The following represents Addendum #1 for the Hazelwood Park lawn Bowling Project. All materials are “or equal”. To review the changes and additions:

ITEM NO. 1 MAINTENANCE PLAN

*My bid package doesn't include Appendix A-Maintenance Plan*

*Please clarify responsibilities included in the bid line item "One Year Maintenance." Is this for plant material only or does it include the bowling green mowing and maintenance?*

*Please clarify responsibilities included in Alternate #6*

Please see attached Appendix A Maintenance Plan.

ITEM NO. 2 COVER SHEET

Please see new sheet L-7 Construction Details (additional fence details).

ITEM NO. 3 EXISTING CONDITIONS SHEET

Clay tile drainage line and elevation located near water supply.

ITEM NO. 4 DEMOLITION SHEET

a. Existing tree noted to be removed is to stay and be protected.  
b. Three additional boulders are to be removed and stockpiled (20 total).  
c. Delete the need to remove and dispose wrought iron railing.  
d. Saw cut area has changed.

ITEM NO. 5 LAYOUT SHEET

a. Fence alignment has shifted along park entry road and each corner.  
b. Pedestrian gate to greens has shifted location.
c. New pedestrian gate to building rear porch added with appropriate details.

ITEM NO. 6  GRADING SHEET

a. Existing clay drainage pipe located.
b. Add Alternate #4 electrical conduit and handhold location and length adjusted.

ITEM NO. 7  ADD ALTERANTE #1 – CONCRETE BANK

a. Delete Add Alternate #1 from the bid.

ITEM NO. 8  ADD ALTERANTE #7 - BENCHES

a. Benches originally specified are deleted. Benches will be provided by the City for Contractor installation. Benches are embedded.

CLARIFICATIONS:

1. The contract time starts 3 days following the effective date of the agreement.
2. Contactor will be responsible for securing the site with temporary chain link fence (TYP.)
3. A Project Construction Sign is required for this project.
4. Contractor is required to have one project manager for the entire project duration. This manager will attend all project meetings, site visits and be the point of contact for the landscape architect and City.
HAZELWOOD PARK
New Bedford, Massachusetts
LAWN BOWLING PROJECT
BID #20650016

THE HONORABLE JONATHAN F. MITCHELL, Mayor
JOSEPH LOPES, City Councilmen
MARY S. RAPOZA, Director, Parks, Recreation and Beaches

INDEX TO DRAWINGS:
E-1 EXISTING CONDITIONS PLAN
L-1 DEMOLITION PLAN
L-2 LAYOUT PLAN
L-3 GRADING & UTILITIES PLAN
L-4 LANDSCAPE PLAN
L-5 CONSTRUCTION DETAILS I
L-6 CONSTRUCTION DETAILS II
L-7 CONSTRUCTION DETAILS III
I-1 IRRIGATION WIRING
I-2 IRRIGATION PIPING
I-3 IRRIGATION DETAILS

Landscape Architect
GARDNER-GERRISH, LLC
151 Broadway, Suite 245
Providence, Rhode Island 02903
401.261.5704

Irrigation Designer
IRRIGATION CONSULTING, INC.
20 Merrit Parkway, 2nd Floor
Nashua, New Hampshire 03062
978.431.8972

ISSUED FOR BID - 18 JULY 2019
REVISED 2 AUGUST 2019
GENERAL DEMOLITION NOTES:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE CITY OF NEW BEDFORD PARKS AND RECREATION DEPARTMENT SUPERVISOR AND STAFF, PROJECT PLANNER, INDOOR SPACE ARCHITECT TO DEVELOP A SUITABLE DEMOLITION AND CONSTRUCTION PLAN, WHICH WILL MINIMIZE PARK DISTURBANCE AND ALLOW ALL FACILITIES TO REMAIN IN OPERATION DURING THE ENTIRETY OF CONSTRUCTION.

