

**BRITISH COLUMBIA
PLACE**

LANDSCAPE ARCHITECTURE

TECHNICAL COMPONENT

FEBRUARY 15, 1982

2ND PROGRESS REPORT

GARDNER, PEEPRE & ASSOCIATES

&

THE EIKOS GROUP

February 18, 1982

Mr. Dave Podmore
Director of Planning and Design
B. C. Place
650 West Georgia St., 21st Floor
Vancouver, B. C.
V6B 4N9

Dear Dave:

We take pleasure in providing you with our second progress report for the technical component of the landscape architecture work for B. C. Place.

The report contains brief descriptions reviewing our work to date, and is divided into the following sections:

1. Master Index of Nursery Catalogues
2. Initial Plant Material Design Considerations
3. Tree Bank Establishment and Organization
4. Computer Database
5. Soil Sterilant Analysis
6. Specifications for Rough Grass Seeding

Briefly, the status of these items is as follows:

1. The Master Index of Nursery Catalogues and our assessment of potential suppliers throughout North America is complete.
2. The Initial Plant Material Design Considerations are complete but limited in scope and require specific interaction between the design groups and the landscape consultants to be authorized by you.

3. The Tree Bank Establishment and Organization details have been brought to a stage where plant procurement and establishment could take place very quickly with a minimum of additional time.
4. The Computer Database is now complete and contains in excess of 300 trees and 500 shrubs. We are in a position to identify qualifying species for procurement as soon as design criteria are settled.
5. The appropriate sampling for the Soil Sterilant Analysis has been undertaken and the Provincial Lab is presently examining the soils. It is our understanding that some soil sterilant residues do remain.
6. Specifications for Rough Grass Seeding were prepared and previously submitted to B. C. Place.

We trust that this work meets with your approval. I am pleased to say that, with the exception of our concern about determining design criteria AS SOON AS POSSIBLE if we are to establish plants in the Tree Bank this year (see detailed section on Tree Bank), we are on schedule with our work.

It has been suggested to Eikos that the increasing complexity of the work warrants the preparation of a Task and Time Chart for the landscape component of the consulting services to B. C. Place. This concept and our detailed proposal for the next stage of the technical component of the landscape services will be forwarded separately to you through Eikos.

We look forward to hearing from you. Should you have any questions on the phases of work to date or any of the on-going requirements, please do not hesitate to contact us.

Yours very truly,

GARDNER, PEEPRE & ASSOCIATES LTD.



M. R. Gardner

RG:sm

encl.

cc: Eikos

B. C. PLACE

MASTER INDEX OF NURSERY CATALOGUES

The response to our most recent request for nursery catalogues (the letters were mailed in December) has been fairly good, with more than half of the nurseries replying so far. A copy of the letter we sent to the nurseries is included in this report.

Also included is a list of nurseries that sell large caliper specimen trees, that is, those with a caliper of 2 1/2 " (6 cm) or more.

During the next few weeks we will probably be receiving the Spring 1982 issues of catalogues from several nurseries. We were frequently sent catalogues that were somewhat outdated, either because the most recent issues had been sold out or because the catalogues were in the process of being updated at the time our request was received.

For the most part, however, the master index of catalogues can be considered complete and up-to-date.

COPY OF LETTER SENT TO NURSERIES

December 7, 1981

Dear Sirs:

Our firm is involved in large-scale plant procurement for an extensive development project, and we believe that a copy of your current catalogue would be useful.

We will ultimately be procuring trees, shrubs, vines, ground covers, annuals and perennials, but at the moment we are most concerned with the availability of specimen trees. If your nursery produces large deciduous or coniferous trees for the wholesale trade, please forward a catalogue to:

Ms. Susan Munro
GARDNER, PEEPRE & ASSOCIATES LTD.
Suite 15, 1600 West 6th Avenue
Vancouver, B. C.
Canada
V6J 1R3

Your cooperation is much appreciated.

Yours very truly,

GARDNER, PEEPRE & ASSOCIATES LTD.

Susan Munro
Research Horticulturist

SM:ts

NURSERIES WITH SPECIMEN TREES

Aldridge Nursery, Inc. - Von Ormy, TX
Amfac Nurseries Select - Fallbrook, CA
Angelica Nurseries, Inc. - Kennedyville, MD
David T. Armstrong Nursery - Windsor Locks, CT

The Robert Baker Companies - West Suffield, CT
Bald Hill Nurseries, Inc. - Exeter, RI
W. R. Baxter Wholesale Nursery Inc. - Emmett, ID
T. H. Belcher Nursery, Inc. - Boring, OR
Boething Treeland Farms - Cupertino, CA
Bork Nurseries, Inc. - Onarga, IL
Boyd Bros. Nurseries - McMinnville, TN
Braun Nursery - Mount Hope, ON
Brookdale-Kingsway - Bowmanville, ON
The Bruce Company - Middleton, WI

California Nursery Company - Fremont, CA
John L. Cartwright Nursery - McMinnville, TN
Cascade Tree Farms - Woodburn, OR
Clavey's Woodstock Nursery, Inc. - Woodstock, IL
Clay's Nurseries - Langley, BC
Clayton Nursery Company - Nampa, ID
Concord Nurseries, Inc. - North Collins, NY
Commercial Nursery Co. - Decherd, TN
Congden & Weller Wholesale Nursery, Inc. - North Collins, NY
Cottage Gardens, Inc. - Lansing, MI
Country Gardens, Inc. - Melville, NY

C.L. Dannar Nursery - Gresham, OR
Dauber's Nurseries - York, PA
DeWilde's Wholesale Nursery - Lynden, WA

Eastside Nursery - Groveport, OH
Eisler Nurseries - Butler, PA

Fairview Evergreen Nurseries, Inc. - Fairview, PA
Charles Fiore Nurseries, Inc. - Prairie View, IL
Forest Nursery Company, Inc. - McMinnville, TN
French Prairie Tree Farms - Gervais, OR

Gilmore Plant and Bulb Co., Inc. - Julian, NC
Greengrove Tree Farms Limited - Mackay, AB
Growth Nursery Farms - Auburn, WA

Halka Bros. Nurseries, Inc. - Englishtown, NJ
H. G. Hallum Nursery Co. - McMinnville, TN
Hansen Nurseries - Sassamansville, PA
Hawkersmith & Sons Nursery, Inc. - Tullahoma, TN
Hillside Gardens Nurseries & Greenhouses - Foley, MO

Ilgenfritz Nurseries, Inc. - Monroe, MI
Ingleside Plantation Nurseries, Inc. - Oak Grove, VA

Jewell Nurseries, Inc. - Lake City, MN
Johnsen Landscaping Ltd. - Burnaby, BC

Kankakee Nursery Company - Aroma Park, IL
Keeline-Wilcox Nurseries, Inc. - East Irvine, CA
Charles Klehm & Son Nursery - Arlington Heights, IL
Knupper's - Palatine, IL

Levi's Nursery - Bonners Ferry, ID
Loomis Nursery, Inc. - Boring, OR

Maschmeyer's Nursery, Inc. - Whiteland, IN
Massot Nurseries Ltd. - Richmond, BC
Mayo Nurseries - Lyons, NY
Millane Nurseries & Tree Experts, Inc. - Cromwell, CT
Mori Nurseries - Niagara-on-the-Lake, ON
E. J. Murray & Son Wholesale Nurseries Ltd. - Langley, BC

Neosho Nurseries - Neosho, MO
Nonesuch Nursery - Pamplin, VA
Northwest Shade Trees, Inc. - Boring, OR

Oki Nursery Co. - Sacramento, CA
Onarga Nursery Co. - Onarga, IL
Orange County Nursery, Inc. - Norwalk, CA
Oregon Tree Farms - Clackamas, OR

Princeton Nurseries - Princeton, NJ

Reid, Collins Nurseries Ltd. - Aldergrove, BC
Samuel J. Rich, Inc. - Hillsboro, OR
Robbins Nursery, Inc. - Willard, NC

Eugene A. de St. Aubin & Bro., Inc. Nurseries - Kirkland, IL
Sakaido Nursery, Inc. - Rosemead, CA
Sandy River Shade Trees - Boring, OR
Sarcoxie Nurseries, Inc. - Sarcoxie, MO
Schichtel's Nursery - Orchard Park, NY
J. Frank Schmidt & Son Co. - Boring, OR
Shadow Nursery, Inc. - Winchester, TN
Shady Grove Plantation & Nursery, Inc. - Orangeburg, SC
Sheridan Nurseries - Oakville, ON
Sherman Nursery Company - Charles City, IA
Silver Creek Nurseries, Inc. - Manitowac, WI
Southern Tree & Landscape Co. - Charlotte, NC
Specialtrees Nursery - Dayton, OR
Stanwood Wholesale Nursery Specimen Trees - Seattle, WA
Stonegate Farm Nursery - Poplar Grove, IL
Synnestvedt Landscape - Glenview, IL

The Tankard Nurseries - Exmore, VA
Taylor's Nursery, Inc. - Raleigh, NC
Alfred Teufel Nursery, Inc. - Portland, OR/Everett, WA
Triangle Nursery Inc. - McMinnville, TN
Matt Tures Sons Nursery - Huntley, IL

Valley Crest Tree Company - Sylmar, CA

Wandell's Nursery, Inc. - Urbana, IL
Warren County Nursery, Inc. - McMinnville, TN
Watkins Nurseries, Inc. - Midlothian, VA
Waynesboro Nurseries - Waynesboro, VA
Weston Nurseries - Hopkinton, MA
Whitham Nurseries, Inc. - Agency, IA

B. C. PLACE

INITIAL PLANT MATERIAL DESIGN CONSIDERATIONS

We have met three times with Eikos to discuss our basic understandings of the major areas associated with B. C. Place (roads, amphitheatre, waterfront, etc.) with respect to establishing plant material design criteria. Brief notes taken at these meetings are included below.

As a result of these joint meetings, we have determined some unresolved questions, which are included in this section of the report. Before proceeding with establishing the initial criteria for plant material selection, we feel it would be useful for us to meet with the design group for the individual projects to discuss these questions.

ITEMS TO BE RESOLVED PRIOR TO
PRELIMINARY TREE SPECIES SELECTION

I. Amphitheatre

1. Eikos/Gardner Peepre should have input into the design of the Plaza, i.e., in terms of structural design, weight and space limitations as it relates to large plant material.
2. What are the present expectations for plant material to serve as a screen for the viaduct?
3. There will be major time constraints for ordering large caliper stock of a suitable scale for this particular part of the project. Decisions will have to be made very soon if the plants are to be installed prior to the 1983 opening of the Stadium.

II. Road

1. What will be the dimensions of the road, with respect to setbacks, width of the roadway, widths of sidewalks, width of the boulevard, etc.?
2. What is the overall desired effect: a parkway/people street or a freeway?
3. Which is preferred: a continuity in planting throughout the road system or a series of units, i.e., the housing area west of Cambie, the section around the Stadium, and the "Chinatown" unit (east of the Stadium to Quebec)?
4. Will there be a separate bike route?
5. Is the road to serve as the service corridor?
6. What are the anticipated treatments of the cross-streets, crosswalks and adjacent open areas?

