

32 10 00 BASES, BALLASTS, AND PAVING

Design of Rigid Paving

1. Typical paving materials for pedestrian and traffic surfaces (walkways, plazas, stairs, ramps, etc.):
 - i. Concrete:
 - a. Exposed aggregate (10mm nominal size).
 - b. Broom finish (preferable for wheelchair access areas).
 - c. Smooth troweled finish not acceptable.
 - ii. Concrete Pavers:
 - a. Nominal sizes, permeable installation.
 - iii. Asphalt:
 - a. Roadways.
 - b. Parking areas.
 - c. Pathways.
 - iv. Gravel:
 - a. Service roads.
 - b. Paths / trails.
 - c. Garden areas (crushed rock or limestone, consult FMGR).
2. All walkways shall be minimum 1200mm wide, and sized to suit the intensity of traffic, prominence of location, etc.
3. Minimize the surface area of paved and impermeable surfaces:
 - i. Use permeable paving wherever possible.
 - ii. EcoGrid and other similar systems shall only be used where directed by FMGT.
10. When slope regrading of a parking area is required, the landscape on the sides of the parking area will and also need to be built up so there is a gentle slope (4H:1V) down to existing grade
11. When the walkway is above grade, the landscape on the sides of the path will and also need to be built up so there is a gentle slope (4H:1V) down to existing grade
12. Grading to match or blend into existing landscape
13. Removal of 1 tree requires planting 3 trees. Species, size and location of new trees determined by Owner. UVic to be notified when roots are encountered before proceeding with work in that area. As a rule, roots larger than the diameter of your thumb should not be disturbed. If roots are present refer to figure 32 10 00.1 for details.

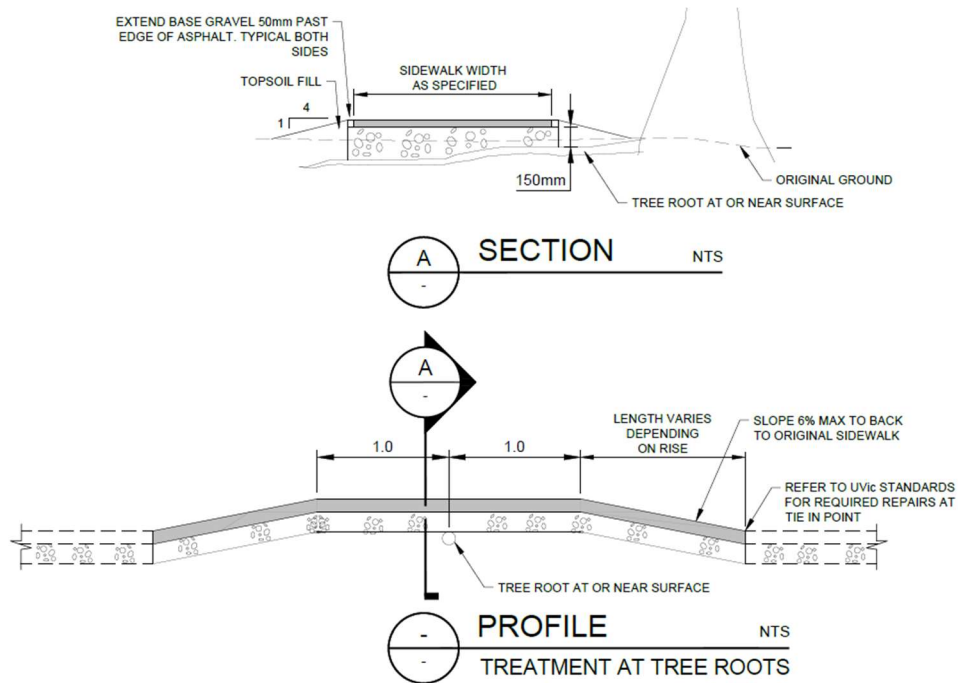


Figure 32 10 00.1

14. For bidding purposes, contractors are to assume asphalt parking lots are 50mm thick, except for areas within Parking Lot 11, which vary between 50mm and 75mm and allow for the removal of existing soils below as required to provide the required thicknesses of granular sub-base and concrete or asphalt.
15. When butting to existing concrete paving refer to figure 32 10 00.2 for reinforcing, and design details. Slabs shall be reinforced with 10M at 400mm on centre each way at mid-depth of slab.

