:

- .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

## **1.7 ENVIRONMENTAL REQUIREMENTS**

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

## **Part 2**

### **Products**

## **2.1 SEALANT MATERIALS**

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.

## **2.2 SEALANT MATERIAL DESIGNATIONS**

- .1 Urethane one part:
  - .1 Self-levelling: to CAN/CGSB-19.13, Type 1, colour to match adjacent surface
    - .1 Adjacent to buildings, sealant to match vertical surface.
- .2 Silicones one part: to CAN/CGSB-19.13.
- .3 Preformed compressible and non-compressible back-up materials:
  - .1 Polyethylene, urethane, neoprene or vinyl foam:
    - .1 Extruded closed cell foam backer rod.
    - .2 Size: oversize 30 to 50 %.

## **2.3 SEALANT SELECTION**

- .1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): sealant type: Urethane one part.
- .2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: sealant type: Urethane one part.
- .3 Seal interior perimeters of exterior openings as detailed on drawings: sealant type: Urethane one part.
- .4 Control and expansion joints on the interior of exterior poured-in place concrete walls: sealant type: Urethane one part.
- .5 Interior control and expansion joints in floor surfaces: sealant type: Urethane one part.
- .6 Perimeter of bath fixtures e.g. sinks, tubs, urinals, stools, water closets, basins, vanities: sealant type: Silicone.
- .7 Exposed interior control joints in drywall: sealant type: Silicone one part.

## **2.4 JOINT CLEANER**

- .8 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .9 Primer: in accordance with sealant manufacturer's written recommendations.

## **Part 3 Execution**

### **3.1 EXAMINATION**

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

### **3.2 SURFACE PREPARATION**

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

### **3.3 PRIMING**

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

### **3.4 BACKUP MATERIAL**

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

### **3.5 MIXING**

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

### **3.6 APPLICATION**

- .1 Sealant:

- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

**3.7**

**CLEANING**

- .1 Progress Cleaning:.
  - .1 Leave Work area clean at end of each day.
  - .2 Clean adjacent surfaces immediately.
  - .3 Remove excess and droppings, using recommended cleaners as work progresses.
  - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.8**

**PROTECTION**

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

**END OF SECTION**

- Part 1**
- 1.1**            **General**  
                  **RELATED WORK**
- .3        Section 32 12 16 Asphalt Paving
- .4        Section 32 17 23 Pavement Markings
- 1.2**            **MEASUREMENT FOR PAYMENT**
- .1        Traffic signage will be measured by each sign delivered and installed to the satisfaction of the Departmental Representative.
- 1.3**            **REFERENCES**
- .1        CGSB1-GP-12c-[68], Standard Paint Colours.
- 1.4**            **SUBMITTALS**
- .1        Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Product Data: Submit manufacturer's instructions, printed product literature and data sheets for traffic signage, including product characteristics, performance criteria, physical size, finish and limitations.
- 1.5**            **DELIVERY STORAGE AND HANDLING**
- .1        Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2        Storage and Handling Requirements:
- .1        Store materials in dry location and in accordance with manufacturer's recommendations.
- .2        Replace defective or damaged materials with new.
- Part 2**
- 2.1**            **Products**  
                  **SIGN SUPPORTS**
- .1        Sawn Timber posts:
- .1        Species: Douglas Fir.
- .2        Grade:#2 or better
- .3        Dimensions: as indicated.
- .4        CAN/CSA-Z809 or FSC or SFI certified.
- .5        Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.
- 2.2**            **REFLECTIVE SHEETING AND TAPE**
- .1        Conform to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.
- .2        Transparent tape: flexible, smooth-surfaced, moisture resistant tape with pressure sensitive adhesive.
- .3        CGSB 62-GP-11M-[78], Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment. Colour: to CGSB1-GP-12C, yellow 505-308, white 513-301.
- 2.3**            **SIGNBOARDS**

- .1 Aluminum blanks:
  - .1 Degrease, etch and bonderize with chemical conversion coating.
  - .2 Clean surfaces with xylene thinner. Dry.
  - .3 For non-reflective signs, spray face with one coat vinyl pretreatment coating and two finish coats of required colour.
- .2 Reflective background sheeting and lettering:
  - .1 Cut and apply in accordance with manufacturer's instructions.
  - .2 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.
  - .3 Reflective signboard faces may be prepared using silk screen transparent ink.
  - .4 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.

**Part 3**  
**3.1 Execution**  
**SIGN SUPPORT:**

- .1 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.
- .2 Wooden post installation:
  - .1 Excavate post holes to 250 mm minimum diameter. Compact bottom of hole to provide firm foundation. Set post and backfill in 150 mm layers with excavated material. Compact each layer before placing each subsequent layer.

**3.2 PROTECTION**

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

**END OF SECTION**

**Part 1**

**General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 11 - Cleaning
- .3 Section 31 23 16.26 - Rock Removal.

**1.2 MEASUREMENT PROCEDURES**

- .1 Measurement and payment of the clearing and grubbing as a lump sum under this contract.
- .2 Measure clearing isolated trees and grubbing isolated tree stumps (if required) as number of isolated trees cleared and number of isolated stumps grubbed.

**1.3 REFERENCES**

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.4 DEFINITIONS**

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
- .4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris.
- .5 Grubbing consists of excavation and disposal of stumps and roots, and boulders and rock fragments less than 300mm diameter, to not less than specified depth below existing ground surface.

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
  - .1 Submit manufacturer's technical data sheets of each material listed below for approval prior to delivery of materials to project site.
  - .2 Tree wound paint: one liter can with manufacturer's label.
  - .3 Herbicide: one liter can with manufacturer's label.
- .3 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

- .4 Submit manufacturer's installation instructions.

## **1.6 QUALITY ASSURANCE**

- .1 Do construction occupational health and safety in accordance Federal and Provincial regulations.
- .2 Safety Requirements: worker protection.
  - .1 Workers must comply with Alberta Occupational Health and Safety requirements when applying herbicide materials.
  - .2 Workers must not eat, drink or smoke while applying herbicide material.
  - .3 Clean up spills of preservative materials immediately with absorbent material and safely discard to landfill.

## **1.7 STORAGE AND PROTECTION**

- .1 Prevent damage to culverts, trees, areas left undisturbed, natural features, existing buildings, existing pavement, utility lines, site appurtenances, water courses, and root systems of trees which are to remain.
  - .1 Repair damaged items to approval of Departmental Representative.
  - .2 Replace trees designated to remain, if damaged, as directed by Departmental Representative.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Do not bury waste or vegetative material from clearing and grubbing operations on site.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Bituminous based paint of standard manufacture specially formulated for tree wounds.
- .2 Herbicide: effective for killing annual and perennial weeds, and bamboo grass, by being absorbed through roots and foliage.
  - .1 Spray applied on non-crop land areas.
  - .2 Type as follows:
    - .1 As approved by Departmental Representative.
- .3 Soil Material for Fill:
  - .1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
  - .2 Remove and store soil material for reused.

## **Part 3 Execution**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.



- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.1 PREPARATION**

- .1 Inspect site and verify with Departmental Representative, items designated to remain.

- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.

- .1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.

- .2 When utility lines which are to be removed are encountered within area of operations, notify Departmental Representative in ample time to minimize interruption of service.

- .3 Notify utility authorities before starting clearing or grubbing.

- .4 Keep roads and walks free of dirt and debris.

### **3.2 APPLICATION**

- .1 Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.3 CLEARING**

- .1 Clearing includes felling, trimming, cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.

- .2 Clear as indicated, by cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

- .3 Cut off branches overhanging area cleared as directed by Departmental Representative.

- .4 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

- .5 Apply herbicide in accordance with manufacturer's label to top surface of stumps designated not to be removed.

### **3.4 CLOSE CUT CLEARING**

- .1 Close cut clearing to ground level.

- .2 Cut off branches overhanging area cleared as directed by Departmental Representative.

- .3 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

### **3.5 ISOLATED TREES**

- .1 Cut off isolated trees as directed by Departmental Representative at height of not more than 300 mm above ground surface.

- .2 Grub out isolated tree stumps.
- .3 Prune individual trees as indicated.
- .4 Trim trees designated to be left standing within cleared areas of dead branches 4 cm or more in diameter; and trim branches to heights as indicated.
- .5 Cut limbs and branches to be trimmed close to bole of tree or main branches.