2. UNLESS OTHERWISE NOTED, THE CONTRACTOR IS RESPONSIBLE FOR THE RELOCATION, DEMOLITION, REMOVAL, AND DISPOSAL, IN A LOCATION APPROVED BY ALL GOVERNING AUTHORITIES, OF ALL EXISTING SITE ELEMENTS AND STRUCTURES SHOWN IN BUT NOT LIMITED TO BITUMINOUS CONCRETE, CEMENT CONCRETE, GRAVEL, CURBS, WALKWAYS, SIDEWALKS, BERMS, FENCES, BOLLARDS, POSTS, PLANTING BEDS, TREES, SHRUBS, UTILITIES, DRAINAGE STRUCTURES AND ALL OTHER STRUCTURES SHOWN WITHIN THE LIMITS OF WORK.

3. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL DEBRIS FROM THE SITE AND DISPOSING OF THE DEBRIS IN A PROPER AND LEGAL MANNER UNLESS OTHERWISE INDICATED TO REMAIN PROPERTY OF THE OWNER.

4. THE CONTRACTOR SHALL COORDINATE WITH RESPECTIVE UTILITY COMPANIES PRIOR TO THE REMOVAL AND/OR RELOCATION OF UTILITIES. THE CONTRACTOR SHALL COORDINATE WITH THE UTILITY COMPANIES CONCERNING PORTIONS OF THE WORK WHICH MAY BE PERFORMED BY THE UTILITY COMPANY AND IS RESPONSIBLE FOR PAYING ANY FEES AND CHARGES TO UTILITY COMPANY FOR THEIR SERVICES.

5. THE CONTRACTOR SHALL PROVIDE NOTICE TO ALL UTILITY COMPANIES REGARDING ALL WORK WITHIN THE VICINITY OF SERVICE LINE, AS REQUIRED, BEFORE PROCEEDING WITH THE WORK.

6. THE CONTRACTOR SHALL MAINTAIN CONTINUOUS ACCESS AND OPERATION FOR鄰近 FACILITIES, AS DEEMED BY THE OWNER, AT ALL TIMES DURING DEMOLITION OF THE EXISTING FACILITIES.

7. PRIOR TO DEMOLITION OCCURRING, ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED. SUBMIT PLAN FOR APPROVAL BY LANDSCAPE ARCHITECT.

8. CITY OF NEW BEDFORD TO OPERATE ALL VALVES AND HYDRANTS. COORDINATE WITH CITY WATER DEPARTMENT AT LEAST 72 HOURS IN ADVANCE.

9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ADEQUATELY SECURE THE SITE. INSTALL TEMPORARY SECURITY FENCING AS REQUIRED. DAMAGES IS NOT TO BE CARRIED BY THE OWNER.

10. IT IS CONTRACTOR'S RESPONSIBILITY TO LOCATE ADDITIONAL STORAGE IF REQUIRED AT NO COST TO THE OWNER.
EXISTING CONDITIONS NOTES:
1. SURVEY INFORMATION PROVIDED BY THE CITY OF NEW BEDFORD DEPARTMENT OF PUBLIC WORKS, MARCH 22, 2019.
2. TEST HOLE DATA PROVIDED IN SPECIFICATIONS, APPENDIX A
3. VERTICAL DATUM REFERENCE IS RAUD 83
INTRODUCTION

The following report are guidelines for the care and maintenance of a lawn bowling turf under normal conditions. The maintenance of a lawn bowling green has very specialized needs more like a golf green than that of a typical lawn. The specialized grasses, shorter heights of cut, and foot traffic require a detailed daily maintenance schedule that must be adhered to in order to maintain the desired playability and aesthetics.

