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Crossed-out sections are in another file on Newton CPC website.

BOWEN DRAINAGE PROBLEM AND SOLUTION

Poor drainage has plagued the Bowen Park for years. After only a moderate day of rain, water collects on the east side of the school building in a large puddle that stretches for up to fifty feet (see attached photos). A principal concern is the risk to the community of mosquito-borne diseases. As we are reminded by recent news reports of incidents of West Nile virus and EEE, everything must be done to minimize these dangers on a school property like Bowen, which gets extensive community use.

Equally important, these severe drainage issues create attendant problems of water that turns to ice in the winter and mud in the spring. As the mud dries, and turns to dust, the result is not only curtained use of the green space and ruined shoes, but aggravated asthma for some. Water seepage in the basement of Bowen Elementary is a long-term problem as well, with mold and mildew damaging the building and causing health concerns for children.

Until the drainage problem is addressed, other community efforts cannot be undertaken. For example, establishing a grassy surface that will grow year in and year out has been a shared priority. But without proper drainage, it is simply not possible.

A new set of storm drains and water catchment features designed for the rear of the property will prevent future flooding, at Bowen, as well as in the basements of abutters and along Cypress Street.

In May 2005, the City surveyed the property and assigned an engineer to design a drainage system. They televised the pipes this past summer, and will perform a percolation test in the next weeks. This new system will direct the water that runs off the building or down the hill from Newton Terraces directly into pipes linked with the City's stormwater collection. The detailed engineering design will be produced by the City's Engineering Department by the end of the year.

The Amphitheatre in the rear of the property was designed with water catchment features (see attachment B, Elevation of Amphitheatre). A two-foot retaining wall will hide a French drain, while plantings behind the wall and a swale will help capture water running down the driveway. In addition, a new speed bump at the top of the driveway will direct water into the woods before it reaches the Amphitheatre.

Lastly, the yard will be regraded to direct surface water flow to a low point, with a new storm drain catch basin. The existing storm drain is situated far above the low point, and thus provides only minimal relief.

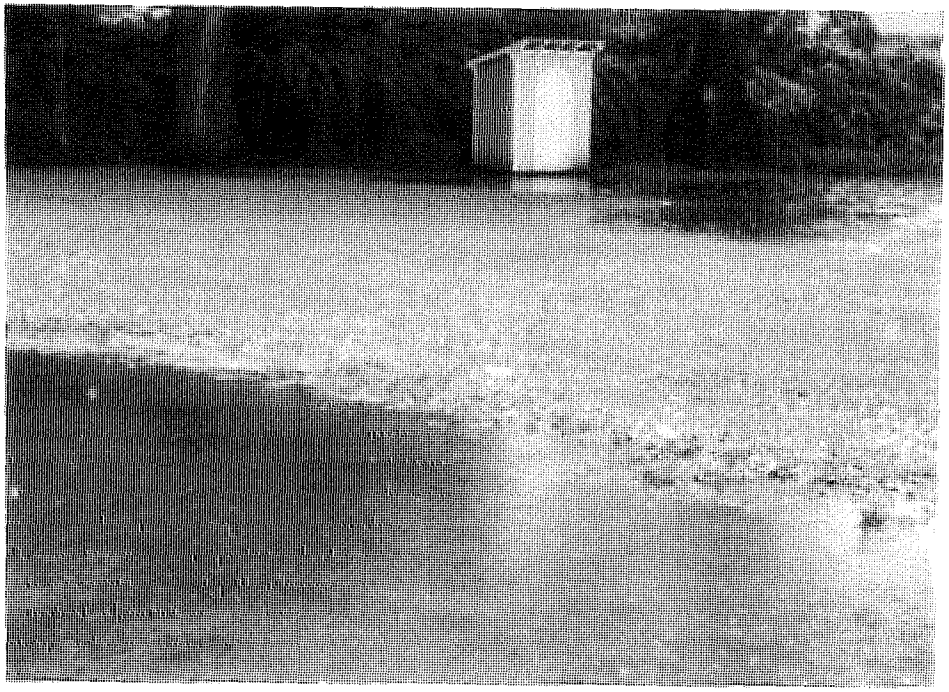
School Department Responsibility and Expense

According to conversations with Commissioner Robert Rooney and Mr. Michael Cronin, the Engineering Department and/or the Department of Public Works will put out an RFP for the drainage work as soon as possible late this fall or early winter. In order to maintain our original schedule, the RFP will specify that the work has to be started and finished between school's ending date and mid-July.

Although the Engineering Department quoted $51,295 for this project, the price for this work drops to roughly $25,500 once the water bubbler is taken out, and all supplies or work that is budgeted elsewhere is subtracted (and then a 10% contingency added on). The City's budget is attached and the revised calculations are as follows:

$51,295	Engineering Dept. Quote (minus contingency and inflation)
$ 5,000	Water bubbler -- we will purchase one with a work order through the School Department instead, for much less.
$11,000	Seeding and grading -- we have budgeted for that already.
$12,180	Sidewalk expenses -- we have budgeted $18,000 elsewhere.
$28,180	Total "extras"
-28,180	
$23,115	New drainage Subtotal
+ 2,311	Contingency (10%)
$25,426	New Drainage Total

Per conversations held during the week of September 19, the School Department will in all likelihood be able to pay this expense, but if bids come in significantly higher than outlined above, then it is a possibility that the Department of Public Works would step in.



