

SPECIFICATIONS AND LANDSCAPING OF UTILITY INSTALLATIONS¹

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Abstract. To keep pace with the increasing demand for electrical service within the last 10 years, Jersey Central Power & Light Company has found it necessary to construct several substations and more generating facilities. Today many municipalities have stringent requirements and ordinances which govern the planting and maintenance of these installations. Therefore, the Company realizes that good planting and maintenance specifications, combined with professional supervision, are essential to design, landscape and maintain its facilities, so that they are an asset to the Company and the communities.

Before discussing specifications, I'd like to give you a brief orientation of the Company and touch on some history of the landscaping program. Jersey Central Power & Light Company, a subsidiary of General Public Utilities Corporation, supplies electrical power to some 650,000 customers in a service area that represents approximately 43 per cent of the state. This service area is divided into six divisions, three in the Northern Area and three in the Southern Area.

In 1961, the Company established a Forestry Section and employed its first Supervisor of Forestry. During the 13 years that followed, two other Foresters were employed, bringing our present staff to three.

In 1968, the Forestry Section first became involved in substation landscaping and maintenance. Prior to this time substation landscaping was usually minimal, consisting of a single row of plants, often pines, spruce or arborvitae, planted up against the substation fence. This type of planting in addition to being almost non-functional, resulted in other problems. Plants were often damaged, or killed, by run-off and root pick up of herbicides applied within the substation fence to control weeds. In cases where the trees did survive, they presented a safety hazard by providing a means of unauthorized entry over the substation fence. Inadequate provision for planting space, and poor drainage design, were other

problems associated with early substation landscaping.

As time progressed and the demand for electrical service increased, additional substation and generating facilities were constructed. Often the substations were needed in residential areas, and in such cases efforts were made to blend them in with the surrounding neighborhood. In other instances, the addition of a substation did much to improve the neighborhood by eliminating roadside dumping areas, while at the same time providing a tax rateable to the community.

With increased substation construction and more public emphasis on beautification, the need for detailed planting and maintenance specifications became essential, and so in 1970 we compiled our first format set of specifications.

Landscape Planting Specifications

At this point, I'd like to discuss planting specifications and some of the information they should contain. To begin with, a good rule of thumb to follow when writing any specification, is to make it *concise, inclusive, and easy to understand.*

Whether one site is to be planted or several, the following information is important:

1. *The location of property lines*, a tax map may be needed to locate the monuments or markers.
2. *The location of overhead and underground utilities* such as, electric, water, gas and telephone.
3. *Are grade changes* required to provide proper drainage, to control erosion, to elevate or lower the planting site for a particular effect?
4. *Topsoil requirements* to include lime, fertilizer, and additional topsoil if necessary.
5. *Species of existing plant material* on the

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FIGURE #1

SECTION III

MAINTENANCE SCHEDULE FOR CLASS I LOCATIONS

DATE _____

MONTH	LIME	FERTILIZER	PRE-EMERGENCE CRAB GRASS CONTROL	BROAD LEAF & VINNY WEED CONTROL	INSECTICIDE	EDGING	REMARKS
JANUARY							
FEBRUARY							
MARCH	1	2 (late)				6	
APRIL			3 (early)			6	
MAY		2 (late)		4 (mid)		6	
JUNE					5 (mid)	6	Apply 1½ oz. per 1,000 sq. feet
JULY						6	
AUGUST		2 (mid)			5 (late)	6	Apply 4 oz. per 1,000 sq. feet
SEPTEMBER						6	
OCTOBER		2 (early)		4 (mid)		6	
NOVEMBER						6	
DECEMBER							

NOTE: Numbers in Maintenance Schedule above indicate reference to specific information in footnotes below.

