

Technical Specifications
For
THORNCREEK HOLE NO. 12 RE-DESIGN
Project #185-23
Final Bid Set



Prepared for:
City of Thornton, Colorado
9500 Civic Center Drive
Thornton, Colorado 80229

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**Thorncreek Hole No. 12 Re-Design
Project No. 185-23
City of Thornton, Colorado**

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APPENDIX A – DRAINAGE SAND

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The following is a general overview of the project. It is not intended to be all-encompassing and does not limit the work to less than that required by the drawings and specifications. The basic Scope of Work includes construction of one new tee complex, including demolition, grading, drainage, concrete cart path relocation, and installation of various grass types.
- B. The Plans, Proposal Forms and Technical Specifications show the entire improvement to be made for this project, and may include work to be done separately by others through arrangement with the Owner. Said work is shown for the Contractor's information and reference and for coordination purposes with the work by others.

1.02 TIME FOR COMPLETION

- A. Time of completion of the Work for the entire Project is as indicated in the proposal documents.
- B. Contractor shall supply schedule of completion for the project that is mutually agreeable to the Owner and Contractor per Special Conditions Section 9.

1.03 SCOPE OF WORK INCLUDED IN GOLF COURSE CONTRACT

- A. General Conditions Provisions
- B. Site Preparation, including preconstruction staking and layout, demolition of existing elements, and erosion control measures.
- C. Bulk earthmoving, rough grading and shaping of golf course features, utilizing proper management of topsoils and subsoils on site, including the use of water for compaction and dust control.
- D. Provision and installation of inlets, piping, and outfalls for golf course subsurface drainage systems.
- E. Adjustments to existing irrigation system.
- F. Construction of golf course tees and surrounds, including provision and installation of specialized gravels, sands, sub-drainage.
- G. Preparation of soil for planting and installation of sod, and landscape trees and / or plants in areas identified on plans.

H. Demobilization, clean-up, restoration, and repair.

END OF SECTION

PART 1 - GENERAL

1.01 PROPOSAL

- A. The Bid Proposal is a part of these Contract Documents and lists each item of work for which payment will be made. No payment will be made for any items other than those listed in the Proposal.
- B. Required items of work and incidentals necessary for the satisfactory completion of the Project which are not specifically listed in the Proposal, and which are not specified in this Section to be measured or to be included in one of the items listed in the Proposal shall be considered as incidental to the specified work required under this Contract, and all costs thereof including Contractor's overhead costs and profit, shall be considered as included in the prices for the various Items. The Contractor shall prepare his Bid accordingly.
- C. Work includes furnishing all plant, labor, equipment, tools, and materials, and performing all operations required to complete the work satisfactorily in place, as specified and as indicated on the Drawings.

1.02 PAYMENT BASIS

- A. Payment for each item of work as shown within the Proposal shall be based on a percent complete multiplier of the amount for that item.
- B. The Owner's determination of the actual percent complete of each item shall determine the amount payable each month. The Owner shall have the authority to revise the Contractor's pay requests based on this determination of percent complete. The GC Architect may assist the Owner in this determination.

1.03 ADDITIONS OR DELETIONS

- A. Approved additions or deletions to the scope of work shall be governed by the various "Unit Price for Increase or Decrease Basis" as listed in the Proposal. Said unit prices shall include all appurtenant and subsidiary work necessary to provide complete-in-place construction.
- B. Additions or Deletions to the Scope of Work which are not covered by a bid item or unit price shall be negotiated separately.

1.04 QUANTITIES

- A. It is the sole responsibility of the Contractor to determine the actual quantities necessary to provide a lump sum price for the complete in-place construction of the scope of work shown on the plans and described in the specifications.

- B. Any quantities shown on the plans or provided separately on the Proposal Forms are approximate, and strictly for the Contractor's convenience. The Owner makes no guarantee as to the accuracy or completeness of said quantities, and they shall not be used as a basis for additional payment or change order.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. These general sitework requirements apply to all site work operations. Refer to Division 2 specification sections for specific general, product, and execution requirements.

1.02 QUALITY ASSURANCE

- A. Comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess and waste materials.
- B. ~~Owner~~ Contractor will obtain and pay for all required site work related inspections, permits, and fees and provide notices required by governmental authorities.

1.03 PROJECT CONDITIONS

- A. Contractor shall not disturb soil or vegetation in areas outside limits of grading or grassing for any purpose throughout contract period. Travel routes between work areas shall be limited to designated or approved routes.
- B. With local utilities companies' assistance, help locate and identify existing underground and overhead services and utilities within contract limit work areas. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations at Contractor's expense. Contact applicable companies prior to commencement of construction work within utility or pipeline easements.
- C. Arrange for disconnection, disconnect and seal or cap all utilities and services designated to be removed before start of site work operations. Perform all work in accordance with the requirements of the applicable utility company or agency involved.
- D. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify Owner immediately to obtain procedure directions. Cooperate with Project authorities in maintaining active services in operation.
- E. Locate, protect, and maintain benchmarks, monuments, control points and project engineering reference points. Re-establish disturbed or destroyed items at Contractor's expense.
- F. Perform site work operations and the removal of debris and waste materials to assure minimum interference with streets, walks, and other adjacent facilities.

- G. Obtain governing authorities written permission when required to close or obstruct streets, walks and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways when required by governing authorities.
- H. Control dust caused by the work. Dampen surfaces as required. Comply with Section 02540 – Erosion and Sediment Control.
- I. Protect existing buildings, paving, and other services or facilities on site and adjacent to the site from damage caused by site work operations. Cost of repair and restoration of damaged items at Contractor's expense.
- J. Protect and maintain streetlights, utility poles and services, traffic signal control boxes, curb boxes, valves and other services, except items designated for removal. Provide for temporary relocation when required to maintain facilities and services in operation during construction work.

1.04 Warranty/Guaranty

- A. Contractor shall warrant all materials and labor for a period of one (1) year following the “Date of Initial Acceptance of Work” (see General Conditions) for the entire project. All replacement of defective materials and workmanship during said period shall be performed at no additional cost to Owner.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment: As selected by Contractor, except as indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine the areas and conditions under which sitework is performed. Do not proceed with the work until unsatisfactory conditions are corrected.
- B. Consult the records and drawings of adjacent work and of existing services and utilities which may affect site work operations.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Perform site preparation work as shown and specified. The work includes:
 - 1. Protecting existing vegetation and existing utilities to remain.
 - 2. Removing trees and other vegetation.
 - 3. Stripping and stockpiling topsoil.
 - 4. Locating and preparing approved laydown area(s).
 - 5. Removing designated site improvements.
 - 6. Installation of siltation barriers or other erosion control materials as required.
- B. Related work:
 - 1. Section 02200: Golf Course Grading

1.02 QUALITY ASSURANCE

- A. Comply with Section 02000 requirements.

1.03 PROJECT CONDITIONS

- A. Perform site preparation work before commencing grading work.
- B. Locate, protect, and maintain active utilities and site improvements to remain.
- C. Provide necessary barricades, coverings, and protection to prevent damage to existing improvements indicated to remain.
- D. Restore to original grades and conditions, areas adjacent to site disturbed or damaged as a result of site preparation work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials and equipment: As selected by the Contractor, except as indicated.

PART 3 - EXECUTION

3.01 SITE IMPROVEMENTS

- A. Existing utilities:

1. Information in the drawings relating to existing utility liens and services is from the best sources presently available. All such information is furnished only for information and is not guaranteed. Contact utility company or easement owner prior to work within any easements. Excavate test pits as required to determine exact locations of existing utilities.
 2. Perform work and provide necessary materials to disconnect or relocate existing utilities as indicated. Record existing utility termination points before disconnecting.
 3. Fill abandoned piping with an 8-inch-thick concrete plug or mortar jointed masonry bulkhead.
- B. Remove existing sidewalks, curbs, and paving, including all base material, as required to accommodate new construction. Cut existing sidewalks, curbs, and paving in neat, straight lines to provide uniform, even transition from new to adjacent existing work. Cut back existing paving a sufficient distance to permit forming and installation of new work.

3.02 CLEARING

- A. Locate and suitably identify trees indicated on plan to be removed.
- B. Clear and grub areas as indicated on plans as required for site access and execution of the work.
- C. Remove trees, plants, undergrowth, other vegetation, and debris as indicated on plans. Strip weeds and grass in areas to be regraded, resurfaced or paved. Strippings may be buried on site in non-critical areas approved by Owner's Representative.
1. Fell trees in a manner to prevent injury of adjacent facilities and to trees which are to remain.
 2. Remove stumps and roots to a clear depth of 36" below subgrades.
- D. Protect existing trees to remain against injury or damage, including cutting, breaking, or skinning of roots, trunks or branches, smothering by stockpiled construction materials, excavated materials, or vehicular traffic within drip line.
1. Repair trees scheduled to remain and damaged by construction operations in a manner acceptable to Owners Representative. Repair damaged trees promptly to prevent progressive deterioration caused by damage.
 2. Replace trees scheduled to remain and damaged beyond repair by construction operations, as determined by Owners Representative, with trees of similar size and species at Contractors expense.

3.03 STRIPPING OF TOPSOIL

- A. Strip topsoil to its full depth in areas to be regraded, resurfaced, or paved within contract limit work area.
- B. Stockpile topsoil in a location acceptable to Owner's Representative for use in finish grading and preparation of rootzones for planting.
 - 1. Stockpiled topsoil shall be free from trash, brush, stone over 3" diameter, and other extraneous matter.
 - 2. Grade and slope stockpiles for proper drainage and erosion prevention.
 - 3. No topsoil shall be removed from site.

3.04 DISPOSAL OF WASTE MATERIALS

- A. Transport waste materials to designated disposal areas off-site. Dispose of waste materials as directed.
- B. Maintain disposal routes clear, clean, and free of debris.
- C. On-site burning is not permitted.

3.05 CLEANING

- A. Upon completion of site preparation work, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, and free of materials and debris and suitable for site work operations.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Perform grading as shown and specified. The work includes:
 - 1. Mass site grading, excavation and filling to within one (1.0) foot of indicated elevations and contours.
 - 2. Finish grading and shaping to bring grades to within one-tenth of one (0.1) foot of indicated elevations and contours.
 - 3. Management of site topsoils and subsoils and capping sand to provide suitable structural stability and growing medium for specified plantings.
 - 4. Erosion, sedimentation and dust control.
- B. Related Work:
 - 1. Section 02100: Site Preparation
 - 2. Section 02210: Greens and Sand Bunkers
 - 3. Section 02400: Golf Course Drainage
 - 4. Section 02440: Irrigation System
 - 5. Section 02485: Grassing

1.02 QUALITY ASSURANCE

- A. Comply with Section 02000 requirements.
- B. Materials and methods of construction shall comply with the following standards:
 - 1. American Society of Testing and Materials, (ASTM).
 - 2. American Association of State Highway and Transportation Officials, (AASHTO).
- C. Comply with shaping operator requirements in Qualifications of Bidders section.

