



# Desert Rose Golf Course Operations Manual

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Prepared for



Prepared by

**CH2MHILL**®



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## **1.0 General Information**

The reconstructed Desert Rose Golf Course is Las Vegas’s newest course. The course is a unique facility that utilizes the golf course area to convey flood waters downstream. The course offers subtle challenges to impact scoring for low handicap golfers while enhancing playability for higher handicap players. Managing the flood risks, along with sustainability has driven the overall design and course maintenance.

### **1.1 Mission Statement**

To provide management of the flood risks to Clark County residents while offering an affordable golf experience for residents and visitors to Las Vegas.

### **1.2 Project History**

The course opened for play in 1964 as Winterwood Golf Course, the course hosted many professional and amateur events and was a source of pride to the local golfers. As the golf industry pivoted from golf as a game to golf as a business, a series of management companies operated the course based upon short term business decisions. Services were reduced, course conditions deteriorated and rounds of golf significantly declined. Long term detrimental site conditions were created which needed to be overcome. Sodium levels ranging from 5,930 to 18,970 EC (microhos/cm) existed within the topsoil whereas less than 1,000 is considered ideal. Tree maintenance has been neglected and an extensive tree trimming and maintenance program has been recommended. Silt buildup from the upstream watershed greatly reduced capacity of the golf course to convey storm events.

### **1.3 Las Vegas Wash Project Overview**

The flood control project that redesigned Desert Rose Golf Course provided approximately 4 miles of flood control improvements to the Las Vegas and Flamingo Washes through existing residential neighborhoods and commercial developments. The project changed the Federal Emergency Management Agency’s (FEMA) Special Flood Hazard Area mapping, which affected 1,700 homes and businesses by reducing the surrounding flood zone limits to within public right-of-way. Clark County Regional Flood Control District (CCRFCD) has invested approximately \$100 million for the Las Vegas Wash improvements and the Flamingo Wash improvements.

The project improvements include a concrete channel lining from north of Stewart Avenue to Nellis Boulevard and from just west of Sloan Lane to the Sloan Channel Confluence on the Las Vegas Wash; bridge and roadway reconstruction on Sahara Avenue; sanitary sewer relocation along the Flamingo Wash; and redevelopment of the Desert Rose Golf Course along the Las Vegas and Flamingo Washes. The Stewart Avenue, Charleston Boulevard, and Nellis Boulevard bridge structures along the wash were protected in place with the concrete channel lining placed underneath the structures.

In order to accommodate the 100-year design flood, the Desert Rose Golf Course has been redesigned by Heckenkemper Golf Course Design/CH2M HILL. The course plays to a par 72 from multiple tees and includes the addition of senior tees along with a “drivable” par 4 on the front side. The four sets of tees allow play at 4,998, 5,452, 6,024 and 6,572 yards. Design of the golf

course received input from golfers through a golfer input survey, a Clark County subcommittee and Clark County Parks and Recreation Department. The information received from these sources was incorporated into the design and layout of the course.

The four sets of properly spaced tees leads to more player enjoyment and increased annual rounds of golf played. Minor routing changes occurred which position the holes farther away from perimeter homes and ease golfer circulation under the Sahara Avenue Bridge. Fairways have been designed to provide more undulations resulting in a different lie each time a golfer plays the course. The putting greens range in size from 4,900 square feet to 6,600 square feet. The contoured putting surfaces comprise gentle rolls and swales to be interesting yet maximize pin placements. Low cut turf will surround the greens to create a wide range of clubs to be used for chipping.

Daily nuisance flows from upstream areas are contained within the concrete-lined low flow channels that meander through the golf course. The flood control channels, separating the golf holes, were constructed with 3:1 and 4:1 side slopes to be used as playable roughs. The channel area has a Pyramat, turf reinforcement mat, to help prevent erosion and establish the vegetation. Fairway mowing patterns dip onto the slopes to blend seamlessly with the site topography. In key areas, horizontal elliptical reinforced concrete pipes allow for the daily nuisance flows to disappear beneath the golf course turf, enhancing the playability of some golf holes along with the practice range. These low flow pipes have trash racks on the ends to provide safety to the golfers. Footbridges over the low flow channels are located in various locations to allow golfers to retrieve errant shots. The placement of the cart paths serves a dual purpose; they are located above the depth of flow of the 100-year flood event to provide a safe exit during floods and as a boundary for the turf. Landscape areas have been created in key areas inside the paths, outside of the limits of the 100-year flood event, and will also frame the perimeter of the course boundary. Decomposed granite groundcover outside the paths has been increased from seven acres to thirty-two acres to conserve on annual water usage. Drip irrigation has been installed to sustain the established trees and new trees along the perimeter of the course, which provides a mature look for the new golf course.

The flood control channels are designed as key components in the Clark County Regional Flood Control Master Plan. The channel cross section has been determined to maintain the 100-year storm event and will need to be maintained. In order to assist with determining the need to remove silt and regrade the flood control areas, elevation markers have been placed throughout the channel with the design elevations marked.

The routing of Holes 10 and 18 has been changed to eliminate the crossing pattern that existed at the Sahara Avenue Bridge, another point of contention with golfers and shared by the golf subcommittee. In the past, golfers had to travel under the bridge, then around and over the bridge, adjacent to Sahara Avenue traffic to get from Hole #10 to Hole #11 and from Hole #17 to Hole #18. The two-way traffic under the bridge created a conflict for golf carts. The routing change of Holes #10 and #18 eliminates this movement and provides for a direct path to cross under Sahara Avenue along each side of the Las Vegas Wash. Because the crossings under the Sahara Avenue Bridge are below the 100-year water surface, at-grade access to Sahara Avenue has been placed at each quadrant of the bridge, within existing right-of-way for access to the course in emergencies

during flood conditions. A gate has been placed at each location with a sidewalk ramp and notch in the median to drive golf carts across the roadway and back to the clubhouse. These at-grade accesses can also be used as maintenance and emergency vehicle access points for the areas north of Sahara Avenue.

The existing soils of the golf course contain very high deposits of salt and the effluent irrigation water source also contains a high amount of total dissolved salts. The type of grass used on the fairways of the golf course is Seashore Paspalum Platinum TE, which is capable of handling the higher sodium levels. This variety of grass reduces long term maintenance needs of the golf course and also reduces the total amount of irrigation water used at Desert Rose. The Seashore Paspalum Platinum TE tolerates greater levels of salt and does not require regular flushing to push the salts down through the root zone as other grasses do. This allows for a wider sprinkler spacing, saving on the overall irrigation system costs as well. Within the flood control channel areas TifSport Bermudagrass is used to cover the Pyramat, the longer cut in the rough will allow the Bermuda grass to also remain salt tolerant.

The project replaced three golf cart bridges within the golf course along the Las Vegas Wash. The new bridges are wider and better suited for golf carts and golf course maintenance vehicles. The location of the northern golf cart bridge has been pushed behind green #13 which creates a better approach for the golfers and better maintenance access for workers. A site plan for the Desert Rose Golf Course and related flood control facilities has been included in Appendix A.

#### **1.4 Course Inspections and Review and Update of the Operations Manual**

Representatives from Clark County Public Works, Real Property Management, Parks and Recreation, and the Clark County Flood Control District will conduct regular inspections of the Desert Rose Golf Course to identify any issues or needed repair.

A quarterly inspection by a certified golf course consultant will be coordinated by the Clark County Parks and Recreation Contact.

The Operations Manual, funding requirements and obligations will be reviewed and updated on a regular annual basis and as conditions change by all parties.

## **2.0 Repair and Replacement Guidelines to Insure Managing the Flood Risks & Capital Preservation**

Communication between the Golf Course Operator and Clark County is essential in managing the flood risks and preserving the capital investment that has been expended. The Clark County Parks and Recreation Department (CCPR) will assign a staff member to serve as the Clark County Project Contact. This staff member will in turn notify other departments and agencies identified in this manual which include Clark County Public Works (CCPW), Clark County Public Works Maintenance (CCPWM), Clark County Real Property Management (CCRPM) and Clark County Regional Flood Control District (CCRFCD).

## 2.1 Storm Clean-up

After a storm event the Golf Course Operator shall notify Clark County Project Contact of the general extents and maximum water depths within the golf course, the amount of debris, silt, and any damage, with hole numbers to identify location, within two hours of the Golf Course Operator's site review. Refer to Desert Rose Golf Course inspection form in Appendix J to assist with the post storm site review.

Golf Course Operator shall document debris and damage with photos and immediately begin clean-up while minimizing rutting of golf course and potential damage to Pyramat areas. Golf Course Operator shall pick-up trash and centralize dump in the maintenance area or adjacent to emergency access roads for roll-off delivery.

CCPR will make inspections 24-hours, 72-hours and one-week following large storm events.

Large debris clean-up will be coordinated with CCPWM when the storm event is classified as greater than a 10-year event.

Trash racks are to be cleaned daily by Golf Course Operator of nuisance trash. CCPR will inspect trash racks monthly and CCPWM will assist in clean-up when a 10-year storm event occurs. The 10-year and 100-year storm event inundation areas are provided in Appendix B.

## 2.2 Silt Removal

Upon notifying Clark County Project Contact of general extent of water depth along with amount of debris and damage, deposited silt shall be removed to minimize soil build-up by using rubber track skid loaders, circular roller brushes, sand pro, landscape rakes, etc., or by flushing with water pressure into the concrete-lined low flow channel and then transported by small utility vehicles to roll-off dumpsters or large trucks and disposed of offsite. Do not damage the Pyramat liner within the channel limits. Any damage to the Pyramat shall be reported and documented with photographs prior to making repairs as outlined in Section 2.3 of this manual. Silt removal will be aided by CCPWM when a storm event is greater than 10-years.

**When the silt/turf build-up has accumulated more than 6-inches over the design elevations at channel and elevation monuments, the Golf Course Operator shall prepare a plan and present it to Clark County Parks and Recreation and Public Works for approval to remove the silt and/or turf build-up. At any time when the silt/turf build-up has accumulated more than 12-inches over the design elevations at channel and elevation monuments, the bottom and slopes of the flood control channel or fairway shall be graded to original grades and re-sodded before June 1 to allow establishment before monsoon season begins. The monuments are located at the level of the Pyramat, damage to the Pyramat shall be avoided. If an area of Pyramat is damaged it shall be repaired per Section 2.3. A tracer wire has been installed to identify the upper limits of the Pyramat and can be detected using a conventional cable/wire hound. The Pyramat is connected to the concrete low flow channel at the lower limits.**

## 2.3 Pyramat Repair & Replacement

### 2.3.1 Short-Term and Long-Term Maintenance of Pyramat

The purpose of this section is to provide some general guidelines for performing short-term and long-term maintenance of Pyramat with respect to maintaining the vegetation reinforced with Pyramat, and patching of Pyramat (in the event it needs to be removed or replaced). These procedures are to be considered minimum guidelines for proper maintenance and further maintenance techniques may be appropriate considering local practices and procedures and if required by the manufacturer's recommendations.

### 2.3.2 Pyramat Lined Flood Control Channel

For Pyramat to be most effective, it is important to ensure that it is properly maintained. Identifying trouble areas is easy with Pyramat, and it can make identifying potential threats much simpler and manageable. Look for areas with sparse, dying, or no vegetation as these are obvious signs that Pyramat is losing intimate contact with the channel surface. If loss of ground surface contact occurs, Pyramat will need to be removed and reinstalled as described in *Patching and Repairs*, Section 2.3.4, after the eroded area is backfilled with compacted soil that is similar to material of the slope. After Pyramat is reinstalled, re-establish vegetation on the Pyramat and disturbed areas. Monitor the sites to determine if frequent watering may be required to establish vegetation.

To minimize exposure to unwanted maintenance and repair, the Pyramat armored channels should be free of unauthorized vehicular traffic. Routine maintenance and slope inspections should be performed with rubber tired vehicles. Tracked equipment such as skid steers, excavators, or dozers should only be allowed to traffic over Pyramat in times of emergency. Failure to control unauthorized traffic can result in Pyramat being damaged resulting in erosion below Pyramat during storm events. In addition, routine mowing maintenance should be used to keep the protected area free of unwanted brush, saplings, and trees. Herbicides that target only the unwanted plants can be used as long as the vegetation established within the Pyramat limits is not impaired. When spraying herbicides around the Alternative Planting Areas care should be used to protect the approved plants in accordance with Section 2.29. Failure to control the sapling and tree growth can result in the trees being uprooted during a flood.

Areas of Pyramat should be identified utilizing the tracer wire before maintenance operations occur, such as turf aeration and irrigation system repairs. Aeration operations should not take place within the limits of the Pyramat, which could cause unwanted damage to the mat.

### 2.3.3 Maintaining Vegetation

Good vegetative cover will ensure maximum performance of the Pyramat. Vegetative cover should be given every opportunity to grow and establish well. This will require that the Golf Course Operator periodically fertilize, water, and mow the grasses. For the entire lifecycle of

Pyramat, every effort must be made to prevent unauthorized encroachments, grazing, vehicle traffic, the misuse of chemicals, or burning during inappropriate seasons.

Implement best practices for mowing over Pyramat. While Pyramat is designed to withstand non-hydraulic stresses such as mowing, there are procedures to minimize exposure to unwanted damage.

After a rainfall event of 1/4 inches or more, mowing should not take place for a minimum of 48 hours to minimize the potential for rutting and/or damage to the slope surface. Depending upon the flow depth within the channel and the amount of debris and/or silt accumulation, mowing may need to be delayed longer so as to not cause damage.

Pyramat protected channels are not as susceptible to animal burrowing due the tenacity of the Pyramat; however, inspections to detect the presence of burrowing animal activity are generally most effective immediately after the slope has been mowed. Animal burrows that are identified should be thoroughly excavated and inspected, backfilled with compacted soil that is similar to material of the slope or compacted planting soil, and vegetation re-established. This will avoid the possibility of water piping through unfilled portions of the burrows. Should Pyramat be damaged, it is to be repaired as described in Patching and Repairs section below.

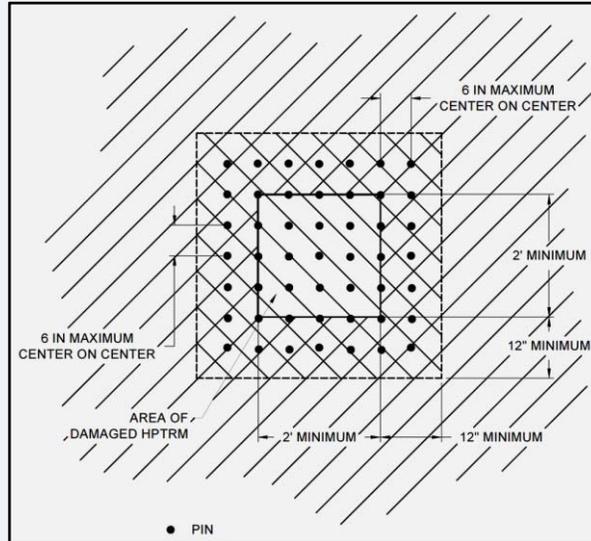
#### 2.3.4 Patching and Repairs

Pyramat may require localized repair at times. For emergency repairs, an adequate supply of Pyramat should be maintained in inventory with the necessary equipment and tools to install. This will allow for a timely, initial repair of the system. Inspection and oversight of Pyramat repairs shall be coordinated with CCRPM and CCPWM.

1. In order to identify areas in need of repair, the site should be patrolled immediately after mowing and after rain events of 1/4 inches or more. When patrolling look for areas of sparse vegetation, exposed edges of Pyramat, and areas where direct contact between Pyramat and the channel surface is compromised. Pyramat should be rated as *Acceptable*, *Minimally Acceptable*, or *Unacceptable* during inspection.
  - A. *Acceptable* (A) - The rated area is in satisfactory, acceptable condition, and will function as designed and intended during the rain event. Pyramat has no exposed edges, is installed tightly by maintaining direct contact to the channel surface with no rilling beneath, and has over 100% vegetation cover in turf areas. Alternate planting areas shall not have a vegetation coverage requirement. There is no noticeable damage present.
  - B. *Minimally Acceptable* (M) - The rated area has a minor deficiency that needs to be corrected. The minor deficiency will not seriously impair the functioning of the area during the next rain event; however, the overall reliability of the project will be lowered because of the minor deficiency. Pyramat has 85% vegetation cover in turf areas with un-vegetated patches as large as one square yard. Edges

of Pyramat are exposed with noticeable damage. Minimal erosion has occurred underneath Pyramat.

- C. *Unacceptable (U)* - The rated area is unsatisfactory. The deficiency is so serious that the area will not adequately function in the next rain event. Pyramat has been physically torn, ripped, or lifted from the channel surface. Less than 85% vegetation cover in turf areas is present with un-vegetated patches being greater than 1 square yard, and there is evidence that erosion is occurring beneath Pyramat.
2. Repair any raised or exposed edges of Pyramat by driving existing and additional pins along the edges as necessary to securely fasten to the ground. Inspect areas where the vegetation is not growing on top of Pyramat. Many times this is an indicator that Pyramat has lost contact with the ground beneath. Check for voids beneath Pyramat and fill any holes, gullies, etc. with compacted fill material if possible. Replace Pyramat as described below.
  3. To repair Pyramat, cut out and remove damaged areas in a square configuration a minimum size of 2 ft. by 2 ft. Remove all vegetation and debris atop of Pyramat. Loosen the top 1 to 2 in of soil in the patch area then seed. The subgrade of area to be patched shall be prepared to be smooth and uniform and transition smoothly into the in-situ area. Cut a square Pyramat patch a minimum of 12 in greater than the damaged area for all four sides of the patch. Overlap the patch area in all directions a minimum of 12 in. The patch overlaps shall be tucked under the existing damaged Pyramat material (Figure 3). For repairs adjacent to concrete structures, Pyramat material shall be connected to concrete using anchor bolts, nuts and washers, see Appendix E for connection detail.



**Figure 3: Pyramat Patch Plan View**

4. Install pins on 6 in (150 mm) (max) centers. For larger areas of damage, anchors should be installed to match existing anchor pattern. Once Pyramat is installed in place, an inspection is required by CCPWM before revegetating the area.

### 2.3.5 Pyramat Repair Summary

Maintenance in turf areas should consist of watering, fertilizing, mowing and weeding, repair of all erosion, and any re-sodding as necessary to establish a uniform stand of vegetation. Throughout the duration of the project, the Golf Course Operator should be responsible for mowing to facilitate growth and should not let the vegetation in the armored areas exceed 3 inches in the turf areas. Native plants as required in the United States Army Corp of Engineers' 404 permit, i.e. cattail (*Typha Latifolia*), bulrushes (*Bolboschoenus* sp.), and local sedges (*Scirpus* sp.), within the Alternative Planting Areas shall be allowed to grow to their natural height and may be maintained or cut as needed. In addition, the Golf Course Operator should water all grassed areas as often as necessary to establish satisfactory growth and to maintain its growth.

## 2.4 Golf Course Drainage Repairs & Replacement

All discharge lines shall outlet according to plans so that water levels of the 100 year flood event do not back up and exit catch basins.

All catch basins, inline drains and inlets shall be constructed of new, best quality material. Installation of these materials shall conform to the manufacturer's recommendations.

Materials - Risers

HDPE – ADS N-12 or Hancor Hi-Q; AASHTO M252, M294;

In turf areas, all catch basins and grates shall have a perforated riser covered with geotextile fabric, with a coarse, fast draining sand backfill a minimum of 12” outside of riser. Catch basins to be Model PB 2400B, supplied by Turf Drainage Company of America, 1-800-999-2794.

In DG areas, all catch basins and grates to be 12’ by 24” depth and supplied by: Nyloplast, 1-866-888-8479.

Perforated Drains: Approved greens sand will be the necessary backfill material for both catch basins and perforated fairway drains.

#### Materials - Solid and Perforated HDPE Pipe

All pipe and fittings shall be new, of the best quality, and conform to the minimum standards for plastic drain pipe as set forth.

Solid Pipe – 4”, 6”, 8”, 10”, 12”, 15”, 18”, 36”

ADS N-12; AASHTO M252, M294; ASTM D2412

Perforated Pipe - 4”- 6”

ADS HDPE N-12; ASTM D2412; Circular Perforations - 4-6-8-Position; No slotted pipe allowed; 10’ lengths with couplers.

#### Installation - Fittings

Double wall HDPE pipe shall be joined using the split outside coupling furnished by the pipe manufacturer, and/or double wall fittings made by manufacturer.

All couplings shall be wrapped with a double thickness geotextile fabric (“Nicolon N-40” Irrigation Repairs & Replacement).

## **2.5 Pump Station Repairs and Maintenance**

Preventative maintenance shall follow Watertronics recommendations (See Appendix G). Provide annual reports of recommendations and actual work performed. Repairs beyond the warranty period shall be made by a certified service company approved by the Clark County Project Contact.

## **2.6 Irrigation Repairs and Maintenance**

Necessary repairs shall comply with manufacturer’s recommendations and shall be of the products used for this project. Copies of approved product construction submittals that have been installed by Wadsworth Golf are attached in the Appendix I. Monthly and Quarterly inspections will be made by CCPR.

## 2.7 Sod Replacement

Golf Course Areas - Only certified Seashore Paspalum Platinum TE sod is acceptable on greens, tees, fairways and portions of the rough originally planted with Seashore Paspalum Platinum TE (See Appendix F).

Drainage Channel Areas - Certified Tifsport bermudagrass sod is to be used for all repairs (See Appendix F).

## 2.8 Tee Screens

Tee screens have been erected by Clark County to minimize balls leaving the site. In the event of any damage contact the Clark County Project Contact and repair immediately.

## 2.9 Bunker Sand

There is approximately 45,000 square feet of sand bunkers along the golf course. Golf Course Operator shall keep sand raked neatly to allow for natural compaction. All materials shall match existing bunker sand and be tested and approved by a United States Golf Association certified testing lab (See Appendix I).

## 2.10 Bunker Liner Repair

Bunker liner repair shall be performed by an approved Better Billy Liner installer, chosen by the Golf Course Operator, in accordance with manufacturer's recommendations (See Appendix I).

## 2.11 Putting Green Repair, Replacement & Enlargement

There is approximately 120,000 square feet of putting green surfaces along the golf course. The putting greens were constructed following California specifications. Greens mix and gravel shall be tested and approved by a United States Golf Association certified testing lab.

Any repair or enlargement shall adhere to University of California, Davis, Putting Green Guidelines. Perforated drain pipe shall be placed on a minimum two inch (2") firm bed of washed crushed stone or pea gravel 1/4" to 3/8" (2mm to 6mm) in diameter. Soft limestone's, sandstone's or shales are not acceptable. Materials must be tested for weathering stability using the *sulfate soundness test* (ASTM C-88). A loss of material greater than a 12% by weight is unacceptable. The gravel shall be hard and sound and shall have the *LA Abrasion test* performed for mechanical stability to withstand ordinary construction traffic. The value obtained using this procedure should not exceed 40.

## 2.12 Decomposed Granite

There is approximately 34 acres of decomposed granite around the golf course. The Golf Course Operator is to maintain the drip irrigation to the perimeter trees and landscaping and follow Southern Nevada Water Authority drip irrigation practices to maintain the health of trees. Any bermudagrass that grows within the decomposed granite areas shall be eradicated using two pounds of active ingredient/acre of glyphosate (Roundup) mixed with fluzafop (Fusilade) at 0.38 pounds active ingredient/acre following manufacturer's specifications. Using a pull behind drag

mat or hand rake, groom all decomposed granite areas to maintain a well-kept appearance. If areas of decomposed granite are disturbed, Golf Course Operator shall provide 2” depth of 3/8” Rebel Red decomposed granite provided by Impact Sand, Kalamazoo Materials, Inc, or approved equal by the County.

### **2.13 Elevation and Channel Monuments**

Elevation and channel monuments have been installed with recorded elevations so as to document soil buildup. Should any monument be damaged, contact Clark County Project Contact. Replace damaged monuments with identical type and size and request CCPW have new elevation recorded. Monument locations and elevations are shown on the plans in Appendix C.

### **2.14 Concrete Low Flow Channel**

The Golf Course Operator shall sweep the concrete low flow channels using a skid steer fitted with a broom/brush to remove algae and gravel at least monthly. The debris collected during sweeping operations shall be collected into small utility vehicles and disposed of offsite. Methods or equipment that damage the concrete channel will not be permitted. Should damage occur to the concrete low flow channel or the trash racks, contact Clark County Project Contact and provide photos and cause of the damage. The Golf Course Operator shall be aware that the Pyramat is directly connected to the concrete low flow channel, edging along the channel shall be kept to a minimum and shall be done using equipment that will not damage the Pyramat liner.

### **2.15 Golf Course Cart Bridges**

The cart bridge at Hole #1 has a design rating of 20,000 pounds. The cart bridges at Holes #2 and #13 are designed for 10,000 pounds. Should damage occur to the cart bridges, contact Clark County Project Contact and provide photos and cause of the damage. Golf Course Operator shall repair graffiti or vandalism damage in a timely manner. Repairs will be initiated by CCPWM only for scour damage around abutments due to storm events. Repairs will be initiated by CCRPM for structural damage and repairs.

A USGS flow monitoring station is near the cart bridge at Hole #2, the radar monitor has been attached to the side of the cart bridge. Golf Course Operator shall protect the monitoring station in place and provide access to personnel, as needed, to calibrate and check monitoring station.

### **2.16 Golf Course Foot Bridges**

Should damage occur to the foot bridges, contact Clark County Project Contact and provide photos and cause of damage. Golf Course Operator shall repair graffiti or vandalism damage in a timely manner. Repairs will be initiated by CCPWM only for scour damage around abutments due to storm events. Repairs will be initiated by CCRPM for structural damage and repairs.

### **2.17 Golf Course Signage and Fixtures**

Should damage or theft occur to the signage and fixtures, contact Clark County Project Contact and provide photos and cause of damage. Golf Course Operator shall repair graffiti or vandalism damage in a timely manner.

## **2.18 Concrete Cart Paths Repair and Addition**

Standard width of the 4,500 PSI concrete cart paths is eight feet (8') along fairways and ten feet (10') along tees and greens. Cart paths are twelve (12') feet in width in high traffic areas.

Curbs are four inches (4") high x six inches (6") wide with a #4 continuous reinforcement bar and 4,500 PSI concrete. Locations shall be approved by the County prior to any installation of curbs beyond existing limits.

Sub-grade for cart path in repair areas or new additions shall be compacted to 95% of proctor density for a depth of six inches (6").

