

**CHEROKEE SPRINGS GOLF CLUB**  
**FRONT NINE - TEE AND BUNKER RENOVATION**  
Tahlequah, Oklahoma

**BOOK OF SPECIFICATIONS**  
VERSION 1 - January 1, 2014



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**Golf Architecture**

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Book of Specifications  
Definitions and Abbreviations - Section 1

**SECTION 1.000 - DEFINITIONS AND ABBREVIATIONS**

As used elsewhere in the Contract Documents, Cherokee Springs Golf Club shall be referred to as **“OWNER,”** the Golf Course Architect (Tripp Davis and Associates) shall be referred to as **“GC ARCHITECT,”** and the Golf Course Builder shall be referred to as **“GC CONTRACTOR.”**

The following abbreviations may be used in these specifications:

- AGC - Associated General Contractors of America
- AIA - American Institute of Architects
- AOSA - Association of Official Seed Analyst
- ASA - American Standards Association
- ASTM - American Society for Testing and Materials
- AWWA - American Water Works Association
- BLM - Bureau of Land Management
- CS - Commercial Standard, U.S. Department of Commerce
- NEMA - National Electrical Manufacturers Association
- NFPA - National Fire Protection Association
- UL - Underwriters Laboratories, Inc.
- USGA - United States Golf Association

Where reference is made to a specification by one or more of the above mentioned or other associations, it is understood that the latest revisions and/or edition at the time of bidding thereof will apply. In case of conflict, this specification will take precedence over the above noted specifications, unless otherwise directed by the **GC ARCHITECT.**

Book of Specifications  
Construction Schedule - Section 2

**SECTION 2.000 - CONSTRUCTION SCHEDULE**

The GC CONTRACTOR agrees to commence work on or before a date to be specified in a written "Notice to Proceed" from the OWNER and to fully complete the project within the following specified time periods: **It is the intent of the OWNER to commence all Work on February 10, 2014 (tentative date).**

**The GC CONTRACTOR is expected to achieve Substantial Completion within sixty (60) calendar days from the date of commencement.** Substantial Completion is defined as completion of all Work that is contained in the Contract Documents to be the responsibility of the GC CONTRACTOR. A Punch List, to correct faulty construction or complete unfinished items, will be prepared at or near the Substantial Completion date. It will be at the discretion of the GC ARCHITECT and OWNER as to which of these items are not necessary to achieve Substantial Completion.

All loss of work days due to weather shall be documented by the GC CONTRACTOR in writing and presented to the OWNER and GC ARCHITECT for approval within seven (7) calendar days of such lost day of work. Once the GC CONTRACTOR has documented and the OWNER and GC ARCHITECT have approved lost work days due to weather, the GC CONTRACTOR shall be granted a one (1) calendar day extension to the schedule for every one (1) day lost due to weather that is documented in writing, presented to the OWNER and GC ARCHITECT for approval within seven (7) calendar days, and such is approved by the OWNER and GC ARCHITECT.

Approval dates shall be coordinated with the OWNER and the GC ARCHITECT. No planting shall be permitted until approval of the finish grade by the GC ARCHITECT.

At the point at which Substantial Completion is achieved, the GC ARCHITECT will provide a Punch List, as noted above. **The GC CONTRACTOR shall have seven (7) calendar days from the date a Punch List is provided to complete this Punch List.** The GC ARCHITECT may adjust this time as he may see fit. If after this time the GC CONTRACTOR has not satisfactorily completed the Punch List, the OWNER reserves the right to complete the remaining items, after giving the GC CONTRACTOR three (3) calendar days notice, and deduct the cost for such from the amount being retained from the GC CONTRACTOR or any funds that have yet to be paid to the GC CONTRACTOR. If the cost of such is greater than the amount being retained or what may be left to be paid, the GC CONTRACTOR shall pay the difference to the OWNER within fifteen (15) calendar days.

**Certification of the Final Pay Application will not be made until such time Substantial Completion is achieved and the Punch List has been satisfactorily completed by either the GC CONTRACTOR or the OWNER and all as-built drawings have been delivered to the OWNER and GC ARCHITECT.**

Book of Specifications  
Scope of Work - Section 3

**SECTION 3.000 - SCOPE OF WORK**

Construction on this project involves renovation of all front nine tees and front nine bunkers as is included in this Book of Specifications and on the Plans. The project is located in Tahlequah, Oklahoma.

GENERAL

1. Mobilization
2. Site Preparation
3. Shaping
4. Irrigation
5. Tee Construction
6. Bunker Construction
7. Cart Path Construction
8. Fine Grade and Seedbed Prep
9. Planting

SPECIFIC

1. Mobilization  
Insurance, testing, equipment move-in, and all other work involved in starting construction as specified here-in.
2. Site Preparation  
General preparation of site for work to be conducted in an approved manner.
3. Shaping  
The creation of the earthen shapes as defined herein.
4. Irrigation  
Installation of Irrigation and/or repair of irrigation per plans and specifications.
5. Tee Construction  
Stripping of grass and debris, shaping as required, leveling of the subgrade, installation of the Root Zone, the leveling of the tee surface, and other as may be required.
6. Bunker Construction  
Coring of Bunkers, grading of subgrade, installation of drainage, installation of bunker liner, and installation of sand.
7. Cart Path Construction  
Removal of existing path as may be necessary, cut-in of new path, prep of subgrade, installation of the concrete path as required herein, tie-in of grades surrounding cart path, and other as may apply.
8. Fine Grade and Seedbed Prep  
Preparation of all areas to be planted.
9. Planting  
Planting of the specified grasses as require herein.

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Site Meetings - Section 4

**SECTION 4.000 - SITE MEETINGS**

The GC CONTRACTOR shall schedule a meeting with the OWNER, or the duly authorized OWNER'S Representative, upon the arrival of the GC ARCHITECT to the site during each visit. During this meeting the GC CONTRACTOR shall present to the OWNER and GC ARCHITECT the issues to be addressed during the visit, and other issues that may need to be addressed soon after such visit.

This will also be the time when the GC ARCHITECT may elect to review the current billing and schedule with the OWNER and GC CONTRACTOR. The GC CONTRACTOR shall distribute complete minutes of the meeting within two working days after such a meeting.

The specifications require GC ARCHITECT approval at certain stages of the work. The GC ARCHITECT will be providing a frequent presence on site, but it is the responsibility of the GC CONTRACTOR to be aware of those times the GC ARCHITECT will be on site and plan Work accordingly.

Book of Specifications  
Mobilization - Section 5

**SECTION 5.000 - MOBILIZATION**

**Bid Items 5.000, 5.000B**

Mobilization - This shall include all “up front” expenses incurred by the GC CONTRACTOR in the preparation to do the Work. This will include, but is not limited to, moving equipment and personnel in to Work, any permits that the GC CONTRACTOR is responsible for applying and paying for, insurance, bonding, testing, and other as may apply. No additions to the Contract Sum will be allowed in the event the Mobilization costs are more than the GC CONTRACTOR allowed for.

Insurance and Testing - This includes all the Insurance Requirements as listed in the Agreement between OWNER and GC CONTRACTOR. This may also include all testing measures required in this Book of Specifications, if such is not included with a specific Bid Item. The GC CONTRACTOR shall be careful to note all testing required in the various sections, such as with Root Zone, concrete, and other as may apply.

Mobilizing - This is the process of moving equipment in and applying for all permits that the GC CONTRACTOR is responsible for. See other Contract Documents for additional mobilization requirements, if any, which may apply, as such is required to be included in this Bid Item as necessary.

All above shall be included in **Bid Items 5.000, 5.000B**.

**Section 5.010 - Field Office and Temporary Facilities**

Temporary Facilities - Temporary facilities are not required to be erected by the GC CONTRACTOR. The GC CONTRACTOR is required to supply the GC CONTRACTOR'S Job Superintendent with a mobile phone that has adequate coverage on the job site. If the GC CONTRACTOR elects to erect a Field Office or Temporary Facilities, to include necessary permits for such, this, and all below, shall be included in Bid Item .

The GC CONTRACTOR shall be required to keep any staging areas for equipment and supplies in neat and clean manner. Any debris shall be contained and disposed of in an appropriate manner.

If the GC CONTRACTOR chooses to erect their own facilities, or if required as a part of the Contract Documents, the following will apply:

The GC CONTRACTOR shall be responsible for all costs associated with the installation and operation of such facilities.

In the absence of a Project Engineer, the GC ARCHITECT and OWNER will serve wholly and completely in administering this section.

**PART I - PROTECTION**

**I. Protection Facilities Installation**

- A. General: Provide a reasonably neat and uniform appearance in protection facilities acceptable to the GC ARCHITECT, Project Engineer and OWNER.

## Book of Specifications Mobilization - Section 5

- B. Barricades, Warning Signs and Lights
  - 1. General: Comply with recognized standards and code requirements for the erection of substantial, structurally adequate barricades where needed to prevent accidents and losses. Paint with appropriate colors, graphics, and warning signs to inform personnel at the site and public, of the hazard being protected against. Provide lighting where appropriate and needed, including flashing red lights where appropriate.
- C. Environmental Protection
  - 1. General: Provide general protection facilities, operate temporary facilities, conduct construction activities, and enforce strict discipline for personnel on the site in ways and by methods that comply with environmental regulations and that minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that undesirable effects might result from the performance of work at the site. Avoid the use of tools and equipment which produce harmful noise. Restrict the use of noise making tools and equipment to hours of use that will minimize noise complaints from persons or firms near the project site.

### PART 2 - CLEAN UP

#### II. Enclosure and Removal of Waste Materials During Construction

- A. Combustible waste material, building debris, and rubbish shall not be stored nor allowed to accumulate within a building under construction, but shall be removed from the premises as rapidly as practical.
- B. It shall be the duty of every contractor, who shall make contracts for the erection or construction of buildings for which a permit is required, and every contractor making such contracts and subletting the same to provide adequate storage facilities to contain combustible waste material, building debris, and rubbish generated at the construction site.  
  
Adequate storage facilities shall mean an enclosed fenced area or a steel container. Each enclosure or container shall be of a size sufficient to contain all combustible waste material, building debris, and rubbish normally generated and disposed of at the construction site during any one week period.
- C. Fenced enclosures may be temporarily erected at the construction site and may be of steel wire mesh of a size to assure that the contents will not be subject to being scattered or blown away by winds. All enclosures shall be provided with a cover of the same material.
- D. Required facilities shall be located not more than one hundred (100) feet from the construction site, and shall be within a reasonable distance of any occupied structure.
- E. The number of fenced enclosures or containers required under this section shall be determined by the building official. Such determination shall be dependent on the size of the construction project and on the estimated quantity of debris to be generated, but in no

Book of Specifications  
Mobilization - Section 5

case less than one fenced enclosure or container shall be provided for each construction site.

- F. All combustible waste material, building debris, and rubbish shall be removed from the enclosures and disposed of in a legal manner on a weekly basis.



Book of Specifications  
Site Preparation - Section 6

**SECTION 6.000 - SITE PREPARATION**

This involves the removal of existing materials, stripping of existing turf, and other as may apply. The GC CONTRACTOR shall provide unit prices for each category of site preparation activity provided. Unit prices for each category of site preparation activity shall generally be consistent with the lump sum bid for the quantities shown on the plan. In the event of major variances in unit prices as compared to the lump sum bid, that may grossly damage the OWNER in the event of changes, such a bid may be subject to disqualification. Any changes to the Plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

The requirements in this Section may have application in, or complement, other areas of this Book of Specifications.

**Section 6.010 - Removal of Existing Turf**

**Bid Items 6.010, 6.010B**

Strip existing sod in and around the tees. The area to be stripped shall be designated on Plans and then approved by the GC ARCHITECT on site. This shall be the limits of disturbance and shall be strictly maintained by the GC CONTRACTOR unless otherwise approved by the GC ARCHITECT. Stripping of existing grass, or disturbance of existing grass, outside the limits of disturbance shall require the GC CONTRACTOR to re-sod at their own expense. All existing grass, in the area of the tees shall be removed completely by the GC CONTRACTOR.

The method of stripping the grass shall be approved by the GC ARCHITECT, but it shall remove at least one inch (1"), but not more than one and a half inch (1.5"), of material from the top of the soil layer. The outside edge of the stripped grass shall be cut or trimmed with a sod cutter so that newly laid sod will fit in tightly with the existing grass to remain without a break in grade, or a gap in density of grass.

The OWNER and GC ARCHITECT shall designate areas stripped grass and other plant debris can be placed into stockpiles, or areas where such may be buried, noting that the OWNER and GC ARCHITECT may approve using stripped grass to cover haul roads as may apply, removed cart path as may apply, or bury pits as may apply.

Bury pits for stripped grass and other plant debris shall be contained to no more than one such bury pit every three holes, unless otherwise approved by the OWNER and GC ARCHITECT. Haul roads used to for this or any purpose must be approved by the OWNER and GC ARCHITECT. After use of a haul road, prior to Substantial Completion of the Project, all such haul roads shall be repaired so that any rutting is brought to the grade that existed prior to use as a haul road and such shall be planted with either stripped grass approved by the OWNER and GC ARCHITECT or planted with new sod.

All hauling of such material and necessary repair of haul roads shall be included in **Bid Items 6.010, 6.010B**. Any and all burial of stripped grass and replanting of disturbed areas shall be included in **Bid Item 6.010, 6.010B**.

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Site Preparation - Section 6

**Section 6.020 - Removal of Existing Inorganic Debris**  
**Bid Items 6.020, 6.020B**

This shall include existing irrigation, drainage, or other inorganic debris that may exist and shall be removed to properly complete all Work.

All debris from the tees, tee surrounds, bunkers, and bunker surrounds, to include existing irrigation, etc., shall be removed by the GC CONTRACTOR to a location approved by the OWNER. Note that inorganic debris shall not be buried, but taken to a location approved by the OWNER.

When removing irrigation or drainage in areas where existing may stay and be connected to, the GC CONTRACTOR shall provide a clean cut of all pipe so that it remains usable.

Inorganic debris that will be more than 3 feet below finished grade can be left as long as a clean cut is provided and it is treated so that there are no potential future problems from leaving it in place.

**The above Section 6.020 is Bid Items 6.020, 6.020B and shall be bid as a lump sum.**

**Section 6.030 - Removal of Existing Bunker Sand**  
**Bid Items 6.030B**

This shall include existing bunker sand to be removed to properly complete all Work.

All bunker sand shall be removed by the GC CONTRACTOR to a location approved by the OWNER. Note that bunker sand shall not be buried, but taken to a location approved by the OWNER.

**The above Section 6.030 is Bid Items 6.030B and shall be bid as a lump sum.**

**Section 6.040 - Tree Removal**  
**Bid Item 6.040**

The GC CONTRACTOR shall be responsible for the removal of (6) trees on Hole #9. **These trees consist of (6) Cypress trees that are (72", 60", 68", 52", 86", 116") calipers.** This shall include all stump grinding or removal of stumps. In the instance of stump grinding, all stumps shall be ground to a depth of 24". All debris shall be removed off site unless otherwise directed by the OWNER.

Trees to be removed shall be marked by GC ARCHITECT prior to this portion of work commencing.

**The above Section 6.040 is Bid Items 6.040 and shall be bid as a lump sum.**

**Section 6.050 - Tracking of Equipment Around the Site**

The OWNER and GC ARCHITECT will determine "avenues" in which equipment can be tracked on the golf course. When accessing areas of the golf course (i.e. around greens, tees, across cart paths to remain, across fairways, etc.) from these "avenues" the GC CONTRACTOR shall place plywood or rubber mats

## Book of Specifications Site Preparation - Section 6

beneath all equipment to help prevent rutting and damage to the turf, underground pipe, cart paths, or other as may apply. Transportation of equipment without the use of plywood or rubber mats, while required will not relieve the GC CONTRACTOR for repair of damage.

**The above in Section 6.050 is not a Bid Item and shall be accounted for in a manner deemed appropriate by the GC CONTRACTOR.**

### **Section 6.060 - Damage Repair**

The GC CONTRACTOR shall be responsible for the repair of any damage to the golf course, whether such damage is within the limit of the Work as outlined in the Plans, or such damage is on other places on the golf course. Such damages will include, but may not be limited to, irrigation, cart path, trees, tire ruts, signage, or any other part of the golf course. All repairs shall be performed by the GC CONTRACTOR, at their expense, to a satisfactory condition, consistent with the conditions that exist prior to the start of the Project, as agreed upon by the OWNER and GC ARCHITECT.

**The above in Section 6.060 is not a Bid Item and shall be accounted for in a manner deemed appropriate by the GC CONTRACTOR.**

### **Section 6.070 - Sod Line**

At the edge of any disturbance of existing grass, the GC CONTRACTOR shall create a clean edge against grass to remain undisturbed by cutting the edge with a Ryan Brand sod cutter, or approved equal, that is in EXCELLENT condition, including a new blade in place. This sod cut shall be such that new grass sod can be laid against existing grass without a break in grade or a variance in the density of grass.