III. Miscellaneous

1. When will enlarged (detailed) drawings of the major areas, particularly of the Stadium area, be available for use?

MEETING NOTES

Priority Areas to Consider

Roads - major
- secondary

Amphitheatre

Waterfront

Parks - neighbourhood
- sub-neighbourhood
- Provincial

Western enclaves

1. Major Road

- Pacific and extension
- central boulevard
- lots of trees
- large canopy trees beside buildings and ornamentals on boulevard
- buildings will be a minimum of 8 stories high
- trees will be shaded
- want to reduce the scale of the street and buildings with trees - a strong, canopy-type tree with spreading habit
- impingements:
 - the neighbourhood park
 - B.C. Place Provincial Park
 - Amphitheatre
- high volume of traffic
- high traffic, e.g., double-tiered buses
- will be one of the first things constructed on the site
- will be used to facilitate access to other construction sites until 1986 (Transpo)
- may be a problem with dust from vehicles
- will be well-lit
- pedestrian use:
 - no berries or other litter
 - some high density places
 - office
 - residential
- important cross streets

- visual appearance is important - continuity
 - "parkway"
- trees should make a substantial statement
- will use some other plant material as well
- overpass conditions at Georgia Viaduct
- generally an east - west aspect
- not too concerned with views, even from buildings, except at corners
- perhaps use smaller scale trees on corners of boulevard
- boulevard trees should be in blocks or groups of 3 to 5, not alternating single species

2. Waterfront

- soil depth limitations
- salt water intrusions
- big containers
- views
- pedestrian scale
- a series of different experiences linked together
- imposition of park, roads and hard surface areas
- tree grates
- water/land interface
- protected - no major winds
- lots of sun
- trees and boats
- fine-textured trees would maintain views
- in certain areas, want to frame the view with trees
- should use 6' standards along pedestrian walkway, but different forms could be used beside buildings
- blocks of trees near seating areas to provide a little shade
- there is always a slight breeze on the waterfront
- warming in winter and cooling in summer
- increases the hardiness potential, but a cold snap will kill marginally hardy stock
- want vandal-proof trees - size
 - bark (e.g., Oaks better than Red Maple)

3. Islands

- native or native-like species
- organic in nature - soft edge
- ecologically sound and representative of island conditions
- simulation of forest and seaside environment
- sympathetic to forest centre - logging
- picnic/informal activities
- stress - compaction

- soft surface - turf
- boating to small islands
- formal walkway
- west side will have more hard surface and more intensive use
- want to screen the industrial south side with trees - frame the view (for the next 25 years or so)

4. Amphitheatre

- large-scale buildings
- covered in some areas
- hard surface - plaza
- high people use
- planting on roof - containers
- large plant material with coarse branching, leaves and bark
- canopy feeling
- clean
- south side - intense sun
- north side - shaded
- stadium will probably generate winds
- want to reduce visual impact of the viaduct
- major priority with respect to time
- terminus of Robson Street and connection of Robson to water
- want to pass by the building, not stop at it

5. Robson Terminus

- pedestrian
- discussion with City
- major pedestrian connection to water
- study to the west
- wide sidewalks
- provide terminus

Note: Beatty Street is outside the B.C. Place property line.

6. Smithe/Nelson

- gateway to city
- elevated roadway from Cambie Bridge
- affected by scale of stadium
- bridge design will have an impact
- pedestrian connection from bridge, but not on Smithe/Nelson
- fairly high priority - pre-Transpo construction

7. Roundhouse/Davie

- public space
- want to link neighbourhood park and Roundhouse Centre
- "hourglass" planting?

8. Georgia Terminus

- gateway
- City plans?
- subway connection

Other Considerations

- B.C. Place Provincial Park - highly urban
- Hamilton/Homer = escape to water from Yaletown, but blocked by Roundhouse
- subneighbourhood parks near Granville Bridge
- secondary roads - plant with the same species for continuity?

B. C. PLACE

TREE BANK ESTABLISHMENT AND ORGANIZATION

The establishment of a "Tree Bank" for B. C. Place (i.e., buying small trees and growing them on to larger caliper at a local nursery) would result in considerable dollar savings compared with purchasing specimen trees at the time of installation. The other major benefit of a Tree Bank established for B. C. Place would be that the Corporation can be certain that the desired species will be readily available in the sizes and numbers appropriate for each design component of the overall development.

We are now in a position to begin making decisions regarding the numbers and species for the Tree Bank as soon as the design criteria are established.

The time constraints involved in establishing a Tree Bank must be emphasized. To obtain the best possible trees for B. C. Place, a Tree Bank should be set up this spring, and the trees reserved by the end of March.

NOTES ON B. C. PLACE TREE BANK

I. BENEFITS OF TREE BANK

- considerable dollar savings from growing on rather than purchasing specimen trees at the time of installation (savings of approximately 50%)
 - at 1981 prices, a single 4" caliper tree costs at least \$250.00 without delivery, presently one of the most significant factors in total cost
 - with inflation over 4 years, the costs could increase to \$375.00 per tree or more, depending on the species
 - these costs would probably be somewhat less for trees bought in quantity
 - by comparison, the Tree Bank will yield appropriate sizes, numbers and species of trees for a cost of approximately \$225.00 to \$250.00 each, delivered to the site
- will have immediate availability of specimen-sized stock (original material bought as 2-year-old budded stock will yield large trees up to 4" caliper)
- exact species will be known
- damage to stock will be minimized compared with long distance shipping
- visual benefits of using older trees will be evident
- trees will already be acclimatized for Vancouver's climate
- reduction in time for logistics when it comes to installation
- proven resistance to diseases and pests tested in Tree Bank
- a record of maintenance can be kept for each tree (using a number system); future requirements will be known, resulting in consistently appropriate care and training and consistent specimens for planting

II. STAGING

- must determine the priority of the various components of the project and forecast the needs of each
 - e.g., Stadium
 - Main Road
 - Waterfront
 - West Housing Area
 - Expo 86
- design criteria for each area must be developed
- qualifying species list will be prepared from computer database
- identification of supplier(s)

- final species selection, done in conjunction with client
- field inspection of budded/grafted bareroot stock prior to importation
- procurement
- shipping and importation logistics must be determined
- Tree Bank layout and tree installation will be determined with each surrogate nursery
- maintenance and inspection will be continued during growing on period
- logistical planning for site installation will be put on PERT

III. COLLECTION AND PREPARATION OF STOCK

- selection of nurseries for growing on (acreage, at a ratio of 2 acres per 1000 trees, will be required)
- should obtain cultural record of stock (provenance, age) for B. C. Place booklet and for maintenance profile
- future cultural requirements in Tree Bank and on site must be laid out
- should buy only the most vigorous of the 2-year-old budded/grafted stock
- guaranteed stock required
- best nursery practice used for culture during growing on period
- insurance of Tree Bank arranged
- should arrange for inspection of material at time of delivery
- for trees bought from nurseries in the U.S., the appropriate import permits will have to be obtained
- letter requesting land reserved and growing on agreement should be drafted with surrogate nursery
- must maintain consistency within species with respect to size and vigour, so an allowance of approximately 5% should be made for sub-standard stock

IV. NURSERY PRACTICE

- determination of end-product requirements for each location
- drafting of management specifications for growing on to meet above
- determination of species specific culture
- installation specifications prepared for lifting, transport, storage, planting and support
- tree requirements (biotic support systems)
- development of container bank - trees to be grown on with root systems for containers on site so as to have a minimum of disturbance of the trees (thus, 100% of the trees can be reused after Expo 86)
- develop schedule and specifications for intensive maintenance during Expo 86
- use of specialized techniques for container trees at Expo 86?

V. RESPONSIBILITY FOR MANAGEMENT

- should probably be shared between the nurseries, the consultants and B. C. PLACE
- trees should be inspected periodically during their time at the Tree Bank to ensure that the growing on agreement is being met

VI. FINANCIAL PLANNING

- must determine the approximate numbers and costs of trees for the Stadium, Main Road, West Housing Area and Expo 86 individually for presentation to the B. C. Place Board
- B. C. Place would acquire sufficient 2-year-old budded/grafted stock outright through a first payment to the nursery
- each surrogate nursery will require, for example:
 - (a) 30% downpayment (to cover the cost of the trees and planting),
 - (b) 30% midway through the contract period (to cover maintenance costs), and
 - (c) the balance upon delivery of the trees to the site
- the total cost of the trees in 1986 would be approximately \$225.00 to \$250.00, including delivery to the site, although the range will depend to a large degree on the species involved
- these figures are based on the following assumptions:
 - (a) There are 1000 to 2000 trees in the Tree Bank
 - (b) The trees are planted in the Tree Bank this spring (1982), and planted on the B. C. Place site in the spring of 1986
 - (c) The costs include an allowance for inflation
- other items that should be written into the contract with each surrogate nursery:
 1. There will be extra maintenance charges if planting on site is delayed past _____ (state a particular year/date).
 2. Some extra trees (perhaps 5% per 1000) should be purchased to cover accidental losses during the contract period. B. C. Place should bear this cost for their own security. It might be possible to arrange for a refund if the trees are not used.
 3. The nursery will be responsible for losses due to pests, accidents, etc.

GENERAL LAYOUT OF A "TREE BANK"

For growing trees to 4.5" caliper:

The trees are spaced a minimum of 12' apart in rows 7' apart, that is, 84 square feet per tree.

$$\frac{43,560 \text{ sq.ft./acre}}{84 \text{ sq.ft./tree}} = 518 \text{ trees/acre}$$

For growing trees to 3 - 4" caliper:

The trees are spaced approximately 7' apart in rows 7' apart, that is, 49 square feet per tree.

$$\frac{43,560 \text{ sq.ft./acre}}{49 \text{ sq.ft./tree}} = 890 \text{ trees/acre}$$

In general, there are no more than 90 trees (3" caliper) in each row. If the rows are any longer, management of the trees becomes much more difficult.

It should be noted that spacing of the trees in the rows depends to a certain extent on the species and general form of the tree. For instance, oaks can be grown closer together than maples, whereas species such as Carpinus betulus 'Fastigiata' could be grown with a fairly narrow spacing.

Assuming that the trees purchased for the Tree Bank had been grafted or budded 2 years previously (they would actually be 4 to 5 years old), they would be 1.5 to 2" in caliper. If they were put into the Tree Bank in the spring of 1982, approximately 2 3/4" of caliper would be added by the time the trees were planted on site in the spring of 1986, as illustrated in the following table:

<u>YEAR</u>	<u>CALIPER ADDED</u>
1982	1/4"
1983	1/2"
1984	3/4"
1985	1 1/4"
	<u>2 3/4"</u>

Thus, the trees would be at least 4" in caliper when planted in 1986. However, if the Tree Bank were not started until the spring of 1983, the trees would put on only 1 1/2" of caliper before planting in 1986.

To obtain the best possible trees for B. C. Place, the 2-year-old budded/grafted stock should be reserved no later than the end of March of this year, although some species may be available in quantity after this.

B. C. PLACE

COMPUTER DATABASE

The following is a listing by scientific name of the 330 trees and 532 shrubs currently accessioned in the database. The accession work is largely completed and is ready to be used when the design criteria for plant material have been determined.

Coupled with the categories outlined in our first report (page 7) it is possible to undertake careful selection of suitable species once the appropriate detailed design criteria are specified. By testing the design criteria against the computer database, a "Qualifying Species List" will be obtained for each of the major locations. Final species selection, using detailed profiles and photographic references, can be made from this list.