### Products:

Concrete: ASTM C 94 Alternate No. 2/4500 psi at 28 days

Fiber mesh: 1 ½ lbs. Fiber mesh / YD

Expansion Joints - Locate expansion joints in path and curb at an interval equal to the existing path and curb using the same material.

Control Joint - Space control joints in concrete cart path and curb at intervals matching existing.

## **2.19 Concrete Access Roads & Gates**

Should damage occur to the concrete access roads or gates, contact Clark County Project Contact who shall in turn notify CCPWM.

## **2.20 Vandalism Reporting and Repair**

Should damage occur, contact Clark County Project Contact and begin to clean-up as soon as possible. Golf Course Operator shall remove graffiti immediately if found within the limits of the golf course, including along fences, concrete channels, cart bridges, Sahara Avenue bridge crossing, pump house, clubhouse, maintenance buildings, flow monitoring stations, restrooms, signs, and footbridges. Graffiti beyond the limits of the golf course, including along the adjacent Clark County trails and concrete flood channels, shall be reported to the Clark county Project Contact. If replacements are necessary they shall be of similar style and materials and approved by the County.

## **2.21 Golf Course Minimum Maintenance Standards**

These golf course minimum maintenance standards have been prepared to insure quality turf to manage the flood risks and to provide a level of conditioning for the golfers playing the course. Consistency of maintenance conditions is critical in achieving player loyalty and repeat play. Inspections will be made monthly by CCPR and quarterly by a golf consultant retained by CCPR.

<b>GREENS</b>	<b>PROPOSED</b>	<b>NOTES</b>
Seashore Paspalum Platinum TE		
HOC	.115 to .125	
Target Speed	9.0' - 9.5'	
Mowing Freq.	Daily	
Mower Type	Triplex	Clean-up with walkers
Rolling	Yes	As needed to maintain speed
Verticut Freq.	Every other week	Commencing early April-Sept.
Topdress Freq.	Every other week	Commencing early April-Sept
Edging	Not needed	
Aerification Freq.	2x/year (More if needed to control thatch/compaction)	Spring and Fall with hollow tines
Ball Mark Repair Freq.	3x/week min.	Using "Gash-be-Gone" Tool.
Logo-ed Flags	TBD	Replace when needed
Pin Placement Rotation	Daily	6 Number system
Time to Repair Damage	24 hours	
Over-seeding	TBD by County	
Access. Repl. Sched.	Every year	More if needed to maintain good image
Preventive Fungicide Apps	No	Develop and submit BMP strategy.
Insect Control	Yes	As allowed under IPM strategy.
Weed Control	Yes	As allowed under IPM strategy.
Fertility Program	Yes	To be determined by tissue and soil tests to activate and enhance salt tolerance characteristics and to provide high quality for turf as approved by Dr. Ron Duncan.

<b>COLLARS/ROLL-OFFS</b>	<b>PROPOSED</b>	<b>NOTES</b>
Seashore Paspalum Platinum TE		
HOC	.500	
Mowing Freq.	3x/week	
Verticut Freq.	3x/year	
Topdress Freq.	Monthly	May-Sept.
Aerification Freq.	1x/year	<b>Caution to not damage Pyramat areas</b>
Time to Repair Damage	1 day	
Over-seeding	TBD by County.	
Preventive Fungicides	No	Develop and submit BMP strategy.
Insect Control	Yes	As allowed under IPM strategy.
Weed Control	Yes	As allowed under IPM strategy.

Fertility Program	Yes	To be determined by tissue and soil tests to activate and enhance salt tolerance characteristics and to provide high quality for turf as approved by Dr. Ron Duncan.
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<b>TEES</b>	<b>PROPOSED</b>	<b>NOTES</b>
Seashore Paspalum Platinum TE		
HOC	.500	
Mowing Freq.	3x/Week	
Verticut Freq	3x/year	
Topdress Freq.	Monthly	May-Sept.
Aerification Freq.	1x/year	<b>Caution to not damage Pyramat areas</b>
Divot Repair Freq.	2x/week par 3	1x/week par 4 & 5
Accessory Rotation Freq.	Daily	
Logo-ed Accessories	Yes	
Access. Repl. Sched.	As needed to maintain good image	
Time to Repair Damage	1 day	
Over-seeding	Perennial Rye Grass	10 lbs/1000 SF
Preventive Fungicides	No	Develop and submit BMP strategy.
Insect Control	Yes	As allowed under IPM strategy.
Weed Control	Yes	As allowed under IPM strategy.
Fertility Program	Yes	To be determined by tissue and soil tests to activate and enhance salt tolerance characteristics and to provide high quality for turf as approved by Dr. Ron Duncan.

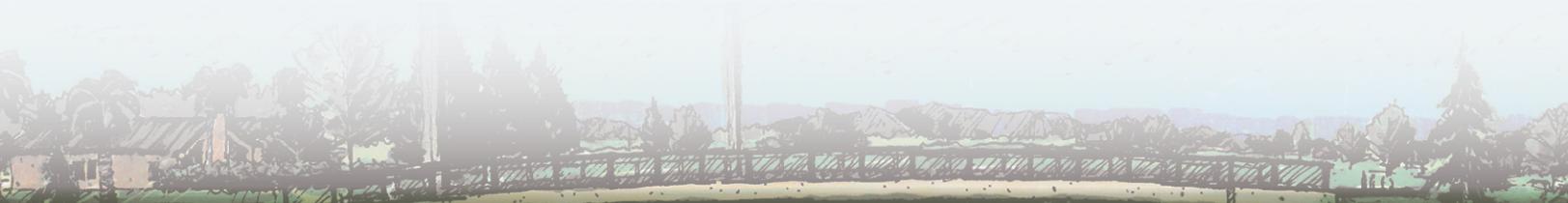
<b>FAIRWAYS</b>	<b>PROPOSED</b>	<b>NOTES</b>
Seashore Paspalum Platinum TE		
HOC	.500	
Mowing Freq.	3x/week	
Verticut Freq.	2x/year	
Topdress Freq.	N/A	
Aerification Freq.	2x/year with Aeravator or equal.	<b>Caution to not damage Pyramat areas</b>
Divot Repair Freq.	1x/week	
Sprinkler/Yardage Markers	yes	Trim 2x-month or as needed for visibility
Time to Repair Damage	3 days	
Overseeding Rate	No	Consider Liquid Overseed
Preventive Fungicides	No	Develop and submit BMP strategy.
Insect Control	Yes	As allowed under IPM strategy.
Weed Control	Yes	As allowed under IPM strategy.

Fertility Program	Yes	To be determined by tissue and soil tests to activate and enhance salt tolerance characteristics and to provide high quality for turf as approved by Dr. Ron Duncan.
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<b>ROUGHS</b>	<b>PROPOSED</b>	<b>NOTES</b>
Tifsport Bermudagrass & Seashore Paspalum Platinum TE		
HOC	1-3/4" to 2" maximum	
Mowing Freq.	2x/week	
Aerification Freq.	1x/year with Aeravator or equal	<b>Caution to not damage Pyramat areas</b>
Time to Repair Damage	3 days	
Overseeding Rate	No	
Preventive Fungicides	No	Develop and submit BMP strategy.
Insect Control	Yes	As allowed under IPM strategy.
Weed Control	Yes	As allowed under IPM strategy.
Fertility Program	Yes	To be determined by tissue and soil tests and adequate amounts to provide high quality

<b>BUNKERS</b>	<b>PROPOSED</b>	<b>NOTES</b>
Raking Freq.	4 Days	Touch up on other days
Sand depth slopes	2-3"	
Sand depth bottom	4-5"	
Sand Type		
Raking Method	Sand Pro (bottoms only/fwy's only) and hand rake all greenside.	
Hand Rakes qty.	1-4 rakes	
Edging Freq.	2x/month	
Mechanical	yes	
Chemical	Yes	Primo only 6 oz/ac
Time to Repair Damage	1 day	

<b>CART PATHS</b>	<b>PROPOSED</b>	<b>NOTES</b>
Edging Freq.	Tees and greens areas	2x/month- summer
	Fairways	1x/month summer
Sweep/blow Freq.	When edged	
Time to Repair Drainage	2 weeks	
Traffic Control (TC) type	Ropes/signs/4x4	
TC Rotation schedule	1x/week	As needed to help alleviate damage.



## **2.22 Turf Care Center**

All areas of the Turf Care Center shall be kept clean and in working order at all times. Damage to the complex shall be repaired within a reasonable time frame upon notice to the Clark County Project Contact who in turn will notify CCRPM and CCPWM. The Water Maze Cleaning System shall be serviced as per manufacturer's recommendations and to include daily operation by mechanic and monthly additives (See Appendix H)

## **2.23 Golf Course Maintenance Equipment**

All maintenance equipment shall be provided by Golf Course Operator. All used equipment shall be cleaned daily using the Water Maze cleaning system and stored for safety. All mowing equipment is to be maintained consistent with typical golf course maintenance standards. It is critical to the success of the turf that only sharp blades and bedknives be used. Any damage caused from leaks are to be repaired immediately. Equipment shall operate as intended so as to not damage golf course turf and Pyramat.

## **2.24 Golf Course Fencing**

Fencing around the Turf Care Center, golf course (excludes adjacent homeowner and Home Owner Association fences) and Clubhouse shall be maintained in good condition at all times by the Golf Course Operator. Damage to fencing along the Las Vegas Wash Trail and Flamingo Arroyo Trail shall be reported to CCPR. CCRPM shall be responsible for repairs to the trail fencing.

## **2.25 Clubhouse Parking Lot**

The parking lot shall be clean and free of debris at all times. Golf Course Operator shall maintain parking lot signing, striping, markings, and sealing on an annual basis.

## **2.26 Clubhouse Building**

The clubhouse shall be open at operating hours approved by the Clark County Project Contact. The building shall conform to all local health department codes and be clean at all times. All areas of the clubhouse, including the kitchen and rest rooms, shall be cleaned daily. Golf Course Operator is responsible for coordinating regular trash service and maintaining grease traps. Repairs or maintenance of the building shall be made upon discussions with the Clark County Project Contact who will in turn notify CCRPM.

## **2.27 Golf Course Cart Barn & Carts**

The cart barn and carts shall be maintained in good condition at all times. Preventative maintenance of the carts shall follow manufacturer's recommendations. The cart barn and the Water Maze Cleaning System shall be cleaned daily. All carts shall have signage restricting carts from driving on channel slopes and will include notice of course evacuation routes. CCPR and CC automotive will conduct quarterly inspections.

### **2.28 Golf Course Tree Care and Planting Limits**

The Golf Course Operator is responsible for maintaining the trees and any landscaping in healthy condition. Fertility, watering and pruning shall be performed as needed. New trees can be planted in all decomposed granite areas. No tree shall be planted outside of decomposed granite areas without approval by the County and under no circumstances are trees allowed within the limits of the Pyramat. Specific areas of the golf course, within the 100-year flood zone limits and City of Las Vegas sewer easement, are restricted from tree plantings without approval by CCPW and CCRFCD. CCPR will have an evaluation performed of existing trees by a Certified Arborist at the conclusion of construction, the CCPR will be responsible for having recommendations performed. Once all recommendations have been fulfilled, the Golf Course Operator is responsible for on-going tree care with assistance of a Certified Arborist from the International Society of Arboriculture. The Golf Course Operator will be responsible for cleaning up pine needles and leaves on a regular basis. Semi-annual inspections will be made by CCPR and CCRPM arborists.

### **2.29 Golf Course Alternative Planting Areas**

The Golf Course Operator is responsible for removing any trash within the Alternative Planting Areas identified in Appendix C. CCPR will contract with a specialized company for periodic maintenance and replacement of native plants. The Golf Course Operator shall water Alternative Planting Areas to maintain vegetation and keep soils moist. All costs associated with irrigation will be the responsibility of the Golf Course Operator. Golf Course Operator shall be responsible for maintaining signage indicating areas as a Hazard Area. Golf Course Operator shall mow Alternative Planting Areas at the direction of the CCPWM, after inspection, up to twice yearly to a height of 12 inches. Mowing will take place outside of the bird breeding season (March through August). If mowing must occur during the bird breeding season, a qualified biologist will survey the area to determine whether active bird nests are present. If an active nest is observed, a 100-foot diameter no work zone will be established until the young birds leave the nest.

### **2.30 Golf Course Vector Control**

The Golf Course Operator is responsible for vector control within the limits of the golf course. The Golf Course Operator shall coordinate with the Clark County Project Contact to schedule mosquito abatement training with CCPW Vector Control. A noticeable problem in the past has been gophers/moles that require constant monitoring and eradication. CCPR shall be notified of any gophers/moles within the Pyramat limits as delineated in Appendix C. CCPR and CCPWM will make semi-annual inspections.

### **2.31 Noxious Weeds**

Golf Course Operator shall treat and remove weeds on a regular basis. Golf Course Operator is to attend committee meetings with CCPR Contract Administrator. The Golf Course Operator shall coordinate with the Clark County Project Contact to schedule vegetation abatement training with CCPW Vector Control.

### **2.32 NDEP Sampling**

Golf Course Operator shall allow access for assigned CCPR personnel to obtain water samples at three sites on the golf course monthly. Golf Course Operator will be required to monitor and record effluent flow data used at the golf course and deliver logs to CCPR. Golf Course Operator will be required to monitor and record the usage of Nitrogen applied to golf course. The water samples, effluent flow data, and Nitrogen usage is reported to NDEP on a quarterly basis by CCPR.

### **2.33 Pond Liner**

The CCPR will assume responsibility for repair and replacement as needed.

### **2.34 Riprap**

Riprap is an integral part of the erosion protection plan for storm events. Golf Course Operator is responsible for trash and debris cleanup within the riprap areas. The Golf Course Operator shall notify the Clark County Project Contact upon noticing any movement of the riprap so that CCPWM can be involved in the necessary repairs.

### **2.35 Low Flow Pipes**

The low flow pipes are an integral part of the storm water conveyance for small and large storm events. The Golf Course Operator is responsible for trash and debris cleanup from the pipes, headwalls, and trash racks. The Golf Course Operator shall notify the Clark County Project Contact upon noticing any blockage so that CCPWM can be involved in the necessary repairs.

### **2.36 Homeless Issues**

Golf Course Operator shall report issues to CCPR as necessary. The CCPR will assume responsibility and contact Homeless Coalition, and Las Vegas Metropolitan Police Department to initiate outreach within 48 hours of reported problem. Golf Course Operator shall notify CCPW of any large items left within the golf course by homeless population for removal. CCPR will review conditions quarterly.

### **2.37 Golf Course Security**

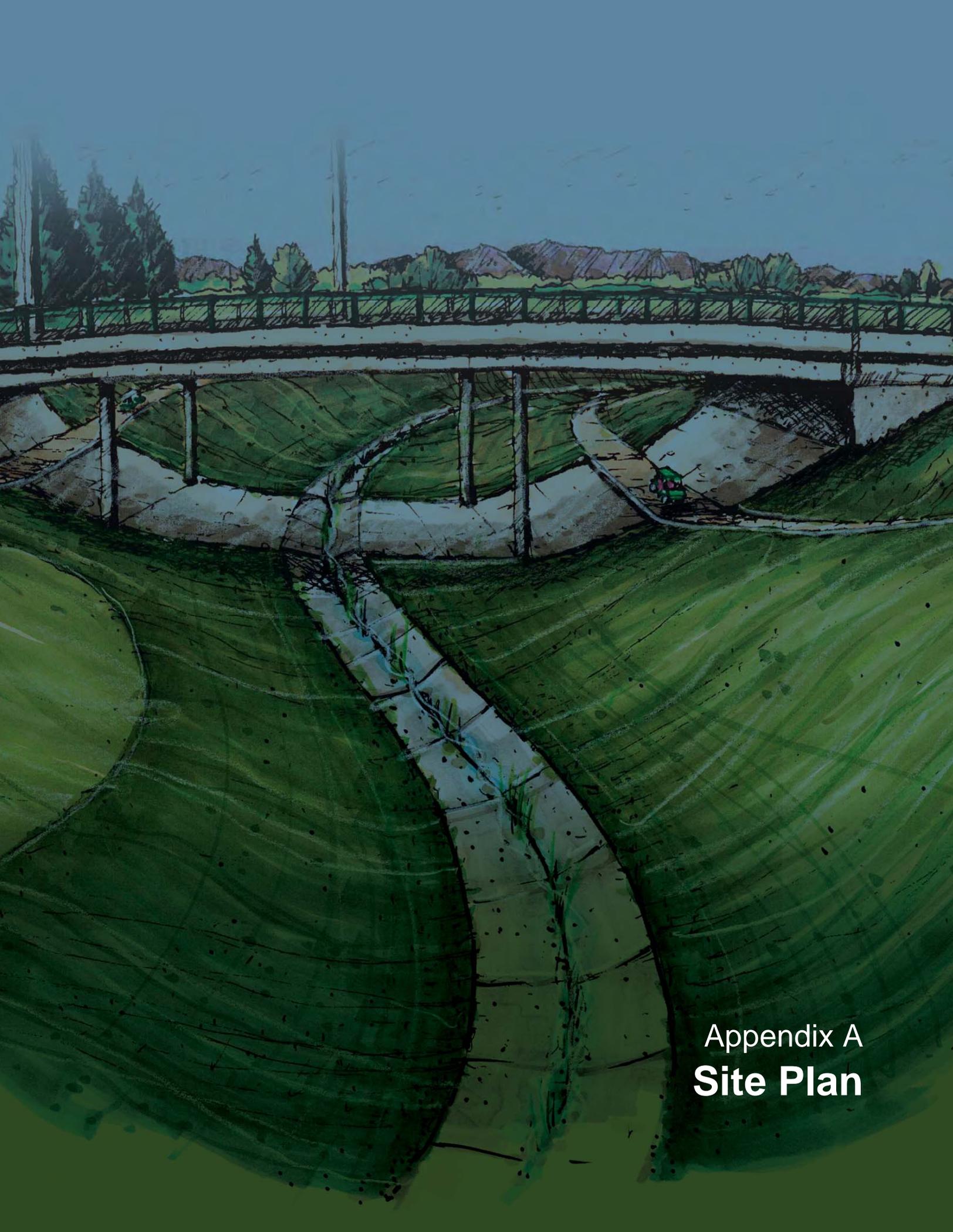
The Golf Course Operator will assume responsibility for contracting and initiating security with alarm monitoring, cameras, and patrols for pump house, maintenance buildings, cart barn, restrooms and clubhouse areas.

### **2.38 Flood Control Monitoring Station**

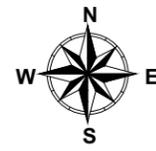
A Clark County Regional Flood Control Monitoring Station building is located near the practice range. There are two grates located along the concrete low flow channels that are used to calculate the flows in the Las Vegas and Flamingo Washes. Golf Course Operator shall protect these facilities and contact the Clark County Project Contact if damages occur. Golf Course Operator is responsible for graffiti removal from the building.

### **2.39 UNLV Air Quality Monitoring Unit**

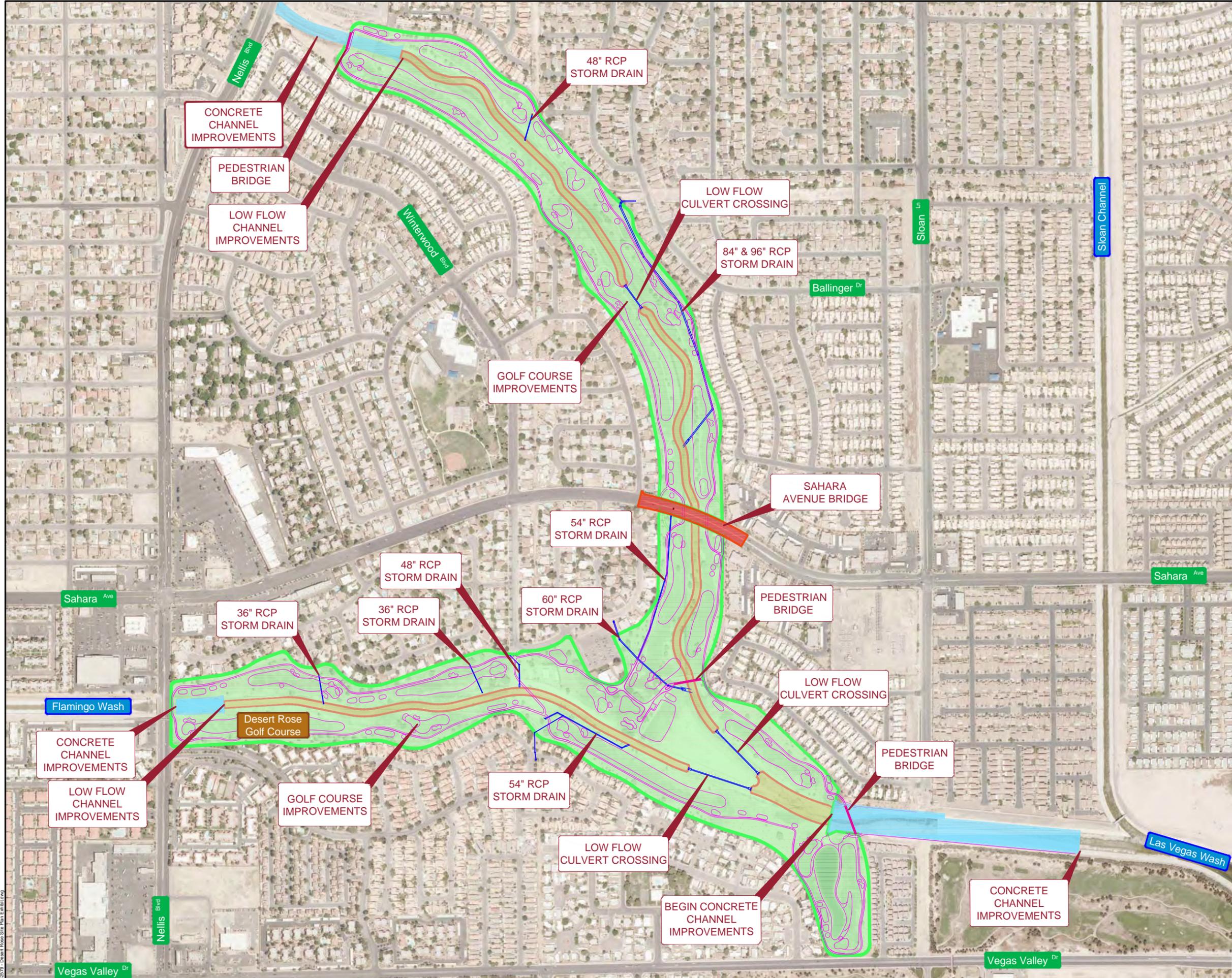
An air quality monitoring unit is located near the Turf Care Center. UNLV staff shall have access to obtain air sample data on a daily basis. This unit will be separately metered for electrical power. Golf Course Operator shall protect this unit and electric power source in place. Golf Course Operator shall report to the Clark County Project Contact if damages, including graffiti or vandalism should occur to this unit.