1.03 PROJECT CONDITIONS

- A. Protect existing trees, plants, and other features designated to remain as part of the work.

- B. Protect excavations by shoring, bracing, sheeting, underpinning, or other methods, as required to prevent cave-ins or loose dirt from entering excavations. Barricade open excavations and post warning lights at work adjacent to public streets and walks.
- C. Underpin adjacent structure(s), including utility service lines, which may be damaged by excavation operations.
- D. Promptly repair damage to adjacent facilities caused by earthwork operations. Cost of repair at Contractor's expense.
- E. Promptly notify the Owner's Representative of unexpected surface and/or sub-surface conditions prior to commencement of work. In the case of topographic discrepancies, if Owner's Representative is notified after work begins in an area claimed to have a discrepancy, Contractor shall be debarred from any claims resulting from such discrepancy, due to lack of a method for verifying discrepancy after the original condition is disturbed.
- F. Grade at excavations to prevent surface water draining into excavated areas.
- G. Cuts/fills shall proceed in accordance with grading plans to the heights, depths, and shapes indicated.
- H. Protect and maintain all green, tee, and fairway centerpoint reference stakes throughout grading operations.
- I. Become thoroughly familiar with site conditions and material to be excavated and used as fill.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fill materials: Material from project excavations shall be used as fill material. Fill materials shall consist of inert on-site soils free of rubbish, debris, rocks larger than three inches, roots, brush, or other objectionable material, and shall be moistened as required. Heavy clay soils or gravelly and rocky soils shall not be used as fill material within 6 inches of finished proposed finished grades.
- B. Other materials required for proper completion of work: As selected by Contractor and acceptable to Owner's Representative.
- C. The Contractor shall provide wooden stakes, magic markers, surveyor's flagging, wire flags, marking paint, paint gun, a 3-foot long SmartTool digital level, a laser instrument and rod and/or sub-centimeter GPS for GCA's use in reviewing, adjusting, and approving the grading work.

2.02 EQUIPMENT

- A. The Contractor may use any type of earthmoving, shaping, compaction and watering equipment he may desire or has at his disposal, provided the equipment is in a satisfactory condition and is of such capacity that the construction schedule can be maintained as planned by the Contractor and acceptable to the Owner. The Contractor shall furnish, operate and maintain such equipment as is necessary to control uniform density, layers, section and smoothness of grade.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Establish extent of grading and excavation by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels, and elevations using nearest available centerpoint and centerline stakes as horizontal and vertical control.
- B. In areas of work, topsoil shall be removed without contamination with subsoil and stockpiled convenient to areas for later application or as specified. Topsoil shall be stripped to full depth and shall be stored separate from other excavated materials and piled free of roots, stones, and other undesirable materials. Topsoils of differing types and quality shall be stored separately from each other.
- C. Earthwork is expected to achieve an overall balance on site. Contractor shall observe the staked heights of proposed fills and the staked depth of proposed cuts as they relate to existing grades shown on the Grading Plans. If discrepancies appear which in Contractor's judgment will affect earthwork balance, then Contractor shall adjust proposed grades to approximate as closely as possible the existing/proposed grade relationship shown on plans. Grade adjustments shall be reflected in all elevations in each work area, with the exception of drainage inlet grate and invert elevations. All grade adjustments are subject to the approval of Owner's Representative.
- D. When volume of excavation is in excess of that required for fill, the excess shall be placed as directed by Owner.
- E. When the volume of excavation is not sufficient for construction fills to the grades indicated, the deficiency shall be supplied from authorized borrow sources.

3.02 EXISTING UTILITIES

- A. Before starting grading and excavation, establish the location and extent of underground utilities in the work area. Exercise care to protect existing utilities during earthwork operations. Perform excavation work near utilities by hand and provide necessary shoring, sheeting, and support as the work progresses.

- B. Maintain, protect, relocate, or extend as required existing utility lines to remain which pass through the work area. Pay costs for this work, except as covered by the applicable utility companies.
- C. Protect active utility services uncovered by excavation.

3.03 GOLF COURSE GRADING

- A. Rough Grading: Excavate, haul, and place fill materials to within an average of 6 inches of proposed final grades and/or subgrades indicated on plans. In no case shall placed material vary from proposed finish grades and/or subgrades by more than 12 inches.
 - 1. Fills which are greater than two feet shall be compacted in eighteen inch lifts by rubber tired scrapers or loaders.
 - 2. Grade surfaces to assure areas drain away from structures and to prevent ponding and pockets of surface drainage.
 - 3. Suspend fill operations when satisfactory results cannot be obtained because of environmental or other unsatisfactory site conditions. Do not use muddy or frozen fill materials. Do not place fill material on muddy or frozen subgrade surface.
 - 4. Maintain surface conditions which permit adequate drainage of rain water and prevent ponding of surface water in pockets. When fill placement is interrupted by rain, remove wet surface materials or permit to dry before placing additional fill material.
 - 5. If rock, shale, hard pan, boulders or other unsatisfactory material is encountered, it shall be excavated to a minimum of 24 inches below finished grades and 12 inches below subgrades for greens and sand bunkers. Unsatisfactory materials shall be disposed of and the portion so excavated refilled with suitable selected material as specified.
 - 6. Contractor shall excavate separately any roadbeds which are to be disturbed as part of the Work. This material shall be stored separately from topsoil, or used in the bottom of a fill, and shall not be spread over any surface areas.
 - 7. Finish required shall be that ordinarily obtained from scraper and large bulldozer operations.
- B. Golf Course Shaping:
 - 1. General:
 - a. Shaping follows rough grading, when earthwork operations in an area have completed 100% of the excavation, and hauled and

placed fill material to within an average of 6 inches proposed final subgrades.

- b. Shaping is defined as the work required to bring the rough grade elevations to within 0.1 foot of the elevations indicated on the plans less any allowance for topsoiling.
- c. Prior to commencement of shaping, all critical points herein defined as high points of mounds, "saddle points" between mounds, toes of slopes, grade breaks, centerlines of swales, depressions and any other points indicated by Owner's Representative shall be staked (or re-staked) by Contractor. Nearest golf hole centerline staking shall be used as reference for horizontal control. Elevations at nearest centerpoint stakes shall be used as vertical control.
- d. Shaping is required on all areas where proposed contours indicate changes in elevation from the existing contours. This includes greens, tees, fairways, mounds, swales, sand traps, grass bunkers, cart paths and lakes.

2. Green Shaping:

- a. Shape subgrade of each green to within 0.1 foot of the subgrade elevation within the seedbed area. Subgrade shall be thoroughly compacted and smooth. No saucer-like depressions or tracks shall be left in subgrade of seedbed area.
- b. Shape surrounding mounds, slopes, swales, grass bunkers and other related landforms to within 0.1 foot of indicated finished subgrade elevations, allowing for topsoil plating to depth specified.
- c. Owner's Representative shall approve shaping of each green subgrade and surrounding features before trenching for subdrains begins. Shape final putting surface to finish elevations indicated on plans.
- d. Contractor may be required to make minor artistic adjustments in the shaping of each green and surrounding features and shall allow an average of four additional hours of shaping time for each green. Time not used on one green may be used on another green and no additional compensation will be allowed unless total additional shaping time required for the artistic adjustments exceeds the total allowance specified above.

3. Tee Shaping:

- a. Grade tee surface to a slope of 1.0%-1.5% from front to back or 0.5-1.0% from right to left unless or as indicated on Plan.
- b. Side slopes shall be as indicated on plans.

- c. An allowance of two additional hours of shaping per teeing area shall be made as per conditions set forth in paragraph B.2.d above.
4. Sand Bunker Shaping:
 - a. All sand bunkers shall be shaped and cut to sizes, shapes and depths indicated on the plans.
 - b. Greenside bunkers shall be shaped so that surface drainage from putting surface is directed away from bunker.
 - c. An allowance of one additional hour of shaping per bunker shall be made as per conditions set forth in paragraph B.2.d above. In addition, an allowance of ten (10) cubic yards of excavation, or an additional ten (10) cubic yards of fill for aesthetic adjustment shall be made.
5. Fairway, Rough, and Cart Path Shaping:
 - a. Shaping shall be performed to the heights, depths, slopes and shapes indicated on plans to within 0.1 foot of proposed subgrade elevations.
 - b. No depressions shall be left which hold water in areas to be grassed or paved.
 - c. The minimum acceptable slope for surface drainage in all areas of work other than greens and tees is 2.5% unless otherwise indicated or approved.
 - d. An allowance of two additional hours of shaping per fairway (in which work is proposed) shall be made as per conditions set forth in paragraph B.2.d above. In addition, an allowance of one hundred (100) cubic yards of excavation or fill for aesthetic adjustment shall be made.
6. Placement of Topsoil
 - a. Approved topsoil shall be placed over subgrades of all areas to be grassed with the exception of the putting green surfaces.
 - b. Do not place topsoil until subgrade has been approved.
 - c. Clear subgrade of all stones larger than three inches, sticks, and other extraneous materials prior to placement of topsoil.
 - d. Spread topsoil to a minimum depth of six inches (6") after natural settlement and light rolling to conform to finish grades and elevations shown on the drawings.

- e. Remove stones larger than three inches from subsoil and remove refuse, tree and shrub roots, clods, sticks or other extraneous materials from topsoil during spreading.
7. Fairway Sand Capping – In locations indicated on drawings on approved subgrades.
- a. Install capping sand in locations indicated on drawings over approved subgrades.
 - b. Subgrades shall be disked or scarified and required sub-drainage installed prior to placement of capping sand.
 - c. Clear subgrade of all stones larger than three inches, sticks, and other extraneous materials prior to placement of capping sand.
 - d. Spread capping sand to a uniform depth of six inches (6") after natural settlement and light rolling to conform to finish grades and elevations shown on the drawings.
8. Maintenance:
- a. Protect finish graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and damaged areas.
 - b. Where completed areas are disturbed by construction operations or adverse weather, scarify, re-shape, and compact to required density.

3.04 DRAINAGE

- A. Provide necessary temporary pumps and drainage lines and maintain excavations, including footings and pits, free from water, ice and snow during excavating and subsequent work operations.

