



REPORT ON TREE SURVEY AND GREEN MANAGEMENT

MUNICIPAL SPATIAL PLANNING SUPPORT PROGRAMME IN KOSOVO

Implemented by:
UN HABITAT
FOR A BETTER URBAN FUTURE

Financed by:
**SWEDISH DEVELOPMENT
COOPERATION**



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In relation to Capital Investment Projects

February 2013

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I. DEFINITIONS

Some important definitions relating to this study:

Arboriculture is the art, science, technology and business of tree care. Arboriculture is practiced by arborists. These individuals are trained to promote tree health, discern tree problems and take measures to correct them. The practice of arboriculture is principally focussed on the care and management of individual trees with the goal of creating environmental and landscape benefits in terms of beautification, shade, shelter, relief from urban pollution, and other benefits.

Green infrastructure is the variety of man-made and naturally established vegetation and associated soil and ground space within and around the built environment, and would include plants on the surface such as grass and herbaceous material, shrubs and trees, and the complex of species, such as woodlands and forests.

The *urban forest* is the total of green infrastructure in cities and towns, in both public and private ownerships. The urban forest includes trees and other plants in streets and parks, church yards and public spaces, back yards, industrial sites, railway lines and “waste land”. Urban forestry is the stewardship of these spaces and the plants growing on them for conservation and enhancement of bio-diversity, and the many benefits the forest provides to human beings. A healthy, rich and vibrant, sustainably managed urban forest is critical to the health and well-being of the urban population.

II. INTRODUCTION

UN-Habitat is assisting Kosovo institutions in the field of governance, spatial planning and municipal administration. As a component of this effort, UN-Habitat's Municipal Spatial Planning Support Programme (MuSPP) is working towards improved and sustainable living conditions for citizens of participating municipalities. The creation and careful management of green infrastructure - the trees, woods, parks and gardens of urban areas, is part of this development process.

The current MuSPP programme in Kosovo is supporting a number of Capital Investment Projects (CIPs). This assignment (RFQ/08/12) on behalf of UN-Habitat-Kosovo examines three current CIPs, to evaluate each in terms of conservation, enhancement and management of the green infrastructure within the scope of the CIP. The aim of the initiative being to create urban projects which build and care for more liveable urban environments, and thus have major positive benefits for local people. The CIPs in three Kosovo municipalities, Ferizaj/Urosevac, Peja/Pec, and Prizren, were studied and field surveys were carried out in January and February 2013. UN-Habitat staff members and personnel from each of the municipalities have been involved in these site surveys. A summary of the field surveys and a list of issues relating to the proposed CIPs, and the green component in each are contained within this report. There is also a list of relevant follow-up tasks which were addressed in the second of the two visits to each of the municipalities. UN-Habitat planners and municipal staff participated in the follow-up sessions and benefited from discussions and technical advice focussed on the particular needs of the individual CIP. Also during the follow-up, there was some guidance for the municipalities in long-term management practices for green infrastructure in their urban areas, such as to extend the benefits of the current projects into stewardship of other green spaces in the future.

Using the three current CIPs as first-hand experience, it is proposed that a seminar/workshop be schedule for all municipalities participating in the current MUSPP. The focus of the proposed seminar/workshop will be the creation and management of the urban forest for a liveable urban environment as part of an ongoing municipal programme.

III. GENERAL RECOMMENDATIONS

Specific recommendations for each of the CIPs follow in this report (Section 3.0). However general recommendations on some specific topics are particularly important. These recommendations have been selected from 12 principles outlined in the Trees and Design Action Group publication (2012), *Trees in the Townscape, a Guide for Decision Makers*. This publication has been supplied to UN-Habitat-Kosovo as a reference manual.

3.1 URBAN TREE INVENTORY OVERVIEW

There are multiple benefits to be derived from tree inventories. An inventory identifies the range of tree species and is part of the key to development of biological diversity on the site. A continues inventory process will monitor health of the tree stock and track treatments and arboricultural practices, and other scheduled maintenance. Re-inventory can measure the success of capital investment in terms of survival and successive growth of the "urban forest", and will highlight the need to schedule new planting. The value of green infrastructure in terms of aesthetics landscape appeal, carbon dioxide absorption, pollutant capture, and carbon sequestration can result from data collected in broad-based tree inventories. Estimates of tree canopy cover can provide a picture of the overall green space available to the public within urban space. Tree inventories are the source of information to register notable trees, incorporate trees dedicated to social events and to honour

individual local citizens, and identify trees which have special significant to the community, such as sacred trees and trees of historic significant.

CIP Application – a tree inventory is proposed in each of the CIPs under study.

- **Peja/Pec** – record any significant trees on site in advance of construction; especially along the irrigation canal corridor;
- **Prizren** – a complete inventory of the existing trees on the CIP site as an aid to selection and retention of individual trees and as a systematic management tool for future tree maintenance;
- **Ferizaj/Urosevac** – an inventory of mature and other trees on site at present and an inventory of new trees established in the site development;
- And in addition, a complete tree inventory can eventually be applied by the respective municipalities to other public trees within the municipalities.

3.2 INVENTORY IMPLEMENTATION

A simple inventory form (courtesy of *Highline Contractors* of the UK) is part of the appendix to this report. The form shows the information to be collected on site. Additional information may be noted as needed. This form could be used in each of the CIPs, and subsequently a version of the form will then be prepared in the Albanian (and Serbian) language for ongoing use. The inventory should be carried out as a team effort - UN-Habitat staff planner, municipal planners and environment officers (and hopefully with local community participation). In Prizren and Ferizaj/Urosevac it is proposed that each tree be numbered sequentially. In Peja only trees that may have some retention value will be noted and marked.

It is recommended a permanent file of the tree inventory be kept in the respective municipalities for future reference. The objective in time will be to develop a full data set on all the publicly owned trees within the municipality. This will help decide the timing of maintenance work and other management practices to be implemented by the municipality. Ultimately the inventory can be digitized on computer using one of several data packages available to public administrators in the fields of environment and green space services.

3.3 TREE PROCUREMENT OVERVIEW

Tree procurement is the process of identifying sources of trees for specific applications and obtaining trees at the right time for planting. Including within the criteria will be trees of the desired species, in the required size for the job, and of a standard and quality to ensure that there is a high degree of survival and future growth. There are basically two sources of trees, 1) trees collected from the wild and transplanted to the final location, and 2) nursery grown trees. There is also a combination of the two, collected trees transplanted to a nursery bed and grown on for future outplanting. Nursery grown trees are now generally more desirable, being of better quality and in a variety of sizes and forms. Collected trees are usually available only in indigenous species, native to the area of collection. In Kosovo, trees from both forest collected sources and nursery grown trees are found in the trade.