CITY of NEWTON
ENGINEERING DIVISION
Bowen School Yard Improvements
Cost Estimate
Prepared By: John Daghlian, Associate City Engineer
9/19/2005

Item	Description	Unit	Estimated Quantity	Bid Price	Totals
1	F & P Crushed Washed Stone	Cu.Yd.	20	$ 16.00	$ 320.00
2	Gravel for pipe bedding	Cu.Yd.	5	$ 14.00	$ 70.00
3	F& I 500 Gallon Precast Concrete H-20 rating	Each	1	$ 6,500.00	$ 6,500.00
4	Peastone for drainage system	Cu.Yd.	1	$ 25.00	$ 25.00
5	Filter fabric	Lump Sum	NA	$ 250.00	$ 250.00
6	F & I Catch Basin Grate & Frame	Each	2	$ 500.00	$ 1,000.00
7	Adjust Casting to finish grade	Each	2	$ 250.00	$ 500.00
8	F & I Siltation Control Hay Bales	Lump Sum	NA	$ 1,000.00	$ 1,000.00
9	Regrade, Loam & Seed	Sq. Yd.	2,000	$ 5.50	$ 11,000.00
10	Construct Retaining wall including foundation	Cu.Yd.	15	$ 650.00	$ 9,750.00
11	F& I 1" Type K Copper Water Service	Lump Sum	NA	$ 2,500.00	$ 2,500.00
12	Testing of Materials	Allowance	NA	$ 200.00	$ 200.00
13	F & I 12" Diameter Corragated Plastic Drain Pipe	Linear ft.	40	$ 25.00	$ 1,000.00
14	F & I 5' Cement Concrete Sidewalks	Sq. Yd.	210	$ 30.00	$ 6,300.00
15	Dense Grade for sidewalks (2" thick)	Sq. Yd.	210	$ 14.00	$ 2,940.00
16	Gravel for sidewalks (6" thick)	Sq. Yd.	210	$ 14.00	$ 2,940.00
17	F & I Accessable Drinking Fountain	Lump Sum	NA	$ 5,000.00	$ 5,000.00
				Sub Total:	$ 51,295.00
				5% Contingency + 2% Inflation	$ 3,590.65
				Total:	$ 54,885.65

jdags\schools\bowen

Attachment (B) New England Wildflower Society student, Aaron Marcus

Because this wooded area is facing large amounts of stress from human activity, it would make sense that we be responsible to repair the health of the ecosystem.

Management Suggestions

Exotics

There are many exotic species in these woods that are gradually invading. Most of them are coming over from the land that is currently being developed. These exotics threaten the diversity of species currently living in the woods. As biodiversity decreases, the ecosystem health will too. I am giving to Bowen School a copy of Invaders published by the New England Wildflower Society. As the book explains, often eradication is an impossible task. Instead, our best move is to control the invading species. This may require persistent and long-term effort. Here is a list of problematic plants, and how to control them. Appendix A has pictures of these plants for identification. The plants of largest threat to the woods are first on the list:

Norway Maple (Acer platanoides)

Norway maples are the largest threat to these woods. They mature very quickly to shade out most of the native plants. They are unfortunately difficult to control because they produce so many seeds that sprout readily. If cut down, A Norway Maple will resprout vigorously. An herbicide applied to the cut stump will kill it, but I don't think this is an option so close to Bowen School. Fortunately, all but one of the Norway Maples on the property are still very small (though numerous). The seedlings only several years old can easily be pulled out by hand. Unfortunately this is a common street tree. For the saplings a weed wrench would be best. A weed wrench pulls Norway Maples out by the roots. The New England Wildflower Society (508-877-7630: Headquarters at Garden in the Woods, Framingham) would be happy to lend a weed wrench. There are also Sugar Maples on the property, which look very similar. Do not pull out the Sugar Maples. See appendix A for identification of invasive species. Also, the first photograph in Appendix A shows the forest on the adjacent land. Though the Norway Maples will probably be cut for the development, their current invasion there is much more progressed than on the Bowen School land. If the Norway Maples are allowed to grow up, they will monopolize the habitat as they already have on the neighboring land. There is one larger sapling I found on the property. I don't know if the weed wrench can pull out such an established tree. Without using pesticides or massive digging I do not know what to suggest, except to pull out the new seedlings annually.

Garlic Mustard (Alliaria petiolata)

I put the plant high on the list because it is so early in its invasion, that it should still be easy to control. Garlic Mustard is a biennial. It lives only two years, and the second year, produces large amounts of seed. This plant also came from the neighboring property and I only spotted one on the Bowen School land. The development on the other property will probably kill most of these plants on the other property. Garlic

(1)

Mustard is easy to pull up by hand. It is best to hand pull just prior to bloom (May or June)

Glossy Buckthorn (Frangula alnus) and Common Buckthorn (Rhamnus cathartica)
These two large shrubs are quite a threat to the woods. They have already formed dense impenetrable thickets. The only plants able to grow in a large Buckthorn thicket I inventoried were Norway Maple, Oriental Bittersweet and Black Cherry (the only native). The berries are also a laxative to birds. These thickets greatly diminish wildlife value. Unfortunately, the Buckthorns are not very feasible to control. According to the Shrub Species chart in Appendix C, Common Buckthorn constitutes 19% of the shrub community and Glossy Buckthorn, 21%. Though the shrub community is more sparse (a horizontal line through the woods will pass through a shrub every 2.3m), this is almost 1000 buckthorns, and many of them are mature. Though small Buckthorns can be handpulled, most of these need to be pulled up by weedwrench. An alternative method would be to cut the Buckthorns to the ground twice per season for 2-3 seasons until the Buckthorns run out of energy and die. In addition Buckthorn seeds can remain viable in the soil for fifty years. Because the woods have so much edge, the Buckthorns should also have no trouble getting back into their favorite habitat from neighboring parklands and yards. I suggest to deal with the other exotic species first.

