

CONSTRUCTED WETLANDS MAINTENANCE

PART 1 - GENERAL

1.01 SUMMARY

- A. This section describes work necessary to complete maintenance and inspections of vegetation and infrastructure within the Constructed Wetlands. This includes general requirements for maintenance of vegetation, nuisance species control, mowing services, planting methods for native species, and protection of berms.
- B. Description of work:
 - a. The Contractor will provide continued mowing services and perform two (2) inspections per year of the Constructed Wetlands. Each semi-annual inspection will include examination of the current conditions of the berms, fences, hydraulic control structures, and presence of invasive species and desirable species cover in the Constructed Wetlands.
 - b. The Contractor shall install and maintain staff gauges in each wetland cell.
 - c. The Contractor will also be responsible for the repair of erosion washouts on the berms. The Contractor is not responsible for repair of any hydraulic control structures or fences.
 - d. If necessary, the Contractor will provide invasive species removal and planting services to prevent further spread of invasive species and replacement with native vegetation. Vegetation management may require a phased approach coordinated with the County.

1.02 DEFINITIONS: The following Definitions are defined for this specification.

- A. Aerial Plant Coverage: Percentage of ground surface that is covered by living, green vegetation as measured by the line intercept method. A minimum of five 1-meter quadrats or 100-foot square areas will be required within each contiguous acre of planting area.
- B. County: Brevard County is herein referred to as the County.
- C. Constructed Wetlands: Refers herein to multi-cell/wetland system constructed to achieve water quality improvement and/or wildlife enhancement objectives.
- D. Contractor Quality Control (CQC): The means by which Contractor ensures that the maintenance, to include that performed by subcontractors and suppliers, complies with the requirements of the Contract.
- E. Deep Zone Plants: Refers to specific planting areas located within the deep or open water areas where wetland bottom depths greater than 18 inches below the normal maximum pool water level.
- F. Emergent Marsh Plants: Refers to plants that reside in the wetland shallow zones that dominate wetland cells where water depth is less than 18 inches deep at normal maximum pool water level. All plants shall be Florida Grade 1 specimens.
- G. Herbivory: Disturbance of plants by animals, including birds, and includes any animal consumption, uprooting, trampling, girdling, or other disturbance that precludes establishment of the specified plant species and densities.
- H. Maintenance Period: Period during which Contractor is responsible for maintenance of plantings.
- I. Nuisance Plant Species: Weeds and noxious plants that have been determined to be aggressive and potentially detrimental to establishment and long-term growth of other planted species within the wetland areas and any tree or palm species on the berms. Undesirable invasive or nuisance plants (weeds) include, but are not limited to, the following:
 - a. Brazilian pepper (*Schinus terbinthifolia*)

- b. Carolina Willow (*Salix caroliniana*)
 - c. Cattail (*Typha latifolia*)
 - d. Groundsel Tree (*Baccharis halimifolia*)
 - e. Primrose Willow (*Ludwigia peruviana*)
 - f. Soda Apple (*Solanum viarum*)
 - g. Torpedograss (*Panicum repens*)
 - h. Water Lettuce (*Pistia stratiotes*)
 - i. Water Hyacinth (*Eichhornia crassipes*)
 - j. Cabbage Palms (*Sabal palmetto*) or other recruited tree species
- J. Phased Approach: Vegetation management may require sequencing of the work to ensure there is no total loss of use for the wetlands. A single cell may need to be taken offline to do maintenance or certain areas may be higher priority and completed before other areas. The Contractor will work with the County to identify areas in need of vegetation management and will provide recommendations in the annual work plan for County approval.
- K. Plant Materials (Plant Propagules): Plant propagules are vegetative plant structures used for plant establishment consisting of aboveground and/or underground structures.
- L. Planting Area: Area within constructed wetlands planted with one or more planted species adapted to same water regime (depth and duration of flooding).
- M. Plantings: Refers to the completed work of soil preparation (discing) for plantings; location, placement, and securing of plant materials (plant propagules) as specified.
- N. Satisfactory Stand:
- a. New Plantings:
 - 1. Minimum Survival Rate: 85 percent coverage after first full growing season cycle (April through October).
 - 2. Under plant density sampling protocols, minimum survival rate for area greater than 100 contiguous square feet shall be 50 percent.
 - 3. The average spacing of plant materials shall be 3 feet on center.
 - b. Sodded Areas:
 - 1. Minimum Aerial Plant Coverage: 80 percent.
 - 2. No areas greater than 5,000 contiguous square feet shall have an aerial plant coverage of less than 25 percent.
 - c. Natural recruitment of native species suitable for habitat may be counted and included when evaluating survivorship.
 - d. Plants damaged by herbivory will not be counted for purposes of survival calculations.
 - e. Required planting work shall be initiated within 30 days from date of determination of insufficient quantity of plant materials as specified and shall be completed within 30 days of starting date of planting. Planting must occur under low water conditions that ensure plants can grow and thrive. Replacement planted vegetation will have same warranty as originally planted vegetation.
 - f. Plant stock for replacement planting shall be viable plants indicated by evidence of one or more new live plant shoots arising from each separate plant plug or clump.
 - g. Each planting area shall not contain contiguous areas of weeds that exceed 100 square feet in size. Overall, cover of weeds in each planting area cannot exceed 15 percent of planted area at end of warranty period.