The first and most important aspect of maintaining a bowling green begins with construction. The Contractor must ensure a level surface with proper root zone mix, drainage and irrigation is key to its ongoing maintenance. Once the green is properly constructed, the following key maintenance categories must be addressed:

- Mowing schedules
- Irrigation schedules
- Fertility
- Pest control
- Weed control
- Thatch maintenance
- Topdressing
- Infrastructure maintenance
- Equipment selection and maintenance
- Labor

***Each category will be looked at in detail, but no plan can substitute for a knowledgeable turf professional who can react and adapt to changing environmental conditions and can recognize necessary adjustments and practices to meet the needs of bowlers.
TABLE OF CONTENTS

1. Performance

2. Mowing and rolling

3. Irrigation

4. Fertility and pest management

5. Cultural practices

6. Integrated Pest Management

7. Equipment Needs
Performance

1. The green is constructed be level =/-1/8th inch. Any topdressing, aeration or other cultural practices must not change the elevations.

2. The Green Speed is measured by taking the number of seconds a bowl from the time of its delivery to the moment it comes to rest approximately 87'-7” from the mat line. A pace of 13-14 seconds for a bowl roll out must be maintained. Adjustments to irrigation, mowing, and rolling will be necessary on a seasonal basis to maintain this roll.

3. The Greens are divided north – south (16’ wide) and east – west (14.1’ wide) into rinks. Rink boundary brackets are located along the bank.

4. The “World Bowls Performance Standards For Flat Green Bowls Surfaces” is included with this Manual.
Mowing and Rolling

1. Mowing:
   a. Mowing should be completed with a suitable walk behind reel mower. The mower should be a sixteen-blade reel mower such as a Toro 1000 or similar style mower designed for cutting golf greens. Mowers should be checked before each mowing, should be back lapped at least once per week, and should be sharpened monthly. Bed knives should be replaced at least once per season and the operator should be observant of any imperfections in the cut. One stone can put a mower out of adjustment and risk damage to the grass surface.
   b. Mowing heights can vary and will affect bowl roll. Cutting between 0.125 to 0.1875 inches would be a good starting point. The lower the cut, the faster the bowl will roll though maintenance of the surface at lower heights goes up.
   c. The greens should be cut five times a week during the growing season to maintain a smooth consistent surface. The exception to this is times of very heavy weather stress such as right after a heavy rain or during heat above 85 degrees. It is important to vary your direction of mow everyday to keep grasses upright and avoid grain and “leggy” bentgrass. Grass should also be brushed or groomed regularly to avoid this.

2. Rolling:
   a. Rolling is undertaken to create smooth and consistent pace. There are several brands on the market, but all perform the same task of smoothing grass. It is typically less stressful to roll consistently than it is to mow more frequently. Rolling five times per week would be a good starting point and adjust according to your needs.

Sample Mowing and Rolling Schedule

<table>
<thead>
<tr>
<th>MON</th>
<th>TUES</th>
<th>WED</th>
<th>THURS</th>
<th>FRI</th>
<th>SAT</th>
<th>SUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mow up and down</td>
<td>Mow left to right</td>
<td>Mow bottom left to upper right</td>
<td>Mow upper left to bottom right</td>
<td>Mow up and down</td>
<td>Mow left to right</td>
<td>Mow bottom left to upper right</td>
</tr>
<tr>
<td>Roll</td>
<td>No Roll</td>
<td>Roll</td>
<td>Roll</td>
<td>NO Roll</td>
<td>Roll</td>
<td>Roll</td>
</tr>
</tbody>
</table>

| Roll      | Roll      | Roll      | NO Roll   | Roll       | Roll       | Roll      |

| Roll      | Roll      | Roll      | NO Roll   | Roll       | Roll       | Roll      |
IRRIGATION

Irrigation tends to be one of the more misunderstood and difficult practices to get right to meet the green growth and playing requirements. A bowling green with good drainage and proper root zone mix, will follow watering practices that should be based on the principle that less is more. Below are several guidelines to keep in mind:

• Bent grass prefers to be on the dry side;
• When watering, water deep but infrequently;
• Irrigate early morning prior to play;
• Use a TDR Moisture meter to understand how much water is needed and how often to water;
• Excessive moisture can lead to disease and mechanical stress;
• Frequently check to make sure no sprinklers or pipes are leaking;
• During times of high heat and humidity, use a hose to lightly syringe the green as opposed to using the irrigation system as you are only trying to cool the grass as opposed to adding additional moisture;
• Use weather as your guide but rely on the moisture meter to establish an accurate watering schedule.
• Irrigation should be limited to the replacement of lost soil moisture and the evapotranspiration loses of the turf.
FERTILITY AND PEST MANAGEMENT

This category has a great deal of subjectivity, but this list provides several guidelines to work within. This category will also include two sub-categories of growth regulation and wetting agents, both items will go a long way to help manage your bowling green.

1. Fertility:
   a. Application: Fertilizers are applied through a spray as a liquid or as a dry granular. Both are good and have advantages and disadvantages. When appropriate, nitrogen applications should be made using slow release sources such as natural organic sources, IBDU, methylene ureas, and coated ureas.
   b. Granular fertility will allow larger volumes of material to be spread, especially if carbon based organic fertility is used. Granular fertilizers must be or greens grade quality to ensure the size of the granule is small. Larger SGN sizes can cause spotting and will affect mowing.
   c. All fertilizer applications should be timed to occur at the time of active plant uptake.
   d. Liquid fertility allows for much greater control and lower more frequent applications. Liquids are usually more readily available to the plant, but more applications are needed.
   e. Nitrogen, Phosphorus and Potassium are the three main nutrients with Nitrogen being the largest by far. Other micronutrients such as calcium magnesium and manganese are also important at lower quantities. The general goal would be to use 4-5 lbs of nitrogen per 1000ft/season but this can vary.
   f. Chelated Iron is another micronutrient than can quickly increase the green color associated with healthy turf.
   g. Applications should not be made immediately preceding a significant storm event.
   h. Application rates should be limited to the documented needs of the turf given an understanding of site-specific soil deficiencies.

2. Pest Management
   a. The three main categories of pests that must be managed are weeds, insects and fungus
b. Weeds: Weed control can be broken down into two categories: Broadleaf and grassy. Broadleaves are things such as dandelion and plantain and usually less of a problem on low cut turf. Grassy weeds such as crabgrass and goose grass should be controlled as a pre-emergent early in the season. Usually one application of a pre-emergent product will be enough.

c. Insects: Grubs and weevils are typical pests that need to be addressed. Grubs can be treated once a year and typically are an easily controlled pest. Weevils, and most notably the bluegrass weevil can be a problem if you have a predominance of Poa Annua. Not usually a problem on a newly constructed green.

d. Fungicides must applied regularly to treat a variety of diseases. Dollar spot, Pythium, anthracnose and take-all patch are common diseases. Snow mold in winter can also be a problem. A detailed analysis on a regular basis is required to know what to apply and when.

3. Wetting agents:
   a. Are products that can either retain moisture or, more importantly allow whatever to pass through soil more efficiently.

4. Growth regulators:
   a. These materials can put the plants energy into root production vs. leaf production, slowing top growth and increasing root mass.

Grow-In Period Fertility Program

Following are basic guidelines for a grow-in fertility program. Initial fertility requirements will be based on the results of soil tests conducted on the existing topsoil and prepared topmixes on the courts and the known nutrient requirements of the turf species selected. Soils will be analyzed for pH, soil nitrogen reserves, calcium, magnesium, phosphorus, potassium, manganese, zinc, and copper availability and balance.

The objective of the grow-in program is the rapid establishment of a high quality turf cover to minimize erosion and potential weed infestation. Accordingly, applications will be made as necessary to adjust pH to be within the range of 5.5 and 6.5 and up to 50% of applied nitrogen fertilizer should be of a water soluble form. At least 50% of applied nitrogen should be from a slow release source, with a heavy use of organics to build up the microbial activity and reduce pest infestation.