Trees from nurseries are available in three types, 1) container grown – that is in pots of either rigid material such as plastic, or flexible rot-resistant fabric. Fabric pots often have handles for ease of movement. Another type, 2) are root balled; that is trees dug from the ground with an earth ball and wrapped to protect and hold the roots intact while the tree is moved to the planting site.

3.4 GUIDELINES FOR ESTABLISHMENT OF TREES

- **Tree Pits** – should be dug circular in shape. The diameter and depth of the tree pit should be twice the size of the root ball or spread of the roots in barefoot trees. For example, a tree root ball diameter of 40 cm should require a pit diameter of at least 80 cm. The excavation of the pit should be 50% deeper than the depth of the root ball. The additional depth should be filled with a soil/humus mixture in advance of placing the root ball in the pit. The bottom of the pit should be loosened up prior to planting with a crowbar or similar tool to allow future tree root penetration especially in hard, compacted subsoil.
- **Soil Mix** – the backfill soil should be prepared in advance. Any reasonable topsoil will be adequate for trees; ideally the soil on site will be re-used. In most cases it is advisable to add organic matter to at least 30% of the backfill material. The source of organic matter is not a critical issue, but the age (state of decomposition) is important, and the older the organic matter the better. Composted leaves, other green vegetation, peat, animal waste and other organic matter will work. Thoroughly mix the organic matter with the available topsoil before planting the tree.
- **Setting Tree** – the planted tree should be set at a depth equal to its depth in the nursery. Planting above the original soil line will leave roots exposed and the tree maybe unstable in the wind. Planting too deep may prevent air penetration to the roots and it may create a situation where the tree roots become waterlogged. Care should be taken in lowering the tree into the pit so as not to damage the roots or stem of the tree. In the case of trees over about 10 cm girth, a lifting machine may be necessary to hoist the root ball into the hole. Once the tree is in place it should be adjusted to ensure it is vertical. If necessary, irrigation pipes should be layed at this point – either using a tree irrigation set or an improvised irrigation pipe fashioned to meet the size of tree and conditions of the site. Soil backfill should be tamped into place by foot to ensure the tree root ball is firm. The pit should be filled with soil up to about 5 to 8 cm below the adjacent ground surface. The resulting depression will then be used for a surface mulch or small temporary irrigation “pond” to be used for the first year following planting (this is especially necessary for trees without an underground irrigation supply pipe).
- **Staking** – there are a variety of tree staking options. The role of staking is to provide support during the very early years (2 or at most 3 years) of the tree in its new position. Staking also has an equally important role of helping protect the new tree from physical damage from passing vehicle traffic and pedestrians, and livestock etc. There is no perfect staking system to protect trees in all instances, and some stakes and tree guard options can be very expensive and not necessarily cost effective. Often the most basic tree guards, installed properly and well-maintained will result in successfully established trees. The most important components of the guarding system are the stakes themselves and a pliable tie that joins the tree to the stake. Frequently the stakes are too small, are not driven properly into the ground, and the tying results in damage to the tree. A very common mistake is to leave the stakes and tree ties in place for longer than necessary. In such cases the tree often is strangled by the ties or the tree is misshapen by the tree growing over and around the tie. Diagrams in the publication, *Urban Tree Design Guide*, produced by Greenleaf (and supplied to UN-Habitat-Kosovo) illustrates several types of tree guards and tying systems, including wrought iron frames for urban street trees.

- **Irrigation** – watering trees is an essential part of the maintenance process and is key to successful establishment of trees. Regardless of the irrigation system (surface, underground, drip) regular application of water is necessary for the first two years of growth. The most successful system is one in which a responsible individual takes control of the watering schedule and is on hand and regularly available for the summer dry period. New trees should be checked at least weekly and thoroughly watered weekly as part of the ongoing maintenance.
- **Mulching** – this is the application of a moisture retaining material around the root zone of trees to maintain soil moisture levels. The mulch can be composed of wood chippings, wood shavings, used animal bedding, rotted straw, leaves or other compost, or sometimes stone chippings which will keep the site moist. Usually the material is applied annually to a depth of about 15 cm or more. Organic mulches provide added humus and nutrients to the soil over time.
- **Aftercare** – can include a variety of necessary tasks. Ensuring that the tree has sufficient water is the most important responsibility. As already mentioned trees should be checked at least weekly and watered to ensure soil does not dry out.

A simple illustration (Fig 1) outlines the general plan for establishing a new tree within an adequately sized tree pit.

IV. CAPITAL INVESTMENT PROJECTS ASSESSMENT

Three UN-Habitat projects were assessed as part of the assignment. These are located in Peja/Pec, Prizren, and Ferizaj/Urosevac, Kosovo.

4.1 PROJECT: PEJA/PEC P-1: ZATRA CIP

Location: Zatra Informal Settlement; Brigadat Kosovare Street, Peja/Pec

Date of Initial Field Survey: 9 January 2013 **Date of Follow-up Meeting:** 25 February 2013

Total Project: €228,210.86 **Greenery Allocation:** €4,190.00

4.1.1 DESCRIPTION OF CIP PROJECT

The Zatra CIP will focus on improving road access to the Zatra district of Peja/Pec. Zatra is an informal settlement in the south-west part of the city and has a population of approximately 1,400 inhabitants; the area has a very high rate of unemployment and poverty and limited access in terms of infrastructure and public services. The present main access road, Brigadat Kkosovare Street is an un-improved, dirt surfaced road, constructed without any planning, and lacks significant engineering infrastructure. An irrigation canal dating from perhaps the mid-1900s runs through the centre of the street separating the east and west lanes of the road, and results in a very narrow right of way which has become impinged-upon from many of the adjacent homesteads. The Peja Urban Regulatory Plan 2010 calls for improvements to the access, including paving and underground infrastructure, and regulation of parking, with the overall objective of improvements to the

quality of life in the area. Of major importance to this study is the municipal planning objective of preservation of open space, improving the image of the neighbourhood, and increasing green areas.