- h. Presence of a satisfactory stand and plant viability will be determined by the County after first full growing season cycle (April through October).
- O. Temporary Irrigation System: Contractor may provide temporary sprinkler and or drip irrigation system used to establish plantings. Fill and drain to maintain saturated soil conditions during plant establishment period can also be considered irrigation.
- P. Wetland Donor Plants: Refers to harvested native wetland plants that are excavated to a depth of about 6 inches or rooting depth and are planted in clumps at high density or are harvested as bare root plants and are maintained wet and shaded before planting.
- Q. Grass Sod: This can also refer to manufactured sod that is grown at a nursery location under controlled conditions in large rectangles and can be rolled up, loaded onto a truck, transported to a site, unrolled, and staked down to quickly establish vegetation.

1.03 SUBMITTALS

- A. Work Plan: The Contractor shall submit a Work Plan to the County for the yearly maintenance including, but not limited to, the following:
 - a. Schedule of mowing services
 - b. Location of mowing equipment staging area (staging area shall be safely located away from the site to protect pedestrians)
 - c. Schedule of semi-annual inspection of berms, fences, hydraulic control structures, staff gauges, wetland plant cover, and invasive species cover
 - d. Detailed description of invasive species control methods describing whether mechanical or herbicidal control will be applied.
 - e. Techniques that will be applied to assure plant/sod viability during harvest, transport, planting/sodding, germination, and establishment that may include maintaining adequate moisture, minimizing exposure to direct sunlight, minimizing the time between extraction and planting.
 - f. Temporary Irrigation System Design: If needed, a temporary irrigation system design describing strategies for pumping, conveyance, and application system proposed to provide water to plants or sod.
 - g. A plan for herbivory control, if required
 - h. County shall review the Work Plan within 2 weeks of submittal by the Contractor and provide written approval to the Contractor once determined to be acceptable.
 - i. Update of Work Plan and submit revisions as changes occur. Work Plan shall be updated and re-submitted to the Contractor each calendar year. Any deviations from previously approved plant selection and Work Plan shall be approved by the County prior to changes being implemented in the work.
- B. Herbicide: Submit proposed herbicide to be used, means of application, application rates, and qualifications of herbicide applicator (including state certification) at least two weeks before application. Herbicide certification shall demonstrate that the intended herbicide is applicable for the targeted species and safe for aquatic application.
- C. Wetland Maintenance Report: The Contractor shall submit a digital copy of the semi-annual inspection report of wetland berms, fences, hydraulic control structures, and invasive species. One inspection shall be performed in February and the other inspection shall be performed in August each year.
 - a. The Wetland Maintenance Report shall include, but not limited to, the following:
 - 1. Date and time of inspection.
 - 2. Water level or depth in each wetland cell
 - 3. Berm, fence and hydraulic control structure inspection observations:

- i. Description of deficiencies in the wetland berms, fences, or hydraulic control structures
 - ii. Photos of berm, fence or hydraulic control structure in need of repair
 - iii. GPS location and description of deficiencies found in the berms, fences, or hydraulic control structures.
 - iv. Proposed recommendation for repair of berm. The Contractor is not responsible for the repair of hydraulic control structures or fences.
 - 4. Invasive species inspection
 - i. Locations of invasive vegetation observed including GPS coordinates.
 - ii. List of species of invasive vegetation observed
 - iii. Size and density of invasive species colony in each wetland cell
 - iv. Map detailing the invasive species locations in each wetland cell
 - v. Outline means and methods for removal of invasive species identified during inspection.
 - 5. Wetland plant cover success
 - i. Locations of gaps in desirable vegetation cover
 - ii. Wetland species affected or lacking and possible causes
 - iii. Map of area requiring planting
- D. Quality control submittals for required planting or sodding:
 - a. Availability of Plant Material:
 - 1. Within 1 month following award of Contract, submit a summary of the availability of plant materials needed to complete planting in the Constructed Wetlands. Identify source for each species and whether these are nursery stock or field harvested.
 - b. Sod placement:
 - 1. Certification of sod; include source and harvest date of sod, and sod seed mix.
 - 2. Certification of sprig type and name.
 - 3. Description of required maintenance activities and activity frequency
 - c. Planting Schedule: Update planting schedule and Work Plan and submit revisions as changes occur. Any deviations from previously approved planting schedule and Work Plan shall be approved by the County prior to changes being made.
 - d. Temporary Irrigation System Design, if needed: At least 1 month prior to initiating planting activities, submit a temporary irrigation system design describing pumping, conveyance, and application system proposed to provide water to plantings in accordance with this specification.
 - e. Herbicide: Submit proposed materials, means of application, application rates, and qualifications of herbicide applicator (including state certification) before use.
 - f. Contract Closeout Submittals: Special Guarantee and description of required maintenance activities and activity frequency.
- E. Surveyor's Report
 - a. A Surveyor's Report shall be completed by a Professional Surveyor or Mapper licensed in the State of Florida.
 - b. A Surveyor's Report shall be submitted to the County for review when a staff gauge is first installed and replaced. The Surveyor's Report shall include, but is not limited to, the level of accuracy for each staff gauge and field notes taken during installation of the staff gauges.

1.04 CONTRACTOR QUALITY CONTROL PLAN

- A. Contractor Quality Control (CQC) Plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used.
- B. Content:
 - a. Plan shall cover the intended CQC organization for the entire Contract and shall include the following, as a minimum:
 - 1. Organization: Description of the quality control organization, including a chart showing lines of authority for all aspects of the work specified.
 - 2. CQC Staff: The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QC function.
 - 3. Submittals: Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, suppliers and purchasing agents.
 - 4. Procedures for tracking deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected by the Contractor.
 - 5. Reporting procedures, including proposed reporting formats; include a copy of the CQC report form.
- C. Acceptance of Plans: Acceptance of the Contractor's basic and addendum CQC plans by the County is required prior to the start of maintenance procedures. Acceptance is conditional and will be predicated on satisfactory performance during the maintenance. The County reserves the right to require Contractor to make changes in the CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Maintain current records of quality control operations, activities, and tests performed, including the work of subcontractors and suppliers.
- E. Records shall be on an acceptable form and shall be a complete description of inspections, the results of inspections, daily activities, tests, and other items, including but not limited to the following:
 - a. Contractor/subcontractor and their areas of responsibility
 - b. Work performed today, giving location, description, and by whom. When a network schedule is used, identify each phase of work performed each day by activity number.
 - c. Material received with statement as to its acceptability and storage.
 - d. Identify submittals reviewed, with Contract reference, by whom, and action taken.
 - e. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
 - f. Contractor's verification statement
 - g. Indicate a description of trades working on the Project; the number of personnel working; weather conditions encountered; and any delays encountered.
 - h. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in file work and workmanship comply with the Contract.

1.05 COUNTY'S QUALITY ASSURANCE

- A. All work is subject to the County's quality assurance inspection at all locations and at all reasonable times before acceptance to ensure compliance with the specifications.
- B. County's quality assurance inspections are for the sole benefit of the County and do not:

- a. Relieve the Contractor of responsibility for providing adequate quality control measures.
 - b. Relieve Contractor of responsibility for damage to or loss of the material before acceptance.
 - c. Constitute or imply acceptance.
 - d. Affect the continuing rights of the County after acceptance of the completed work.
- C. The presence or absence of County personnel does not relieve the Contractor from any Contract requirement.
- D. The County may discount payment to the Contractor by the amount of any additional cost of inspection when work is delayed by the Contractor and not ready at the time specified by the Contractor for inspection, or when prior rejection makes inspection or retest necessary. Contractor will not be held responsible for events (extreme weather) outside of the Contractor's control.
- E. Quality assurance inspections will be performed in a manner that will not unnecessarily delay the work performed by the Contractor.