Oriental Bittersweet (Celastrus orbiculatus)
This vine prefers sun over shade, but it is known to invade woods as well. Its unusual leaves can best be described as very round with a point at the end. Though Oriental Bittersweet berries are popular to wildlife, it has the threatening ability to carpet forest trees, monopolizing light. This species is generally localized to the disturbed and sunny habitat along the driveway that goes between the school and the playing field. Its seedlings go into the woods both directions for 30-50 meters, but they seem much less vigorous due to the shade. Keep an eye on these plants. They are known to climb up and shade out trees 60 feet tall. They also can spread very fast. If cut, Bittersweet will just resprout more vigorously. Though these plants have a remarkable spread, there aren't very many individuals. For large plants, cut them and cover the stumped area with black plastic so the plant can't photosynthesize. Smaller plants can be pulled by hand. Controlling at least the vigorous Bittersweets in the driveway would be a good priority, but it can take several years.

Winged Euonymous or Burning Bush (Euonymous alata)
This plant is slower growing and slower to invade, but invades just as destructively as the other invasives. Like Buckthorns, Winged Euonymous invades woods forming an incredibly dense shrub layer and a dense root system that monopolizes light and nutrients. Even so this invasive has some benefits. It was introduced as a garden plant because of its bright red fall foliage, and its popularity to birds. Because Winged Euonymous invades slower, it is not as far into its invasion. I did not see any fully mature specimens. Of several dozen plants, all of them are just on the far side of the driveway that goes through the woods. I don't know if this is Bowen School property. The roots of this shrub are very dense. I weedwrench will not pull it out. Try digging it out with shovels and pitchforks.

Multiflora Rose (Rosa multiflora)
This plant has naturalized throughout the property, but it does not seem very healthy except at the edges. This is an invasive to pastures. It likes lots of sunlight. Though a popular winter foodsource to many native birds, this plant also displaces many native plants and animals. Watch for this plant's advances particularly on the edge of the woods. To control, cut plants to the ground 3-6 times every year for 2-4 years.

Tartarian or Morrow's Honeysuckle (Lonicera tatarica/morrowii)
Like Buckthorn and Euonymous, these Honeysuckles have the ability to create a dense shrub layer that shades out all plants below it including tree seedlings. There is only one of these in the area, and it is old and not too healthy. It produced no flowers this year. This shrub is still a hazard though, if a tree falls and opens a light gap for this shrub to thrive in. I suggest pulling it out anyway. Honeysuckles have weak root systems. You shouldn't even need a weedwrench. It should pull right up.

Poison Ivy (Toxicodendron radicans)
Poison Ivy is actually a native plant. Poison Ivy can also be invasive though. Unlike most exotic species though, Poison Ivy does not stall natural succession. It should be noted that the oils of poison ivy only cause an allergic reaction in humans. All the native birds and animals have evolved to be immune to it. It's berries happen to be one of the most popular plants to birds. It has spectacular fall color as well. If the Poison Ivy weren't right on the school grounds, I would advocate leaving it. Those who are allergic to Poison Ivy are allergic to the oil it gives off. It takes five days for a rash to form. It is best in the next few hours after possible contact to thoroughly wash any parts of the body that may have the oil. There are many drugstore items that can be used before or after exposure to break down the oil. The oils can also adhere to clothing or shoes, so wash these as well. Direct sunlight also can break down Poison Ivy oils. You can leave your boots out in the sun. Never burn Poison Ivy. The fumes can cause an allergic reaction in the lungs.
There are several hundred Poison Ivy plants on the property. They can be found as a groundcover, a small vine or most commonly as a two foot shrub. Most of it is either growing as a groundcover, hanging right into the path, or as a shrub in relatively inaccessable parts of the woods. This plant is hard to control if you are allergic (people often become allergic later in their lives). Poison Ivy can be smothered by covering it with black plastic. Poison Ivy can also be pulled out by hand, but be careful. If pesticides can be used, consider painting a Roundup herbicide solution on the leaves. Except for the Buckthorn thickets the shrub layer is somewhat sparse, giving pedestrians the option of making their own paths. Some of these "paths" go right through patches of Poison Ivy.
There are four places there is Poison Ivy on the paths (these are mostly not official paths). I will point them out to be marked. To get to most of the rest of the Poison Ivy, one must go through dense thickets. It may be best to just label these distant patches with a sign to warn passers-through.

Japanese Knotweed (Polygonatum cuspidatum)

This weed is only on the far end of the neighboring land. But this plant is really hard to dig up. Its underground stems can stretch for 60 ft, and this plant can come up through concrete. If the construction doesn't kill it, and it reaches the Bowen school property, control it. No plants can grow with knotweed. The best method of control is to cut or mow this plant to the ground whenever it reaches 2 ft. tall. It takes several years to kill.

Japanese and European Barberries (Berberis vulgaris and B. thunbergii)
These are two more shrubs that monopolize the shrub level of habitat. I have only seen one young plant of each of these on the neighboring property. But they are close to the Bowen School property. This is a rocky area that will probably be left as woods. These plants are once again best pulled out by weedwrench. They have thorns so it may be best to cut off the branches first.

Creeping Euonymous and Privet
These are two more plants to watch out for. Creeping Euonymous has a similar habit to Ivy. It creeps along the ground until it comes to a large tree to climb. So far, it is only creeping on the ground. The Creeping Euonymous is very localized (one clone) to a 10 ft. by 10 ft area right next to the driveway. It forms a mat that many native seedlings can't penetrate. Privet is a book that forms dense thickets. The Privet can come out with a weed wrench.