**3.6 UNDERBRUSH CLEARING**

- .6 Clear underbrush from areas as indicated at ground level.

**3.7 GRUBBING**

- .1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 200 mm below ground surface.
- .3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m<sup>3</sup>.
- .4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

**3.8 REMOVAL AND DISPOSAL**

- .1 Remove cleared, grubbed materials off site to disposal area as indicated designated by Departmental Representative.
- .2 Cut timber greater than 150 mm diameter to 4 meter lengths and transport to stockpile at Marmot gravel pit as indicated. Stockpiled timber becomes property of Departmental Representative.
- .3 Dispose of cleared grubbed materials by transporting offsite.
- .4 Chip mulch and stockpile spread cleared and grubbed vegetative material on site as directed by Departmental Representative.

**3.9 FINISHED SURFACE**

- .1 Leave ground surface in condition suitable for immediate grading operations stripping of topsoil to approval of Departmental Representative.

**3.10 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

Approved: 2006-06-30

**Part 1**  
**1.1**            **General**  
                 **RELATED REQUIREMENTS**

- .1            Section 01 74 11 - Cleaning.

**1.2**            **MEASUREMENT PROCEDURES**

- .1            Measure following items in cubic metres within limits as indicated:

- .1            Soil Stripping, including stockpiling.

**1.3**            **REFERENCES**

- .1            U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1            EPA 832R92005, Storm Water Management for Construction Activities:  
Developing Pollution Prevention Plans and Best Management Practices.

**Part 2**  
**2.1**            **Products**  
                 **NOT USED**

- .1            Not Used.

**Part 3**  
**Execution**

- .1            Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**3.1**            **STRIPPING OF TOPSOIL**

- .1            Ensure that procedures are conducted in accordance with applicable Federal and Provincial requirements.
- .2            Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .3            Handle topsoil only when it is dry and warm.
- .4            Strip topsoil to depths as indicated.
  - .1            Avoid mixing topsoil with subsoil.
- .5            Pile topsoil in berms or spread in locations as indicated on the plans.
  - .1            Stockpile height not to exceed 2.5 - 3 m.
  - .2            Topsoil can be spread immediately in areas of trail restoration that are prepared in advance.
- .6            Protect stockpiles from contamination and compaction.
- .7            Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

**3.2**            **STRIPPING OF SUBSOIL**

- .1 Ensure that procedures are conducted in accordance with applicable Federal and Provincial requirements.
- .2 Do not remove subsoil in wet condition.
- .3 Pile subsoil in berms in locations as directed by Departmental Representative.

.1 Stockpile height not to exceed 2.5 - 3 m.

### **3.3**

#### **PREPARATION OF GRADE**

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

### **3.4**

#### **CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 11 – Cleaning
- .3 Section 31 14 13 Soil Stripping and Stockpiling
- .4 Section 31 23 33.01 - Excavating, Trenching and Backfilling

**1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM D698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m<sup>3</sup> ).
- .2 Underwriters' Laboratories of Canada (ULC)

**1.3 MEASUREMENT AND PAYMENT**

- .1 Measure rough grading in place by area of rough grading work brought to grade and accepted by Departmental Representative.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Sustainable Design Submittals:
  - .1 Construction Waste Management:
    - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
    - .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction.

**1.5 EXISTING CONDITIONS**

- .1 Examine Geotechnical Investigation Report which is bound into specification as an Appendix
- .2 Known underground and surface utility lines and buried objects are as indicated on site plan.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Fill material: Type 3 Fill in accordance with of Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Excavated or graded subsoil material existing on site is suitable to use as fill for grading work if approved by Departmental Representative.

**Part 3**  
**3.1 Execution**  
**EXAMINATION**

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

**3.2 STRIPPING OF TOPSOIL**

- .1 Refer to Section 31 14 13 Soil Stripping and Stockpiling

**3.3 GRADING**

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades:
  - .1 100 mm for grassed areas.
  - .2 390 mm for asphalt paving.
  - .3 250mm for concrete paving.
  - .4 75mm for granular trails.
- .3 Slope rough grade away from buildings 1:50 minimum.
- .4 Grade ditches to depth as indicated.
- .5 Prior to placing fill over existing ground, scarify surface to depth of 100 mm minimum before placing fill over existing ground. Recompact will fill and existing surface within 2% of optimum water content (OWC) to facilitate bonding.
- .6 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:
  - .1 85% under landscaped areas.
  - .2 Minimum 98% under paved and walk areas.
- .7 Do not disturb soil within branch spread of trees or shrubs to remain.

**3.4 TESTING**

- .1 Submit testing procedure, frequency of tests, testing laboratory as designated by ULC or certified testing personnel to Departmental Representative for approval review.

**3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.6 PROTECTION**

- .1 Protect existing culverts, trees, natural features, buildings, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.

**END OF SECTION**

Approved: 2006-09-30

**Part 1**  
**1.1 General**  
**RELATED REQUIREMENTS**

- .1 Section 31 14 13 Soil Stripping and Stockpiling

**1.2 MEASUREMENT PROCEDURES**

- .1 Excavated materials will be measured in cubic metres in their original location.
  - .1 Unclassified excavation quantities measured will be actual volume removed within following limits:
    - .1 Width for trench excavation as indicated.
    - .2 Width for excavation for structures as indicated.
    - .3 Depth from ground elevation immediately prior to excavation, to elevation as indicated.
  - .2 Rock quantities measured will be actual volume removed within following limits:
    - .1 Width for trench excavation as indicated.
    - .2 Width for excavation for structures to be bounded by vertical planes up to 500 mm outside of and parallel to neat lines of footings as indicated.
    - .3 Depth from rock surface elevations immediately prior to excavation, to elevation as indicated.
    - .4 Where design elevation is less than 200 mm below original rock surface, depth will be considered to be 200 mm below original rock surface.
    - .5 Volume of individual boulders and rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.
- .2 Backfilling to authorized excavation limits will be measured in cubic metres compacted in place for each type of material specified.
- .3 Placing and spreading of topsoil will be measured for payment in cubic metres calculated from cross sections taken in area of excavation from original location.
  - .1 If double handling of topsoil is required, (stockpiling and later placing), then quantities will be measured twice; on excavation from original location and on excavation from stockpile.
    - .1 Rates for excavating from original location and from stockpile must be provided at time of tender.

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
  - .4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).



- .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
- .6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric. Canada Green Building Council (CaGBC)
- .3 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
  - .2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

#### 1.4

##### **DEFINITIONS**

- .1 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .2 Topsoil:
  - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .6 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 : Sieve sizes to CAN/CGSB-8.1.
    - .2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .7 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Preconstruction Submittals:
  - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
  - .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, location plan of relocated and abandoned services, as required.

**1.6 QUALITY ASSURANCE**

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

**1.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Divert excess materials from landfill to local facility for reuse as directed by Departmental Representative.

**1.8 EXISTING CONDITIONS**

- .1 Examine soil report available as an Appendix to the Specifications.
- .2 Buried services:
  - .1 Before commencing work establish location of buried services on and adjacent to site.
  - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
  - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
  - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .5 Prior to beginning excavation Work, notify applicable Departmental Representative establish location and state of use of buried utilities and structures. Departmental Representative to clearly mark such locations to prevent disturbance during Work.
  - .6 Maintain and protect from damage, if applicable, electrical, telephone and other utilities and structures encountered.
  - .7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing and/or re-routing. Costs for such Work to be paid by Departmental Representative.
  - .8 Record location of maintained, re-routed and abandoned underground lines.
  - .9 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
  - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, service poles, wires, and pavements which may be affected by Work.

- .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative
- .3 Where required for excavation, cut roots or branches in accordance with Section 32 01 90.33 - Tree and Shrub Preservation.

## Part 2

### 2.1

## Products

### MATERIALS

- .1 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
  - .1 Crushed, pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.2.
  - .3 Table: Type 1: Base Course Gradation

Sieve Designation	% Passing
25 mm	100
20 mm	82-97
16 mm	70-94
10 mm	52-79
5 mm	35-64
1.25	18-43
0.630 mm	12-34
0.315 mm	8-26
0.160 mm	5-18
0.08 mm	2-10

- .4
- .5 Table: Type 2: Subbase Course Gradation

Sieve Designation	% Passing
80 mm	100
50 mm	55-100
25 mm	38-100
16 mm	32-85
5 mm	20-65
0.315 mm	6-30
0.075 mm	2-10

- .2 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 150 mm, cinders, ashes, sods, refuse or other deleterious materials.