- (1) Apply ground or granular agricultural limestone at 50 pounds per 1,000 square feet.
- (2) Fertilize lawn areas at the rate of 5 pounds per 1,000 square feet, using the following fertilizer or approved equivalent.
Agrico Country Club Fertilizer, 20-12-8 (6.8% Water Insoluble Nitrogen), 50% Organic.
- (3) Apply pre-emergence crab grass control, siduron (Tupersan) to established lawns. Use 12 lbs. active ingredient per acre or 24 lbs. per acre of Tupersan 50% wettable powder. If using granular form, follow label instructions.
- (4) Apply a combination of 2,4-D and Silvex at ¾ lb. per acre of the acid equivalent of each or 1 lb. of 2,4-D acid equivalent plus ½ lb. of Silvex. That would be 1½ pints of each per acre or 1 quart of 2,4-D plus 1 pint Silvex.
- (5) Apply Dursban to entire lawn area for control of chinch bug, sod webworm and grubs. Refer to the Pest Control Section, pages 13-14. Use one of the materials listed at the rates indicated.
- (6) Edge all plant beds, tree circles, black top or other defined borders. Excess soil and turf from the edging shall be removed from the premises and not left on top of mulch in plant beds or tree circles.

site and on surrounding properties. If it is growing well perhaps some of the same plants can be used.

6. *The proposed location of new plant material; where it will be most effective.*

Next in order, and as a part of the planting specification, a landscape plan is needed. The plan should be drawn to scale and include all the specifics which pertain to a particular job. It should contain:

1. The common and scientific plant names.
2. The quantity, size, and whether the plants are to be balled and burlapped or bare root.
3. The location of existing plant material, if it is to be retained, and the location of the new plants to be installed. On many of Jersey Central's planting projects, the Company Forester selects the trees at a nursery and tags them with a metal looking seal which is numbered. By doing

this the contractors are all bidding on the same plants and it assures us of quality plant material. All plants upon arrival at the planting site are then inspected by the Company forester and must have the numbered tags which correspond with the numbers recorded on the landscape plan.

4. The size of the planting pits and whether or not the existing soil is to be used for back fill or removed from the site.
5. The location of grass areas, types of seed and the seeding rate.
6. The amount of topsoil, if necessary, for grass areas and for back filling plants.

Another important consideration before finalizing the plan is to check municipal ordinances concerning the removal of existing trees, set back requirements for plants and fences, and drainage requirements.

If grade changes are necessary, a topography map will be needed. This should also be drawn to scale and include existing grades as well as proposed changes.

Although many of the planting procedures can be included on the landscape plan, a written set of specifications is also necessary to cover all other aspects of the planting operation and the contract. This specification can be prepared in such a way, so that it can be used in conjunction with any landscape plan which may be used in the future. An example of the information to be included is:

1. General information.
2. Scope of work.
3. Insurance requirements.
4. Inspection of site.
5. Consultation with company representatives.
6. Selection of plant material.
7. Soil requirements.
8. Planting seasons.
8. Plant installation.
10. Staking and guying diagrams.
11. Tree wrapping.
12. Fertilizer.
13. Mulch.
14. Railroad tie installation diagrams.
15. Maintenance.
16. Safety procedures.
17. Guarantee.
18. A Unit Cost Sheet.

While this is only an example of the information to be included, the important thing to remember is to include all the information that remains constant. This will save many hours otherwise spent in writing a separate specification for each planting project.

Landscaping Utility Installations

Within the last 10 years most of our landscaping efforts have been concentrated on 34.5 KV substations. During that time, more emphasis has been placed on site selection and substation design has improved considerably. Whenever possible, low profile equipment is used. Often, enclosed cubical type construction is used to lessen equipment noise and provide a

SPEC. 0. VI
UNIT PRICE

ITEM	UNIT DESCRIPTION	UNIT PRICE
Lime	Ground	Per 100 Pounds
	Granular	Per 100 Pounds
Fertilizer	Agrico Country Club 20-10-8 (6.6% Water Insoluble Nitrogen) 50% Organic	Per 100 Pounds
	Other Fertilizers Comparable to the One Above. List Brand Names and Complete Analysis.	Per 100 Pounds
Crab Grass Control	Pre-Emergence (1uperson)	Per 1,000 Square Feet
	Post-Emergence (List Brand Name)	Per 1,000 Square Feet
Broad Leaf Chemical	2,4-D Plus 2,4,5, TP (Silvex)	Per 1,000 Square Feet
Topsoil		Per Cubic Yard
Dethatching		Per 1,000 Square Feet
Aeration	Slicing	Per 1,000 Square Feet
	Coring	Per 1,000 Square Feet
	Plugging	Per 1,000 Square Feet