Turf Grass Establishment Period

The turf grass establishment period consists of the first and second years following the germination of the turf. The basic fertility requirements during this period are as follows. These applications should be adjusted accordingly during this period if desired growth is not
achieved or if clipping weights/examination of foliage indicate that reduced applications would be suitable:

<table>
<thead>
<tr>
<th></th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23,000 sf</td>
<td>4.0 lbs/1000sf/year</td>
<td>based on soil test</td>
<td>51 lbs/1000sf/yr</td>
</tr>
</tbody>
</table>

**Turf Grass Post-Establishment Period**

The post-establishment period consists of the life of the course subsequent to the first two years following germination of the turf. Fertilizer applications should be based on the results of analytical soil tests and examination turf conditions. Estimates of anticipated application rates for this period are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23,000 sf</td>
<td>2.5 lbs/1000sf/year</td>
<td>based on soil test</td>
<td>51 lbs/1000sf/yr</td>
</tr>
</tbody>
</table>
CULTURAL PRACTICES

Cultural practices include aeration, grooming, over-seeding, verti-cutting and various other techniques. These processes help relieve compaction, reduce thatch building and keep turf healthy over the long term. Neglecting these practices will dramatically affect the health and playing conditions of the lawn bowling green and can lead to the need for drastic repairs in the future.

1. **Aeration (Hollow Tine):** This practice pulls many small cores out of the green which are then dragged, returning the soil back the green and leaving the organic thatch matter to be removed from the green. Thatch buildup increases disease, creates a squishy surface, holds moisture and makes a less desirable playing surface. Spring and fall hollow tine aeration keeps this thatch in check and creates a desirable playing surface.

2. **Venting (Solid Tine):** Similar to aeration, venting creates holes without removing material. The benefit is to reduce compaction increase water porosity and to facilitate gas exchange. This should happen several times throughout the season.

3. **Verti-cutting:** cuts grass vertically to avoid sideways growth, and grain.

4. **Topdressing:** is the process of lightly spreading sand on the surface of the green once per year. This sand smooths and firms the surface while diluting organic material in the soil. 0.20 cubic yards/1000 sf.

**Sample Cultural practice schedule:**

<table>
<thead>
<tr>
<th>Aeration</th>
<th>Venting</th>
<th>Verti-cutting</th>
<th>Topdressing</th>
<th>Brushing/grooming</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x per year</td>
<td>4x per year</td>
<td>2x per year</td>
<td>1x per year</td>
<td>Every month</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INTEGRATED PEST MANAGEMENT

All pest control activities will adhere to integrated pest management (IPM) practices. IPM is an approach to pest control which seeks to anticipate and address the full range of physical, cultural, and biological factors affecting the development of pest populations. This approach does not seek, as a goal, the eradication of pest populations; rather, it seeks to prevent the growth of pest populations and/or disease infestations above acceptable threshold levels. To achieve these goals an IPM program is one that must be flexible and reduce reliance on any single mechanism such as chemical pesticide applications. Given that this is a holistic approach to pest control, the implementation of an IPM program has the direct benefit of reducing the use of chemical pesticides in the maintenance program.

The implementation of an IPM program requires the disciplined completion of a specific protocol of tasks. The results of each task are synthesized to ensure an integrated approach to decision making. The results of some tasks serve as base data on the characteristics of the site and local pest population while the results of others serve as feedback relative to the effectiveness of the control program. Regardless of the ultimate application of the information generated, each task is critical to the successful implementation of IPM. Description of the specific tasks, in sequential order, follows below:

**Initial Information Gathering**

The gathering of information on potential pest populations ensures that as the turf becomes established the superintendent has the knowledge and tools necessary to anticipate and address likely pest problems. The background information to be gathered during this task should include:

1. Identification of likely pest species and information on their specific life cycles and their physical, cultural, and biological requirements.

2. Identification of all applicable controls available for each identified pest species. These controls would include cultural, biological, and chemical options.