## Part 3

### 3.1

## Execution

### TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of sediment and erosion control plan, specific to

site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 SITE PREPARATION**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

### **3.3 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.
- .4 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.
- .5 Protect buried services that are required to remain undisturbed.

### **3.4 STRIPPING OF TOPSOIL**

- .1 Refer to Section 31 14 13 Soil Stripping and Stockpiling

### **3.5 STOCKPILING**

- .1 Refer to Section 31 14 13 Soil Stripping and Stockpiling

### **3.6 EXCAVATION**

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Remove concrete, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Dispose of surplus and unsuitable excavated material off site.
- .9 Do not obstruct flow of surface drainage or natural watercourses.
- .10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .11 Notify Departmental Representative when bottom of excavation is reached.
- .12 Obtain Departmental Representative approval of completed excavation.
- .13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .14 Correct unauthorized over-excavation as follows:
  - .1 Fill under bearing surfaces and footings with concrete specified for footings Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density.
  - .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.
- .15 Hand trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
  - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- .16 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

### **3.7 FILL TYPES AND COMPACTION**

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698.
  - .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.
  - .2 Within building area: use Type 2 to underside of base course for floor slabs. Compact to 100 % of corrected maximum dry density.
  - .3 Under concrete slabs: provide 150 mm compacted thickness base course of Type 1 fill to underside of slab. Compact base course to 100 %.

### **3.8 BEDDING AND SURROUND OF UNDERGROUND SERVICES**

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

### **3.9 BACKFILLING**

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Departmental Representative has inspected and approved installations.
  - .2 Departmental Representative has inspected and approved of construction below finish grade.

- .3 Inspection, testing, approval, and recording location of underground utilities.
- .4 Removal of concrete formwork.
- .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1 m.
  - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
    - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:
    - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

### **3.10 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Restore as indicated.

**END OF SECTION**

**Part 1**  
**1.1**            **General**  
                  **SECTION INCLUDES**

- .1 Description
- .2 Measurement procedures
- .3 Definitions
- .4 Quality assurance
- .5 Waste management and disposal
- .6 Materials
- .7 Water distributors
- .8 Stripping of topsoil
- .9 Excavating
- .10 Embankments
- .11 Subgrade compaction
- .12 Finishing
- .13 Protection

**1.2**            **RELATED SECTIONS**

- .1 Section 01 35 43 - Environmental Procedures
- .2 Section 01 56 00 - Temporary Barriers and Enclosures.
- .3 Section 31 11 00 - Clearing and Grubbing.
- .4 Section 32 11 19 – 50 mm Granular Sub-base Course.

**1.3**            **MEASUREMENT AND PAYMENT**

- .1 Measure Trail Excavation, Embankment and Compaction in place by area of as listed under Trail Base Preparation in Section 01 21 00, and as incorporated into Work and accepted by Departmental Representative.
- .5 No overhaul will be paid for this Work.

**1.4**            **DESCRIPTION**

- .1 This item consists of the excavation and disposal of all materials in conformity with the lines, grades and dimension indicated on the drawings, and includes:
  - .1 Trail and borrow excavation

- .2 Construction of trail ditches, embankments, permanent access entrances, day use areas, berms and other earthworks necessary for the construction of the trail.
- .3 Removal and disposal of unsuitable materials from excavation, embankment and borrow areas.
- .4 Transportation of excavated materials
- .5 Finishing of top surfaces and slopes
- .6 Maintenance of the work set forth under this section in a finished condition until any portion thereof has been accepted as completed by the Departmental Representative.
- .7 Embankment:
  - .1 Embankment construction will not be measured for payment directly, rather it should be considered incidental to "Unit Price Item: Trail Base Preparation".
  - .2 Traffic and Pedestrian Control required for this Work shall be incidental to and no separate payment will be made to the Contractor.
  - .3 Excavating unnecessarily beyond lines established by Departmental Representative, with exception of unavoidable slide material. Does not measure slide material, when such slides are attributable to negligence.
  - .4 Scarifying or benching existing slopes or existing road surfaces.
  - .5 Removing unsuitable material from embankment attributable to negligence.
  - .6 Watering, drying and compacting.
  - .7 Compaction of material (150 mm) below sub grade horizon in areas of cut.
  - .8 Ripping and/or drilling and blasting of material.
  - .9 Shattering rock to 300 mm below sub grade elevation.
  - .10 Scaling and removing loose rock from rock face.
  - .11 Rock bolting or any other in-place stabilization as necessitated by improper blasting operations.
  - .12 Finishing.

## **1.5 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM).
- .8 ASTM D698 00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft lbf/ft<sup>3</sup>) (600 kN m/m<sup>3</sup>).

## **1.6 DEFINITIONS**

- .1 Common Excavation: excavation of materials that are not Rock Excavation or Stripping.
- .9 Free Haul: distance that excavated material is hauled without compensation.
- .10 Stripping: excavation of organic material covering original ground.
- .11 Over Haul: authorized hauling in excess of free haul distance that excavated material is moved. No overhaul will be paid for materials hauled under this Contract.
- .12 Embankment: material derived from usable excavation and placed above original ground or stripped surface.
- .13 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.



- .14 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

**1.7 QUALITY CONTROL**

- .1 Adhere to regulations of authority having jurisdiction when blasting is required.
- .15 Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved.

**1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.

**Part 2 Products**  
**2.1 MATERIALS**

- .1 Embankment materials require approval by Departmental Representative.
- .2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or other unsuitable material.

**Part 3 Execution**  
**3.1 WATER DISTRIBUTORS**

- .1 Apply water with equipment capable of uniform distribution and suitable for trail site conditions

**3.2 STRIPPING OF TOPSOIL**

- .1 Commence topsoil stripping of areas on approval by the Departmental Representative after clearing and grubbing debris have been removed from these areas.
- .2 Strip topsoil to depths as directed by the Departmental Representative. Do not mix topsoil with subsoil. Stripping depth is estimated to be on average 100mm.
- .3 Stockpile stripped materials in the designated site stockpile area. Ensure the stripped materials are contained within the overall trail clearing limits of the new trail.

**3.3 EXCAVATING**

- .4 General:
  - .1 Notify the Departmental Representative when unsuitable trail embankment materials are encountered and remove to depth and extent as directed by the Departmental Representative. This material shall be placed on the side slope outside the slope.
  - .2 Sub cut below sub grade elevation in cut sections only as directed by the Departmental Representative. Compact top 150 mm below sub cut to minimum 95% maximum dry density, ASTM D698 (AASHTO T99). Replace with approved embankment material and compact.

- .3 Treat ground slopes, where sub grade is on transition from excavation to embankment, at grade points in accordance with the Drawings.
- .4 The dimensions of the excavations and embankments shall be, in accordance with the typical sections accompanying these specifications, but the dimensions of any or all excavations and embankments may be increased or decreased at any time by the Departmental Representative as conditions and circumstances may determine.
- .5 Drainage:
  - .1 Maintain profiles, crowns and cross slopes to provide good surface drainage at all times.
  - .2 Provide ditches as work progresses to provide drainage.
  - .3 Shall protrude above design sub grade elevation.

### **3.4 EMBANKMENTS**

- .1 This item consists of the construction of the sub grade in embankments and cuts to the lines, grades, cross-sections and dimensions shown on the drawings.
- .2 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces. Method used to be subject to prior approval of the Departmental Representative.
- .3 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized.
- .4 Maintain crowned or cross sloped surface during construction to ensure ready run off of surface water.
- .5 Drain low areas before placing materials.
- .6 Place and compact to full width in layers not exceeding 150 mm loose thickness. The Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.
- .7 Rock Embankments:
  - .1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 0.6 m.
  - .2 Distribute rock material to fill voids with smaller fragments to form compact mass.
  - .3 Fill surface voids at design elevation with rock spalls or selected material to form earth tight surface.
  - .4 The Contractor may place rock embankments during freezing conditions provided compaction equipment of sufficient size to break large rock particles is used and all snow and ice is removed from fill surface.
  - .5 The Departmental Representative has no preference for which embankments are constructed with rock fill.