Also included in this section of the report are examples of both a shrub and a tree design profile, illustrating the type of information held in the database for each of the species listed.

LIST OF TREES IN DATABASE

NAME - ACER X LOBELII
NAME - ACER CIRCINATUM
NAME - ACER GINNALA
NAME - ACER GRISEUM
NAME - ACER NIKOENSE (ACER MAXIMOWICZIANUM)
NAME - ACER PALMATUM
NAME - ACER PENNSYLVANICUM
NAME - ACER PLATANOIDES
NAME - ACER PSEUDOPLATANUS
NAME - ACER RUBRUM
NAME - ACER SPICATUM
NAME - ACER TATARICUM
NAME - ALNUS TENUIFOLIA
NAME - AILANTHUS ALTISSIMA
NAME - ALBIZZIA JULIBRISSIN
NAME - ALNUS GLUTINOSA
NAME - AMELANCHIER LAEVIS
NAME - ARALIA ELATA
NAME - BROUSSONETIA PAPYRIFERA
NAME - CARPINUS BETULUS
NAME - CARPINUS CAROLINIANA
NAME - CARAGANA ARBORESCENS
NAME - CASTANEA MOLLISSIMA
NAME - CATALPA SPECIOSA
NAME - CASTANEA SATIVA

NAME - CERCIDIPHYLLUM JAPONICUM
NAME - CERCIS CANADENSIS
NAME - CLADRASTIS LUTEA
NAME - CHIONANTHUS VIRGINICUS
NAME - CERCIS SILIQUASTRUM
NAME - CORNUS CONTROVERSA
NAME - CORNUS FLORIDA
NAME - CORNUS KOUSA
NAME - CORNUS MACROPHYLLA
NAME - CORNUS NUTTALLII
NAME - CORYLUS COLURNA
NAME - CRATAEGUS CRUSGALLI
NAME - CRATAEGUS MOLLIS
NAME - CRATAEGUS OXYACANTHA (C. LAEVIGATA)
NAME - CRATAEGUS PHAENOPYRUM
NAME - DAVIDIA INVOLUCRATA
NAME - DIOSPYROS VIRGINIANA
NAME - EUONYMUS EUROPAEA
NAME - EVODIA DANIELLII
NAME - FAGUS GRANDIFOLIA
NAME - FAGUS SYLVATICA
NAME - FRANKLINIA ALATAMAHA
NAME - FRAXINUS ORNUS
NAME - FRAXINUS PENNSYLVANICA (LANCEOLATA)
NAME - FRAXINUS VELUTINA

NAME - FRAXINUS AMERICANA
NAME - GINKGO BILOBA
NAME - GLEDITSIA TRIACANTHOS VAR. INERMIS
NAME - GYMNOCLADUS DIOICUS
NAME - HALESIA MONTICOLA
NAME - KALOPANAX PICTUS
NAME - KOELREUTERIA PANICULATA
NAME - LABURNUM X WATERERI
NAME - LAGERSTROEMIA INDICA
NAME - LIGUSTRUM LUCIDUM
NAME - LIQUIDAMBAR STYRACIFLUA
NAME - LIRIODENDRON TULIPIFERA
NAME - MAGNOLIA ACUMINATA
NAME - MAGNOLIA CORDATA
NAME - MAGNOLIA GRANDIFLORA
NAME - MAGNOLIA SALICIFOLIA
NAME - MAGNOLIA X SOULANGEANA
NAME - MAGNOLIA HEPTAPETA (M. DENUDATA)
NAME - MALUS BACCATA
NAME - NYSSA SYLVATICA
NAME - OSTRYA VIRGINIANA
NAME - OXYDENDRUM ARBOREUM
NAME - PHELLODENDRON AMURENSE
NAME - PLATANUS X ACERIFOLIA (P. X HYBRIDA)
NAME - PLATANUS ORIENTALIS

NAME - PRUNUS AVIUM (& P. AVIUM PLENA)
NAME - PRUNUS BLIREIANA
NAME - PRUNUS CERASIFERA ATROPURPUREA
NAME - PRUNUS 'HALLY JOLIVETTE'
NAME - PRUNUS LUSITANICA
NAME - PRUNUS MAXIMOWICZI
NAME - PRUNUS MUME
NAME - PRUNUS NIPPONICA
NAME - PRUNUS SARGENTII
NAME - CARYA AQUATICA
NAME - CARYA CORDIFORMIS
NAME - CARYA GLABRA
NAME - CARYA ILLINOENSIS
NAME - CARYA LACINIOSA
NAME - CARYA OVATA
NAME - CARYA TOMENTOSA
NAME - CORNUS OFFICINALIS
NAME - PRUNUS SUBHIRTELLA
NAME - PRUNUS YEDOENSIS
NAME - QUERCUS ALBA
NAME - QUERCUS BOREALIS (Q. RUBRA)
NAME - QUERCUS COCCINEA
NAME - QUERCUS GARRYANA
NAME - QUERCUS KELLOGGI
NAME - QUERCUS PALUSTRIS

NAME - QUERCUS ROBUR
NAME - QUERCUS VIRGINIANA
NAME - ROBINIA PSEUDOACACIA
NAME - SASSAFRAS ALBIDUM (S. OFFICINALE)
NAME - SOPHORA JAPONICA
NAME - SORBUS ALNIFOLIA
NAME - SORBUS AUCUPARIA
NAME - SORBUS FOLGNERI
NAME - STYRAX JAPONICUM
NAME - TILIA CORDATA
NAME - TILIA X EUROPAEA
NAME - TILIA X EUCHLORA
NAME - ULMUS ALATA
NAME - ULMUS AMERICANA
NAME - ULMUS CARPINIFOLIA
NAME - ULMUS GLABRA
NAME - ULMUS PARVIFOLIA
NAME - ULMUS PROCERA
NAME - ULMUS PUMILA
NAME - UMBELLULARIA CALIFORNICA
NAME - ZELKOVA SERRATA
NAME - ACER BUERGERIANUM
NAME - ACER CAMPESTRE
NAME - ACER CAPILLIPES
NAME - ACER CARPINIFOLIUM

NAME - ACER DAVIDII
NAME - ACER GLABRUM
NAME - ACER MACROPHYLLUM
NAME - ACER MONSPESSULANUM
NAME - ACER SACCHARUM
NAME - ACER TRIFLORUM
NAME - ACER TSCHONOSKII
NAME - AMELANCHIER CANADENSIS
NAME - CELTIS BUNGEANA
NAME - CELTIS LAEVIGATA
NAME - CELTIS OCCIDENTALIS
NAME - CORNUS MAS
NAME - CRATAEGUS ARNOLDIANA
NAME - CRATAEGUS COCCINIOIDES
NAME - CRATAEGUS X LAVALLEI
NAME - CRATAEGUS MONOGYNA
NAME - CRATAEGUS NITIDA
NAME - CRATAEGUS PINNATIFIDA MAJOR
NAME - CRATAEGUS PRUINOSA
NAME - CRATAEGUS PUNCTATA
NAME - CRATAEGUS SUCCULENTA
NAME - CRATAEGUS VIRIDIS
NAME - ELAEAGNUS ANGUSTIFOLIA
NAME - EVODIA HUPEHENSIS
NAME - FRAXINUS HOLOTRICHA ('MORAINE')

NAME - FRAXINUS MARIESII
NAME - FRAXINUS QUADRANGULATA
NAME - HALESIA CAROLINA
NAME - MAGNOLIA 'HOKKAIDO'
NAME - MAGNOLIA 'KOBUS'
NAME - MALUS 'FLAME'
NAME - MALUS FLORIBUNDA
NAME - MALUS 'HOPA'
NAME - MALUS 'KATHERINE'
NAME - MALUS 'RADIANT'
NAME - MALUS SPECTABILIS 'RIBERSII'
NAME - MALUS 'SNOWDRIFT'
NAME - MALUS 'VANGUARD'
NAME - MELIA AZEDARACH
NAME - PLATANUS RACEMOSA
NAME - PTEROSTYRAX HISPIDA
NAME - PYRUS CALLERYANA ('BRADFORD')
NAME - QUERCUS ACUTISSIMA
NAME - QUERCUS BICOLOR
NAME - QUERCUS CERRIS
NAME - QUERCUS ENGLERIANA
NAME - QUERCUS IMBRICARIA
NAME - QUERCUS LAURIFOLIA
NAME - QUERCUS LIBANI
NAME - QUERCUS MACROCARPA

NAME - SORBUS CASHMIRIANA
NAME - SORBUS CUSPIDATA
NAME - SORBUS 'EMBLEY'
NAME - SORBUS DOMESTICA
NAME - SORBUS 'JOSEPH ROCK'
NAME - SORBUS X KEWENSIS
NAME - SORBUS 'MITCHELLII'
NAME - SORBUS 'PEARLY KING'
NAME - SORBUS SARGENTIANA
NAME - SORBUS TIANSHANICA
NAME - SORBUS VILMORINII
NAME - CORYLUS AMERICANA
NAME - CORYLUS AVELLANA
NAME - CORYLUS MAXIMA
NAME - CRATAEGUS CHRYSOCARPA
NAME - CRATAEGUS COLUMBIANA
NAME - CRATAEGUS DOUGLASII
NAME - CRATAEGUS X GRIGNONENSIS
NAME - CRATAEGUS HOLMESIANA
NAME - CRATAEGUS SUBMOLLIS
NAME - CRATAEGUS 'TOBA'
NAME - PRUNUS AMERICANA
NAME - PRUNUS ARMENIACA
NAME - PRUNUS AMYGDALUS
NAME - PRUNUS CAMPANULATA

NAME - PRUNUS CAROLINIANA
NAME - PRUNUS CERASIFERA
NAME - PRUNUS CERASUS
NAME - PRUNUS DULCIS
NAME - PRUNUS EMARGINATA
NAME - PRUNUS 'HALLY JOLIVETTE'
NAME - PRUNUS MAACKII
NAME - PRUNUS MARITIMA
NAME - PRUNUS NIGRA
NAME - PRUNUS 'OKAME'
NAME - PRUNUS PADUS
NAME - PRUNUS PENNSYLVANICA
NAME - PRUNUS PERSICA
NAME - PRUNUS SEROTINA
NAME - PRUNUS SERRULA
NAME - PRUNUS SERRULATA
NAME - PRUNUS SUBHIRTELLA
NAME - PRUNUS VIRGINIANA
NAME - POPULUS TRICHOCARPA
NAME - POPULUS TREMULOIDES
NAME - POPULUS SIMONII
NAME - POPULUS NIGRA
NAME - POPULUS MAXIMOWICZII
NAME - POPULUS LASIOCARPA
NAME - POPULUS GRANDIDENTATA