Dutch Elm Disease
Dogwood anthracnose

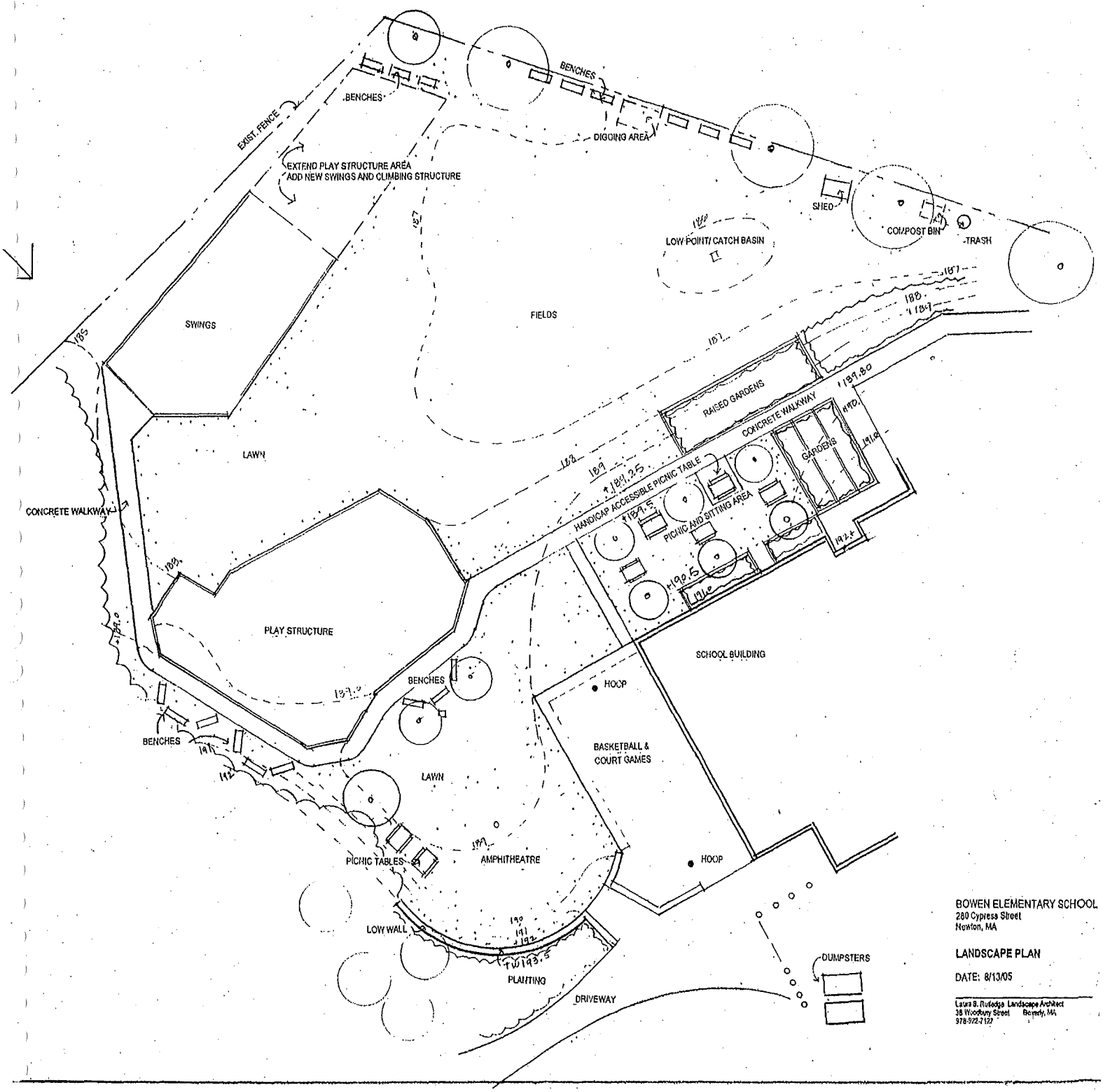
The purpose of a weedwrench is to not just pull up the main stem, but the larger roots as well. Many of these invasive species (such a Buckthorns) will resprout from any remaining large roots left in the ground. After pulling up a plant (or planting one), be sure to cover the soil you disturbed as soon as possible with a mulch several inches thick. Otherwise it is likely that dormant seeds another invasive species will quickly grow. When cutting or pulling out roses or barberries, I suggest to wear leather gloves because of thorns.
Any of these plants, even if they are eradicated from the site, require continued vigilance to make sure they don't return or get out of control.
Replacement plants
Viburnum cassinoides, Viburnum dentatum, Viburnum acerifolium, Vaccinium corymbosum, Lonicera sempervirens, Sassafras albidum, Cornus sericea, Ilex verticillata?, Cornus alternifolia

Deadwood

The Bowen School woods are blessed with a lot of dead wood. Deadwood is an integral part of a woodland ecosystem. It is actually more valuable to wildlife than the former live trees. I recommend that Bowen School leave these snags and logs (as long as they don't cross the trail) to preserve biodiversity and therefore, the health of the ecosystem. I recommend to refrain from pruning the trees or cutting down dead ones unless they are a safety hazard.