### **3.5 SUB GRADE COMPACTION**

- .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.

- .2 Embankment material shall be placed in successive uniform layers over the entire area as follows:
- .3 Material containing less than 25 percent by volume of stones larger than 100mm shall be placed in 150mm compacted layers.
- .4 Material containing 25 percent or more by volume of stones larger than 100 mm shall be placed in layers not exceeding the maximum size of the stones. Stones larger than 100mm shall not be placed within 150mm of the sub grade elevation.
- .5 In embankments composed principally of material obtained from rock cuts, the larger stones shall be carefully distributed and the interstices filled with smaller stones and other material to form a compact mass. Such embankments shall be constructed in layers not exceeding 1 metre. The placing of individual rocks and boulder exceeding 1.0metres in least dimension will be permitted provided they are carefully distributed and the interstices filled with finer material to form a dense and compact mass. Each layer, before starting the next, shall be levelled and smoothed with suitable equipment. Hauling and spreading equipment shall be operated over the full width of each layer.
- .6 Each layer shall be brought to its required degree of compaction throughout its entire width before successive layers are placed.
- .7 Compact each layer to minimum 95% maximum dry density, ASTM D698 (AASHTO T99). Top 100 mm of sub grade to be compacted to 98% maximum dry density, ASTM D698 (AASHTO T99).
- .8 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.
- .9 For rock placed as fill, compact with large steel wheeled or tracked equipment of sufficient size to break larger particles. Compact until rock fill is stable under compaction equipment and all voids are filled.

### **3.6 FINISHING**

- .1 Shape entire trailbed to within 25 mm of design elevations.
- .2 Scale cut slopes in bedrock.
- .3 Round top of back slope as shown on the Drawings.
- .4 Trim between constructed slopes and edge of clearing to provide drainage.

### **3.7 PROTECTION**

- .1 Maintain finished surfaces in condition conforming to this section until acceptance by the Departmental Representative.

END OF SECTION

**Part 1 General**

**1.1 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION**

- .1 Granular sub - base material: supplied by Departmental Representative at pit.

- .1 Marmot pit. Located 3.8 km from project site

**1.2 RELATED REQUIREMENTS**

- .1 Section 32 11 23 Aggregate Base Course
- .2 Section 32 12 16 Asphalt Paving

**1.3 MEASUREMENT AND PAYMENT**

- .1 Measure installation and compaction of granular sub-base in cubic metres measured in place by cross section and calculated by average end area method of material incorporated into Work and accepted by Departmental Representative.

**1.4 REFERENCES**

- .1 ASTM International
  - .2 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .3 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .4 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .5 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
  - .6 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .7 ASTM D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
  - .8 ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .9 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

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

.2 Sustainable Design Submittals:

.1 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction.

## **1.6 DELIVERY, STORAGE AND HANDLING**

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

.2 Storage and Handling Requirements:

.1 Store materials in accordance with erosion and sedimentation control plan.

.2 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MATERIALS**

.1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.3 Table: Type 1: Subbase Course Gradation

Sieve Designation	% Passing
80 mm	100
50 mm	55-100
25 mm	38-100
16 mm	32-85
5 mm	20-65
0.315 mm	6-30
0.075 mm	2-10

.4

.1 LA Abrasion Loss: Max 50%

.2 % Fracture by weight: Min. 20%

.3 Plasticity Index: Max. 8

.5 Other properties as follows:

.1 Liquid Limit: to ASTM D4318, Maximum 25.

.2 Plasticity Index: to ASTM D4318, Maximum 6.

.3 Los Angeles degradation: to ASTM C131.

.1 Maximum loss by mass: 40 50 %.

**Part 3**  
**3.1 Execution**  
**EXAMINATION**

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

**3.2 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**3.3 PLACING**

- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 200 mm compacted thickness.
  - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

**3.4 COMPACTION**

- .1 Compaction equipment to be capable of obtaining required material densities.

- .2 Compact to density of not less than 98% maximum dry density in accordance with ASTM D698.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.6 SITE TOLERANCES**

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

### **3.7 PROTECTION**

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Departmental Representative.

**END OF SECTION**

Approved: 2011-06-30

**Part 1                    General**  
**1.1                    RELATED REQUIREMENTS**

- .1        Section 32 11 16.01 Granular Subbase
- .2        Section 32 12 16 Asphalt Paving

**1.2                    MEASUREMENT AND PAYMENT**

- .1        The quantity of asphalt paving installed shall be the square meters installed and accepted, as measured along the top of the pavement.
- .2        Installation to include hauling, placing and compacting of Asphalt Paving materials.

**1.3                    REFERENCES**

- .1        Alberta Transportation (AT)
  - .1        Alberta Transportation Standard Specifications For Highway Construction, 2013
- .2        American Association of State Highway and Transportation Officials (AASHTO)
  - .1        AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.
  - .2        AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
  - .3        AASHTO T245-97(2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
- .3        Asphalt Institute (AI)
  - .1        AI MS-2-Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
- .4        ASTM International
  - .1        ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .2        ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .3        ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
  - .4        ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
  - .5        ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
  - .6        ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .7        ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .8        ASTM C207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.
  - .9        ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.



- .10 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
  - .11 ASTM D3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
  - .12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
  - .5 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-8.1-88, Sieves Testing, Woven Wire, Inch Series.
    - .2 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
  - .6 U.S. Environmental Protection Agency (EPA) / Office of Water
    - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- 1.4 ACTION AND INFORMATIONAL SUBMITTALS**
- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.
    - .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C 4 weeks prior to beginning Work.
  - .3 Samples:
    - .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks prior to beginning Work.
  - .4 Test and Evaluation Reports:
  - .5 Certificates:
    - .1 Certification to be marked on pipe.
  - .6 Test and Evaluation Reports:
    - .1 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for approval at least 4 weeks prior to beginning Work.
    - .2 Submit printed record of mix temperatures at end of each day.
- 1.5 DELIVERY, STORAGE AND HANDLING**
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Submit to Departmental Representative copies of freight and waybills for asphalt concrete as shipments are received.
    - .1 Departmental Representative reserves right to check weights as material is received.

**Part 2**  
**2.1**            **Products**  
                  **MATERIALS**

- .1 Per Alberta Transportation Mix Type M1 (PG 52-34)

**2.2**            **EQUIPMENT**

- .1 Per Alberta Transportation Mix Type M1 (PG 52-34)

**2.3**            **MIX DESIGN**

- .1 Per Alberta Transportation Mix Type M1 (PG 52-34)
- .2 Mix design to be approved in writing by Departmental Representative.

**Part 3**            **Execution**

- .1 Per Alberta Transportation Standard Specifications for Highway Construction (2013)

**3.1**            **FINISH TOLERANCES**

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

**3.2**            **DEFECTIVE WORK**

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
  - .1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

**3.3**            **CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

**Part 1**

**General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 24 14 Trail Excavation

**1.2 MEASUREMENT AND PAYMENT**

- .1 Measure crushed stone surfacing in place by area of material incorporated into Work and accepted by Departmental Representative.
- .2 Measurement of quantity installed will be by the width of surface course installed per the construction plans, multiplied by the length of surface course installed as measure in the field along the centerline of the trail.

**1.3 REFERENCES**

- .1 ASTM International
  - .1 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .3 ASTM D4318-05, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
  - .4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- .1 Access: allow access to building at all times.
- .2 Scheduling: co-ordinate paving schedule to minimize interference with normal use of premises.

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.6 DELIVERY, STORAGE AND HANDLING**

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

**Part 2**

**Products**

**2.1 MATERIALS**

- .1 Granular Sub-Base
  - .1 Not required
- .2 Granular base:

- .1 Only for use in locations designated on the plans.
- .2 In accordance with Section 31 11 23 - Aggregate Base
- .3 Parks Gravel Trail Mix:
  - .1 The Trail Mix is available to the Contractor in stockpile at the Marmot Gravel Pit

**Part 3 Execution**

**3.1 SUBGRADE**

- .1 Ensure subgrade preparation conforms to levels and compaction required, to allow for installation of granular base.

**3.2 GRANULAR BASE**

- .1 Granular base material thickness: as indicated.
- .2 Spread and compact granular base material in uniform layers not exceeding 100 mm compacted thickness.
- .3 Compact to a density of not less than 100 % Standard Density in accordance with ASTM D698.