NAME - POPULUS FREMONTII
NAME - POPULUS DELTOIDES
NAME - POPULUS CANDICANS
NAME - POPULUS X BEROLINENSIS
NAME - POPULUS BALSAMIFERA
NAME - POPULUS ANGUSTIFOLIA
NAME - POPULUS ALBA
NAME - SALIX ALBA
NAME - SALIX AMYGDALOIDES
NAME - SALIX BABYLONICA
NAME - SALIX BEBBIANA
NAME - SALIX X BLANDA
NAME - SALIX CAPREA
NAME - SALIX DISCOLOR
NAME - SALIX ELAEAGNOS
NAME - SALIX X ELEGANTISSIMA
NAME - SALIX GRACILISTYLA
NAME - SALIX HOOKERIANA
NAME - SALIX LASIANDRA
NAME - SALIX LUCIDA
NAME - SALIX NIGRA
NAME - SALIX PENTANDRA
NAME - SALIX PURPUREA
NAME - SALIX SCOULERIANA
NAME - SALIX VITELLINA

NAME - JUGLANS CINEREA

NAME - JUGLANS CORDIFORMIS

NAME - JUGLANS HINDSII

NAME - JUGLANS NIGRA

NAME - JUGLANS REGIA

DESIGN PROFILE - TREE

NAME - GLEDITSIA TRIACANTHOS VAR. INERMIS
HEIGHT - 15-25 M; >25 M
SPREAD - 9-15 M; >15 M
RATE OF GROWTH - RAPID; MEDIUM
LONGEVITY - LONG; MEDIUM
HARDINESS - ZONE 3,4
FORM - PYRAMIDAL; OPEN; SPREADING; ROUNDED; FLAT; UP
ROOTING HABIT - NON-FIBROUS; SHALLOW; DEEP
SOIL CHARACTERISTICS - WELL-DRAINED; DEEP; RICH; MOIST; TOLERATES ALKALINE, CLAY
LIGHT PREFERENCE - FULL SUN
SHADE -
WINDFIRMNESS - POOR
DROUGHT - TOLERANT
POLLUTION - TOLERANT
FOLIAGE - MEDIUM GREEN
FALL COLOUR - YELLOW
FLOWERS - MAY-JUN; WHITE; GREEN; YELLOW; MONOECIOUS
FRUIT - RED; BROWN; PERSISTENT; OBJECTIONABLE
CONTAINERS - YES
PESTS - MAJOR; MINOR
TEXTURE - MEDIUM; FINE
MASS - MEDIUM
RECOMMENDED USE - CITIES; PARKS; STREETS; SEASHORE; NOT FOR SEATTLE
CULTURE - MEDIUM; LOW
PLACE OF ORIGIN - E. TO C. U.S.
OUTSTANDING FEATURES - ADAPTABILITY; SALT TOLERANCE
REFERENCES - NEILL; DIRR; HUDAK; ROBINSON; WYMAN; KOLLER/DIRR

LIST OF SHRUBS IN DATABASE

NAME - ABELIA 'EDWARD GOUCHER'
NAME - ABELIA X GRANDIFLORA
NAME - ABELIA SCHUMANNI
NAME - ABELIOPHYLLUM DISTICHUM
NAME - ACANTHOPANAX SIEBOLDIANUS
NAME - ACER CAMPESTRE
NAME - ACER CIRCINATUM
NAME - ACER GINNALA
NAME - ACER PALMATUM
NAME - ACER SPICATUM
NAME - AESCULUS PARVIFLORA
NAME - AMELANCHIER ALNIFOLIA
NAME - AMELANCHIER CANADENSIS
NAME - AMELANCHIER X GRANDIFLORA
NAME - AMELANCHIER STOLONIFERA
NAME - AMORPHA CANESCENS
NAME - AMORPHA FRUTICOSA
NAME - ANDROMEDA POLIFOLIA
NAME - ARALIA ELATA
NAME - ARALIS SPINOSA
NAME - ARBUTUS UNEDO
NAME - ARCTOSTAPHYLOS COLUMBIANA
NAME - ARCTOSTAPHYLOS STANFORDIANA
NAME - ARCTOSTAPHYLOS UVA-URSI
NAME - ARDISIA JAPONICA

NAME - ARONIA ARBUTIFOLIA
NAME - ARONIA MELANOCARPA
NAME - ARONIA PRUNIFOLIA
NAME - ARTEMISIA ABROTANUM
NAME - ARTEMISIA ABSINTHIUM
NAME - ARTEMISIA FRIGIDA
NAME - ARTEMISIA STELLERIANA
NAME - ARTEMISIA TRIDENTATA
NAME - AUCUBA JAPONICA
NAME - AZARA MICROPHYLLA
NAME - BACCHARIS HALIMIFOLIA
NAME - BERBERIS BEANIANA
NAME - BERBERIS BUXIFOLIA VAR. NANA
NAME - BERBERIS CANDIDULA
NAME - BERBERIS X CHENAULTII
NAME - BERBERIS CIRCUMSERRATA
NAME - BERBERIS CONCINNA
NAME - BERBERIS DARWINII
NAME - BERBERIS GAGNEPAINII
NAME - BERBERIS GILGIANA
NAME - BERBERIS JULIANAE
NAME - BERBERIS KOREANA
NAME - BERBERIS X MENTORENSIS
NAME - BERBERIS POTANINII
NAME - BERBERIS X STENOPHYLLA

NAME - BERBERIS THUNBERGII
NAME - BERBERIS TRIACANTHOPHORA
NAME - BERBERIS VERRUCULOSA
NAME - BRUCKENTHALIA SPICULIFOLIA
NAME - BUDDLEIA ALTERNIFOLIA
NAME - BUDDLEIA DAVIDII
NAME - BUDDLEIA GLOBOSA
NAME - BUXUS MICROPHYLLA
NAME - BUXUS SEMPERVIRENS
NAME - CALLICARPA JAPONICA
NAME - CALLUNA VULGARIS
NAME - CALYCANTHUS FLORIDUS
NAME - CAMELLIA JAPONICA
NAME - CAMELLIA SASANQUA
NAME - CAMELLIA X WILLIAMSII
NAME - CARAGANA ARBORESCENS
NAME - CARAGANA MAXIMOWICZIANA
NAME - CARAGANA MICROPHYLLA
NAME - CARYOPTERIS X CLANDONENSIS
NAME - CEANOTHUS AMERICANUS
NAME - CEANOTHUS X DELILIANUS
NAME - CEANOTHUS OVATUS
NAME - CEPHALANTHUS OCCIDENTALIS
NAME - CHAENOMELES JAPONICA
NAME - CHAENOMELES SPECIOSA

NAME - CHAENOMELES X SUPERBA
NAME - CHILOPSIS LINEARIS
NAME - CHIMONANTHUS PRAECOX
NAME - CHOISYA TERNATA
NAME - CHRYSOTHAMNUS GRAVEOLENS
NAME - CISTUS ALBIDUS
NAME - CISTUS X CYPRIUS
NAME - CISTUS LADANIFERUS
NAME - CISTUS LAURIFOLIUS
NAME - CISTUS X PURPUREUS
NAME - CLERODENDRUM TRICHOTOMUM
NAME - CLETHRA ACUMINATA
NAME - CLETHRA ALNIFOLIA
NAME - CLETHRA BARBINERVIS
NAME - COLUTEA ARBORESCENS
NAME - COMPTONIA PEREGRINA
NAME - COPROSMA PETRIEI
NAME - CORNUS ALBA 'SIBERICA'
NAME - CORNUS AMOMUM
NAME - CORNUS HESSEI
NAME - CORNUS MAS
NAME - CORNUS PAUCINERVIS
NAME - CORNUS RACEMOSA
NAME - CORNUS SERICEA (C. STOLONIFERA)
NAME - CORYLOPSIS GLABRESCENS

NAME - CORYLOPSIS GRIFFITHII
NAME - COTINUS COGGYRIA
NAME - COTINUS OBOVATUS (C. AMERICANUS)
NAME - COTONEASTER ADPRESSA
NAME - COTONEASTER APICULATA
NAME - COTONEASTER BULLATA FLORIBUNDA
NAME - COTONEASTER CONGESTA
NAME - COTONEASTER CONSPICUA
NAME - COTONEASTER DAMMERI
NAME - COTONEASTER DIELSIANA
NAME - COTONEASTER DIVARICATA
NAME - COTONEASTER FOVEOLATA
NAME - COTONEASTER FRANCHETII
NAME - COTONEASTER FRIGIDA
NAME - COTONEASTER GLAUCOPHYLLA (C. BUXIFOLIUS)
NAME - COTONEASTER HENRYANA
NAME - COTONEASTER HORIZONTALIS
NAME - COTONEASTER LUCIDA
NAME - COTONEASTER MICROPHYLLA
NAME - COTONEASTER MULTIFLORA CALOCARPA
NAME - COTONEASTER PANNOSA (C. BUXIFOLIUS)
NAME - COTONEASTER RACEMIFLORA SOONGORICA
NAME - COTONEASTER ROTUNDIFOLIA
NAME - COTONEASTER SALICIFOLIA FLOCCOSA
NAME - COTONEASTER SIMONSII

NAME - COTONEASTER ZABELII
NAME - CYRILLA RACEMIFLORA
NAME - CYTISUS ALBUS
NAME - CYTISUS ARDOINII
NAME - CYTISUS BATTANDIERI
NAME - CYTISUS X BEANII
NAME - CYTISUS X DALLIMOREI
NAME - CYTISUS DECUMBENS
NAME - CYTISUS X KEWENSIS
NAME - CYTISUS MULTIFLORUS
NAME - CYTISUS NIGRICANS
NAME - CYTISUS X PRAECOX
NAME - CYTISUS PROCUMBENS
NAME - CYTISUS PURGANS
NAME - CYTISUS PURPUREUS
NAME - CYTISUS SCOPARIUS
NAME - DABOECIA CANTABRICA
NAME - DANAE RACEMOSA
NAME - DAPHNE X BURKWOODII
NAME - DAPHNE CNEORUM
NAME - DAPHNE GENKWA
NAME - DAPHNE GIRALDII
NAME - DAPHNE X MANTENSIANA
NAME - DAPHNE MEZEREUM
NAME - DAPHNE ODORA

NAME - DEUTZIA X CANDELABRUM
NAME - DEUTZIA GRACILIS
NAME - DEUTZIA GRANDIFLORA
NAME - DEUTZIA X HYBRIDA 'CONTRASTE'
NAME - DEUTZIA X KALMAIEFLORA
NAME - DEUTZIA X LEMOINEI
NAME - DEUTZIA X MAGNIFICA
NAME - DEUTZIA PARVIFLORA
NAME - DEUTZIA X ROSEA 'EXIMIA'
NAME - DEUTZIA SCABRA
NAME - DIAPENSIA LAPPONICA
NAME - DIERVILLA SESSILIFOLIA
NAME - DISANTHUS CERCIDIFOLIUS
NAME - ELAEAGNUS ANGUSTIFOLIUS
NAME - ELAEAGNUS X EBBINGEI
NAME - ELAEAGNUS PUNGENS
NAME - ELAEAGNUS UMBELLATUS
NAME - ELLIOTTIA RACEMOSA
NAME - ELSHOLTZIA STAUNTONII
NAME - EMPETRUM NIGRUM
NAME - ENKIANTHUS CAMPANULATUS
NAME - ENKIANTHUS DEFLEXUS
NAME - ENKIANTHUS PERULATUS
NAME - EPIGAEA REPENS
NAME - ERICA CARNEA

