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Writing Construction Specifications for Prairie Landscapes: The Basics

Jon Bryan Burley
Landscape Architecture, Colorado State University, Fort Collins, Colorado

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Jon Bryan Burley
Landscape Architecture, Colorado State University,
Fort Collins, Colorado 80523

Abstract. Prairie landscaping is being incorporated into the construction industry. This means that designers of prairie landscapes must be able to communicate landscape specifications to landscape contractors. At present, the Construction Specifications Institute (CSI) format has been adopted by the construction industry as the organizing structure to communicate specifications. This paper describes the CSI specification structure and its application in preparing prairie landscaping construction specifications. The paper describes the importance of divisions zero, one, and two plus sections 02200, 02920, 02930, 02950, and 02970. In addition, the paper presents basic key principles in writing each specification section and the content of the section including: related work; submittals; product delivery, storage, and handling; job conditions; quality assurance; inspection; products; and execution. Suggestions concerning the appropriate wording of the specifications are also presented.

Key Words. landscape architecture, prairie, specifications, planting design

INTRODUCTION

Prairie landscaping emerged when prairie enthusiasts and landscape architects began creating prairies for more than just scientific research and landscape preservation. These prairie landscapes were created for residential, institutional, and commercial purposes. Morrison (1979) typifies recent prairie landscaping trends. From these efforts, prairie landscaping has emerged to become a significant part of the landscape construction industry. Many designers and new landscape contractors are participating in prairie landscaping. However, many of these participants are unfamiliar with current requirements for communicating construction specifications and implementing a design. This paper is written to inform landscape contractors who wish to install prairie landscapes and landscape designers who wish to write specifications for installing prairie landscapes concerning specification basics.

Construction specifications are typically used by designers to clarify standards, procedures, and products used by a contractor to build a project. Almost any construction project that requires the communication of specifications may require a construction specification document.

Presently, the Construction Specifications Institute (CSI), an interdisciplinary organization concerned with the advancement of construction technology, has developed a standard for communicating construction specifications. Until this format was developed, writing and reading construction specifications was extremely time consuming, because each architectural/engineering firm had its own format for writing specifications.

Landscape architects and contractors need to become competently familiar with this body of specification literature. Using the CSI format streamlines the specification writing and reading process plus assists in the comprehension and clarification of construction processes, procedures, and products.

The primary source for learning about specifications is the Manual of Practice (Construction Specifications Institute 1988). This book provides details about general construction specifications writing and organization of specifications. This book may be purchased by writing: The Construction Specifications Institute, 601 Madison Street, Alexandria, Virginia 22314-9970.

Specifications are written documents that accompany construction drawings. In addition, bidding requirements, contract forms, conditions of the contract, addenda, and contract modifications accompany the specifications and drawings. To avoid miscommunication, these items must be carefully coordinated. The drawings indicate the locations of materials, the dimensions of the construction work, and details illustrating the connections between construction materials. The specifications describe the physical qualities, chemical constituents, workmanship, and installation procedures associated with the construction materials.

The drawings and specifications must be consistent in terminology and should not repeat information (double describing). Double describing can lead to errors and confusion. Usually the errors are the result of changing either the drawing or specification without modifying the accompanying construction document. In the case of problems arising from conflicts associated with double describing, CSI recommends that neither the drawings nor specifications should be stated as having precedence. Instead, it is recommended that the conflict be brought to the attention of the landscape architect, and the landscape architect will make a written interpretation.

WRITING SPECIFICATIONS

Methods of Specifying

Four basic methods for writing specifications exist. Usually a specification document uses a combination of the four methods. The first method is a descriptive approach. This approach is tedious and does not mention actual brand names. By law some government documents require that brand names not be given when specifying products and procedures. The second method is the performance approach. This approach states the required results of the product or from a piece of equipment. The third approach is the reference standard method. For example a certain material can be installed according to a particular reference. While this approach is common in installing concrete or asphalt, it may not be common in prairie landscaping. However, as new books and procedures are developed and improved, standard reference material may be made available. When specifying several references, be careful that there is not duplication or conflict arising from the references. The fourth method is the proprietary approach. This approach lists specific products and materials to be used. Closed proprietary specifications require that only the identified product can be used. Open proprietary specifications allow the use of alternate products and alleviate some of the problems associated with overpriced sole source suppliers.