**The above in Section 6.070 is not a Bid Item and shall be accounted for in a manner deemed appropriate by the GC CONTRACTOR.**

### **Section 6.080 - Site Maintenance and Clean-Up**

All material staging areas shall be cleaned up after use by the GC CONTRACTOR, so that the area is in as good or better condition than existed prior to the start of the Project.

All existing drainage and irrigation material removed by the GC CONTRACTOR during construction shall be stockpiled in a designated area approved by the OWNER. If the OWNER does not have appropriate means for such material to be picked up and taken away from the site, such disposal of these materials shall be the responsibility of the GC CONTRACTOR.

The GC CONTRACTOR shall sweep up and remove all mud and soil from cart paths upon completion of work in the designated areas.

All equipment, debris and waste shall be removed from the site by the GC CONTRACTOR upon completion of the project. There may be means by which some debris and waste may be regularly picked up at the site on behalf of the OWNER, but it is the responsibility of the GC CONTRACTOR to confirm such.

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Site Preparation - Section 6

All sod pallets shall be stacked neatly after use and returned on a regular basis.

The GC CONTRACTOR will be responsible for the repair of any areas within the golf course that are damaged by their crews, vendors, and/or sub-contractors to a satisfactory condition as approved by the OWNER. This shall include the repair of any haul roads used during golf course construction.

**The above in Section 6.080 is not a Bid Item and shall be accounted for in a manner deemed appropriate by the GC CONTRACTOR.**

Book of Specifications  
Shaping and Earthwork - Section 7

**SECTION 7.000 - SHAPING**

This is defined as the movement of earth to construct the shapes of the golf course and necessary functional elements. This shall include all necessary cut/fill earthwork needed to bring features to grade per grading Plans, and topsoil as defined herein.

**7.010 - Supply of Shaping Dozer**  
**Bid Item 7.010**

The GC CONTRACTOR should provide a price for the use of a dozer - JD 650, D5K, or approved equal - to include fuel and maintenance, as a contingency in the event the GC ARCHITECT provides their own Shaper to shape the tee, bunkers, and fairways/roughs. The time duration for the dozer shall be the length of the full construction project being **(60) days**. The GC ARCHITECT'S Shaper will work closely with the GC CONTRACTOR to provide allowance for this machine to be used for other construction related items. The GC CONTRACTOR shall give 24 hour notice of when these occurrences will be necessary.

Weather related days or delays by the GC CONTRACTOR creating days the GC ARCHITECT'S Shaper cannot shape, do not count toward the time the GC CONTRACTOR is to provide the machine.

**The above Section 7.010 is Bid Item 7.010 and shall be bid as a lump sum.**

**Section 7.020 - Earthwork**

**Bid Item 7.021 - Hauling of Fill Material**

The Bid Item associated with this Section will only have to do with the earth picked up and moved from one place to another. Moving earth in small amounts within the same disturbance area, where the intent is to balance cut and fill, shall be accounted for in Shaping and/or other Bid Items as may apply. The GC ARCHITECT shaper will make every effort to make cut/fill balance with in the limit of disturbance.

For this Project, there will be very little earth picked up and moved from one place to another. In the first instance, each area should be made to balance (cut equals fill), which will be directed by the GC ARCHITECT in the field, which may involve spreading cut over the bottoms of the bunkers, in the slopes on the sides of the bunkers, in areas adjacent to bunkers, or the surrounds of new tees. If there is a need for material, the GC CONTRACTOR will need to work with the OWNER to determine nearby borrow sites. This must be approved by the OWNER. There are designated borrow areas denoted on plans that are berms that need to be removed.

This bid item only pertains to material that is need to be hauled from one location to another. All distances shall be under 500'.

**The above Bid Item 7.021 shall be bid by the cubic yard.**

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Shaping and Earthwork - Section 7

**Section 7.022 - Earthwork for Shaping**

The GC ARCHITECT will set layout and benchmark grades on site for the earthwork operations prior to the start of the Work. This will include the layout of the general limits of disturbance, which the GC CONTRACTOR shall strictly adhere to.

When determined to be necessary by the GC ARCHITECT, adjustments may be made to the Plans to preserve existing grades and/or other site features. The GC CONTRACTOR shall consult the GC ARCHITECT about other site features that appear to have value to the character of the course.

The GC CONTRACTOR shall arrange for all sewer lines, gas lines, water lines and any other underground utilities to be staked by the appropriate utility companies before any Work begins. The GC CONTRACTOR shall take care not to perform any Work which will in any way disturb any utility, even if he is performing Work in accordance with the Plans. The GC CONTRACTOR shall study the Plans and determine whether potential conflicts may occur before he performs any Work. Ultimate responsibility for detecting potential conflicts before irreversible damage occurs shall belong to the GC CONTRACTOR. Any damage caused by GC CONTRACTOR to the existing utilities shall be the GC CONTRACTOR'S responsibility to repair at his own expense.

**Burial of material not allowed to be buried by local, state or federal regulations shall be the responsibility of the GC CONTRACTOR to stock pile in a location on-site determined by the OWNER, and such shall then be removed from the site by the GC CONTRACTOR in an approved manner.**

The GC CONTRACTOR shall make adjustments as necessary to avoid disturbing trees that are scheduled to be saved, first making the GC ARCHITECT aware of such conflicts and then adhering to the direction of the GC ARCHITECT. **The OWNER will remove all trees to be removed.**

**Cuts and fills shall proceed according to the Plans, direction provided by the GC ARCHITECT and this Book of Specifications. The GC CONTRACTOR shall pay attention to the shapes and elevations that are indicated on the Plans. No variances will be tolerated unless written notice is provided by the GC ARCHITECT in a Field Order. Note that even if the GC ARCHITECT verbally recommends variances, such shall not be applied unless it is provided in writing. This is critical to avoid misunderstanding.**

All fill material shall consist of native soil only, which does not contain debris or rock, unless otherwise approved in writing by the GC ARCHITECT.

No fill shall be placed under the canopy of any existing tree to be saved unless otherwise approved in writing by the GC ARCHITECT.

All of the above are general requirements for Earthwork that may apply to Shaping, and/or other in this Book of Specifications.

**This is not a bid item and shall be included with the shaping bid items that are provided as alternates.**

## Book of Specifications Shaping and Earthwork - Section 7

### Section 7.030 - Shaping

Shaping is the process of bringing the non-engineered earthwork to within a tolerance of one tenth of one foot (.1') as shown on the Plans. This tolerance is a requirement in so much as the design intent is met, as determined by the GC ARCHITECT. No areas shall have a slope greater than 4 to 1 (unless specifically indicated), no irregular surfaces that create bumps, ruts, or holes are to be left, and the shaped area shall drain at least 2.5 feet in 100 feet, except on greens, tees, and in bunkers. This step shall also involve the direction of the GC ARCHITECT to provide the unique forms of the earthwork.

**The GC CONTRACTOR shall pay attention to the shapes and elevations that are indicated on the Plans. No variances will be tolerated unless written notice is provided by the GC ARCHITECT in a Field Order. Note that even if the GC ARCHITECT verbally recommends variances, such shall not be applied unless it is provided in writing, which may be considered applicable via email. This is critical to avoid misunderstanding.**

The GC CONTRACTOR shall employ a "Class A" Lead Shaping Operator(s) who has no less than three (3) years' experience as a Lead Shaping Operator for golf course construction, having performed this function on no less than three (3) projects of similar scope to this Project over the last three (3) years. This person(s) shall begin and end this project in this role. In the event the GC CONTRACTOR allows for someone other than the designated Lead Shaping Operator(s) to perform this function, and the Work is not within tolerance, the GC ARCHITECT shall have the right to request that the Work be done again, not counting towards the time that the GC ARCHITECT has reserved for artistic changes, nor will such allow the GC CONTRACTOR to request an increase in time or request an increase in the Contract Sum. The GC ARCHITECT reserves the right to request a new Lead Shaping Operator at any time during the project in the event that the current Lead Shaping Operator is unable to perform under the direction given to them. This change shall be made promptly with no additional cost to the OWNER, or impact the schedule impact.

The GC CONTRACTOR shall provide ample staking of the site to control the shaping and allow the GC ARCHITECT to review the shaping. The GC ARCHITECT may request additional staking to be done in order to properly review the Work.

### **Bid Item 7.031Alt1 - Shaping of Tees**

Shaping of the tee subgrade and surrounds shall be performed by the GC CONTRACTOR'S approved Shaper as may apply. Shaping of the tee shall follow the grades and direction of slope provided on the Plans, and follow the layout, relative to size, as provided by the GC ARCHITECT on the Plans or in Field Notes.

**Prior to the tee subgrade prep, the GC CONTRACTOR must schedule a Walk Through with the GC ARCHITECT to approve the rough shaping of each tee. Note that any work done by the GC CONTRACTOR beyond this point prior to approval is subject to be changed at no expense to the OWNER. The GC CONTRACTOR will be made aware of the GC ARCHITECT'S schedule in advance and should plan for walk through and sign-off's accordingly. At no time will the GC ARCHITECT be held responsible for schedule impacts due to lack of approval.**



## Book of Specifications Shaping and Earthwork - Section 7

**This section shall be bid as part of Bid Item 7.031Alt1. All qualifications stated in Section 7.010 pertain to this scope of work.**

### **Bid Item 7.032Alt1 - Sand Bunker Shaping**

This is the process of using dozer, box blade and/or track-hoe operations to bring the sand bunker complex to the size, shape, elevation, location, and slope as provided in the Plans, Construction Details, this Book of Specifications, and direction from the GC ARCHITECT (specific to the shaping of sand bunkers the GC ARCHITECT will often provide three dimensional sketches to explain intent). The sand bunker complex defined by the outline of the sand line as it is shown on the Plans and the associated/integrated earthwork that surrounds the sand bunker. Note that the bottom elevation given within sand bunkers is the grade intended after the placement of sand. When shaping the sand bunkers, the GC CONTRACTOR shall meet the bottom elevation given, minus one foot (1.0') to the sub-grade. While there is only 5" of compacted sand specified, achieving the bottom elevation minus one foot allows for edging material that is displaced in the bottom of the sand bunker and it allows for some measure of a "lip" above the sand line.

Sand bunkers shall only be "rough shaped" at first so as to allow the GC ARCHITECT to review each sand bunker and provide specific instructions for the completion of each sand bunker. The GC CONTRACTOR shall take into consideration when preparing his bid that the GC ARCHITECT may make artistic changes to the sand bunkers. The GC CONTRACTOR shall allow for a small dozer (John Deere 550/650 or equivalent) to make one (1) hour worth of artistic revisions per sand bunker at the direction of the GC ARCHITECT. Time not used on one sand bunker may be used on another. No addition to the Contract Sum or Contract Time will be allowed unless the artistic changes exceed the time prescribed above. This time will not be used to correct errors.

In preparing the soil on the faces of the bunker that will be grass, loose, non-compacted earth is not allowable. All faces shall be compacted prior to and after installation of topsoil. Topsoil shall be spread liberally on the faces of the bunkers that will be grass into the bottom past the expected edge cut and then compacted fully to allow for a proper edge to be cut as defined in Section 10 of this Book of Specifications and per the Construction Detail.

The GC CONTRACTOR shall have a 4' "Smart Tool" available to perfect bunker slopes and to allow the GC ARCHITECT to review such slopes. The Construction Details provide the intended bunker slopes. **No bunker will be approved for completion (making of the specified edge cut, installation of drainage, installation of bunker liner and placement of sand) until the slopes have been reviewed by the GC ARCHITECT and the specified slopes approved. There will be no tolerance. The GC CONTRACTOR shall only be allowed to proceed with written approval by the GC ARCHITECT. The GC CONTRACTOR will be made aware of the GC ARCHITECT'S schedule in advance and should plan for walk through accordingly. At no time will the GC ARCHITECT be held responsible for schedule impacts due to lack of approval.**

In carrying out all instructions it is the responsibility of the GC CONTRACTOR to maintain the general size of the sand bunkers as shown in the Plans. Unless there is specific direction, specifically noting an increase or a decrease in the size of a bunker, provided by the GC ARCHITECT, the GC CONTRACTOR shall not make claims for a specific bunker being larger than Plan. If a bunker is specifically reduced in size, or eliminated altogether, the reduction in the size of a bunker, or the size of a



## Book of Specifications Shaping and Earthwork - Section 7

**bunker removed from the Plan, shall be deducted from the total square footage of the bunkers. Note that is applies to all Bid Items associated with actual size of the bunkers.**

No sand bunker shall be deeper than shown in the Plans, unless approved by the GC ARCHITECT.

All sand bunkers shall be shaped, although it may not be explicitly shown on the Plans, so that the surrounds of the sand bunkers do not drain into the sand bunker. Such shaping, to divert water, shall be done so that there are always smooth, mow-able, contours. "V ditches" will not be permitted. On green side sand bunkers, the slope away from the sand bunker, to divert water from the sand bunker, shall not be greater than 10% and water shall not be allowed to collect at any point as a result. Do note that there may be greenside bunkers where water cannot be diverted away from the bunker without unacceptable irregular shapes, which will be either noted on the Plans or noted by the GC ARCHITECT in the Field Notes.

All shaping for bunkers shall be included in **Bid Item 7.032Alt1**. All of the bunker shaping will be bid based on the designed square footage of the bunker delineated within the sand line.

### **Bid Item 7.033Alt1 - Fairway and Rough Shaping**

Shaping of the fairways and roughs is not included in the shaping of Bunkers. All shall proceed as illustrated in the Grading Plans and consistent with all required herein.

All shaping for fairways and roughs shall be included in **Bid Item 7.033Alt1** and shall be bid as a unit price based on the designed square footage of the areas of grading outside of greens and bunkers. It is the responsibility of the GC CONTRACTOR to contain the shaping to the planned areas and allow for minor field direction that may be provided by the GC ARCHITECT. The area volume of the fairway and rough shaping shall not be subject to increase in the Contract Sum unless the area for grading such is changed significantly and the GC CONTRACTOR provides notice in writing that additional area of shaping will require an increase in the Contract Sum and such is provided prior to performing any such shaping. Claiming additional shaping in the fairway and rough after such has been done will not be allowed.

### **Section 7.040 - Topsoil** **Bid Items 7.040, 7.040B**

The GC ARCHITECT and/or OWNER may identify areas that do need topsoil where grass has merely stripped and grade not changed if there is a concern over the quality of the topsoil to remain. The need for installation of topsoil shall be evaluated by the OWNER prior to preparing any area for planting. As such, we have provided an allowance for topsoil installation. The GC CONTRACTOR shall provide a price to purchase and install topsoil as defined herein in those areas the OWNER determines there is a need for topsoil. Note that the GC CONTRACTOR shall provide a price for the actual cost of topsoil to be delivered to the site, and include transport to each location it is needed.

Purchased topsoil shall be free of debris and be primarily made of soil that is primarily considered loam that is largely free of clay. The topsoil shall be approved by the OWNER prior to being purchased.

Note that less than 4" of topsoil as installed will be allowable to properly tie into undisturbed areas where a clean line of existing turf has been maintained, or where grade has not changed. Such tie in shall be done so that the transition from the clean line of existing turf to 4" of topsoil shall be a slope of not less than 5%,

## Book of Specifications Shaping and Earthwork - Section 7

which means that the typical distance from the clean line of existing turf to 4" of topsoil shall be 6.5 feet. The GC ARCHITECT may reduce the percentage of slope if such provides a better tie in, which may often occur at the top of a bunker next to a green - in this case there should be no topsoil installed above the bunker next to the green unless specifically directed by the GC ARCHITECT.

The GC CONTRACTOR is not required to over excavate to allow for the placement of 4" of topsoil compacted to meet Plan grade - Plan grade can come up by 4" to allow for such so as to not produce additional cut/excavation.

In spreading 4" of topsoil on the bunker faces where applied, such topsoil shall be spread liberally into the bunker bottom and compacted completely on the face of the bunker where applied so the bunker edge is stable with at least 4" of topsoil at the edge cut.

This is **Bid Items 7.040, 7.040B** and shall be priced by the cubic yard. Given the impossibility to quantify a planned amount, the amount provided in the Bid Form is an estimate that should more than cover what will be used, noting that this will be an Allowance and during the course of the Project the GC CONTRACTOR shall provide what is actually used with the submission of each Pay Application. The final amount shall be based on the delivered amount of topsoil to the Project and the Contract Sum shall be adjusted to the actual amount used per the unit prices provided in the Bid Form.

### **Section 7.050 - Rock**

For this Project, we do not anticipate the GC CONTRACTOR having to remove "Rock" to perform the Scope of Work. Rock excavation includes rock, or other solid debris which can be removed only by blasting, with impact tools, or by drilling. In the event the GC CONTRACTOR encounters Rock such will be addressed on a case by case basis and the GC CONTRACTOR shall provide an estimated scope of work and cost for the Work at the time this becomes an item to be addressed. Note that no such Work can be done until the OWNER has provided written direction to proceed upon the estimated scope of work and cost estimate.