4.1.2 KEY ISSUES TO ADDRESS

- Placement, establishment and successful growth of green infrastructure within a restricted right of way;
- The value of natural vegetation present along the irrigation canal, its impact currently and in the future on the irrigation canal, with special attention to protection of the existing irrigation canal from destructive growth, especially the ingress of roots from the adjacent natural and possible planted greenery;
- The choice of planting material, particularly suitable trees and shrubs for the limited space available, including container plantings distributed along the length of the right-of-way; and additionally the type of tree containers to use;
- Included within the choice of planting material is a variety of climbing plants for the proposed concrete retaining walls to be used in parts of the project;
- How to amend the soil used to establish the green infrastructure; including topsoil, organic matter, and added fertilizer to ensure good growth over time;
- Consider the issue of irrigation of new plant material in the short and longer terms to ensure initial survival and healthy growth over time; including sourcing water from the existing irrigation canal and/or mains water supply; a drip irrigation system and other such infrastructure;
- The need to engage the Zatra community, especially the residents along Brigadet Kosovare Street in assisting in the establishment of greenery, and taking care of the trees, shrubs and herbaceous plants in the long-term;
- The maintenance and attention that the new green infrastructure will require in the future, include services that can be mobilized within the community and municipal services that will be needed;

4.1.3 PROJECTED FOLLOW-UP TASKS TO MEET PROJECT REQUIREMENTS

- Make a second visit to the Zantra site with UN-Habitat and Municipality of Peja/Pec staff to discuss relevant issues, and review on site recommendations for creating and sustaining greenery in the project area;
- Provide UN-Habitat with a list of suitable trees, shrubs and herbaceous plants that will satisfy the requirements of the project;
- Assist UN-Habitat staff in identifying sources of plant materials from nurseries within Kosovo or suitable sources outside of the country;
- Consider tree container options, suggest soil mixes and ground preparations practices adjacent to containers to facilitate healthy root structure development below the containers;

- Recommend water irrigation measures to sustain new plantings and provide long-term plant maintenance;
- Help with the provision of guidance in respect to establishment of climbing plants on the proposed concrete retaining walls;
- To temporarily mark existing plants within the right of way which have, or will provide green benefits in the future;
- Provide guidance on plant maintenance to help ensure a high rate of survival and ongoing growth for new plantings;
- Consider project monitoring needs as construction work is implemented;

4.1.4 ASSESSMENT OF EXISTING GREENERY

- There is a variety of greenery along the course of the irrigation canal. This includes seedlings, saplings, small bushes and young trees. Most of this growth will require removal in order not to compromise the integrity of the canal's concrete structure. However, some desirable trees and shrubs could be left on approval of the project engineers where sufficient space is available for the plants to develop properly. As needed some of these plants could be "pollarded" or crown controlled to minimize their impact on road traffic or the canal. Any desirable trees should be marked with a paint spot in advance of initiating project works.
- Sketches of trees proposed for planting in containers have been provided. The containers proposed are concrete drainage pipes used horizontally. Pipes of approximately 1.25 metre diameter and about 0.6 m to 0.75 m in height should be considered. The pipes could be buried to about a depth of 0.3 m. They will allow the trees to root in the ground below the pipe and will not restrict the roots to the container which would cause problems in the future, and limit the growth and healthy development of the tree. It is suggested in construction that the area in the road immediately below the "container" be excavated to about 2 m in depth, and 2 m to 3 m in diameter and the resulting hole filled with a mixture (about 50% each) of topsoil and organic matter. Any organic matter will work, but it should be rotted, such as cow or chicken manure, composted leaves, peat moss or similar vegetative material.
- Tree species for use in the containers could include the ones listed below. The important consideration is that the trees will be limited to medium height, approximately 10 m at maturity, and should have a narrow crown (top) and branching structure. The narrow shape will thus not interfere with passing traffic or have a detrimental effect on the neighbouring properties. Sketches showing *Betula* (birch) and *Carpinus* (hornbeam) trees in containers have been included in the Appendix to this report.
- Proposed small to medium sized trees suitable for containers in street situation: *Betula utilis* (Himalayan birch) *Carpinus betulus Fastigiata* (European hornbeam) columnar shape *Pyrus calleryana* (Ornamental pear) has no fruit *Corylus colurna* (Turkish hazel) *Sorbus spp* (Mountain ash) there are many columnar varieties.

- Availability of these and other species have not been confirmed with local suppliers (nurseries). Approximately 14 to 15 trees in containers as shown on the street plan would be ideal. Small herbaceous plants and vines, etc. can also be grown in the containers with the trees to add colour and interest.
- Detail on climbing plants for the concrete retaining walls has been provided. An attachment shows recommended climbers; a hardcopy of this document has been made available to the Zatra team. One climbing plant for each 2 m of retaining wall could be used as a guide to planting. Some attention has been focussed on a means of providing rooting space for the climbers at the base of the proposed concrete retaining walls.
- Where space is available within the project area, a number of trees ranging from small to large size (at maturity) would be appropriate. These should be considered in the numbers shown: Tilia – Lime trees x 5 or Platanus orientalis – medium size Pyrus calleryana - Ornamental pear x 5 – small to medium size Gleditsia triacanthos - Honey locust x 3 – large size Malus spp - Flowering crabapple x 5 – small size.
- The above trees are additional to the container trees and will be used in the proposed group plantings at each end of the road. It should be noted in the Bill of Quantity that final selection of plant material will be carried out on recommendation of the project supervisor.

4.2 PROJECT: PRIZREN CIP P-7: LIDHJA E PRIZRENIT SQUARE

Location: The centre of Prizren

Date of Field Survey: 15 January 2013 **Date of Follow-up Meeting:** 21 February 2013

Total Project: €471,668.40

Greenery Allocation: €4698

4.2.1 DESCRIPTION OF CIP

This Prizren CIP will create a major public space within the heart of the city. The site was previously an access road and space dedicated to car parking, with small areas for sitting and for the use of adjacent cafes. On re-development the space is to be called, “Historic Centre of Prizren Square”, and will enable the public to enjoy concerts, gather informally, sit and enjoy open space free from traffic, and take refreshment, all within the city centre. This new space will complement the nearby historic urban space of Shadervan, and the new civic development of Farkatareve Road. There are existing trees on the Square site, and with careful construction practices and management of the project, some of the residual trees will be successfully retained and new trees will be added to develop a green haven within the urban area.

4.2.2 KEY ISSUES TO ADDRESS

- There are a many trees pre-existing on site; most as a result of previous street tree and terrace planting – how will good residual trees be protected during the construction phase?;
- Some trees will need to be removed as they are already dead, dying or are in conflict with the planned layout of the hard infrastructure; there are younger trees that could be carefully transplanted, moved off-site and relocated in the final landscape;
- New trees are to be added to the Square; how will these trees be selected by species, size and quality?;
- How will new trees be properly planted with measures to ensure their survival and successful growth into the future?;
- How will the green infrastructure be monitored in the future; tree by tree to ensure a high level of stewardship and ongoing in terms of a schedule for management treatments?;
- Who will address the need for overseeing the site during project construction activities?

4.2.3 PROJECTED FOLLOW-UP TASKS TO MEET PROJECT REQUIREMENTS

- Undertake an inventory of the trees on site, numbering in sequence each tree to be retained and initiating a paper-based data set, which would include tree species, date of planting, physical dimensions, general condition, future treatments required, and other pertinent information relating to urban tree management; such a data set to be permanently maintained by the Municipality; during the field inventory, examine, discuss and mark trees for removal from the Square as part of the construction phase;

- Create a list of useful trees and shrubs appropriate for planting within the Square; investigate sourcing plant materials from nurseries within Kosovo or whether outside sources will be utilised;
- Review measures to properly protect trees from construction works, being sure to include the stem, crown, surface and underground root structure from digging, grading, and above surface impact; special attention needs to focus on paving that in plan is intended to be laid adjacent and over the root structure of existing trees;
- Discuss with Municipal staff the procedure to be followed in the establishment of new trees, with special emphasis on making allowances for root growth and development, irrigation in short and long-term, staking and guarding, and maintenance to ensure successful establishment;
- Finally, emphasise the need for ongoing construction supervision to ensure existing trees on site are respected during the construction phase, and that new trees planted as part of the project are carefully maintained during the early years.