NAME - ERICA CILIARIS
NAME - ERICA CINEREA
NAME - ERICA X DARLEYENSIS
NAME - ERICA MEDITERRANEA
NAME - ERICA TETRALIX
NAME - ERICA VAGANS
NAME - ESCALLONIA LANGLEYENSIS
NAME - ESCALLONIA VIRGATA
NAME - EUONYMUS ALATUS
NAME - EUONYMUS AMERICANUS
NAME - EUONYMUS BUNGEANUS SEMIPERSISTENS
NAME - EUONYMUS EUROPAEUS 'ALDENHAMENSIS'
NAME - EUONYMUS FORTUNEI 'VEGETUS'
NAME - EUONYMUS KIAUTSCHOVICUS
NAME - EUONYMUS LATIFOLIUS
NAME - EUONYMUS SANGUINEUS
NAME - EUONYMUS YEDOENSIS
NAME - EXOCHORDA GIRALDII WILSONII
NAME - FALLUGIA PARADOXA
NAME - FATSHEDERA X LIZEI
NAME - FATSIA JAPONICA
NAME - FENDLERA RUPICOLA
NAME - FICUS CARICA
NAME - FORSYTHIA 'ARNOLD DWARF'
NAME - FORSYTHIA INTERMEDIA SPECTABILIS

NAME - FORSYTHIA OVATA
NAME - FORSYTHIA SUSPensa SIEBOLDII
NAME - FORSYTHIA VIRIDISSIMA 'BRONXENSIS'
NAME - FOTHERGILLA GARDENII
NAME - FOTHERGILLA MAJOR
NAME - FOTHERGILLA MONTICOLA (F. MAJOR)
NAME - FRANKLINIA ALATAHAMA
NAME - FUCHSIA MAGELLANICA
NAME - GARRYA WRIGHTII
NAME - GAULTHERIA MIQUELIANA
NAME - GAULTHERIA PROCUMBENS
NAME - GAULTHERIA SHALLON
NAME - GAULTHERIA VEITCHIANA
NAME - GAYLUSSACIA BRACHYCERA
NAME - GENISTA CINEREA
NAME - GENISTA HISPANICA
NAME - GENISTA LYDIA
NAME - GENISTA PILOSA
NAME - GENISTA TINCTORIA
NAME - HALIMODENDRON HALODENDRON
NAME - HAMAMELIS X INTERMEDIA 'ARNOLD PROMISE'
NAME - HAMAMELIS MOLLIS
NAME - HAMAMELIS VERNALIS
NAME - HAMAMELIS VIRGINIANA
NAME - HEBE BUXIFOLIA

NAME - HEBE TRAVERSII
NAME - HEDERA HELIX 'ARBORESCENS'
NAME - HIBISCUS SYRIACUS
NAME - HIPPOPHAE RHAMNOIDES
NAME - HOLODISCUS DISCOLOR ARIAEOFOLIUS
NAME - HYDRANGEA ARBORESCENS 'GRANDIFLORA'
NAME - HYDRANGEA ARBORESCENS RADIATA
NAME - HYDRANGEA ASPERA SARGENTIANA
NAME - HYDRANGEA MACROPHYLLA
NAME - HYDRANGEA PANICULATA 'GRANDIFLORA'
NAME - HYDRANGEA QUERCIFOLIA
NAME - HYPERICUM BUCKLEYI
NAME - HYPERICUM CALYGINUM
NAME - HYPERICUM DENSIFLORUM
NAME - HYPERICUM FRONDOSUM
NAME - HYPERICUM HOOKERIANUM
NAME - HYPERICUM KALMIANUM
NAME - HYPERICUM X MOSERIANUM
NAME - HYPERICUM PATULUM HENRYI (H. BEANII)
NAME - HYPERICUM PROLIFICUM
NAME - HYPERICUM REPTANS
NAME - HYPERICUM X 'ROWALLANE'
NAME - IBERIS GIBRALTRIACA
NAME - IBERIS SEMPERVIRENS
NAME - IBERIS TENOREANA

NAME - ILEX CASSINE
NAME - ILEX CILIOSPINOSA
NAME - ILEX CORNUTA
NAME - ILEX CRENATA
NAME - ILEX DECIDUA
NAME - ILEX GLABRA
NAME - ILEX PEDUNCULOSA
NAME - ILEX PERNYI
NAME - ILEX RUGOSA
NAME - ILEX SERRATA
NAME - ILEX VERTICILLATA
NAME - ILEX VOMITORIA
NAME - ILEX YUNNANENSIS
NAME - ILLICIUM FLORIDANUM
NAME - INDIGOFERA AMBLYANTHA
NAME - INDIGOFERA INCARNATA ALBA
NAME - INDIGOFERA KIRILOWII
NAME - INDIGOFERA POTANINII
NAME - ITEA VIRGINICA

NAME - KALMIA ANGUSTIFOLIA
NAME - KALMIA LATIFOLIA
NAME - KALMIOPSIS LEACHIANA
NAME - KERRIA JAPONICA
NAME - KOLKWITZIA AMABILIS
NAME - LAGERSTROEMIA INDICA

NAME - LAURUS NOBILIS

NAME - LAVANDULA OFFICINALIS (L. ANGUSTIFOLIA)

NAME - LEDUM GROENLANDICUM

NAME - LEIOPHYLLUM BUXIFOLIUM

NAME - LEPTODERMIS OBLONGA

NAME - LESPEDEZA BICOLOR

NAME - LESPEDEZA CYRTOBOTRYA

NAME - LESPEDEZA JAPONICA

NAME - LEUCOTHOE CATESBAEI (L. FONTANESIANA)

NAME - LEUCOTHOE KEISKEI

NAME - LEUCOTHOE RACEMOSA

NAME - LEYCESTERIA FORMOSA

NAME - LIGUSTRUM AMURENSE

NAME - LIGUSTRUM DELAVAYANUM

NAME - LIGUSTRUM HENRYI

NAME - LIGUSTRUM X IBOLIUM

NAME - LIGUSTRUM JAPONICUM

NAME - LIGUSTRUM LUCIDUM

NAME - LIGUSTRUM OBTUSIFOLIUM

NAME - LIGUSTRUM OVALIFOLIUM

NAME - LIGUSTRUM QUIHOU

NAME - LIGUSTRUM SINENSE

NAME - LIGUSTRUM X VICARYI

NAME - LIGUSTRUM VULGARE

NAME - LINDERA BENZOIN

NAME - LOISELEURIA PROCUMBENS
NAME - LONICERA ALPIGENA 'NANA'
NAME - LONICERA X AMOENA 'ARNOLDIANA'
NAME - LONICERA X BELLA
NAME - LONICERA DEFLEXICALYX
NAME - LONICERA FRAGRANTISSIMA
NAME - LONICERA KOROLKOWII
NAME - LONICERA MAACKII
NAME - LONICERA MORROWII
NAME - LONICERA NITIDA
NAME - LONICERA PILEATA
NAME - LONICERA PROSTRATA
NAME - LONICERA PYRENAICA
NAME - LONICERA QUINQUELOCULARIS
NAME - LONICERA SACCATA
NAME - LONICERA SYRINGANTHA
NAME - LONICERA TATARICA
NAME - LONICERA TATSIENENSIS
NAME - LONICERA THIBETICA
NAME - LONICERA XYLOSTEUM
NAME - LOROPETALUM CHINENSE
NAME - LYONIA MARIANA
NAME - MAGNOLIA LILIFLORA 'NIGRA' (M. QUINQUEPETA)
NAME - MAGNOLIA STELLATA
NAME - MAGNOLIA VIRGINIANA

NAME - MAGNOLIA WILSONII
NAME - MAHONIA AQUIFOLIUM
NAME - MAHONIA BEALI (M. JAPONICA)
NAME - MAHONIA REPENS
NAME - MITCHELLA REPENS
NAME - MOLTKIA PETRAEA
NAME - MYRICA CALIFORNICA
NAME - MYRICA CERIFERA
NAME - MYRICA PENNSYLVANICA
NAME - NANDINA DOMESTICA
NAME - NEVIUSIA ALABAMENSIS
NAME - NOTHOPANAX DAVIDII (NEOPANAX DAVIDII)
NAME - ORIXA JAPONICA
NAME - OSMANTHUS X FORTUNEI
NAME - OSMANTHUS HETEROPHYLLUS (O. ILLICIFOLIUS)
NAME - PACHYSANDRA TERMINALIS
NAME - PAEONIA SUFFRUTICOSA
NAME - PALIURUS SPINA-CHRISTI
NAME - PAXISTYMA CANBYI
NAME - PAXISTYMA MYRSINITES
NAME - PERNETTYA MUCRONATA
NAME - PHILADELPHUS CORONARIUS
NAME - PHILADELPHUS X CYMOSUS
NAME - PHILADELPHUS GRANDIFLORUS
NAME - PHILADELPHUS INCANUS

NAME - PHILADELPHUS INODORUS
NAME - PHILADELPHUS INODORUS LAXUS
NAME - PHILADELPHUS X LEMOINEI
NAME - PHILADELPHUS PURPURASCENS
NAME - PHILADELPHUS X PURPUREO-MACULATUS 'SIRENE'
NAME - PHILADELPHUS SCHRENKII JACKII
NAME - PHILADELPHUS X SPLENDENS
NAME - PHILADELPHUS X VIRGINALIS
NAME - PHILLYREA VILMORINIANA
NAME - PHOTINIA GLABRA
NAME - PHOTINIA SERRULATA
NAME - PHOTINIA VILLOSA
NAME - PHYSOCARPUS OPULIFOLIUS
NAME - PIERIS FLORIBUNDA
NAME - PIERIS FORMOSA
NAME - PIERIS JAPONICA
NAME - PIERIS TAIWANENSIS
NAME - PONCIRUS TRIFOLIATA
NAME - POTENTILLA FRUTICOSA
NAME - PRINSEPIA SINENSIS
NAME - PRUNUS BESSEYI
NAME - PRUNUS X CISTENA
NAME - PRUNUS GLANDULOSA
NAME - PRUNUS JAPONICA
NAME - PRUNUS LAUROCERASUS

NAME - PRUNUS LUSITANICA
NAME - PRUNUS MARITIMA
NAME - PRUNUS TENELLA ALBA
NAME - PRUNUS TOMENTOSA
NAME - PRUNUS TRILOBA
NAME - PYRACANTHA ATALANTIOIDES
NAME - PYRACANTHA COCCINEA
NAME - PYRACANTHA CREMULATA ROGERSIANA
NAME - PYRACANTHA FORTUNEANA (P. CREMULATA-SERRATA)
NAME - RAPHIOLEPIS UMBELLATA
NAME - RHAMNUS DAVURICA
NAME - RHAMNUS FRANGULA
NAME - RHODOTYPOS SCANDENS
NAME - RHUS AROMATICA (R. CANADENSIS)
NAME - RHUS CHINENSIS (R. JAVANICA)
NAME - RHUS COPALLINA
NAME - RHUS GLABRA
NAME - RHUS TYPHINA
NAME - RIBES ALPINUM
NAME - RIBES ODORATUM
NAME - RIBES SANGUINEUM
NAME - ROBINIA HISPIDA
NAME - ROSMARINUS OFFICINALIS
NAME - RUBUS DELICIOSUS
NAME - RUBUS ODORATUS