This is not a bid item.

Book of Specifications  
Drainage – Section 8

**SECTION 8.000 - DRAINAGE**

The GC CONTRACTOR shall use the Plans, Field Notes from the GC ARCHITECT, the requirements within this Book of Specifications, and other in the Contract Documents as may apply, to control all Drainage activities. The GC CONTRACTOR should review all sections within this Book of Specifications and note what requirements may have implications during the Drainage activities as well as what within this Section may have applications in other Sections or in the Plans.

All materials shall be installed in accordance with the manufacturer's recommendations and/or the Construction Details. All materials shall be placed at the proper elevations shown on the Plans, as described in the Construction Details and shall meet all requirements in this Section of the Book of Specifications or other Sections as may apply. Invert elevations or flow line of the pipe may be indicated on the Plans, but at all times the GC CONTRACTOR shall install drainage materials that meet, at a minimum, all that is required in this Section, and other Sections, of this Book of Specifications.

**Note: Meeting minimum tolerances for surface drainage must be met regardless of plan elevations for drainage hardware. Hardware may be adjusted in the field as necessary, provided all requirements are met. Lowering drainage basins more than six inches (6") must be approved by the GC ARCHITECT.**

**Section 8.010 – Drainage Pipe**

**Bid Item 8.010B**

Drainage Pipe - This is defined as all subsurface pipes that are being used to accommodate nuisance and storm flow of water. The pipe specified under Drainage is all subsurface pipes that are outside the confines of the greens and bunkers. The GC CONTRACTOR shall provide unit prices for each size and type of pipe provided. Unit prices for each size and type of pipe shall generally be consistent with the lump sum bid for supplying and installing the quantities shown on the plan. In the event of major variances in unit prices as compared to the lump sum bid, that may grossly damage the OWNER in the event of changes, such a bid may be subject to disqualification. Any changes to the Plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

Under no circumstances shall the subgrade cover over any pipe be less than ten inches (10"), or the topsoil plated finish grade less than fourteen inches (14") over the top of the pipe. In the event topsoil is not stripped and replaced, all pipe shall have at least fourteen inches (14") of soil cover.

Any pipe installation requiring a depth of trench greater than five feet shall adhere to OSHA Safety Standards governing such installations.

All drainage pipe and fittings used on this project shall be ADS N-12 with N-12 fittings, unless otherwise specifically noted in the plans or in the Bid Form.

Inspect piping before installation to detect apparent defects. Mark defective materials with red paint and promptly remove from site.

Lay piping beginning at the low point of system, true to grades and alignment indicated, with unbroken continuity of invert. All pipes shall have a consistent fall of no less than 1% (1.0' in 100' of run) towards the

## Book of Specifications Drainage – Section 8

discharge point. Place bell ends, or groove ends, of piping facing upstream. Clear interior of piping of dirt and other superfluous material as work progresses.

**14 gauge wire shall be run with every drain line from the eventual discharge, to the vertical pipe that ties to drain basins, and/or the connection of flared ends at the top of the line. As built drawings of the drainage shall be recorded weekly as drainage pipe is installed and shall made available weekly for review by the OWNER or GC ARCHITECT.**

Place plugs in ends of uncompleted conduit at end of day or whenever work stops. The GC CONTRACTOR shall take care to leave very little, if any, pipe installed without suitable backfill cover over night.

Make joints between different sizes and types of pipe with standard manufactured adapters and fittings intended for that purpose. All changes in pipe size shall be done with approved ADS, or approved equal, reducer. The reducer shall be installed within five (5') feet above (high side) drain inlet locations or connections to other pipe runs, where changes in pipe sizing are indicated.

In no instance shall any “aftermarket” products such as expandable foam, duck tape, plastic bags etc. be used to fill any gaps at improper connections, such as but not limited to a change in pipe size, pipe direction, basins, bubblers, or caps. Only the manufacturer recommended adapters, fittings, reducers, gaskets may be used. Tape may be used to secure approved fittings. The Construction Details may allow the above in certain applications.

Prior to backfilling inspect all trenches for trash, pipe for line displacement, improper or loose connections or other damage that has occurred.

All trenches shall be backfilled with clean material free of all foreign material such as rocks larger than 3 inches, sticks, roots, trash, etc.

Make inspections after lines have been installed and backfill is in place, and again at completion of project. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects, and re-inspect.

All above shall be included in **Bid Item 8.010B**.

### **Section 8.020 – Drain Basins** **Bid Item 8.020B**

These are the hardware connections to areas designated on the Plans or based on field direction to install drainage basins. The GC CONTRACTOR shall provide a unit price bid for the entire supply and installation of the drainage basins as shown on the Plans, Construction Details and all as necessary for proper installation of such Plans, as instructed in the Construction Details, and as instructed in this Book of Specifications. Any changes to the Plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

Drain basins shall be eight-inch (8”) Nyloplast Cast Iron Grates, as indicated in the Plans, or noted by the GC ARCHITECT.

## Book of Specifications Drainage – Section 8

All of the drainage hardware shall be installed at the elevations, true to top and invert, as shown on the Plans and per those instructions shown on Construction Details. Note that all horizontal pipes from drainage basins shall be connected using solid pipe and gravel shall be used as back fill around such vertical pipe as shown on the Construction Details.

All drain basins should be placed at the absolute bottom of the depression in which they are located, with a surrounding slope of not less than 03% and not greater than 05% within 15' of the basin. No grades shall be left around the basin, which will puddle and not run directly into the basin. Note that in most cases drain basins are to be placed in areas that are intended to be lower than surrounding grade on all sides. This may not be depicted with spot elevations on the Plans due to clarity of the Plan Sheets. The requirements found within this paragraph shall guide earthwork around drain basins. In the event of a question, contact the GC ARCHITECT.

During construction, after installation of the vertical pipe to the basin, but prior to installation of drainage hardware, the vertical pipe should extend above grade and be protected at the base with gravel. Refer to the Construction Details.

If the gravel is stockpiled on site prior to placement in the drain basins the GC CONTRACTOR will be responsible for the loading and hauling of the gravel from the on-site stockpile to the locations on the golf course. The GC CONTRACTOR shall take care to not pick up foreign material when eventually transporting to the location of use. If any such foreign material is brought to and placed in the gravel, such shall be removed and an appropriate amount of clean gravel shall be replaced.

If the gravel becomes contaminated while on-site from silt, debris or any other form of matter which will hinder the function of the gravel as designed, the GC CONTRACTOR shall remove the contaminated material and the appropriate amount of clean gravel shall be replaced.

In the event a drain basin is located in an area that was the result of fill, rather than cut, the GC CONTRACTOR shall take care to properly compact the fill in the area of the drain basin. In the event problems with the drainage result from soil movement the GC CONTRACTOR shall be required to reset the drain basin as specified. Problems that can occur include, but may not be limited to, the basin sinking significantly below surrounding grade through heaving of the surrounding soil.

All drain basins shall be protected with sod extending no less than 10' (ten feet) on all sides from the edge of the drain basin. The sod should match the type of turf to be used in the given area, and with the type of turf to be used in the rough areas in the event a drain basin is located in an area to be grassed with native grasses. **The sod shall be laid so that the top of the grate used in the drain basin is at least ½" below, and no more than 1" below, the top of the soil in the sod. Drain basins not shown on the Planting Plan as having sod around the basin have been calculated in the total for each sod type that may be used to meet this specification. The GC CONTRACTOR is required to sod around drain basin even when sod is not shown on the Planting Plan.**

This is **Bid Item 8.020B** and shall be priced by each drain basin installed per sizing included in the Plans. The GC ARCHITECT has included an estimated quantity in the Bid Form. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

Book of Specifications  
Drainage – Section 8

**Section 8.030 – Drainage Outfalls**

**Bid Item 8.030B**

These are the hardware connections to the drainage pipe that will complete the drainage system. These will be the terminus of the drainage trunk line if the drainage line is unable to daylight. The GC CONTRACTOR shall provide a single lump sum bid for the entire supply and installation of the drainage hardware as shown on the Grading and Drainage Plans, other attached plans, all as necessary for proper installation of such plans, as instructed within the Construction Details, and as instructed in this book of specifications. No extras will be allowed for minor or major inaccuracies in the estimate of quantities which may be provided by the GC ARCHITECT. Unit prices for each type shall generally be consistent with the lump sum bid for supplying and installing the quantities shown on the plan. In the event of major variances in unit prices as compared to the lump sum bid, that may grossly damage the OWNER in the event of changes, such a bid may be subject to disqualification. Any changes to the plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

Drain Outfalls shall be twelve-inch (12”) Nyloplast Cast Iron Grates, as indicated in the plans, unless otherwise noted by the GC ARCHITECT.

All of the drainage hardware shall be installed at the elevations, true to top and invert, as shown on the Grading and Drainage Plans and per those instructions shown on Construction Detail Sheet. Note that all horizontal pipes from drainage basins shall be connected using solid pipe and gravel shall be used as back fill around such vertical pipe as shown on the Construction Detail Sheet.

All drainage outfalls should be placed in an adequate location to promote positive surface drainage away from the drainage outfall at minimum of 3%. No grades shall be left around the drainage outfall, which will puddle and not surface flow.

During construction, after installation of the vertical pipe to the inlet, but prior to installation of drainage hardware, the vertical pipe should extend above grade and be protected at the base with gravel. Refer to the Construction Details.

**In the event a drainage outfall is located in an area that was the result of fill, rather than cut, the GC CONTRACTOR shall take care to properly compact the fill in the area of the drainage outfall. In the event problems with the drainage result from soil movement the GC CONTRACTOR shall be required to reset the drainage outfall as specified. Problems that can occur include, but may not be limited to, the outfall sinking significantly below surrounding grade through heaving of the surrounding soil.**

All drainage outfalls shall be protected with sod extending no less than 10' (ten feet) on all sides from the edge of the drain inlet. The sod should match the type of turf to be used in the given area, and with the type of turf to be used in the rough areas in the event a drainage outfall is located in an area to be grassed with native grasses. **The sod shall be laid so that the top of the grate used in the drainage outfall is at least ½” below, and no more than 1” below, the top of the soil in the sod. Drainage outfalls not shown on the Planting Plan as having sod around the basin have been calculated in the total for each sod type that may be used to meet this specification. The GC CONTRACTOR is required to sod around drainage outfall even when sod is not shown on the Planting Plan.**

All above shall be included in **Bid Item 8.030B**.



Book of Specifications  
Irrigation – Section 9

**SECTION 9.000 – IRRIGATION**

**Bid Item 9.010, 9.010B**

The GC CONTRACTOR shall be responsible for the removal, relocation and new installation of any irrigation required to perform the scope of work as set forth in the Contract Documents. All materials used during the installation of the new irrigation shall be new and of the highest quality for the application.

All new pipe connections shall be solvent weld with schedule 40 fittings. “Slip Fixes” are NOT ACCEPTABLE.

The GC CONTRACTOR shall make all wire connections and splices with 3M DBY/DBR/DBY-6/DBR-6 connectors. PVC adhesives or sealing compounds are not allowed. All wire splices shall be placed in a Carson Electrical Valve Box with a black lid.

All lateral pipe shall be 2” Class 200 pipe, with schedule 40 fittings.

Irrigation quick couplers to be installed are the Toro 473-00 model.

Any irrigation head that needs to be replaced or added shall be the applicable Toro 855S model with nozzle 32.

All irrigation swing joint to be installed will be 1” Lasco swing joints with Acme thread.

All heads shall have an individual wire and wires ran back to satellites designated on the plan, or connected at the proposed connection point. No splicing of heads together shall be permitted.

The GC CONTRACTOR shall install a new 2” isolation valve at the connection point to the existing system.

All additional cart path removal and replacement that is a direct effect of the irrigation work shall be allocated within this section.

Trenches shall be compacted with a mechanical vibrating compactor to prevent any future settlement of the backfill material. Trench lines shall be water settled if soil is deemed to dry to compact by mechanical purposes solely. **Any settlement of the trench line, head, valve box, or surrounding area within one (1) year of acceptance of the project by the OWNER shall be repaired at no additional cost by the GC CONTRACTOR.**

The GC CONTRACTOR shall be responsible for insuring that each head is working and the wiring at the irrigation controller is correct. The GC CONTRACTOR will be required to have OWNER approval of the irrigation operation and wiring prior and finish prep and planting.

The GC Contractor is required to prepare as-builts of all irrigation work performed.

**All the above shall be included in Bid Item 9.010, 9.010B and bid as lump sum.**

Book of Specifications  
Tee Construction - Section 10

**SECTION 10.000 - TEE CONSTRUCTION**

These are the operations to bring the shaped and finished subgrade of the tees, to the finished elevations as they are shown on the Plans and Details, or as may be directed by Field Notes. This will involve the installation of sand to provide a root zone, finish of the surface of the root zone, and other as may be specified. This section may have application in other sections of this Book of Specifications and other sections, as well as the Plans and Details, may have application related to this section.

**Section 10.010 - Staking of Tees**

Layout and Staking of tee complexes shall be performed by GC ARCHITECT. The GC CONTRACTOR shall be paid for the actual size of the tees as staked by the GC ARCHITECT.

If at any time staking of the tees prepared by the GC ARCHITECT are disturbed, the GC CONTRACTOR shall not proceed until review and approval by the GC ARCHITECT. Such review and approval may only be conducted during regular visits by the GC ARCHITECT, so to avoid delay it is imperative to protect staking of the tees. Any delays resulting from the above are the responsibility of the GC CONTRACTOR.

**The GC CONTRACTOR will be responsible for layout materials such as stakes, ribbons, and any other materials needed for staking.**

**Section 10.020 - Tee Shaping**

Defined in Section 7.032Alt1

**Section 10.030 - Tee Subgrade Prep**  
**Bid Item 10.030**

Once the rough shaped tee complex is approved by the GC ARCHITECT, the sub-grade of the tee shall be worked carefully to achieve a smooth sub-grade surface while maintaining the relationship to the grades stakes that were set as control to follow the Plans or the Field Notes, generally following **Construction Detail (T1)**. At this point, the GC ARCHITECT shall review the sub-grade, provide direction for reasonable adjustments, and provide approval prior to moving forward.

**Prior to installing irrigation and sand, the GC CONTRACTOR must schedule a Walk Through with the GC ARCHITECT to approve the subgrade of each tee. Note that any work done by the GC CONTRACTOR beyond this point prior to approval is subject to be changed at no expense to the OWNER. The GC CONTRACTOR will be made aware of the GC ARCHITECT'S schedule in advance and should plan for walk through and sign-off's accordingly. At no time will the GC ARCHITECT be held responsible for schedule impacts due to lack of approval.**

This item will be bid on the actual square footage of the tee surface and will be paid based on the actual square footage of the tee surface completed. All above shall be included in **Bid Item 10.030**.



Book of Specifications  
Tee Construction - Section 10

**Section 10.040 - Tee Root Zone Material**

**Part A - Purchase and Testing of Material**  
**Bid Item 10.040a**

The Root Zone material for the tees shall be **four inches (4")** of sandy material with no more than 7% silt, and no less than 4% silt. The percolation rate shall not exceed 20 inches per hour, but not be less than 10 inches per hour. This requirement shall be tested at one of the approved labs and these requirements may only be adjusted with the approval of the GC ARCHITECT.

Once a source for the Root Zone to be used in the tees has been located and approved by the testing lab, this source shall not change and every 500 tons to be used shall be again tested and approved prior to use. The OWNER shall provide a representative to accompany the GC CONTRACTOR to pull samples for such testing.

Turf Diagnostics & Design  
613 East 1<sup>st</sup> Street  
Linwood, KS 66052  
Attn: Sam Ferro  
Phone: 913-723-3700

The GC CONTRACTOR shall be responsible for the submission of all materials for testing and for the payment of the lab fees. The GC CONTRACTOR shall ensure that all reports are submitted to the OWNER and GC ARCHITECT.

All above shall be included in **Bid Item 10.040a**.

**Part B - Tee Surface Construction**  
**Bid Item 10.040b**

This Bid Item shall include the necessary hauling of the root zone material from a designated stockpile area chosen by the OWNER to the designated tees areas that are outlined in the plans.

The GC CONTRACTOR shall also get permission from the OWNER on which haul roads will be necessary for hauling of material.

The GC CONTRACTOR shall install four inches (4") of the approved root zone material, matching the grades of the sub-grade of the tee, but achieving uniformity to the Plans or Field Direction on the surface. There shall be a tolerance of +/- 0.25" in depth and a tolerance of .25% in the consistency of the slope of the surface across the entire tee. At no time should any part of the surface of the tee have a slope less than .9%, nor greater than 1.5%.