1.06 SUBMITTAL QUALITY CONTROL

- A. The CQC organization shall be responsible for certifying that all submittals are in compliance with the Contract requirements.

1.07 MAINTENANCE DUTIES AND SERVICES

- A. Yearly maintenance operations to include:
 - a. Semi-annual wetland maintenance inspection of berms, fences, and hydraulic control structures, assessment of desirable plant and invasive plant cover and preparation a semi-annual Wetland Maintenance Report for delivery to the County.
 - b. Washouts or Erosion: Contractor to include repair means and methods in the Work Plan for washouts for approval by the County.
 - c. Mowing: Mow after grass height reaches 6 inches, and mow as necessary to maintain grass height from exceeding 12 inches
 - d. Inspection of staff gauges for maintenance, repair, or replacement.
 - e. Semi-annual invasive species removal and planting based on findings in the semi-annual Wetland Maintenance Report. This work may require a Phased Approach and shall be coordinated with the County on which areas to complete each year.
 - f. Sodding of denuded areas or portions thereof immediately at the end of the maintenance period if a satisfactory cover has not established in restoration area.
 - 1. Watering: Keep surface moist if sod services have been provided
- B. If invasive species are found, the maintenance operations shall include, but are not limited to, the following:
 - a. Herbicidal or mechanical removal of invasive species.
 - b. Soil preparation of invasive species removal area.
 - c. Planting based on normal water level depth of location.

1.08 MOWING MAINTENANCE SERVICES

- A. The Contractor shall be responsible for mowing the berms and all grass areas inside of the fence.
 - a. Mow after grass reaches 6 inches and to maintain grass height from exceeding 12 inches.
 - b. Mowing shall be completed to reduce the "scalping" or creation of tire ruts from hard turns of the mowers.

- c. Mowing interval shall be determined by grass height and frequency may change during the year due to environmental conditions.
- d. A 2-foot buffer will be maintained from the water's edge to promote the growth of a natural littoral zone.

1.09 PLANTING SERVICES - DELIVERY, STORAGE, AND PROTECTION

- A. Nursery Stock and/or Harvested Wetland Plant Species:
 - a. Harvest and deliver only after planting area is prepared and water levels are at safe and acceptable levels to complete plantings.
 - b. Deliver and plant bare-root material within 48 hours after harvesting or obtaining nursery stock.
 - c. Keep container and bare-root material moist and covered to protect from drying from time of harvesting, during delivery, and until planted.
 - d. Any plants that have been permitted to dry out or are otherwise injured for any reason in the judgment of the County and do not show a viable condition, shall be rejected for use.
- B. Sod: Receive delivery of sod only after laying bed is prepared for sodding, Roll or stack to prevent yellowing, Deliver and lay within 24 hours of harvesting, keep moist and covered to protect from drying from time of harvesting until laid.
- C. Planting Schedule:
 - a. At least 1 month prior to initiating planting activities, submit a planting schedule in accordance with the Work Plan outlining proposed schedule and procedures for installation of plant materials as specified.
 - b. Update planting schedule and submit revisions as changes occur. Any deviations from previously approved planting schedule shall be approved by the County prior to changes being made.

1.10 STAFF GAUGES

- a. The Contractor shall install and maintain staff gauges in each of the wetland cells.
- b. Staff gauge maintenance shall be included in the semi-annual inspections of the wetlands.

1.11 PLANTING SERVICES - ENVIRONMENTAL REQUIREMENTS

- A. Perform work under favorable weather and soil moisture conditions as determined by local practice.
- B. Do not plant when mean daily air temperature is below 40 degrees F.

1.12 COORDINATION OF PLANTING SERVICES - SEQUENCING AND SCHEDULING

- A. Coordinate wetland planting operations with wetland vegetative material harvesting to minimize time from harvest to planting and irrigation.
- B. Coordinate with the County when planning water deliveries and when draining and removing water from constructed wetlands to provide sufficient lead time for the County to lower water levels and bypass wetland areas requiring maintenance. Coordination with the County does not relieve the Contractor from responsibility for planning and coordinating water delivery and water drainage schedule. If re-grading is required, final grading should be completed and water delivery ready for operation before planting.
- C. Follow planting schedule as developed in Work Plan and during coordination of planting activities. Submit any deviations from planting schedule to the County for approval prior to changes being made.
- D. Notify the County at least 3 days in advance of:
 - a. Start of planting activity for each planting stage

- b. Completion of planting activity for each planting stage
 - c. Flooding of planted areas. Contractor is required to coordinate with the County on flooding wetland area
- E. Contractor will coordinate with the County for water delivery after planting activities. The Contractor shall coordinate irrigation with the County.