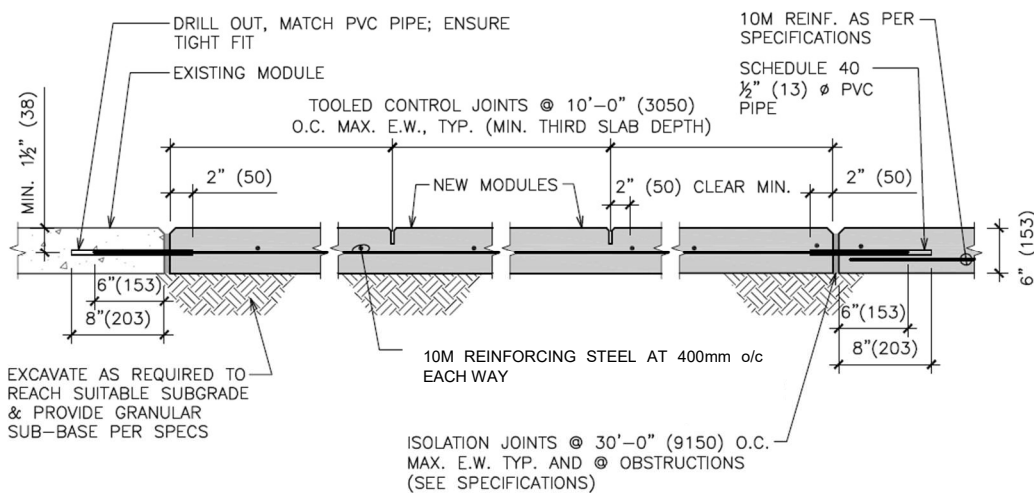


Figure 32 10 00.2

1. The Contractor shall retain a Geotechnical engineer to review the subgrade throughout the project.
2. The Contractor shall retain concrete materials testing agency to test plastic and hardened properties of the mix, including slump, air content, and compressive strength.
 - i. Allow for testing as per CSA A23.1.
 - ii. Keep a record of pour and test locations and submit test results to the owner / consultant upon request.
3. The Contractor shall retain an asphalt materials testing agency to perform Marshall testing for flow and stability.
 - i. Allow for sampling and testing every day that asphalt is being placed.
 - ii. Keep a record of test locations and submit test results to the owner / consultant upon request

32 11 00 BASE COURSES

Granular Base Products

1. Granular base shall be crushed gravel "road base"; maximum size aggregate 19mm minus as per MMCD Sections 32 11 23 and 31 05 17 2.10.

Sub Grade Preparation

1. Contractor to engage a geotechnical engineer to review subgrade throughout the project.
2. Remaining subgrade to be free of organic or other deleterious materials, unless otherwise approved by geotechnical.

Granular Base Placement

1. For asphalt parking lots Granular base material to achieve 100mm minimum depth. Base gravel pad to be 50mm wider than parking lot width on either side.
2. For concrete walkways granular base material to achieve 150mm minimum depth.
3. The maximum layer depth that can be placed (at one time) is 150mm and compacted to at least 95% of modified proctor density to ASTM D698.

32 12 16 ASPHALT PAVING

Products

1. All materials shall be new, of merchantable quality, and suitable for the intended purpose.
2. Upper Course #2 asphalt as per MMCD Section 32 12 16
3. Joint Sealer is to be as per MMCD Section 32 12 13.1.