- NOTES:
1. THIS SHEET IS TO BE COMPLETED BY THE CONTRACTOR AND RETURNED TO THE COMPANY WITH THE BID.
 2. *Unit Description - If other than listed, fill in appropriate unit.
 3. This sheet is for extra work requested by the company during the Maintenance Season.

more aesthetically pleasing substation. Allowance is made for adequate highway setback and planting space. Strategically located plant beds and trees have replaced the single row of plant material formerly planted around substation fences. Existing plant material is preserved whenever possible and is supplemented with additional plants. Driveways are often lined with railroad ties or curbing and are curved whenever possible to eliminate a straight line of site into the substation. In some residential areas, cubical type construction in conjunction with a mansard roof and decorative brick is employed.

Generating stations have also taken on a new appearance. Yards Creek, Pumped Storage Facility, owned jointly by Jersey Central Power & Light Company and Public Service Electric and Gas Company is an example. This station, located in the northern part of the state, was built in the early 1960's, and upon its completion the areas disturbed by construction were replanted with grass, shrubs, ground cover and trees. Today, with the exception of the area occupied by generating equipment, the site is almost completely restored to its natural state.

Facilities at the site for public use include an educational visitor's center, picnic areas, nature

FIGURE #1 UNIT PRICE LIST

TREATMENTS	UNIT DESCRIPTION	PRICE
carbaryl (Sevin)		
50% WP	Per Pound	\$ _____
4 Flowable	Per Quart	\$ _____
80 Sprayable	Per Pound	\$ _____
chlorobenzilate		
25% WP	Per Pound	\$ _____
20% EC	Per Quart	\$ _____
diazinon		
50% WP	Per Pound	\$ _____
25%	Per Pint	\$ _____
dicofol (Kelthane)		
18.5% WP	Per Pound	\$ _____
35% WP	Per Pound	\$ _____
18.5% EC	Per Quart	\$ _____
dimethoate (Cygon)		
23.4% EC	Per Quart	\$ _____
Trichlorfon (Dylox)		
80% SP	Per Pound	\$ _____
40.5% Liquid	Per Pint	\$ _____
malathion		
25% WP	Per Pound	\$ _____
50-77% EC	Per Quart	\$ _____
Imidan		
50% WP	Per Pound	\$ _____
Meta-Systox-R		
25% SC	Per Pint	\$ _____
methoxychlor		
50% WP	Per Pound	\$ _____
25% EC	Per Quart	\$ _____
dormant oil		
	Per Quart	\$ _____
chlorthane		
	Per Pint	\$ _____

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 3. Pesticides - List price of material only. To be applied at labor rates listed.
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lookouts, comfort stations and hiking trails.

Oyster Creek Nuclear Generating Station, in the south eastern part of the state is another example. Upon completion of the station in 1969, the initial planting was undertaken. Since the station is located on the coast within two miles of the ocean, selection of plant material was an important consideration. The primary trees used were pin oaks, sycamores, and Japanese black pine. Shrubs consisted of inkberry, juniper varieties, taxus, and firethorn. Because of the sandy soil, and salt contaminated soil from dredging operations, over 2,000 cubic yards of topsoil were trucked in to create shrub beds and to back fill trees.

As the Company's landscaping planting program expanded, the landscape maintenance program grew accordingly. At present, within the Company area there are 217 locations consisting of substations, generating stations, and office buildings, on the landscape maintenance program. The cost to maintain the 217 sites this year is approximately \$365,000.00. With this kind of an expenditure, we feel that good main-

tenance specifications and careful scrutiny of the program is essential.