After the installation of the root zone the GC CONTRACTOR shall string line level or laser level all tee surfaces to ensure uniform grades across the tee surface. Tees shall be water settled and firmly compacted prior to implementing a final finish. Great care must be taken when planting the tee to avoid disrupting the

## Book of Specifications Tee Construction - Section 10

approved finished grade. This shall include using plywood to avoid any direct foot or machine traffic on the surface of the tee when planting.

**Prior to proceeding with the planting of the tees the GC CONTRACTOR must receive written approval of the finished surface of each tee by the GC ARCHITECT. At no time will the GC CONTRACTOR be authorized to proceed without written approval. The GC CONTRACTOR will be made aware of the GC ARCHITECT'S schedule in advance and should plan for reviews and sign offs accordingly. At no time will the GC ARCHITECT be held responsible for schedule impacts due to lack of approval.**

All the above shall be included in **Bid Item 10.040b.**

### **Section 10.050 - As-Built Drawings and Application for Payment**

Tee Construction will be considered complete when all specified root zone material has been installed per the Plans and Field Notes, Details and this Book of Specifications, the GC ARCHITECT has made an inspection of this portion of the WORK, and complete as-built drawings have been issued to the GC ARCHITECT and the OWNER.

**Progress as-built drawings shall be the current working documents prepared by the GC CONTRACTOR. The GC ARCHITECT shall make available one copy of the base sheets to be used to develop the progress as-built drawings. It is the responsibility of the GC CONTRACTOR to make additional field copies of the base sheets. As-built drawings not prepared on these sheets will not be accepted. The GC CONTRACTOR shall prepare clean and legible as-built drawings and include ALL relative dimensions.**

**Final as-built drawings must be completed by the GC CONTRACTOR in AutoCAD so that a digital version of the final as-builts can be delivered to the OWNER upon completion of the Tee Construction work. As well as providing a digital version of the final as-builts to the OWNER, the GC CONTRACTOR must also provide two (2) hard copies of the final as-builts to the OWNER upon completion of the Tee Construction work.**

The GC CONTRACTOR may make applications for payment based on the completion of the drainage. The schedule of values submitted with each pay applications shall include the percent complete of drainage. Updated progress as-built drawings shall be submitted with pay applications. The OWNER will only pay for the installation of materials that can be verified from the as-built drawings. Materials properly stored on site may be included with pay applications.

## Book of Specifications Section 11 - Sand Bunker Construction

### **SECTION 11.000 - SAND BUNKER CONSTRUCTION**

These are the operations to bring the shaped and finished sub-grade of the sand bunkers to the finished elevations as they are shown on the Plans and Construction Details. This will involve cutting the bunker edge, finishing the subgrade, installation of sub-drainage, installation of bunker liner (alternates), purchase of bunker sand, installation of bunker sand, and other as may be specified. This section may have application in other sections of this Book of Specifications, as well as the Plans and Construction Details, may have application related to this section.

#### **Bunker Definitions:**

**Reconstruction of Existing Bunkers** - Defined as Work done to an existing bunker that does not have the desired form. Work will require stripping turf from around the bunker as noted in the Plans, removing existing sand and other debris, shaping as noted in the Plans, cutting a 12 inch edge in the bunker, preparing the subgrade of the bunker, removing excess soil as required, installing drainage, liner as specified, installing sand to a depth of 5 inches compacted, preparing the ground for sodding, and sodding. All as specified herein and/or included in the Construction Details. This Work will be bid as specified herein and on the Bid Form.

**New Bunker** - Defined as Work done to build a new bunker where one does not currently exist. The Work will require stripping the existing turf within the limit of disturbance as quantified and shown on the Plans, shaping, installing and compacting topsoil as may be required in areas that are shaped, making the edge cut per the Construction Details, prepping the sub-grade of the bunker, installing new drainage, installing new liner, installing new sod, installing new sand, and all as specified herein and/or included in the Construction Details. This Work will be bid as specified herein and on the Bid Form.

**Filling In Existing Bunker** - Defined as Work done to an existing bunker to remove part or all of the bunker. Work will involve removing existing sand, liner, and drainage, shaping as noted in the plans, preparing the ground for sodding, and sodding.

#### **Section 11.010 - Staking of Sand Bunkers**

Once the bunker area has been stripped, cleared of all debris, and the area approved by the GC ARCHITECT or the OWNER, which is a part of a separate Bid Item and included elsewhere in this Book of Specifications, the GC ARCHITECT and GC CONTRACTOR shall layout and stake, or flag, the dimensions of the new bunker for the GC ARCHITECT to review. Construction of the bunkers shall then follow the relative relationship with the Plans.

This is not a Specific Bid Item and shall be included in the GC CONTRACTOR'S price to perform the overall scope of work.

#### **Section 11.020 - Sand Bunker Shaping**

**The sand bunker shaping has been defined elsewhere.**

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### Section 11 - Sand Bunker Construction

Prior to the establishment of the bunker edge and the preparation of the bunker sub-grade the GC CONTRACTOR must schedule a Walk Through with the GC ARCHITECT to approve the shaping of each bunker complex. The GC CONTRACTOR will be made aware of the GC ARCHITECT'S schedule in advance and should plan for the walk through and sign-offs accordingly. At no time will the GC ARCHITECT be held responsible for schedule impacts due to lack of approval.

The percentage slope of the faces of the bunkers shall be per the Construction Detail and direction provided during construction by the GC ARCHITECT.

This item has been bid elsewhere in the specifications.

#### **Section 11.030 - Sand Bunker Edge Cut and Sub-grade Preparation**

##### **Bid Item 11.030B**

The GC CONTRACTOR shall supply the GC ARCHITECT with marking paint and wire flags so that the GC ARCHITECT may personally outline the sand bunker edges prior to cutting the exact vertical edge.

The sand bunkers will be cut with an exact **10 to 12 inch vertical edge, as provided in the Construction Details**, as a part this bid item. Generally, the edge facing the green, in either greenside or fairway bunkers, will be a 12 inch edge, while the low or entry side of the bunker will be a 10 inch edge.

Prior to cutting the vertical edge, the location of the edge cut should be compacted (which may involve the use of water to aid in compaction), so that the edge cut can be made as precisely as possible and to allow the edge cut to be as sustainable as possible through the bunker construction process. The GC ARCHITECT shall then paint the edge of the bunker with paint provided by the GC CONTRACTOR. After this edge is painted by the GC ARCHITECT, the GC CONTRACTOR shall immediately flag this edge every 12 inches along the paint line.

In making the exact vertical edge cut, the GC CONTRACTOR shall make sure there is no "ledge" and that there is a smooth transition to the bottom of the bunker. Once the vertical edge cut has been made, the vertical edge cut is to be beveled to provide a "rounded" top line, as shown in the Construction Details.

Note that when laying sod around the edges of the bunker, the sod should be laid vertically over the edge to the toe of the edge cut, stapling this length of sod into the edge cut per the Construction Details, and this same piece of sod shall lay vertical 2 feet above the edge cut. From there, the remainder of the bunker face shall be laid horizontally and the seam lines shall be staggered 12 inches apart to reduce the chance of erosion into the bunker. Note that the 12 inches of sod that rolls over the edge cut to the toe of the edge cut has been accounted for in the quantity of sod in the estimates. For this project, we are specifying that Palisades Zoysia sod will be used along the entire edge cut of the bunker, running 12 inches over the edge cut, and then vertically 2 feet above the edge cut. In cases where a portion of the bunker face is also sodded with Palisades Zoysia, a takeoff has been prepared to account for the edge cut that will have Bermuda on the face, and for the edge cut that will have Palisades Zoysia on the face. See the Construction Details for clarification.

The entire sub-grade of the bunker shall be worked by hand so as to eliminate any water holding pockets that may result from the exact edge cut. There should be no less than a 1% slope to the trench edge of a drain line at all points in the sub grade of the sand bunkers. The sub grade of the sand bunkers shall flow

## Book of Specifications

### Section 11 - Sand Bunker Construction

smoothly from the bottom of the sub-grade to the toe of the edge cut. The GC CONTRACTOR shall have a “Smart Tool” available to test such slopes and to allow the GC ARCHITECT to review such slopes. **No bunker will be approved for completion (making of the edge cut, installation of drainage and placement of sand) until the slopes have been reviewed by the GC ARCHITECT and the specified slopes approved. There will be no tolerance.**

**Prior to installing the sub drainage, the GC CONTRACTOR shall schedule a Walk Through with the GC ARCHITECT to review the bunker core and sub-grade. The requirements of establishing smooth sub grades shall be met, including completing the edges of the bunkers as required prior to installing sub drainage.**

The edge cut and sub-grade preparation for all bunkers is broken down, as may apply, per type of bunker as illustrated on the Bid Form as **Bid Item 11.030B** and is priced per the square footage of the bunkers. The GC ARCHITECT has included an estimated quantity in the Bid Form. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

#### **Section 11.040 - Sub-Drainage**

##### **Bid Item 11.040B**

This section, this is defined as the 4”ADS N-12 perforated pipe perforated pipe, with the specified gravel to be installed within the subgrade of the bunkers. The GC CONTRACTOR shall provide a unit price bid for the entire supply and installation of the drainage pipe as shown on the Plans, Construction Details and all as necessary for proper installation of such Plans, as instructed in the Construction Details, and as instructed in this Book of Specifications, to include gravel. Any changes to the Plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

Sub-drainage shall be painted in the subgrade of bunkers by the GC CONTRACTOR and approved by the GC ARCHITECT or OWNER prior to installation. Such shall follow the general outline for drainage layout as may be provided in the Construction Details.

For this Project, we do not anticipate the GC CONTRACTOR having to remove “Rock” to perform the Scope of Work. Rock excavation includes rock, or other solid debris which can be removed only by blasting, with impact tools, or by drilling. In the event the GC CONTRACTOR encounters Rock, such will be addressed on a case by case basis and the GC CONTRACTOR shall provide an estimated scope of work and cost for the Work at the time this becomes an item to be addressed. Note that no such Work can be done until the OWNER has provided written direction to proceed upon the estimated scope of work and cost estimate. As such the removal of any rock shall not be included in the Bid.

The installation of such sub-drainage shall be done in such a manner that there is no more than 15 feet between any sub-drainage lines, to the edge of the bunker, in all bunkers that are under 2,500 square feet in size. For bunkers over 2,500 square feet in size, spacing shall be 20 feet. The GC ARCHITECT may modify this requirement upon inspection in the field to allow for spacing that is closer or further apart. This paragraph shall supersede what may be shown in the Plans.

Trenches for the sub-drainage pipe shall be “cut” into the approved subgrade of bunkers in the locations shown on the Plans and/or as approved by the GC ARCHITECT or OWNER in the field. These trenches

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shall be a minimum of eight inches (8") wide and eight inches (8") in depth. Trenches shall slope a minimum of 1.0%, match the slope in the subgrade within a tolerance of two tenths of one inch (0.2") if the subgrade slope is greater than 1.0%, and the bottom of the trench shall be reasonably uniform. If trenches are over-excavated, the material from the trench should be replaced and compacted at the proper depth.

Spoil (cuttings) from trenches shall be entirely removed from the bunker core and disposed of outside of the bunker complex. Care shall be taken to assure that small quantities of "spoil" cuttings do not form "dikes" in the bunker subgrade to inhibit flow of water into trenches. Any depressions created in bunker subgrade during this operation shall be hand raked to provide a consistently smooth subgrade. Any spoils that fall into the trench at any time shall be removed.

14-gauge wire shall be run with all pipe for use in locating lines in the future. This line shall be tied off at the absolute top and bottom of the pipe runs.

All trenches shall be filled with a washed 1/8" to 3/8" pea gravel that has been previously approved by the GC ARCHITECT. The bottom of the perforated pipe shall be placed uniformly one to two inches from the bottom of the trench, making sure that there is consistent fall in the pipe.

In the event a bunker liner will not be used, or the gravel in the trench will not have liner between it and the Bunker Sand, gravel materials to be used in the sub-drainage of the bunker shall be evaluated at one of the following accredited testing laboratories to make sure the gravel will bridge the chosen Bunker Sand and/or is otherwise acceptable to use for this purpose. Such testing shall be paid for by the GC CONTRACTOR. Once a source for the gravel to be used in the bunkers has been located and approved by the testing lab, this source shall not change and every 500 tons to be used shall be again tested and approved prior to use. The OWNER shall provide a representative to accompany the GC CONTRACTOR to pull samples for such testing.

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613 East 1<sup>st</sup> Street  
Linwood, KS 66052  
Attn: Sam Ferro  
Phone: 913-723-3700

The GC CONTRACTOR shall be responsible for the submission of all materials for testing. The GC CONTRACTOR shall ensure that all reports are submitted to the OWNER and GC ARCHITECT. At the completion of the Project, the GC CONTRACTOR shall submit a collated report of all test results, noting where the gravel tested was used on the golf course.

If the gravel is stockpiled on site prior to placement in the drainage trenches the GC CONTRACTOR will be responsible for the loading and hauling of the gravel from the on-site stockpile to the locations on the golf course. The GC CONTRACTOR shall take care to not pick up foreign material when eventually transporting to the location of use. If any such foreign material is brought to and placed in the gravel, such shall be removed and an appropriate amount of clean gravel shall be replaced.

Upon completing the installation of the sub-drainage in the bunker, the gravel shall be heaped up 2" above and around the drain line to protect from siltation. Prior to the finish prep of the bunker core and installation of the bunker liner the gravel heap shall be removed to be flush with the surrounding grade. If



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the entire gravel trench has been contaminated with soil, it should be made free of such contamination and clean gravel replaced.

Installation of sub-drainage shall be scheduled in such a manner that pipe and gravel is installed and the above described protection is provided all in the same day for bunkers. No pipe, or gravel below the top of the trench, shall be left unprotected overnight.

All 4" ADS N-12 pipe extending beyond the core edge of the bunkers shall be solid pipe and backfilled with a suitable material, free of stones over 2 inches in diameter or any sharp rocks which may puncture the pipe. Soil backfilled into trenches shall be water tamped level with adjacent ground, or compacting thoroughly in 6 inch lifts. No slumps in the finished grade that would indicate the drain lines shall exist prior to planting, and any such slumps that may show up within one year from completion of the Project shall be repaired by the GC CONTRACTOR.

The installed depth of the 4" ADS N-12 solid pipe that is outside the bunker cores and connected to the sub-drainage shall be no less than 14 inches from the finished grade coming from bunkers. However, under no circumstances should any such pipe exceed five feet in depth.

Pipe shall be carried away from the bunkers to locations provided per Plan or per field direction by the OWNER and GC ARCHITECT, noting that in some cases sumps will be installed in the bunkers. At no time shall any pipe being carried away from the bunker, or any pipe this may be connected through drain basins, have a flow line that is lower than the flow line of the pipe as it leaves the bunker all such pipe may be connected to.

This is **Bid Item 11.040B** and is priced per the linear foot. The GC ARCHITECT has included an estimated quantity in the Bid Form. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

#### **Section 11.051 - Cleanouts**

##### **Bid Item 11.051B**

These are the hardware connections to areas designated on the Plans or based on field direction to install Cleanouts outside bunker at the top run of the drainage pipe. The GC CONTRACTOR shall provide a unit price bid for the entire supply and installation of the Cleanout as shown on the Plans, Construction Details and all as necessary for proper installation of such Plans, as instructed in the Construction Details, and as instructed in this Book of Specifications. Any changes to the Plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

The "Cleanout" shall be constructed by using an approved 90-degree elbow located at the top run of the center trunk line of the drainage system. At the surface of the cleanouts a standard 4" female adapter (V-2104) and 4" threaded plug (V-2004) shall be secured to the top of the pipe. A Carson Industries Econo 708 7" Round Valve Box (Body 708-9) shall be place around the top end of the pipe with the valve box lid (Carson Industries 708-4 Green Round Valve Box Lid) set flush to grade just below the top of the sod that will be placed around them. There shall be a minimum clearance of 6" between the valve box lid and top of the Cleanout. Drainage gravel shall be placed in the valve box but shall not cover the cleanout. These structures are not intended to collect water.

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### Section 11 - Sand Bunker Construction

No continuous runs from the pipelines to the Cleanouts will be allowed without risers or 90's. The GC CONTRACTOR shall install all Cleanouts tubes and clearly note the location of these on the as-built drawings.

This is **Bid Item 11.051B** and shall be priced by each drainage cleanout installed per the Plans. The GC ARCHITECT has included an estimated quantity in the Bid Form. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

#### **Section 11.052 - Inspections**

##### **Bid Item 11.052B**

These are the hardware connections to areas designated on the Plans or based on field direction to install Inspections outside all tees and bunkers on the pipeline that discharges drainage from the relative feature. The GC CONTRACTOR shall provide a unit price bid for the entire supply and installation of the Inspections as shown on the Plans, Construction Details and all as necessary for proper installation of such Plans, as instructed in the Construction Details, and as instructed in this Book of Specifications. Any changes to the Plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

The "Inspections" shall be constructed by using an approved tee fitting located along the discharge line of the proposed feature drainage. At the surface of inspections a standard 4" female adapter (V-2104) and 4" threaded plug (V-2004) shall be secured to the top of the pipe. A Carson Industries Econo 708 7" Round Valve Box (Body 708-9) shall be placed around the top end of the pipe with the valve box lid (Carson Industries 708-4 Green Round Valve Box Lid) set flush to grade just below the top of the sod that will be placed around them. There shall be a minimum clearance of 6" between the valve box lid and top of the Inspection. Drainage gravel shall be placed in the valve box but shall not cover the inspection. These structures are not intended to collect water.