1.13 PLANTING SERVICES - PLANT MATERIAL PERFORMANCE WARRANTY

- A. Provide extended guarantee or warranty, with the County named as beneficiary, in writing, as special guarantee. The Contractor shall guarantee removal and replacement with new plants for those found defective or not in a vigorous, thriving condition after the first full growing period (April to October) and after date of County inspection.
- B. Plants damaged or lost as a result of vandalism or acts of neglect by others are not subject to this performance warranty. Herbivory shall not be considered vandalism.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All plant materials delivered onsite shall be properly identified and shall be in a healthy/viable condition at time of planting.
- B. Any deviations in planting stock quantities or listed species must be approved by the County.
- C. All plant material must be from parent plants from within a 75-mile radius of Project Site, unless otherwise approved by the County.

2.02 REQUIRED EQUIPMENT AND FACILITIES

- A. Mowing services
 - a. Contractor is responsible for owning and maintaining the equipment necessary to conduct mowing services year-round. Repair or replacement of mowing equipment shall be completed by the Contractor at no additional cost to the County. Mowing equipment shall be removed daily from the site by the Contractor upon completion of the work or be stored at a mutually agreed upon location identified in the work Plan so pedestrian visitors to the area are not affected to access the site.
- B. Planting Services
 - a. All equipment and materials required to complete planting services as specified shall be provided and maintained by the Contractor and shall be removed daily from the site by the Contractor upon the completion of the work or stored at a mutually agreed upon location by the County so pedestrian visitors to the area are not affected to access the site. All equipment and materials used as to install and furnish the plantings shall be removed within 1 week of work completed.
 - b. If required, water supply for irrigation shall be provided by the Contractor unless otherwise explicitly agreed upon and documented with the County.
 - c. Wooden stakes or other nontoxic, degradable materials may be used for anchoring of plant plugs or clumps.

2.03 PLANT MATERIALS

- A. Acceptable plants under this section may consist of transplants (harvested or nursery stock), bare-root material (nursery stock with no soil attached to roots), plant fragments (tubers, rhizomes) for submerged aquatic areas, seedlings (entire plants, container grown), tubeling (seedlings grown in narrow tube-shaded containers), woody stem cuttings, or plant plugs (plant material from local populations or

nursery-grown vegetative material that has been divided into plugs or clumps that contain viable plants and are of the minimum size as specified).

- a. The following plants are examples of acceptable species for planting in the Constructed Wetlands. Other native plant species may be proposed by the Contractor based on availability and must be approved by the County prior to planting.

Acceptable Water Depth	Botanical Name	Common Name	Plant Density
18" to 36"	<i>Schoenoplectus californicus</i>	Giant bulrush	3 feet on center
18" to 36"	<i>Cladium jamaicense</i>	Sawgrass	3 feet on center
6" to 18"	<i>Sagittaria lancifolia</i>	Duck potato	3 feet on center
6" to 18"	<i>Schoenoplectus tabernaemontani</i>	Softstem bulrush	3 feet on center
6" to 18"	<i>Pontederia cordata</i>	Pickerelweed	3 feet on center
6" to 18"	<i>Saururus cernuus</i>	Lizard's Tail	3 feet on center
6" to 18"	<i>Thalia geniculata</i>	Fireflag	3 feet on center
6" to 18"	<i>Eleocharis palustris</i>	Spikerush	3 feet on center
6" to 18"	<i>Eleocharis interstincta</i>	Jointed Spikerush	3 feet on center
6" to 18"	<i>Juncus effusus</i>	Soft Rush	3 feet on center
6" to 18"	<i>Cladium jamaicense</i>	Sawgrass	3 feet on center

- B. Plants shall be live, fresh, healthy, in uninjured at the time of planting. Plants shall be acceptable as defined in this section. Plants may be harvested from local wetland areas or ponds, provided that a written affidavit is provided that documents all necessary authorizations have been received. Plants shall be kept continually moist and shaded until they are planted. Any plants that have been permitted to dry out or are otherwise injured for any reason in the judgment of the County and do not show a viable condition, shall be rejected for use.
- C. Plants shall be sufficient size and height to prevent flooding of plants determined by the depth of water and wetland plant location at the time of planting. Optimize plug or clump size for viability and rapid colonization of wetland plants. As a rule of thumb, water depth is typically 30 percent of the plant height.