NAME - RUBUS X TRIDEL 'BENENDEN'
NAME - RUSCUS ACULEATUS
NAME - SALIX CAPREA
NAME - SALIX GRACILISTYLA
NAME - SALIX LANATA
NAME - SALIX LUCIDA
NAME - SALIX PURPUREA
NAME - SALIX REPENS
NAME - SALIX TRISTIS
NAME - SALIX UVA-URSI
NAME - SALVIA GREGGII
NAME - SAMBUCUS CANADENSIS
NAME - SAMBUCUS COERULEA
NAME - SAMBUCUS PUBENS
NAME - SAMBUCUS RACEMOSA
NAME - SANTOLINA CHAMAECYPARISSUS
NAME - SARCOCOCCA HOOKERIANA HUMILIS
NAME - SARCOCOCCA RUSCIFOLIA
NAME - SHEPHERDIA CANADENSIS
NAME - SIPHONOSMANTHUS DELAVAYI
NAME - SKIMMIA JAPONICA
NAME - SKIMMIA REEVESIANA
NAME - SOPHORA DAVIDII (S. VICIIFOLIA)
NAME - SORBARIA SORBIFOLIA
NAME - SORBUS TIANSHANICA

NAME - VIBURNUM HENRYI
NAME - VIBURNUM JAPONICUM
NAME - VIBURNUM X JUDDII
NAME - VIBURNUM LANTANA
NAME - VIBURNUM LENTAGO
NAME - VIBURNUM LOBOPHYLLUM
NAME - VIBURNUM MACROCEPHALUM
NAME - VIBURNUM NUDUM
NAME - VIBURNUM OPULUS
NAME - VIBURNUM PLICATUM
NAME - VIBURNUM PRUNIFOLIUM
NAME - VIBURNUM X RHYTIDOPHYLLOIDES
NAME - VIBURNUM RHYTIDOPHYLLUM
NAME - VIBURNUM RUFIDULUM
NAME - VIBURNUM SARGENTII 'FLAVUM'
NAME - VIBURNUM SETIGERUM 'AURANTIACUM'
NAME - VIBURNUM SIEBOLDII
NAME - VIBURNUM TINUS
NAME - VIBURNUM TOMENTOSUM
NAME - VIBURNUM TRILOBUM
NAME - VIBURNUM VEITCHII
NAME - VIBURNUM WRIGHTII
NAME - VINCA MAJOR
NAME - VINCA MINOR
NAME - VITEX AGNUS-CASTUS

DESIGN PROFILE - SHRUB

NAME - EUONYMUS ALATUS
COMMON NAME - WINGED EUONYMUS
HEIGHT - 2-4 M; 4-7 M
SPREAD - >2 M
RATE OF GROWTH - MEDIUM; SLOW
HARDINESS - ZONE 3
FORM - HORIZONTAL BRANCHES; FLAT-TOPPED; DENSE; TWIGGY
ROOTING HABIT - FIBROUS
SOIL CHARACTERISTICS - PH ADAPTABLE; AVERAGE; WELL-DRAINED
LIGHT PREFERENCE - FULL SUN; PARTIAL SHADE
SHADE - TOLERANT
DROUGHT -
POLLUTION -
FOLIAGE - DARK; MEDIUM GREEN
FALL COLOUR - SCARLET; RED
FLOWERS - MAR-APR; MAY-JUN; YELLOW; GREEN; INCONSPICUOUS
FRUIT - RED; ORANGE; SCARLET; PERSISTENT
THORNS - NO
POISON STATUS -
PESTS - MAJOR; MINOR
TEXTURE - COARSE; MEDIUM
MASS -
CONTAINERS -
COVERAGE -
RECOMMENDED USE - SPECIMEN; HEDGES; BORDERS; SCREENS; BACKGROUND; MASSING
CULTURE - LOW INTENSITY
PLACE OF ORIGIN - NE ASIA
COMPANION PLANTS - DARK EVERGREENS
OUTSTANDING FEATURES - CORKY TWIGS; FALL COLOUR
REFERENCES - WYMAN; SUNSET; ROBINSON; DIRR

B. C. PLACE

SOIL STERILANT ANALYSIS

Six samples were taken from each of three locations, for a total of 18 samples. These samples were sent to the Provincial Lab to be analyzed for soil sterilant residues, namely:

TRADE NAME	COMMON NAME	CHEMICAL CLASSIFICATION
Krovar	bromacil/diuron combination	aliphatic organic nitrogen compounds
Hyvar XL	bromacil	aliphatic organic nitrogen compounds (uracils)
Velpar	Velpar	heterocyclic nitrogen compounds
Spike 80 W	tebuthiuron	aliphatic organic nitrogen compounds
MCPA ester 80	MCPA	carboxylic-aromatic compounds (phenoxy compounds)
Tordon	picloram	heterocyclic nitrogen compounds (picolinic acids)

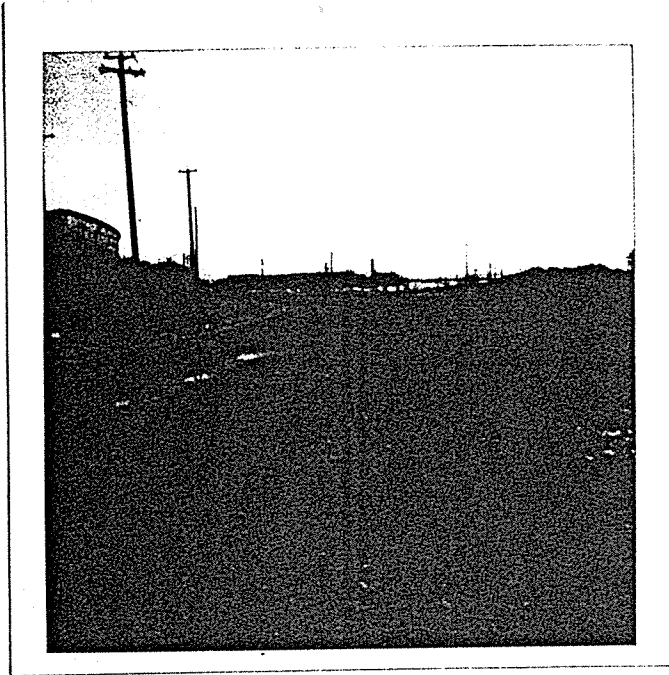


PLATE 1

Location 1. Soil sample composite was taken in this general area, where trackage has been lifted in the far west of the site. Samples were made of the top 50 cm of the soil profile to include both ballast and sub-grade material into which leaching may have carried some sterilant.

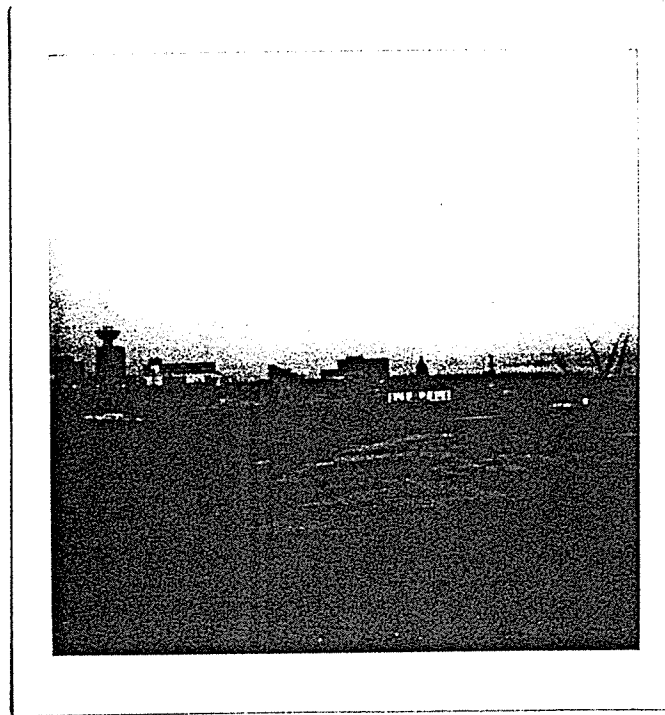


PLATE 2

Location 2. The composite samples for this location were collected in the area immediately to the east of the Roundhouse. The area sampled ranged from the site road in the south to the temporary fill berm to the north.

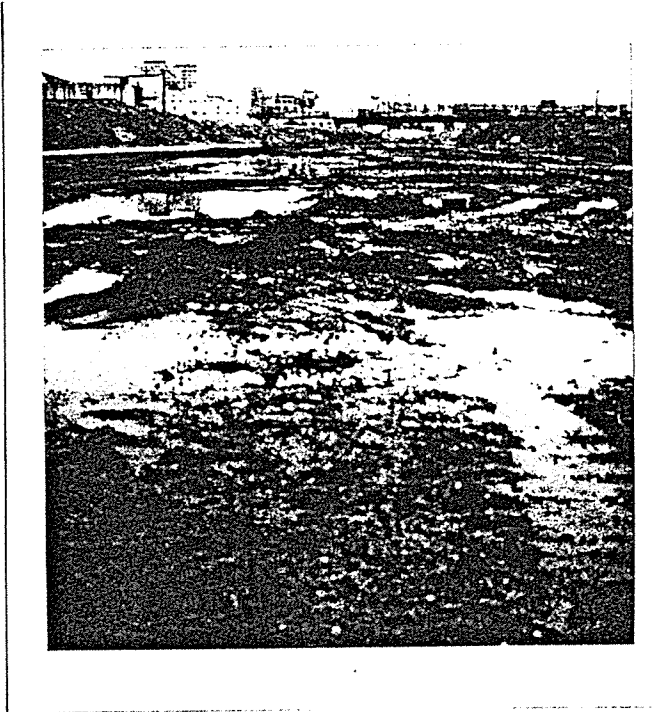


PLATE 3

Location 3. This sample area is slightly east and directly north of the Marina parking lot and encompasses the old trackage area from the concrete beam storage to the south up to the fill berm in the north. This location is approximately halfway between the Roundhouse and the Cambie Street Bridge.

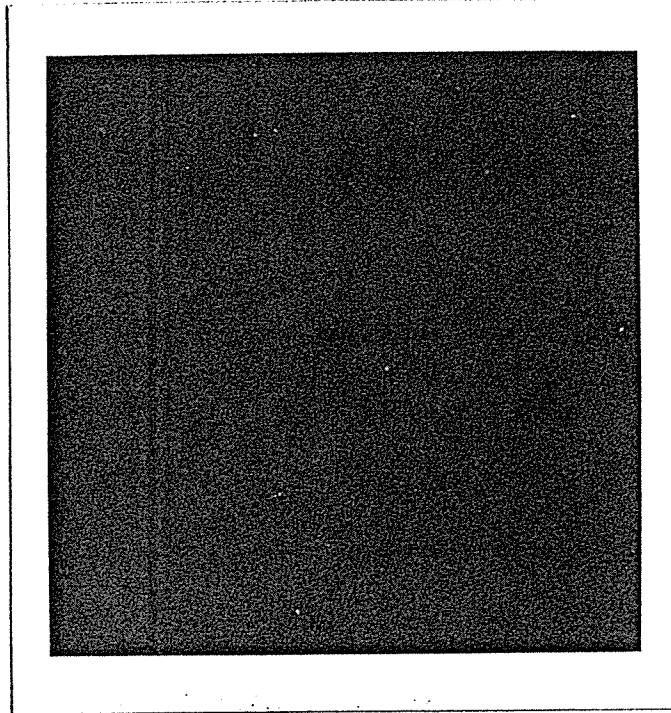


PLATE 4

Typical sample pit used to procure soil sterilant samples. Holes were dug through the spread ballast and cinder layers to the sand sub-base below. Side samples throughout the 50 cm pit profile were then collected from each of five pits to produce a composite area sample.