Plantings on Margins or as replacement for Invasives
Suggestions for parents-dos and don'ts

Pull and plant

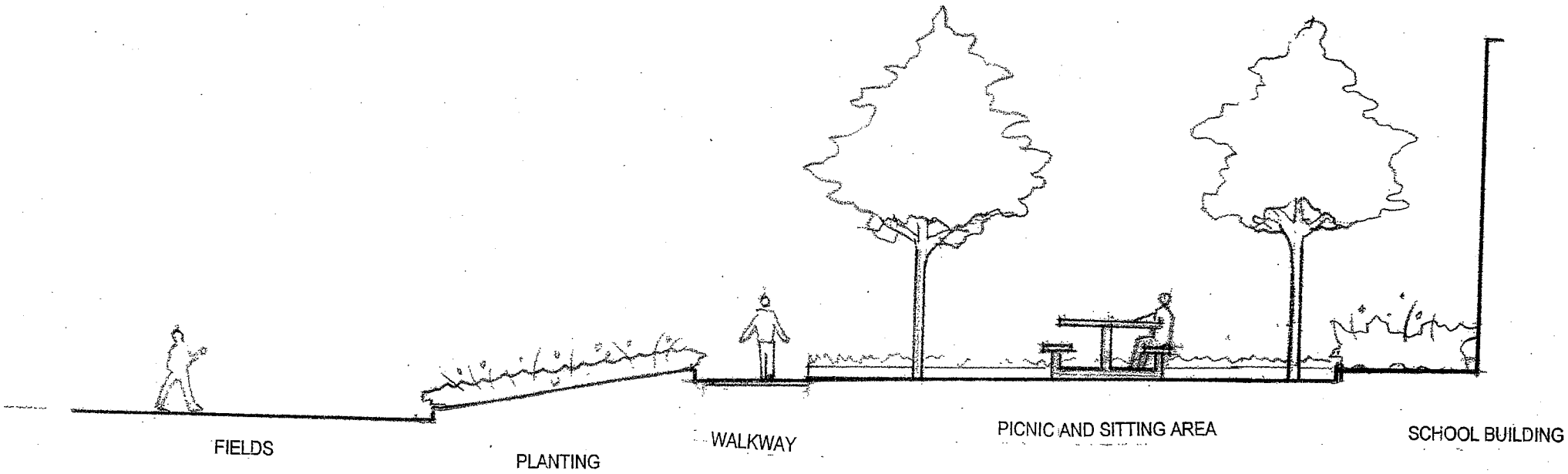


BOWEN ELEMENTARY SCHOOL
280 Cypress Street
Newton, MA

LANDSCAPE PLAN

DATE: 8/13/05

Laura B. Rutledge Landscape Architect
36 Woodbury Street Beverly, MA
978-922-7127