2.04 SOD

- A. Sod: Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted. Sod species shall be Bahia or match species onsite.

2.05 TOPSOIL

- A. General: Natural, friable, obtained from well-drained areas, free from objects larger than 1 1/2 inches maximum dimension, and free of subsoil, roots, grass, other foreign matter, hazardous or toxic substances, and deleterious material that may be harmful to plant growth or may hinder grading, planting, or maintenance.

- B. The Contractor shall provide test results for organic matter and pH. Soil quality must meet the following:
 - a. Organic Matter: Minimum 1.5 percent by dry weight as determined in accordance with ASTM D2974.
 - b. pH shall be determined in accordance with ASTM D4972-19 and shall be in the range of 5.0 to 7.0.

2.06 PLANTING SERVICES - PLANT REPLACEMENT

- A. The Contractor shall plant, at their own expense and within 30 days from the County's initial planting inspection date, any areas where the plant density is less than the specified amount. County inspection for plant density shall be within 14 days after completion of planting.
- B. All planting will be completed within an appropriate planting window as determined by the Contractor.
- C. The Contractor is responsible for obtaining a supply of viable plant material for planting. Plant material for planting may be available from local populations or nursery stock, subject to review by the County.

2.07 FERTILIZER

- A. No fertilizer application is allowed within Constructed Wetland planting areas

2.08 STAFF GAUGES

- A. The Contractor shall furnish and install materials conforming to the following provisions:
 - a. Staff gauge shall be Stevens Water, Style E, or equivalent and shall be visible from the berms.
 - b. Staff gauge shall use figure plates to display a minimum of two elevations and shall extend from elevation 29 (National American Vertical Datum 1988 [NAVD 88]) to the bottom of each wetland cell.

PART 3 - EXECUTION

3.01 GENERAL

- A. Maintain an adequate inspection process and perform maintenance of Constructed Wetlands.
- B. Maintain complete inspection records and make them available at all times to the County.

3.02 COORDINATION MEETINGS

- A. The Contractor shall coordinate semi-annual meetings with the County to discuss the proposed planting and maintenance items, including schedule for the contract year, areas of concern identified by the County, the Contractor's goals for maintaining optimal cover of desirable species of the wetlands and minimizing invasive species. Coordination meetings will discuss any phasing or sequencing of vegetation management.
- B. There may be occasions when subsequent conferences may be called by either party to reconfirm mutual understandings and/or address deficiencies.

3.03 YEARLY REQUIRED MAINTENANCE ACTIVITIES

- A. The Contractor is responsible for periodic inspections of berms, fences and hydraulic control structures.
 - a. Berms
 - 1. Berms shall be inspected at a minimum of twice per year.

- i. Berms shall be inspected for deficient conditions including, but not limited to, the following:
 - a) Presence of erosion
 - b) Animal burrows located on the top or sides of the berm
 - c) Fault or failure of the slopes
 - d) Other irregularities requiring repair
 - ii. The Contractor shall notify the County at the discovery of deficient condition of the berms within 48 hours.
 - iii. The Contractor shall identify any berm erosion that is deeper than 6 inches to the County within 24 hours.
 - iv. The Contractor shall discuss the proposed strategy for repair with the County and complete repair of the deficient condition within 30 days of documentation of the deficiency.
- b. Fence maintenance
 - 1. Fences shall be inspected at a minimum of twice per year.
 - i. The Contractor will not be responsible for repair of the fences and will only be responsible for inspections.
- c. Hydraulic control structure maintenance
 - 1. Hydraulic control structures shall be inspected at a minimum of twice per year for damage.
 - 2. All valves, visible pipes, and water control hydraulic control structures shall be visually inspected for damage.
 - 3. The Contractor shall not be responsible for the repair of any structural repairs and will only be responsible for inspections.
- d. Grassed common areas and slopes
 - 1. Lawns and grassed areas will be inspected for erosion and high traffic wear. Areas will be restored upon agreement by the County, as necessary.