3.05 SPILLAGE, DUST AND EROSION CONTROL

- A. Spillage: The Contractor shall prevent spillage when hauling on or adjacent to any public street or highway. In the event that spillage occurs, the Contractor shall remove all spillage and sweep, wash, or otherwise clean such streets or highways as required by local Owner, County and/or State authorities.
- B. Dust and Erosion Control: The Contractor shall take all precautions needed to prevent a dust nuisance to adjacent public or private properties and to prevent erosion and transportation of soil to downstream of adjacent properties due to his work under this Contract. Any damage so caused shall be corrected or repaired by the Contractor at no cost to the Owner.

3.06 DISPOSAL OF WASTE MATERIALS

- A. Transport excess excavated material, including rock, to designated disposal area. Stockpile or spread as directed. Remove from site and legally dispose of trash and debris.
- B. Maintain disposal route clear, clean, and free of debris.

3.07 CLEANING

- A. Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for site work operations.
- B. Those areas outside of the work areas in which the top layer of soil material becomes compacted due to hauling or to any other activity of the Contractor shall be scarified and disked to a depth of four inches to loosen and pulverize the soil. Such areas shall be re-graded and existing grass in these areas shall be replaced at Contractor's expense.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The work of this section consists of furnishing all necessary materials, equipment and labor for the construction of tee surfaces, including laser leveling, subdrainage, drainage sand, and capping sand. The tee complex construction shall follow the specific drawings, plans, and on-site directions from the Golf Course Architect.

1.02 QUALITY ASSURANCE

- A. Comply with shaping operator requirements in Qualifications of Bidders section. Also, a crew of not less than two men, at least one of which is an accomplished surveyor, shall be required to stakeout work areas.
- B. Contractor shall be responsible for preserving quality control of all materials used throughout construction. Contractor shall also be responsible for maintaining the required mixing ratio of sand and amendments to guarantee the laboratory specified characteristics.

1.03 SUBMITTALS AND TESTING

- A. The Contractor shall submit product data on all pipeline materials and test results on pipe material by manufacturer. The Contractor shall submit representative samples of drainage sand and capping sand for testing and approval. Samples shall be sent to both Owner's Representative and a soils laboratory which performs seedbed testing in accordance with USGA Green Section guidelines such as Brookside Laboratories or approved equal. The evaluations shall include the standard physical and particle size analysis, hydraulic testing and chemical stability for compatibility. Chemical analysis shall include pH, soluble salts, metals, and a complete nutrient profile. Acid extraction analysis methods shall be used. Provide rinse chemical analysis for any amendments at process plant. The Contractor shall make the necessary adjustments to amendments that are determined by the lab results. Costs for all materials testing shall be borne by Contractor. All test results shall be used by the Owner/Golf Course Architect to determine if the proposed materials are acceptable. Approvals of materials and mixtures shall be done at a date following contract award.
- B. Such materials delivered to jobsite shall again be tested at volume intervals not greater than 1000 cubic yards to assure that they comply with the materials approved in the initial testing. The cost of the check tests shall be borne by the Contractor. If representative materials delivered to jobsite vary significantly from those initially submitted and approved, all costs of complete retesting shall be borne by the Contractor.

- C. Owner's Representative reserves the right to reject all such materials which are found to be unsuitable, and Contractor shall be responsible for the removal of such materials from the jobsite and the replacement of such materials with approved materials at no additional cost to Owner.
- D. Contractor shall verify that the supplier(s) of each tee sand component is insured and in good standing with all subcontractors to maintain deliveries and have adequate inventories during and after construction. Submit supplier's prior references on completed projects.
- E. Provide Tee Subdrain Record Drawings:
 - 1. Legibly mark drawings to record actual construction.
 - 2. Indicate horizontal and vertical locations, referenced to permanent surface improvements.
 - 3. Identify field changes of dimension and detail and changes made by Change Order.
 - 4. Record drawings shall be current, and processing of pay request will not occur until such drawings are updated.

1.04 RELATED WORK SPECIFIED ELSEWHERE

Section 02200: Golf Course Grading
Section 02485: Grassing

PART 2 - MATERIALS

2.01 SUBDRAINS

- A. Turf Drain™ Sub-drains
 - 1. Shall be "Turf Drain™ sub-drains" of type and quality as manufactured by Turf Drainage Company of America, P.O. Box 702, Marrero, LA 70072 – or approved equal, size and type as indicated on plans.

2.02 SUBDRAIN BACKFILL SAND

- A. Shall be an approved sand, generally a material with minimal silt and clay with a saturated hydraulic conductivity rate of 30+” per hour.

2.08 CAPPING MATERIAL – ALTERNATE BID

- A. Tee Capping Material – Shall be a 70/30 blend of “Colorado Screened Topsoil” and “Premium 3 Compost” as supplied by A1 Organics of Eaton, Colorado.

PART 3 - EXECUTION

3.01 TEE SUBDRAINS

- A. Installation of Turf Drain:
 - 1. Drainage locations and patterns shall be determined in the field by the Architect and or Owner’s Representative.
 - 2. The Turf Drain material must be installed in trenches a minimum of 5” in width with a positive slope of a minimum of 0.5% maintained in the trench. It is recommended that the Turf Drain uses relief points that are 24” deep. Minimum depth of any lateral trench is 18”.
 - 3. Upper ends of the Turf Drain lines must be properly sealed with tape to prevent contamination from entering the system. Additionally, all lateral connections must be made with Turf Drain Lateral Connectors and properly taped.
 - 4. All Turf Drain lines are to be backfilled completely with approved sand, generally a material with minimal silt and clay with a saturated hydraulic conductivity rate of 30+” per hour. During the sand backfill process, it is acceptable to place the Turf Drain in the center of the trench, or as an alternative installation method to save labor; the contractor may place the Turf Drain against alternating walls. The contractor may pin the Turf Drain against alternating walls with sand, approximately every 5 to 8 feet. This procedure will assure that the Turf Drain material will have a sufficient amount of area where the sand is on both sides of the material. Once the material has been pinned against the walls the trench can be backfilled. It is recommended that a TyCrop or similar type of conveyor type material handler be used for this purpose. This will save labor versus trying to keep the Turf Drain standing up vertically in the center of the trench throughout the installation. The sand shall be compacted both mechanically and hydraulically to 6” below grade. The top 6” of the trench may be filled in a variety of ways depending on the installation. On projects that will be sprigged or seeded; the top 6” of the trench should be filled with a mix that has moisture retention of 15-18%. It is acceptable during the final grading process for native soil to intermix with this backfill material. On sand capped areas it is acceptable for the material that is being used in the sand capping process to be used at the top of the trench to the same depths as the overall sand cap. On projects where sod is being removed prior to the drainage installation and replaced

after the installation, the mix should be placed in the top 6” of the trench prior to replacing the sod.

5. Connection of Turf Drain to Outfall: Turf Drain lines shall be extended into a suitable connection point that allows free relief such as drain basins or solid drain lines or bodies of water. Connections into HDPE type drain lines shall be made with adapter fittings as supplied by The Turf Drainage Company of America.

3.02 TEE SURFACE

- A. Tee surfaces shall be capped with 6-inches of approved sand or mix as specified in 2.08.A of this section. Subgrade of tee shall be constructed 6-inches below finished grade and laser- leveled to uniform slope as indicated on plans. Subdrains shall be installed per 3.01.A of this section, and as shown on plans and/ or construction detail sheet. Sand shall then be placed at a uniform 6-inch depth over the tee surface limits. Topsoil capping of surrounds shall be flush with finished grade of capping sand and smoothed to a seamless transition at interface of sand cap and surrounding soil.

3.03 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from green, tee, and sand bunker installation.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide site drainage as shown and specified. The work includes:

1. Drainage structures and piping.
2. Excavating and backfilling site drainage work.

B. Related work:

1. Section 02200: Golf Course Grading
2. Section 02300: Greens, Tees, and Sand Bunkers

1.02 QUALITY ASSURANCE

A. Materials and methods of construction shall comply with the following standards:

1. American Society for Testing and Materials, (ASTM).
2. American Association of State Highway and Transportation Officials, (AASHTO).

1.03 SUBMITTALS

A. Product data:

1. Submit complete materials list of items proposed for the work.
2. Submit piping and inlet product data.

B. Provide golf course drainage system record drawings:

1. Legibly mark drawings to record actual construction.
2. Indicate horizontal and vertical locations, referenced to permanent surface improvements.
3. Identify field changes of dimension and detail and changes made by Change Order.
4. Record drawings shall be current, and processing of pay request will not occur until such drawings are updated.

1.04 PROJECT CONDITIONS

- A. Protect existing trees, plants, lawns, and other features designated to remain as part of the work.
- B. Protect excavations by shoring, bracing, sheeting, underpinning, or other methods, as required to prevent cave-ins or loose dirt from entering excavations. Barricade open excavations and post warning lights at work adjacent to public streets and walks.
- C. Underpin adjacent structure(s), including utility service lines, which may be damaged by excavation operations.
- D. Promptly repair damage to adjacent facilities caused by site drainage earthwork operations. Cost of repair at Contractor's expense.
- E. Promptly notify the Owner's Representative of unexpected sub-surface conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Site drainage piping: Provide types and sizes indicated. Provide matching couplings, fittings, and accessory components to ensure continuity of the site drainage system.
 - 1. 4" through 36":
 - a. High density corrugated polyethylene (PE) smooth interior drain pipe manufactured in conformity with the latest AASHTO Type S. The material compound shall conform to ASTM D3350.
 - b. Water tight pipe and fittings where specified.
- B. Golf Course PVC Surface Drainage Inlets
 - 1. Shall be an "In-Line Drain" of type and quality as manufactured by Nyloplast Drainage Products. The cast iron grate for the inlet is to be considered an integral part of the surface drainage inlet and shall be furnished by the same manufacturer. Size as indicated on Plans.
 - 2. The inline drains shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the furnished configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the piping system specified. This joint tightness shall conform to ASTM D3212. The pipe connection stubs shall be joined to the main body of the drain basin or catch basin utilizing a watertight, gasketed, swedged-type connection.