Placing Asphalt

1. All work to comply with applicable MMCD specifications.
2. Contractor shall provide, maintain and pay for all materials, tools, machinery, equipment, temporary facilities, controls and conveniences necessary for execution of the Work.

3. All installation methods of materials must comply with the latest Manufacturer's printed instructions. Contractor to notify the Consultant in writing of any conflict between the Contract Documents and Manufacturer's instructions. All packaged materials must be delivered, stored and maintained with the Manufacturer's seals and labels intact.
4. Clean surfaces of existing concrete or asphalt tie in and apply bituminous material prior to new asphalt placement.
5. Supply, place and compact MMCD Upper Course #2 mix to the lengths and widths shown on the contract documents.
6. Apply joint sealer at tie in points to existing asphalt sidewalks.
7. The method of measurement and payment in the contract document overrides those in MMCD.

Cold Weather Requirements

1. When "Forecasted Air Temperature" is at or below 7°C:
2. Asphalt shall not be placed on or against any surface which is at a temperature of less than 7°C

Drainage of Pedestrian Paved

1. Large paved areas shall be sloped to drains, minimum 1% to maximum 2% fall. Where falls are 2%, provide sufficient number of drains to prevent "dishing."
2. Provide positive slopes away from entrances and exits, not less than 4%, to adequate storm drains, gratings or landscape. Do not extent the 4% slope for more than 2m horizontally.

32 13 13 CONCRETE PAVING

Concrete Products

1. All new concrete modules to be **150mm** thick, minimum. Thickness will be closely monitored and isolated areas less than 150mm thick will not be accepted.
2. Portland cement shall be type GU or GUL.
3. Concrete shall have a unit weight of $23 \pm 1 \text{ kN/m}^3$. Curing and protection for hot, cold or dry weather is to be as per clauses 7.4.1.8 and 7.4.2 of CAN/CSA A23.1 as a minimum. See also the "Cold Weather Requirements" section of these specifications. Maintain curing regime 3 per CSA A23.1 Table 19, extended wet curing.
4. Broom Finish Slab-on-Grade
 - i. The general contractor is responsible for working with the concrete supplier to ensure that the plastic and hardened mix properties meet site requirements for placing, finishing, and owner specified performance requirements. The general contractor shall meet the documentation and quality control requirements outlined under the "Performance" alternate of Table 5 of CSA A23.1.
 - ii. The concrete supplier shall meet all certification and documentation requirements as outlined under the "Performance" alternate of Table 5 of /CSA A23.1.
 - iii. Concrete to conform to CSA A23.1, exposure class C-2
 - a. Maximum water-cementing materials ratio: 0.45
 - b. 28-day Compressive Strength: 32 MPa, minimum

- a. Nominal maximum aggregate size: 20mm
- b. Air content: 5-8%
- c. Curing: Type 3 (wet 7 days minimum, Per Table 19 CSA A23.1)
- d. Slump: 80mm +/- 20 mm

5. Exposed Aggregate Finish Slab-on-Grade

- i. This section outlines the requirements to achieve a standardized aesthetic appearance of exposed aggregate concrete walkways and other flatwork on the University of Victoria Campus.
- ii. The standard of acceptance is the concrete sidewalk near the University of Victoria Bookstore as shown in figures 32 10 00.1.



32 10 00.2 Aerial view of exposed aggregate sidewalk (located in red circle) considered a reference sample of exposed aggregate concrete aesthetic appearance. The location is directly north-east of the University of Victoria Bookstore adjacent to bicycle storage rack.