3.04 PREPARATION

- A. Protect hydraulic control structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting or maintenance operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.05 REMOVAL OF UNDESIRABLE SPECIES

- A. Semi-Annual Invasive Species Inspection
 - a. The Contractor shall perform invasive species inspections as stated in the semi-annual Wetland Maintenance Report.
 - 1. The Contractor shall provide the County with detail of invasive species present including the location, species, quantify surface area of invasive species, map detailing the invasive species, and proposed means and method for control of the invasive species.
- B. Invasive Species Removal
 - a. The Contractor is responsible for determining the means and methods for invasive species removal in the Invasive Species Inspection Report.

1. The Contractor shall perform removal of invasive species following the means and methods outlined in the Contractor's Work Plan. If new methods are desired to be used by the Contractor, the Contractor shall verify the new means and methods and received written approval by the County prior to starting work.
- b. The Contractor shall remove species twice per year. The Contractor is responsible for coordinating species removal with the County.
- c. The Contractor is responsible for coordinating with the County 30 days in advance prior to commencement of invasive species removal and notify the County if changes in water level are required for treatment or removal.

3.06 PLANTING SERVICES - PLANTING AREAS AND DENSITY

- A. The Contractor shall coordinate planting with the County on which species, in which zones, and total area required to be planted. Plant quantity shall meet 3 feet on center density.

3.07 PLANTING SERVICES – PLANTING SOIL PREPARATION

- A. Complete soil preparation prior to initiating planting activities.
- B. Prepare areas to smooth, even surface with loose uniformly fine texture as follows:
 - a. Roll and rake, remove ridges, fill depressions to meet finish grades
 - b. Perform final soil preparation activities parallel to edge of open water/deep zones so as to minimize potential for channeling of flow.
 - c. Limit preparation to areas to be planted within 1 week
 - d. Remove debris, stones larger than 1-1/2 inches in diameter, and other objects that may interfere with planting and maintenance operations.
 - e. Cultivate by discing and/or rototilling to a minimum depth of 6 inches
- C. Restore prepared areas to specified condition if eroded or otherwise disturbed after preparation and before planting.
- D. Limit equipment traffic over prepared surface to minimize over-compaction of planting areas.
- E. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and take, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.
- F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.08 PLANTING SERVICES - PREPARATION FOR PLANTING

- A. Coordinate with the County 24 hours in advance prior to start of planting. Verify water levels with County prior to planting.
- B. Flood topsoil prior to planting each stage so that soil is saturated at installation.

3.09 PLANTING SERVICES - PLANTING SEQUENCE

- A. Prior to planting, coordinate lowering of water depth with County to result in saturated soil conditions with minimal surface water.

- B. Within each cell, plant deeper zones first to minimize soil erosion and sedimentation after planting preparation has occurred.
- C. Plant all other wetland species after soil is saturated with the County's approval of soil condition.

3.10 PLANTING SERVICES - PLANTING METHODS

- A. Emergent Wetland Plants:
 - a. Verify water levels with the County prior to planting. Plant in moist to shallowly flooded (less than 2 inches of water depth) soils. Coordinate with the County to maintain water depths during planting and initial plant establishment to allow optimal rooting conditions.
 - b. Plant emergent wetland plants by hand using a shovel, spade, dibble, trowel, or other method approved by the County. Use a planting tool to create a shallow hole in moist substrate for planting. Construct holes of sufficient depth and width to allow entire root mass to be inserted without breakage or other damage.
 - c. Stagger planting rows to avoid creating open pathways along direction of water flow.
 - d. Place plants upright so the junction between root crown and stem or leaf base is at ground surface.
 - e. After placing plant in hole, carefully close hole around plant roots by gently applying pressure to edge of hole with a foot or other method approved by the County.
 - f. Plant plugs or clumps may be anchored by staking in place or otherwise securing at discretion of Contractor.
- B. Replace plants judged by the County to be damaged by mishandling during planting process.

3.11 WORK ACTIVITIES AND SITE DISTURBANCE

- A. At completion of plant installation, remove all work equipment, materials displaced during work activities, water containment berms, and other features and materials within 1 week. Restore areas used for soil preparation, planting, water control, or other work activities, leaving no substantial high or low points within the grades of constructed wetlands.

3.12 SODDING

- A. Lay sod within 24 hours of stripping. Do not lay sod if dormant.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface.
 - a. Lay sod across angle of slopes exceeding 1:3.
 - b. Anchor sod on slopes exceeding 1:4 with wood pegs, not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod as needed to establish plants/sod and to develop and sustain plant growth to achieve a satisfactory stand.