3. The pipe stock used to manufacture the main body and pipe stubs of the surface drainage inlets shall meet either ASTM D3034 or ASTM D679. The swedge gasket material and the gaskets used to form the connecting joint with the pipe stub shall meet the requirements of ASTM F477. Surface drainage products shall meet the mechanical property requirements for fabricated fittings as described in ASTM F794, F979, and F1336.
 4. The grates furnished for all surface drainage inlets shall be cast iron and shall be made specifically for each fitting. Grates for 12 inch and larger catch basins and inline drains shall be capable of supporting H-20 wheel loading. Grates for catch basins and inline drains inlets smaller than 12 inches shall be capable of supporting light wheel load traffic. Metal used in the manufacture of the castings shall conform to ASTM A-48-83 class 30B for gray iron. The castings shall be furnished with a black paint.
- C. Perma Basin™ Drains
1. Shall be a "Perma Basin™ Drain" of type and quality as manufactured by Turf Drainage Company of America, P.O. Box 702, Marrero, LA 70072 – or approved equal, size and type as indicated on plans.
- D. Earth Fill: Natural sandy-clay-loam subsoil, or approved excavated materials, free of foreign matter, organic material, rocks larger than one inch, and debris.
1. Excavated materials removed in site drainage trenching operation may be used as backfill when acceptable to the Golf Course Architect.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Layout site drainage work and establish extent of excavation by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels, and elevations.
- B. Inspect piping prior to installation to detect apparent defects. Mark defective materials with highly visible paint and remove from site.

3.02 EXISTING UTILITIES

- A. Before starting excavation, establish the location and extent of underground utilities in the work area. Exercise care to protect existing utilities during earthwork operations. Perform excavation work near utilities by hand and provide necessary shoring, sheeting, and supports as work progresses.
- B. Protect active utility services uncovered by excavation.

3.03 INSTALLATION

- A. Perform excavating and backfilling as required to install storm drainage work.
- B. Provide trench wall support and pumping of surface and ground water as required to provide suitable conditions for performing the work.
- C. Excavate trenches to accommodate indicated bedding conditions and material. Trim and shape trench bottoms to proper line and grade, free of irregularities. Remove unstable material and replace with compacted fill. Trenches shall be no less than 4 inches wider than the outside of the pipe on each side.
- D. Install site drainage system true to grade and alignment indicated.
 - 1. Provide necessary equipment for lowering pipe safely into trenches. Handle pipe and accessories to prevent damage. Damaged materials replaced at Contractor's expense.
 - 2. Do not place pipe in water, or when trench or weather is unsuitable for site drainage work.
 - 3. Remove all dirt and foreign material from pipe before installation. Provide controls as required to prevent entrance of dirt or water after installation.
 - 4. Lay and fit pipe sections to provide a smooth, uniform invert, with sealed joints and full bearing in bedding material. Provide uniform continuous fall in flow direction between the invert elevations shown on the Plans.
 - 5. Excavate bell holes under each bell to ensure uniform bedding for all types of bell and spigot piping.
 - 6. Install pipe joint gaskets in accordance with manufacturer's recommendations.
 - 7. Install plastic pipe in accordance with manufacturer's recommendations and in accordance with ASTM D2321.
 - 8. Place plugs in ends of uncompleted piping whenever work is suspended.
 - 9. Extend site drainage system to outfall indicated and make required connections.
 - 10. Joints connecting pipes of different material shall be standard manufactured fittings and/or adapters intended for that purpose.
 - 11. Install drain line cleanout risers as indicated on plans.

12. Obtain required inspections and perform testing prior to backfilling. Remove obstructions, replace damaged components, and retest as required. Provide a satisfactory free flowing site drainage system.
- E. Backfill trenches with an approved backfill material, free from large clods, stones, and debris.
 1. Backfill trenches in 6" compacted layers until there is a cover of not less than 12" over piping. Place remaining backfill material in 12" watered and compacted layers.
 2. Backfill evenly on both sides of piping for its full depth. Provide thorough compaction of fill under pipe haunches.
 3. Inspect piping after each segment between inlets, pipe junctions or cleanouts is complete and backfilled for line displacement or other damage.
 - F. Mechanically compact backfill with hand tampers or vibrating compactors.
 - G. Fill, compact, and restore to original level and condition all settlement.
 - H. Install drainage inlets of the type and size indicated in locations and at elevations indicated on plans. Protect from siltation with approved methods such as silt fence, tires, hay bales, or geotextile fabric under grate. The specified PVC surface drainage inlets shall be installed using conventional flexible pipe backfill materials and procedures. The backfill material shall be crushed stone or other granular material meeting the requirements of class 1 or 2 material as defined in ASTM D2321. The surface drainage inlets shall be bedded and backfilled uniformly in accordance with ASTM D2321.
 - I. Construct drainage system outfalls and pond overflows of the type and size indicated on plans.

3.04 DISPOSAL OF WASTE MATERIALS

- A. Transport excess excavated materials, including rock, to designated disposal area. Stockpile or spread as directed. Remove from site and legally dispose of trash and debris.
- B. Maintain disposal route clear, clean, and free of debris.

3.05 CLEANING

- A. Maintain site drainage piping and structures in a clean workable condition during construction operations.
- B. Flush site drainage system with water in sufficient volume to obtain free flow through each line. Remove all silt, trash, and debris just prior to acceptance of work.

- C. Upon completion of site drainage work, remove tools and equipment. Provide site clear, clean, free of debris, and suitable for site work operations.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The work of this section consists of removal of stones, sticks, roots and other debris from all finished graded areas to be grassed; soil preparation, fertilization and sprigging, plugging, or seeding of fairways, greens, tees, and roughs; and sod installation.

1.02 SUBMITTALS AND TESTING

- A. Seed

Seed shall be labeled in accordance with the United States Department of Agriculture under the Federal Seed Act, AOSA, and state seed laws. Each seed container shall bear the date of the last germination, which date shall be within a period of six months prior to commencement of the targeted planting operations. Seed that has become damaged in transit or in storage will not be acceptable. The type and minimum percentage-by-weight of pure live seed shall be as follows:

Purity	97 percent
Live seed	90 percent
Crop Seed	0 percent
Weed Seed	0 percent
Poa trivialis	0 percent
Poa annua	0 percent
Poa compressa	0 percent

Each lot of seed shall be subject to sampling and testing at the discretion of the Architect.

At the request of the Architect a 50 gram (1/8 lb.) sample of each seed type and seed lot shall be sent to an independent registered seed lab for testing. Sampling and testing will be in accordance with the latest Rules and Regulations under the Federal Seed Act, AOSA and state seed laws.

- B. Fertilizer

The fertilizer shall be delivered to the site in bags or other convenient containers, each fully labeled, conforming to applicable state fertilizer laws, and bearing the name, trade name or trademark, and the warranty of the producer.

C. Sod

Sod quality must conform to the standards set in Materials Section 2.05 of these specifications.

D. Sprigs

All sprigs and sod shall be freshly cut and in excellent viable condition upon arrival at jobsite. Contractor shall submit name of grass supplier and nursery location at least one month prior to ordering grass. If supplier is not a known supplier of grass, Owner's Representative may require an inspection of the nursery to verify that the grass is free of noxious weeds. All expenses related to such inspection shall be the responsibility of the Contractor. Tifsport or Tifway 419 springs shall be furnished in lengths no greater than four inches. Ultradwarf or Tifdwarf Bermuda sprigs for greens shall be furnished in lengths no greater than two inches. No dead top growth from previous growing seasons shall be included with live sprigs.

E. Soil Tests

Well in advance of soil preparation, Contractor shall submit representative soil samples from each golf hole to an approved agricultural or agronomic laboratory such as Brookside Laboratories, or approved equal, for testing to determine the need for soil reaction or other specific fertility adjustments. Costs for testing as well as specific reaction and fertility requirements differing from those specified shall be borne by Contractor.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200: Golf Course Grading
- B. Section 02210: Greens and Sand Bunkers
- C. Section 02440: Irrigation System

1.04 QUALITY ASSURANCE

- A. Seed shall be purchased from a reputable seed company such as the following or approved equal:

Seed Research of Oregon
27630 Llewellyn Road
Corvallis, Oregon 97333
541-757-2663

Jacklin Seed
5300 W Riverbend Avenue
Post Falls, Idaho 83854

800-688-SEED
Sharp Brothers Seed Co.
101 East 4th Street Road
Greeley, Colorado 80631
800-421-4234

- B. Sod and sprigs shall be purchased from a reputable grass nursery such as the following or approved equal:

Green Valley Turf Company
(303) 798-6764

1.05 DELIVERY AND HANDLING

- A. Seed shall be furnished in sealed standard containers unless exception is granted in writing by the contracting agency. Seed delivered to the job site shall be stored in a cool, dry, dark location until ready for use. Protect all materials from deterioration during delivery and storage.
- B. Provide strongly rooted sod, not less than one year old, in vigorous condition and free from uncontrollable weeds or grasses. Before any sod is delivered, the Contractor shall notify the Owner's Representative in writing as to the location from which the sod is to be obtained and the approximate quantity available, the same shall be subject to inspection and approval before it is lifted. No sod grown on peat shall be used. Sod shall be cut in rectangular sections as required, varying in lengths up to six feet; uniform width not to exceed eighteen inches. Sod shall be delivered to the job site within 24 hours after being cut, unless circumstances beyond the Contractor's control make it necessary for the sod to be placed in temporary storage, in which case, permission shall be obtained from the Owner's Representative. Any sod permitted to dry out or rot will be rejected if, in the judgment of the Owner's Representative, its survival after placement is doubtful.
- C. The Contractor shall provide and plant the grass sprigs by shredding the grass at the time of harvest and by delivering it to the job site and having it planted in the ground within 48 hours after it has been harvested.

1.06 JOB CONDITIONS

- A. No grassing is to be done until the irrigation system in the area to be grassed has been proven to be operable and reliable.
- C. All finished grades shall be approved by Owner's Representative prior to grassing.