Specification Language

Certain communication approaches are preferred, and some communication languages to be avoided in the specification document. Essentially, the specifications should be clear, correct, complete, and concise. Various terms are avoided. These undesirable terms can cause a specification to become unclear. Table 1 gives a list of the common terms to be avoided. The specifications are written in an imperative mood. An example of the imperative mood is "Apply seed with a Truax seeder."

Table 1. A list of specification terms to be avoided (Construction Specifications Institute 1988).

Term
As allowed
As appropriate
As approved
As directed
As indicated
As necessary
As required
Hereinafter
Hereinbefore
Herewith
Wherein
Any
All
Such
etc.
As per
In a workmanlike manner
To the satisfaction of the Landscape Architect/ Architect/Engineer
Shall function as intended
As indicated

Organization

Specifications have a specific organization, which allows for a standard location for the contents of the specification information. Before the standards were implemented, each engineering/landscape architectural firm had its own specification writing preferences and habits. This meant chaos for the contractor. The contractor had to be acquainted with each design firm's own particular specification organization. The CSI system has reduced this chaos. The result has been that contractors are able to more efficiently understand the specifications and have increased the accuracy of their bids.

It was agreed at interdisciplinary meetings back in the 1960s that specifications should be placed into divisions. Each division contained broad categories of construction information that were similar in nature. Division 2 contains specifications relating to site work including site preparation, site demolition, earthwork, piped utilities, landscaping, paving, and surfacing. Therefore, landscape contractors should always examine Division 2 for information directly pertaining to landscape work.

Each Division is divided into sections, as listed in Masterformat (Construction Specifications Institute 1988). Landscaping is Section 02900 of Division 2. Other pertinent sections include Section 02100 Site Preparation and Section 02200 Earthwork. The landscaping section can be divided further into several sections including Section 02910 Shrub and Tree Transplanting; Section 02920 Soil Preparation; Section 02930 Lawns and Grasses; Section 02950 Trees, Plants, and Ground Covers; and Section 02970 Landscape Maintenance.

These sections are the current framework for the landscape section; however, they do not neatly incorporate prairie landscaping procedures. For example, Section 02930 addresses lawns and grasses including hydro-mulching, plugging, seeding, sprigging, sodding, and stolonizing of grasses. Yet prairie landscaping often includes the seeding or plugging of forbs. The present construction format seems to ignore the need to incorporate non-grass material in this section. This oversight may be corrected in the future. For the present, it is recommended that forb seeding and plugging be included in Section 02930.

Each section has a particular, universal outline for the content of the material placed in the section. This outline assists in the consistent location of similar information and keeps the information in a logical order.

Descriptions of Specifications Parts

Sections are divided into three parts. The first part is a general description that identifies specific requirements unique to the section. The second part addresses the products by describing in detail the quality of the item. The third part describes the execution of how the product is to be incorporated into the construction site.

Description of Part 1.

Products furnished but not installed under the section are listed in Part 1. For example, the contractor may supply plant materials that may be installed by the owner. In addition, products installed but not furnished under this section also are listed. These products may be plant material supplied by the owner but installed by the contractor. Part 1 of any section should list the sections related to the current section. Usually sections addressing earthwork, site preparation, plant material installation, and site maintenance are pertinent to prairie landscaping. However, each construction project is unique and may require the list of other important sections.

Many times on large construction sites, the exact area of land to be prepared or planted may not be known. Construction site damage and earth moving may produce variability. Thus, it may be difficult for a contractor to give an exact quote for implementing the construction documents. However, some site construction work can be identified as having an allowance. This means that, depending upon how much area is prepared or planted, the contractor will be given an allowance for a precise unit of measurement. Those items covered under allowances need to be listed, and the units of measurement need to be stated. Do not include cash amounts. Cash amounts are covered in other areas of the contract and bidding documents.

If certain portions of the section are part of a request for alternative bids, the alternatives need to be identified. For example, two types of seeding mixtures may be in the construction specifications. One mixture may be more expensive, while the other is an inexpensive mixture that minimally covers the site with essential plant materials. The contract documents in Division 1 may request that the contract give two prices or alternates.

References pertaining directly to the sections should be listed. For example, botanical names differ according to regional authorities. In North Dakota, Stevens (1963) may be considered an authority for the identification and botanical name for plant material; however, in Wisconsin, Curtis (1959) may be used as a reference. Each reference should be listed in Part 1. Occasionally, a term may require defining. That term should be defined in Part 1.