**3.3 GRANULAR TOPPING**

- .1 Place granular topping to compacted thickness as indicated.
- .2 Place material in uniform layers not to exceed 75 mm compacted thickness.
  - .1 Compact layer to 100 % Standard Density in accordance with ASTM D698.

**3.4 FIELD QUALITY CONTROL**

- .1 Inspection and testing of crushed stone paving: carried out by designated testing laboratory.
- .2 Costs of tests: paid by Departmental Representative.

**3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.6 PROTECTION**

- .1 Prevent damage to buildings, landscaping, curbs, sidewalks, trees, fences, roads and adjacent property.
  - .1 Repair damages incurred.

**END OF SECTION**

Approved: 1996-06-30

**Part 1**  
**1.1**            **General**  
                  **RELATED WORK**

- .1        Section 32 12 16 Asphalt Paving

**1.2**            **REFERENCES**

- .1        CAN/CGSB-1.5-[M91], Low Flash Petroleum Spirits Thinner.
- .2        CGSB1-GP-12c-[68], Standard Paint Colours.
- .3        CGSB1-GP-71-[83], Method, of Testing Paints and Pigments.
- .4        CGSB1-GP-74M-[79], Paint, Traffic, Alkyd.

**1.3**            **MEASUREMENT FOR PAYMENT**

- .5        Pavement marking will be measured by lump sum.

**Part 2**  
**2.1**            **Products**  
                  **MATERIALS**

- .1        Paint:
  - .1        To CGSB1-GP-74M, alkyd traffic paint.
  - .2        Colour: to CGSB1-GP-12C, yellow 505-308, white 513-301.
- .2        Thinner: to CAN/CGSB-1.5.

**Part 3**  
**3.1**            **Execution**  
                  **EQUIPMENT REQUIREMENTS**

- .1        Paint applicator to be an approved pressure type [mobile] distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

**3.2**            **CONDITION OF SURFACES**

- .1        Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

**3.3**            **TRAFFIC CONTROL**

- .1        Do not allow traffic on surface until paint is completely dry.

**3.4**            **APPLICATION**

- .1        Lay out pavement markings.
- .2        Unless otherwise approved Departmental Representative, apply paint only when air temperature is above 10C, wind speed is less than 60 km/h and no rain is forecast within next 6 h.
- .3        Apply traffic paint evenly at rate of 3 m<sup>2</sup>/L.
- .4        Do not thin paint unless approved by Departmental Representative

- .5 Symbols and letters to conform to dimensions indicated.
- .6 Paint lines to be of uniform colour and density with sharp edges.
- .7 Thoroughly clean distributor tank before refilling with paint of different colour.

**3.5 TOLERANCE**

- .1 Paint markings to be within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings as directed by Departmental Representative.

**3.6 PROTECTION OF COMPLETED WORK**

- .1 Protect pavement markings until dry.

**END OF SECTION**

- Part 1**
- 1.1 General**
- RELATED REQUIREMENTS**
- .1 Section 32 15 40 Crushed Stone Surfacing
  - .2 Section 32 91 19.13 Topsoil Placement and Grading
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS**
- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- 1.3 MEASUREMENT FOR PAYMENT**
- .1 Exterior Site Furnishings will be measured and paid by lump sum for each listed item in Part 2. Payment will include transport to site, storage and installation.
- 1.4 DELIVERY, STORAGE AND HANDLING**
- .1 Supply and delivery provided by Departmental Representative.
  - .2 Storage and Handling Requirements:
    - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Store and protect furnishings from nicks, scratches, and blemishes.
    - .3 Replace damaged materials with new.
- Part 2**
- 2.1 Products**
- Log BENCH**
- .1 Supplied by Departmental Representative, as indicated.
- 2.2 TRASH CONTAINER**
- .1 Bear proof construction
  - .2 4.0 CY capacity
  - .3 Powder coat finish
  - .4 Basic construction material: galvanneal steel.
  - .5 With precast mounting pad
  - .6 Self dumping Waste container
  - .7 Make / model:
    - .1 Haul-All Hyd-A-Way HL Series
    - .1 Complete with precast base and steps.
- 2.3 Concrete Picnic Table**
- .1 Picnic table legs and seta supports from cast in place reinforced concrete, as per detail.
  - .2 Table top and seats constructed from cedar planks
  - .3 Steel plates and hardware from hot Dipped Galvanized Steel.
- 2.4 Trailhead Kiosk Install**
- .1 Existing Relocated kiosk to be installed per plan.

**2.5 Panabode Custom Outhouse**

- .1 Panabode privy to be supplied by Departmental Representative
- .2 Two hole privy fiberglass tank to be supplied by Departmental Representative.
- .3 Contractor to install tank and construct concrete slab per manufacturer's recommendations.
- .4 Contractor to install privy per manufacturer's recommendations.

**2.6 Landscape Boulders**

- .1 Landscape boulders are available at the Marmot pit.
- .2 Boulders shall be approved by the Departmental Representative before installation.

**Part 3 Execution**

**3.1 EXAMINATION**

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

**3.2 PREPARATION**

- .1 Locate and protect utility lines.
- .2 Notify and acquire written acknowledgment from utility authorities before beginning installation Work

**3.3 Log BENCH Install**

- .1 Installed on 100mm of Trail Gravel, minimum 300mm pad on all sides of bench.

**3.4 TRASH CONTAINER Install**

- .1 Assemble container and precast concrete pads in accordance with manufacturer's written recommendations.
- .2 Install furnishing as indicated. Concrete pads shall be set on 100mm of Aggregate Base Course, gravel base to extend 150mm beyond footprint of concrete pads.
- .3 Touch-up damaged finishes to approval of Departmental Representative.

**3.5 CONCRETE PICNIC TABLE**

- .1 Installed on 100mm of Trail Gravel, minimum 600mm pad on all sides of table.

**3.6 TRAILHEAD KIOSK INSTALL**

- .1 Existing Relocated kiosk to be installed per plan.

**3.7 PANABODE CUSTOM OUTHOUSE**



- .1 Contractor to install tank and construct concrete slab per manufacturer's recommendations.
- .2 Contractor to install privy per manufacturer's recommendations.
- .3 Privy slab to be maximum 1 cm above finish trail gravel surface

**3.8 LANDSCAPE BOULDERS**

- .1 Landscape boulder installation shall include layout, selection, transportation and setting in place.
- .2 Install per as indicated.

**3.9 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.10 PROTECTION**

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

**END OF SECTION**

**Part 1**

**General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 14 13 Soil Stripping and Stockpiling
- .2 Section 31 22 13 Rough Grading

**1.2 MEASUREMENT PROCEDURES**

- .1 Preparation of sub-grade for placing of topsoil will be measured in square metres of area prepared.
- .2 Topsoil stripping
  - .1 Section 31 14 13 Soil Stripping and Stockpiling.
- .3 Measure placing and spreading and finish grading of topsoil in cubic metres removed from stockpile.
  - .1 Stockpiles will be measured by Departmental Representative and volume of topsoil removed calculated by average end area method.
  - .2 Inform Departmental Representative if additional topsoil is required for landscaped areas per plan.
  - .3 Measurement for imported weed free topsoil will be per cubic meter delivered, placed, spread and finish graded.

**1.3 REFERENCES**

- .1 Agriculture and Agri-Food Canada
  - .1 The Canadian System of Soil Classification, Third Edition, 1998.
- .2 Canadian Council of Ministers of the Environment
  - .1 PN1340-2005, Guidelines for Compost Quality.
- .3 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.4 QUALITY ASSURANCE**

- .1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) or 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

**Part 2**

**Products**

**2.1 TOPSOIL**

- .1 Use stockpiled A Horizon topsoil.
- .2 If insufficient topsoil is available, use weed free imported topsoil.

**Part 3 Execution**

**3.1 STRIPPING OF TOPSOIL**

- .1 Section 31 14 13 Soil Stripping and Stockpiling

**3.2 PREPARATION OF EXISTING GRADE**

- .1 Section 31 22 13 Rough Grading
- .2 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

**3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL**

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 100 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil to following minimum depths after settlement.
  - .1 100 mm for seeded areas.
  - .2 100 mm for sodded areas and shrub beds.
  - .3 In the event of surplus unused topsoil, spread as directed by Departmental Representative
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

**3.4 FINISH GRADING**

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
  - .1 Leave surfaces smooth, uniform and firm against deep footprinting.