- iii. The general contractor shall meet the documentation and quality control requirements outlined under Alternate 2, "Prescriptive" of Table 5 of CSA A23.1.
- iv. The supplier shall meet all certification and documentation requirements as outlined under Alternate 2, "Prescriptive" of Table 5 of CSA A23.1.
 - a. Prior to commencement of the work, the contractor/ concrete supplier shall provide an explicit mix design to confirm the proportions of the concrete mix and to confirm conformance with of this specification.
 - b. The concrete supplier shall provide batch records for all concrete loads.
 - c. The concrete supplier shall record and report water content for delivered concrete: including batch water, wash rack water and any other water additions.
- v. Prescriptive Mix Design Parameters
 - a. Cement content: 300 kg/m³
 - b. Supplementary Cementing Materials (SCM) content: 30 kg/m³
 - c. Air Content: 6 – 9 %
 - d. Maximum Water cementing materials ratio: 0.45:
 - e. Coarse aggregate to be sourced from quarries located on the southern half of Vancouver Island (Generally up to and including Nanaimo) and shall be non-staining and non-reactive to alkali conditions.
 - f. Pre-approved quarries for coarse aggregate include:
 - Butler Brothers - Keating Pit
 - Van-Isle Aggregates - Spruston Pit

- Hub City Paving – Nanaimo River Road Pit
- Alternates to be approved by the Owner via mock up sample.
- g. Coarse aggregate to be natural round stone, not subject to fresh mechanical fracture, except as described below:
 - Maximum 15% content of naturally angular and freshly fractured particles, as determined by particle count.
 - Maximum 10% content of thin, flat or elongated particles, as determined by particle count.
 - Aggregate samples shall be submitted to the Owner.
 - Acceptance of the proposed coarse aggregate stone material, with regard to the particle shape and texture considerations, is reserved by the owner or his designated representative.
- h. Gradation to be in conformance with CSA A 23.1 Table 11, Group II, 10-5, with the following exception:
 - The allowable grading for the 10-mm sieve opening shall be 65% to 90% (percent passing).
 - Alternate grading to be approved by the Owner.
- vi. Fine aggregate
 - a. To be natural sand.
 - b. Gradation to be in conformance with CSA Table 10, FA 1
- vii. Combined Aggregate Content:
 - a. Combined aggregate content shall be proportioned such that the concrete has a minimum coarse aggregate (>5-mm in diameter) content of 43%, by volume (of total concrete volume).
 - b. If concrete pumping is required, and only when accepted by the owner, the minimum coarse aggregate (>5-mm in diameter) content shall be 39%, by volume (of total concrete volume).

Note: Concrete mix MAY not be pumpable. Satisfactory pumping SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF WORK.
- viii. Water reducing admixture:
 - a. As required to achieve desired workability
 - b. In conformance with ASTM C494
- ix. Slump: 80 +/- 30 mm
- x. Air entrainment admixture:
 - a. As required to achieve specified air content
 - b. In conformance with ASTM C260
- xi. Curing: type 3 (wet 7 days minimum)
- xii. Admixtures containing calcium chloride are not permitted.

Aggregate Products

1. To be in conformance with CSA A23.1/ A23.2 for use in concrete.
 - i. Current aggregate test data, in accordance with CSA A23.1 Table 11 & 12, shall be submitted for review.

Surface Retarder (spray-applied water-soluble surface retarder) Products

1. Approved products
 - i. TOP-STOP by WR Meadows
 - ii. Unisol F Spray by Universal Concrete Accessories
 - iii. Masterfinish EA by BASF

Isolation Joint Products

1. Asphalt-impregnated fibreboard (by WR Meadows), Ceramar foam (By WR Meadows), or none (i.e. cold joint) - to match existing conditions.

Placing Concrete

1. Do concrete work in accordance CSA A23.1.
2. Provide finish (broomed, exposed aggregated, or "smooth") to match surrounding concrete in colour, profile, and texture. Broomed finish to provide corrugations approximately 2mm deep.
 - i. For exposed aggregate finish, follow surface retardant manufacturer's recommendations for application. Do not apply surface retarder until all bleed water has evaporated.
3. For exposed aggregate finish, internal vibration and/or vibrating screed are not permitted.
4. Provide edging to match surrounding concrete.
5. The final finish shall be done by experienced concrete workers thoroughly conversant with trowel and exposed aggregate work.
6. Perform work in sufficiently small quantities such that one crew can perform all of the finishing work in a given area.
7. Account for differences in environmental conditions throughout the day that may affect concrete finish. Varying environmental conditions (eg. hot/windy afternoon) shall not be acceptable cause for failure of the work to match the mock-up.