PART 2 - MATERIALS

2.01 SOIL AMENDMENTS

- A. Owner shall provide and apply all soil amendments and fertility.
1. ~~Basic fertilizer for areas to be seeded with rye and bluegrass shall be a 14-21-10 turfgrass grade, small particle size product. A minimum of 25 percent of the total nitrogen (14 percent) shall be derived from sulfur coated urea; 45 percent from urea and the remaining 30 percent from monammonium phosphate. The quantity of application shall be 200 pounds per acre. Greens and Tees shall receive an additional application of STEP (Scotts Trace Element Package) or approved equal at the rate of 11 lbs. per 1,000 SF. Greens shall also receive an application of Milorganite or Hounactinite of 10 lbs. Per 1,000 SF, and 2 lbs./1,000 SF of Nitroform or approved equal.~~
 - ~~2. Basic Fertilizer for native grass areas shall be a 16-25-12 turf grass grade small particle sized physical blend. A minimum of 70% of the total nitrogen (16 percent) is to be derived from a polymer-encapsulated sulfur-coated urea and 30% from monammonium phosphate. Unless amended by soil reports the quantity of application shall be 176 lbs. per acre.~~
 - ~~3. Soil reaction amendments as specified by soil tests.~~

2.02 METHYL BROMIDE SOIL FUMIGANT

2.03 SPRIGS

- A. All sprigs shall be certified as to genetic purity and be free from pests and disease. All sprigs shall come from a nursery approved by the Owner's Representative.
1. Fairways/Near Roughs: **NA**

Rate: Six-hundred (600) "Texas", "Georgia" or "Industry Standard" (0.4 Cu. Ft.) bushels per acre
 2. Greens: **NA**

Rate: Forty (40) "Texas", "Georgia" or "Industry Standard" (0.4 Cu. Ft.) bushels per thousand square feet

2.04 SEED MIXTURES

A. Provide the following seed mixtures:

1. Greens: **NA**

Rate: 1.25 lbs./MSF
2. Target Greens: **NA**
2. Fairways/ Green Surrounds: **NA**

Rate: 450 lbs./AC
3. Roughs: **NA**

Rate: 400 lbs./AC
4. Native Areas: **NA**

Rate: Drilled – 35 lbs./ AC

2.05 SOD

A. Provide strongly rooted sod, nursery grown, certified as to genetic purity, not less than one year old, in vigorous condition and free from weeds, harmful insects, and disease. Sod shall be harvested no more than 48 hours prior to installation and shall be mowed at one and one-quarter (1 1/4") inch height before lifting from field. All sod shall be cut by same sod cutter or multiple machines adjusted to cut the same thickness of sod/root/soil mass. Owner's Representative reserves the right to reject any sod deemed unacceptable for installation.

1. Tee Surfaces (as indicated on grassing plan):

Green Valley Turf Short Cut Bluegrass Sod
2. Tee Surrounds (as indicated on grassing plan):

“Colorado Blue” Kentucky Bluegrass Sod

2.06 EROSION CONTROL BLANKET

- A. North American Green DS75 or approved equal.

2.07 STRAW MULCH

- A. Straw shall be derived from wheat, rice, or barley.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Fairways, Green, Roughs, Green & Tee Surrounds

All stones one (1) inch and larger, sticks and roots over 2 inch in diameter and 6 inches long, and any other lumps or debris larger than one (1) inch occurring within the top two (2) inches of soil which become visible during soil preparation, grassing, or specified grow-in period shall be removed. Areas where the topsoil has been severely compacted by traffic shall be disked to a depth of 4 inches to loosen the soil. Areas which have not been heavily compacted shall be disked to a depth of 2-3 inches to loosen soil and create a friable condition for seeding. Existing grasses and weeds may be disked under and killed as long as they do not interfere with producing a smooth and friable seedbed. Greens and tees shall not be disked, but shall be put in a smooth friable condition. All areas to be grassed shall be smoothed with a pipe/mat drag combination to level high spots and fill low spots simultaneously. All depressions which do not drain shall be eliminated to avoid standing water. All eroded and silted areas shall be restored to the proper finished grade. Within one week of the targeted grassing date, soil reaction adjustments shall be made to all fairways, roughs and tees at the rate specified by the soil analysis report. These amendments shall be incorporated by the Owner's Golf Course Superintendent. NOTE: When amendment is required, it will be applied prior to the placement of fertilizer. Fertilizer shall be distributed uniformly at the specified rates over the areas to be seeded as indicated on the drawings. Fertilizer shall not be incorporated into the green seedbed. STEP shall be distributed at the specified rate on both greens and tees. Shaping and soil preparation in all areas to be grassed shall be approved by the GCA prior to grassing.

- B. Tees

The fine grading of tees shall consist of leveling the tee surfaces to the slopes indicated on the Grading Plans by use of a tractor or sand pro mounted laser grader. The finish prepared by the laser grader for seeding shall be a plane which slopes 1% in the direction indicated on the Grading Plans. Crowned tees or those that fall off at the edges are not acceptable.

C. Greens and Collars

After the 12 inches of seedbed mix has been installed on the approved subgrade of the greens and collars by bulldozer. The following Scope of work shall be performed:

The seedbed mix shall be thoroughly watered (2 inches + over the entire surface) and then wheel rolled with a rubber tired tractor to thoroughly compact it. Cut off the HDPE moisture barrier 1 inch below grade. A plate compactor shall be used to compact where the mix meets the sidewalls of the cavity.

Following compaction, the seedbed mix shall be depth probed to verify correct depth. Add seedbed mix wherever the depth probing indicates that there is less than 12 inches.

Use a mechanized sand trap rake equipped with a blade or box to finish the surface and tie in around the perimeter.

- D. Contractor shall outline all areas to be grassed with stakes or wire flags in accordance with the Grassing Plans. Outlines shall be adjusted and/or approved by GCA prior to grassing.

3.02 GREENS FUMIGATION

~~A. All green seedbed areas and approximately three (3) feet beyond the perimeter thereof, shall be sterilized before planting with methyl bromide soil fumigant, applied under plastic covers in accordance with manufacturer's recommendations at the minimum rate of one (1) pound per one hundred (100) square feet of area.~~

~~B. Covers shall be left in place a minimum of twenty four (24) hours when the air temperature is 72 degrees F or greater, or a minimum of forty eight (48) hours when the air temperature is less than 60 degrees F.~~

~~C. Fumigated areas shall be permitted ventilation for at least forty eight (48) hours of clear, open weather, after the covers are removed before any grass is planted therein.~~

3.03 SPRIGGING

~~A. All sprigged areas indicated in Grassing Plans shall be sprigged to the type and rates specified herein.~~

~~B. Approved large tractor pulled planting equipment may be used on large, level, regular fairway or rough areas. This equipment shall contain Coulter blades or~~

~~similar devices for pushing the sprigs at least 1 1/2" into the friable topsoil bed. A farm disk shall not be used to incorporate sprigs.~~

~~C. Greens, tees, and areas too steep or irregular for the use of large planting equipment, shall be grassed by hand broadcasting the sprigs and using a smaller, walk behind planter to incorporate the sprigs into the prepared soil.~~

~~D. Sprigged areas shall be watered within 45 minutes of installation of sprigs.~~

3.04 SEEDING

A. All areas indicated on Grassing plans shall be seeded to the appropriate rates and mixtures specified herein.

B. Seed shall be uniformly sown by first incorporating ½ of the specified seeding rate in one direction and then ½ of the seeding rate at right angles to the first sowing with a cultipacker seeder such as a Brillion seeder or approved equal.

C. In areas too steep or restricted for the cultipacker seeder to operate, seed shall be hand broadcast to 1.5 times the specified rate. In preparation for hand broadcast seeding, the soil shall be roughened and loosened to otherwise treated to prevent washing of seed from slopes. Hand broadcast seeding shall be done only at such times when winds are less than 5 mph.

D. **No seed shall be installed later than September 15th without written consent of Owner.**

3.05 SODDING

A. All areas to be sodded shall receive an application of basic fertilizer 16-25-12 at the rate of 176 lbs. per acre before the placement of sod. Prior to installation of sand trap sand, the specified sod shall be installed on surrounding slopes of all sand traps. Sod shall be placed by hand with close joints with no overlapping. Joints shall be staggered. Sod strips shall be laid on slopes parallel with contours. All spaces between sections of sod, openings at angles, and similar gaps shall be plugged with sod. Soil surface of the sod shall be flush with adjacent sprigged, plugged or seeded areas. Within 45 minutes of laying, the sod shall be watered thoroughly and then tamped with approved sod tampers or rolled sufficiently to incorporate the sod with the sod bed and insure tight joints between the sections or strips. Any voids, openings or crevices still left after tamping or rolling shall be filled with topsoil. Upon completion of the above work, the sodded areas shall coincide with the finish grade, shall be flush with other seeded or grassed areas. Sod shall be pegged on slopes steeper than 3:1 with the pegs driven through the sod into the soil until pegs are flush with the turf. Pegs shall be sharpened one inch square by six inch long wood or sharpened six inch lengths of wood lath.

- B. **No sod shall be installed later than October 15th without written consent of Owner.**

3.06 EROSION CONTROL BLANKET

- A. Erosion control blanket shall be installed per manufacturer's instructions on all areas indicated on plans.

3.07 STRAW MULCH

- A. Straw shall be applied within 24 hours of drill seeding over fertilized and seeded soil surfaces. Do not apply during high wind conditions. Apply mulch in a uniform cover at a minimum rate of 4000 lbs./acre by hand or machine distribution. Anchor straw mulch to soil surface by crimping into soil mechanically using a knife bladed roller or straight bladed coulter, known commercially as a "crimper".

3.08 MAINTENANCE (Base Bid)

- A. Contractor shall apply initial watering following installation of ~~sprigs~~, seed, or sod. Owner shall then assume watering and other maintenance responsibilities.

3.09 INSPECTION AND ACCEPTANCE

- A. Owner shall evaluate all grassed areas approximately 28 days after the complete installation of seed, ~~sprigs~~, ~~plugs~~ or sod on each hole to determine whether a satisfactory stand of grass appears likely. Owner shall be the sole judge as to acceptability of grass establishment.
- B. Areas found to be unsatisfactory shall be reseeded, ~~resprigged~~, or resodded to the extent deemed necessary at Contractor's expense if in the sole judgment of the Owner the unsatisfactory conditions are due to materials or methods employed by the Contractor.
- C. Grassed areas will be accepted by Owner at a minimum unit of one hole at a time. No partially complete holes shall be accepted unless agreed to in writing by Owner.