No continuous runs from the pipelines to the "Inspections" will be allowed without risers or 90's. The GC CONTRACTOR shall install all Inspection tubes and clearly note the location of these on the as-built drawings.

Inspections are not necessary if the drainage from the edge of the tee or sand bunker ties directly into a Drainage Basin, Gravel Drainage Sump, Drainage Bubbler or openly discharges within 30 feet of the feature.

This is **Bid Item 11.052B** and shall be priced by each drainage cleanout installed per the Plans. The GC ARCHITECT has included an estimated quantity in the Bid Form. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

#### **Section 11.060 - Installation of Better Billy Bunker Liner**

##### **Bid Item 11.060B**

##### **Part A - Gravel Layer**



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Gravel Layer - This is the 1/8" to 3/8" washed pea gravel or crushed stone that shall be placed at a depth of 1.5 to 2 inches (1.5 - 2"), matching exactly the elevations of the finished subgrade plus 1.5 - 2 inches (1.5 - 2") and brought up to the edge of the bunker.

#### **Material Selection**

The entire subgrade shall be covered with an approved layer of clean, washed gravel or crushed stone. The selection of the drainage gravel shall conform to the USGA's current recommended specifications. The gravel shall be evaluated with the approved bunker sand with respect to the recommended bridging and permeability factors.

Soft limestone, sandstone, or shale is not acceptable materials. Hardness and abrasion tests shall be conducted on any questionable materials. The testing shall be either ASTM C-131, the LA Abrasion test, or ASTM C-88, the sulfate soundness test. Angular gravels are generally preferred to rounded materials for stability and to facilitate shaping. Properly sized pea gravels, however, are usually an acceptable choice.

Gravel found to be "dirty" or contaminated with silt or clay will be rejected.

#### **Material Testing**

The GC CONTRACTOR shall submit all proposed drainage gravels to the recommended laboratory for analysis as soon as possible, preferably within thirty (30) days after the award of the contract. Whenever possible, the gravel analysis shall be conducted on a sample of at least 1 kg. The gravel shall be subject to the following sieve analysis:

Gravel Particle Size Distribution (in U.S. sieve mesh sizes): 1/2", 3/8" 1/4", #5, #7, #10, #18, & pan. The distribution shall be reported as the percentage retained on each of the required sieves.

Gravel shall be evaluated at the following accredited testing laboratories, and paid for by the GC CONTRACTOR. The same testing lab to be used for the greens mix shall be used for testing this gravel. Once a source for the gravel to be used in the bunkers has been located and approved by the testing lab, this source shall not change and every 500 tons to be used shall be again tested and approved prior to use. The OWNER shall provide a representative to accompany the GC CONTRACTOR to pull samples for such testing.

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613 East 1<sup>st</sup> Street  
Linwood, KS 66052  
Attn: Sam Ferro  
Phone: 913-723-3700

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The GC CONTRACTOR shall be responsible for the submission of all materials for testing and for the payment of the lab fees. The GC CONTRACTOR shall ensure that all reports are submitted to the OWNER and GC ARCHITECT.

After drains have been prepared, the entire surface of the bunker area shall be covered to a uniform depth of 1.5-2 inches (1.5 - 2") with the approved 1/8" to 3/8" gravel. All gravel shall be stockpiled outside of the bunker core and brought in and spread and finished by hand with rakes. When bringing gravel into the new sub-grade of the bunker and when spreading gravel, all traffic must be limited to plywood laid over the sub-grade and drain lines and no traffic shall be allowed on areas where the gravel has been installed to a uniform depth of 1.5 - 2 inches (1.5 - 2"). Directly dumping gravel into the bunker core is not acceptable. Any area in which the GC CONTRACTOR dumps material into the core will be required to be removed completely and the direction of these specifications followed.

The GC CONTRACTOR shall bid the entire supply and installation of the bunker gravel layer as shown in the Plans, the Construction Details and as described in this Book of Specifications. The GC ARCHITECT has provided an estimated quantity for the above Work, it is the responsibility of the GC CONTRACTOR to perform a take-off.

The above is Part A of **Bid Item 11.060B** for the purchase, delivery, and installation of the gravel material.

#### **Part B - Polymer**

The liner will consist of spreading a (2") approved gravel layer across the complete bunker subgrade and then shall be sprayed with ST410 POLYMER by a certified and trained installer (a list of certified installers is available from Better Billy Bunker).

Using proper pressure spray equipment, a uniform layer of ST410 POLYMER shall be applied to the gravel in the bunker at a rate 1 gallon of ST410 POLYMER per 30-35 square feet. The gravel must be dry (less than 15% as tested by the certified installer) at application time. The treated bunker shall be allowed to cure for approximately 24 hours prior to sand installation. NOTE: ST410 POLYMER will penetrate approximately 1/2 - 1" (12mm - 25mm) depth of the gravel. A sturdy pliable layer of glued gravel will be the result.

After 12-24 hours, the ST410 POLYMER application will have cured and an inspection must occur and be approved in writing by the installer prior to the installation of bunker sand.

Every Square foot (meter) of every bunker MUST be inspected prior to the job being considered complete. Improper application can leave areas weak and gravel loose. Those areas must be touched up with reapplication of ST410 POLYMER.

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### Section 11 - Sand Bunker Construction

Loose rock on the soil or grass next to the bunker that was not treated must be blown away from the bunker or the sand will be contaminated.

It is installer's responsibility to inspect and maintain the highest standards when installing the Better Billy Bunker Polymer.

The GC CONTRACTOR shall bid the entire supply and installation of the Better Billy Bunker Polymer as shown in the Plans, the Construction Details and as described in this Book of Specifications. The GC ARCHITECT has provided an estimated quantity for the above Work, it is the responsibility of the GC CONTRACTOR to perform a take-off. The above is Part B of **Bid Item 11.060B**. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

#### **Section 11.070 - Purchase of Bunker Sand**

##### **Bid Item 11.070B**

This includes the purchase of Pro Choice Bunker Sand from Arkansas Decorative Stone in Sheridan, Arkansas, contact Michael Collins 870.941.8303.

The GC CONTRACTOR shall submit the proposed bunker sand, to the recommended testing laboratory for an analysis as soon as possible - preferably within thirty (30) days after the award of the contract. Bunker sand shall be evaluated by the following accredited testing laboratory, and paid for by the GC CONTRACTOR. Once a source for the bunker sand to be used has been located and approved by the testing lab, this source shall not change and every 500 tons to be used shall be again tested and approved prior to delivery to the project site. The GC CONTRACTOR shall notify the OWNER a minimum of 3 days in advance of when a sample will be taken, giving the OWNER an opportunity to be present during the pulling of the sand sample. All materials shall be approved in writing by the GC ARCHITECT and OWNER prior to the GC CONTRACTOR entering into a written contractor with the sand source and/or the delivery of the sand to the project site.

The testing shall simulate the condition of the proposed sand on the face of a bunker as well as the condition of the sand at the base of a bunker. Each measurement shall be reported as a range. The first value in each range shall be the amount of force (kg/cm<sup>2</sup>) required to bury a golf ball to its midpoint. The second value in each range shall be the amount of force (kg/cm<sup>2</sup>) required to bury a golf ball past its midpoint.

The testing laboratory's report shall include the tested material's dry color, wet color, Penetrometer Value (kg/cm<sup>3</sup>), shape/angularity, shape/sphericity, crusting, set-up, and Uniformity Coefficient (cu).

In addition the testing lab shall report the Infiltration Rate (in/hr), Infiltration Rate (cm/hr) and Bulk Density (g/cc) of the proposed bunker sand.

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### Section 11 - Sand Bunker Construction

The particle size distribution of the tested material (sand, straight, and mixes) shall be determined by subjecting the sand or mix to the following analysis:

#### Textural Analysis

Clay (<0.002mm), Silt (0.05 to 0.002 mm), Sand (0.05 to 2.0mm), Gravel (2 mm and above)

#### Sand Particle Size Distribution (U.S. sieve mesh):

The percentages retained on the following sieve sizes - #18, #35, #60, #100, & #270

In addition the following tests shall also be performed:

Angle of Repose

Moisture Column Test over 2 inches of proposed gravel

The results of the bunker sand testing should be made available for review by the OWNER and GC ARCHITECT. The selected bunker sand should have a textural/particle size distribution that would not create a layer that is a significant impediment to air/water permeability, within the bunker or on the green when sand is splashed onto the green. Bunker sand samples shall be sent to the following laboratory for testing.

#### Turf Diagnostics & Design

613 East 1<sup>st</sup> Street

Linwood, KS 66052

Attn: Sam Ferro

Phone: 913-723-3700

The GC CONTRACTOR shall provide a unit price for the supply of the bunker sand. The GC CONTRACTOR shall bid the entire supply of the bunker sand as shown in the Plans, the Construction Details and as described in this Book of Specifications. The GC ARCHITECT has provided an estimated quantity for the above Work, it is the responsibility of the GC CONTRACTOR to perform a take-off and bid their estimated quantity as **Bid Item 11.070B** for the purchase and delivery of the approved bunker sand. The GC ARCHITECT has included an estimated quantity in the Bid Form. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

#### **Section 11.080B - Installation of Bunker Sand**

##### **Bid Item 11.080B**

Prior to installing the bunker sand, the GC CONTRACTOR shall schedule a Walk Through with the GC ARCHITECT to review the installation of the bunker liner, if applicable. The bunker liner, if applicable,

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**shall be installed per the Plans, Construction Details and this Book of Specifications prior to installing the bunker sand.**

Once bunker liner is in place in the bunkers, (if applicable), no mechanized equipment will be allowed in the bunker core. Bunker Sand to be placed in the bunker may be dumped along the edge over plywood, or it can be conveyed into the bunker with a Tycrop or equal, but it shall be spread by hand. Any damage to the edge cut, or any other parts of the bunker or bunker surrounds, during this operation shall be repaired prior to sodding the surrounds of the bunker. If the bunker surrounds have already been sodded, it is a requirement to place plywood down over the sod, checking for any damage that may have occurred during the operation, and repairing any such damage.

If the Bunker Sand is stockpiled on site prior to placement within the bunker core the GC CONTRACTOR will be responsible for the loading and hauling of the Bunker Sand from the on-site stockpile to the locations on the golf course. The GC CONTRACTOR shall take care to not pick up foreign material when eventually transporting to the location of use. If any such foreign material is brought to and placed in the Bunker Sand, such shall be removed and an appropriate amount of clean Bunker Sand shall be replaced.

Bunker Sand shall be installed in the bunkers to a compacted depth of five (5") inches throughout the entire bunker, using hand tamps to achieve compaction. Depth of sand shall be checked after hand tamping has occurred. If any area of the bunker has less than five (5") inches of sand after hand tamping, the GC CONTRACTOR shall add the necessary amount of sand and compact again.

Unless otherwise approved, Bunker Sand shall be placed and spread in the bunkers prior to sodding the surrounds of the bunker. The Bunker Sand shall form a "dike" at the edge of the bunker to reduce possible contamination of the remainder of the Bunker Sand.

After sod has been installed, the OWNER shall hand water the Bunker Sand as possible to help speed the process of getting the Bunker Sand to set up firm. For any bunkers that have any slopes in the sand that exceed 45%, the OWNER shall, after sod as rooted in, rake sand from such slopes into the bottom of the bunker until there is a maximum of three (3") inches of sand, spreading the sand in the bottom to be as smooth as possible.

**Bid Item 11.080B** shall be for the transportation of the Bunker Sand from the on-site stockpile to the bunker cores on the golf course, for the installation of the Bunker Sand into the bunker cores, compacting per the specifications, and shall be priced by the ton. The GC ARCHITECT has included an estimated quantity in the Bid Form. All Work shall be measured in the field and the Contract Sum adjusted per the unit prices provided in the Bid Form.

#### **Section 11.090 - As-Built Drawings and Application for Payment**

Bunker Construction will be considered complete when all in this Section has been completed per the Plans, Construction Details and this Book of Specifications, the GC ARCHITECT has made an inspection of this portion of the WORK, and complete as-built drawings have been issued to the GC ARCHITECT and OWNER.

**It is the responsibility of the GC CONTRACTOR to provide as-built drawings for the OWNER and GC ARCHITECT. The GC CONTRACTOR shall prepare clean, legible, digital as-built drawings in**

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### Section 11 - Sand Bunker Construction

**AutoCAD and include ALL relative dimensions. The GC CONTRACTOR must obtain the most recent digital base topo information from the GC ARCHITECT so they can use this as a base to complete the most accurate as-built drawings possible.**

The GC CONTRACTOR may make applications for payment based on the percentage completion of drainage. The schedule of values submitted with each pay applications shall include the percent completed of the drainage. Updated progress as-built drawings must be submitted with pay applications. The OWNER will not approve applications for payment until progress as-builts are submitted to both the OWNER and the GC ARCHITECT. The OWNER will only pay for the installation of materials that can be verified from the as-built drawings. Materials properly stored on site may be included with pay applications. Final as-built drawings must be submitted with the Final Pay Application.

## Book of Specifications Cart Paths and Curbing - Section 12

### **SECTION 12.000 - CART PATHS and CURBING**

Cart Paths - The paved areas that will handle cart traffic. This section will include the removal of existing paths, the cutting in of new paths, the preparation of the subgrade of the paths, the installation of concrete paths, the installation of curbing as defined herein, and other as may apply.

Curbing - As defined below.

#### **Section 12.010 - Removal of Existing Paths** **Bid Item 12.010, 12.010B, 12.010Alt2, 12.010Alt4**

The Plans will identify which existing path is to be removed. Prior to removal, the GC CONTRACTOR shall indicate the portions of the cart path they intend to remove for review by the OWNER and GC ARCHITECT. Any damage to the existing irrigation system, existing grass, existing trees, or anything else that may exist, that occurs during the demolition of the existing path shall be repaired by the GC CONTRACTOR at no additional cost to the OWNER.

All material is to be hauled offsite unless otherwise directed by the GC ARCHITECT or OWNER.

All of the above shall be included in **Bid Items 12.010, 12.010B, 12.010Alt2, 12.010Alt4.**

#### **Section 12.020 - Location and Alignment of New Paths**

New Cart paths shall follow the alignment as shown on the Plans. Prior to installation of any path, the GC CONTRACTOR shall receive approval from the OWNER and the GC ARCHITECT relative to alignment.

All downhill drop-offs steeper than 3:1 next to the cart paths shall have at least 5 feet of flat ground between cart path and drop-off. Cart paths shall not be crowned and must let drainage pass from one side to the other over the surface unless the path is being used as a drainage path. No cart path shall slope towards tee unless there is a drain basin provided to collect any and all water in the area or directed by the GC ARCHITECT. Ponding of drainage next to cart paths is not allowed and must be corrected by GC CONTRACTOR at their own expense prior to Substantial Completion.

#### **Section 12.030 - Slopes and Widths of Paths**

Cross slopes less than .5% or steeper than 1.5% are not acceptable. Longitudinal downhill slopes less than 1% or steeper than 8% are not acceptable, unless approved by the GC ARCHITECT. These requirements shall supersede any shown on the Grading and Drainage Plan. Consult the GC ARCHITECT with any necessary changes to grade.

All cart paths shall be at the width specified on the plan, unless specific direction is provided by the OWNER and/or GC ARCHITECT.

## Book of Specifications Cart Paths and Curbing - Section 12

### Section 12.040 - Tie-In of Cart Path

This shall consist of the tie-in of the proposed cart path to existing and proposed surrounding grades. Care shall be taken that no pockets of water or drainage flow lines are impeded by the completion of this task. All back fill material shall be free of debris and suitable for plant growth.

### Section 12.050 - Excavation and Sub-Grade of the New Cart Path

Excavation shall extend to a depth necessary to produce the proper finish grade according to the plans. Finish grades of the cart path are generally to be flush with surrounding grades and shall allow water to pass without water sitting on or near the path.

All fill underneath cart paths shall be done in 6" to 1' lifts using heavy machinery to compact each lift fully.

Subgrade shall be finished to a smooth even surface and thoroughly compacted to a minimum dry density of 95%.

In the event that the GC CONTRACTOR cannot achieve 95% compaction due to poor soils they shall consult with the GC ARCHITECT to best determine a solution. At the time a solution is presented the GC CONTRACTOR will provide a Change Order for approval prior to proceeding.