Appendix A  
**Site Plan**



- Project Legend**
- █ Concrete Channel Improvements
  - █ Golf Course Regrading
  - █ Sahara Avenue Bridge
  - █ Golf Course Improvements
  - █ Concrete Low Flow Channel
  - █ Pedestrian Bridge Crossing
  - █ Storm Drain Pipes



**Las Vegas Wash**

**CH2MHILL**





4/25/2017 - Desert Rose Site Plan E-1000.dwg

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Appendix B

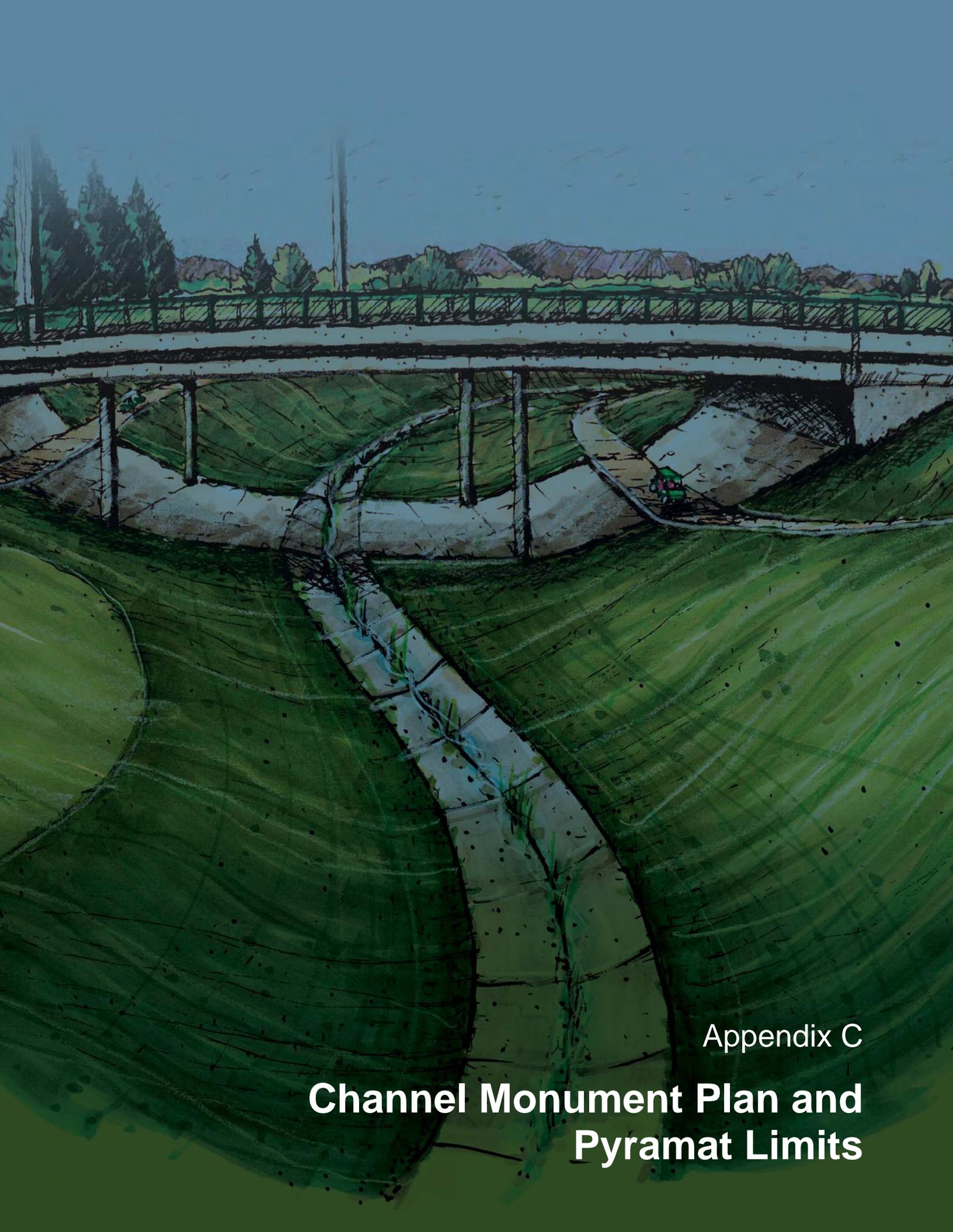
# Inundation Areas



# DESERT ROSE GOLF COURSE 10-YEAR AND 100-YEAR STORM EVENT INUNDATION AREAS

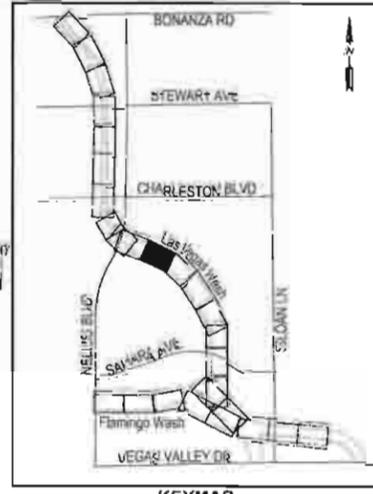
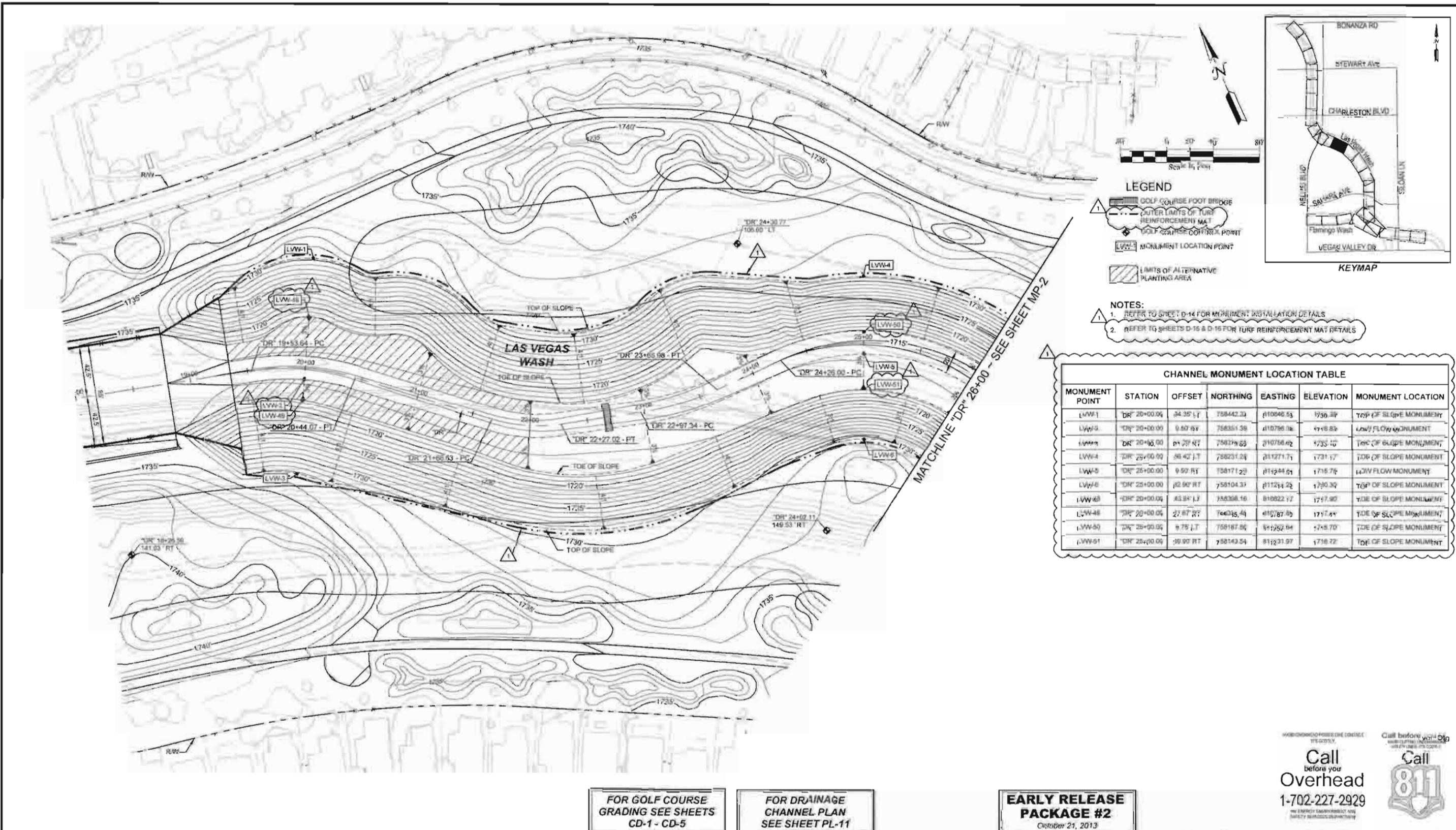


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Appendix C

# Channel Monument Plan and Pyramat Limits



- LEGEND**
- GOLF COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANTING AREA

- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LWV-1	DR 20+00.00	34.35' LT	758442.33	810848.53	1736.39	TOP OF SLOPE MONUMENT
LWV-2	DR 20+00.00	9.50' RT	758351.39	810796.98	1718.83	LAWY FLOW MONUMENT
LWV-3	DR 20+00.00	81.20' RT	758279.65	810756.02	1733.10	TOP OF SLOPE MONUMENT
LWV-4	DR 25+00.00	86.42' LT	758231.24	811271.71	1731.17	TOP OF SLOPE MONUMENT
LWV-5	DR 25+00.00	9.50' RT	758171.29	811244.51	1716.76	LAWY FLOW MONUMENT
LWV-6	DR 25+00.00	82.90' RT	758104.37	811214.25	1730.30	TOP OF SLOPE MONUMENT
LWV-7	DR 20+00.00	83.81' LT	758366.16	810822.17	1717.90	TOP OF SLOPE MONUMENT
LWV-8	DR 20+00.00	27.87' RT	758335.44	810787.85	1717.41	TOP OF SLOPE MONUMENT
LWV-9	DR 25+00.00	8.75' LT	758187.86	811252.04	1718.70	TOP OF SLOPE MONUMENT
LWV-11	DR 25+00.00	39.90' RT	758143.54	811231.97	1718.72	TOP OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

FOR DRAINAGE CHANNEL PLAN SEE SHEET PL-11

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you dig  
**Overhead**  
1-702-227-2929

REV	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"DR" 18+00 TO "DR" 26+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



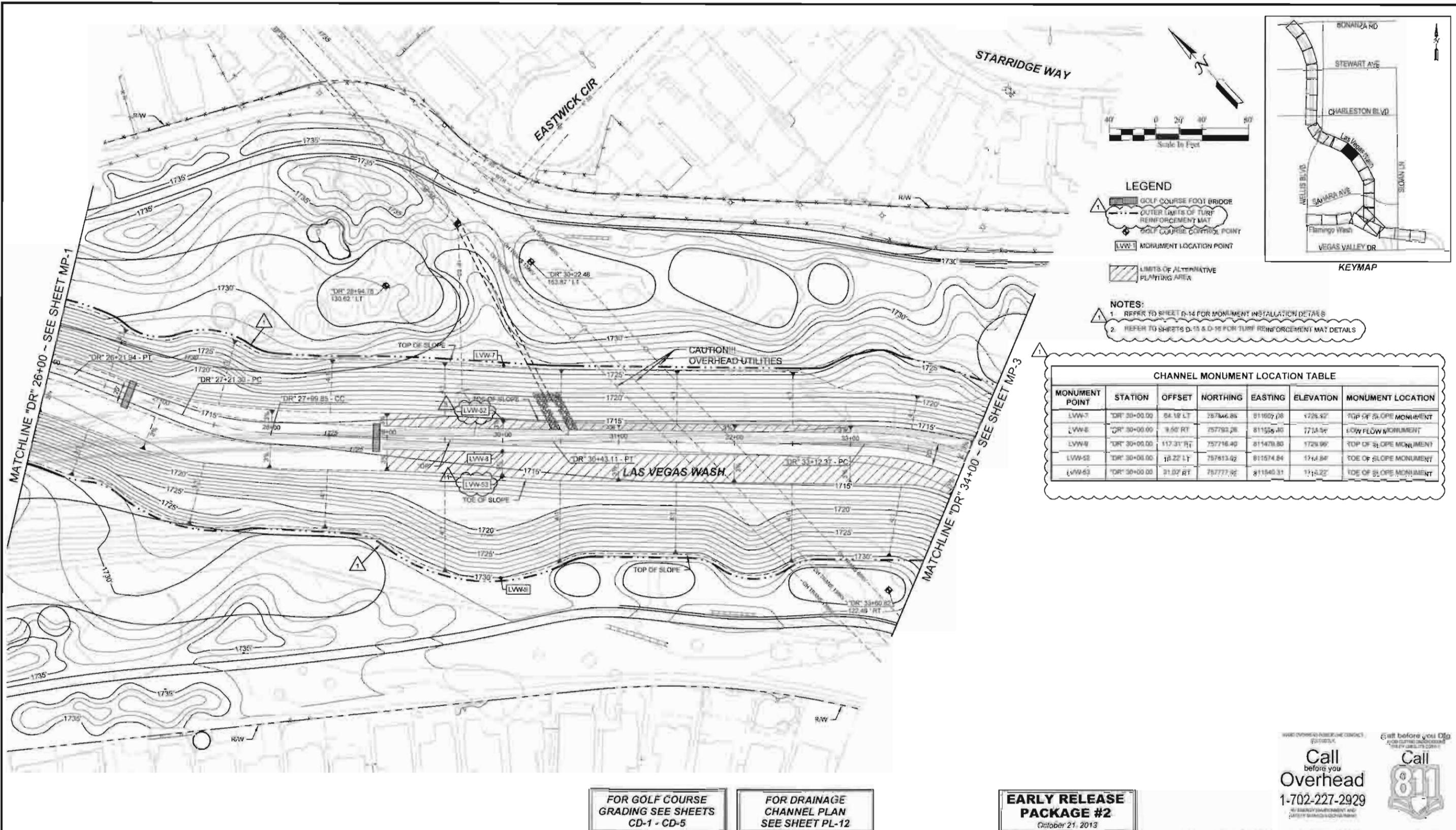
DESIGNED BY: M. WARDEN  
DRAWN BY: B. MAJAN  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013

**CH2MHILL**  
3485 VILLAGE VIEW DRIVE, SUITE 300  
HENDERSON, NEVADA 89024  
PHONE 702-369-6176, FAX 702-369-4149

PROJECT No: 462579  
SHEET: 37 OF 119

**L-2031**  
DRAWING No:  
**MP-1**

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



**LEGEND**

- GOLF COURSE FOOT BRIDGE
- OUTER LIMITS OF TURF REINFORCEMENT MAT
- GOLF COURSE CONTROL POINT
- MONUMENT LOCATION POINT
- LIMITS OF ALTERNATIVE PLANTING AREA

- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

**CHANNEL MONUMENT LOCATION TABLE**

MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LW-7	"DR" 30+00.00	54.18' LT	75786.88	811607.08	1726.42'	TOP OF SLOPE MONUMENT
LW-8	"DR" 30+00.00	9.50' RT	75793.28	811555.40	1714.54'	LOW FLOW MONUMENT
LW-9	"DR" 30+00.00	117.31' RT	757716.40	811478.80	1729.96'	TOP OF SLOPE MONUMENT
LW-52	"DR" 30+00.00	18.22' LT	757813.62	811574.84	1714.86'	TOE OF SLOPE MONUMENT
LW-53	"DR" 30+00.00	21.02' RT	757777.92	811540.31	1714.22'	TOE OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

FOR DRAINAGE CHANNEL PLAN SEE SHEET PL-12

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

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REV	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JNG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"DR" 26+00 TO "DR" 34+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



**CH2MHILL**  
2488 VILLAGE VIEW DRIVE, SUITE 300  
HENDERSON, NEVADA 89014  
PHONE 702-369-9175, FAX 702-369-1107

SCALE: HORIZ 1" = 45'

VERT NONE

FIELD BOOK

WORK ORDER

PROJECT No. 46257-9

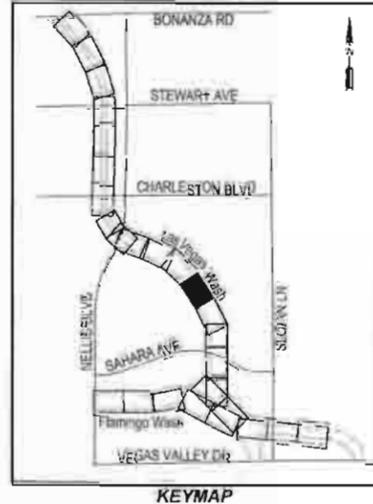
L-2031

DRAWING NO. **MP-2**

SHEET 38 OF 119

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS

CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LWV-10	"DR" 35+00.00	73.04' LT	757472.45	811930.02	1726.58	TOP OF SLOPE MONUMENT
LWV-11	"DR" 35+00.00	9.50' RT	757414.81	811871.23	1713.30	LOW FLOW MONUMENT
LWV-12	"DR" 35+00.00	85.83 RT	757374.98	811831.11	1726.12	TOP OF SLOPE MONUMENT
LWV-13	"DR" 40+00.00	64.71' LT	757071.86	812247.83	1723.11	TOP OF SLOPE MONUMENT
LWV-14	"DR" 40+00.00	9.50' RT	757030.97	812185.90	1712.07	LOW FLOW MONUMENT
LWV-15	"DR" 40+00.00	40.82 RT	757013.71	812159.75	1714.75	TOP OF SLOPE MONUMENT
LWV-54	"DR" 35+00.00	27.42' LT	757440.44	811807.54	1713.09	TOP OF SLOPE MONUMENT
LWV-55	"DR" 35+00.00	13.58 RT	757411.67	811868.34	1713.87	TOE OF SLOPE MONUMENT
LWV-56	"DR" 40+00.00	20.71' LT	757047.81	812211.11	1712.44	TOE OF SLOPE MONUMENT
LWV-57	"DR" 40+00.00	27.57 RT	757021.01	812170.82	1712.64	TOE OF SLOPE MONUMENT



- LEGEND**
- GCN COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - LWV MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANTING AREA

- NOTES:**
- REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  - REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS



FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

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October 21, 2013

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REV	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JWG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"DR" 34+00 TO "DR" 43+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS

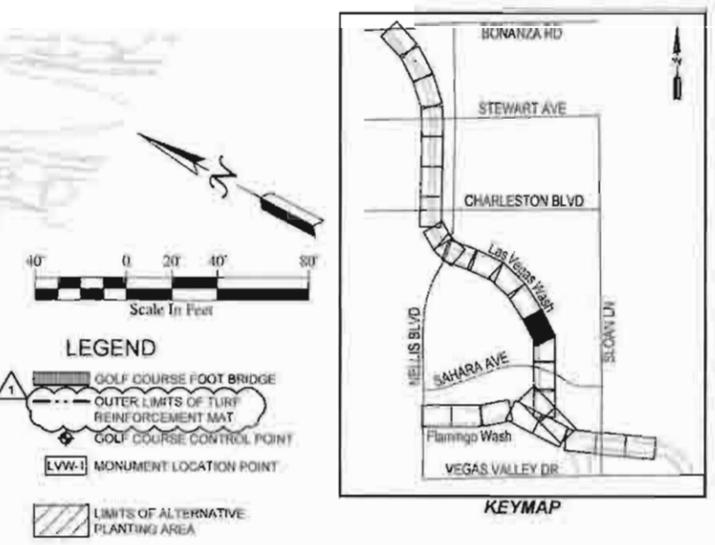
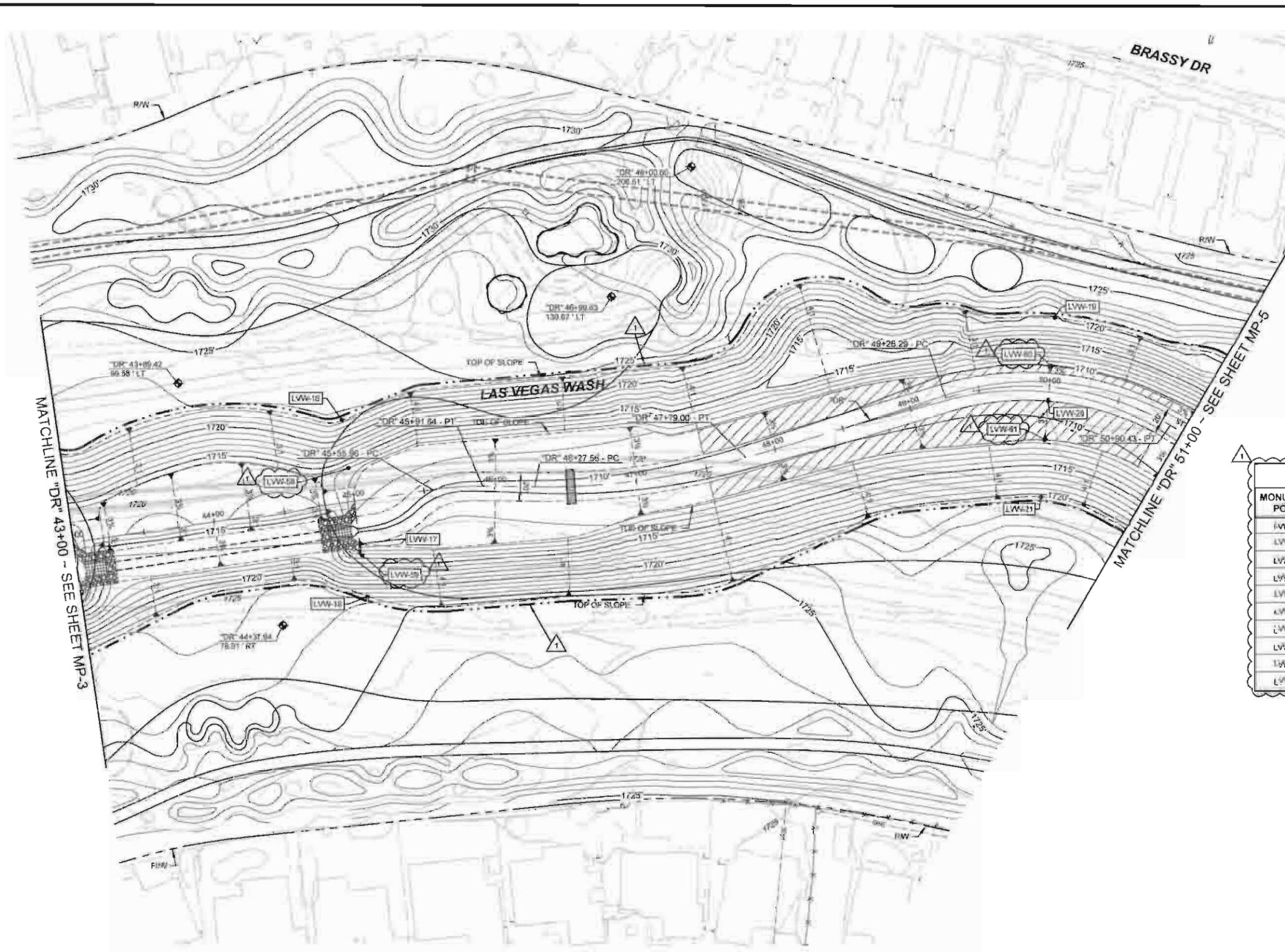


DESIGNED BY: M. VARRINO  
DRAWN BY: E. MANN  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013

**CH2MHILL**  
2485 VILLAGE VIEW DRIVE, SUITE 200  
HENDERSON, NEVADA 89074  
PHONE 702-369-8175, FAX 702-369-4307

HORIZ: 1" = 40'	L-2031
VERT: NONE	DRAWING NO.
FIELD BOOK	<b>MP-3</b>
WORK LOGS	
PROJECT No: 462579	SHEET 08 OF 11

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



- LEGEND**
- GOLF COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANTING AREA

- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

**CHANNEL MONUMENT LOCATION TABLE**

MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LWV-16	DR 43+00.00	47.05' LT	796043.07	812495.32	1723.19	TOP OF SLOPE MONUMENT
LWV-17	DR 45+00.00	39.32' RT	796081.82	811942.63	1710.45	LOW FLOW MONUMENT
LWV-18	DR 45+00.00	87.71' RT	796068.91	812382.02	1722.81	TOP OF SLOPE MONUMENT
LWV-19	DR 50+00.00	48.74' LT	796231.17	812782.12	1719.89	TOP OF SLOPE MONUMENT
LWV-20	DR 50+00.00	9.60' RT	796208.38	812738.52	1708.58	LOW FLOW MONUMENT
LWV-21	DR 50+00.00	77.00' RT	796181.96	812676.34	1720.26	TOP OF SLOPE MONUMENT
LWV-22	DR 45+00.00	23.49' LT	796093.15	812468.12	1713.00	TOP OF SLOPE MONUMENT
LWV-23	DR 45+00.00	38.23' RT	796087.18	812418.11	1719.23	TOP OF SLOPE MONUMENT
LWV-24	DR 50+00.00	14.00' LT	796217.97	812761.07	1709.79	TOP OF SLOPE MONUMENT
LWV-25	DR 50+00.00	87.35' RT	796197.48	812712.89	1710.40	TOP OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

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October 21, 2013

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Call 811

REV. NO.	DATE	DESCRIPTION	APPROVED
1	12/03/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JNG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"DR" 43+00 TO "DR" 51+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



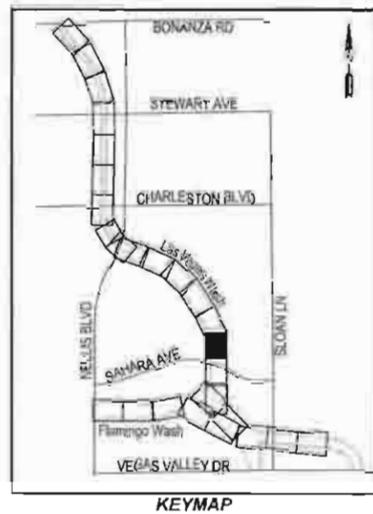
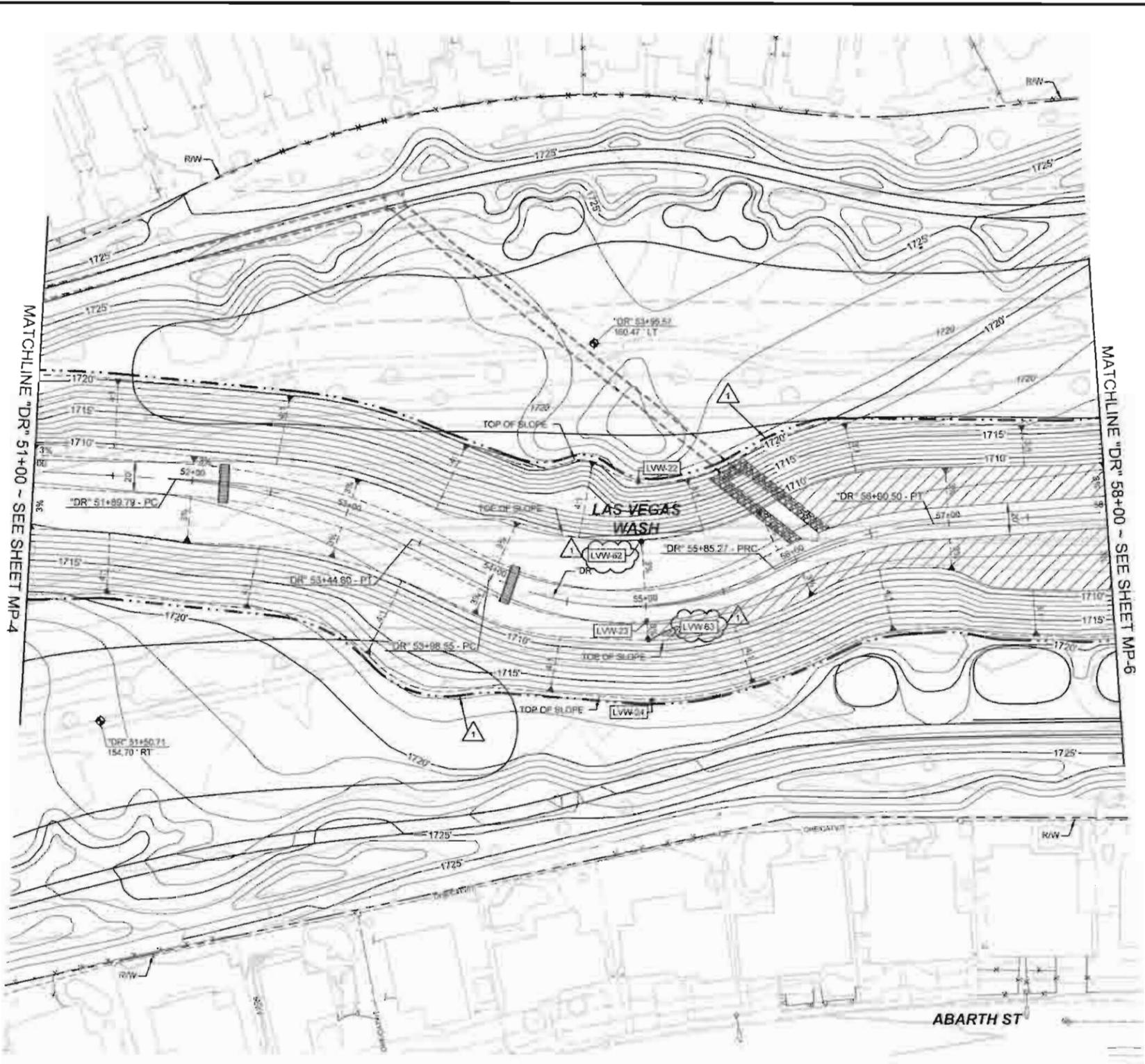
Designed by: M. Vespjnick  
Drawn by: B. Markin  
Checked by: J. Griest  
Date: October 25, 2013

**CH2MHILL**  
2448 VILLAGE VEGAS DRIVE, SUITE 300  
HENDERSON, NEVADA 89174  
PHONE 702-369-6178 FAX 702-388-4009

PROJECT No. 162579  
SHEET 30 OF 110

**L-2031**  
DRAWING NO.  
**MP-4**

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



- LEGEND**
- GOLF COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANTING AREA

- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LVW-21	"DR" 50+00.00	78.17' LT	759733.20	817757.83	1720.63	TOP OF SLOPE MONUMENT
LVW-22	"DR" 55+00.00	8.50' RT	756727.08	812870.17	1707.91	LOW FLOW MONUMENT
LVW-23	"DR" 55+00.00	88.10' RT	756723.84	812821.00	1717.57	TOP OF SLOPE MONUMENT
LVW-24	"DR" 55+00.00	41.50' LT	756730.84	812794.14	1708.91	TOE OF SLOPE MONUMENT
LVW-25	"DR" 55+00.00	34.67' RT	756726.22	812858.03	1708.34	TOE OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you Overhead  
1-702-227-2929

REV#	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JMG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"DR" 51+00 TO "DR" 58+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



DESIGNED BY: M. WARNICK  
DRAWN BY: B. MAHAN  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013

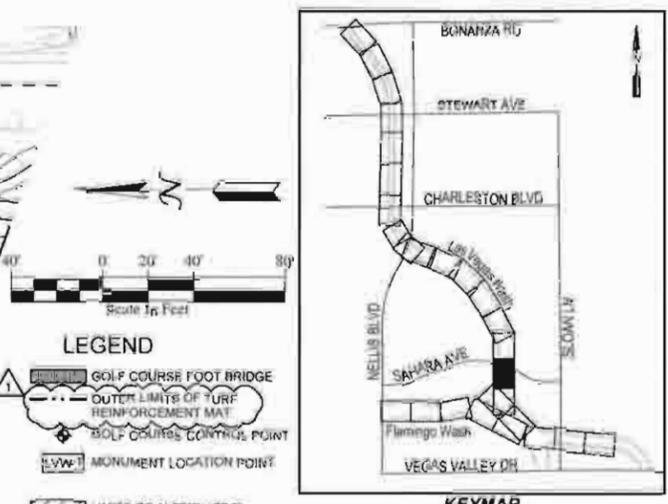
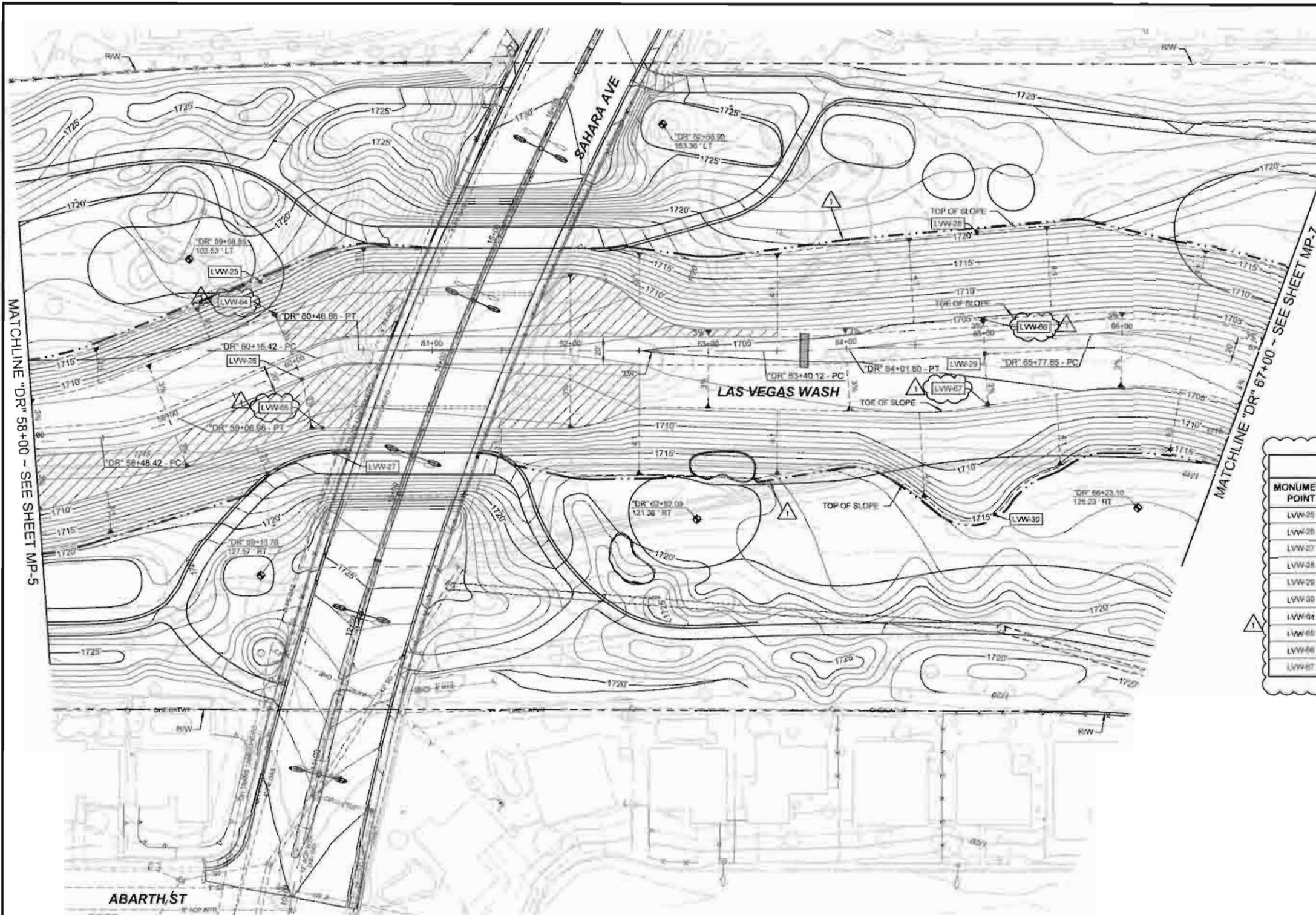
**CH2MHILL**  
2485 VILLAGE VIEW DRIVE, SUITE 200  
HENDERSON, NEVADA 89074  
PHONE 702-994-8175 FAX 702-994-1107

SCALE:  
HORIZ: 1" = 40'  
VERT: NONE

FIELD BOOK:  
JOB ORDER:  
PROJECT No: 452479

DRAWING NO:  
**MP-5**  
SHT. 41 OF 119

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



- LEGEND**
- GOLF COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANTING AREA
- NOTES:**
- 1 REFER TO SHEETS D-14 FOR MONUMENT INSTALLATION DETAILS
  - 2 REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

**CHANNEL MONUMENT LOCATION TABLE**

MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LWV-25	"DR" 59+00.00	87.08 LT	755273.85	812857.25	1716.95'	TOP OF SLOPE MONUMENT
LWV-26	"DR" 60+00.00	8.50 RT	755243.12	812787.02	1707.14'	LOW FLOW MONUMENT
LWV-27	"DR" 60+00.00	86.80 RT	755220.98	812734.45	1714.41'	TOP OF SLOPE MONUMENT
LWV-28	"DR" 65+00.00	73.34 LT	754754.58	812889.65	1720.40'	TOP OF SLOPE MONUMENT
LWV-29	"DR" 58+00.00	9.87 RT	754748.76	812808.89	1704.42'	LOW FLOW MONUMENT
LWV-30	"DR" 65+00.00	126.41 RT	754741.12	812893.23	1718.11'	TOP OF SLOPE MONUMENT
LWV-64	"DR" 60+00.00	41.84 LT	755293.58	812834.10	1708.14'	TOE OF SLOPE MONUMENT
LWV-65	"DR" 60+00.00	47.28 RT	755299.06	812752.27	1708.50'	TOE OF SLOPE MONUMENT
LWV-66	"DR" 65+00.00	15.00 LT	754750.36	812833.34	1704.82'	TOE OF SLOPE MONUMENT
LWV-67	"DR" 65+00.00	48.73 RT	754746.31	812771.74	1705.97'	TOE OF SLOPE MONUMENT

MATCHLINE "DR" 58+00 - SEE SHEET MP-5

MATCHLINE "DR" 67+00 - SEE SHEET MP-7

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS

FOR GOLF COURSE  
GRADING SEE SHEETS  
CD-1 - CD-5

**EARLY RELEASE  
PACKAGE #2**  
October 21, 2013

Call before you dig  
UncleGround  
1-702-432-5300

Call before you dig  
**Overhead**  
1-702-227-2929

Call before you dig

REV No	DATE	DESCRIPTION	APPROVED



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
**CHANNEL MONUMENT PLAN**  
 "DR" 58+00 TO "DR" 67+00  
 CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



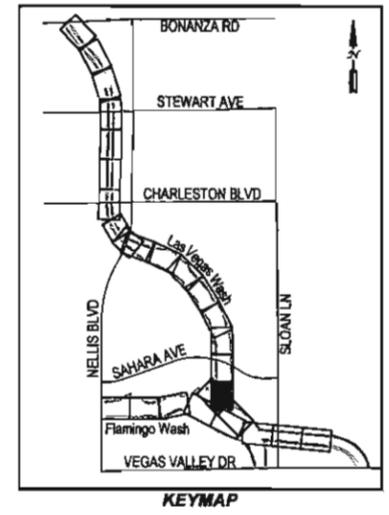
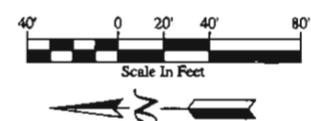
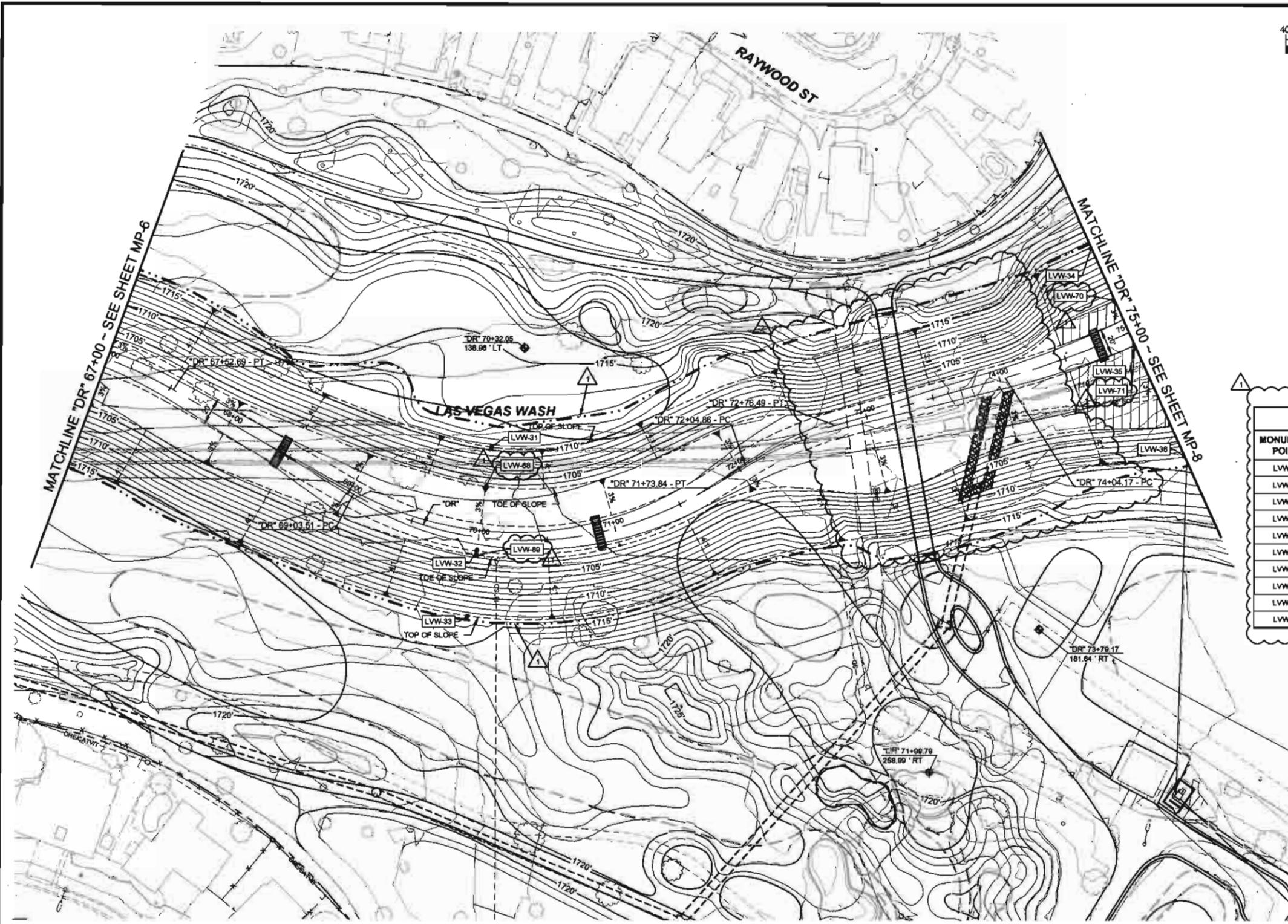
DESIGNED BY: M. WARNICK  
 DRAWN BY: B. MAJUMDER  
 CHECKED BY: J. GRIEST  
 DATE: October 21, 2013

**CH2MHILL**  
 2405 VILLAGE VIEW DRIVE, SUITE 200  
 HENDERSON, NEVADA 89014  
 PHONE: 702-360-8175, FAX: 702-366-1101

SCALE:  
 HORIZ: 1" = 40'  
 VERT: NONE

FIELD BOOK:  
 WORK ORDER:  
 PROJECT No: 462579

DRAWING No:  
**MP-6**  
 SHEET 42 OF 119



- LEGEND**
- GOLF COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANTING AREA

- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LVW-31	"DR" 70+00.00	65.61' LT	754273.10	812744.98	1710.47	TOP OF SLOPE MONUMENT
LVW-32	"DR" 70+00.00	9.50' RT	754282.91	812670.50	1702.44	LOW FLOW MONUMENT
LVW-33	"DR" 70+00.00	57.20' RT	754289.14	812823.21	1713.42	TOP OF SLOPE MONUMENT
LVW-34	"DR" 75+00.00	67.12' LT	753839.15	812891.51	1711.89	TOP OF SLOPE MONUMENT
LVW-35	"DR" 75+00.00	9.50' RT	753807.37	812821.70	1700.94	LOW FLOW MONUMENT
LVW-36	"DR" 75+00.00	97.64' RT	753770.70	812741.31	1708.96	TOP OF SLOPE MONUMENT
LVW-68	"DR" 70+00.00	37.00' LT	754276.84	812716.60	1703.35	TOE OF SLOPE MONUMENT
LVW-69	"DR" 70+00.00	13.00' RT	754283.37	812687.03	1702.58	TOE OF SLOPE MONUMENT
LVW-70	"DR" 75+00.00	25.35' LT	753821.83	812853.50	1701.45	TOE OF SLOPE MONUMENT
LVW-71	"DR" 75+00.00	10.00' RT	753807.17	812821.33	1700.96	TOE OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

EARLY RELEASE PACKAGE #2  
October 21, 2013

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY.

Call before you dig  
Overhead  
1-702-227-2929  
BY ENERGY ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

Call before you dig  
811  
BY ENERGY ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

REV No.	DATE	DESCRIPTION	APPROVED
2/28/2014		REVISED TRM/RIPRAP LIMITS - REPLACED RIPRAP WITH TRM/SOC	JNG
12/23/2013		TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JNG



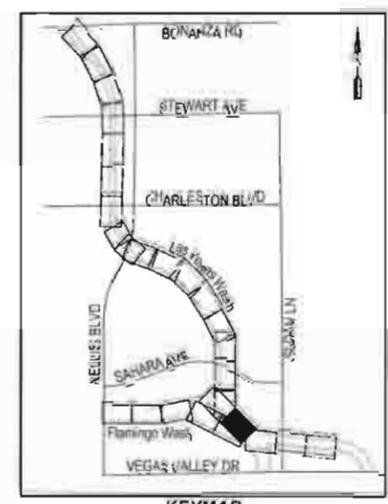
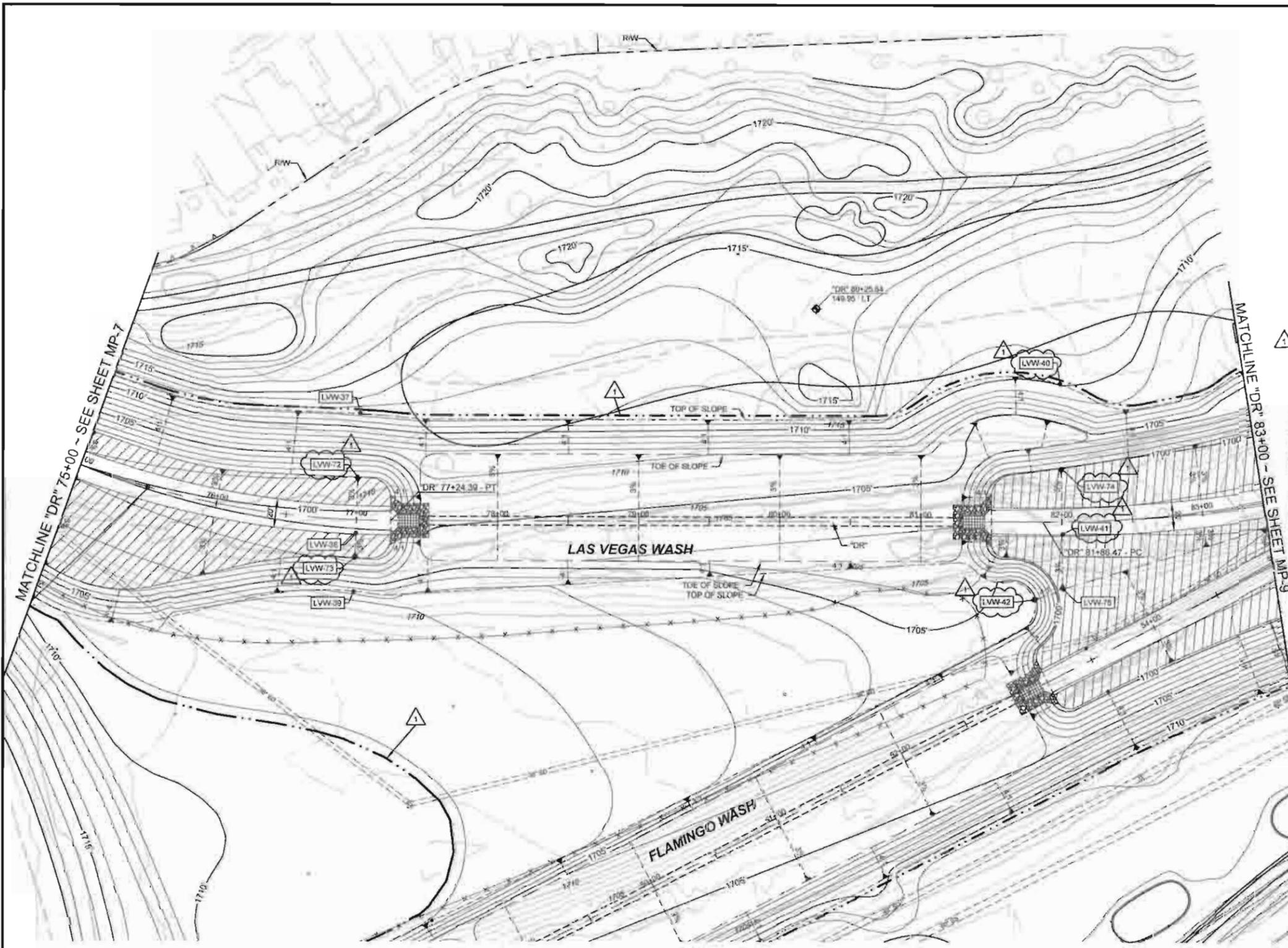
**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
**CHANNEL MONUMENT PLAN**  
 "DR" 67+00 TO "DR" 75+00  
 CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



DESIGNED BY: M. WARNICK  
 DRAWN BY: B. MAHAN  
 CHECKED BY: J. GRIEST  
 DATE: October 21, 2013

**CH2MHILL**  
 2485 VILLAGE VIEW DRIVE, SUITE 350  
 HENDERSON, NEVADA 89074  
 PHONE 702-369-8175, FAX 702-369-1107

SCALE	HORIZ: 1" = 40'	VERT: NONE	FIELD BOOK	WORK ORDER	PROJECT No. 462579	SHT: OF
L-2031						DRAWING No.
						<b>MP-7</b>



CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LWW-37	"DR" 77+00.00	74.8' LT	753890.58	812995.47	1719.40'	TOP OF SLOPE MONUMENT
LWW-38	"DR" 77+00.00	8.50' RT	753893.72	812993.29	1700.34'	LOW FLOW MONUMENT
LWW-39	"DR" 77+00.00	50.30' RT	753811.32	812903.44	1706.59'	TOP OF SLOPE MONUMENT
LWW-40	"DR" 82+00.00	90.91' LT	753357.74	813359.08	1740.00'	TOP OF SLOPE MONUMENT
LWW-41	"DR" 82+00.00	8.75' RT	753282.56	813284.82	1698.50'	LOW FLOW MONUMENT
LWW-42	"DR" 81+80.36	64.98' RT	753284.44	813285.29	1705.45'	TOP OF SLOPE MONUMENT
LWW-43	"DR" 77+00.00	30.04' LT	753665.38	812957.41	1700.59'	TOE OF SLOPE MONUMENT
LWW-73	"DR" 77+00.00	26.53' RT	753827.23	812920.66	1700.88'	TOE OF SLOPE MONUMENT
LWW-74	"DR" 82+00.00	37.46' LT	753315.44	813317.20	1699.61'	TOE OF SLOPE MONUMENT
LWW-75	"DR" 82+00.00	47.38' RT	753255.67	813287.88	1699.50'	GRADING HINGE

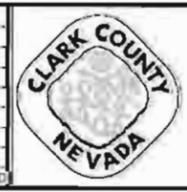
- NOTES:**
- REFER TO SHEET CD-1 FOR MONUMENT INSTALLATION DETAILS
  - REFER TO SHEETS CD-1A & CD-1B FOR TURF REINFORCEMENT MAT DETAILS

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you Dig  
Overhead  
1-702-227-2929  
CLARK COUNTY DEPARTMENT OF PUBLIC WORKS

REV NO.	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JNG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"DR" 75+00 TO "DR" 83+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS

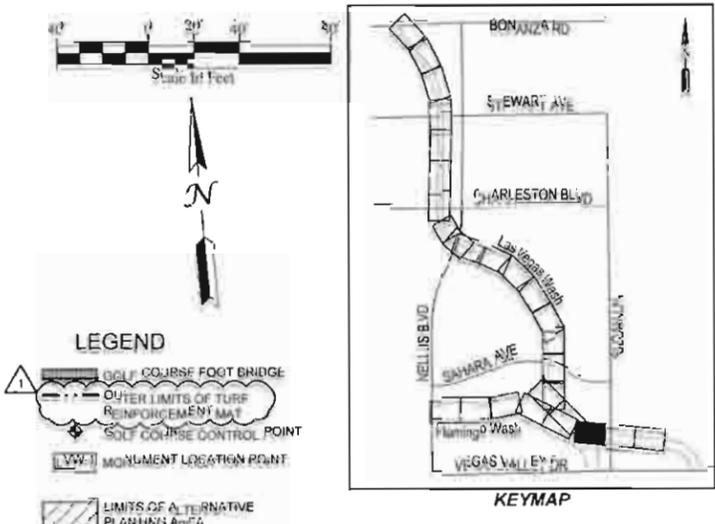
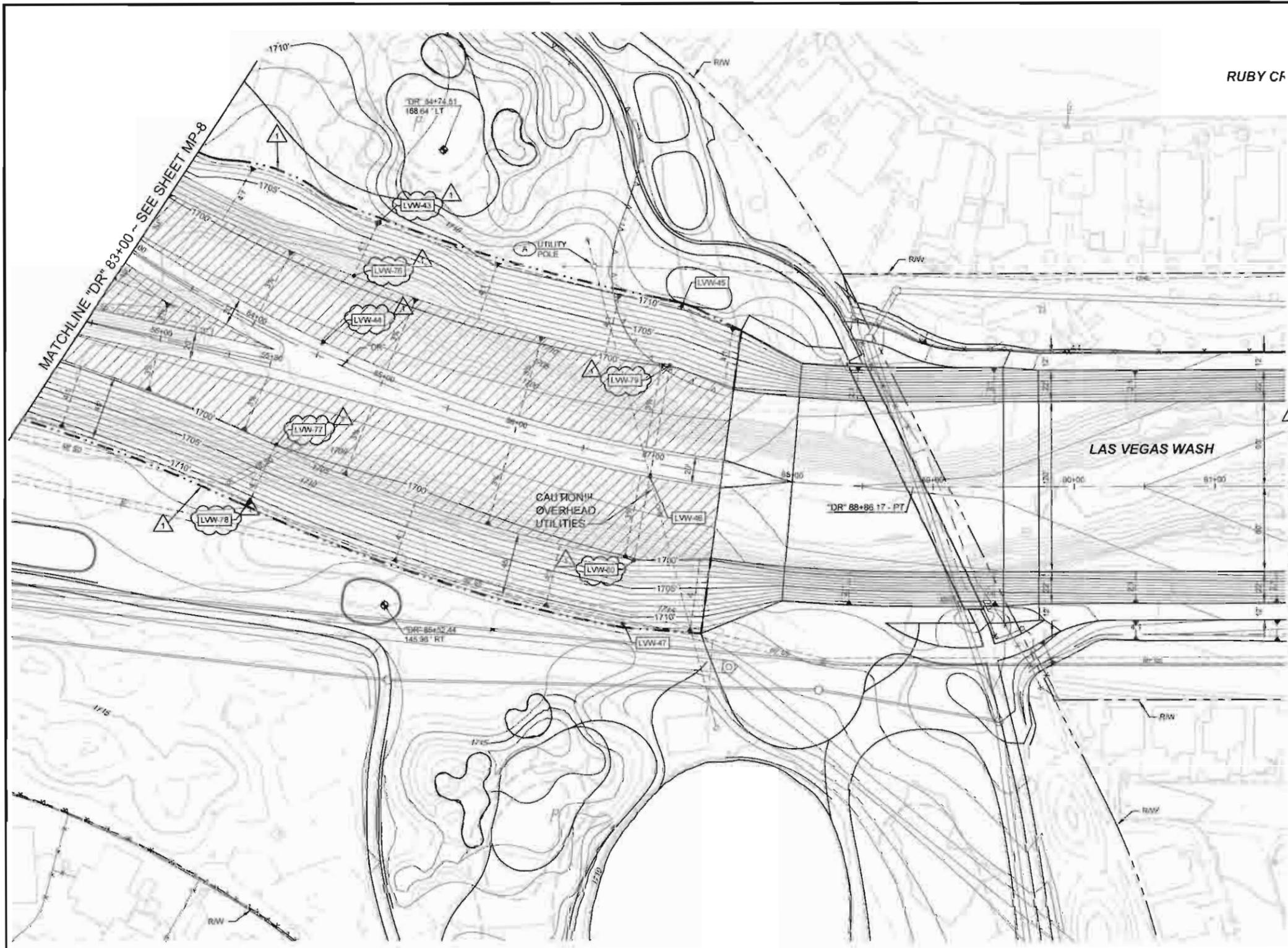