~~3.10 ADDITIVE ALTERNATE BID FOR MAINTENANCE PERIOD:~~

- ~~A. Provide all labor, materials, and equipment for grow in and maintenance (excluding mowing) of each hole grassed and vegetated under this contract for a minimum period of Twenty-eight (28) calendar days after grassing of the hole is~~

~~complete as specified herein, or until seed has germinated and is ready for first mowing in seeded areas. Such maintenance shall include, but is not limited to the following:~~

- ~~1. Irrigation with automatic sprinkler heads, temporary over ground systems and hoses pulled from quick coupling valves at satisfactory intervals to keep grassed areas thoroughly moist but free from runoff. Irrigation procedures shall be performed and/or directed by a person experienced in irrigation and turf maturation procedures.~~
- ~~2. Any erosion or other soil disturbance which occurs prior to the conclusion of the maintenance period shall be promptly restored to the proper finished grade and replanted to the proper grasses and rates.~~
- ~~3. Seeded areas contaminated with other seed types from other areas shall be corrected.~~
- ~~4. Turf diseases and insect infestations shall be diagnosed and treated by Owner in coordination with Contractor, at Owner's expense.~~
- ~~5. Post plant fertilization of seeded areas shall be provided and applied by Owner in coordination with Contractor, at Owner's expense.~~
- ~~6. Areas shall be determined ready for initial mowing and acceptance as follows (mowing to be performed by Owner):~~
 - ~~a. Greens: Turf shall be considered mowable when grass plants are firmly rooted and leaves have reached a height of 3/8 inch to 1/2 inch, and there is sufficient turf coverage to support mowing equipment without deformation of ground surface. Mow at a height so as to remove no more than 30% of the leaf area. Mow at intervals as necessary, preferably 3 to 4 times per week, but not less than once every three days. Do not remove clippings until they reach such a volume as to shade the turf or create an environment for disease activity. As the turf canopy reaches full closure mowing height should be gradually reduced and mowing frequency increased to daily mowing.~~
 - ~~b. Tees, Fairway, Roughs: Turf shall be considered mowable when grass plants are firmly rooted and leaves have reached a height of 1.5 – 1.75 inches, and there is sufficient turf coverage to support mowing equipment without deformation of ground surface. Mow at a height so as to remove no more than 30% of the leaf area. Mow at intervals as necessary, but not less than once every three days. Do not remove clippings until they reach such a volume as to shade the turf or create an environment for disease activity. As the turf canopy reaches full closure mowing height should be gradually reduced.~~

- ~~c. Native Areas: Will not be subject to “first mowing” criteria above for initial acceptance, but shall be watered as other turf grass areas, with any erosions or damages repaired by the Contractor during the maintenance period for adjacent turf areas. Native areas shall be turned over to Owner at the time adjacent turf areas are accepted for mowing by Owner~~
- ~~8. Topdressing of Greens: Use material consistent in physical characteristics to the original root zone mix. Light, weekly applications (approx. 0.02 inch) should begin 2 to 3 weeks after planting depending on rate of turf development.~~
- ~~9. At the conclusion of maintenance period, all installed grasses and vegetation (excluding native areas) shall have germinated and be in a vital, actively growing condition, consistent with characteristics of each vegetation type and the installation rates specified herein. Under no circumstance shall any single bare area exceed four (4) square feet on greens & tees (a 2 ft. x 2 ft. area), or sixteen (16) square feet on fairways and near roughs (a 4 ft. x 4 ft. area).~~
- ~~10. Grassed areas which have reached a stage of growth ready for the first mowing and with other conditions as described above will be accepted by Owner at a minimum unit of one hole at a time. No partially complete holes shall be accepted unless agreed to in writing by Owner.~~

3.11 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from grassing operations.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The work of this section consists of furnishing all materials, equipment and labor for the construction of cart paths of concrete.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200: Golf Course Grading

1.03 JOB CONDITIONS

- A. Cart path installation shall occur after the shaping and irrigation has been approved in an area.

1.04 COORDINATION OF WORK

- A. If concrete is supplied by a ready-mix concrete producer, the Contractor shall coordinate and control the mixing and delivery of all off-site produced concrete.

PART 2 - MATERIALS

2.01 FORMS

- A. Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use forms free of distortion and defects.

2.02 PORTLAND CEMENT

- A. Portland cement: ANSI/ASTM C150, Type 1, unless otherwise acceptable to GCA.

2.03 AGGREGATES

- A. Coarse and fine aggregates shall conform to the requirements of ANSI/ASTM C150, Type 1, unless otherwise acceptable to GCA.

2.04 WATER

- A. Water shall be clean water from the utility company mains, free from acids, alkalis, oils or organic materials and shall be suitable for drinking purposes.

2.05 EXPANSION JOINT FILLER

- A. Redwood 1 x 4 lumber full depth, or Redwood 1 x 4 lumber with caulk sealant top strip

2.06 STEEL REINFORCING

- A. Shall conform to A615/A615M-05a: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

PART 3 - EXECUTION

3.01 STORAGE OF MATERIALS

- A. Protect all materials from damage or contamination by water, dirt, or other substances while stored at either the project site or the production site and during delivery.
- B. Store all materials above and clear of the ground surface except for aggregate.
- C. The method of delivering the aggregates to the work and storing and handling shall be such that the moisture content of the aggregates as they come to the mixer shall not be subjected to frequent or unnecessary changes. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates.

3.02 PREPARATION

- A. Following approval of an area for cart path installation, route of path shall be excavated to the proper depth required. The excavation width shall be at least as wide as the indicated cart path width in an area and no more than one foot wider. The final subgrade depth shall be such that finished paved surface of paths will be level with finished grade in adjacent grassed areas. Cart paths shall not cause water to stand nor impede drainage in any manner. The subgrade shall be scarified to a depth of two to three inches and the loose materials moisture conditioned to 2% below optimum moisture content prior to compaction. The subgrade shall then be compacted by a minimum of five passes of the largest self-propelled or tractor-towed roller that will fit into the excavated width.
- B. Remove loose material and debris from base surface before placing concrete.
- C. Install, align, and level forms. Stake and brace forms in place. Maintain following grade and alignment tolerances:

1. Top of form: Maximum 1/8" in 10'-0".
 2. Vertical face: Maximum 1/8" in 4".
- D. Clean forms after each use and coat with form release agent as necessary to assure separation from concrete without damage.
- E. Locate, place and support reinforcement as indicated.
1. ~~Provide a single layer of welded wire fabric or Fibermesh reinforcing in all concrete slabs on grade.~~
 2. Provide steel reinforcing bar as indicated on cart path detail, adequately supported and secured to prevent displacement.
 3. Provide reinforcing bars at curbs, steps and other locations indicated, adequately supported and secured to prevent displacement.
- F. Install, set and build-in work furnished under other specification sections. Provide adequate notification for installation of necessary items.
- G. Install pipe sleeves for irrigation system as indicated on plans. Stake location of irrigation sleeves.

3.03 MIXING OF CONCRETE

- A. Measuring and mixing of concrete shall be in accordance with the recommended practices of ACI 614 and PCA.
- B. All concrete shall be thoroughly mixed in approved batch mixer conforming to the requirements of the Mixer Manufacturer Bureau of the Associates General Contractor of America.
- C. All concrete materials shall be batched by weight. Materials for concrete shall be measured within the following percentages of accuracy:

Cement	1%
Water	1%
Aggregates	2%
Admixtures	3%

- D. Fine and coarse aggregates shall be separately measured and the water required by the concrete mix designs shall include the water that is contained in the aggregates. The method used for measuring shall be subject to the approval of the Owner's Representative, and shall be such that all mix ingredients can be

uniformly and accurately controlled and easily checked. Fine and coarse aggregates shall be measured loose and moist as delivered on the job.

- E. Each batch of 2 cubic yards or less shall be mixed for not less than 1½ minutes after all ingredients are in the mixer. Mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. Each batch shall be completely discharged before another is mixed.

3.04 TRUCK MIXED CONCRETE

- A. The use of truck mixed concrete will be permitted if consistent with the general provisions of this section and ASTM C94.
- B. The mixing time length and the number of revolutions of mixing shall conform to ASTM C94. Concrete shall be rejected if not placed within 1½ hours after water is first added or if 300 revolutions have taken place, whichever comes first.
- C. No water shall be added to any truck mixed concrete after leaving the batching plant.

3.05 FIBERMESH CONCRETE – Alternate Bid Item

- A. Alternate Bid Item H.7 - Substitute 4000 psi formed and poured concrete with 1.5 lbs./cubic yard of Forta SuperNet fibrillated fiber for the formed and poured concrete with steel reinforcing. All of the standards specified herein shall apply to the fibermesh concrete.

3.06 DELIVERY TICKETS

- A. Duplicate delivery tickets, one for the Contractor and one for the Owner shall be furnished with each load of truck mixed concrete delivered to the project site.
- B. Delivery tickets shall provide the following information;
 - 1. Ticket number
 - 2. Date
 - 3. Name of ready mixed concrete producer
 - 4. Name or number of plant at which concrete is batched
 - 5. Truck number
 - 6. Contractor's name
 - 7. Job name and location
 - 8. Type of cement used
 - 9. Class of concrete together with required strength, cement content, maximum size of aggregate and slump
 - 10. Time dispatched from plant, time arrived at jobsite, time left jobsite

11. Type, name and amount of admixture, if any
12. Amount of concrete in load in cubic yards
13. Amount of water added at job, if any, with signature of person authorizing the added water

3.07 USE OF ADMIXTURES

- A. Admixtures for the purposes of increasing workability or appearance of the concrete, or for improving any other characteristic, may be permitted, but only with the approval of the Owner. Any proposed admixture shall conform to the requirements of ASTM C260 or C494.
- B. Admixture shall be added by methods and in quantities recommended by the manufacturer. The Contractor shall be responsible for incorrect usage of type or quantity of admixtures.

3.08 CONCRETE TESTING PROCEDURES

- A. The Contractor shall furnish all materials that are to be tested at no cost to the Owner. All testing will be conducted in accordance with the hereinbefore listed ASTM Standards and Specifications by an established independent testing laboratory selected and paid by the Contractor.
- B. The Contractor shall be responsible for notifying the laboratory at least 24 hours before it is necessary to make test cylinders. If the Contractor places concrete without notifying the laboratory, the Owner will have the concrete tested by means of a core test as specified in ASTM C42 at the Contractor's expense.
- C. Sampling of fresh concrete shall be in accordance with ASTM C172.
- D. Tests for slump and entrained air shall be made every time test cylinders are made in accordance with ASTM C143 and reported by the testing laboratory. Additional slump tests may be required if any batches or deliveries are in doubt as to quality and as required for good control. Slump shall not exceed 4.5".
- E. Test cylinders will be made of concrete that is actually being placed at the project site and in accordance with ASTM C31. One test shall consist of three cylinders: one for testing at end of 7 days and two (2) for testing at the end of 28 days. One test shall be made for each 100 cubic yards of concrete placed, of each class strength specified, but not less than one test for each day's pour.
- F. The contractor shall provide adequate facilities as required by the testing laboratory for safe storage and proper curing of concrete test cylinders on the project site for the first 24 hours as required by ASTM C31.

- G. Testing of cylinders will be in accordance with ASTM C39.