4.2.4 INITIAL ASSESSMENT OF EXISTING GREENERY

- Trees existing on site include: mainly *Platanus orientalis*, *Tilia spp*, *Fraxinus* (spp possibly *pennsylvanica?*), *Aesculus hippocastanum*; other minor species such as *Acer spp.*, *Ailanthus altissima*, *Thuja spp.*, and others.
- Site visit included preliminary marking of trees to be removed – red spray paint dot;
- The site visit also included group discussion of trees with vigour and potential for further growth and development – criteria for retention outlined – especially lack of vigour, defect present, age, dieback in the tree crown, etc.;
- Observations were made of defect – stem canker, past crude and repeated crown reduction (pollarding) resulting in multiple dead stubs, rot and other defect in many older trees; validity of keeping these defective trees in the short and longer terms and the expense of removing dead and dying trees from the new infrastructure after project completion; retained trees should yield at least 15 years of future growth and reasonable vigour; *Fraxinus spp* trees are generally of poor condition on the site and should be judged accordingly;
- It is expect at least 10 to 15 trees should be removed in advance of development subject to re-inspection;
- Further detailed examination should be carried out of the existing greenery to make the final assessment of retained trees; these should be clearly marked and measured as part of an eventual permanent tree inventory for the site and for Prizren city generally.

4.2.5 PROTECTION/CONSERVATION OF EXISTING GREENERY DURING THE CONSTRUCTION PHASE

- As a reference it is suggested to use practices outlined in: *Trees in relation to design, demolition and construction – Recommendations* (see reference list);

- Careful consideration is needed of the size, outline and options for delineation of root protection areas (RPA) for retained trees on site;
- Within the context of CIP resources, methods of creating barriers for RPA and tree crowns needs to be planned – available contractors fencing, staking and roping off will be needed; the Municipality needs to take an inventory of materials on hand for this use or budget financial resources for the task;
- There is a requirement for written guidance and standards for protection of retained greenery as part of development contracts and these details need to be prepared in advance of initiating site work; the above referenced manual should be used for guidance in this matter;
- Of particular importance is: the maintenance of grade level in RPA, minimizing soil compaction, and ensuring drainage is maintained to avoid soil saturation during and after the construction;
- It has been agreed on site that the Municipal Environment Officer will take responsibility for the planning and monitoring of protection and conservation of the existing on-site greenery during the construction process.

4.2.6 NEW TREE SELECTION AND SOURCING

- Between 10 and 15 major new trees will be required to fulfil the landscape development plan; a preliminary discussion of species was based on the reference manual: *A Time for Trees* (see reference list)
- Suggested species for new planting: note – there are many ornamental trees, some introduced and some indigenous species which will function well as urban and/or street trees. The final selection of trees to use in the CIP will be heavily dependent upon what is available currently in the Kosovo local and imported trade.

Table 4.2.5.1 See species list of trees in Latin/Albanian/English

Small Sized Trees	Medium Sized Trees	Large Sized Trees
<i>Amelanchier arborea</i>	<i>Corylus colurna</i>	<i>Tilia spp</i>
<i>Cercis Canadensis</i>	<i>Carpinus betulus</i>	<i>Platanus orientalis</i>
<i>Malus spp (flowering crabapple)</i>	<i>Acer campestre</i>	<i>Gleditsia triocanthos Inermis</i>
<i>Crataegus spp (flowering hawthorne)</i>	<i>Pyrus calleryana</i>	<i>Acer platanoides</i>
<i>Sorbus spp</i>	<i>Robina pseudoacacia Selected</i>	<i>Sophora japonica</i>

- Where possible it is agreed that the largest tree within the confines of the space available will be used; there are considerable advantages of using large trees for the benefit of bio-diversity, climate change resilience, and large canopy leaf structure;
- Up to perhaps six different species in all should be selected from the three size ranges; this will provide a range of biological diversity and landscape interest; it is recommended to plant in groups rather than by species in an alternating arrangement;
- The criteria used in selection should include, trees for shade, flowering habit, seasonal interest, wildlife use, and ease of maintenance, etc.;
- The reference: Kosovo Tree Nurseries (working document; see references) plus local knowledge is to be used for sourcing plant material and/or advising site contractors;

4.2.7 NEW TREE ESTABLISHMENT ON-SITE

- General guidelines for establishment of new trees on development sites have been outlined in section 2.5.
- The Prizren Square CIP is unique in terms of the need to plant successfully in largely surfaced paved areas and incorporate existing trees in new paving;
- The manual, *Urban Tree Design Guide* (see references) outlines a number of practices essential for new tree establishment; the important issues are minimizing compaction to tree roots, ensuring that moisture and air are accessible to the root systems of new and existing trees, and making available a sufficient volume of soil for the trees to make new roots and gain nutrients;
- Tree pits are the holes that are dug to accommodate the growing medium (soil and amendments) and the new tree; tree pits should be large enough for the ultimate size of the tree to be planted; minimum specification are as follows:

Small trees – canopy diameter 3 meters:4.24 cubic meters
 Medium trees – canopy diameter 5 meters:.....11.8 cubic meters
 Large trees – canopy diameter 8 meters:..... 30 cubic meters

Where trees are in groups or in lines such as street tree plantings, tree pits are likely to be linked and as such pit volume can be reduced as trees within the strip are likely to share the growing medium. These figures on tree pit volumes are made available by Greenleaf – Urban Tree and Landscape Products.

- In respect to paving adjacent to existing trees, an area around the stem of the tree should be free of paving (at least 4 square meters for a small tree and up to 16 square meters for a large tree) so that rain or irrigation water, and air can penetrate the ground to maintain root health. The resulting open ground can be mulched with an organic material such as wood chippings or compost, planted with a

low ground cover, or surfaced with light gravel. A proprietary material called Arboresin can be applied to the tree pit surface after tree planting to maintain a tidy and environmentally sound surface. A photograph of such a treatment has been supplied to the Prizren project team.