PREPARED BY: M. WERNICK  
DRAWN BY: B. JAVHAN  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013  
**CH2MHILL**  
4000 VILLAGE VIEW DRIVE, SUITE 300  
RENDERSON, NEVADA 89074  
PHONE 702-298-8175, FAX 702-298-1621

SCALE  
HORIZ: 1" = 10'  
VERT: NONE  
FIELD BOOK  
WORK ORDER  
PROJECT NO: 492579

L-2031  
DRAWING NO:  
**MP-8**  
SHEET 14 OF 119

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



- LEGEND**
- GOLF COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANNING AREA
- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS U-10 & U-11 FOR TURF REINFORCEMENT MAT DETAILS

**CHANNEL MONUMENT LOCATION TABLE**

MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
LWV-43	"DR" 84+50.00	102.16' LT	75328.13	813540.53	1708.20'	TOP OF SLOPE MONUMENT
LWV-44	"DR" 84+50.00	9.50' LT	753145.28	813493.55	1698.61'	LOW FLOW MONUMENT
LWV-45	"DR" 87+00.00	111.53' LT	753145.55	813768.22	1710.48'	TOP OF SLOPE MONUMENT
LWV-46	"DR" 87+00.00	9.50' RT	753029.84	813718.91	1698.19'	LOW FLOW MONUMENT
LWV-47	"DR" 87+00.00	115.00' RT	752828.50	813586.46	1711.30'	TOP OF SLOPE MONUMENT
LWV-76	"DR" 84+50.00	81.13' LT	753189.85	813019.71	1700.20'	TOE OF SLOPE MONUMENT
LWV-77	"DR" 84+50.00	70.00' RT	753078.65	813463.53	1700.00'	TOE OF SLOPE MONUMENT
LWV-78	"DR" 84+50.00	115.00' RT	753027.80	813435.82	1711.20'	TOP OF SLOPE MONUMENT
LWV-79	"DR" 87+00.00	89.95' LT	753106.29	813737.48	1700.04'	TOE OF SLOPE MONUMENT
LWV-80	"DR" 87+00.00	70.00' RT	752971.79	813598.85	1705.04'	TOE OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

FOR DRAINAGE CHANNEL PLAN SEE SHEET PL-19

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you dig  
**Overhead**  
1-702-227-2929

Call before you dig  
**811**

REV NO	DATE	DESCRIPTION	APPROVED
1	12/23/2015	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JMG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"DR" 83+00 TO "DR" 92+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



DESIGNED BY: M. WARNICK  
DRAWN BY: B. MAHAN  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013

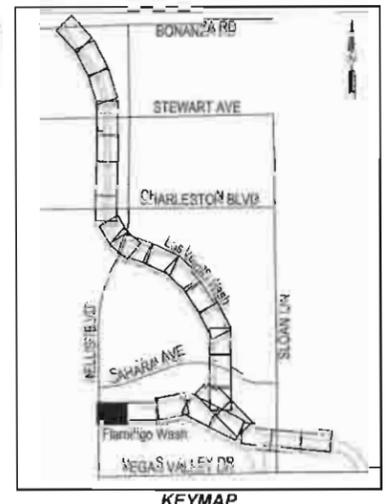
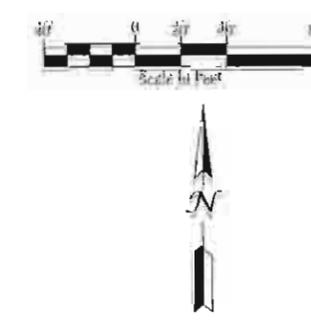
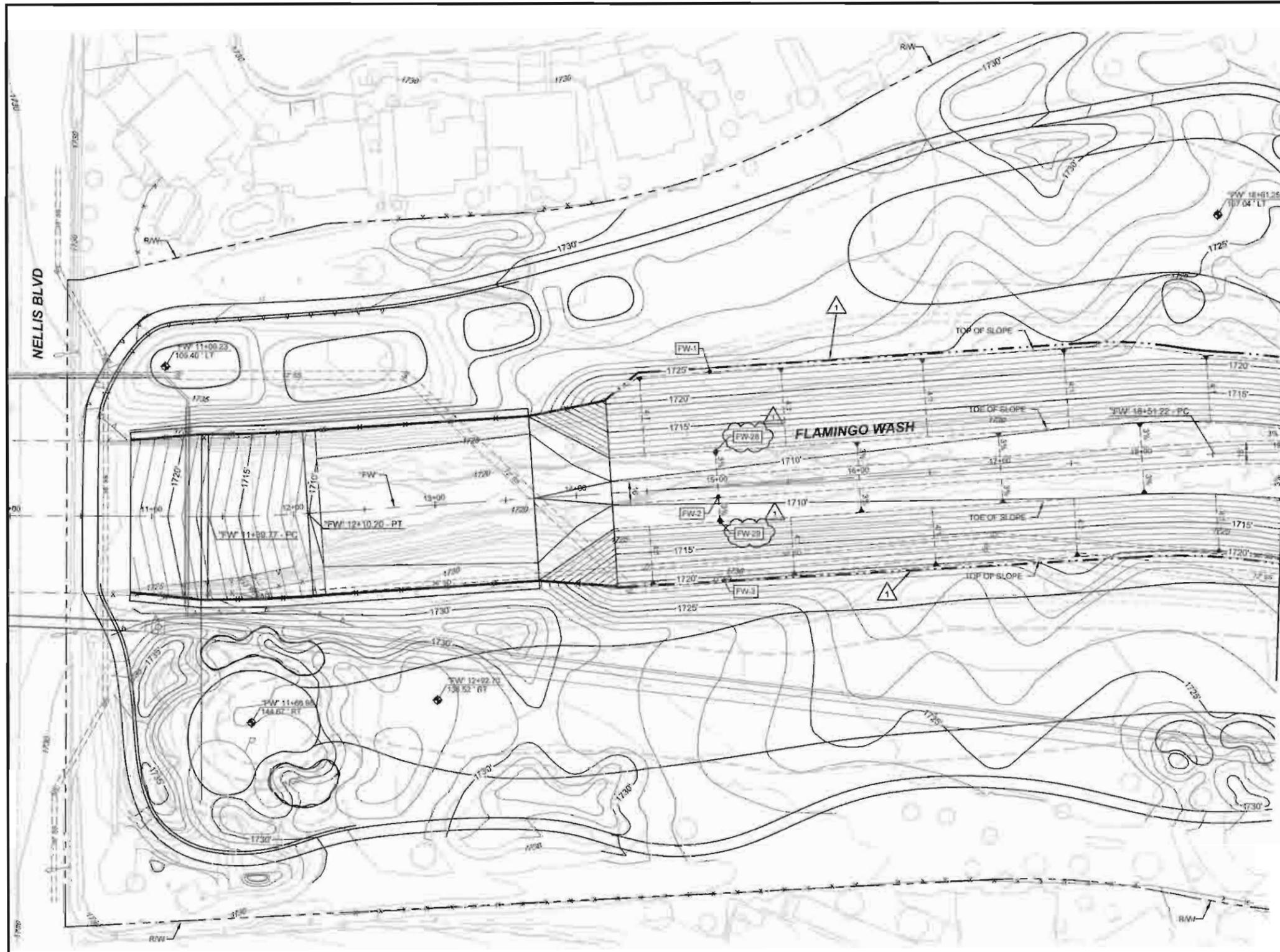
**CH2MHILL**  
488 VILLAGE VIEW DRIVE, SUITE 300  
HENDERSON, NEVADA 89014  
PHONE: 702-269-6175, FAX: 702-269-1407

SCALE: Horizontal: 1" = 40'  
VERT: NONE

PROJECT NO: 462579

**L-2031**  
DRAWING NO:  
**MP-9**

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



- LEGEND**
- GOLF COURSE FOOT BRIDGE
  - ALTER LIMITS OF EAVE REINFORCEMENT MAT
  - GOLF COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE by Aerials AREA

- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS D-15 & D-16 FOR THRU REINFORCEMENT MAT DETAILS

MATCHLINE "FW" 19+00 ~ SEE SHEET MP-11

MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
FW-1	"FW" 11+00.00	50.00' RT	76384.01	809507.66	1724.96'	TOE OF SLOPE MONUMENT
FW-2	"FW" 12+00.00	7.50' RT	75303.07	808588.61	1709.82'	LOW FLOW MONUMENT
FW-3	"FW" 15+00.00	55.00' RT	763748.70	808672.36	1720.63'	TOP OF SLOPE MONUMENT
FW-2B	"FW" 15+00.00	25.00' LT	753838.60	809966.53	1710.38'	TOE OF SLOPE MONUMENT
FW-2S	"FW" 15+00.00	25.00' RT	753789.60	809966.73	1710.38'	TOE OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

FOR DRAINAGE CHANNEL PLAN SEE SHEET PL-22

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you dig  
**Overhead**  
1-702-227-2929

Call before you dig  
**811**

REV. NO.	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JMG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"FW" 10+00 TO "FW" 19+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



DESIGNED BY: M. WARNICK  
DRAWN BY: E. MAHAN  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013

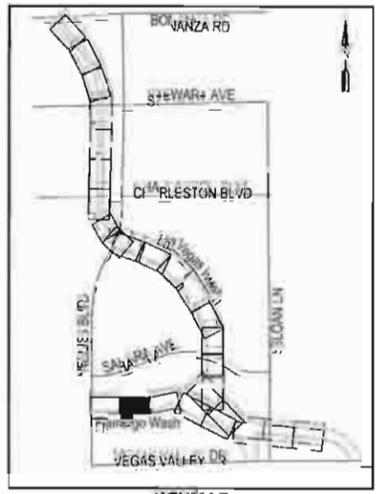
**CH2MHILL**  
2485 VILLAGE VIEW DRIVE, SUITE 300  
HENDERSON, NEVADA 89014  
PHONE 702-365-8175 FAX 702-365-1187

SCALE: HORIZ 1" = 60'	PROJECT No. 462519
VERT: NONE	
FIELD BOOKS	Sheet 46 of 110
WORK ORDER	
<b>L-2031</b> DRAWING No. <b>MP-10</b>	



**LEGEND**

- GOLF COURSE FOOT BRIDGE
- OUTER LIMITS OF TURF REINFORCEMENT MAT
- GOLF COURSE CONTROL POINT
- MONUMENT LOCATION POINT
- LIMITS OF ALTERNATIVE PLANTING AREA



**NOTES:**

1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
2. REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
FW-4	FW 20+00.00	35.30 RT	75386.40	810076.38	1725.23	TOP OF SLOPE MONUMENT
FW-5	FW 20+05.00	7.50 RT	75387.44	810084.52	1709.07	LOWE MONUMENT
FW-6	FW 20+00.00	7.50 RT	753751.20	810051.59	1725.07	TOP OF SLOPE MONUMENT
FW-7	FW 20+05.00	72.54 RT	753821.03	810047.02	1724.45	TOP OF SLOPE MONUMENT
FW-8	FW 20+00.00	7.50 RT	753750.10	810043.02	1725.07	TOP OF SLOPE MONUMENT
FW-9	FW 20+05.00	51.47 RT	753898.97	810059.36	1720.00	LOWE MONUMENT
FW-33	FW 20+00.00	75.20 LT	753835.77	810059.30	1705.13	TOP OF SLOPE MONUMENT
FW-31	FW 20+00.00	75.20 LT	753781.45	810057.65	1715.20	TOP OF SLOPE MONUMENT
FW-30	FW 25+00.00	21.54 LT	753783.37	810055.02	1708.87	TOP OF SLOPE MONUMENT
FW-33	FW 25+00.00	25.40 RT	753733.17	810053.37	1708.80	TOP OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you Overhead  
1-702-227-2029



REV. NO.	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"FW" 19+00 TO "FW" 28+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS

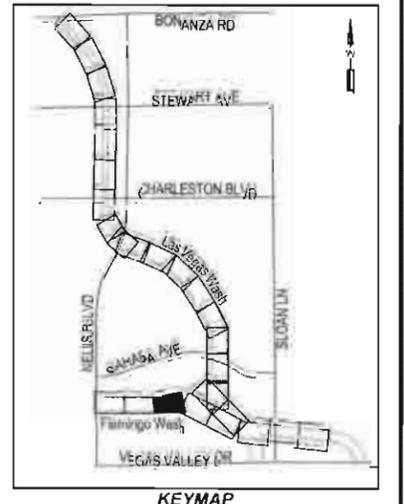
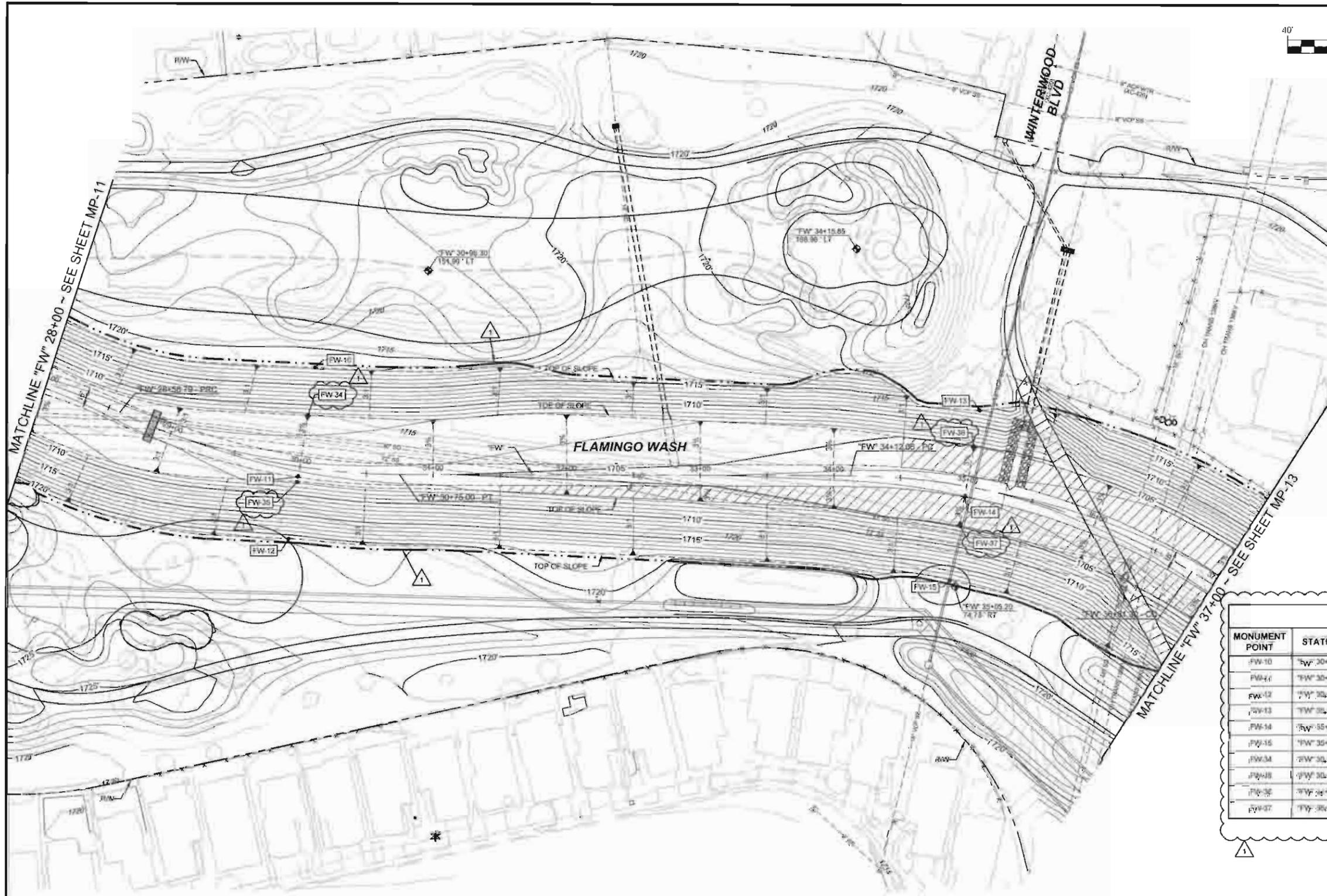


DESIGNED BY: B. MARGIN  
DRAWN BY: J. GRIEST  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013  
**CH2MHILL**  
3488 VILLAGE VIEW DRIVE, SUITE 400  
HENDERSON, NEVADA 89015  
PHONE 702-369-5175 FAX 702-369-5177

SCALE:  
HORIZ: 1" = 40'  
VERT: N=1"=10'  
FIELD BOOK:  
WORK ORDER:  
PROJECT No: 200579  
SHEET: 07 OF 11

**L-2031**  
DRAWING No:  
**MP-11**

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



**LEGEND**

- GOLF COURSE FOOT BRIDGE
- TURF REINFORCEMENT MAT
- GOLF COURSE CONTROL POINT
- MONUMENT LOCATION POINT
- LIMITS OF ALTERNATIVE PLANTING AREA

**NOTES**

1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
2. REFER TO SHEETS D-15 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
FW-10	"FW" 30+00.00	74.74' LT	753364.73	811046.21	1718.14	TOP OF SLOPE MONUMENT
FW-11	"FW" 30+00.00	7.80' RT	753782.91	811054.69	1708.47	LOW FLOW MONUMENT
FW-12	"FW" 30+00.00	34.20' RT	753726.45	811056.47	1720.48	TOP OF SLOPE MONUMENT
FW-13	"FW" 30+00.00	87.47' LT	753959.74	811036.19	1713.84	TOP OF SLOPE MONUMENT
FW-14	"FW" 35+00.00	7.82' RT	753894.94	811541.18	1704.01	LOW FLOW MONUMENT
FW-15	"FW" 35+00.00	70.06' RT	753831.98	811546.00	1718.20	TOP OF SLOPE MONUMENT
FW-16	"FW" 30+00.00	38.00' LT	753828.16	811066.88	1707.45	TOP OF SLOPE MONUMENT
FW-18	"FW" 30+00.00	11.28' RT	753779.45	811055.05	1706.58	TOP OF SLOPE MONUMENT
FW-36	"FW" 34+59.00	30.11' LT	753932.45	811438.25	1704.72	TOP OF SLOPE MONUMENT
FW-37	"FW" 35+00.00	29.85' RT	753872.94	811542.94	1704.71	TOP OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you dig  
**Overhead**  
1-702-227-2929  
**811**

REV#	DATE	DESCRIPTION	APPROVED
1	12/23/2013	TURF REINFORCEMENT MAT REVISIONS & MONUMENTS ADDED	JNS

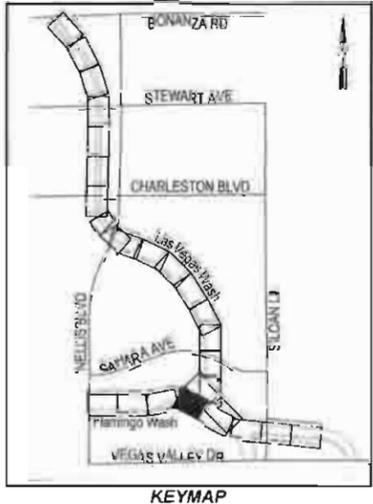
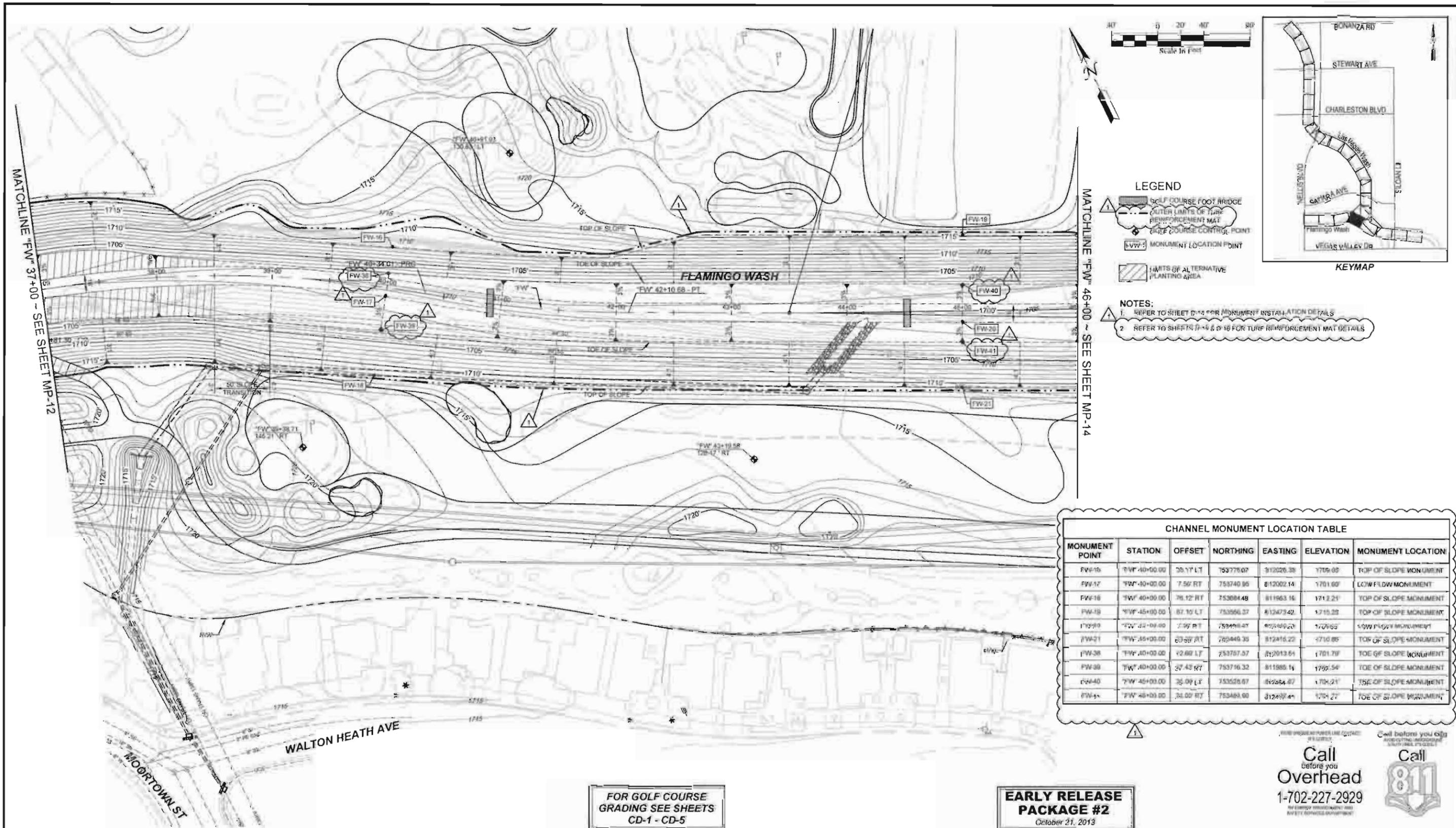


**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"FW" 28+00 TO "FW" 37+00  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



DESIGNED BY: M. WARRICK  
DRAWN BY: B. WARRICK  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013  
**CH2MHILL**  
2485 VILLAGE VIEW DRIVE, SUITE 300  
HENDERSON, NEVADA 89074  
PHONE: 702.388.6175 FAX: 702.388.6199

PROJECT NO: 462379  
DRAWING NO: **L-2031**  
**MP-12**  
SHEET 14 OF 110



- LEGEND**
- SELF COURSE FOOT BRIDGE
  - OUTER LIMITS OF TURF REINFORCEMENT MAT
  - SLOPE COURSE CONTROL POINT
  - MONUMENT LOCATION POINT
  - LIMITS OF ALTERNATIVE PLANTING AREA

- NOTES:**
1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
  2. REFER TO SHEETS D-14 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
FW-16	"FW" 40+00.00	20.17' LT	753775.07	812026.38	1709.05	TOP OF SLOPE MONUMENT
FW-17	"FW" 40+00.00	7.50' RT	753740.95	812002.14	1701.60	LOW FLOW MONUMENT
FW-18	"FW" 40+00.00	76.12' RT	753684.48	811963.16	1712.21	TOP OF SLOPE MONUMENT
FW-19	"FW" 45+00.00	67.10' LT	753566.37	812473.42	1715.25	TOP OF SLOPE MONUMENT
FW-20	"FW" 45+00.00	7.50' RT	753490.47	812499.20	1709.65	LOW FLOW MONUMENT
FW-21	"FW" 45+00.00	63.50' RT	753449.35	812415.22	1710.85	TOP OF SLOPE MONUMENT
FW-38	"FW" 40+00.00	12.60' LT	753767.57	812013.61	1701.70	TOP OF SLOPE MONUMENT
FW-39	"FW" 40+00.00	37.43' RT	753716.32	811985.14	1702.54	TOE OF SLOPE MONUMENT
FW-40	"FW" 45+00.00	35.00' LT	753526.67	812464.47	1704.21	TOE OF SLOPE MONUMENT
FW-41	"FW" 45+00.00	34.00' RT	753483.60	812497.47	1704.27	TOE OF SLOPE MONUMENT

FOR GOLF COURSE GRADING SEE SHEETS CD-1 - CD-5

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you dig  
**Overhead**  
1-702-227-2929

REV. NO.	DATE	DESCRIPTION	APPROVED
12/23/03		TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JMG