Requests for submittals in prairie landscaping are common. The requests ask for relevant data to be furnished by the contractor. The submittals may be product data, shop drawings, samples, quality control documents, test reports, warranties, and other notices. Requests may include a list from the seed supplier giving

the quantity and botanical name of the seed supplied. In addition, the contractor may request to have tests performed that verify seed germination results, amount of weed seed, amount of inert material, and percent of pure live seed. These submittals are often related to quality assurance and may require the appropriate certificate or sample.

Part 1 also describes the delivery, storage, and handling of construction material. This is an important portion of the document. Plant material is a live product and must be treated and handled properly. The requirements must be stated clearly, such as if seed needs to be stored at a specific temperature, humidity, and light level; or if plugs, bare root plants, potted plants, or balled and burlapped plants require specific handling or storage, the requirements must be stated clearly.

Project and site conditions required for the installation of material and the protection of existing site features must be listed in Part 1. Often, grade stakes, site utilities, and pavement must be protected and kept clean. Special sequencing and scheduling requirements pertinent to other sections also are described. For example, the site preparation may include careful control and elimination of weed seeds in the topsoil. Until the weed seeds are eliminated, the seed planting cannot be accomplished. Special and extended warranties must be identified in Part 1. For example, seed germination failure may be guaranteed by mandating a second seeding application.

Description of Part 2.

A list of manufacturers or growers that are able to supply the products under the section are often given at the beginning of Part 2. This approach is especially important if a certain type of seed mixture or piece of equipment is to be used. The contractor needs to know where the material can be obtained.

The exact description of materials is listed in Part 2. This description is extremely important. For example, landscape drawings may only identify locations for application of seed mixtures A, B, and C. The specification then lists the contents of those seed mixtures. Special proportions for seed mixtures or soil material are also listed. If the material is inspected at the source, requests for verification or certificates should be identified in Part 2.

Description of Part 3.

A request may be made to verify the suitability of the site to receive the products before the work is executed. This request should be clearly stated. For example, weed seeds may still be on a site that was to receive a seeding mixture. However, if a certain percentage of weeds cover the site, the landscape is not ready to be planted. Actions specifically required to prepare a site or surface are stated in Part 3. In addition, special action that needs to be taken to protect other materials and surfaces requires listing.

The actual installation procedures are listed in Part 3. This means that the actions required to install the products and perform the work are presented. Each product will require its own list of actions. The procedures are presented in chronological order. During the installation, any tests or field quality control measures are described. The final actions to install the product are listed in Part 3. For example, some materials may require special cleaning and adjustment. In addition, some products may require special protection. Seeded areas may require barriers or signs to protect the material.

These three parts comprise the organization and presentation of information for each section. The parts allow a general overview, a list of products and installation instructions.

EXAMPLE SPECIFICATIONS

To conclude this paper, an example of a section specification is provided (Figure 1). Please note that this specification is simply an example to illustrate the structure and organization of a section specification. Each construction project has a unique client, site, and users. Therefore, the specification should reflect these characteristics. Universal, perfect specifications for every construction site do not exist. The specification should be tailored to fit special environmental conditions and design functions. In addition, the standards for prairie landscaping are still evolving. Specifiers may have their own particular approaches to constructing a project, and these approaches may vary according to regions.

FIG. 1. Example of a specification written for section 02930.

Section 02930- Seeding

Part I GENERAL

SUMMARY:

This section encompasses the furnishing of all labor, equipment and material to complete hydro-seeding work.

Allowances and Unit Prices: Amount hydro-seeded will be measured by acre seeded to the nearest one-thousandth acre.

RELATED WORK SPECIFIED ELSEWHERE:

Division 1 General Requirements
Topsoil in Section 02920
Landscape Maintenance in Section 02970

REFERENCES:

Stevens, O.A. 1963. Handbook of North Dakota Plants. North Dakota Institute for Regional Studies.

USDA. 1972. Plant Hardiness Zone Map. USDA, miscellaneous publication No. 814.

SUBMITTALS:

Grower's Certification: Data showing plant species supplied and location of origin.

Seed Data: Test reports showing purity, mix and germination.

Certificates: Manufacturer's certification of fertilizer and herbicide composition.

QUALITY ASSURANCE:

Labor: Work is performed with personnel experienced in the work required by this Section under the direction of a skilled foreman.

Substitutions: If specified product is not obtainable, submit to Landscape Architect proof of non-availability and proposal for use of equivalent.