- For trees planted in paving, a modular shoring system to suspend the paving and at the same time create a high grade growing space for tree roots is available from commercial suppliers (www.greenleaftrees.co.uk and www.deeproot.com). These innovations for growing trees within confined urban infrastructure also accommodate electric, water and other utility lines (see Silva Cell Technical Sheet in Appendix). It may be useful to consider this technology, but cost may limit application in the current CIPs in Kosovo.
- Simple staking has been mentioned and illustrated in the general section (Sec 2.0) of this report. As a reminder staking serves to stabilise new trees from disruptive wind and other external forces, including vandals, and is a reminder to the public that new planting has been carried out and should be acknowledged. The most straight forward staking includes two wooden stakes of approximately 5 cm diameter, strong galvanized malleable wire, and 2 pieces of discarded hose pipe cut to about 15 cm lengths, to guide the wire around the tree stem and protect the stem from abrasion (see illustration Fig 1).
- Irrigation of new trees is essential during the first and second growing seasons. The most successful watering schemes are those carried out manually with hose pipes on a regular basis by responsible individuals. For ease of saturating the soil and getting moisture penetration, a low “dam” should be created around the stem of the trees, part way to the drip line of the tree, approximately 0.5 to 0.75 meters from the stem, and the resulting area flooded by hose pipe. Watering in this manner should be carried out weekly during the growing season in year 1 and year 2 following planting. On the Prizren CIP site, standpipes or hydrants should be established at several points to distribute water from the mains and facilitate new tree care.
- As an alternative to irrigation via “damned” reservoirs at the tree bases, some consideration should be given to installation of a permanent water delivery system, such as “Rootrain” illustrated in the **Urban Tree Design Manual** (page 37 to 45). This will result in further capital investment but will result in a more dependable and convenient system, especially one designed specifically for precinct (paved) sites where leaving a temporary unfinished surface at the tree base is not practical.

4.2.8 AFTERCARE

- It is advisable even in the most professionally implemented planting project to plan for replacement of failed trees following the initial installation. “Beating up” is usually undertaken one year after the first plantings to bring the inventory of new planting up to the designated level. A small percentage of the planting budget could be held in reserve for replacements, or the planting contract might include a clause to replace dead or dying trees within the initial year of planting. The contractor would be expected to price the project on that basis, with the expectation of taking extra care in planting.

- With careful choice of species in the new planting little or no crown pruning should be required during the early lifespan of the trees. This will reduce or help eliminate the budget for crown reduction and pollarding which is common in Kosovo's urban tree stock.

4.3 PROJECT: FERIZAJ/UROSEVAC CIP P-12, GREEN CORRIDOR

Location: northwest part of Ferizaj/Urosevac

Date of Initial Field Survey: 16 January 2013 **Follow-up Meeting:** 22 February 2013

Total Project: €346,965.30

Greenery Allocation: €14,000

4.3.1 DESCRIPTION OF CIP

The Ferizaj/Urosevac Green Corridor CIP is a proposal for exemplary development of facilities to create a high quality recreational and leisure facility to benefit residents of the Municipality. In addition to the enhancement of the existing sports complex and educational facilities, a children's' playground, football arena, quiet landscaped sitting areas and other developments are planned. The project will also create open space accessible to the city centre, and green landscaping for local people to enjoy. Cycle and walking routes will enable easy access to the area and will provide further routes to unspoiled woodland and countryside on the periphery of the city. The project provides an outstanding opportunity for the Municipality to directly enhance the quality of life for its people.

4.3.2 KEY ISSUES TO ADDRESS WITHIN THE PROJECT PROPOSAL

- The lack of a detailed landscape development plan within such a grand proposal for green space, public recreation and leisure;
- The selection of a variety of interesting, hardy and manageable trees, shrubs and herbaceous plant material for the site;
- The placement, careful establishment and successful growth of green infrastructure throughout the proposed complex;
- Ground preparation measures necessary to properly plant the selected plant material, including where necessary – soil drainage, removal of building waste from previous construction activities, enhancement of soil with amendments such as fertilizer and organic matter, and other measures to ensure successful landscape development;
- The long-term maintenance practices that will need to be scheduled for upkeep of green infrastructure.

4.3.3 PROJECTED FOLLOW-UP TASKS TO MEET PROJECT NEEDS

- Create a list of proposed plant material by species for the site;
- Determine numbers of each individual species and size specification;
- Outline ground preparation requirements in advance of scheduled planting;

- Prepare a general procedure for planting including planting pit dimensions, soil mix and amendments for backfilling, irrigation requirements, staking and guarding, mulching and immediate aftercare needs;
- Prepare a written review of long-term tree management requirements to help ensure successful onward growth and development of on-site green infrastructure;
- Undertake an examination and inventory of existing trees and shrubs on site and rate these plants for their potential as part of the overall greenery within the project;
- Consider project monitoring needs as construction is underway;

4.3.4 INITIAL ASSESSMENT OF EXISTING GREENERY

- There are a small number of existing trees and shrubs on the development site. These are only of minor value, but several significant trees are present, mostly poplar and a small hedge of *Prunus* spp. Two large declining Lombardy poplars (*Populus nigra*), near the entrance to the high schools from the main road and located within the pedestrian pathway, but are of little long-term value and should be removed in the course of site development. Other trees on site should be inventoried before site work begins and a determination made of their suitability for retention (using urban tree inventory form – see appendix). However, in general the limited nature of greenery present is not significant to the project.

4.3.5 SITE PREPARATION

- There is considerable site work required to fulfil the terms of this project, especially in terms of laying new paving for pathways and grass cover. In conjunction with these works, re-contouring of existing pathways, particularly the path along the Shtime road should be undertaken. Here construction waste and rough ground has fouled the sloped grade from the paved surface of the pathway. In advance of tree planting the sloped pathway edges should be filled and smoothed to create a suitable final grade. Illustration (Fig ...) shows the situation, before and after filling and grading.

4.3.6 NEW TREE SELECTION AND SOURCING

- The overall success of this project is practically entirely dependent upon the procurement and establishment of a large number of new trees. To meet the criteria of the development, a selection of good planting stock and careful planting to a high standard are essential.
- A total of 430 new trees are projected for the site. Additionally, 100 shrubs and 150 small conifers are expected. A preliminary discussion of plant species was discussed during the site visit and the reference manual, *A Time for Trees* is expected to be used for final selection (see reference list).
- Below is an initial selection of species for new planting: note – there are many ornamental trees, introduced and some indigenous which will function well as urban and/or street trees. The final selection of trees to use in the Ferizaj/Urosevac CIP will be heavily dependent upon what is available in the Kosovo local and imported trade.

Table 4.3.6.1 Attention is drawn to the species list of trees in Latin/Albanian/English in the appendix to this document.