**CLARK COUNTY NEVADA**

**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**

**CHANNEL MONUMENT PLAN**

**"FW" 37+00 TO "FW" 46+00**

**CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS**



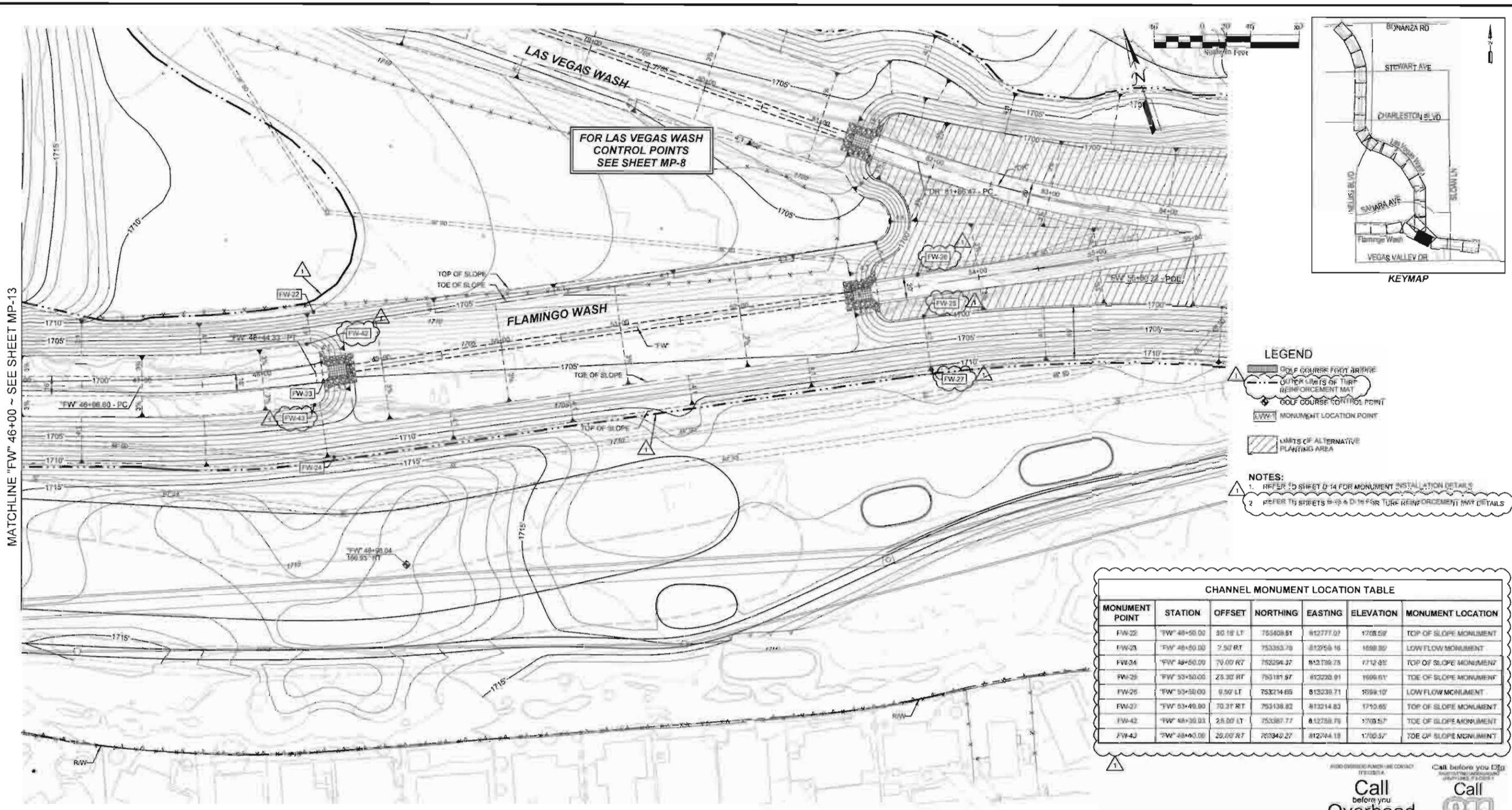
DESIGNED BY: M. WARNICK  
 DRAWN BY: B. MAHAN  
 CHECKED BY: J. GRIEST  
 DATE: October 21, 2013

**CH2MHILL**  
 2485 VILLAGE VIEW DRIVE, SUITE 300  
 HENDERSON, NEVADA 89074  
 PHONE 702.988.9775 FAX 702.988.1107

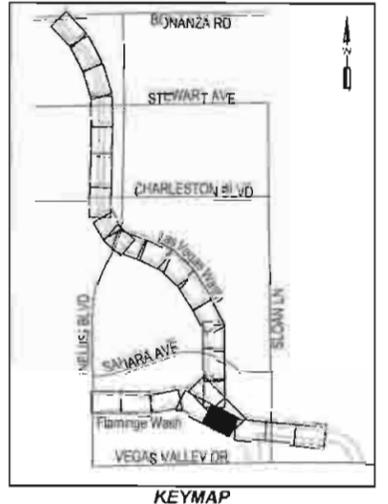
SCALE: HORIZ 1" = 40'	<b>L-2031</b>
VERT: NONE	
FIELD BOOK	
WORK ORDER	
PROJECT NO: 462579	<b>MP-13</b>
SHT: 49 OF 119	

LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS

MATCHLINE "FW" 46+00 ~ SEE SHEET MP-13



FOR LAS VEGAS WASH  
CONTROL POINTS  
SEE SHEET MP-8



LEGEND

- GOLF COURSE FOOT BRIDGE
- OUTER LIMITS OF TURF REINFORCEMENT MAT
- GOLF COURSE CONTROL POINT
- MONUMENT LOCATION POINT
- LIMITS OF ALTERNATIVE PLANTING AREA

NOTES:

1. REFER TO SHEET D-14 FOR MONUMENT INSTALLATION DETAILS
2. REFER TO SHEETS P-13 & D-16 FOR TURF REINFORCEMENT MAT DETAILS

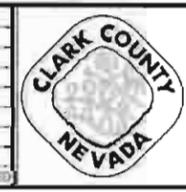
CHANNEL MONUMENT LOCATION TABLE						
MONUMENT POINT	STATION	OFFSET	NORTHING	EASTING	ELEVATION	MONUMENT LOCATION
FW-22	"FW" 46+50.00	30.18' LT	753408.51	812777.07	1708.58'	TOP OF SLOPE MONUMENT
FW-23	"FW" 46+50.00	7.50' RT	753353.79	812758.16	1698.59'	LOW FLOW MONUMENT
FW-24	"FW" 46+50.00	79.00' RT	752294.37	812726.75	1712.82'	TOP OF SLOPE MONUMENT
FW-25	"FW" 53+50.00	23.30' RT	753181.97	813220.91	1699.61'	TOE OF SLOPE MONUMENT
FW-26	"FW" 53+50.00	9.50' LT	753214.66	813238.71	1699.10'	LOW FLOW MONUMENT
FW-27	"FW" 53+49.00	70.31' RT	753136.82	813214.83	1710.65'	TOP OF SLOPE MONUMENT
FW-42	"FW" 46+30.03	2.80' LT	753387.77	812758.79	1700.57'	TOE OF SLOPE MONUMENT
FW-43	"FW" 46+40.00	20.00' RT	753340.27	812744.18	1700.57'	TOE OF SLOPE MONUMENT

FOR GOLF COURSE  
GRADING SEE SHEETS  
CD-1 - CD-5

**EARLY RELEASE  
PACKAGE #2**  
October 21, 2013

Call before you Dig  
Overhead  
1-702-227-2929  
Call 811

REV NO.	DATE	DESCRIPTION	APPROVED
03/23/2013		TURF REINFORCEMENT MAT REVISED & MONUMENTS ADDED	JMG



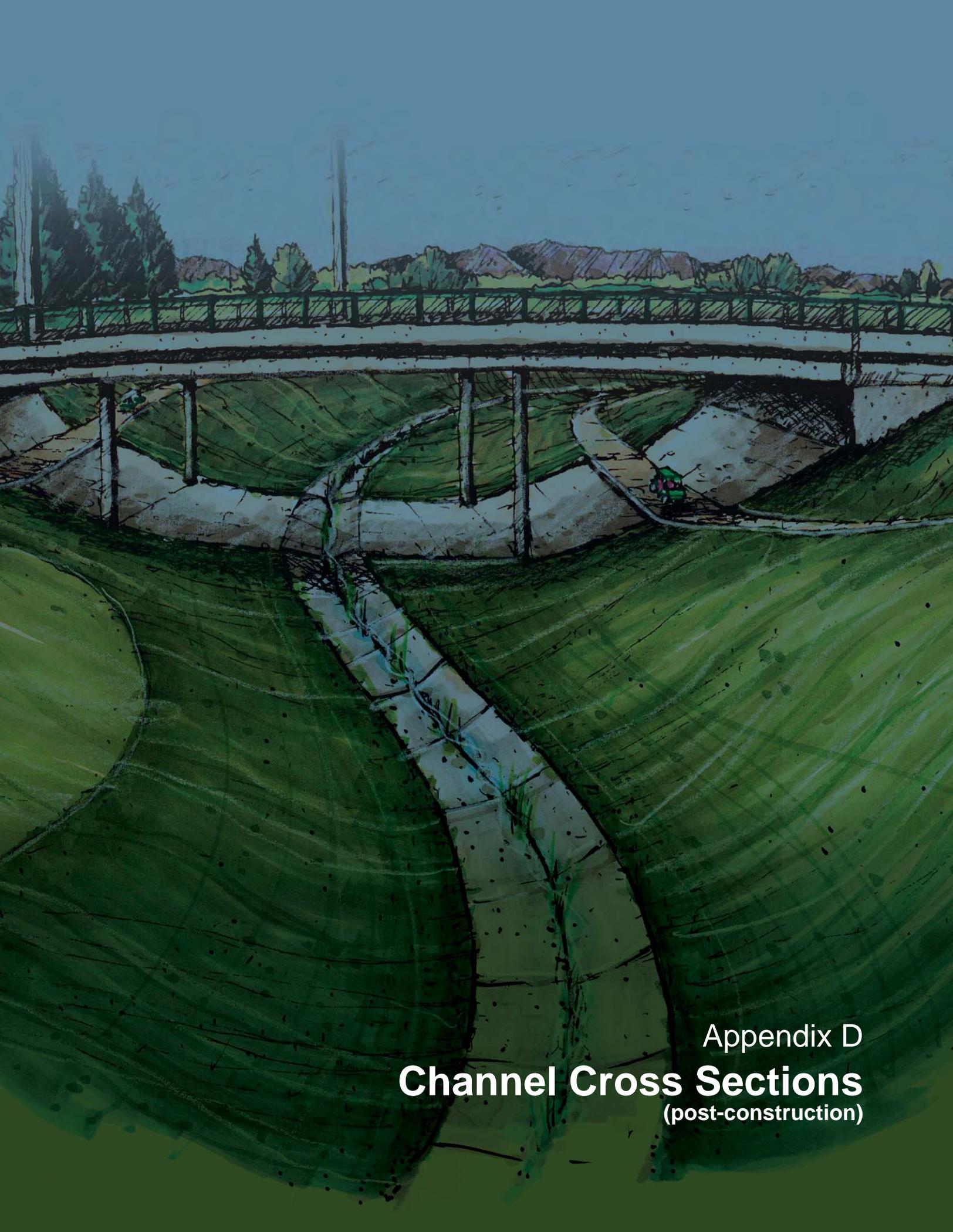
**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
CHANNEL MONUMENT PLAN  
"FW" 46+00 TO "FW" 55+80.32  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



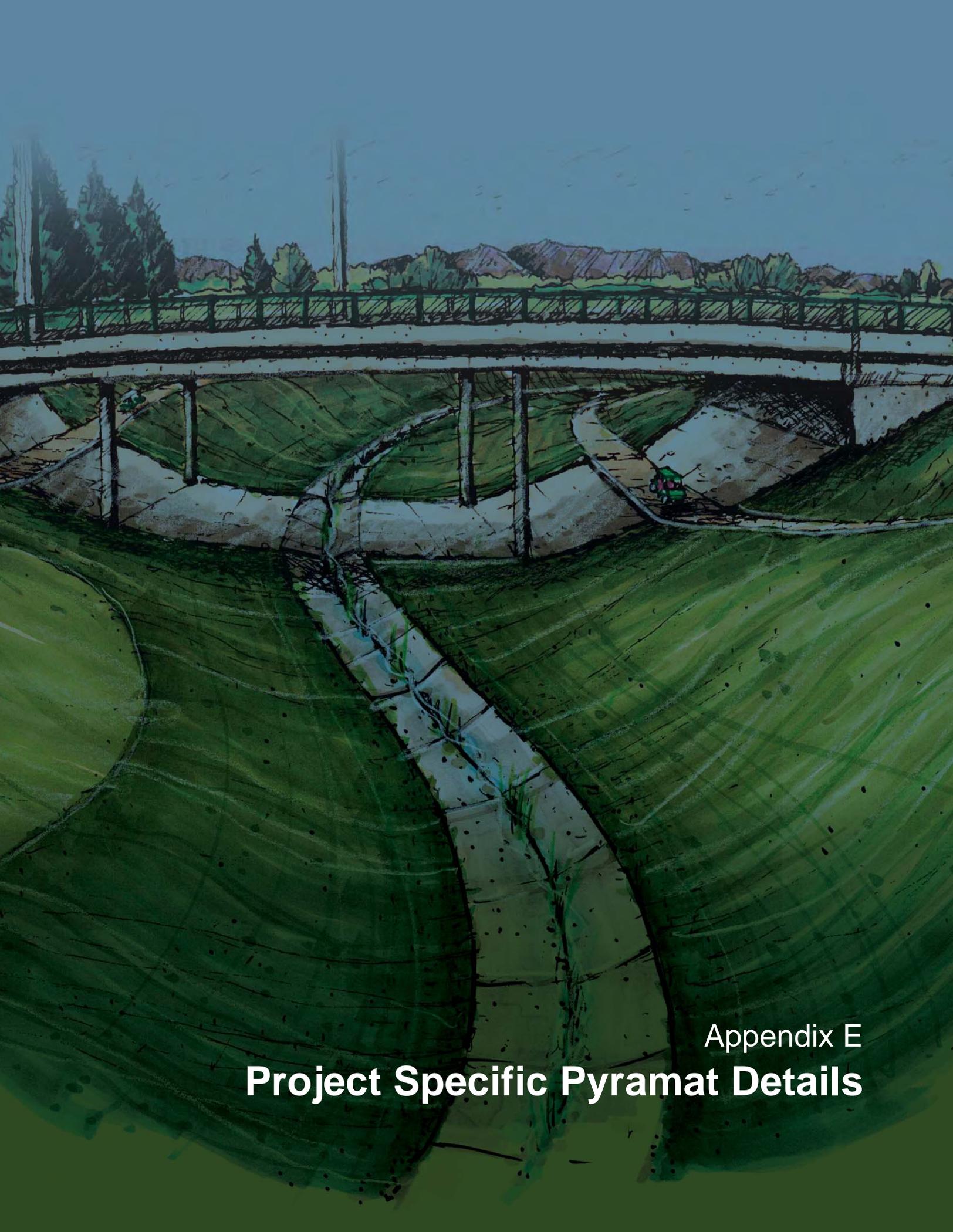
DESIGNED BY: M. WARNICK  
DRAWN BY: B. MAHAN  
CHECKED BY: J. GRIEST  
DATE: October 21, 2013  
**CH2MHILL**  
2485 VILLAGE VIEW DRIVE, SUITE 500  
HENDERSON, NEVADA 89014  
PHONE: 702-366-6175 FAX: 702-366-1167

SCALE: 1" = 40'  
VERT: NONE  
FIELD BOOK  
WORK ORDER  
PROJECT No: 482579  
SHEET: 09 OF 119  
**L-2031**  
DRAWING NO:  
**MP-14**

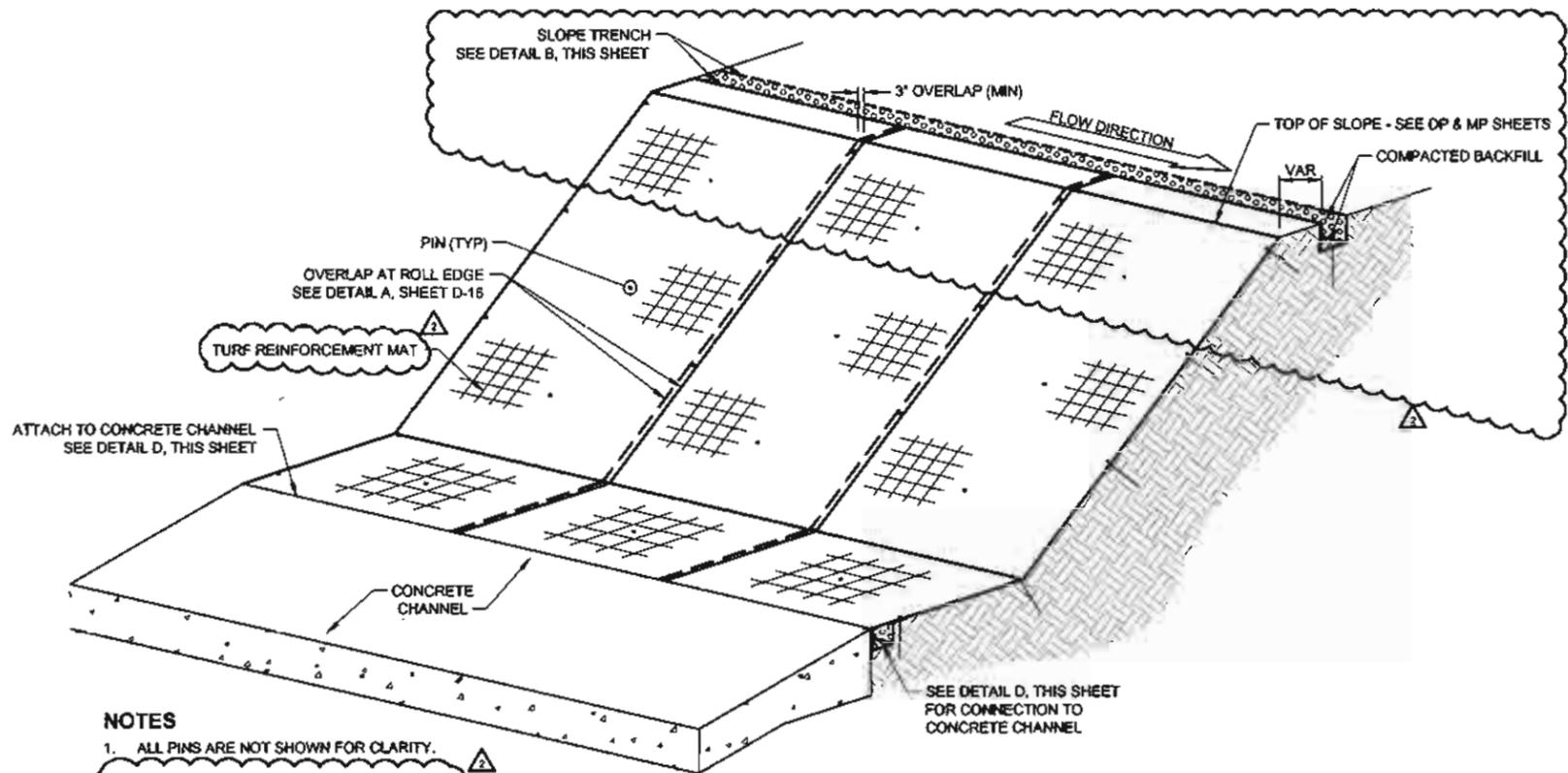
LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



Appendix D  
**Channel Cross Sections**  
(post-construction)

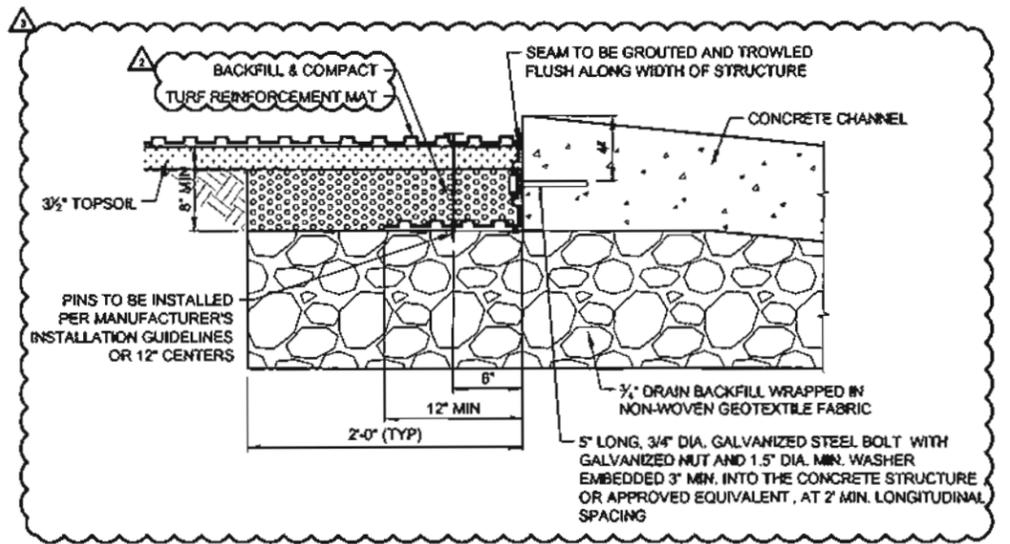


Appendix E  
**Project Specific Pyramat Details**

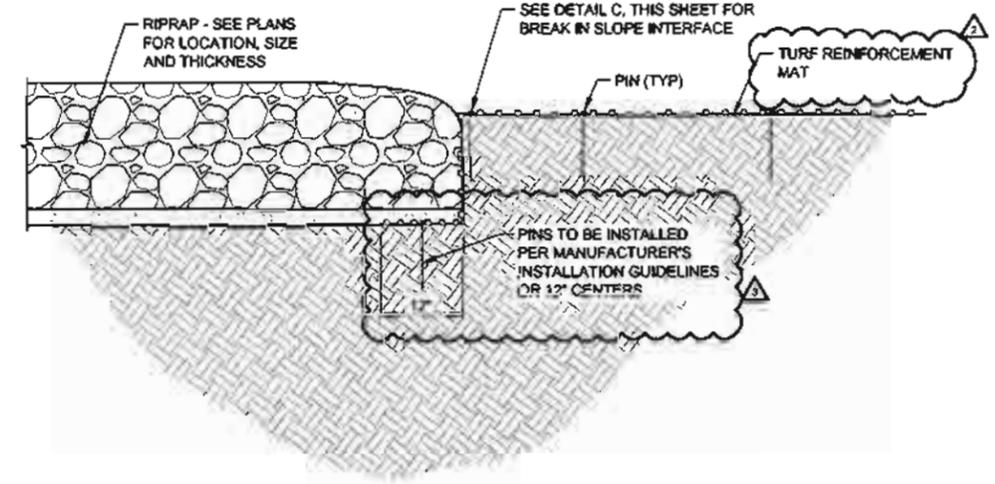


- NOTES**
1. ALL PINS ARE NOT SHOWN FOR CLARITY.
  2. INSTALL TURF REINFORCEMENT MAT PER MANUFACTURER'S GENERAL INSTALLATION GUIDELINES.
  3. COVER TURF REINFORCEMENT MAT WITH 1/2" MINIMUM TOPSOIL BEFORE GRASSING.

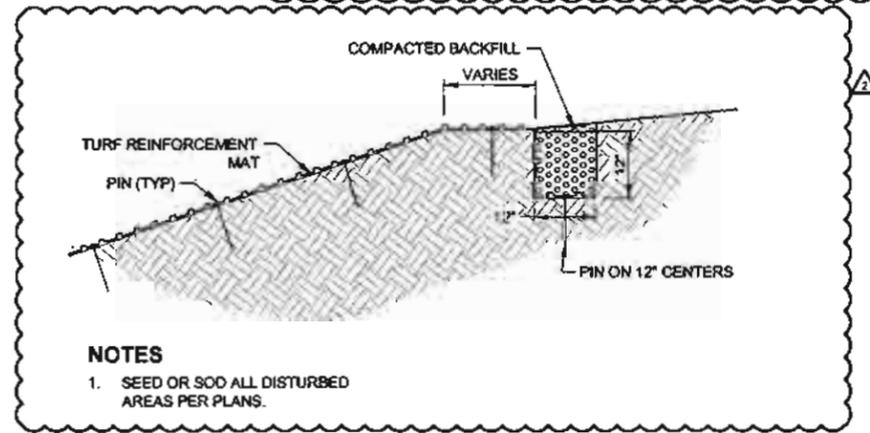
**A TURF REINFORCEMENT MAT SLOPE INSTALLATION DETAIL**  
NOT TO SCALE



**D CONCRETE ATTACHMENT DETAIL**  
NOT TO SCALE

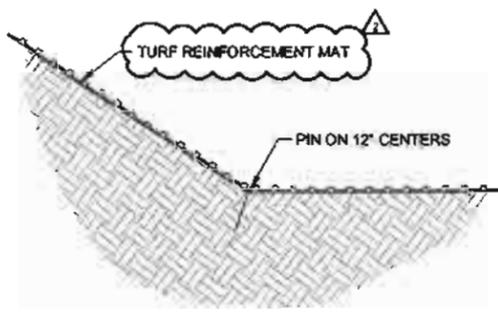


**E RIPRAP CONNECTION DETAIL**  
NOT TO SCALE



- NOTES**
1. SEED OR SOO ALL DISTURBED AREAS PER PLANS.