SPECIFICATIONS FOR
ROUGH GRASS SEEDING

British Columbia Place
Vancouver, B. C.

GARDNER, PEEPRE & ASSOCIATES LTD.
#15, 1600 West 6th Avenue
Vancouver, B. C.
V6J 1R3

Telephone: (604) 731-7918

INDEX

CONTRACT # _____

ROUGH GRASS SEEDING
B. C. PLACE
VANCOUVER, B. C.

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BID FORM	1 - 5
BIDDING INSTRUCTIONS	6 - 8
HYDROSEEDING SPECIFICATIONS	9 - 20

BID FORM

- c) The Bid Bond shall be forfeited to the Owner in the event that the successful bidder fails to execute a satisfactory Agreement, or file an acceptable Performance Bond and Labour and Material Payment Bond within fourteen (14) days after the award of the Contract.
- d) The successful Contractor shall be required to provide to the Owner on RAIC/CCA approved forms, a Performance bond and a Labour and Material Payment bond, both in the amount equal to fifty percent (50%) of the Contract price as security of fulfillment of the Contract.

3. COMPLETION

- a) We hereby agree to execute and complete our contract(s) in accordance with the requirements of the specifications and the Landscape Architect.
- b) We hereby confirm that the duration for the execution of our contract(s) will be:

Rough Grass Seeding _____ calendar days

and will commence work not later than April 15, 1982, after being notified in writing by the Owner of acceptance of this tender.

4. CONDITIONS

It is understood and agreed that:

- a) Failure to comply with and complete all applicable items on this Tender Form may be cause for rejection without consideration of the tender.
- b) The lowest of any tender will not necessarily be accepted.
- c) The tender price will remain unchanged for a period of thirty (30) calendar days from the date of closing of tender.

5. SUBCONTRACTORS

- a) The Contractor shall name all proposed subcontractors against the Subcontract List following.

BID FORM

- b) All items in the Subcontract List shall have either a subcontractor's name or the name of the Contractor entered against them; none shall be left uncompleted; where more than one subcontractor is involved with one listed item of work, other names shall be entered with indication of division of work. No alternate names shall be entered. No change of named subcontractors shall be allowed after close of bids without the written permission of the Landscape Architect.
- c) We, the undersigned, propose using the following subcontractors.

6. SUBCONTRACT LIST

Portion of Work

Subcontractor

<u>Portion of Work</u>	<u>Subcontractor</u>

7. SCHEDULE OF UNIT PRICES

We hereby confirm and agree that:

- a) All unit prices quoted include conveyance and delivery, unloading, all labour, setting, fitting and fixing in position, waste and include all overhead, profit and taxes.
- b) Measurement of all quantities shall be by the Landscape Architect with confirmation by signature of an authorized representative of the Landscape Architect.
- c) Hereunder are our unit prices as required by the specifications. These prices are required for possible additions or deletions to the Contract.

BID FORM

8. SCHEDULE OF UNIT PRICES

Item	Description	Unit Measure	Unit Price	
			Add	Deduct
1.	Scarification	m ²		
2.	Hydroseeding	m ²		

9. LIST OF DRAWINGS

Areas to be hydroseeded Drawing #1

10. ADDENDUM

Acknowledgement of receipt of the following addenda to the contract documents is hereby made:

Addendum No. _____ dated _____ : _____ pages

Addendum No. _____ dated _____ : _____ pages

Signature of Legal Signing Authority: _____

BID FORM

Contractor's Registered Name & Address: _____

Witness' Legal Signature: _____

Witness' Address: _____

Signed this ____ day of _____, Nineteen Hundred
and _____.

(Corporate firms shall affix their Corporate Seals)

BIDDING INSTRUCTIONS

1. SUBMISSION OF TENDERS

- a) Sealed tenders, in triplicate, made on the Tender Form provided, together with all other documents required by the Contract documents, shall be filed with:

Gardner, Peepre & Associates Ltd.
Suite 15, 1600 West 6th Avenue
Vancouver, B. C.
V6J 1R3

not later than _____ hours P.S.T. on _____, 1981.

- b) Tender shall be in a plain envelope clearly marked:

"Tender for:

ROUGH GRASS SEEDING
FOR
B. C. PLACE
VANCOUVER, B. C.

and showing the tenderer's name and address.

- c) Each tender must be signed in longhand by the bidder, with his usual signature. Tenders by partnerships must be signed by two of the partners, followed by the signatures and designations of the partners signing. Tenders by a corporation must be signed by the legal names of the corporation followed by the signatures of the authorized signing officer and the company's seal affixed.
- d) The tender shall not contain any recapitulation of the work to be done.
- e) All applicable blank spaces in the Tender Form shall be filled. All non-applicable blank spaces in the Tender Form shall be stroked out.
- f) Persons tendering are notified that tenders will not be considered unless made on the Tender Form supplied by the Landscape Architect and unless signed as specified in "c)" above.

2. ACCEPTANCE OF TENDER

Tender price will remain unchanged for a period of thirty (30) calendar days after the closing date of tenders.

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2. ACCEPTANCE OF TENDER

Tender price will remain unchanged for a period of thirty (30) calendar days after the closing date of tenders.

BIDDING INSTRUCTIONS

3. AWARD OF CONTRACT

The Owner reserves the right to reject any or all tenders, or to accept other than the lowest tender for the work.

4. SALES TAX

All federal and provincial sales and excise taxes shall be included in all tenders.

5. EXAMINATION OF DOCUMENTS

- a) Each tenderer shall examine the tender documents and shall satisfy himself of the extent of the proposed work. He shall make his own estimate therefrom of the facilities and difficulties attending the performance and completion of the work.
- b) Tender drawings and specifications issued to each tenderer are selected as being directly applicable to this contract.

6. SITE EXAMINATION

- a) The site on which the work is to be executed is indicated on the Contract Drawing.
- b) Each bidder shall make a careful examination of the site and investigate and satisfy himself at his own risk and expense as to all matters relating to the nature of the work to be undertaken; means of access and egress; the extent of the work to be performed and any and all matters which are referred to in the drawings, specifications and other Contract Documents, or which are necessary for the full and proper completion of the work and the conditions under which it will be performed. No allowance shall be made subsequently in this connection on behalf of the bidder for any error or negligence on his part, or on account of any difference appearing in the site of the work from any projected conditions represented in the Contract Documents.

BIDDING INSTRUCTIONS

7. INSURANCE

The Contractor shall provide third party liability insurance and property insurance to cover all parties on the site. Insurance to be provided by the Contractors includes equipment insurance, automobile insurance and air and marine insurance.

8. QUERIES AND CLARIFICATIONS

- a) Should the tenderer, during tendering, require clarification of any items contained within the Tender Form, Tendering Instructions and Schedules, he shall submit immediately after scrutiny of the documents such request in writing to the Landscape Architect's office, to the attention of Mr. Juri Peepre, telephone number (604) 731-7918 to permit the Landscape Architect to issue an Addendum, if required, before tender closing date.
- b) Requests for clarification of any items contained within the Specification shall be submitted immediately after scrutiny of the documents to the Landscape Architect, to allow the Landscape Architect to issue an Addendum, if required, before tender closing date. A copy of such requests is to be submitted to the Landscape Architect's office.

9. METRIC MEASUREMENTS

- a) This project has been designed using metric dimensions.
- b) Within the specification the unit symbols for all metric units are included.

10. TRADE UNION LABOUR

- a) All labour shall be performed by members in good standing of a Trade Union or Trade Unions whose jurisdiction embraces the work to be undertaken.
- b) Jurisdictional disputes for work to be performed by a subcontractor shall be the responsibility of the prime contractor.

HYDROSEEDING

ROUGH GRASS SEEDING

PART 1: GENERAL

1.1 Scope of Work

- .1 This section specifies the requirements for all operations necessary for rough grass seeding.
- .2 This shall include scarification and surface preparation where required, hydraulic seeding, hydraulic mulching and maintenance until final acceptance.

1.2 Submittals

- .1 The Contractor shall submit to the Landscape Architect a dealer guarantee statement of composition of the mixture and the percentages of purity of each variety of seed used by the seed grower.
- .2 This statement shall include the names and addresses of suppliers and manufacturers of all materials to be used.

1.3 Site Examination

- .1 The Contractor shall make a careful examination of the site and investigate and satisfy himself at his own risk and expense as to all matters relating to the nature of the work to be undertaken; means of access and egress; the extent of the work to be performed and any and all matters which are referred to in the drawings, specifications and other Contract Documents, or which are necessary for the full and proper completion of the work and the conditions under which it will be performed. No allowance shall be made subsequently in this connection on behalf of the Contractor for any error or negligence on his part, or on account of any difference appearing in the site of the work from any projected conditions represented in the Contract Documents.
- .2 The Contractor shall report to the Landscape Architect, in writing, any conditions or defects encountered on the site during or prior to

HYDROSEEDING

construction upon which the work of this section depends and/or which may adversely affect its performance.

- .3 Work shall not be commenced until any such conditions or defects have been investigated and corrected.
- .4 The Contractor shall provide notification forty-eight (48) hours prior to any commencement of work to the Landscape Architect.
- .5 Commencement of work shall imply acceptance of conditions and no claim for damages or extras resulting from such conditions or defects shall be accepted thereafter, except in cases where such conditions cannot be determined prior to or during the course of construction.
- .6 The limit of the work of the Contract is designated on the drawings. The Owner and/or Landscape Architect, however, will designate the boundaries of the working areas in consultation with the Contractor in which the Contractor will operate. The work and the operation of vehicles and machinery, storage of equipment, materials and/or supplies must be contained within designated areas.

1.4 Protection

- .1 The Contractor shall ensure that existing site equipment, roadways, landscaping, reference points, monuments, markers and structures are protected from damage.
- .2 The Contractor shall make good any such damage to the complete satisfaction of the Landscape Architect.
- .3 The Contractor shall provide barricades, warning signs and lights as necessary for the protection of all people and property on and adjacent to the site. The Contractor shall alter, adapt, maintain, relocate and remove as necessary or as directed by the Architect. Hold the Owner and his agents harmless from all claims in this regard.

HYDROSEEDING

- .4 The Contractor shall conduct all construction operations in strict accordance with the directions and regulations of authorities having jurisdiction over work in this Contract.

1.5 Security

- .1 No security will be provided or compensation paid by the Owner for material or work stolen, lost, damaged or destroyed. The Contractor shall be responsible for watching the site at all times and for making good all deficiencies at no extra cost to the Contract Sum.

1.6 Construction Safety

- .1 The Contractor shall comply with all applicable laws and regulations of Federal, Provincial and Municipal authorities, concerning construction safety.
- .2 The Contractor shall comply with the Workers' Compensation Act of British Columbia Accident Prevention Regulations (latest edition) and shall provide all necessary safety requirements as prescribed by the Act for his work.

1.7 Rubbish, Debris and Waste

- .1 The Contractor shall be responsible for removal of all rubbish, debris and waste from the site. Remove from the site periodically. No accumulation of rubbish or debris will be permitted.