Small Sized Trees	Medium Sized Trees	Large Sized Trees
<i>Amelanchier arborea</i>	<i>Corylus colurna</i>	<i>Tilia spp</i>
<i>Cercis canadensis</i>	<i>Carpinus betulus</i>	<i>Platanus orientalis</i>
<i>Malus spp (flowering crabapple)</i>	<i>Acer campestre</i>	<i>Gleditsia triacanthos Inermis</i>
<i>Crataegus spp (flowering hawthorne)</i>	<i>Pyrus calleryana</i>	<i>Acer platanoides</i>
<i>Sorbus spp</i>	<i>Robinia pseudoacacia Selected</i>	<i>Sophora japonica</i>

- Where possible it is agreed that the largest tree within the confines of the space available for planting will be used; there are considerable advantages of using large trees for the benefit of bio-diversity, climate change resilience, and large canopy leaf structure;
- Up to perhaps 10 different species in all should be selected from within the three size ranges; this will provide a range of biological diversity and landscape interest; it is recommended to plant in groups rather than by species in an alternative arrangement;
- The criteria used in selection should include, trees for shade, flowering habit, seasonal interest, wildlife use, and ease of maintenance, etc.;
- The reference: Kosovo Tree Nurseries (working document; see references) plus local knowledge will be used for sourcing plant material and/or advising site contractors;
- The specifications for plant material previously noted; British Standards Institute nursery stock standards are suggested as future reference.

4.3.7 NEW TREE ESTABLISHMENT ON-SITE

- General guidelines for establishment of new trees on development sites have been outlined in section 2.5.
- The Ferizaj/Urosevac Green Corridor CIP is unique in terms of the opportunity of planting in a large practically open space where pathways have already been installed with new paving;
- The manual, *Urban Tree Design Guide* (see references) outlines a number of practices essential for new tree establishment; the important issues are minimizing compaction to tree roots, ensuring that moisture and air are accessible to the root systems of new and any existing trees, and making available a

sufficient volume of soil for the trees to make new roots and gain nutrients; these criteria should be achievable on the open ground in this CIP.

- The illustration (Fig 1) titled *General Planting Outline* shows the basic structure of new tree planting in undisturbed ground. The important aspects are a planting pit of sufficient size to accommodate the root ball, this being at least twice the diameter and depth of the ball. Backfill soil should be of good quality and amended with humus/organic matter to add nutrients essential to the first years of growth on site. The root ball should be at approximately the same depth as was the case in the tree nursery. Staking and tying of the tree should be secure and adequate to restrain the tree during at least a two year period from planting. Proprietary tree ties should be used or fabricated locally from waste hose pipe or similar rubber material. The important aspect is to prevent the ties or wire from causing abrasions to the tree stem. When properly installed in the tree pit with stakes and ties, it should not be possible to sway or move the tree by hand within its new position. The tree ties should be removed after approximately two growing seasons to avoid the ties damaging the tree stems and to acclimatise the tree to the effect of on-site wind. This will encourage the tree to grow a stabilizing, wind-proof root system.
- Illustration no... shows a commercially available tree irrigation pipe in place. This system could be utilized in the Green Corridor, but in terms of simplicity and limiting costs, preference should probably dictate using the soil dam and flood method of watering. Illustration figure 1 also shows this detail as a small, circular earthen dam on the periphery of the tree pit. Irrigation by hand and hose pipe is then used to flood the area within on a regular basis during the first two growing seasons of the tree on-site.
- Plans for the project call for installation of water hydrants or standpipes around the site. At least 4 new hydrants will be available for tree irrigation. Hose pipe lengths sufficient to reach all new trees should be made available or be ensured by the site contractors.
- For trees planted within paved areas, tree pits should be large enough for the ultimate size of the tree to be planted; minimum specification are as follows:

Small trees – canopy diameter 3 meters:4.24 cubic meters
Medium trees – canopy diameter 5 meters:.....11.8 cubic meters
Large trees – canopy diameter 8 meters:..... 30 cubic meters

Where trees are in groups or in lines such as street tree plantings, tree pits are likely to be linked and as such pit volume can be reduced as trees within the strip are likely to share the growing medium. These figures on tree pit volumes are made available by Greenleaf – Urban Tree and Landscape Products.

- In respect to paving adjacent to existing trees, an area around the stem of the tree should be free of paving (at least 4 square meters for a small tree and up to 16 square meters for a large tree) so that rain or irrigation water, and air can penetrate the ground to maintain root health. The resulting open ground can be mulched with an organic material such as wood chippings or compost, planted with a

low ground cover, or surfaced with light gravel. A proprietary material called Arboresin can be applied to the tree pit surface after tree planting to maintain a tidy and environmentally sound surface. A photograph of such a treatment has been supplied to the project team.

- For trees planted in paving, a modular shoring system to suspend the paving and at the same time create a high grade growing space for tree roots is available from commercial suppliers (www.greenleaftrees.co.uk and www.deeproot.com). These innovations for growing trees within confined urban infrastructure also accommodate electric, water and other utilities. It may be useful to consider this technology, but cost may limit application in the current CIPs in Kosovo.

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- With careful choice of species in the new planting little or no crown pruning should be required during the early lifespan of the trees. This will reduce or help eliminate the budget for crown reduction and pollarding which is common in Kosovo’s urban tree stock.

V. APPENDIX

5.1 TREE SURVEY AND GREEN MANAGEMENT – REFERENCES AND SUGGESTED SOURCES OF INFORMATION

Gorniak, A. Et al. 2008 **Greenkeys@ Your City, a Guide for Urban Green Quality**, Greenkeys Project Team, Dresden, Germany (www.greenkeys-project.net)

Hibberd, B. 1989. **Urban Forestry Practice**, Forestry Commission Handbook 5, HMSO, London

Trowbridge, P., Bassuk, N. 2004. **Trees in the Urban Landscape, Site Assessment, Design, and Installation**. John Wiley and Sons, Hoboken, N.J.

Toomer, S. 2005. **Trees for the Small Garden**. Timber Press, Cambridge

Trees and Design Action Group. 2012 **Trees in the Townscape: A Guide for Decision Makers**. TDAG London (<http://www.tdag.org.uk/trees-in-the-townscape.html>)

GreenBlue Urban Ltd. **Urban Tree Design Guide**. Available as a free download. www.greenleafrees.co.uk

British Standard Institution. 2012. **Trees in relation to design, demolition and construction – Recommendations** BS 5837:2012.

Glover, M. 2009. **It's Time for Trees**. Barcham Trees Plc.

Britt, C., Johnston, M. 2008. **Trees in Towns II**. Research for Amenity Trees 9, Department of Communities and Local Government, London

URGE – Team, 2004. **Making Greener Cities – A Practical Guide**. UFZ Centre for Environmental Research, Leipzig

Carreiro, M., Song, Y., Wu, J. Editors 2010. **Ecology, Planning, and Management of Urban Forests**, Springer Series on Environment Management.

IUFRO 2012. **Forests for cities, forests for people; Perspectives on urban forest governance**, Conference 27-28 September 2012, Zagreb, Croatia.