Tolerances

1. Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.
2. Depth of aggregate exposure to be within 15% of mock-up (eg. if 33% of aggregate diameter exposed in mock-up, aggregate in completed work to be exposed 28-38% of diameter)

Isolation Joints

1. Install isolation joints around manholes, catch basins and along length adjacent to concrete curbs, buildings, or permanent structure.
2. If module is in a location where isolation joints are provided between all modules, provide isolation joints to match existing.

Curing

1. Wet cure concrete continuously in accordance with CSA-A23.1 Table 19, regime 3, for at least 7 days after placing.
2. Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period.
3. Protect fresh concrete from direct sunlight and excessive wind.
4. Provide temperature control, if required.

Cold Weather Requirements

1. Forecasted Air Temperature at or Below 5°C:
 - i. The aggregate or mixing water shall be heated to maintain a minimum concrete temperature of 10°C at time of pour.
 - ii. Concrete shall not be placed on or against any surface which is at a temperature of less than 5°C.
 - iii. Concrete temperature shall be maintained above 2°C for at least 7 days or until the concrete reaches 70% of specified strength. Cover concrete with polyethylene and insulation or construct hoarding and provide heat as required.
 - iv. Forms and steel shall be free from ice and snow.

Mock-Ups

1. The owner will designate an existing module on site to which the mock-up is to be matched.
2. Power wash existing modules near mock-up to allow for comparison with mock-up.
3. The Contractor shall construct a mock-up replacement panel, minimum 1200mm by 1200mm by 100mm thick. The methods used to provide the sample finish shall be the same as those determined with the Consultant and subsequently used in the remainder of the work.
4. It is recommended the mock-up is utilized to determine the appropriate application time for the surface retarder. This can be completed by separating the mock-up area into sections and washing off the retarder at varying intervals in order to achieve the desired depth of etch.
 - i. Note: the surface retarder application time is dependent on many factors including temperature, wind, exposure to sun, etc. The contractor shall satisfy oneself with the variability of these factors and make provisions to account for environmental changes throughout the progress of the project.
5. Mock-up to cure 10 days minimum. Subsequently, the owner and the consultant will review the mock-up. If the mock-up is not deemed to be an acceptable match, the contractor shall provide additional mock-ups approved by the owner and the consultant.
6. The cost of the mock-up process is to be included in the base price.
7. Once approved, the mock-up is to be cut into 12"x12" squares and four such squares are to be kept on site to serve as portable samples. The mock-up may not remain as part of the finished work.
8. The mock-up, once accepted, shall be the standard to be achieved with regards to appearance. A very close match between the mock-ups and subsequent work is required. New modules deemed not to comply with this standard will be rejected and are to be replaced at the contractor's expense.

32 30 00 SITE IMPROVEMENTS

32 33 13 SITE BICYCLE RACKS

1. The University uses 3 types of manufactured bike racks. Refer to drawings immediately following this section.
 - i. Type A – typical unrestricted placement.
 - ii. Type B, with wheel stop – placement at 500mm against a wall or structure.
 - iii. Type C, with wheel stop – placement at 275mm against a wall or structure.

32 33 43 SITE SEATING AND TABLES

Exterior landscape benches:

- i. Refer to Figure 32 30 00-1 following this section for exterior Landscape bench design.
- ii. Arm rests should not be used
- iii. Wood: Clear Select Cedar. Wood members 3 ½" (89 mm) x 3 ½" (89 mm) with ¼" (6 mm) radius on edges and ends. Top and front members to be 1" (25 mm) radius bullnose. Cedar to be smooth sanded and CCA pressure treated.
- iv. Metal: Mild steel, wheel-abraded to bare metal, then precisely fabricated to final shape. The metal is to be a powder coated "mar-resistant" finish. HSS tube legs and bent plate bench brackets, size and connections to be engineered by manufacturer.
- v. Hardware: Provide bolt-through construction to create a single, solid unit. A special wrench for vandal-resistant hardware is to be provided with each bench. All hardware is to be powder coating to match bench finish.
- vi. Install bolted to concrete.
- vii. Where existing standard is encountered match product to that standard.