### Section 12.060 - Installation of Cart Path

#### **Bid Items 12.060, 12.060B, 12.060Alt2, 12.060Alt3, 12.060Alt4**

Cart paths shall be paved with 3,000 PSI concrete, with Fibermesh, at a minimum of 4" inches thick. **Construction Detail (CP 1)** applies. These bid items shall include all included in this Section as it relates to the installation of the cart paths.

#### Concrete Specifications

##### General

1. Reference Standards:
  - A. American Concrete Institute (ACI):
    1. Recommended Practice of Evaluation of Compression Test Results of Field Concrete (ACI 214)
    2. Specifications for Structural Concrete for Buildings (ACI 301)
    3. Building Code Requirements for Reinforced Concrete (ACI 318)
    4. Recommended Practice for Selecting Proportions for Concrete (ACI 613)
    5. Selection and Use of Aggregates for Concrete (ACI Comm. 621)
    6. ACI Manual of Concrete Inspection (SP -2)
    7. Recommended Practice for Measuring, Mixing and Placing Concrete (ACI 614)
  - B. American Society of Testing Materials (ASTM):
    1. Standard Method for Making and Curing Concrete Compressions and Flexure Test Specimens in the Field (ASTM C31)
    2. Standard Specifications for Concrete Aggregates (ASTM C33)



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### Cart Paths and Curbing – Section 12

3. Standard Method of Test for Compressive Strength of Molded Concrete Cylinders (ASTM C39)
  4. Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (ASTM C42)
  5. Standard Specification for Ready Mixed Concrete (ASTM C94)
  6. Standard Method of Test for Sieve of Screen Analysis of Fine and Coarse Aggregate (ASTM C136)
  7. Standard Method of Test for Slump of Portland Cement Concrete (ASTM C143)
  8. Standard Specification for Portland Cement (ASTM C150)
  9. Standard Method of Sampling Fresh Concrete (ASTM C172)
  10. Standard Specification for Air Entraining admixtures for Concrete (ASTM C260)
  11. Standard Specification for Chemical Admixtures for Concrete (ASTM C494)
- C. Portland Cement Association: Design and Control of Concrete Mixtures.
- D. Latest Edition of each of above Governing Standards shall apply. Except as modified in this section or the other related sections, ACI 301 shall generally apply to all concrete work in this project.
- E. Base Course (Alternate) – Base course shall be of an ABC type material approved by the PROJECT CONSTRUCTION MANAGER.

#### Submittals and Sample Pour

- A. The proposed concrete mix design for each separate class of concrete shall be submitted by the GC CONTRACTOR for review by the PROJECT CONSTRUCTION MANAGER.
- B. Design Mix proportions together with certifications by an independent testing laboratory or by the material manufacturer that proposed grout setting bed for base and bearing plates will reach the specified strength shall be submitted for review by the PROJECT CONSTRUCTION MANAGER.
- C. The GC CONTRACTOR shall provide a minimum of four 3m x 3m sections of cart path, including curb, to show the options of how the cart path can be finished within the Unit Price per square meter provide by the GC CONTRACTOR. The GC CONTRACTOR shall pour the test sections a minimum of 30 days prior to the commencement of cart path work on the project. The GC CONTRACTOR shall inscribe in the corner of each test sample the color and rate of the associated test pour. The final selection of the cart path color and finish will be made by the GC ARCHITECT. The GC CONTRACTOR shall be responsible for maintaining the consistency of the finish throughout the project.

#### Coordination of Work

## Book of Specifications

### Cart Paths and Curbing – Section 12

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

#### Quality Assurance

- A. All concrete work shall be performed by a firm with at least five years of experience with work of similar scope and quality.
- B. All work shall be performed in accordance with ACI 301 and ACI 316. Work during hot weather shall conform to ACI 305. Work during cold weather shall conform to ACI 306.
- C. The GC CONTRACTOR shall obtain all materials for the installation of concrete from the same source throughout the duration of the project. At no time will multiple sources or a change of source be acceptable.

#### Products

- 1. Portland Cement
  - A. Portland cement, or approved equal, shall conform to the requirements for Type I or III cement of ASTM C150.
- 2. Aggregates
  - A. Fine aggregate shall consist of natural and/or manufactured sand having hard, strong and durable particles and which conform to the requirements of ASTM C33.
  - B. Coarse aggregate shall consist of clean, hard, fine-grained, sound crushed rock or washed gravel which do not contain in excess of five (5) percent by weight of flat, chip-like, thin, elongated, friable or laminated pieces, or more than one (1) percent by weight of shale or cherty material. Any piece having a major dimension in excess of two and one-half (2-1/2) times the average thickness shall be considered to be flat or elongated. Coarse aggregate shall conform to the requirements of ASTM C33.
  - C. Refer to concrete quality table for maximum sizes of aggregate permitted for each class of concrete.
- 3. 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.

## Book of Specifications

### Cart Paths and Curbing - Section 12

4. Grout Setting Bed for Base and Bearing Plates (Not Applicable)
5. Color **(no color is specified at this time, but the following would apply if color is used)**
  - A. Color additives shall comply with manufacturer's instructions. Delivery of color additives shall be in the original, unopened packaging. Because coloring may vary during the manufacturing all color for the project shall be purchased at the same time.
  - B. The manufacturer of color additives shall be Davis Color; phone 800-356-4848, email: [info@daviscolors.com](mailto:info@daviscolors.com), or internet [www.daviscolors.com](http://www.daviscolors.com).  
  
Substitutions may be allowed if the GC CONTRACTOR submits alternative prior to bidding or provides and alternate price during the bid process.
  - C. All materials for color additives shall contain pure, concentrated mineral pigments specially processed for mixing into concrete and complying with ASTM C979.
  - D. Color additives containing carbon black are not acceptable.

#### Execution

1. 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.
  - D. All bags of coloring additive shall be stored in a dry location.
2. 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 GC CONTRACTOR of America.

## Book of Specifications

### Cart Paths and Curbing - Section 12

- C. All concrete materials shall be batched by weight.
  - D. The mixture rate for Fibermesh is 1 bag equaling, 1.5 pounds, added to 1yard of concrete.
  - E. 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 **PROJECT CONSTRUCTION MANAGER** , 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.
  - F. Each batch of 2 cubic yards or less shall be mixed for not less that 1-1/2 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.
  - G. Concrete suppliers shall use Mix-Ready disintegrating bags or the Chameleon bulk handling system to add color to concrete. Mixing shall be in accordance with manufacturer's instructions. Mix until color additives are uniformly dispersed throughout mixture and disintegrating bags, if used, have disintegrated.
3. Base Course Aggregate (not applicable, but included herein if eventually required)
- A. Base course aggregate shall be spread and compacted upon the sub-base to a uniform thickness of 10cm measured after compaction. Base course shall be watered and compacted by rolling with a roller weighing not less than five (5) US tons. Surface of the base course shall conform to the required grade and cross section, and any depressions which may develop shall be filled and re-rolled. Compaction shall be to a 95% density.
4. 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 1-1/2 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.
5. Delivery Tickets

## Book of Specifications

### Cart Paths and Curbing - Section 12

- A. Duplicate delivery tickets, one for the GC CONTRACTOR and one for the PROJECT CONSTRUCTION MANAGER 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. GC 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, and 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
6. **Tooled and Expansion Joints**
- A. The GC CONTRACTOR shall allow for a tooled joint or hot joint, every 3m. All tooled joints must be scoured and finished with the appropriate tools.
  - B. The GC CONTRACTOR shall allow for expansion joints at a minimum of every 15m or at the end of a truck, whichever is less. All cold joints or expansion joints are to be made with a 1/2" x 4" treated cedar plank that spans the thickness of the section of path and is true in size, shape, and alignment. Severely warped planks or those that are not true to size will be rejected by the PROJECT CONSTRUCTION MANAGER and will need to be replaced at the expense of the GC CONTRACTOR.
7. **Use of Admixtures**
- A. Admixtures for the purposes of increasing workability or appearance of the concrete, or for improving any other characteristic, will be permitted but only with the approval of the PROJECT CONSTRUCTION MANAGER. 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 GC CONTRACTOR shall be responsible for incorrect usage of type or quantity of admixtures.

## Book of Specifications

### Cart Paths and Curbing – Section 12

8. Concrete Testing Procedures
  - A. The GC 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 herein before listed ASTM Standards and Specifications by an established independent testing laboratory selected and paid by the GC CONTRACTOR.
  - B. The GC CONTRACTOR shall be responsible for notifying the laboratory at least 12 hours before it is necessary to make test cylinders. If the GC CONTRACTOR places concrete without notifying the laboratory, the PROJECT CONSTRUCTION MANAGER will have the concrete tested by means of a core test as specified in ASTM C42 at the GC CONTRACTOR's expense.
  - C. Sampling of fresh concrete shall be in accordance with ASTM C172.
  - D. Slump tests 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.
  - 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 50 cubic yards or every fifth truck or a fraction thereof in each day's placing and for each separate specified class of concrete.
  - F. The GC 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.
9. 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.

## Book of Specifications

### Cart Paths and Curbing - Section 12

- 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 **PROJECT CONSTRUCTION MANAGER** 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 indicate that concrete of low strength has been placed which cannot safely, in the opinion of the **PROJECT CONSTRUCTION MANAGER**, 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 **PROJECT CONSTRUCTION MANAGER** 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, or load test of the area required as will be regulated by the **PROJECT CONSTRUCTION MANAGER**.
  - 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 **GC CONTRACTOR**.
10. Testing of Concrete
- A. The **GC CONTRACTOR** will provide and pay for all materials that are to be tested. The **GC CONTRACTOR** shall notify the testing laboratory 24 hours prior to the placement of any concrete. The testing laboratory will submit three (3) copies of each report to the **PROJECT CONSTRUCTION MANAGER** and two (2) copies of the report to the **GC CONTRACTOR**.
  - B. It will be the responsibility of the **GC CONTRACTOR** to make arrangements for delivery of the cylinders to the testing laboratory.
  - C. Concrete for each test shall be tested at the place of deposit for slump and entrained air and these values recorded on the test report.
  - D. The **GC CONTRACTOR** shall keep a standard slump cone and bull nosed rod on the jobsite for any additional slump tests required where a variation of slumps is visible.
  - E. The testing laboratory will be provided by the **PROJECT CONSTRUCTION MANAGER** prior to the commencement of construction.

### 11. Compression and Strength Tests



## Book of Specifications

### Cart Paths and Curbing - Section 12

- A. The testing laboratory or GC CONTRACTOR will take samples and make tests as hereinafter listed for each fifty (50) cubic yards of fresh concrete placed, of each class strength specified, but not less than one test for each day's pour.
  - B. Each test shall consist of four (4) standard 6"x12" cylinders. The four cylinders of each test shall be made in accordance with ASTM C31 and broken in accord with ASTM C39 at the ages as follows:
    - 1. One cylinder from each test, break in 7 days
    - 2. Three cylinders from each test break in 28 days
  - C. The average strength of the three 28 day cylinders shall be the basis for evaluation of acceptable concrete. This 28 day, three cylinder averages shall be at least 25% greater than the strengths specified on the drawings.
12. Reinforcement of Strength Requirements
- A. When the ultimate compressive strength (average) of any test falls below the specified strength for the class of concrete specified, the PROJECT CONSTRUCTION MANAGER may order additional curing for that portion of the structure where the questionable concrete has been placed.
  - B. In the event that such additional curing does not give the strengths specified, determined from cores made in accord with ASTM C42, and if such tests indicate the necessity, the defective parts shall be removed and replaced as directed by the PROJECT CONSTRUCTION MANAGER at the GC CONTRACTOR's expense, including the expense of the tests.
13. Review by the GC ARCHITECT Before Concrete Replacement
- A. Review by the GC ARCHITECT and PROJECT CONSTRUCTION MANAGER is required of all work required to be built into the concrete before the concrete is placed. Review by the GC ARCHITECT and PROJECT CONSTRUCTION MANAGER does not relieve the GC CONTRACTOR from complying with the requirements for the Contract Drawings and specifications.
  - B. The PROJECT CONSTRUCTION MANAGER and GC ARCHITECT must be notified at least 24 hours prior to the placing of any concrete, and the placement of concrete before such notice is given and/or before review by the GC ARCHITECT, is a valid reason for rejecting the concrete so placed.
  - C. Before any concrete is placed, mixing and conveying equipment shall be well cleaned, form work completed, the forms or space to be filled with concrete thoroughly cleaned;

## Book of Specifications

### Cart Paths and Curbing - Section 12

forms, if not oiled shall be wet; all reinforcement secured and cleaned; and expansion joint material, anchors and other embedded items positioned.

- D. 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 re-handling or flowing.
- E. Place concrete only when the ambient temperature is at least 40 degrees Fahrenheit and rising, and will remain above 40 degrees for a period of at least 12 hours. A calibrated thermometer shall be provided at the project site.
- H. 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.
- I. 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.

#### 14. 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 degrees Fahrenheit for 72 hours after placing and prevented from going below freezing for 3 days thereafter.
- B. The GC CONTRACTOR shall submit, for review by the PROJECT CONSTRUCTION MANAGER, the methods proposed for protecting the concrete against low or high temperatures. The GC 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. Should the weather forecast call for a 30% or more chance of rain in the area within five hours of the last pour the GC CONTRACTOR shall be responsible for furnishing and installing measures to protect freshly poured concrete from becoming damaged. In the event that the concrete is damaged due to rain it will be the responsibility of the GC CONTRACTOR to remove and replace, at his expense, the damaged section or sections at the direction of the PROJECT CONSTRUCTION MANAGER. Any means of patching or surface sealing the damaged section will not be permitted.
- D. Prevention of loss of moisture from surface of concrete shall be accomplished by keeping surface or forms continuously wet for as long as conditions require. Wet curing shall extend for not less than seven (7) days.

## Book of Specifications

### Cart Paths and Curbing - Section 12

- E. Whatever curing method is used, it shall be applied immediately after final troweling, floating, or after forms are removed. The curing method used shall be coordinated with the method of protection.
- F. Membrane forming compounds shall be applied as soon as possible after finishing operations. Apply compound in two (2) coats, the second at right angles to the first.
- G. 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.

#### 15. 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. Honeycombed areas and other defective concrete shall be removed down to sound concrete as directed by the **PROJECT CONSTRUCTION MANAGER** before patching. All honeycombed areas shall be shown to the **PROJECT CONSTRUCTION MANAGER**.
- D. All areas to be patched shall be thoroughly cleaned and dampened before patching is begun.

#### 16. Finishing of Formed Surfaces

- A. A broom finish, of the type approved before the cart path work begins, shall be provided on top of paths. Broom finish shall consist of a coarse and scoured texture as directed by the **GC ARCHITECT** by drawing a stiff broom across the concrete surface. This operation shall follow immediately after floating. Tolerances shall be within 1/8 inch to promote the intended drainage.

#### 17. End of the Day

- A. The **GC CONTRACTOR** shall schedule with the plant dispatcher for the days work and plan on ending all work with a cold joint

Paths will be considered complete when all is complete per this Book of Specifications, the Plans, Construction Details, and all other necessary to properly construct the paths.

The **GC CONTRACTOR** may make applications for payment based on the completion of the paths. The schedule of values submitted with each pay applications shall include the percent complete of paths.

## Book of Specifications Cart Paths and Curbing - Section 12

Updated progress as-built drawings shall be submitted with pay applications. The OWNER will only pay for the installation of materials that can be verified from the as-built drawings. Materials properly stored on site may be included with pay applications.

### **Section 12.070 - Installation of Curbing** **Bid Items 12.070, 12.070Alt2**

Any and all curbing to be installed shall be concrete and poured as a monolithic pour in conjunction with cart path. The curb shall be four inch (4") x four inch (4") rolled curb. **Construction Detail (CR1) applies.**

The location of the curbing is located on the Plans. Prior to installation, the GC CONTRACTOR shall layout the location of the curbing, which must be approved by the OWNER and the GC ARCHITECT.

The surrounding earthen grades shall be fully compacted flush with the elevation of the top of the curbing, with a variance of plus half an inch ( $\frac{1}{2}$ "). In the event the grades surrounding the curbing fall away from the curbing, there should no less than two feet (2') that falls toward the curbing at a grade not to exceed ten percent (10%). In the event the grades surrounding the curbing fall toward the path, there should be no less than two feet (2') from the path that falls not greater than ten percent (10%), unless otherwise approved by the GC ARCHITECT.

Curbing will be considered complete when all is complete per this Book of Specifications, the Plans, Construction Details, and all other necessary to properly construct the curbing.

The GC CONTRACTOR may make applications for payment based on the completion of the curbing. The schedule of values submitted with each pay applications shall include the percent complete of curbing. Updated progress as-built drawings shall be submitted with pay applications. The OWNER will only pay for the installation of materials that can be verified from the as-built drawings. Materials properly stored on site may be included with pay applications.