5.2 KOSOVO TREE NURSERIES AND SUPPLIERS

It is possible this is the first list of tree nurseries in Kosovo. The list has been prepared to assist municipal and other public bodies, private developers and individual identify sources of trees to use in their landscaping projects. The choice of the most suitable trees, in the right size and quality is critical to successful tree planting work. As this is a working document and ongoing survey the list of suppliers may change periodically.

Key to types of nurseries surveyed: (to be added later)

1. Grower only

2. Grower and broker

3. Grower and importer

4. Broker only

5. Importer only

Name	Website	Email	Phone	Contact	Notes	Municipality
Fidanishtja Bytyqi	www.fidanishtjabytyqi	Info@fidanishtjabytyqi.com	044763888 044173430	Sherif Bytyqi	Decorative & fruit trees	Klina
Fidanishtja Biti			044 159 024	Sabit Kaqiu	Decorative & fruit trees	Podujeve
Fidanishtja Duhani			044 395 484	Lek Duhanaq	Fruit trees	Klina
Kopshtar Rexha			044 278 278		Urban & Decorative trees	Suhareke
Gjelbrim “Te Nexhi”			044 647 044	Bedri bekteshi	Decorative trees	Veternik Prishtine
Fidanishtja “Cufa”			044 315351		Decorative & urban trees	Vragoli fush Kosove.
Lulishtja “Osmani”				Osman	Decorative & urban trees	Mushtisht, Suhareka
AGROMOD	Facebook: Agromod	samikrnr@gmail.com	044 230 117	Sami Kryeziu	Decorative & urban trees	Suhareke.
Lulishte Ideali			044 155 044	Lulzim Arifi		Ferizaj

5.3 TREE SURVEY AND GREEN MANAGEMENT - LIST OF PUBLICATIONS SUPPLIED

Rogers, K., Hansford, D., Jarratt, T., (2011) **Torbay's Urban Forest, Assessing Urban Forest Effects and Values.** Treeconomics, Exeter. (3 copies)

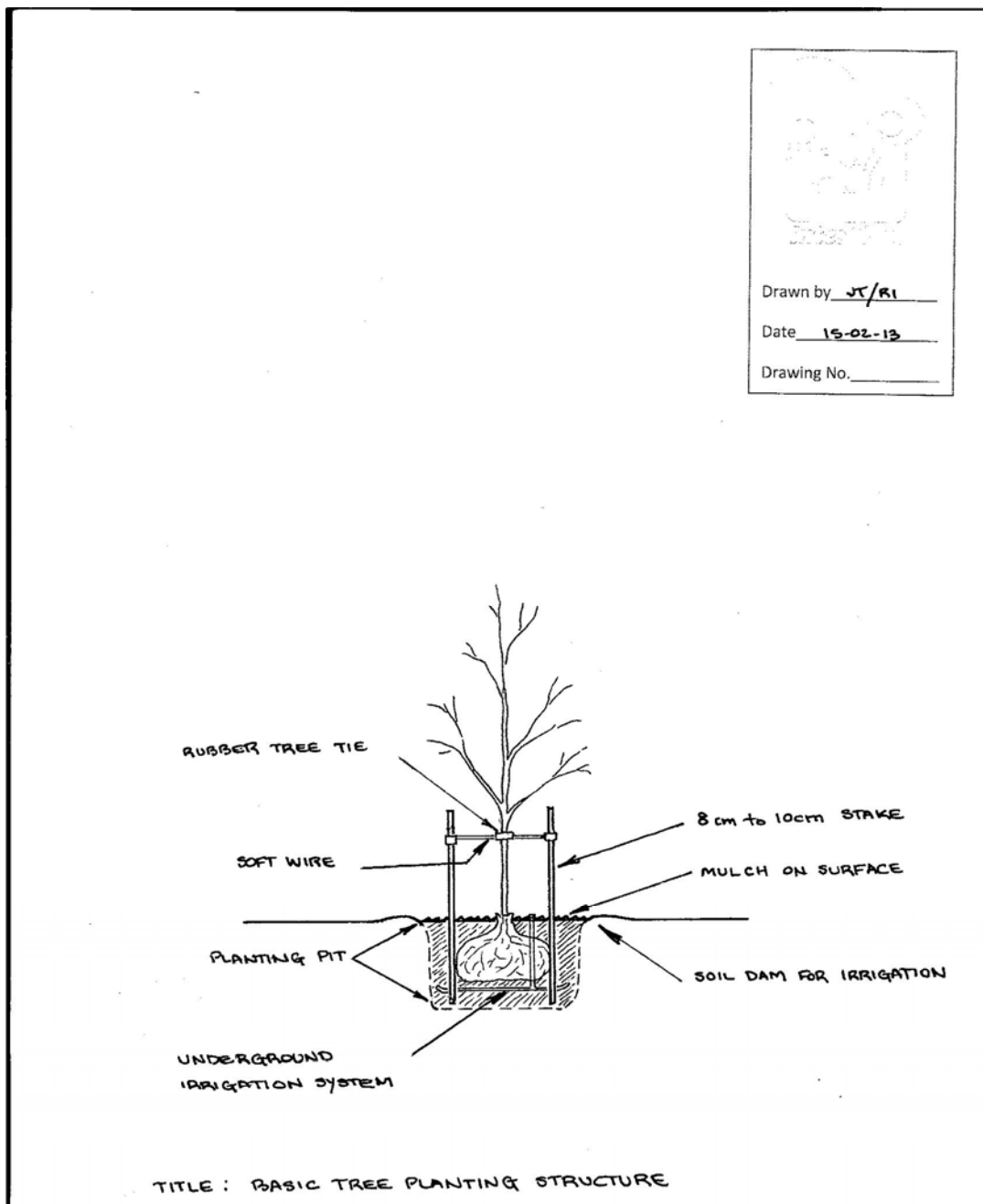
Greenleaf Urban Tree and Landscape Products. (Undated) **A guide to the Benefits of Urban Trees.** Hastings. (3 copies)

Greenleaf Urban Tree and Landscape Product. (Undated) **Urban Tree Design Guide.** Hastings (3 copies)

Barcham Tree Plc. (Undated) **Time for Trees.** Ely, Cambridgeshire (4 copies)

Trees and Design Action Group. **Trees in the Townscape, A Guide for Decision Makers** (4 copies)

Figure 5.3.1 Basic Tree Planting Structure



SILVA CELL TECHNICAL SHEET

DeepRoot's new Silva Cell supports traffic loads while providing uncompacted soil volumes for large tree growth and on-site stormwater management. The modular framework provides unlimited access to healthy soil — a critical component of tree growth in urban environments — allowing them to manage stormwater, reduce heat-island effect, and improve air quality.

The modular design of the Silva Cell makes using increased quantities of native or specialized soils simple and easy, ensuring high quality soils and expanded rooting zones to grow vibrant, healthy trees with long life expectancies.