3. Information on pest infestations and successful control strategies experienced in the area of the site.

There are many potential pests of turf grasses including the fungal species Pythium and Rhizoctonia, the bacteria Xanthamonas, various insects and nematodes, weeds such as nutsedge, and mammals such as shrews, moles, and ground hogs. An initial list of potential pests is provide below. It must be recognized that this list is not exhaustive. The list is provided solely for the purposes of providing the superintendent with a foundation for an expanded list to be developed as a site specific history of pest activity is established:
Sources of initial information include university extension services, USGA Green Section agronomists, local exterminators, local lawn care professionals, and superintendents of area golf courses. Each of these potential sources should be consulted personally.

**Monitoring of Pests and Non-target Organisms**

Monitoring consists of the frequent examination of each management area to determine the status of pest and non-pest organisms. Information to be gathered includes the identification of species present, their level of activity, and the extent of impact. Monitoring is essential to the superintendent’s ability to make early and accurate diagnoses of pest presence and threat prior to the pest reaching unacceptable levels.

Monitoring for weed, insect, and small animal pests can be done through visual inspection of the turf surface, thatch and root zones. The intensity of monitoring activities for weed and insect pests should be adjusted to reflect the life cycles of the potential pests. For example, monitoring for specific weed pests should be intensified when the species are most likely to germinate given the time of the growing season and specific environmental conditions conducive to such germination. While turf will not display symptomatic signs before weed germination, symptoms of moderate insect infestations may be detectable. Accordingly, monitoring for insect pests should include sample counts to both establish an action threshold and determine when the threshold is exceeded.
Monitoring for early disease and fungal detection is more difficult. Early detection often is impossible and the rapidity and severity of damage caused by such diseases as Pythium blight dictate the need for preventative applications of fungicides when and if environmental conditions are favorable for the development of the disease. The incidence of disease has been found to be closely linked to measurable environmental conditions, primarily high temperatures and humidity, degree of sun exposure, and leaf wetness. Optimum temperatures for the development of a number of diseases are as follows:

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>OPTIMUM TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RANGE (F)</td>
</tr>
<tr>
<td>Dollar Spot</td>
<td>60 to 85</td>
</tr>
<tr>
<td>Snow Mold</td>
<td>68 to 77</td>
</tr>
<tr>
<td>Pythium Root Rot</td>
<td>52 to 70</td>
</tr>
<tr>
<td>Pythium blight</td>
<td>74 to 93</td>
</tr>
<tr>
<td>Summer patch</td>
<td>83 to 87</td>
</tr>
<tr>
<td>Brown patch</td>
<td>70 to 90</td>
</tr>
<tr>
<td>Yellow tuft</td>
<td>48 to 75</td>
</tr>
<tr>
<td>Necrotic ring spot</td>
<td>59 to 82</td>
</tr>
</tbody>
</table>

A number of diagnostic tools have become available in recent years to aid in the early detection of diseases, but their effectiveness remains spotty. These tools range from simple predictor models using readily collected environmental data to diagnostic kits utilizing biochemical information. Examples of the predictor models include those developed for the Pythium blight by Nutter et al. (1983). An example of the biochemical diagnostic kits is that developed by the Agri-Diagnostic Associates. The Agri-Diagnostics detection kit includes immunoassays for four diseases: Pythium blight, Brown patch, Yellow patch, and Dollar spot.

**Establishing Damage Thresholds and Action Levels**

As the objective of the IPM is the control of pest populations at acceptable levels, it is crucial that sound efforts be made to establish acceptability thresholds for each pest. The threshold of acceptability will vary for each pest. The setting of thresholds involves consideration of economics and the tolerance of patrons. The superintendent will establish appropriate thresholds based on these considerations.
Action levels are levels of synthesized information which indicate that damage thresholds are or are about to be exceeded. Such synthesized information will include weather and cultural data, the specific period of the pest life cycle, and the accumulated knowledge of previous experiences controlling the pest on the site. Although some guidance on the initial setting of action levels can be obtained, the levels thus established should be set very conservatively and adjusted upward only as site-specific history information has been developed. Initially, the superintendent should consult with golf course superintendents in the area to establish action thresholds.