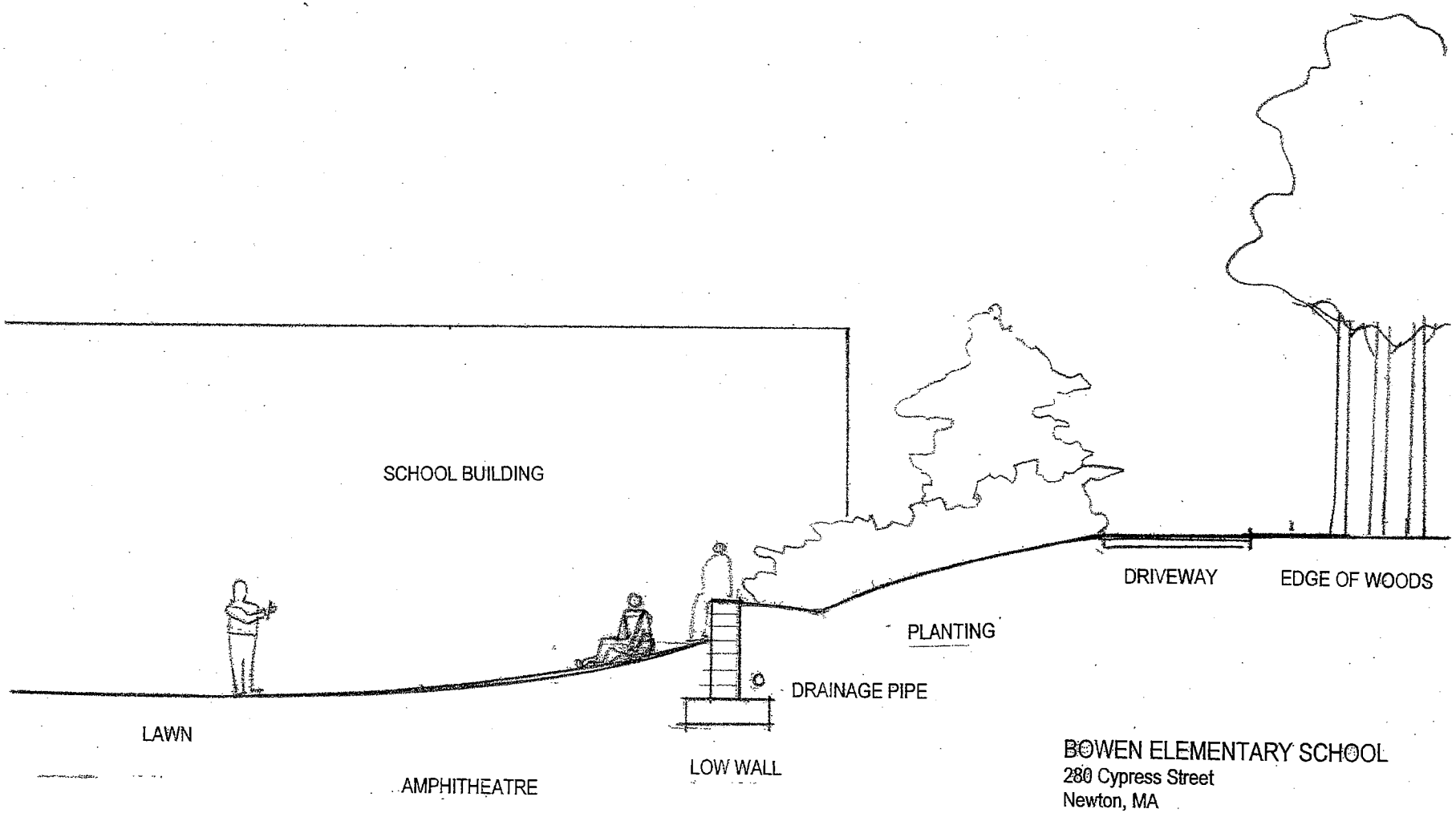


BOWEN ELEMENTARY SCHOOL
280 Cypress Street
Newton, MA

LANDSCAPE SECTION

DATE: 8/13/05 SCALE: 1/8"=1'-0"

Laura S. Rutledge Landscape Architect
38 Woodbury Street Beverly, MA
978-922-7127



BOWEN ELEMENTARY SCHOOL
280 Cypress Street
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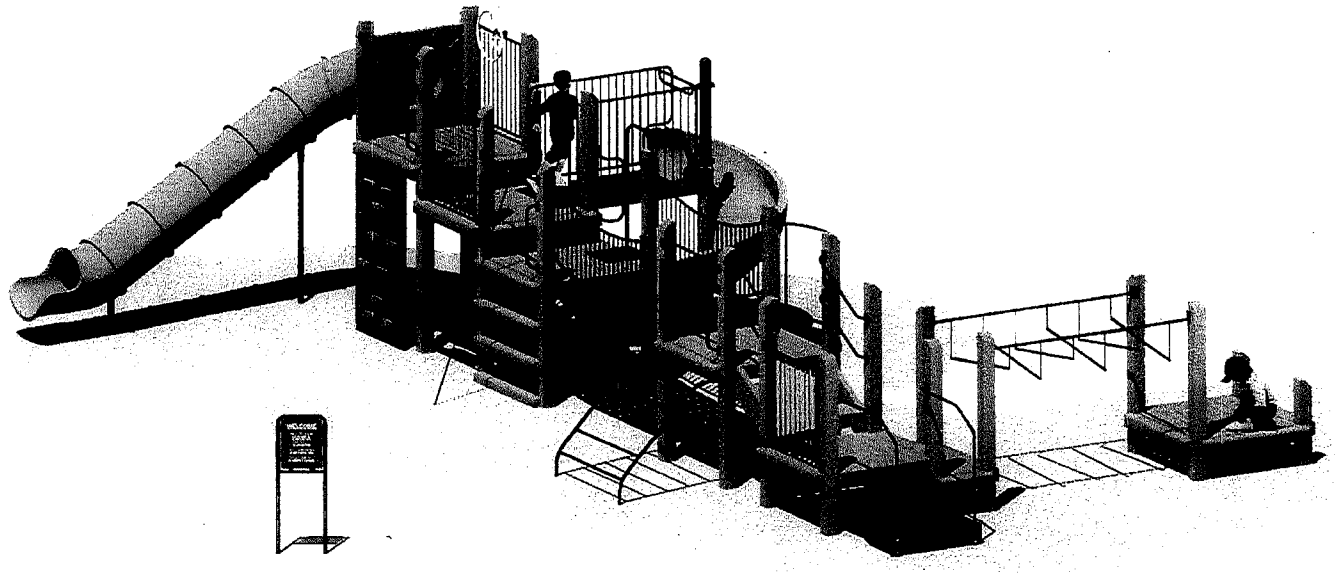