All above shall be included in **Bid Items 12.070, 12.070Alt2.**

Book of Specifications  
Finish Preparation - Section 13

**SECTION 13.000 - FINISH PREPARATION**

The GC CONTRACTOR shall use the Planting Plan, this Book of Specifications, and any other the GC CONTRACTOR deems necessary to control the seed bed prep and planting operation including the establishment of grass lines.

The GC CONTRACTOR shall provide unit prices for each type of fine grading and seedbed prep required to provide a friable bed to the Owner for planting. No extras will be allowed for minor or major inaccuracies in the estimate of quantities which may be provided by the GC ARCHITECT. The GC CONTRACTOR shall also note that in the event they exceed the prescribed disturbed areas on the existing holes, such areas must be planted with exact type that is adjacent to such an area at their own expense. Any changes to the plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

**No planting will be permitted until the irrigation system in the area to be planted has been tested and proven to be operable and reliable.** Loss of planted material due to malfunctions in the irrigation system will require the GC CONTRACTOR to replant such areas within the guides of this Book of Specifications, as long as such irrigation system malfunction is due to defects in workmanship or materials provided by the GC CONTRACTOR.

**Section 13.010 - Soil Preparation and Finish Preparation**  
**Bid Items 13.010, 13.010B**

Soil preparation is the final preparation of the soil prior to planting.

All haul roads shall be ripped to a depth of 12" and fine graded for approval by the GC ARCHITECT prior to planting.

For fairways and roughs, soil preparation requires removing all sticks or roots larger than ½" in diameter by 3" in length, any other debris larger than 1". The GC CONTRACTOR shall disk the topsoil, existing or platted, to a depth of 6", paying special attention to those areas that may have been compacted, to loosen soil and create a friable soil bed for seeding or sprigging. Existing grass and weeds may be disked under and killed as long as they do not interfere with producing a smooth friable soil bed for planting. In the event of native Bermuda, such shall be sprayed as necessary so that it does not interfere with sprigging operations. Larger weeds shall be pulled up or dug up and removed from the area to be sprigged or sodded. All depressions on areas to be grassed shall be corrected to avoid standing water.

All turf areas must be box bladed to a very smooth surface immediately prior to planting (within 12 hours or after the last rain that caused any surface irregularities). Generally, soil preparation for planting can be accomplished with mechanized equipment. However, in certain limited circumstances, such as around green edges, tree and shrub wells, drainage basins, lake edges, bunker faces, and sprinkler heads, etc., the final soil preparation shall be completed by hand with rakes and shovels.

All mentioned above shall be included in **Bid Items 13.010, 13.010B.**

Book of Specifications  
Finish Preparation - Section 13

**Section 13.020 - Fertilization and Soil Amendments**

**This Section performed by the OWNER.**

The GC CONTRACTOR shall notify the OWNER two (2) weeks in advance of planting to allow for the OWNER to have materials on site before planting.

Book of Specifications  
Planting - Section 14

**SECTION 14.000 - PLANTING**

The GC CONTRACTOR shall use the Planting Plan, this book of specifications, and any other the GC CONTRACTOR deems necessary to control the planting operation. The planting operations will consist of sodding all disturbed areas and tee surfaces per the planting plan.

The GC CONTRACTOR shall provide unit pricing for the installation of all planting as shown on the Planting plan, other attached plans, all as necessary for proper installation of such plans, as instructed in the Construction Details, and as instructed in this book of specifications. No extras will be allowed for minor or major inaccuracies in the estimate of quantities which may be provided by the GC ARCHITECT. The GC CONTRACTOR shall also note that in the event they exceed the prescribed disturbed areas on the existing holes, such areas must be planted with exact type that is adjacent to such an area at their own expense. The GC CONTRACTOR shall provide unit prices for each type of planting provided. Any changes to the plan, approved in writing by the GC ARCHITECT, shall be measured in the field and the Contract Sum shall be adjusted per the unit prices provided in the Bid Form.

**Section 14.010 - Planting Matrix**

**Bid Item 14.010, 14.010B, 14.010Alt2, 14.010Alt3, 14.010Alt4**

LOCATION	GRASS TYPE	RATE
Tee Surface	Astro Bermuda	Sod
Tee Surrounds	Astro Bermuda	Sod
Fairway and Roughs	Astro Bermuda	Sod
Bunker Surrounds	Astro Bermuda	Sod

Astro Bermuda has been chosen for the grass type because it has the qualities of having lower growth for mowing, thinner grass blade, and better winterkill resistance. Astro Bermuda is specific for golf course use and provides a better playing surface, and easier maintenance qualities. Please contact Ray at Tulsa Grass and Sod at 918.369.3661.

No planting will be permitted until the irrigation system in the area to be planted has been tested and proven to be operable and reliable. Loss of planted material due to malfunctions in the irrigation system will require the GC CONTRACTOR to replant such areas within the guides of this book of specifications, as long as such irrigation system malfunction is due to defects in workmanship or materials provided by the GC CONTRACTOR.

**Section 14.020 - Planting Guidelines for Sodding**

**Bid Item 14.020, 14.020B, 14.020Alt2, 14.020Alt3, 14.020Alt4**

The sod shall be cut so that the soil layer is no less three quarters of an inch (3/4") thick and no more than one inch (1") thick. While the soil layer shall not be less than three quarters of inch (3/4") thick, it may be



## Book of Specifications Planting - Section 14

acceptable to have the sod cut as thick as two inches (2") thick, so long as the variance within this variety is never more than one quarter of an inch (1/4") during the project. The sod shall not be tattered or torn so as to fall apart when being installed or to present an uneven surface once installed. Variations in sod thickness that result in an uneven surface will not be acceptable and such unacceptable areas shall be replaced per these guidelines.

Sod being installed on slopes steeper than 3:1 and/or which is subject to sloughing shall be held in place by means of split wooden shingles, metal staple pins or other means acceptable to the GC ARCHITECT. There shall be a minimum of one shingle or pin per square foot when such is required to be used.

**Prior to watering, all sod shall be rolled using a standard walk behind water drum roller.**

Around all drain basins the sod shall be laid so that the top of the grate used in the drain basin is at least 1/2" below, and no more than 1" below, the top of the soil in the sod.

### **Section 14.040 - Watering**

The GC CONTRACTOR is responsible for watering the same day the sod and sprigs are actually planted, following the schedule and planting guidelines provided herein. **The GC CONTRACTOR shall notify the OWNER'S Golf Course Superintendent when the watering is going to take place so that they may be present to monitor the initial watering or take over the watering.**

### **Section 14.050 - Satisfactory Establishment**

Fourteen (14) days after the planting of each specific area planted, or a minimum of one week after each specific area has been mowed for the first time - whichever is later, the GC ARCHITECT and OWNER shall evaluate whether all areas planted by the GC CONTRACTOR have established so that there is adequate coverage in all areas sprigged or seeded and that all sod has rooted and is alive.

The GC ARCHITECT'S and OWNER'S judgment alone shall be the basis for evaluation. In the event that certain areas are found by the GC ARCHITECT and OWNER to be unsatisfactory, the GC CONTRACTOR shall re-sprig, re-seed or re-sod, in whole or part, those areas designated by the GC ARCHITECT and OWNER as deficient in growth or in live root. The OWNER will not incur any additional costs for the replanting of areas which do not achieve satisfactory establishment.

**Satisfactory establishment will be generally reviewed on the basis of the following guidelines:**

Sod - At the point at which the GC CONTRACTOR requests this type of planting to be reviewed, all sod shall be alive and shall have adequately rooted to the soil so that it is difficult to pull up the sod due to root attachment. Any sod that fails to meet these standards shall be replaced immediately at the GC CONTRACTOR'S expense.

# **Cherokee Springs Golf Club**

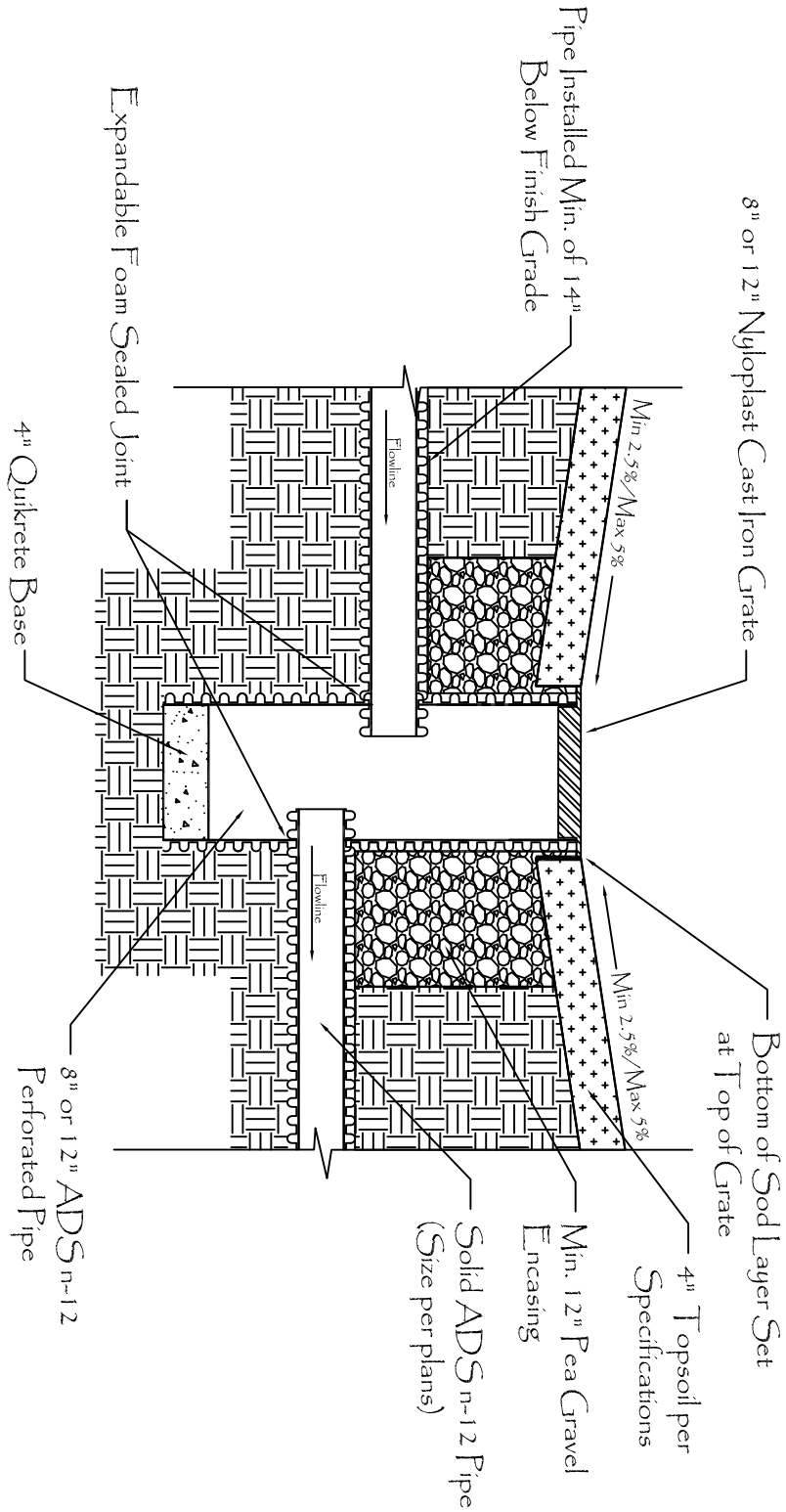
## **Tee and Bunker Renovation**

### **Construction Details**

Version 1 - January 1, 2014



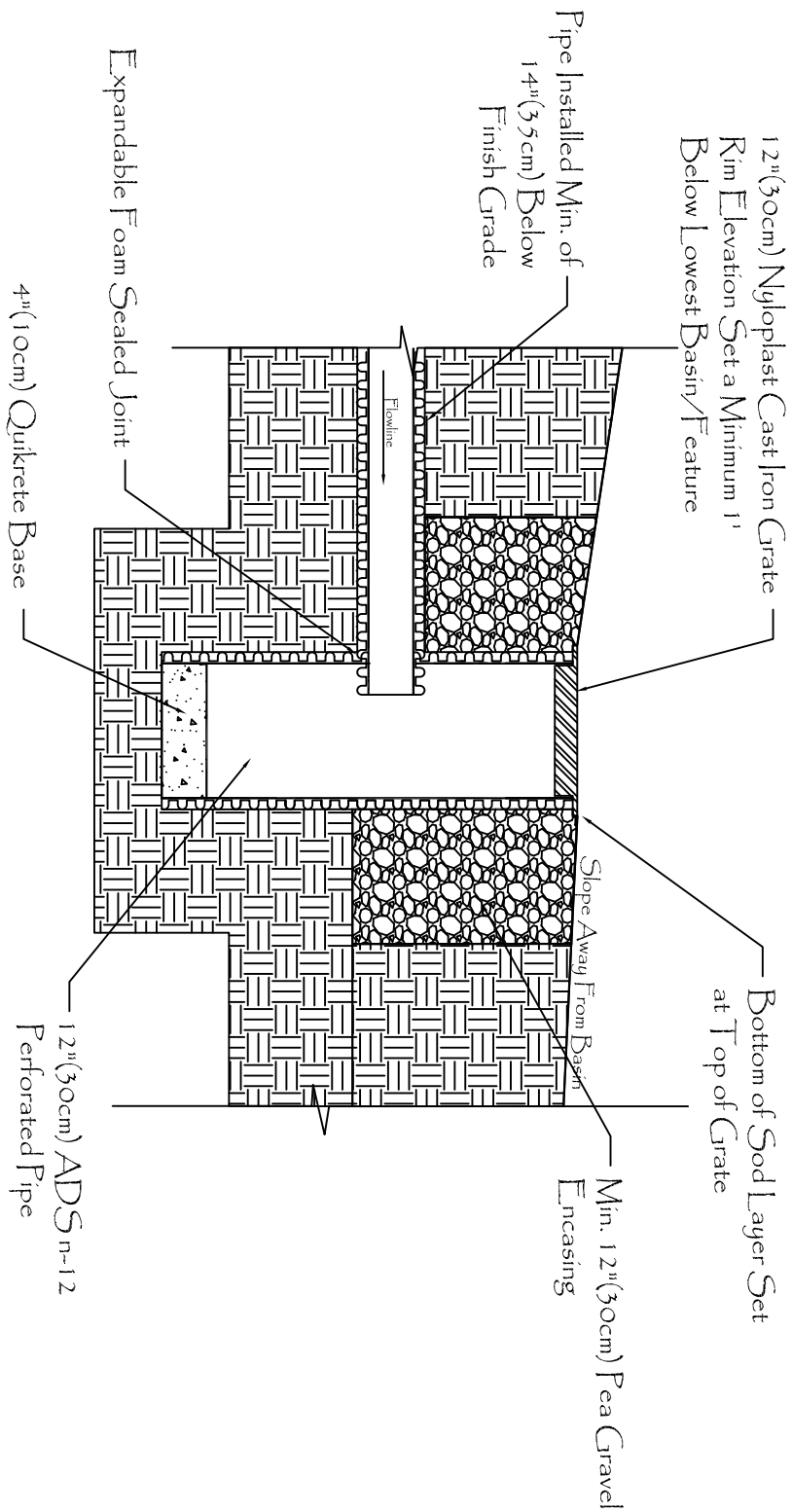
Tripp Davis and Associates  
Golf Architects  
Norman, Oklahoma • Peoria, Arizona



DB1

# Drain Basin Detail

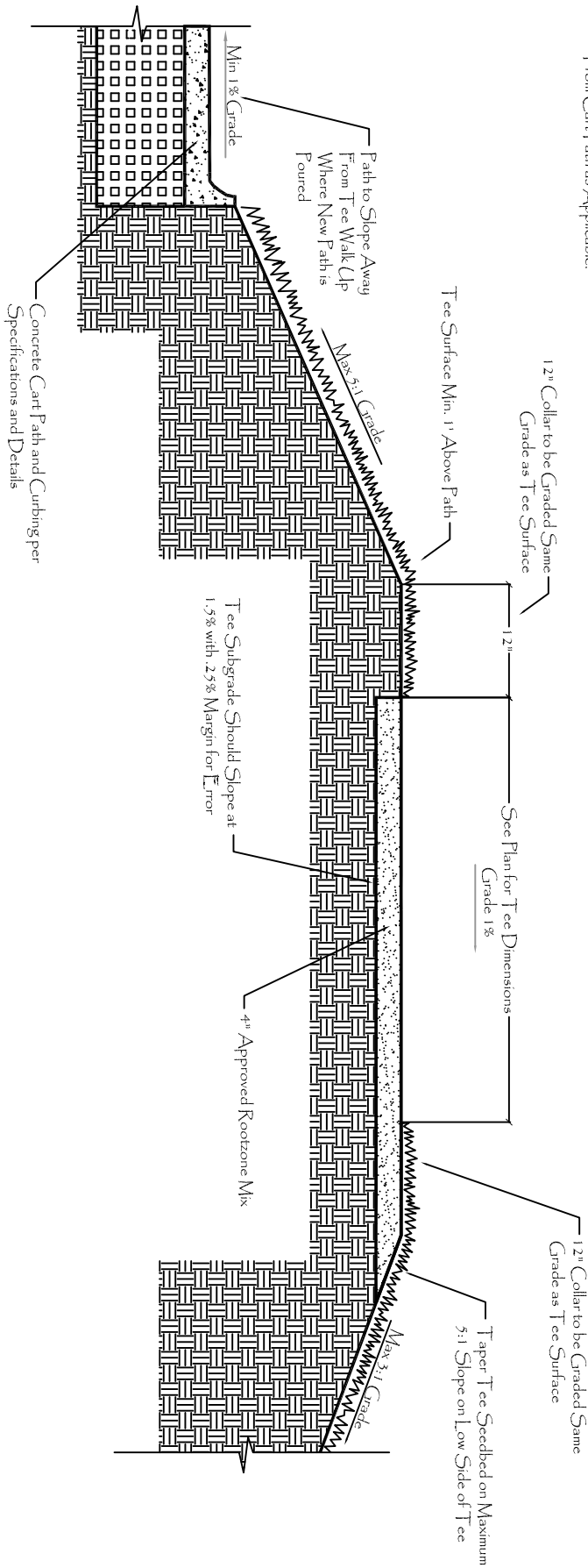
Not to Scale



D01

**Drainage Outfall Detail**  
Not to Scale

\* Note: Approved Tee Seedbed Shall Slope Away From Cart Path as Applicable.