Standards: Provide plants true to name, grown in a recognized nursery or seed farm in accordance with good horticultural practice. Nomenclature in accordance with Stevens (1963).

Provide healthy, vigorous stock, free from disease, insects, eggs, larvae and free of defects, injuries, abrasions or disfigurement.

Plant material will be from nurseries or seed farms that have been inspected by state or federal agencies and comply with the rules and regulations under the Federal Seed Act.

Less than 1.3% weed seed allowed in seed mixes.

Less than 66% non-weed seed impurities allowed in seed mixes

Collected material may be used when approved.

All plants shall be from stock which has been acclimated to the state of North Dakota. Plants which have been consistently grown and cultivated outside the state but within the boundaries shown on the Plant Hardiness Zone Map, USDA, miscellaneous publication No. 814, 1972 in Zones 2 and 3 shall be considered winter hardy in Fargo, North Dakota.

PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver products in original package labeled with manufacturer's name, product name, weight, certified analysis and instructions for use.

Protect seed from dehydration, contamination, freezing and heating during transportation and delivery.

Store seed in a dark room, 50 degrees F. to 60 degrees F., at 20% to 40% relative humidity.

Prior to planting, keep seed in area protected from mechanical and chemical damage.

JOB CONDITIONS:

Existing conditions: Perform plant installation after work affecting ground conditions are completed.

Site Utilities: Locations of utilities must be determined by contractor and work performed in a manner which will avoid damage to utilities.

Figure 1 (Continued)

Maintain grade stakes, benchmarks and monuments.

Site Maintenance: During work specified in this section, keep pavement, sidewalks and buildings clean and unstained. Keep work area in an orderly condition. Remove all litter from premises weekly. Remove all waste material from site.

When any detrimental conditions to plant growth are encountered, such as rubble fill, clay fill, adverse drainage conditions and obstructions, notify landscape architect before proceeding.

Protection: Restrict foot and vehicular traffic from seeded area to the end of the establishment period.

PART 2 PRODUCTS:

Upland Seed Mix: Seed mix containing the following species:
- Agropyron smithii
- Bouteloua curtipendula
- Bouteloua gracilis
- Chrysothamnus nauseous
- Lolium multiflorum
- Sarcobatus vermiculatus
- Schizachyrium scoparium
- Symphoricarpos occidentalis

Wetland Seed Mix:
- Distichlis stricta
- Elymus salinus
- Puccinellia distans
- Sporobolus airoides
- Suaeda depressa

Upland Fertilizer: Contained weight 10% slow release nitrogen, 10% phosphorus and 10% potash.

Wetland Fertilizer: Contained weight 10% slow release nitrogen, 0% phosphorus and 0% potash.

Water: Furnish all necessary hose, equipment, attachments and accessories for hydro-seeding. Water shall be clean and potable.

Cellulose Fiber Mulch

Tackifier

PART 3 EXECUTION:

UPLAND HYDRO-SEEDING:

Seeding to occur between April 16th to May 31st.

Apply upland fertilizer and upland seed mix together.

Apply upland fertilizer at a rate of 1000 pounds per acre.

Apply upland seed mix at:

Agropyron smithii	4 pounds per acre PLS
Bouteloua curtipendula	1 pound per acre PLS
Bouteloua gracilis	1/2 pound per acre PLS
Chrysothamnus nauseous	1/4 pound per acre PLS
Lolium multiflorum	1/2 pound per acre PLS
Sarcobatus vermiculatus	1/4 pound per acre PLS
Schizachyrium scoparium	1 pound per acre PLS
Symphoricarpos occidentalis	1 pound per acre PLS

Apply cellulose wood mulch and tackifier together.

Apply cellulose wood mulch and tackifier within two hours of applying upland fertilizer and upland seed mix.

Apply cellulose wood mulch at a rate of 1,500 pounds per acre.

Apply tackifier at a rate of 45 pounds per acre.

WETLAND HYDRO-SEED MIX

Seeding to occur between August 15th and September 15th.

Apply wetland seed mix and wetland fertilizer together.

Apply wetland fertilizer at a rate of 1000 pounds per acre.

Apply wetland seed mix at:

Distichlis stricta	1 pound per acre PLS
Elymus salinus	2 pounds per acre PLS
Puccinellia distans	2 pounds per acre PLS
Sporobolus airoides	1 pound per acre PLS
Suaeda depressa	2 ounces per acre PLS

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