**B SLOPE TRENCH DETAIL**  
NOT TO SCALE



**C BREAK IN SLOPE INTERFACE DETAIL**  
NOT TO SCALE

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you dig  
Overhead  
1-702-227-2929  
N.V. ENERGY ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

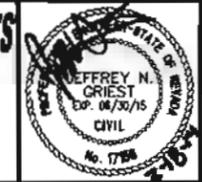
REV NO.	DATE	DESCRIPTION	APPROVED
2/13/2014		DETAILS REVISED	JNG
12/23/2013		DETAILS REVISED	JNG
10/31/2013		SHEET ADDED	JNG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**

**TURF REINFORCEMENT MAT DETAILS**

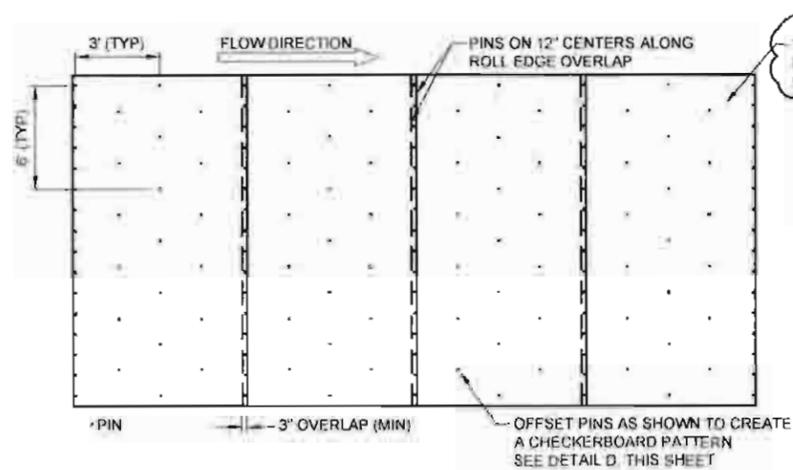
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



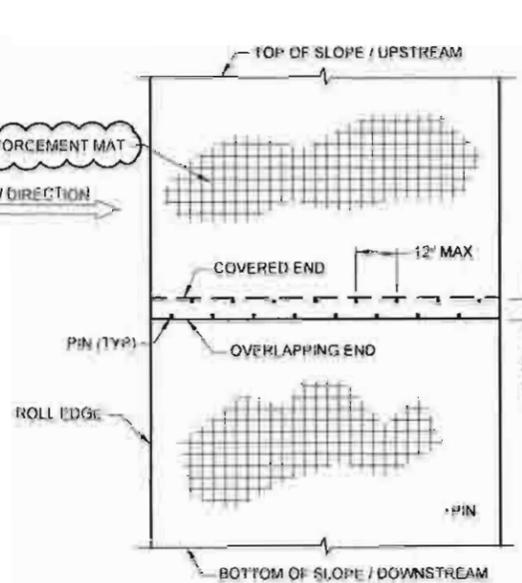
DESIGNED BY: M. WARNICK  
DRAWN BY: B. MAHAN  
CHECKED BY: J. GRIEST  
DATE: November 1, 2013  
**CH2MHILL**  
2488 VILLAGE MEV DRIVE, SUITE 360  
HENDERSON, NEVADA 89074  
PHONE 702-389-6175, FAX 702-389-1107

SCALE		DRAWING NO.
HORIZ:	AS NOTED	
VERT:	NONE	D-15
FIELD BOOK		
WORK ORDER		
PROJECT No.	462579	SHT: OF

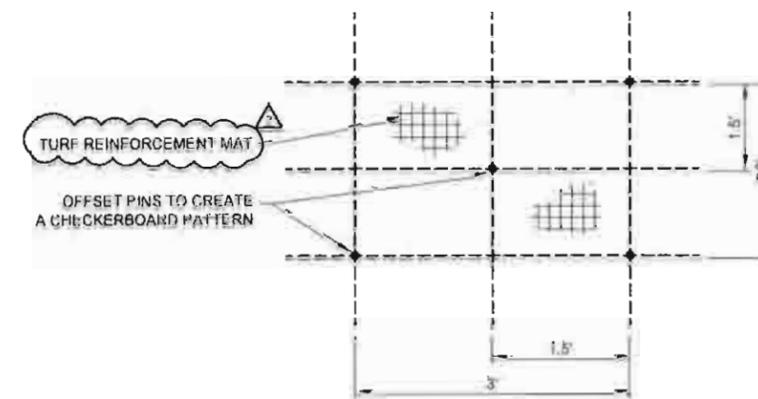
LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS



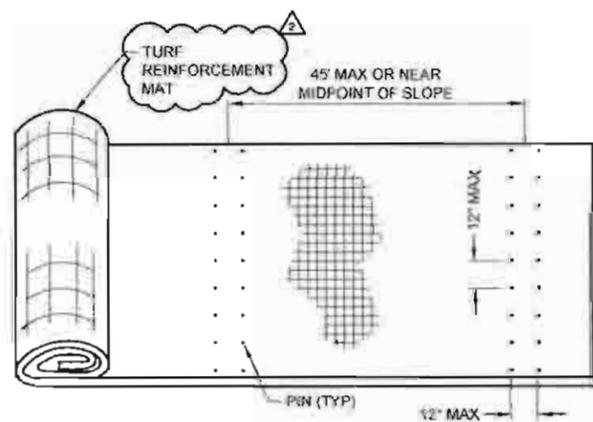
**A** PIN PATTERN & LONGITUDINAL EDGE DETAIL  
NOT TO SCALE



**C** OVERLAP AT ROLL EDGE DETAIL  
NOT TO SCALE



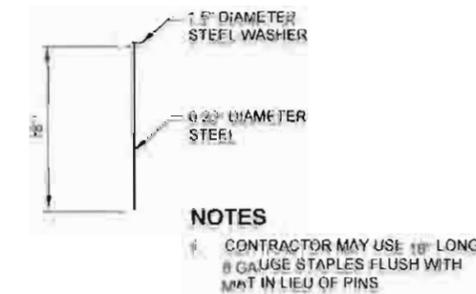
**D** PIN PATTERN DETAIL  
NOT TO SCALE



**B** SIMULATED CHECK SLOT DETAIL  
NOT TO SCALE

**NOTES**

- TURF REINFORCEMENT MAT SHOULD BE SHINGLED IN THE DIRECTION OF THE DOWN SLOPE AND FLOW



**E** PIN DETAIL  
NOT TO SCALE

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

Call before you dig  
**Overhead**  
1-702-227-2929

REV#	DATE	DESCRIPTION	APPROVED
1	12/23/2013	DETAILS REVISED	JMG
2	11/03/2011	SHEET ADDED	JMG



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**

**TURF REINFORCEMENT MAT DETAILS**

CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



DESIGNED BY: M. WARRICK  
DRAWN BY: B. MAHAN  
CHECKED BY: J. CRIST  
DATE: November 4, 2013

**CH2MHILL**  
2485 VILLAGE VIEW DRIVE, SUITE 300  
HENDERSON, NEVADA 89074  
PHONE 702.269.8175 FAX 702.269.1161

SCALE  
HORIZ: AS NOTED  
VERT: NONE  
FIELD BOOK  
WORK ORDER  
PROJECT No. 482573

L-2031  
DRAWING NO.  
**D-16**  
SHEET 54 OF 113



Thank you for purchasing the Pyramat<sup>®</sup> High Performance Turf Reinforcement Mat (HPTRM) by Propex Operating Company, LLC (Propex). This document provides installation and maintenance guidelines for Pyramat used as channel armoring to increase channel resiliency towards forces created by high velocities and shear stresses. Pyramat provides permanent erosion protection on the side slopes and/ or bed of a channel.

## SHORT-TERM AND LONG-TERM MAINTENANCE OF PYRAMAT

The purpose of this section is to provide some general guidelines for performing short-term and long-term maintenance of Pyramat with respect to maintaining vegetation reinforced with Pyramat, and patching of Pyramat (in the event it needs to be removed or replaced). These procedures are to be considered minimum guidelines for proper maintenance, and further maintenance techniques may be appropriate considering local practices and procedures.

### PYRAMAT PROTECTED CHANNEL

For Pyramat to be most effective, it is important to ensure that it is properly maintained both during construction and after construction. Identifying trouble areas is easy with Pyramat, and it can make identifying potential threats much simpler and manageable. Look for areas with sparse, dying, or no vegetation as these are obvious signs that Pyramat is losing intimate contact with the channel surface. If loss of ground surface occurs, Pyramat will need to be removed and reinstalled as described in *Patching and Repairs* Section after the eroded area is backfilled with compacted soil that is similar to material of the slope. After Pyramat is reinstalled, re-establish vegetation on the newly installed Pyramat and disturbed areas. Monitor the sites to determine if frequent watering may be required to establish vegetation.

To minimize exposure to unwanted maintenance and repair, Pyramat armored channels should be free of unauthorized vehicular traffic. Routine maintenance and slope inspections should be performed with rubber tired vehicles. Tracked equipment such as skid steers, excavators, or dozers should only be allowed to traffic over Pyramat in times of emergency after vegetation establishment is complete. Failure to control unauthorized traffic can result in Pyramat being damaged resulting in erosion below Pyramat during storm events. In addition, routine mowing maintenance should be used to keep the protected area free of unwanted brush, saplings, and trees. Selective herbicides that target only the unwanted plants can be used as long as the vegetation established with Pyramat is not impaired. Failure to control the sapling and tree growth can result in the trees being uprooted during a flood.

### MAINTAINING VEGETATION

Good vegetative cover will ensure maximum performance of Pyramat. Vegetative cover care starts before a project is complete and is ongoing until all Pyramat is installed. Vegetative cover should be given every opportunity to grow and establish well. This will require that a contractor periodically fertilize, water, and mow the grasses as needed until a project is complete in the short-term, with the owner of the channel fulfilling the maintenance of the channel in a similar fashion for the long-term. For the entire lifecycle of Pyramat, every effort must be made to prevent unauthorized encroachments, grazing, vehicle traffic, the misuse of chemicals, or burning during inappropriate seasons.

1. After the installation of vegetation is complete, immediately water and soak the entire area using a fine spray to prevent erosion. A suggested amount of water is identified below. Prior to installation if using sod, the sod pads in storage should be kept moist at all times and not stored for more than 24 hours from site arrival to installation. Warmer weather will necessitate more frequent applications than listed below.



- A. For each reach/segment of installed vegetation, watering shall be conducted immediately after each installation or the day's work.
  - B. First 30 days, completed segments shall be watered daily with a minimum of 0.75 and a maximum of 1.0 inches per square foot per day (20,364 gallons minimum, 27,152 gallons maximum per acre per day).
  - C. Second 30 days, the watering may be reduced to 0.50 inches per square foot per day (13,576 gallons maximum per acre per day) or as required based upon the condition of the sod.
  - D. Avoid excessive application of water, so that surface runoff does not occur. Runoff should be prohibited. However, additional watering may be required for repaired or damaged areas.
2. Initial fertilizing should be applied 14 days after vegetation is placed, using 25-lbs per acre ammonium nitrate or ammonium sulfate. Post-fertilization should be conducted 30 to 45 days after installation, using an application rate of 25-lbs per acre (ammonium nitrate or ammonium sulfate). Application example: in order to apply ammonium nitrate or ammonium sulfate at a rate of 25-lbs per acre, 75 lbs of 33-0-0 is required.
  3. Implement best practices for mowing over Pyramat. While Pyramat is designed to withstand non-hydraulic stresses such as mowing, there are procedures to minimize exposure to unwanted damage.
    - A. Immediately after installation, signage and post shall be installed stating that "Vehicles and Pedestrians are Prohibited from Access" on the slopes and the newly installed vegetation. Signage shall be posted every 1,500 lineal feet.
    - B. Vegetated areas should be mowed to a height no less than 6 inches and no greater than 12 inches from natural ground after a period of 60 days of growth. The excessive grass clippings created from mowing shall be evenly spread on the slope section outside of the armored area. Periodic and final grass mowing should be performed until final inspection and acceptance of slope work. Monitor the vegetated areas throughout winter months and generate reports as needed, noting any issues that should be addressed. Minimum mowing heights will depend on the vegetation density and should be as follows:
      - i. 6" with 0 – 30% vegetation establishment
      - ii. 4" with 30 – 70% vegetation establishment
      - iii. 3" with 70 – 100% vegetation establishment
    - C. To prevent damage to the newly established vegetation, the mowing tractor should be fitted with 3-rib agriculture tires. Note that tractors with 8-foot flail mowers provide best results. Tractors with 15-foot brush hogs should avoid sharp turns up the slope to prevent damage to vegetation.
    - D. Mowing should not take place for a minimum of 48 hours after a rainfall event of 2 inches or more to minimize the potential for rutting and/or damage to the slope surface. Maintenance mowing of the slope should be done on a consistent basis to prevent vegetation growing to more than 3 feet in height. This will minimize thatch thickness and potential damage to Pyramat. If turn-around pads are present, operate mowing equipment utilizing the turn-around pads to the fullest extent. The mowing blade height over Pyramat should be a minimum of 8 inches. However, should vegetation grow to more than 3 feet in height, the mowing blade height for the condition should be a minimum of 12 inches.
  4. Some special circumstances may exist. When mowing the crown of a slope with a crown or crest equal to or exceeding 20%, it should be mowed with an articulating arm mower to minimize the potential for the mower blades to the catch Pyramat at the channel surface. The articulating arm mower should be level on



the surface with the articulating arm extending over the crown. **Pay close attention to areas where the slope changes.** The mower blades should be set at a minimum height of 8 inches. If the Pyramat is damaged by the mowing blades at any time, mowing should stop immediately and further direction should be obtained to continue activity. Repair the damaged area as described in the *Patching and Repairs* section below.

5. Pyramat protected channels are not as susceptible to animal burrowing due the tenacity of the Pyramat; however, inspections to detect the presence of burrowing animal activity are generally most effective immediately after the slope has been mowed. Animal burrows that are identified should be thoroughly excavated and inspected, backfilled with compacted soil that is similar to material of the slope, and vegetation re-established. This will avoid the possibility of water piping through unfilled portions of the burrows. Should Pyramat be damaged, it is to be repaired as described *Patching and Repairs* section below.

## PATCHING AND REPAIRS

Pyramat may require localized repair at times. For emergency repairs, an adequate supply of Pyramat should be maintained in inventory with the necessary tools to install. This will allow for a timely, initial repair of the system.

1. In order to identify areas in need of repair, the site should be patrolled immediately after mowing and after rain events of 2 inches or more. When patrolling look for areas of sparse vegetation, exposed edges of Pyramat, and areas where direct contact between Pyramat and the channel surface is compromised. Pyramat should be rated as *Acceptable*, *Minimally Acceptable*, or *Unacceptable* during inspection.
  - A. *Acceptable (A)* - The rated area is in satisfactory, acceptable condition, and will function as designed and intended during the rain event. Pyramat has no exposed edges, is installed tightly by maintaining direct contact to the channel surface with no rilling beneath, and has over 90% vegetation cover. There is no noticeable damage present.
  - B. *Minimally Acceptable (M)* - The rated area has a minor deficiency that needs to be corrected. The minor deficiency will not seriously impair the functioning of the area during the next rain event; however, the overall reliability of the project will be lowered because of the minor deficiency. Pyramat has 75% vegetation cover with un-vegetated patches as large as one square yard. Edges of Pyramat are exposed with noticeable damage. Minimal erosion has occurred underneath Pyramat.
  - C. *Unacceptable (U)* - The rated area is unsatisfactory. The deficiency is so serious that the area will not adequately function in the next rain event. Pyramat has been physically torn, ripped, or lifted from the channel surface. Less than 75% vegetation cover is present with un-vegetated patches being greater than 1 square yard, and there is evidence that erosion is occurring beneath Pyramat.
2. Repair any raised or exposed edges of Pyramat by driving existing and additional pins along the edges as necessary to securely fasten to the ground. Inspect areas where the vegetation is not growing on top of Pyramat. Many times this is an indicator that Pyramat has lost contact with the ground beneath. Check for voids beneath Pyramat and fill any holes, gullies, etc. with compacted fill material if possible. Replace Pyramat as described below.
3. To repair Pyramat, cut out and remove damaged areas in a square configuration a minimum size of 2 ft by 2 ft. Remove all vegetation and debris atop of Pyramat. Loosen the top 1 to 2 in of soil in the patch area. The subgrade of area to be patched shall be prepared to be smooth and uniform and transition smoothly into the in-situ area. Cut a square Pyramat patch a minimum of 12 in greater than the damaged area for all four sides of the patch. Overlap the patch area in all directions a minimum of 12 in. The patch overlaps shall be tucked under the existing damaged Pyramat material (Figure 1 and Figure 2).

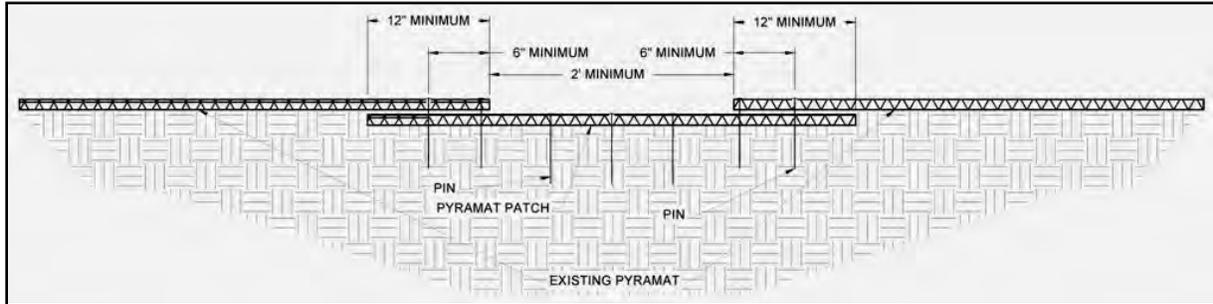


Figure 1: Pyramat Patch Cross Section

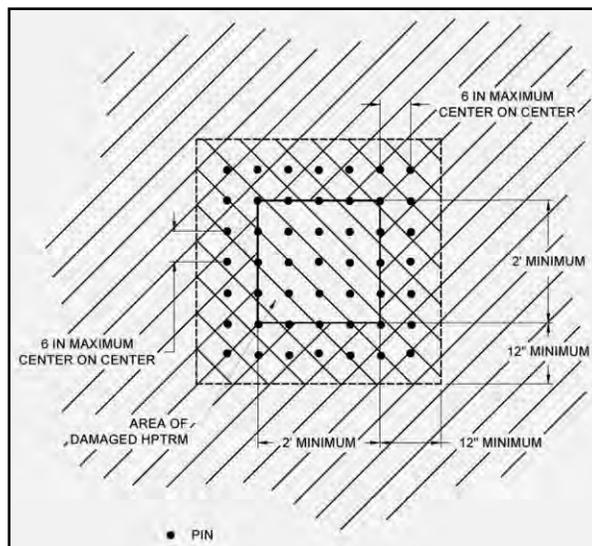
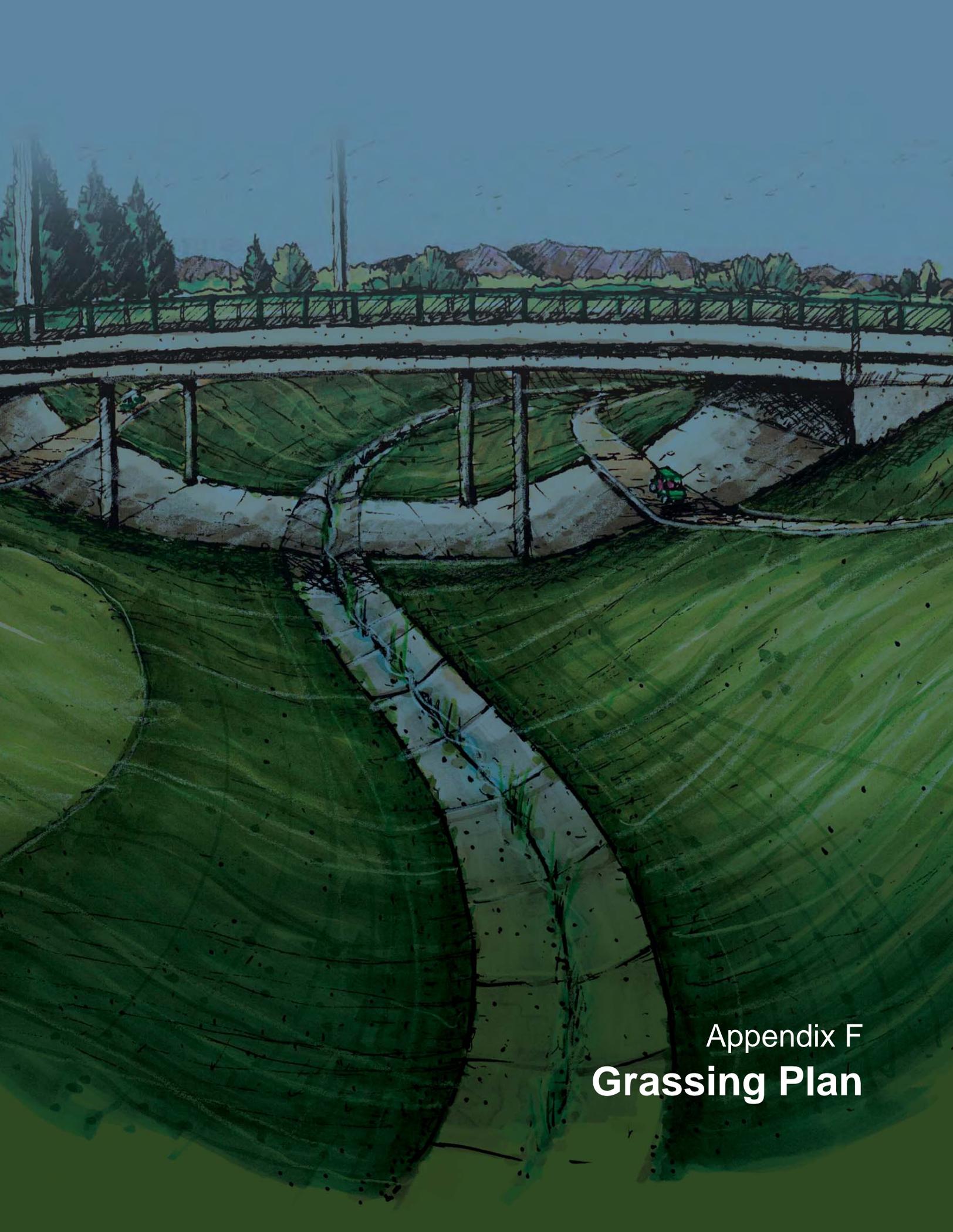


Figure 2: Pyramat Patch Plan View

4. Install pins on 6 in (150 mm) (max) centers. For larger areas of damage, anchors should be installed to match existing anchor pattern. Once Pyramat is in place, vegetate per project specifications.

## SUMMARY

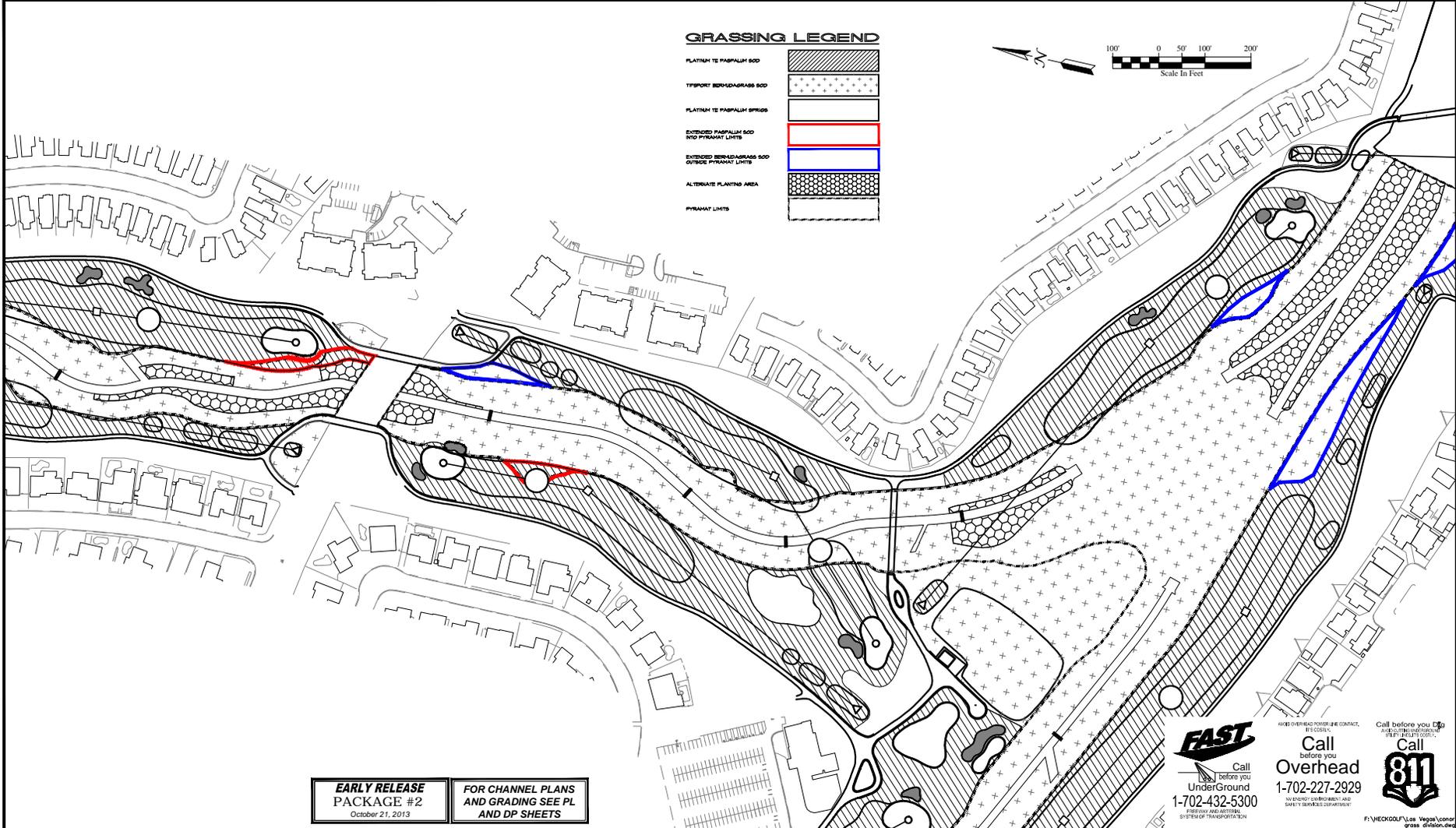
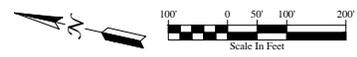
Maintenance should consist of watering and weeding, repair of all erosion, and any re-sodding as necessary to establish a uniform stand of vegetation during construction and beyond. A minimum of 70% of the armored area should be covered with no bare or dead spots greater than 10 ft<sup>2</sup> (1 m<sup>2</sup>). Establishing vegetation should not be mowed prior to 70% vegetative density and a minimum grass growth of 4 in (100 mm). Throughout the duration of the project, the contractor should be responsible for mowing to facilitate growth and should not let the vegetation in the armored areas exceed 18 in (450 mm). In addition, the Contractor should water all grassed areas as often as necessary to establish satisfactory growth and to maintain its growth throughout the duration of the project. After the project is complete, it is the responsibility of the Owner to maintain and upkeep all Pyramat installed areas for long term performance and best results as described herein for superior channel armoring.