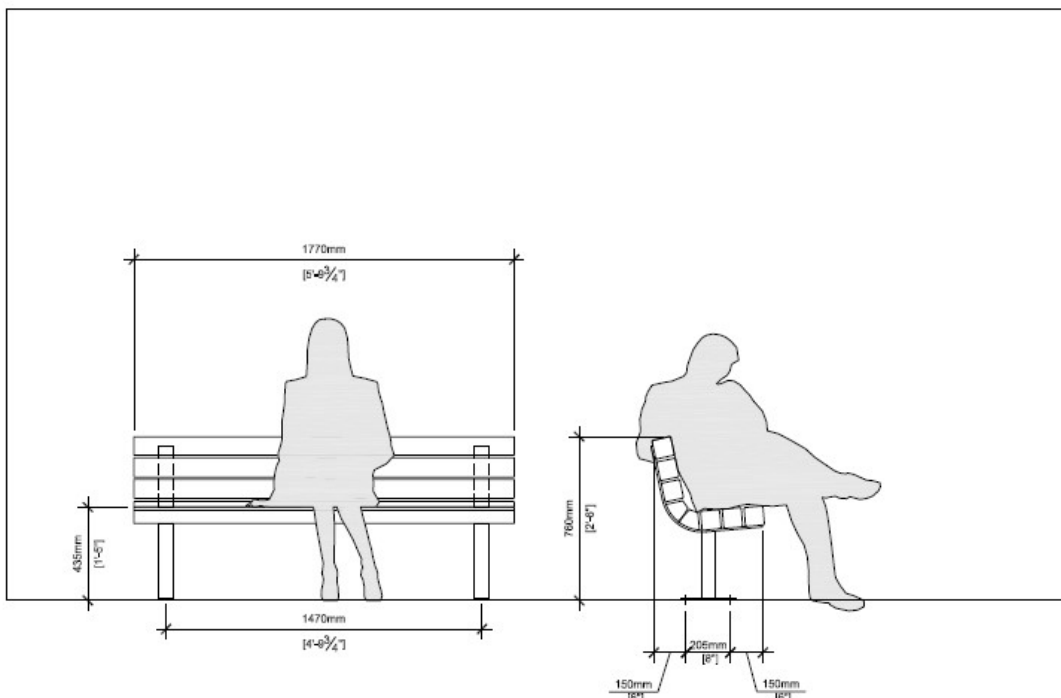


Figure 32 30 00-1

32 33 23 SITE TRASH AND LITTER RECEPTACLES

1. Typical waste receptacles:
 - i. Waste receptacles: 610 x 610 x 710mm high, exposed aggregate concrete containers, from Mackays Precast.
 - ii. Waste receptacles for buildings: Schaefer GMT Cart, from Rollins Machinery – 2 sizes:
 - i. Gray 360L – 610 x 890 x 1010mm high.
 - ii. Blue or Brown 240L – 585 x 740 x 1070mm high.
2. Waste Receptacle Enclosures:
 - i. Provide screening such that waste bins are visible only from the direction of service vehicle approach.