3.13 PLANTING SERVICES - TOPSOIL PLACEMENT FOR SOD

- A. Coordinate stockpile locations with the County.
- B. Do not place topsoil when subsoil or topsoil is excessively wet, or otherwise detrimental to the work.
- C. Uniformly distribute to within 1/2 inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.

- D. Remove stones exceeding 1 1/2-inch diameter, roots, sticks, debris, and foreign matter during and after topsoil placement.
- E. Remove surplus subsoil and topsoil from the site. Grade stockpile area as necessary and place in condition acceptable for planting or sodding.

3.14 SATISFACTORY LAWN

- A. Sodded lawns will be satisfactory provided requirements, including of maintenance, have been met and healthy, well-rooted, even-colored, viable lawn is established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Re-sod lawns that do not meet requirements and continue maintenance until lawns are satisfactory.

3.15 WATERING

- A. Apply water as needed to establish plants/sod and to develop and sustain plant growth to achieve a satisfactory stand.
- B. Temporary Irrigation System, if needed:
 - a. Water sodded areas until satisfactory emergence has been achieved, as accepted by the County.
 - b. Water plants as necessary to sustain plant growth and achieve a satisfactory stand.
- C. Flooding:
 - a. The Contractor shall coordinate with the County to flood and drain the wetland marsh zones.
- D. Planting areas will be either continuously or intermittently flooded to maintain moist soil conditions until plants have passed inspection and been accepted by the County. The Contractor shall recommend to the County application rates and depths of flooding for water level control to maintain moist conditions for optimum growth of wetland plants until inspection and acceptance by the County. Contractor to coordinate irrigation with the County.
- E. If planting commences prior to completion of water delivery, integrate temporary irrigation water containment with the planting such that irrigation can be supplied at all stages of planting. As successive areas are planted and supplied with temporary irrigation water, remove containment features serving areas planted previously. Design temporary irrigation water control and containment methods to avoid interference with subsequent planting stages.

3.16 STAFF GAUGE INSTALLATION

- A. The Contractor shall install the staff gauges inside the wetland cells within visual site of effluent sluice gate structures. The location of the staff gauges shall be coordinated and approved by the County.
- B. The Contractor shall level staff gauge elevations to within +/- 0.01 feet or less. All leveling will be performed under the direct supervision of a Professional Surveyor or Mapper licensed in the State of Florida. Leveling will meet or exceed the National Geodetic Survey Standards for third order leveling. Field notes shall be incorporated into a Surveyor's Report and shall be submitted to the County for review.

3.17 STAFF GAUGE MAINTENANCE

- A. The Contractor shall maintain the staff gauges including, but not limited to, cleaning the staff gauge to ensure it is legible from the berm and inspect the staff gauge for damage. The Contractor shall repair or replace the staff gauge if damage is observed. If repair or replacement of staff gauge is required, the Contractor shall ensure new staff gauge meets specifications for new installation for leveling and accuracy.

3.18 INSPECTION AND ACCEPTANCE OF WORK

- A. The County will give Contractor 3 days' notice prior to plant inspection visits.
- B. The County inspections for acceptance of work will take place at completion of initial plantings and after the first growing season for plantings. This frequency allows Contractor to react to obvious areas that may require replacement planting, if appropriate.
 - a. Initial planting inspections completed by the County shall determine if the plantings meet the density of plants meet the specifications.
 - b. Full growing season inspection will be completed by the County to determine the plantings meet the satisfactory stand description as specified.
- C. Punchlist:
 - a. The County shall develop a punchlist of items which do not conform to the specification requirements.
 - b. The Contractor will prepare and submit a plan to the County within 14 days of receiving the punchlist. The plan shall describe the Contractor's means and methods for completing the punchlist items. The plan shall indicate a timeline to complete the planting or repair.
 - c. Following completion of punchlist items by the Contractor, the County shall make a second inspection to ascertain that all deficiencies have been corrected.
- D. If requirements for satisfactory stands are met at final inspection, wetland planting will be accepted, and general plant maintenance will continue.

3.19 PLANT REPLACEMENT

- A. Plant replacements in any areas where the plant quantity is less than the specified density within 30 days after deficiency is identified by the County.
- B. Plant replacements in any areas that do not meet the survival rate specifications of a satisfactory stand after a full growing season cycle as identified by the County.

END OF SECTION