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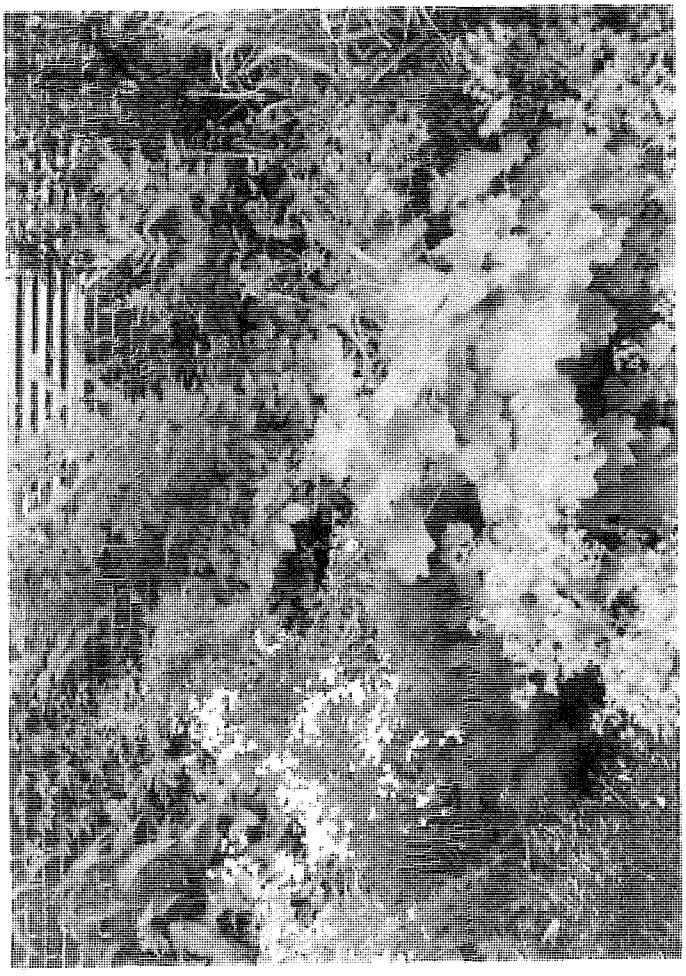
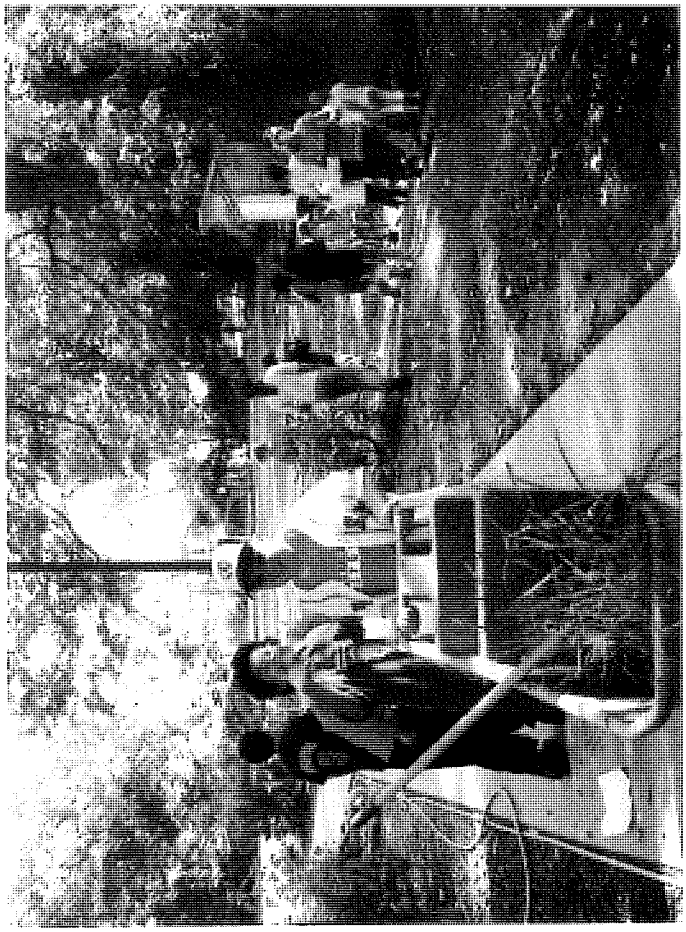
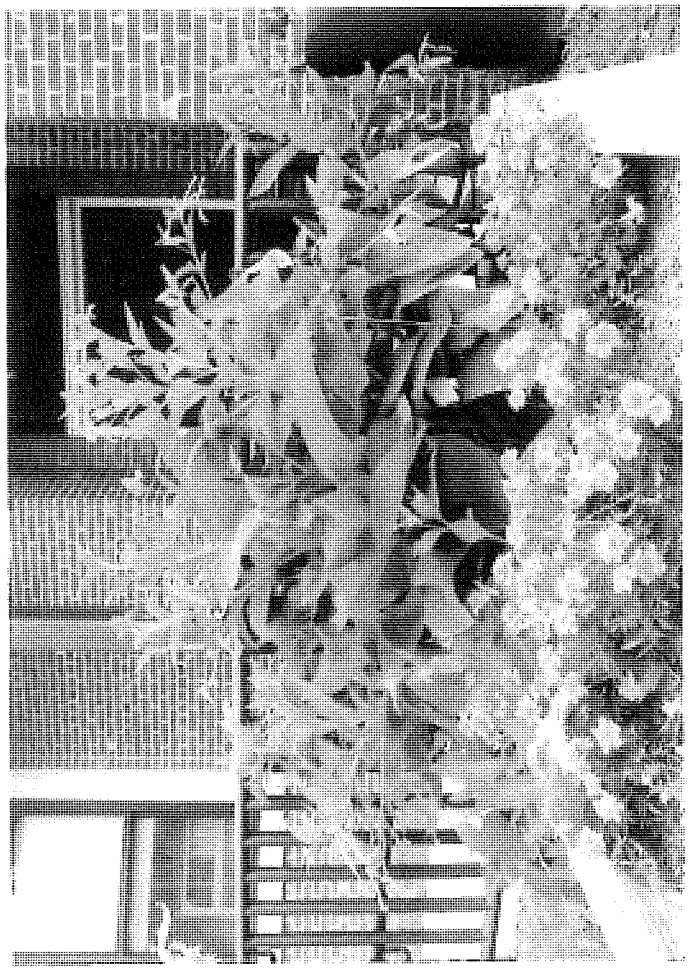
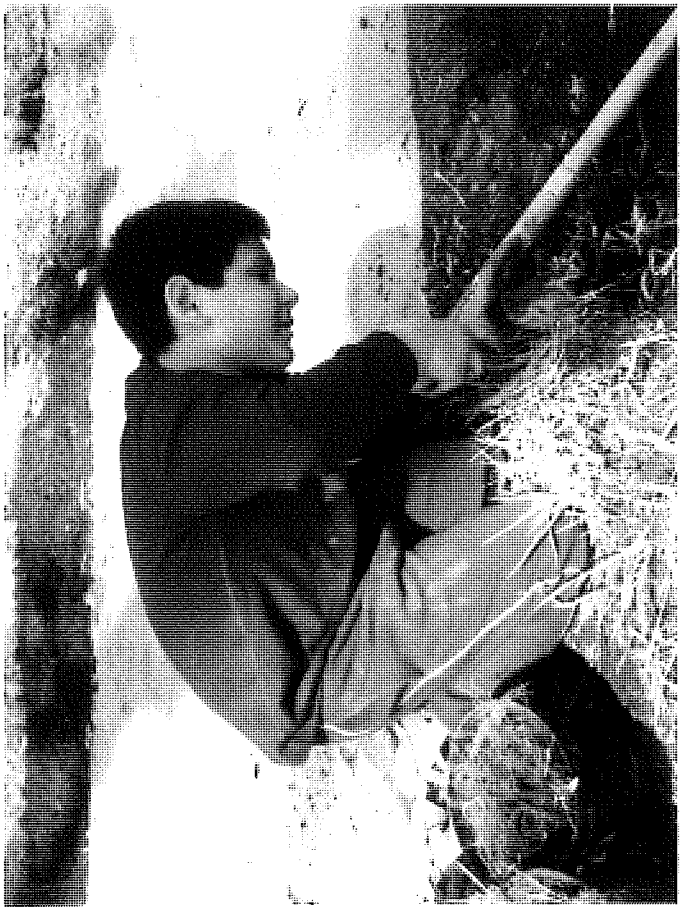
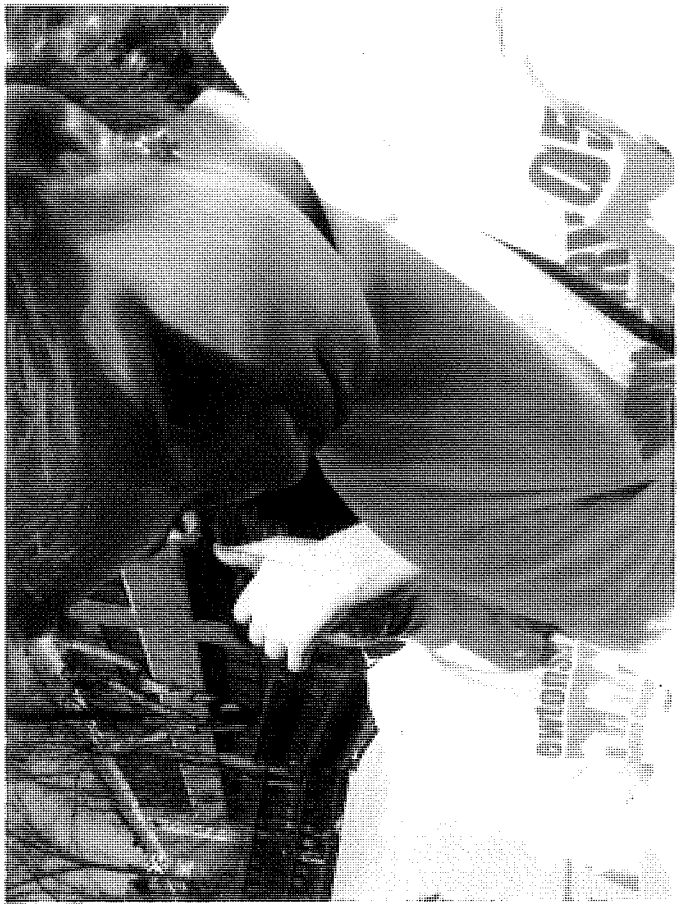
Attachment H