32 80 00 IRRIGATION

32 84 23 UNDERGROUND SPRINKLERS

Irrigation

1. Irrigation is required in all contained planting areas.
2. All Irrigation work to be completed in accordance with IIABC and BCLNA standards.
3. Drip irrigation shall not be used except in special circumstances as determined by FMGR. Polyvinyl pipe sizes: Class 200 pipe is preferred as a minimum in all applications; Class 160 may be used in special circumstances, with FMGR approval.
4. Reinstatement following construction:
 - i. All irrigation systems impacted by construction to be reinstated by Contractor.
 - ii. Systems to be tested and verified by FMGT Grounds.
 - iii. Equipment Standards:
 - a. Lawn sprinkler heads (Rotor type) Hunter I-40-04-SS, Hunter 1-20-04-SS or Hunter PGJ-04.
 - b. Lawn sprinkler heads (Pop up type): Irritrol I-Pro series with check valve and rainbird VAN nozzles
 - c. Shrub bed Rotors: Hunter PGJ-00 or Hunter I-20-00 on 3'-0" sched 80 grey risers supported by metal posts.
 - d. Shrub bed Spray Heads: Irritrol I-Pro Series 12" pop ups with check valve or sched 80 grey risers with shrub adaptors supported by metal posts
 - e. All sprinkler heads to have a minimum of 2' of flexible PVC. No swing joints

32 90 00 PLANTING

32 91 00 PLANTING PREPARATION

General Landscaping

1. All work shall conform to the latest edition of the B.C. Landscape Standard, issued by the British Columbia Society of Landscape Architects (BCLSA), unless approved by the Owner otherwise.
2. Preserve and enhance the overall character of the campus through the elements of landscape. Use continuity and consistency as design principles to create a coherent relationship between buildings and structures that may be quite different in their architectural expression.
 - i. Consider trees as the most important elements to define the functional and visual character of spaces. Douglas fir is the primary planting material, followed by other evergreens such as Cedar, Sequoia and Arbutus (broadleaf), as well as the deciduous Oak, Maple, and Dogwood.
 - ii. Shrubs shall be of a wider variety.
3. The established policy of the University stipulates that existing trees shall be retained wherever possible. Where tree removals over 100mm diameter are necessary, the University strives to provide 3 new trees on campus to replace every 1 tree removed.
4. In areas of brush and small trees under 100mm in diameter, the area to be cleared will be marked out by the University. Where existing trees over 100mm in diameter interfere with construction, the University will clearly mark the individual trees which are to be removed if required as part of the work.

32 91 13 SOIL PREPARATION

Landscape Materials

1. Soil Additives:
 - i. Manure: Well-rotted mushroom manure, to requirements of B.C. Landscape Standard.
 - ii. Sand: Hard, granular sharp sand to CSA A82 SO-M1976, well-washed and free of impurities.
 - iii. Peat Moss: Horticultural grade, to the B.C. Landscape Standard.
 - iv. Wood Residuals: Content of sawdust (such as fir or hemlock) shall not cause a C to N ratio higher than 40:1. Cedar or Redwood sawdust shall not be present in the soil mix.
 - v. Dolomite Lime: Horticultural commercial grade, finely and uniformly ground, containing not less than 20% by weight.
 - vi. Compost: Well-rotted vegetable matter, free of impurities and chemicals.
2. Fertilizers:
 - i. Standard commercial brands, meeting requirements of Canada Fertilizer Act, packed in waterproof containers with weight, analysis and manufacturer's name clearly marked. Granular, pelleted, or pill form, dry and free-flowing. Applied fertilizers must not contain a Phosphorus % in excess of 1% of total weight of overall applied fertilizer.
3. Planting Soil:
 - i. Shall be substantially free from roots, sticks, building materials, wood chips, pollutants, crab grass, noxious weeds or seeds/parts thereof.
 - a. Maximum requirements of dolomite lime to require pH: 220kg/100sq.m (100 lbs/1000sf).
 - b. Salinity: Maximum saturation extract conductivity 3.0 millihos/cm at 25°C.