**3.5 ACCEPTANCE**

- .1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

**3.6 SURPLUS MATERIAL**

- .1 Dispose of materials except topsoil not required where directed by Departmental Representative.

**3.7 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

**1.2                MEASUREMENT AND PAYMENT**

- .1      Measure hydraulic seeding in square metres for:
  - .1          Grass mixture including fertilizer.
  - .2          Areas of blending into existing vegetation will not be measured for payment.
- .2      Measure maintenance during establishment period and warranty period of areas seeded in square metres.
- .3      Payment for seeding made at unit price bid of actual area surface measurements taken and computed by Departmental Representative.

**1.3                ADMINISTRATIVE REQUIREMENTS**

- .1      Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.
- .2      Scheduling:
  - .1          Schedule hydraulic seeding to coincide with preparation of soil surface.
  - .2          Schedule hydraulic seeding using grass mixtures and mixtures containing legumes between dates recommended by Departmental Representative.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1          Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.
  - .2          Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3      Submit in writing 5 days prior to commencing work:
  - .1          Volume capacity of hydraulic seeder in litres.
  - .2          Amount of material to be used per tank based on volume.
  - .3          Number of tank loads required per hectare to apply specified slurry mixture per hectare.
- .4      Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5      Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

## **1.5 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Landscape Contractor: to be a Member in Good Standing of Landscape Alberta Nursery Trades Association.
  - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
  - .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
  - .2 Inoculant containers to be tagged with expiry date.
- .3 Storage and Handling Requirements:
  - .1 Store fertilizer in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **1.7 WARRANTY**

- .1 For seeding, 12 months warranty period is extended to 2 full growing seasons.
- .2 Contractor hereby warrants that seeding will remain free of defects in accordance with General Conditions GC 12.3, but for 2 full growing seasons.
- .3 End-of-warranty inspection will be conducted by Departmental Representative.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
  - .1 Grass mixture: "Certified", "Canada No. 2 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
    - .1 Mixture composition:
      - .1 25% Awned / Slender Wheatgrass, *Elymus trachycaulus* .
      - .2 50% Sand grass / *Calamovilfa longifolia*.
      - .3 25% Western Wheatgrass, *Agropyron smithii*.
- .2 Hydromulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:

- .1 Type I mulch: (Profile Cocoflex or equivalent)
  - .1 Made from predominately green dyed wood fibers and coconut fibers and without man-made fibers.
  - .2 Organic matter content: 95% plus or minus 0.5%.
  - .3 Value of pH: 6.0.
  - .4 Potential water absorption: 1500%.
  - .5 Biodegradability: 100%
  - .6 Functional Longevity: Up to 24 months
  - .7 Wet bond strength: 7 lb / ft
- .2 Tackifier:
  - .1 Crosslinked biopolymers and water absorbents (10%)
- .3 Water: free of impurities that would inhibit germination and growth.
- .4 Fertilizer:
  - .1 To Canada "Fertilizers Act" and Regulations.
  - .2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

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

#### **3.2 INSTALLERS**

- .1 Use installers members in Good Standing of Landscape Alberta Nursery Trades Association.
- .2 Installer shall be approved by product manufacturer, have access to the manufacturer's required equipment, and trained in the proper application of the product.

#### **3.3 PROTECTION OF EXISTING CONDITIONS**

- .1 Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray.
- .2 Immediately remove any material sprayed where not intended as directed by Departmental Representative.

### **3.4 PREPARATION OF SURFACES**

- .1 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .2 Fine grade areas to be seeded free of humps and hollows.
  - .1 Ensure areas are free of deleterious and refuse materials.
- .3 Cultivated areas identified as requiring cultivation to depth of 25 mm.
- .4 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
- .5 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.

### **3.5 PREPARATION OF SLURRY**

- .1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. Supply equipment required for this work.
- .2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
- .3 After materials are in seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

### **3.6 SLURRY APPLICATION**

- .1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.
- .2 Hydraulic seeding equipment:
  - .1 Slurry tank.
  - .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
  - .3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
  - .4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".
- .3 Hydromulch slurry mixture applied per hectare.
  - .1 Seed: grass mixture: 15 kg.
  - .2 Type 1 Mulch mixture: 4500 kg
    - .1 Adjust application rate based on slope gradient, as recommended by manufacturer.
- .4 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
  - .1 Using correct nozzle for application.
  - .2 Using hoses for surfaces difficult to reach and to control application.
- .5 Blend application 500 mm into adjacent grass areas or sodded areas to form uniform surfaces.
- .6 Re-apply where application is not uniform.

- .7 Remove slurry from items and areas not designated to be sprayed.

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  - .1 Clean and reinstate areas affected by Work.

### **3.8 PROTECTION**

- .1 Protect seeded areas from trespass until plants are established.
- .2 Remove protection devices as directed by Departmental Representative.

### **3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Ensure maintenance is carried out under supervision of certified Landscape Maintenance Supervisor.
- .2 Perform following operations from time of seed application until acceptance by Departmental Representative.
- .3 Grass Mixture:
  - .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
  - .2 Control weeds by mechanical means utilizing acceptable integrated pest management practices.
  - .3 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

### **3.10 ACCEPTANCE**

- .1 Seeded areas will be accepted by Departmental Representative provided that:
  - .1 Plants are uniformly established. Seeded areas are free of rutted, eroded, bare or dead spots.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

### **3.11 MAINTENANCE DURING WARRANTY PERIOD**

- .1 Perform following operations from time of acceptance until end of warranty period:
  - .1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.

**END OF SECTION**





**Part 1            General**

**1.1               RELATED SECTIONS**

- .1        Section 32 91 19.13 - Topsoil Placement and Grading.
- .2        Section 32 92 19.16 – Hydraulic Seeding

**1.2               MEASUREMENT PROCEDURES**

- .1        Payment for Trail Restoration will be made at unit price bid of actual area surface measurements taken and computed by Departmental Representative.

**1.3               SCHEDULING**

- .1        Schedule sod relocation to coincide with preparation of soil surface.
- .2        Schedule sod relocation when frost is not present in ground.

**Part 2            Products**

**2.1               MATERIALS**

- .1        Topsoil
  - .1        Topsoil areas to be restored per Section 32 91 19.13 – Topsoil.
  - .2        Topsoil to depths as indicated in Part 3 of this section.
- .2        Native Sod Material transplanted from proposed paved or gravel areas on site.
  - .1        No invasive weeds present in material.
  - .2        Select sod material from area of site similar in sun exposure and drainage to the area receiving the sod.
  - .3        Soil portion of sod: 25 to 75 mm in thickness.
  - .4        Contactor to attempt to relocate sod with excavator in a manner that preserves the integrity of the vegetative mat. Note that native sod is composed of an irregular mix of grasses and groundcover and may not entirely cover the soil, and may be friable.
- .3        Sod establishment support:
  - .1        Use on steep slopes to retain sod in place as needed.
  - .2        Geotextile fabric: biodegradable, 12 mm square mesh.
  - .3        Biodegradable starch pegs: 17 x 8 x 200 mm.
- .4        Hydro seeding
  - .1        In areas not sodded, hydroseed per Section 32 92 19.16 – Hydraulic Seeding
- .5        Water:
  - .1        Supplied by Departmental Representative at hydrant located at One Compound Way.
- .6        Deadfall and Debris

- .1 Deadfall and debris to be secured from area of parking lot clearing and grubbing.
- .2 Deadfall to be sound fallen trees with branches and root ball. Use conifers for deadfall, do not use aspen. Do not use standing trees cut for clearing operations.
- .3 Debris to be individual branches from dead trees or on ground.

## **2.2 SOURCE QUALITY CONTROL**

- .1 Obtain approval from Departmental Representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.
- .3 Use deadfall and debris from area of parking lot clearing, do not import deadfall.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Remove and dispose of invasive weeds; debris; contaminated by deleterious materials; off site.
- .4 In areas to be sodded, place topsoil so that the depth of topsoil plus the sod is 100mm or greater.
- .5 In areas to be hydroseeded, place topsoil to 100mm depth.
- .6 Fine grade surface free of humps and hollows to smooth, even grade, with surface to drain naturally.