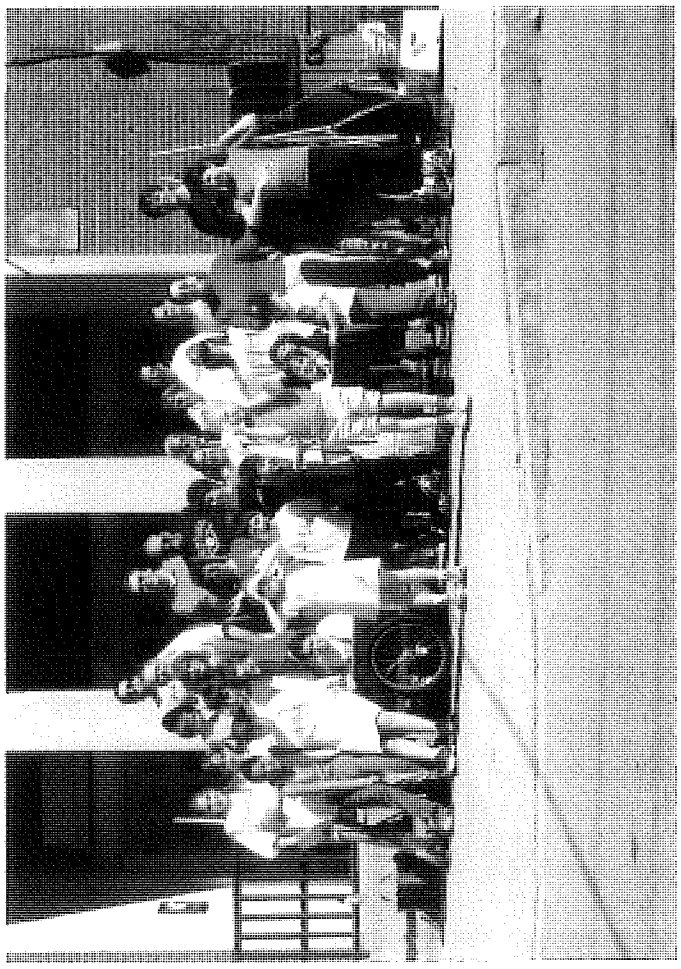












Bowen hosts its second NewtonSERVES