- c. Total Nitrogen: 0.2-0.4% by weight.
- d. Available Phosphorus: 50-70 ppm.
- e. Available Potassium: 50-100ppm.
- f. Cation Exchange Capacity: 30-50meq.
- g. Carbon to Nitrogen Ratio: maximum 40:1.
- h. Allowable pH: lawns 6.0-6.5; planting areas 5.0-6.0.
- i. Texture:
 - 1. Dry weight organic content (compost) 30-50%.
 - 2. Particle size glasses: rock and gravel (2mm) 0-3%.
 - 3. Sand: (0.05 & 2mm) 30-35%.
 - 4. Silt & Clay: (0.05mm) 15-20%.
 - 5. Clay: (0.002mm) 0-10%.

4. Bark Mulch

- i. Dark brown in colour, 25mm and smaller, Douglas fir or Hemlock, free of chunks and all foreign and harmful material.

Landscape Reinstatement

1. Soil Preparation and Placement:

- i. Supply, prepare and place planting medium where indicated on drawings and as affected by the work.
- ii. Prior to placement, do not move or work soil or additives when they are excessively wet, frozen, extremely dry or in any manner, which will adversely affect soil structure.
- iii. Protect soil, additives and fertilizers against extreme wetting and against contamination by weeds and insects.
- iv. Deliver and store fertilizers and chemical ingredients in the original manufacturer's containers.
- v. Place a minimum 50mm layer of bark mulch in all planting beds.
- vi. Thoroughly mix soil with additives to produce planting medium.
- vii. Scarify compacted sub-grades to a minimum depth of 100mm (4") prior to placing planting soil.
- viii. Place planting soil to depth of 225mm for groundcover areas, 450mm for shrubs and gardens.
- ix. Individual plants shall have shrub pit 300mm wider and 150mm deeper than root-ball.
- x. Crown or slope for positive surface drainage.
- xi. Do not compact, but finish the surface smooth, uniform and firm against deep footprints.
- xii. Protect planted areas with 1220mm high temporary fencing.

2. Grass:

- i. Reinstatement topsoil as per FMGT Standard mix see "typical soil preparation and placement notes above).
- ii. Roll out topsoil to compact prior to sodding.
- iii. Replant using sod.
- iv. Apply Quickstart fertilizer.

32 93 00 PLANTS

Plantings

- 1. The University quadrangle is strongly defined by formal planting, walkways and the surround architecture. Trees in this space are primarily Pin Oak, Garry Oak, and Douglas fir. All future formal planting within the quadrangle shall be consistent with the existing.

2. Maintain the informal planting and natural plant material growth outside the quadrangle.
3. Plant materials shall be selected with the acknowledgement that UVic practices Integrated Pest Management. Discuss plant combination to be applied in specific locations with FMGR.
4. Areas of site to be “reforested” – i.e. areas where planting will recover the quality of native growth – will primarily be Douglas fir, Western Red Cedar, Big Leaf Maple, and Dogwood.
5. Transition areas between forest and developed areas shall be provided with plant materials compatible to both areas.
6. Areas closer to buildings (domesticated areas) shall use trees such as Pacific Crabapples, Red Oaks, Pin Oak, Garry Oak and Maple.
7. In special circumstances, other specimen materials may be required by the botanical studies program for educational purposes, as directed by FMGT in co-ordination with FMGR and the Biology Department.
8. Shrubs shall be chosen to define space, complement buildings, control circulation and provide wind screening. In developed areas, ground cover shall be primarily lawn, supplemented by other materials with proven performance suitability on campus. Shrubs and ground cover are elements of space continuity; however, the extent of their use shall be evaluated in relation to the cost of maintenance required for the first two years of plant establishing.
9. Annuals provide desirable bright colour, but should be used only in contained areas where irrigation is available, and maintenance and replacement are not problematic (i.e. courtyards).
10. Mulching (fertile mulch) of planting beds is required. Hog fuel type of Bark mulch is prohibited. Consult FMGR.
11. UVic prefers the short-term use of irrigation to establish plants (maximum 2 growing seasons). Low water, drought tolerant planting is encouraged.

Planting Warranty

1. One full year labour and planting.
2. Materials warranty to be provided for all landscape work.