1.8 Inspection and Acceptance

- .1 During the course of construction the Landscape Architect shall undertake inspections of work in progress.

.2 General Inspection

- a) Upon completion of all seeding and after necessary clean-up has been undertaken, the general inspection shall be held.

HYDROSEEDING

- b) At this point in time, should the work meet with the Landscape Architect's approval, the required maintenance period shall begin.

.3 Final Inspection

- a) Upon completion of the required maintenance period, and if all seeded areas are uniform in colour and density, well established and in a vigorous growing condition, the Contractor shall submit a written request to the Landscape Architect for a final inspection.
- b) With this request, the Contractor shall also submit a statement that he has reviewed in detail the drawings and specifications, and that to the best of his knowledge and ability, all conditions of these Contract Documents have been met.

.4 Partial Acceptance shall only be given when seeding and/or related work has been delayed due to circumstances beyond the control of the Contractor or when further seeding work would conflict with good horticultural practice and jeopardize the performance of work and materials.

.5 Final Acceptance shall only be given when the final inspection is made and the work is accepted. Upon final acceptance the work is to be turned over to the owner for subsequent maintenance.

1.9 Guarantee

- .1 All seeded areas shall be guaranteed for a period of one (1) year from date of final acceptance.
- .2 All areas which show deterioration, bare spots, or are thin due to faulty materials and/or workmanship, shall be reseeded at the Contractor's expense.

HYDROSEEDING

PART 2: MATERIALS

2.1 Handling and Storage

.1 Grass Seed

All grass seed where specified, shall be stored in a dry, weatherproof storage place and shall be protected from damage by heat, moisture, rodents or other causes until time of seeding. Care shall be taken that labels or other identification are not removed or defaced.

.2 Fertilizers

- a) Fertilizer shall be packed in standard waterproof containers, clearly marked with the name of the manufacturer, weight and analysis.
- b) All fertilizer shall be stored in a weatherproof storage place and in such a manner that it will stay dry and its effectiveness is not impaired.

.3 Mulch

All mulch and tackifier shall be stored in such a manner as to ensure protection from moisture and other damage. The mulch must be kept free of weeds and all other foreign materials and shall be supplied in packages labelled to indicate weight and composition.

2.2 Testing/Samples

- .1 Seed and fertilizer shall be packed in a container clearly showing the name of the supplier and indicating an analysis of the certified quantities of the various components in the mixture.
- .2 The Landscape Architect or Owner may request that the seed and fertilizer be tested for quality and composition at the expense of the Contractor in case of any doubts as to the product's quality and composition.
- .3 Samples of seed and fertilizer shall be provided to the Landscape Architect ten (10) days prior to the commencement of work.

HYDROSEEDING

2.3 Seed Mixture

- .1 All seed shall be certified seed, meeting the requirements of the Seeds Act for Canada No. 1 Seed, all other applicable seed laws and statutes both federal and provincial, and any other guidelines established by the municipality or horticultural trades associations.
- .2 The seed shall have minimum germination rating of 75% and minimum purity of 97%.
- .3 Seed shall be packed and delivered in original containers clearly showing:
 - analysis of seed mixture
 - percentage of pure seed
 - year of production
 - net weight
 - date and location of bagging
- .4 The mixture shall be mixed and supplied by a recognized seed house with tested rates for purity and germination of not less than those indicated in 2.3.2 above.
- .5 The following mixture shall be used:

<u>Lolium perenne</u> (Perennial Ryegrass)	15%
<u>Dactylis glomerata</u> (Orchard Grass)	25%
<u>Agrostis alba</u> (Redtop)	20%
<u>Festuca arundinacea</u> (Tall Fescue)	20%
<u>Trifolium pratense</u> (Red Clover)	10%
<u>Trifolium repens</u> (White Clover)	5%
<u>Medicago sativa</u> (Alfalfa)	5%

2.4 Fertilizer

- .1 Fertilizers provided shall be standard approved commercial brands with a minimum of 50% of elements derived from organic sources.
- .2 All fertilizers shall be in granular form, and shall be dry, free-flowing and free from lumps.
- .3 The fertilizer shall have a guaranteed N.P.K. analysis as follows:

HYDROSEEDING

- (i) 5-20-20 in granular form, applied at rate of 583 kg/ha.
 - (ii) slow release sulphur-coated urea of 32-0-0 composition at 133 kg/hectare.
- .4 Any rates and/or analysis listed above shall be subject to adjustment by the Landscape Architect upon receipt of the soil analysis report.

2.5 Hydraulic Mulch

- .1 Hydraulic mulch shall be capable of dispersing rapidly in water to form a homogeneous slurry and remain in such state when agitated or mixed with other specified materials. When applied, the hydraulic mulch shall be capable of forming an absorptive mat, which will allow moisture to percolate into the underlying soil. It shall contain no growth or germination inhibiting factors. The mulch shall be dry, be free of weeds and all other foreign material and shall be supplied in packages bearing the manufacturer's label clearly indicating weight and product name.
- .2 Hydraulic mulch shall consist of raw wood fibre produced from clear, whole, hardwood chips and shall be dyed green.
- .3 Sample of mulch shall be provided to the Landscape Architect for approval at least ten (10) days prior to installation. Sample shall be labelled so as to indicate manufacturer, composition analysis, pH rating and water holding capacity (in grams of water per 100 grams of mulch).
- .4 The mulch shall contain a colloidal polythacuride tackifier (or approved equal) which shall be adhered to the wood fibre to prevent separation during shipment and to avoid chemical agglomeration during mixing in hydraulic mulching equipment.
- .5 Manufactured product "conwed 2000" or approved equal shall be used as mulch.

HYDROSEEDING

2.6 Water

- .1 Water used in hydroseeding shall be potable, and free from any impurities that may have an injurious effect on success of seeding.

PART 3: EXECUTION

3.1 Equipment

- .1 Seed, fertilizer and hydraulic mulch shall be applied, in the various combinations described in this specification, via an hydraulic seeder/mulcher.
- .2 All hydraulic seeding/mulching equipment shall have the tank volume certified by an identification plate or sticker which shall be affixed in plain view on the equipment and shall not be removed or altered.
- .3 The hydraulic seeder/mulcher shall be equipped with sufficient agitation to mix the materials into a homogeneous slurry and to maintain the slurry in a homogeneous state until it is applied. The discharge pumps and gun nozzles shall be capable of applying the materials uniformly over the designated areas.

3.2 Scheduling of Work

- .1 Seeding shall be carried out during periods which are most favourable for the establishment of a healthy stand of grass, according to accepted local practices.
- .2 A schedule of work shall be submitted to the Landscape Architect for approval at least ten (10) days prior to commencement of work. Revisions shall be made as requested by the Landscape Architect.
- .3 Any changes in this schedule shall be communicated with the Landscape Architect immediately.
- .4 Notification shall be provided to the Landscape Architect forty-eight (48) hours prior to commencement of any work.

HYDROSEEDING

3.3 Operational Constraints

- .1 The Contractor shall not carry out the work under adverse conditions of high wind, frozen ground or ground covered with snow, ice or standing water.
- .2 The Contractor shall ensure that fertilizer in solution does not come in contact with the foliage of any trees, shrubs, or other susceptible vegetation. The Contractor shall not spray seed or mulch on objects not expected to grow grass.
- .3 The Contractor shall ensure that existing site equipment, roadways, landscaping, reference points, monuments, markers and structures are protected from damage. The Contractor shall make good any such damage to the complete satisfaction of the Landscape Architect.

3.4 Preparation

- .1 Areas that are compacted shall have their surfaces loosened by means of a thorough scarification discing or harrowing. Such areas shall be identified on-site by the Landscape Architect.
- .2 Scarification shall be to a depth of 100 mm.
- .3 Before commencement of seeding operation approval of site preparation shall be obtained from the Landscape Architect.

3.5 Hydroseeding

- .1 Seed, fertilizer and hydraulic mulch shall be thoroughly mixed in a water slurry and shall be distributed uniformly over the surface area via an approved hydraulic mulcher.
- .2 The Contractor shall measure the quantities of each of the materials to be charged into the hydraulic seeder/mulcher tank either by mass or by a system of mass - calibrated volume measurements approved by the Landscape Architect. The materials shall be added to the tank while it is being filled with water, and in

HYDROSEEDING

the following sequence: seed, fertilizer, and where applicable, mulch. The materials shall be thoroughly mixed into a homogeneous water slurry and shall be distributed uniformly over the surface area via the hydraulic seeder/mulcher.

- .3 The Contract shall: keep seeds for grass, and legumes in separate containers prior to seeding.

The Contractor shall: add legume seed to grass mixture at time of seeding. Inoculate legume seed with standard product humus culture before mixing with grass seed. Protect inoculated seed from exposure to sunlight for periods of over one-half hour. Use seed within eight hours from inoculation or re-inoculate.

- .4 The rates of application per hectare shall be as indicated below:

Seed Mix	83 kg/ha
Fertilizer	5-20-20 at 583 hg/ha and 32-0-0 at 133 kg/ha
Hydraulic Mulch	1,620 kg/ha
Water	30,300 L/ha

After charging, no water or other material shall be added to the mixture in the hydraulic mulcher.

The Contractor shall ensure that fertilizer in solution does not come in contact with the foliage of any trees, shrubs, or other susceptible vegetation.

- .5 PROPER GERMINATION AND EMERGENCE OF ALL SPECIFIED GRASS SPECIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ALSO, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE MAINTENANCE UNTIL THE GRASS AREAS ARE ESTABLISHED TO THE COMPLETE SATISFACTION OF THE LANDSCAPE ARCHITECT, AND UNTIL SUCH TIME AS THEY ARE TAKEN OVER BY THE OWNER.

3.6 Clean-Up

- .1 All materials and other debris resulting from seeding operations shall be removed from the job site.

HYDROSEEDING

- .2 The Contractor shall, at his own expense, clean any vehicles, buildings, pavement or structures which were at all sprayed or subjected to drifting spray of hydroseeding mix. All cleaning shall be done to the complete satisfaction of the Landscape Architect.
- .3 All seeded areas shall be left neatly dressed.
- .4 Not until completion of the necessary clean-up, will the general inspection be undertaken by the Landscape Architect.

3.7 Maintenance

- .1 It shall be the responsibility of the contractor to provide adequate protection of seeded areas against damage until such time as the Landscape Architect is satisfied that a good stand of grass has been established, and the work has been given final acceptance.
- .2 Seeded areas shall be maintained for a minimum of four (4) weeks from time of final acceptance.
- .3 Soil in seeded areas shall be kept continually moist during germination period. During maintenance period seeded areas shall be watered frequently as required.
- .4 Water shall be applied in sufficient quantities in all seeded areas to ensure moisture penetration of 8 to 10 centimeters. Sprinkling shall be controlled and monitored to prevent washouts.
- .5 Reseeding shall be undertaken as required (see 1.9) to correct areas of poor growth.
- .7 NOTE: It is stressed that proper germination and emergence of all specified grass species shall be the responsibility of the contractor. Also, it shall be the Contractor's responsibility to provide adequate maintenance until the seeded areas are established to the complete satisfaction of the Landscape Architect, and until such time as they are taken over by the Owner.