3.09 EVALUATION OF CONCRETE TESTS

- A. The concrete cylinder tests shall be evaluated in the following manner. The concrete shall be considered acceptable if the average of the two 28-day compression tests is equal to or greater than the required laboratory minimum 28-day strength specified for each particular class of concrete construction.
- B. If any one of the two tests is less than the average of the two tests by more than 10%, that entire test shall be considered erratic and not indicative of the concrete strength. Core samples will be required of this concrete.
- C. Should any of the 28-day laboratory tests show an average compressive strength less than that specified for each class of concrete construction, the cement content of the remaining concrete to be placed shall be increased as will be regulated by the Owner's Representative to ensure concrete at adequate strength throughout the remainder of the work and no charge shall be made to the Owner for the increased cement content.
- D. If any 28-day laboratory test indicates that concrete of low strength has been placed which cannot safely, in the opinion of the Owner's Representative, sustain the loads for which it has been designed under laws and regulations, the concrete in question shall be tested by taking cores from such portions of the work as the Owner's Representative may direct. At least three representative cores shall be taken and tested as specified in ASTM C42.
- E. If compression tests of the core specimens show that the concrete is inadequate for design loads and stresses, the concrete shall be strengthened, defective members or materials replaced, as will be regulated by the Owner's Representative.
- F. The taking and testing of core samples, the replacement or strengthening of defective concrete and area load test shall be entirely at the expense of the Contractor.

3.13 REVIEW BY THE OWNER'S REPRESENTATIVE BEFORE CONCRETE REPLACEMENT

- A. Review by the Owner's Representative is required of all work required to be built into the concrete before the concrete is placed. Review by the Owner's Representative does not relieve the Contractor from complying with the requirements for the Contract Drawings and Specifications.

- B. The Owner's Representative must be notified at least 72 hours prior to the placing of any concrete, and the placement of concrete before such notice is given and/or before review by the Owner's Representative, is a valid reason for rejecting the concrete so placed.
- C. Before any concrete is placed, mixing and conveying equipment shall be well cleaned, formwork completed, the forms or space to be filled with concrete thoroughly cleaned; forms, if not oiled, shall be wet; all reinforcement secured and cleaned; and expansion joint material, anchors and other embedded items positioned.
- D. Excess form oil shall be wiped off and no oil shall be allowed to coat reinforcing steel to the slightest degree.
- E. Concrete shall be handled as rapidly as practicable from the mixer to the place of final deposit by methods which prevent the separation or loss of ingredients. It shall be deposited as nearly as practicable in its final position to avoid rehandling or flowing.
- F. Place concrete only when the ambient temperature is at least 40° F and rising, and will remain above 40° for a period of at least 12 hours. A calibrated thermometer shall be provided at the project site.
- G. Concrete shall be carefully worked around reinforcing and other embedded items, along surfaces and into the corners of forms eliminating all air or stone pockets.
- H. Concrete shall be consolidated by the use of vibrators in accordance with ACI 609. Vibration must be by direct action in the concrete and not against forms or reinforcements. Concrete shall be vibrated until the water shows indications of rising, but not until the water has risen.

3.14 INSTALLATION

A. CONCRETE PLACEMENT

1. Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as specified.
2. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing. In cold weather comply with ACI 306, "Recommended Practice for cold Weather Concreting". In hot weather comply with ACI 305, "Recommended Practice for Hot Weather Concreting".

3. Moisten base to provide a uniform dampened condition at the time concrete is placed. Verify manholes or other structures are at required finish elevation and alignment before placing concrete.
4. Place and spread concrete to the full depth of the forms. Use only square-end shovels or concrete rakes for hand-spreading and consolidating concrete. Exercise care during spreading and consolidating operations to prevent segregation of aggregate and dislocation of reinforcement.
5. Place concrete in a continuous operation between expansion joints. Provide construction joints when sections cannot be placed continuously.
6. Place concrete in one course, monolithic construction, for the full width and depth of concrete work.
7. Strike-off and bull-float concrete after consolidating. Level ridges and fill voids. Check surface with a 10'-0" straightedge. Fill depressions and refloat repaired areas. Darby the concrete surface to provide a smooth level surface ready for finishing.
8. Provide curb profiles indicated.

B. Joints

1. Construct control, expansion and construction joints properly aligned with face perpendicular to concrete surface. Provide control joints as indicated on Cart Path Details on plan sheets.
2. Provide tooled control joints, sectioning concrete into areas indicated. Tool joint to depth equal to not less than one-fifth (1/5) of the concrete thickness. Hand tool control joints in pattern and at spacing indicated. When not indicated provide even spacing equal to slab width and not greater than 10'-0" on center, perpendicular to path direction.
3. Provide standard keyed-section construction joints where indicated.
4. Provide expansion joints using redwood or premolded joint filler at concrete work abutting curbs, walls, structures, walks, and other fixed objects.
 - a. Locate expansion joints as indicated. When not indicated, provide joints at maximum 30'-0" on center for curbs and paths. Align expansion joints in abutting curbs and walks.

- b. Install joint fillers full-width and depth of joint. Provide top edge flush with adjacent finished surface with tooled concrete edge on both sides.
- c. Provide joint fillers in single lengths for the full slab width, whenever possible. Fasten joint filler sections together when multiple lengths are required.
- d. Protect the top edge of the joint filler during concrete placement.

3.15 PROTECTION AND CURING OF CONCRETE

- A. All concrete placed shall be protected such that the temperature at the surface shall be prevented from going below 55° for 72 hours after placing and prevented from going below freezing for 3 days thereafter.
- B. The Contractor shall submit, for review by the Owner's Representative, the methods proposed for protecting the concrete against low or high temperatures. The Contractor shall adhere to the recommendations for cold or hot weather concreting of ACI 306 and 605, respectively, to temperature of fresh concrete, heating or cooling of concrete materials, use of accelerators and other admixtures, methods of protection, temperature records, etc.
- C. After concrete placement protect concrete during other construction activities as necessary to prevent damage from equipment and personnel movements and from excessive stresses resulting from construction loads.

3.16 REPAIR OF SURFACE DEFECTS

- A. After forms are removed, joint marks, fins, honeycombed areas, bulges, depressions, etc., on all concrete surfaces shall be removed and/or filled, leaving a smooth, dense and true surface.
- B. All tie holes and all repairable defective areas shall be patched immediately using non-staining, non-shrink grout with a minimum compressive strength of 6000 psi. The color of the patching grout shall match that of adjacent concrete.
- C. Honeycombed areas and other defective concrete shall be removed down to sound concrete as directed by the Owner's Representative before patching. All honeycombed areas shall be shown to the Owner's Representative.
- D. All areas to be patched shall be thoroughly cleaned and dampened before patching is begun.

- E. Cracked concrete sections shall be removed and replaced as directed by Owner's Representative.

3.17 FINISHES

- A. ~~The edges of the path and along the control and expansion joints shall be troweled smooth with the centers receiving a brushed texture. Brush lines shall be straight and perpendicular to the path.~~
- B. Concrete surfaces shall receive a broom finish. Brush lines shall be straight and perpendicular to the path. Tool all edges with 0.5" radius to prevent chipping of edge.

3.18 CURBS

- A. Concrete curbs shall be four (4) inches high (or as indicated on cart path detail) and shall be a "mountable" rolled type curb unless otherwise indicated. The concrete used for the curbs shall meet the same standards as specified for the actual paving and shall be installed as a monolithic pour with the path.

3.19 SPOIL REMOVAL

- A. All spoils from the excavation of cart path subgrade, if not used nearby for back grading against the cart path, shall be disposed of in areas approved by Owner.

END OF SECTION

PART 1: GENERAL

- 1-1 DESCRIPTION: The work of this section consists of temporary measures for the control of erosion, sedimentation and other pollutants during construction. Work includes installation of such measures, maintenance during the contract period to assure proper function, and removal of temporary measures in coordination with installation of permanent erosion control measures.
- 1-2 RELATED WORK SPECIFIED ELSEWHERE:
Golf Course Grading – Section 02220
- 1-3 SUBMITTALS: Prior to beginning construction the Contractor shall prepare and submit to the Owner a sketch plan showing any alternative control measures, adjustments or phasing anticipated during the construction, typical details and manufacturer's information for materials.
- 1-4 REFERENCE STANDARDS: The basic standards and details to be used are those contained in Volume 3 of the Urban Storm Drainage Criteria Manual by The Urban Drainage and Flood Control District. In addition, the Contractor may submit details, sketches and descriptions of other soil erosion and sediment control measures he wishes to utilize during construction (or modifications to the specified practices).

PART 2: MATERIALS

- 2-1 CHANNEL SLOPES AND OTHER DISTURBED AREAS: Materials for use as temporary measures include straw bales, loose mulch, mulch blankets, silt fence, sod buffer strips and other stabilization materials.
- 2-2 ACTIVE FLOWING STREAM OR DIVERSION: Material for use as temporary measures to stabilize the invert or toe of slope zone of a live stream or diversion channel include pipe, concrete rubble, riprap, plastic sheeting, synthetic erosion control matting or other functional material that is not hazardous to water quality. Refer also to Section 02530, Water Control and Dewatering.
- 2-3 STORM SEWER OUTFALLS/POINT DISCHARGES: Materials for temporary erosion control on slopes downstream of storm sewer or swale outfalls may be pipe, concrete rubble, riprap, cast-in-place concrete, plastic sheeting, synthetic erosion control matting or other functional material that is not hazardous to water quality.

PART 3: EXECUTION

- 3-1 GENERAL: Procedures for installation, maintenance and removal of temporary erosion control measures shall generally conform to the guidelines contained in the criteria manual referenced in Part 1-4. The specific practices and measures to be implemented depend on the contractor's construction procedures, sequencing and general approach to the project. These specifications are intended to be objective-oriented. As such they describe conditions which are to be guarded against by temporary controls while allowing the Contractor to determine the nature and form of the control measures.