**Define Effective Treatments**

The full range of potentially effective treatments for each pest should be identified and assessed as to its applicability to given situations. This range would include biological, cultural, and chemical treatments. Appropriate cultural practices which have the effect of reducing pest infestations to levels below the action level are discussed herein under the heading of CULTURAL MANAGEMENT PROGRAM. The following discussion focuses on biological and chemical control treatments.

Biological control is defined as the regulation of pest populations by their natural enemies, including antagonists, parasites, and predators. Biological controls, if target specific, can be effective. However, frequently this effectiveness is unpredictable. This unpredictability means that the superintendent will be taking a risk in selecting such treatment that may place the turf in jeopardy. For this reason a decision to select a biological control must be made early in order to provide an opportunity to implement other strategies.

In general, biological control efforts have been targeted to insect pests. Research on biological control of disease and weed problems has only recently begun. One effectively proven biological control is the use of bacteria Bacillus popillae to produce milky spore disease which, in turn, controls the growth of White grub populations. It has been suggested that predatory nematodes be considered for the control of Japanese beetle grubs and black cutworms. Other biological controllers of insect populations include such small mammals as moles and shrews. These small mammals, however, often cause more damage to the turf than the insects.

Chemical pesticide applications are essential elements of any effective IPM program. As with cultural and biological controls, chemical applications should be made only as necessary to prevent the pest infestations from surpassing acceptable thresholds and only if the application constitutes the best available control. Best available control refers to the control effort which will achieve the desired result at an acceptable cost and minimum environmental impact relative to other available options. Environmental impact in this context includes damage to non-target species, water quality and air quality.
It is anticipated that a number of currently available pesticides will be used and that yet to be developed pesticides eventually will be used when appropriate. Given the constantly evolving nature of the chemical industry, it is impossible to identify all the chemical pesticides to be employed over the life of the facility. At best, a list of currently available and acceptable pesticides may be provided together with a set of operating guidelines for the use of these and future products.

The following basic guidelines will govern the use of chemical pesticides:

1. Use pesticides only as a component of IPM and only to the extent that they represent best available control either singly or in combination with other non-chemical control mechanisms.
2. Use only those pesticides which have been registered for use in the Commonwealth of Massachusetts.
3. Store and apply pesticides in strict conformance with label directions.
4. Use new products as they become available only to the extent that they represent best available control relative to existing products.

**Making the Treatment Decision**

The decision making process is the essence of IPM. Decisions must be made by the superintendent based on the best available data and knowledge of the site gained by site specific experiences. The goal of all decisions is to utilize the best available control so that acceptability thresholds for each turf pest are not exceeded.

**Evaluation of Treatment and Record-Keeping**

These tasks provide the feedback information necessary to ensure the selection of best available control over time. The data base established through the completion of these tasks represents the site specific experience garnered through the implementation of IPM. Each control effort should be followed by a review of the treatment's effectiveness and detailed records should be kept in a computerized data base for enhanced retrieval and correlative analysis. Records should specify the location of treatments, the severity of the infestation, the type and level of treatment applied, the date of treatment, and the specific environmental conditions encountered at the management area immediately prior to, during, and immediately following treatment.
BASIC EQUIPMENT NEEDS

**MOWER:**
Toro Greensmaster (30” reel)

**Roller:**
GreensIRON 6200 roller

**Aerator:**
Toro 648 (rent)

**SPRAYER:**

**DRY LINE MARKER:**
LAYOUT NOTES

1. ALL LINES AND DIMENSIONS ARE PARALLEL OR PERPENDICULAR TO THE LINES FROM WHICH THEY ARE MEASURED UNLESS OTHERWISE NOTED.