### **3.2 SOD PLACEMENT**

- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Do not travel over sections of sod already placed.

### **3.3 SOD PLACEMENT ON SLOPES AND PEGGING**

- .1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.
- .2 Peg sod on slopes steeper than 2 horizontal to 1 vertical:
  - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
  - .2 Not less than 3 pegs per square metre.
  - .3 Drive pegs to 20mm above soil surface of sod sections.

### **3.4 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Perform following operations from time of installation until acceptance.
- .2 Water seeded and sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 mm.

### **3.5 ACCEPTANCE OF SODDED AREAS**

- .1 Native Sod Material will be accepted by Departmental Representative provided that:
  - .1 Sodded areas are properly established.
  - .2 Sod vegetation is growing, and more than 75% of sod is free of bare and dead spots.
- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

### **3.6 HYDROSEEDED AREAS**

- .1 Place topsoil to 100mm depth.
- .2 Hydroseed in accordance to section 32 92 19.16.

### **3.7 DEADFALL/DEBRIS PILES**

- .1 Construct deadfall piles across slope in areas that will impede foot traffic over former trail.
- .2 Deadfall piles shall be installed prior to hydroseed operations.
- .3 Deadfall piles shall be installed after sodding operations.
- .4 Ensure that deadfall piles are sufficiently interlocked to prevent pile from moving under wind load or by rolling. Use at least 3 trees at any pile cross section. The pile shall have a minimum height of 450mm and length of 600mm, with a width sufficient to cross pathway.

### **3.8 MAINTENANCE DURING WARRANTY PERIOD**

- .1 Perform following operations from time of acceptance until end of warranty period:
  - .1 Water sodded and hydroseed areas at weekly intervals to obtain optimum soil moisture conditions to depth of 75 mm
- .2 Repair and resod dead or bare spots to satisfaction of [Departmental Representative] [Engineer] [Consultant] [\_\_\_\_].

### **3.9 CLEANING**

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

**END OF SECTION**

Approved: 2011-06-30

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 329116.13 – Topsoil Placement and Grading

**1.2 REFERENCES**

- .1 Reference Standards:
  - .1 Agriculture and Agri-Food Canada (AAFC).
    - .1 Plant Hardiness Zones in Canada-2000.
  - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Scheduling: obtain approval from Departmental Representative of schedule 7 days in advance of planting dates.
- .2 Schedule to include:
  - .1 Quantity and type of plant material.
  - .2 Planting Dates.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for, fertilizer, and mulch and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

**1.5 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Landscape Contractor: to be a Member in Good Standing of Landscape Alberta Nursery Trades Association.
  - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
  - .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Ornamental Maintenance designation.

**1.6 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.
  - .1 Protect foliage and root balls using anti-desiccants and tarpaulins.
- .3 Storage and Handling Requirements:
  - .1 Immediately store and protect plant material which will not be installed within 1 hour in accordance with supplier's written recommendations and after arrival at site in storage location approved by Departmental Representative.
  - .2 Protect stored plant material from frost, wind and sun and as follows:
    - .1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in topsoil and watering to full depth of root zone.
    - .2 For pots and containers, maintain moisture level in containers. Heel-in fibre pots.
  - .3 Store and manage hazardous materials in accordance with manufacturer's written instructions.

## **1.7 WARRANTY**

- .1 Contractor hereby warrants that plant material as itemized on plant list will remain free of defects in accordance with General Conditions CCDC GC 12.3, but for 1 full growing season, providing adequate maintenance has been provided.
- .2 End-of-warranty inspection will be conducted by Departmental Representative.

## **Part 2 Products**

### **2.1 PLANT MATERIAL**

- .1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.
  - .1 Source of plant material: grown in area of site, or:
    - .1 Grown in an ecoregion similar to the project site, as approved by the Departmental Representative.
  - .2 Plant material in location appropriate for its species.
- .2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.
- .3 Trees: with straight trunks, well and characteristically branched for species.
- .4 Collected stock: maximum 40 mm in caliper, with well developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.
  - .1 During collection, ensure 10% maximum seed crop (or plants) are collected from healthy population of many individuals, and from several plants of same species.
  - .2 Leave remainder for natural dispersal and as food for dependent organisms.

### **2.2 WATER**

- .1 Free of impurities that would inhibit plant growth.

## **2.3 STAKES**

- .1 Wood, pointed one end, 38 x 38 x 2300 mm.

## **2.4 WIRE TIGHTENER**

- .1 Type 1: galvanized steel, triangular shape.
- .2 Type 2: turnbuckle, galvanized steel, 9.5 mm diameter with 270 mm open length.

## **2.5 GUYING WIRE**

- .1 Type 1: steel, 3 mm wire.
- .2 Type 2: 1.5 mm diameter multi-wire steel cable.
- .3 Type 3: 3 mm diameter multi-wire steel cable.

## **2.6 CLAMPS**

- .1 U-bolt: galvanized, 13 mm diameter, c/w curved retaining bar and hex nuts.
- .2 Crimp type.

## **2.7 ANCHORS**

- .1 Wood:
  - .1 Type 1: 38 x 38 x 460 mm.
  - .2 Type 2: 38 x 67 x 600 mm.
- .2 Drive-in type.
  - .1 Type 1: 13 mm diameter x 75 mm long.
  - .2 Type 2: 18 mm diameter x 120 mm long.
- .3 Screw-in type:
  - .1 Type 1: 100 mm diameter steel disc.

## **2.8 GUYING COLLAR**

- .1 Tube: plastic, 13 mm diameter, nylon reinforced.

## **2.9 TRUNK PROTECTION**

- .1 Wire mesh: galvanized, electrically welded 1.4 mm wire with 25 x 25 mm mesh and fastener.
- .2 Plastic: perforated spiralled strip.
- .3 Burlap: clean 2.5 kg/m<sup>2</sup> minimum mass and 150 mm minimum wide, and twine fastener.
- .4 Tar impregnated crepe paper and twine fastener.

## **2.10 FERTILIZER**

- .1 Synthetic commercial type as recommended by manufacturer.

**2.11 ANTI-DESICCANT**

- .1 Wax-like emulsion.

**2.12 FLAGGING TAPE**

- .1 Fluorescent, orange colour.

**2.13 SOURCE QUALITY CONTROL**

- .1 Obtain approval from Departmental Representative of plant material prior to planting.
- .2 Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.

**Part 3 Execution**

**3.1 EXAMINATION**

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

**3.2 PRE-PLANTING PREPARATION**

- .1 Proceed only after receipt of written acceptability of plant material from Departmental Representative.
- .2 Remove damaged roots and branches from plant material.
- .3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.
- .4 Locate and protect utility lines.
- .5 Notify and acquire written acknowledgment from utility authorities before beginning excavation of planting pits for trees and shrubs.

**3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS**

- .1 Establishment of sub-grade for planting beds in accordance with Section 31 22 13 - Rough Grading.
- .2 Preparation of planting beds in accordance with Section 32 91 19.13 - Topsoil Placement and Grading.
- .3 For individual planting holes:



- .1 Stake out location and obtain approval from Departmental Representative prior to excavating.
- .2 Excavate to depth and width as indicated.
- .3 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
- .4 Scarify sides of planting hole.
- .5 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

### **3.4 PLANTING**

- .1 For bare root stock, place 50 mm backfill soil in bottom of hole.
  - .1 Plant trees and shrubs with roots placed straight out in hole.
- .2 Plant vertically in locations as indicated.
  - .1 Orient plant material to give best appearance in relation to structure, roads and walks.
- .3 For trees and shrubs:
  - .1 Backfill soil in 150 mm lifts.
    - .1 Tamp each lift to eliminate air pockets.
    - .2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.
    - .3 After water has penetrated into soil, backfill to finish grade.
  - .2 Form watering saucer as indicated.
- .4 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.
- .5 Water plant material thoroughly.
- .6 After soil settlement has occurred, fill with soil to finish grade.

### **3.5 TRUNK PROTECTION**

- .1 Install trunk protection on deciduous trees as indicated.
- .2 Install trunk protection before installation of tree supports.