- 3-2 CONSTRUCTION IN WATERWAYS: To the extent possible, movement of construction equipment within the flowing portion of channels or waterways should be minimized. Frequent fording of the stream should be avoided. Isolate or divert stream flows so construction equipment, materials and earthwork are not exposed (vulnerable) to flow.
- 3-3 TEMPORARY CONTROLS DURING SITE WORK:
- A. All dewatering flows that carry sediment or other deleterious material shall not be directly introduced to the stream. Such flows shall be routed to a sediment basin(s) or trap(s) for treatment prior to discharge to the stream. The intent is to trap material disturbed by construction activities and prevent the discharge of this material into the stream. Refer to Section 02530. Sediment basins or traps shall be monitored and maintained no less than weekly (including removal of sediment and/or repair of basin dike or filter material) or whenever the basin fills with sediment to 50 percent of capacity. Provide a reference line, marked post or other means to indicate sediment storage level.
 - B. Properties and roadways adjacent to the site shall be protected from sediment deposition. This may be accomplished by leaving a sod buffer strip around the lower perimeter of the land disturbance, by installing perimeter controls such as sediment barriers, filters or dikes, or by a combination of such measures. Construction ingress and egress routes should be stabilized by gravel or other means to prevent tracking sediment, mud or debris onto adjacent thoroughfares.
 - C. Sediment basins and traps, perimeter dikes, sediment barriers (such as straw bale barriers or silt fencing), and other measures intended to trap sediment on-site, must be constructed as a first step in grading and be made functional before upslope land disturbance takes place.
 - D. Diversion channels must be stabilized against erosion by use of riprap, or other measures. Refer also to section 02530.
 - E. Roughened soil surfaces are preferred to smooth surfaces on slopes during initial grading operations. Diversion dikes should be constructed at the top of long or steep slopes which have significant drainage areas above the slope. Diversions or terraces may also be used to reduce slope length.
 - F. Concentrated storm water should not be allowed to flow down cut or fill slopes unless contained within a stabilized temporary or permanent channel, flume or slope drain structure.
 - G. Wherever a slope face crosses a water seepage plane which endangers the stability of the slope, adequate drainage or other protection should be provided.
- 3-4 DUST ABATEMENT: During the performance of the work required by these Specifications or of any operation appurtenant thereto, the Contractor shall furnish all the labor, equipment, materials and means required, and shall carry out proper and efficient measures whenever and as often as necessary to reduce the dust nuisance and to prevent dust which has originated from his operations from damaging dwellings or causing a nuisance to persons. The Contractor shall be liable for any damage resulting from dust originating from his operations under these Specifications. The cost of sprinkling or of other methods for dust control shall be included in the cost for erosion and sediment control.

3-5 DISPOSITION OF TEMPORARY MEASURES: All temporary erosion and sediment control measures shall be removed and disposed of as permanent measures are being installed. Both operations shall be coordinated to prevent erosion or other damage to the channel or finished grading. Trapped sediment or other disturbed soil areas shall be permanently stabilized to prevent further erosion and sedimentation.

END OF SECTION

Appendix A

Drainage Sand

February 24, 2016

L.G. Everist, Inc.
7321 E. 88th Ave., Suite 200
Henderson, CO 80640

Attention: Mr. Tim Cheever

Subject: Laboratory Test Results
Firestone Pit ASTM C 33 Aggregate Tests
ASTM C 33 Fine Aggregate
ASTM C 33 Size No. 8 Coarse Aggregate
ASTM C 33 Size No. 57/67 Coarse Aggregate
ASTM C 33 Size No. 4 Coarse Aggregate
Squeegee
WesTest Project No. 480916

Gentlemen:

Enclosed on Tables 1 through 5 are the results of aggregate physical property and quality tests, done in general accordance with ASTM and AASHTO criteria, on aggregate sampled from the above-referenced source on January 13, 2016.

The test results indicate the material meets ASTM C 33, *Standard Specification for Concrete Aggregates*, and Colorado Department of Transportation requirements for the properties tested.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,
WesTest

Quyên Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.

LABORATORY TEST REPORT



627 Sheridan Boulevard • Lakewood, CO 80214
303.975.9959 • office@westest.net

CLIENT: L.G. Everist, Inc.
SOURCE: Firestone Pit
SAMPLED BY: Client
PROJECT: Firestone Pit Aggregate Testing

WesTest PROJECT NO.: 480916
REPORT DATE: February 24, 2016

MATERIAL DESCRIPTION	ASTM C 33 Fine Aggregate
DATE SAMPLED	January 13, 2016
SAMPLE LOCATION	Stockpile

Aggregate Physical Property and Quality Tests (ASTM C 33, AASHTO M 6 Specifications)

ASTM C 117 & C 136, AASHTO T 11 & T 27				ASTM C 128, AASHTO T 84, Bulk Specific Gravity = 2.61, Bulk Specific Gravity (SSD) = 2.64, Apparent Specific Gravity = 2.69, Absorption = 1.2%				ASTM C 88, AASHTO T 104, Sodium Sulfate Soundness, 5 Cycles					
SIEVE SIZE	% Passing	ASTM C 33 Spec.	AASHTO M 6 Spec.			SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g	PERCENT PASSING AFTER TEST	WEIGHTED PERCENT LOSS			
1"				ASTM D 2419, AASHTO T 176, Sand Equivalent Value = 94 Specification: 80 Min. (CDOT)				Minus #100	7				
3/4"								# 50 to # 100	8				
1/2"								# 30 to # 50	19	100.0	2.4	0.5	
3/8"	100	100	100	ASTM C 142, AASHTO T 112, Clay Lumps & Friable Particles FINE AGG. = 0.0%, Specification: 3.0% Max.				# 16 to # 30	29	100.0	3.5	1.0	
# 4	100	95 - 100	95 - 100					# 8 to # 16	25	100.0	7.3	1.8	
# 8	88	80 - 100	80 - 100					# 4 to # 8	12	100.0	7.3	0.9	
# 16	63	50 - 85	50 - 85	ASTM C 123, AASHTO T 113, Lightweight Particles in Aggregate				3/8" to # 4	0				
# 30	34	25 - 60	25 - 60					TOTAL	100	FINE AGG. TOTAL 100%		4	
# 50	15	5 - 30	10 - 30					SPECIFICATION:					10 Max.
# 100	7	0 - 10	2 - 10	SAMPLE WT.	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC.	ASTM C 40, AASHTO T 21, Organic Impurities: Less than Organic Plate No. 1 Specification: Organic Plate No. 3 or Less					
# 200	1.4	0 - 3.0	0 - 2.0	386.1	ZnCl ₂ /2.0	0.0%	0.5% Max.						
Fineness Modulus	2.93	2.3 - 3.1	2.3 - 3.1	386.1	ZnBr ₂ /2.4	0.0%	3.0% Max.						

COMMENTS:

TABLE 1

Golf Course Construction Bid Proposal Form

Thorncreek Hole 12 Re-Design

City of Thornton, Colorado

Lump Sum Bid All Items Complete In Place

Base Bid Items

A. Mobilization					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
A.1	Bonding Costs	LS		1	\$ -
A.2	Equipment Mobilization, Job Office, Permits, Signage, Etc.	LS		1	\$ -
Subtotal Mobilization:					\$ -

B. Site Preparation					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
B.1	Preconstruction Staking and Layout	LS		1	\$ -
B.2	Rototill All Work Areas	EA		1.12	\$ -
B.3	Prepare SWPPP (Erosion Control Plan)	LS		1	\$ -
B.4	SWPPP Documentation, NOI Filing Fee, and Inspections	LS		1	\$ -
B.5	Filter Fabric Fence	LS		580	\$ -
B.6	Inlet Protection Barriers	EA		7	\$ -
B.7	Stabilized Construction Access	EA		1	\$ -
B.8	Concrete Truck Washout Structure	EA		1	\$ -
Subtotal Site Preparation:					\$ -

C. Earthwork					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
C.1	Local Dozer Cut & Fill	CY		574	\$ -
C.2	Onsite Scraper/ Topload Cut & Fill	CY		0	\$ -
C.3	Onsite Topsoil Management	CY		907	\$ -
C.5	Shaping	AC		1.12	\$ -
C.6	Dust Control	LS		1	\$ -
Subtotal Earthwork:					\$ -

D. Storm Drainage					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
D.1	Install 6" Solid ADS Smoothwall Pipe	LF		388	\$ -
D.2	Install 8" Solid ADS Smoothwall Pipe	LF		163	\$ -
D.3	12" PermaBasin Drain - PB 2400	EA		6	\$ -
D.4	12" PermaBasin Drain - PB 4800	EA		1	\$ -
D.5	Misc. Tie-ins to existing drainage structures as indicated on plans	LS		1	\$ -
D.6	Supplemental TurfDrain Sub-drainage allowance around inlets	LF		200	\$ -
Subtotal Storm Drainage:					\$ -

E. Tees					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
H.1	Laser level all tee surfaces	SF		8,520	\$ -
Subtotal Tees:					\$ -

F. Cart Paths					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
J.1	Exst. Path demolition	SF		3,460	\$ -
J.2	New concrete path	SF		3,610	\$ -
J.3	Rolled Monolithic curbing	LF		335	\$ -
Subtotal Cart Paths:					\$ -

G. Grassing					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
K.1	Prepare and Float All Areas to be Grassed (amendments and fertility application by Owner)	AC		1.04	\$ -
K.2	Solid Sod - Short-Cut Kentucky Bluegrass - Tee Surfaces	SF		8,520	\$ -
K.3	Solid Sod - "Colorado Blue" Kentucky Bluegrass - Surrounds	SF		36,277	\$ -
Subtotal Grassing & Landscape:					\$ -

Total Base Bid Construction Cost: \$ -

Alternate Bid Items

H. Additive Alternate Bid Items					
ITEM	DESCRIPTION	UNITS	UNIT COST	Quantity	Cost
H.1	Tee Subdrainage - Install TurfDrain with specified backfill on tee surfaces	LF		185	\$ -
H.2	Tee Subdrain Outfalls - 4" Solid ADS Smoothwall Pipe	LF		940	\$ -
H.3	Tee Surface Soil Cap - 4" Compacted Depth - A1 Organics Amended Topsoil - 70% "Colorado Screened Topsoil"/ 30% "Premium 3 Compost"	SF		8,520	\$ -
H.4	Lump Sum Irrigation Bid from Irrigation Bid Form	LS		20,000	\$ -
H.5	Install 8 ft. Austrian Pine - Location TBD by Golf Architect	EA		25	\$ -
H.6	Install 2" to 2.5" Caliper Kentucky Coffee Tree - Location TBD by Golf Architect	EA		5	\$ -
H.7	Change in Bid Price to Install 4000 psi Fibermesh (Forta SuperNet @ 1.5#/CY) Concrete in Lieu of 3500 psi Steel Reinforced Concrete Cart Paths	SF		3,610	\$ -

Thorncreek 12 Tee Irrigation System Renovation Bid Form November 9, 2023

Unit prices will be used to calculate any cost changes in the event equipment is added or deleted. As-builts will be used to determine final installed quantities.

Equipment	Unit	Unit Cost	Bid Quantity
Furnish and install 2" DR11 HDPE pipe	LF	\$0.00	
Raise existing sprinkler to match new grade. Include fittings, splice kit and swing joint modifications as needed	EA	\$0.00	
Lower existing sprinkler to match new grade. Include fittings, splice kit and swing joint modifications as needed	EA	\$0.00	
Raise existing valve box. Include sleeving as needed	EA	\$0.00	
Lower existing valve box. Trim sleeving as needed	EA	\$0.00	
Furnish and install 2" DR11 HDPE pipe with Philmac compression fittings.	LF	\$0.00	
Project Costs			
Mobilization			\$0.00
Irrigation Labor			\$0.00
Project Overhead and Profit			\$0.00
Materials			\$0.00
Irrigation System Bid			\$0.00