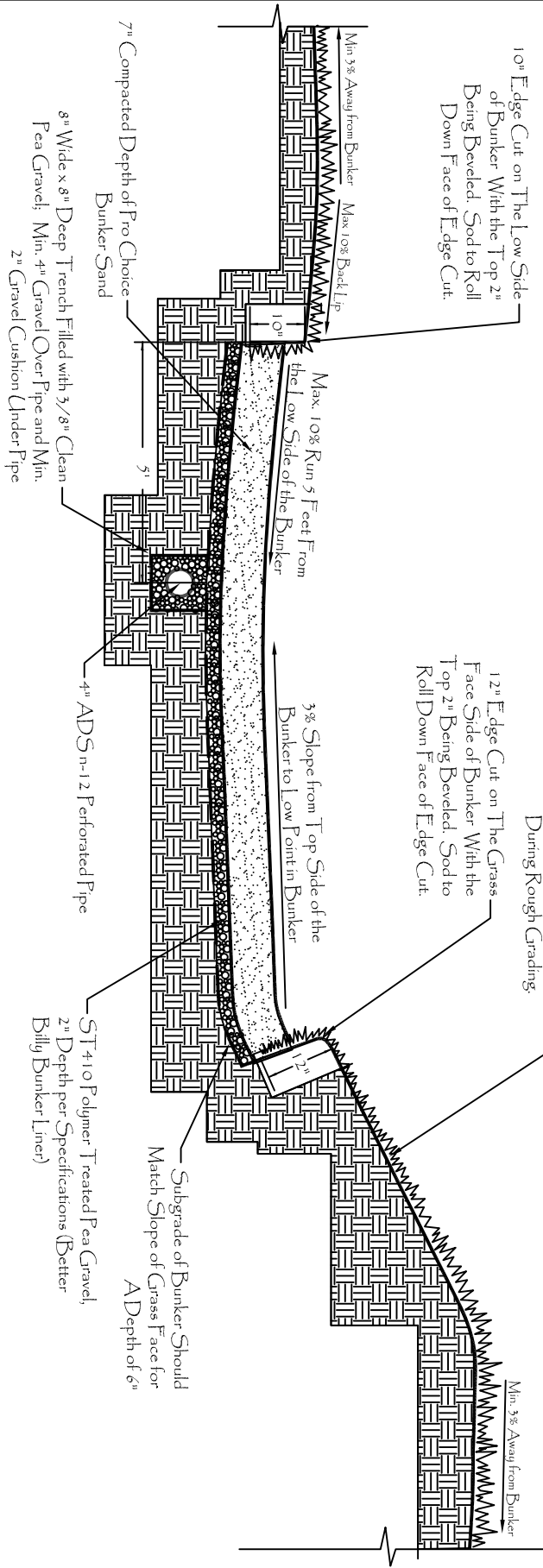
T1

# Tee Construction

Not to Scale

\* NOTE: Final Depth and Shape of Bunker per Plan and Field Direction Provided by the GC ARCHITECT

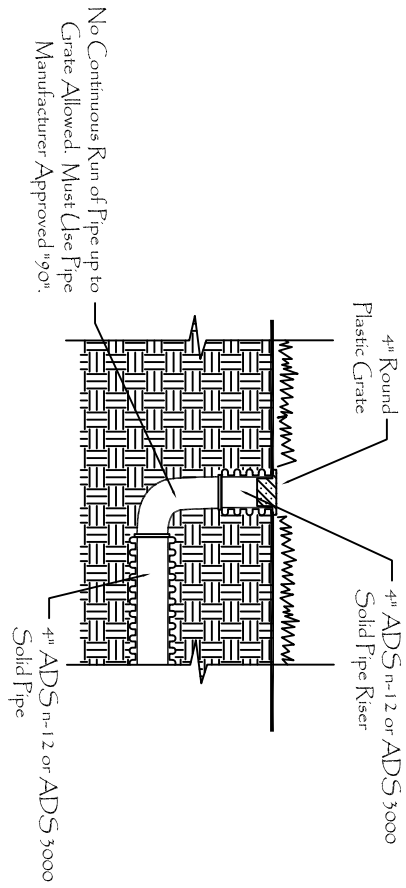
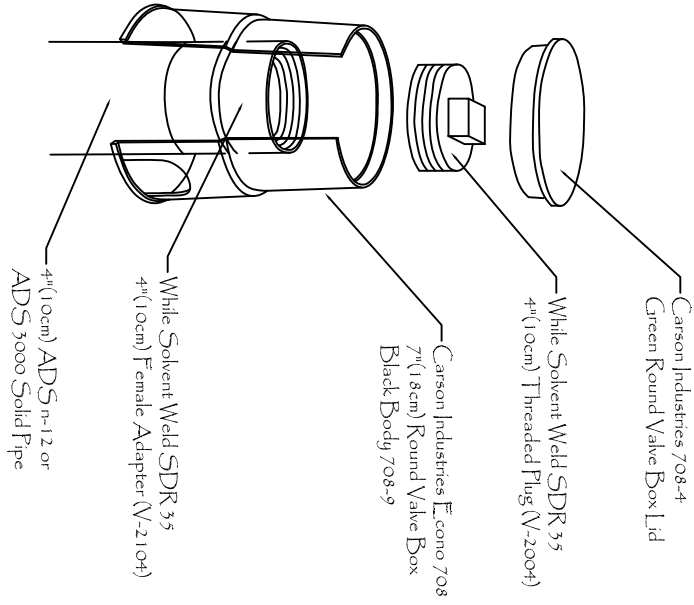
Plan Will Indicate Desired Slope of Bunker Face and GC ARCHITECT Will Also Provide an Exact Slope as a Part of Review During Rough Grading.



B1

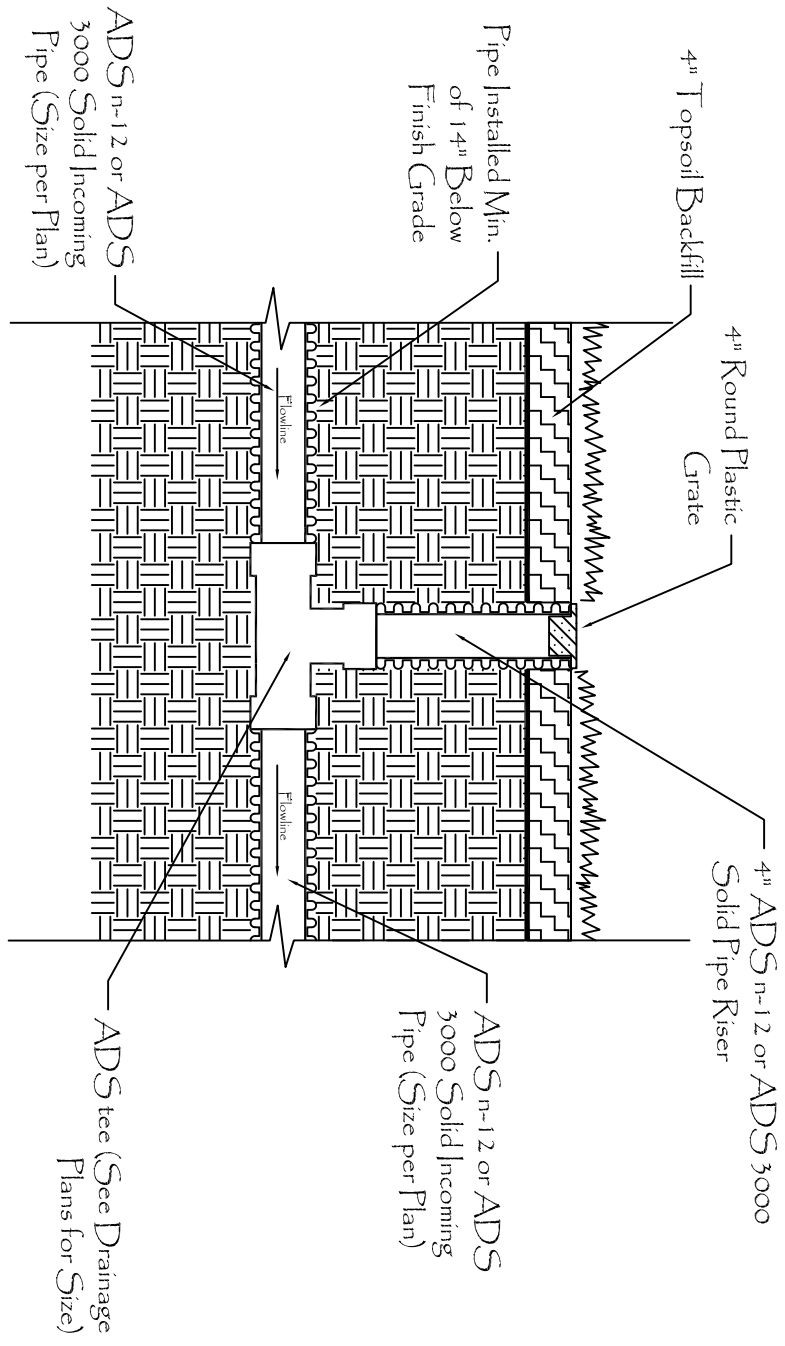
# Bunker Construction Detail

Not to Scale



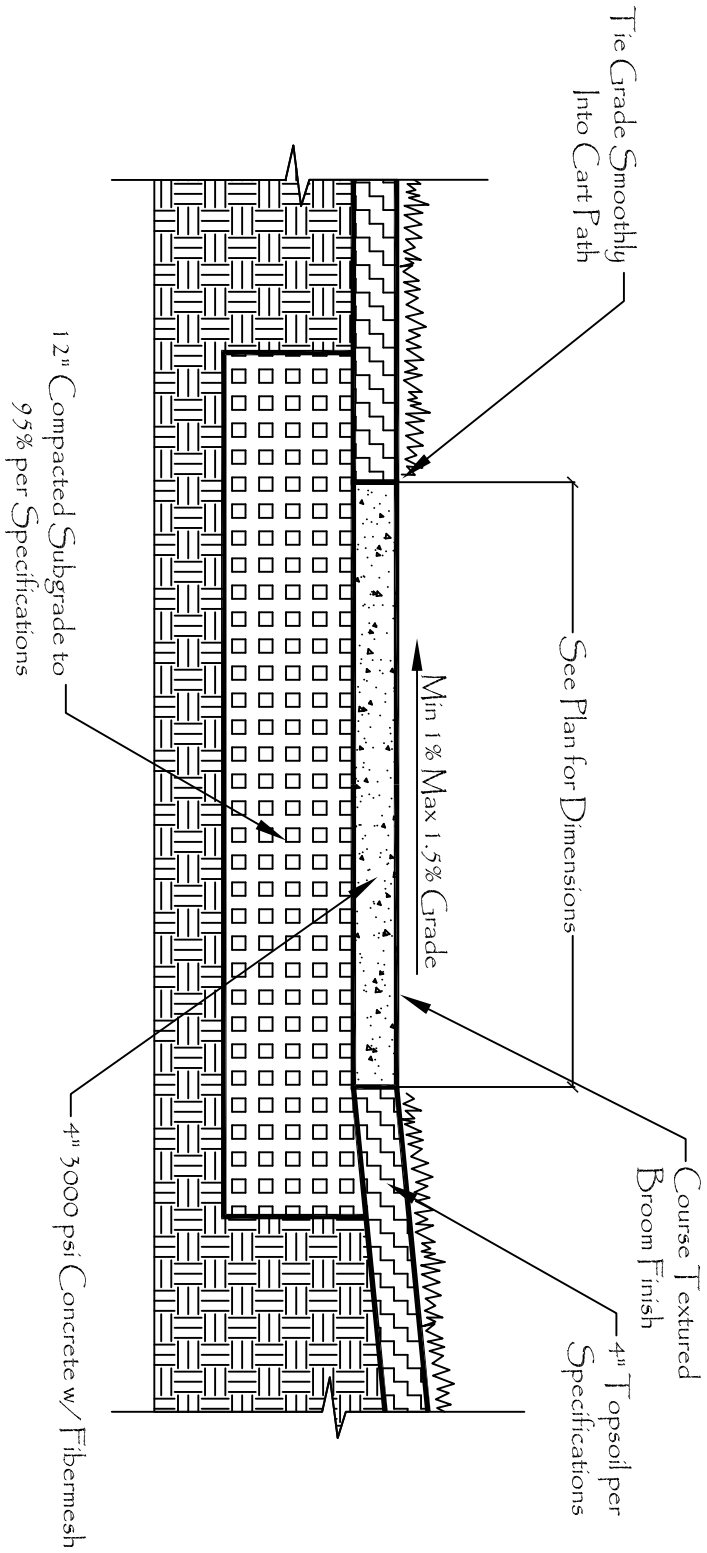
**C01**  
**Cleanout Detail**  
 Not to Scale





11

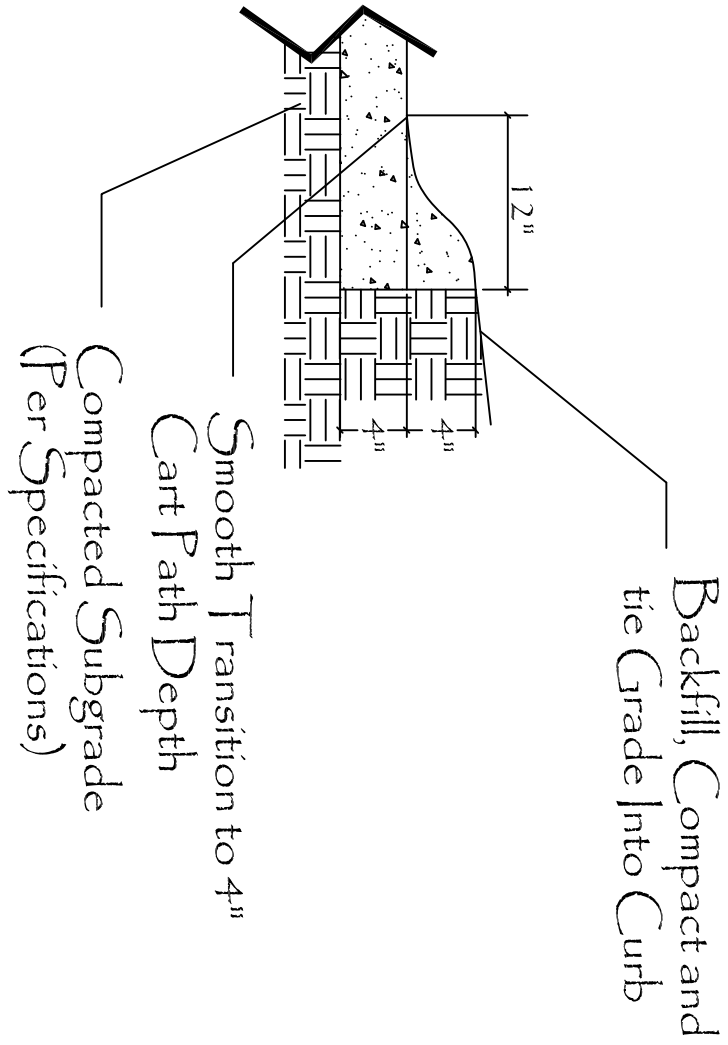
**Inspection Detail**  
Not to Scale



CP1

# Concrete Cart Path Detail

Not to Scale



CRI

# 4" Rolled Curb Detail

Not to Scale