Silva Cell systems can also easily be sized to treat the water quality volume of surrounding impermeable surfaces in a typical urban setting. For example, a 1,200 cubic foot volume (34 m³) of Silva Cells can be designed for 0% runoff from a 3,000 square foot (279 m²) Type II rain event.

By combining on-site stormwater management with expanded rooting volumes for large, healthy trees, Silva Cells create an unparalleled opportunity to improve the environmental and aesthetic functioning of our urban spaces.

MATERIAL SPECIFICATIONS

Fiberglass reinforced, chemically-coupled, impact modified polypropylene.
Galvanized steel tubes.

FRAME DIMENSIONS

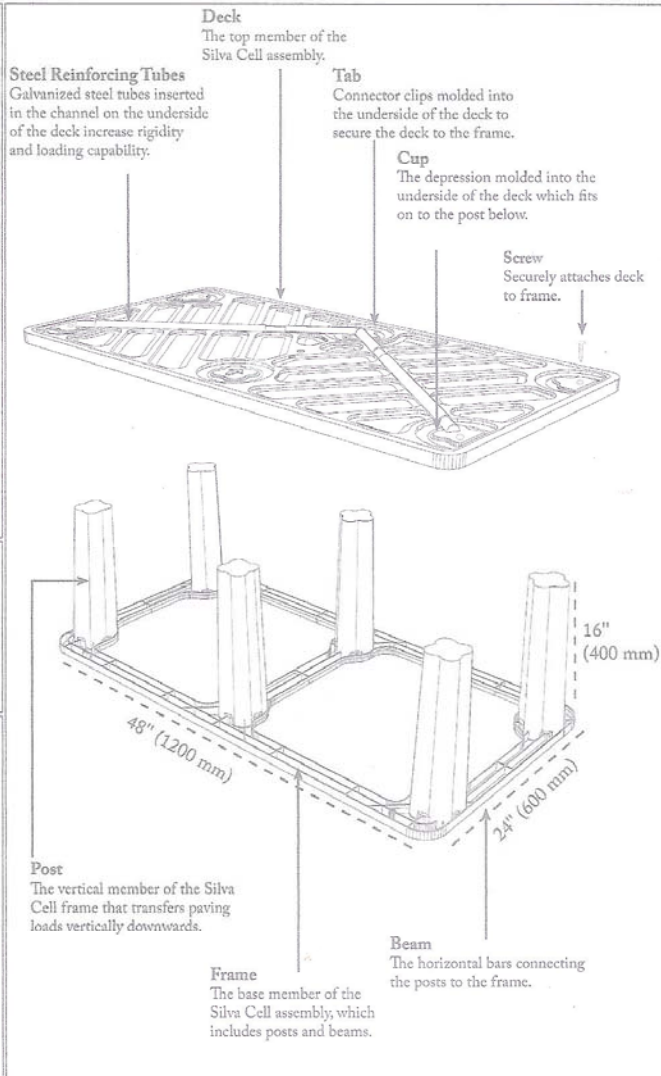
Length: 48" (1200 mm)
Width: 24" (600 mm)
Height: 16" (400 mm)

DECK DIMENSIONS

Length: 48" (1200 mm)
Width: 24" (600 mm)
Height: 2" (51.5 mm)

CAPACITY

Void capacity: approximately 92%
Soil capacity: approximately 10 ft³ (.28 m³)



Deep Root Partners, L.P.
530 Washington Street
San Francisco, CA 94111
Tel: 415/781-9700 Fax: 415/781-0191 www.deeproot.com
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Figure 5.3.2 *Betula* planted in container

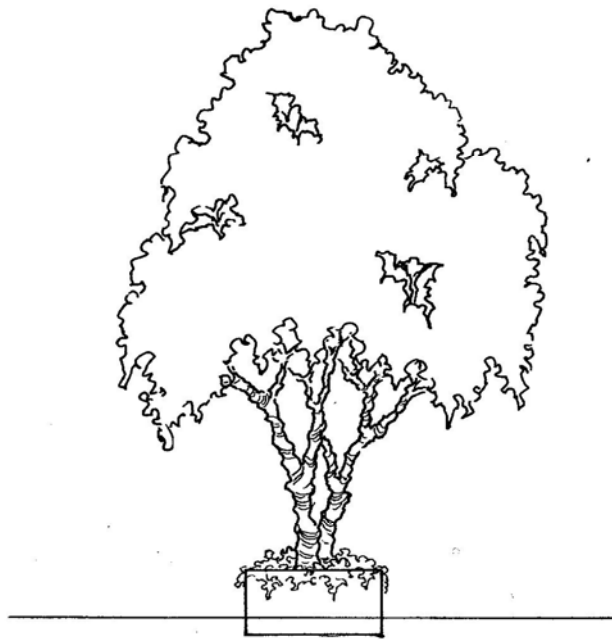

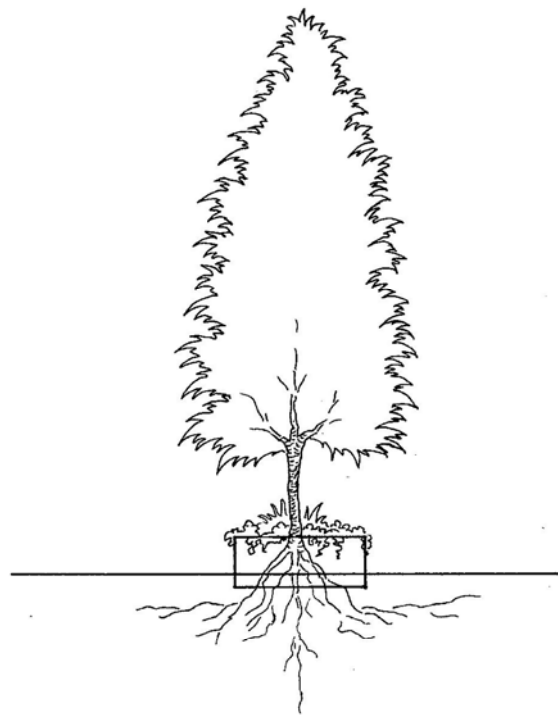


Figure 5.3.3 *Carpinus* planted in container – root penetration below container



Drawn by JT
Date 15-02-13
Drawing No. _____



TITLE : CONTAINER PLANTED CARPINUS - SHOWING ROOT PENETRATION

BS 5837 Tree Survey Schedule

Tree Ref No	Species	Height m	Stem Dia mm	Branch Spread m				Height of Crown Clearance m	Age Class	Physiological Condition		Preliminary Management Recommendations	Est Yrs Con	Category Code
				W	N	E	S			Structural	Condition			

HI-LINE, Brookfield Road, Whitestone, Exeter EX4 2HF
 Tel: 01392 811338
 Fax: 01392 811843
 www.hi-linecontractors.co.uk

Figure 5.3.4 Pathway re-contouring