Landscape Maintenance Specifications

In our Company, the maintenance program extends from March through November. During the year two formal inspections, in June and October, are conducted with the contractor, in addition to spot checks by our own personnel. During these inspections, recommendations for the proceeding year are also compiled. Since several of the sites have the same requirements; insect control, pruning, fertilizing, and grass cutting, to mention a few, we have developed a maintenance schedule which covers the majority of the sites. As you can see on the sample schedule, Figure 1, almost all of the treatments needed are on the one sheet. On the top right hand corner is space for the date. Next across the top from left to right is the month and the column headings indicating the treatments required. On the bottom half of the schedule are the names of the materials to be used, the application rates, and a description of other treatments such as edging. To specify a particular treatment, simply place the proper footnote number in the corresponding column on the line opposite the month the work is to be done; for example, if the lawns are to be fertilized with a single rate of fertilizer four times, write the footnote number two, in the fertilizer column across from the desired months of treatment. This maintenance schedule is for lawns at Class I Locations, however, similar schedules are used for maintenance of plant material, and Class II areas, which work in the same manner, by placing the proper footnote numbers in the corresponding columns.

Now that we have specified all of the routine requirements on the schedules, a supplemental sheet is included which lists all of the locations, addresses and classifications, such as Class I areas, Class II areas or Ornamental Maintenance locations. On this sheet, specific treatments at various sites are indicated in addition to the cutting frequency of lawns and clean up stipulations.

Also included in the maintenance specification is a *Pest Control Section* which lists our problem

insects, the control material, and the rates of application. As with the planting specifications, information concerning insurance requirements, scope of work, etc. is also included.

The last item in the maintenance specification is a Unit Cost Section, Figures 2, 3, and 4. These sheets list all the materials that are specified in the maintenance program and have blank spaces for the prices of each. Also there is space for the contractors to list their equipment, labor classifications and the appropriate rates. This section when filled in by the contractor and returned with his bid, enables us to order additional treatments and materials, when required during the maintenance season, at the same contract prices without preparing a new contract.

The planting and maintenance specifications that I have referred to are currently being used by Jersey Central Power & Light Company and are satisfactory for our needs. However, it should be noted that they represent but one of many ways to write specifications.

In closing, I would like to emphasize two points:

1. No matter how good a specification is, it will only be effective if it is enforced by good supervision.
2. The intent of our landscape planting and maintenance program is not to create outstanding showplaces, but rather to landscape our facilities so that they are

aesthetically pleasing, and to maintain them with economically sound and practical procedures to protect our planting investment.

*Jersey Central Power & Light Company
Asbury Park, New Jersey*

UNIT PRICE, CONT'D

ITEM	*UNIT DESCRIPTION	PRICE
Grass Seed Merion Mixture Specified in Section III	Per 5 Pounds	\$ _____
Perennial Rye PennLawn Red Fescue Kentucky Blue Grass	Per 5 Pounds	\$ _____
Grass Seed Mix 80% Kentucky 31 Tall Fescue 20% Perennial Ryegrass	Per 5 Pounds	\$ _____
Equipment (List All Equipment With Appropriate Hourly or Daily Rates).		
Labor (List All Classifications With Appropriate Hourly Rates).		

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ABSTRACT

Norris, L.A. 1975. **Behavior and impact of some herbicides in the forest.** p. 159-176. *In* Herbicides in Forestry, Proc. J.S. Wright Forestry Conference, Purdue University, West Lafayette, Indiana.

Chemical action is the direct effect of a chemical on an organism. Chemical action on any organism requires that the chemical be present at the site of action in the organism in an active form in sufficient quantity and for a sufficient period of time to produce an effect. There are two factors which determine the probability of chemical action occurring. These are (1) the intrinsic toxicity or biological activity of a chemical and (2) the potential for exposure of an organism to the chemical. An adequate assessment of the hazards associated with chemical use requires a consideration of both factors. There are two kinds of toxicity — acute and chronic. Acute toxicity is the fairly rapid response of organisms to a few relatively large doses of chemical administered over a short period of time. Chronic toxicity is the slow or delayed response of organisms to the exposure of relatively small doses of chemical administered over a relatively long period of time. The behavior of a chemical in the environment determines the potential for exposure. Chemical behavior includes movement, persistence, and fate.