2. STORAGE AREAS FOR CONTRACTOR'S EQUIPMENT AND MATERIALS SHALL BE ON AND WITHIN LIMITS OF WORK AS SHOWN ON THE PLANS AND AS APPROVED BY THE OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AT NO ADDITIONAL COST TO OWNER.

3. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DIScrepancies TO THE ARCHITECT PRIOR TO STARTING WORK.

4. ALL LAYOUTS FOR WALKS, PATHS AND TERRACES SHALL BE ACCURATELY STATED BY THE CONTRACTOR AND APPROVED BY THE ARCHITECT PRIOR TO CONSTRUCTION.

5. THERE ARE SEVEN RINKS ON EACH COURT OR GREEN. EACH RINK HAS A WHITE, FIBERGLASS, SQUARE, NUMBER PLATE (RAL#TBA) MANUFACTURED BY RICKLY INDUSTRIES, INC. 800-466-1677. THE FOUR RINKS ON THE EAST AND WEST END OF EACH COURT OR GREEN ARE MARKED WITH BRACE JOINT ANGLE METAL BRACKETS (3" x 8") SECURED TO THE PAVEMENT THROUGH THE RUBBER MAT (IF APPLICABLE) WITH 2" GALVANIZED WOOD SCREWS PAINTED WHITE (RAL#TBA).

6. THE CONTRACTOR IS REQUIRED TO CONSTRUCT AN 1:1 SCALE, 8' x 8' CORNER SECTION OF COURT PLINTH, DITCH, FOOTINGS, AND BANK FOR APPROVAL.
GRADING NOTES:
1. TIE IN ALL BUILDING DOWNSPOUTS TO DRAINAGE SYSTEM.HYDRO SEED NOT DONE DOWNSPOUT ADAPTOR SPINS.
2. THERE SHALL BE NO MORE THAN AN 1/8" OF D E V A T I O N IN ANY DIRECTION ON PREVIOUS COURT ELEVATION.
3. ALL PIPES AT 1% UNLESS OTHERWISE NOTED.
4. CONTRACTOR TO PROVIDE AND MAINTAIN AT LEAST 100 LF OF STRAW WATTLE AT SITE FOR EROSION CONTROL.
5. GRADE PRICE ALIGNMENT TO REMOVE ALL ABRUPT ELEVATION CHANGES FOR A CONTINUOUS, CONSISTENT SLOPE.
6. DRAWN LINE ELEVATION TAKES PRIORITY OVER ELECTRICAL CONDUIT LOCATION. ADJUST CONDUIT AS NECESSARY.
7. ADD ALTERNATE #4.
8. REMOVE SEDIMENT AND POTENTIAL POLLUTANTS WHICH MAY ACCUMULATE DURING SITE WORK.
9. ACCUMULATED SEDIMENT SHALL BE REMOVED FROM ALL ESC MEASURES AND DISPOSED OF IN A MANNER TO MINIMIZE AREAS OF EXPOSED SOIL.
10. THE CONTRACTOR SHALL INSTALL ALL ESC MEASURES AS APPROVED AND AS DETERMINED BY THE CONTRACTOR TO PROVIDE PROPER CONTROL OF EROSION AND SEDIMENTATION.
11. THE CONTRACTOR SHALL INSTALL ALL ESC MEASURES AS APPROVED AND AS DETERMINED BY THE CONTRACTOR TO PROVIDE PROPER CONTROL OF EROSION AND SEDIMENTATION.
12. ANY SEDIMENT OR DEBRIS COLLECTED WITHIN THESE FACILITIES FROM THE PROJECT SITE SHALL BE APPROVED BY THE ENGINEER.
13. THE CONTRACTOR SHALL INSTALL ALL ESC MEASURES AS APPROVED AND AS DETERMINED BY THE CONTRACTOR TO PROVIDE PROPER CONTROL OF EROSION AND SEDIMENTATION.
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