### **3.6 TREE SUPPORTS**

- .1 Install tree supports as indicated.
- .2 Use single stake tree support for deciduous trees less than 3 m in height and evergreens less than 2 m in height.
  - .1 Place stake on prevailing wind side and 150 mm minimum from trunk.
  - .2 Drive stake 150 mm minimum into undisturbed soil beneath roots.
    - .1 Ensure stake is secure, vertical and unsplit.
  - .3 Install 150 mm long guying collar 1500 mm above grade.
  - .4 Thread Type 1 guying wire through guying collar tube.

- .1 Twist wire to form collar and secure firmly to stake. Cut off excess wire.
- .3 Use 3 guy wires and anchors for deciduous trees greater than 3 m in height and evergreens greater than 2 m in height.
  - .1 Use Type 2 guying wire with clamps for trees less than 75 mm in diameter and Type 3 guying wire with clamps for trees greater than 75 mm in diameter.
  - .2 Use Type 1 anchors for trees less than 75 mm in diameter and Type 2 anchors for trees greater than 75 mm in diameter.
  - .3 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed 2.5 m above grade.
  - .4 Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees.
  - .5 Install anchors at equal intervals about tree and away from trunk so guy wire will form 45 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.
  - .6 Attach guy wire to anchors. Tension wire and secure by multi-wraps.
  - .7 Install wire tightener ensuring that guys are secure and leave room for slight movement of tree.
  - .8 Saw tops off wooden anchors which extend in excess of 100 mm above grade or as directed by Departmental Representative.
  - .9 Install flagging tape to guys as indicated.
- .4 After tree supports have been installed, remove broken branches with clean, sharp tools.

### **3.7 MULCHING**

- .1 Ensure soil settlement has been corrected prior to mulching.
- .2 Spread mulch as indicated.

### **3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.
  - .1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.
    - .1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.
    - .2 Remove weeds monthly.
    - .3 Replace or respread damaged, missing or disturbed mulch.
    - .4 For non-mulched areas, cultivate as required to keep top layer of soil friable.
    - .5 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal

regulations. Obtain product approval from Departmental Representative prior to application.

- .6 Remove dead or broken branches from plant material.
- .7 Keep trunk protection and guy wires in proper repair and adjustment.
- .8 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

### **3.9 MAINTENANCE DURING WARRANTY PERIOD**

- .1 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.
  - .1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
  - .2 Reform damaged watering saucers.
  - .3 Remove weeds monthly.
  - .4 Replace or respread damaged, missing or disturbed mulch.
  - .5 For non-mulched, unseeded areas, cultivate monthly to keep top layer of soil friable.
  - .6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
  - .7 Apply fertilizer in early spring as indicated by soil test.
  - .8 Remove dead, broken or hazardous branches from plant material.
  - .9 Keep trunk protection and tree supports in proper repair and adjustment.
  - .10 Remove trunk protection, tree supports and level watering saucers at end of warranty period.
  - .11 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
  - .12 Submit monthly written reports to Departmental Representative identifying:
    - .1 Maintenance work carried out.
    - .2 Development and condition of plant material.
    - .3 Preventative or corrective measures required which are outside Contractor's responsibility.

### **3.10 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.11 CLOSEOUT ACTIVITIES**

- .1 Submit maintenance reports for trees, shrubs, and other plantings.

**END OF SECTION**

Approved: 2006-06-30

## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1        Section 02 41 13 Selective Site Demolition

### **1.2                MEASUREMENT PROCEDURES**

- .1        Included as part of work in Section 02 41 13 Selective Site Demolition

### **1.3                REFERENCES**

- .1        American National Standard Institute (ANSI)
  - .1        ANSI A300 (Part 1)-2001, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (revision and re-designation of ANSI A300-1995) (includes supplements).
  - .2        ANSI A300 (Part 2)-1998, Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices - Part 2 - Fertilization.
  - .3        ANSI A300 (Part 3)- 2000, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance: Standard Practices - Part 3 - Tree Support Systems (a. Cabling, Bracing, and Guying) (supplement to ANSI A300-1995).
- .2        Canadian Nursery Landscape Association (CNLA)
- .3        International Society of Arboriculture (ISA)
- .4        Ontario Ministry of Agriculture, Food and Rural Affairs
  - .1        Publication 483-2004, Pruning Ornamentals.

### **1.4                DEFINITIONS**

- .1        Crown Cleaning: consists of selective removal of one or more of following items: dead, dying or diseased branches, weak branches and water sprouts.
- .2        Crown Thinning: consists of selective removal of branches to increase light penetration, air movement and reduce weight.
- .3        Crown Raising: consists of removal of lower tree branches to provide clearance.
- .4        Crown Reduction or Crown Shaping: decreases tree height and/or spread.
- .5        Vista Pruning: is selective thinning of framework limbs or specific crown areas to improve views.
- .6        Crown Restoration: improves structure, form and appearance of trees that have been severely headed or vandalized.

### **1.5                QUALITY ASSURANCE**

- .1        Certification: provide International Society of Arboriculture or Canadian Nursery Landscape Association certification.

- .2 Field Samples: do sample pruning in manner to enable Departmental Representative to identify:
  - .1 Knowledge of target areas including branch bark ridge and branch collars.
  - .2 Technique for selection process and pruning used to establish desired form and shape for each species.
- .3 Acceptance of Work will be determined by Departmental Representative from field sample.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Place materials defined as hazardous or toxic in designated containers.
- .2 Dispose of unused disinfectant at official hazardous material collections site approved by Departmental Representative.
- .3 Ensure emptied containers are sealed and stored safely.
- .4 Divert wood materials from landfill to composting as directed by Departmental Representative.

## **1.7 TOOL MAINTENANCE**

- .1 Ensure that tools are clean and sharp throughout pruning operation: do not use tools that crush or tear bark.
- .2 Disinfect tools before each tree is pruned.
- .3 On diseased plant material disinfect tools before each cut.

## **Part 2 Products**

### **2.1 DISINFECTANT**

- .1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 GENERAL**

- .1 Prune in accordance with ANSI A300, and as directed by Departmental Representative. Where discrepancies occur between standard and specifications, specifications govern.
- .2 Notify immediately Departmental Representative conditions detrimental to health of plant material or operations.

- .3 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10 degrees C.
- .4 Retain natural form and shape of plant species.
- .5 Do not:
  - .1 Flush cut branches.
  - .2 Crush or tear bark.
  - .3 Cut behind branch bark ridge.
  - .4 Damage branch collars.
  - .5 Damage branches to remain.

### **3.3 PRUNING**

- .1 Around perimeter of project limit of work, existing trees shall be pruned to remove dead, dying, diseased and weak growth from plant material to provide crown raising for clearance of vehicles and pedestrians, or as directed by Departmental Representative, in order to promote healthy growth.
- .2 Remove live branches that:
  - .1 Interfere with healthy development and structural strength including branches crossed or rubbing more important branches.
  - .2 Are of weak structure including narrow crotches.
  - .3 Obstruct development of more important branches.
  - .4 Are broken.
- .3 Remove live branches to re-establish natural species form including:
  - .1 One or more developing leaders.
  - .2 Multiple growth due to previous topping.
  - .3 Branches extending outward from natural form.
  - .4 Undesirable sucker growth.
- .4 Remove loose branches, twigs and other debris lodged in tree.
- .5 Remove vines.
- .6 For branches under 50 mm in diameter:
  - .1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at angle equal to that formed by line opposite to branch bark ridge.
  - .2 Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.
  - .3 Do not cut lead branches unless directed by Departmental Representative.
- .7 For branches greater than 50 mm in diameter:
  - .1 Make first cut on lower side of branch 300 mm from trunk, one third diameter of branch.

- .2 Make second cut on upper side of branch 500 mm from trunk until branch falls off.
- .3 Make final cut adjacent to and outside branch collar.
- .8 Ensure that trunk bark and branch collar are not damaged or torn during limb removal.
- .1 Repair areas which are damaged, or remove damaged area back to next branch collar.
- .9 Remove additional growth designated by Departmental Representative.

### **3.4 ROOT GIRDLING**

- .1 For girdling roots one-quarter size of trunk diameter or larger, V-cut girdling root one-half way through at point where root is crossing.
- .2 Remove exposed portion of girdling root as directed by Departmental Representative after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

### **3.5 CARE OF WOUNDS**

- .1 Shape bark around wound to oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.

### **3.6 CLEAN-UP**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Collect and compost/recycle whenever applicable pruned material and remove from site.
- .3 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**