Appendix F  
**Grassing Plan**

**GRASSING LEGEND**

PLATTIN™ TE PASPALUM SOG	
TYPHOID BERMUDA GRASS SOG	
PLATTIN™ TE PASPALUM SPRIGS	
EXTENDED PASPALUM SOG W/O PYRAMAT LIMITS	
EXTENDED BERMUDA GRASS SOG W/O PYRAMAT LIMITS	
ALTERNATE PLANTING AREA	
PYRAMAT LIMITS	



**EARLY RELEASE PACKAGE #2**  
October 21, 2013

**FOR CHANNEL PLANS AND GRADING SEE PL AND DP SHEETS**

**FAST**  
Call before you Dig  
UnderGround  
1-702-432-5300  
FREE AND ARTIFICIAL SYSTEM OF TRANSPORTATION

Call before you Dig  
Overhead  
1-702-227-2929  
WE ENJOY OUR BUSINESS AND WANT YOURS TO SUCCEED

Call before you Dig  
Call 811  
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**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
**GOLF COURSE GRASSING PLANS**  
 SHEET 1 OF 5  
 CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



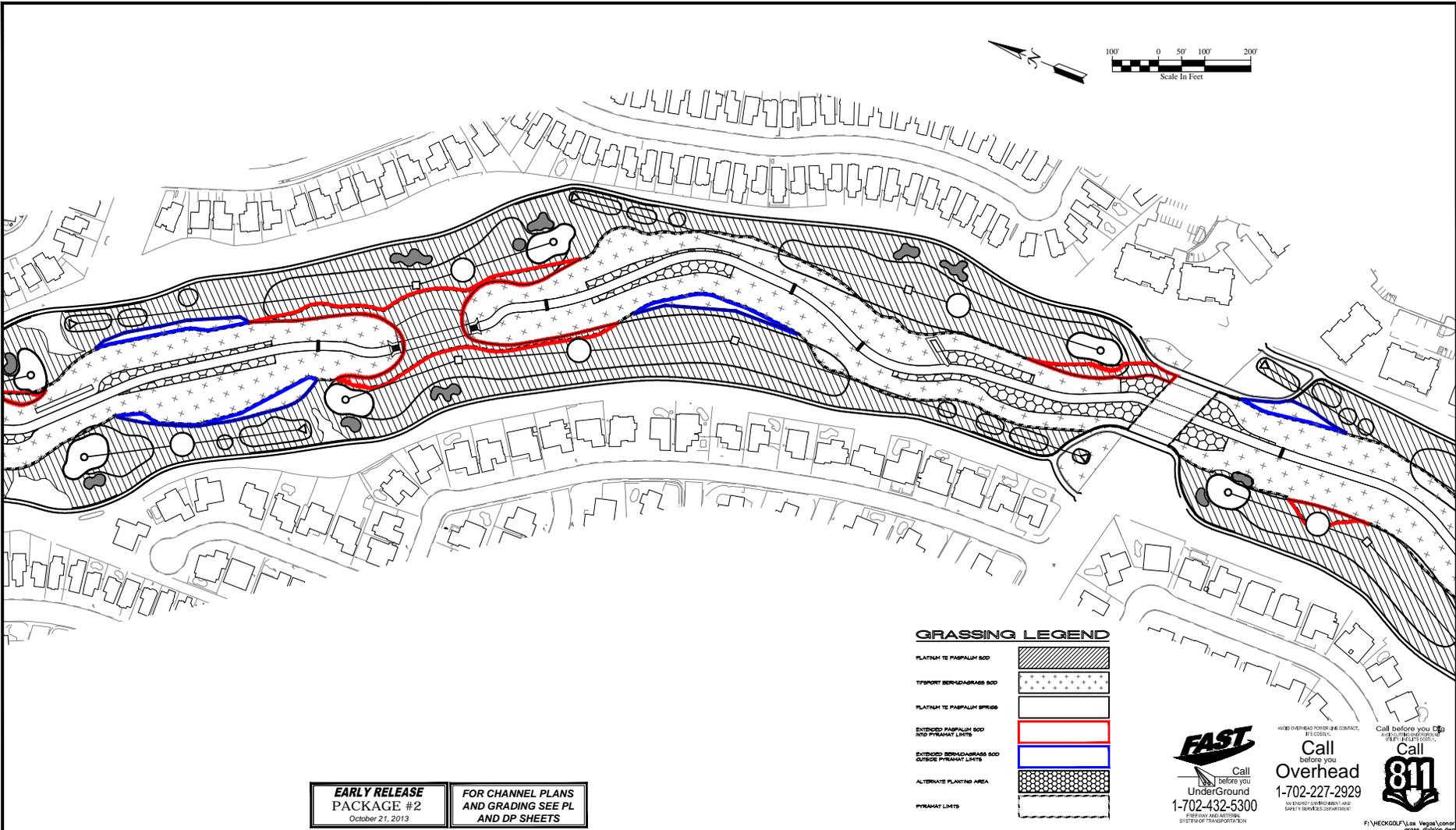
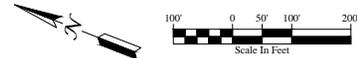
DESIGNED BY: RH  
 DRAWN BY: AB  
 CHECKED BY: CE  
 DATE: 10-21-13

**HECKENKEMPER GOLF COURSE DESIGN**  
 2614 SOUTH VALE AVENUE SUITE 100 LAS VEGAS, NV 89149  
 PHONE: 702.432.5300 FAX: 702.432.5300

SCALE  
 HORIZ: 1"=100'-0"  
 VERT: NONE

FIELD BOOK  
 WORK ORDER  
 PROJECT No.

L-2031  
 DRAWING NO.  
**CG-1**  
 SH: OF



**GRASSING LEGEND**

PLAINH TE PAMPALUM SOD	
TYFPORT BERUADAGRASS SOD	
PLAINH TE PAMPALUM SPERG	
EXTENDED PAMPALUM SOD INSIDE PERMANENT LIMITS	
EXTENDED BERUADAGRASS SOD OUTSIDE PERMANENT LIMITS	
ALTERNATE PLANTING AREA	
PERMANENT LIMITS	

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October 21, 2013

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Call before you Dig  
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FREE-OF-CHARGE SERVICE  
SYSTEM OF TRANSPORTATION

Call before you Dig  
Call Overhead  
1-702-227-2929  
IN EMERGENCY CONTACT AND  
EMERGENCY SERVICE

Call before you Dig  
Call 811  
FAST

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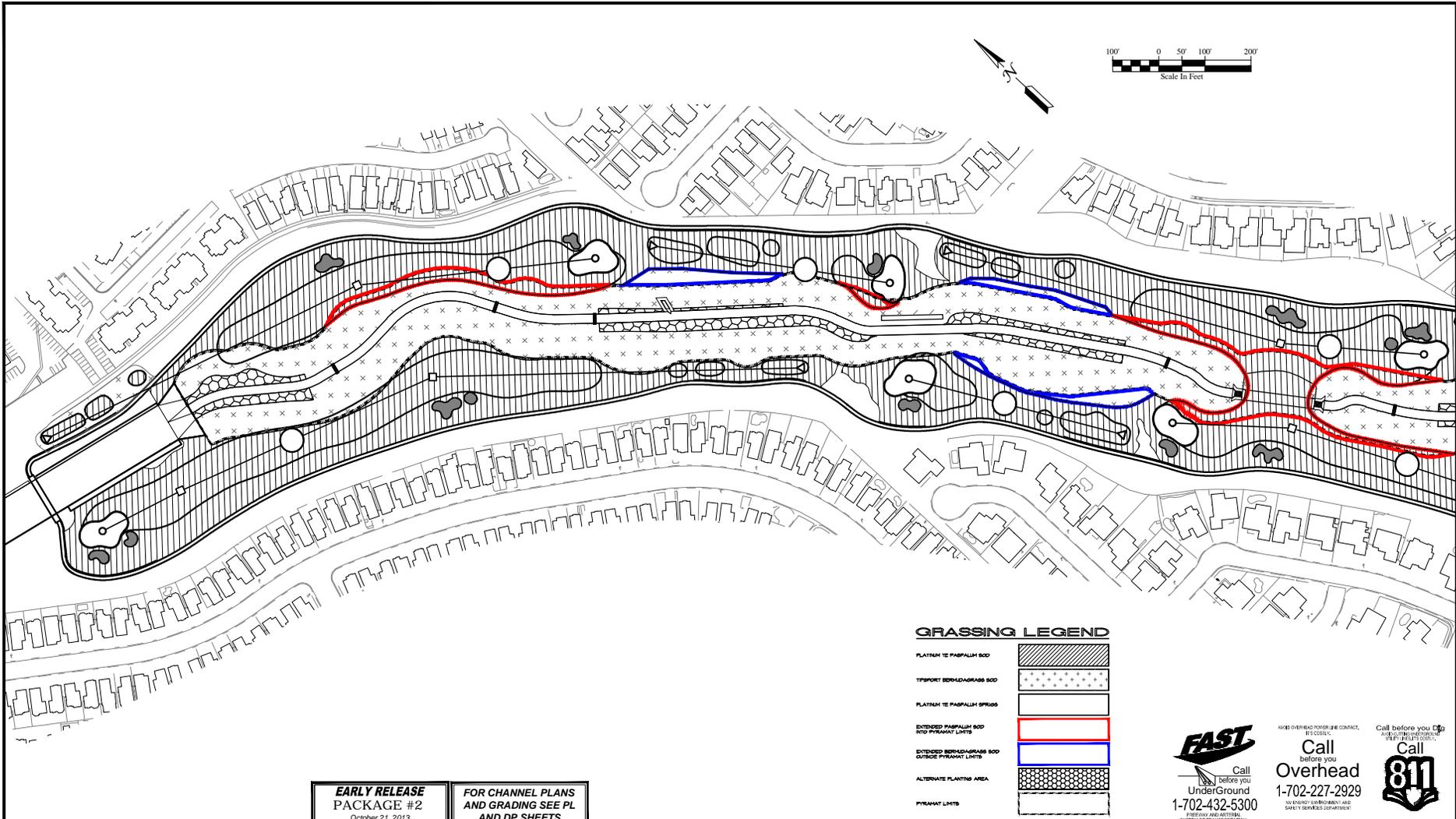


**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
GOLF COURSE GRASSING PLANS  
SHEET 2 OF 5  
CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS

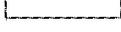


DESIGNED BY: RH	SCALE
DRAWN BY: AB	HORIZ: 1"=100'-0"
CHECKED BY: CE	VERT: NONE
DATE: 10-21-13	FIELD BOOK
HECKENKEMPER GOLF COURSE DESIGN	WORK ORDER
2818 BONAVILLE AVE. SUITE 100 LAS VEGAS, NV 89133	PROJECT No.
PHONE: 702-432-5300 FAX: 702-432-5300	SHT: OF

L-2031
DRAWING
<b>CG-2</b>



**GRASSING LEGEND**

- FLATNIX TO PAMPALUM SOG 
- TYPHOID BERMUDA/GRASS SOG 
- FLATNIX TO PAMPALUM SPRIGS 
- ENTRANCED PAMPALUM SOG WITH PYRAMAT LIMITS 
- ENTRANCED BERMUDA/GRASS SOG OUTSIDE PYRAMAT LIMITS 
- ALTERNATE PLANTING AREA 
- PYRAMAT LIMITS 

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

**FOR CHANNEL PLANS AND GRADING SEE PL AND DP SHEETS**

**FAST** Call before you dig  
1-702-432-5300

**Call before you Overhead**  
1-702-227-2929

**Call 811**

WORK OVERHEAD POWER LINE CONTACT, BE CAREFUL. CALL BEFORE YOU DIG. CALL 811 FOR INFORMATION. IN EMERGENCY CONTACT 911. F:\HECKGOLF\Las Vegas\condor grass div\lsc.dwg

REV NO.	DATE	DESCRIPTION	APPROVED



**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**

**GOLF COURSE GRASSING PLANS**

**SHEET 3 OF 5**

**CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS**

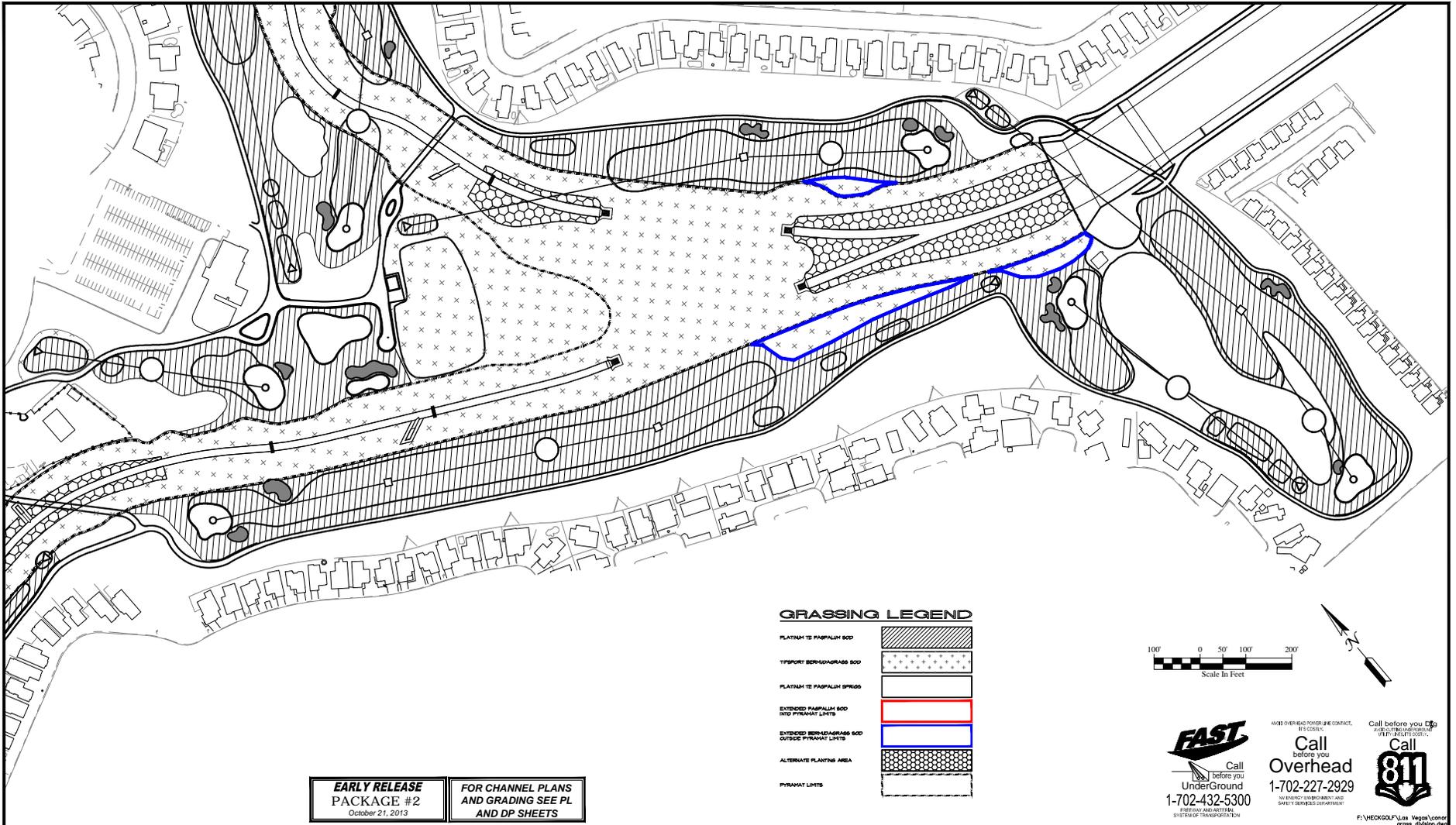


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 CHECKED BY: CE  
 DATE: 10-21-13

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 2514 SOUTH VALE AVE. SUITE 100 LAS VEGAS, NV 89149  
 PHONE: 702.432.5300 FAX: 702.432.5300

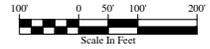
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FIELD BOOK	WORK ORDER	PROJECT No.
L-2031	DRAWING	SHT: OF

**CG-3**



**GRASSING LEGEND**

- PLATINUM TE PASPALUM BOD 
- TEMPORARY BERMUDAGRASS BOD 
- PLATINUM TE PASPALUM SPRIGS 
- EXTENDED PASPALUM BOD INTO PYRAMAT LIMITS 
- EXTENDED BERMUDAGRASS BOD OUTSIDE PYRAMAT LIMITS 
- ALTERNATE PLANTING AREA 
- PYRAMAT LIMITS 



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October 21, 2013

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**FAST**  
Call before you UnderGround  
1-702-432-5300  
PROFESSIONAL ENGINEERING AND SURVEYING CORPORATION  
SUSTAINABLE TRANSPORTATION

WORK OVERHEAD POSITIVE CONTRACT, BY ORDER OF THE CITY OF LAS VEGAS

Call before you Dig  
Call 811  
1-702-227-2929  
WE ENERGY ENLIGHTENED AND SAFELY GROUND OUR CONTRACTORS

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**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
**GOLF COURSE GRASSING PLANS**  
 SHEET 4 OF 5  
 CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS



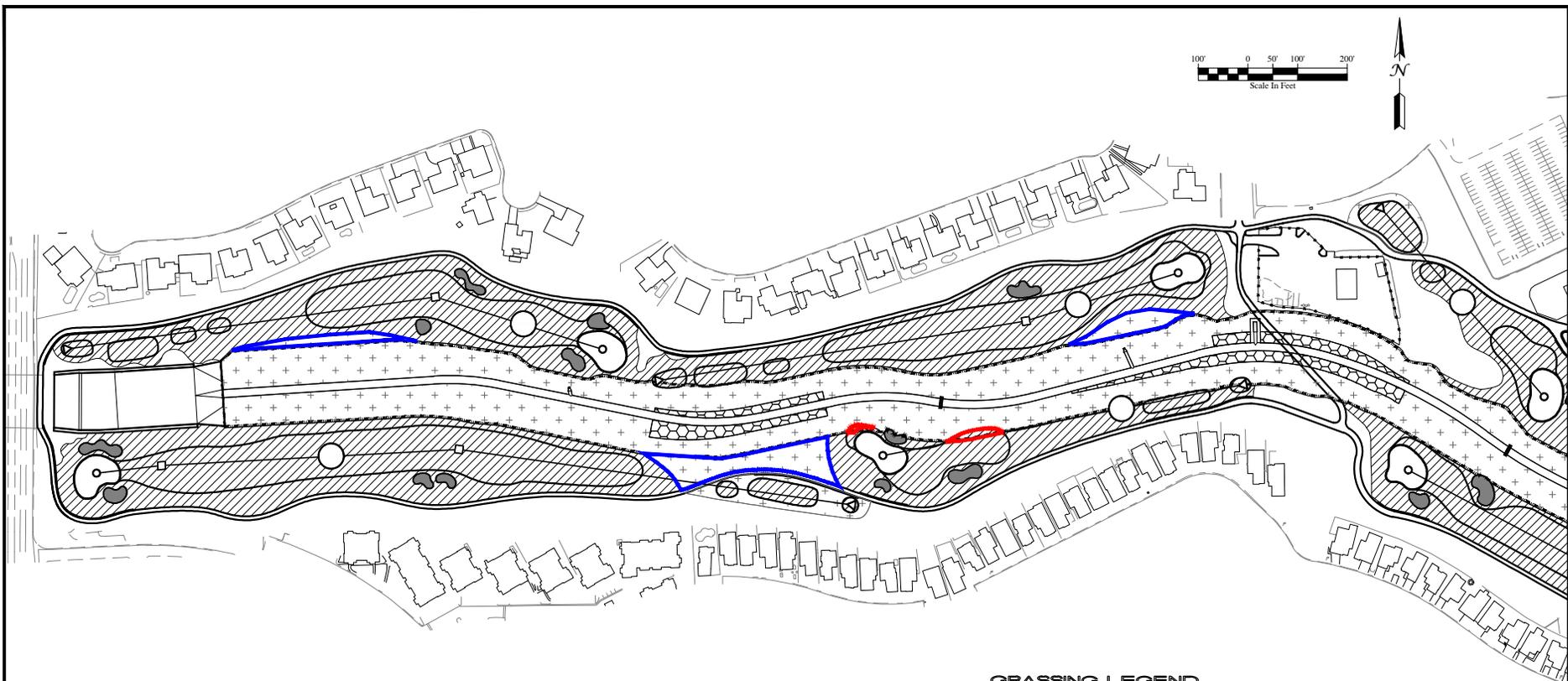
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 CHECKED BY: GE  
 DATE: 10-21-13

**HECKENKOPFER GOLF COURSE DESIGN**  
 2515 SOUTH VALE AVENUE SUITE 100 LAS VEGAS, NV 89149  
 PHONE: 702.432.5300 FAX: 702.432.5301

SCALE  
 HORIZ: 1"=100'-0"  
 VERT: NONE

FIELD BOOK  
 WORK ORDER  
 PROJECT No. \_\_\_\_\_  
 SHEET \_\_\_\_\_ OF \_\_\_\_\_

L-2031  
 DRAWING **CG-4**



**GRASSING LEGEND**

- FLATLAND TO PAMPALUM SOG
- TEMPORARY BERMUDAGRASS SOG
- FLATLAND TO PAMPALUM SPRIGS
- EXTENDED PAMPALUM SOG INTO PYRAMAT LIMITS
- EXTENDED BERMUDAGRASS SOG OUTSIDE PYRAMAT LIMITS
- ALTERNATE PLANTING AREA
- PYRAMAT LIMITS

**EARLY RELEASE PACKAGE #2**  
October 21, 2013

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FREE-ON AND ARTIFICIAL SYSTEM OF TRANSPORTATION

Call before you Dig  
**Call Overhead**  
1-702-227-2929  
WE ENERGY CONFIDENTIALITY AND SAFETY SERVICES CONFIDENTIAL

Call before you Dig  
**Call 811**  
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**LAS VEGAS WASH - SLOAN CHANNEL TO BONANZA RD & FLAMINGO WASH BELOW NELLIS BLVD IMPROVEMENTS**  
**GOLF COURSE GRASSING PLANS**  
**SHEET 5 OF 5**  
**CLARK COUNTY, NEVADA DEPARTMENT OF PUBLIC WORKS**



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 DATE: 10-21-13

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 2514 SOUTH VALE AVENUE SUITE 100 LAS VEGAS, NV 89149  
 PHONE: (702) 432-5300 FAX: (702) 432-5300

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 HORIZ: 1"=100'-0"  
 VERT: NONE

FIELD BOOK  
 WORK ORDER  
 PROJECT No.

L-2031  
 DRAWING  
**CG-5**  
 SH: OF



Appendix G

# Pump Station Preventative Maintenance Guidelines



Service Order No. \_\_\_\_\_  
 Service Date \_\_\_\_\_  
 Page 1 of \_\_\_\_\_

## PREVENTIVE MAINTENANCE CHECKLIST

Job Name \_\_\_\_\_ Job No. \_\_\_\_\_ Model No. \_\_\_\_\_

### STATION USAGE

N/A  
 Total Gallons Pumped \_\_\_\_\_ X 1000 Gallons

### INCOMING POWER

Single Phase \_\_\_\_\_ Volts  
 Three Phase A to B \_\_\_\_\_ Volts A to C \_\_\_\_\_ Volts B to C \_\_\_\_\_ Volts

### STATION PERFORMANCE

Discharge Pressure	Discharge Flow
Design _____ psi	Design _____ psi
Actual _____ psi	Actual _____ psi

### STATION CONFIGURATION

Suction Lift  Submersible  
 Maximum Lift \_\_\_\_\_ feet

Booster  Flooded Suction

Static Incoming Pressure \_\_\_\_\_ psi  
 Design Incoming Pressure \_\_\_\_\_ psi  
 Actual Incoming Pressure at Maximum Flow \_\_\_\_\_ psi  
 Design Boost Pressure at Maximum Flow \_\_\_\_\_ psi  
 Actual Boost Pressure at Maximum Flow \_\_\_\_\_ psi

### ALARM SET POINTS

<input type="checkbox"/>	Low Pressure	_____ psi
<input type="checkbox"/>	High Pressure	_____ psi
<input type="checkbox"/>	Low Level	_____ psi
<input type="checkbox"/>		

### BASE, MANIFOLD, AND ENCLOSURE INSPECTION

Paint	<input type="checkbox"/>	OK	<input type="checkbox"/>	Problem	_____
Corrosion	<input type="checkbox"/>	OK	<input type="checkbox"/>	Problem	_____
Leaks	<input type="checkbox"/>	OK	<input type="checkbox"/>	Problem	_____
Cooling Fan	<input type="checkbox"/>	OK	<input type="checkbox"/>	Problem	_____
Prop Rod/Strut	<input type="checkbox"/>	OK	<input type="checkbox"/>	Problem	_____
	<input type="checkbox"/>		<input type="checkbox"/>	Problem	_____

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Service Order No. \_\_\_\_\_  
 Service Date \_\_\_\_\_  
 Page 2 of \_\_\_\_\_

## CONTROL PANEL PREVENTIVE MAINTENANCE CHECKLIST

Job Name \_\_\_\_\_ Job No. \_\_\_\_\_ Model No. \_\_\_\_\_

**PLC**  
 Manufacturer \_\_\_\_\_ Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

### OPERATOR INTERFACE

N/A  Warning Lights  ASCII  Analog  
 2/4 Line Display Manufacturer \_\_\_\_\_ Model \_\_\_\_\_ Program Version \_\_\_\_\_

### VFD / SOFTSTART

N/A Manufacturer \_\_\_\_\_ Model \_\_\_\_\_  
 3 Phase Conversion  
 Inspection  OK  Problem \_\_\_\_\_

### CONTROL CABINET VISUAL INSPECTION

Corrosion Inhibitors	<input type="checkbox"/> N/A	<input type="checkbox"/> Replaced	<input type="checkbox"/> Problem	_____
Paint	<input type="checkbox"/> OK	<input type="checkbox"/> Problem		_____
Door Gaskets	<input type="checkbox"/> OK	<input type="checkbox"/> Problem		_____
Latching Hardware	<input type="checkbox"/> OK	<input type="checkbox"/> Problem		_____
Moisture in Cabinet	<input type="checkbox"/> OK	<input type="checkbox"/> Problem		_____

### CONTROL WIRING AND EQUIPMENT

Discolored Wires	<input type="checkbox"/> No	<input type="checkbox"/> Problem	_____
Fuse Blocks	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Motor Wires	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Motor Contactors	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Terminal Blocks	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Conduit	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Wire Loom	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____

### **WARNING: SHUT OF ALL POWER LEADING TO CONTROL PANEL**

### TIGHTEN ALL ELECTRICAL CONNECTIONS

Disconnect Lugs	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	Terminal Blocks	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	VFD/Softstart	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A
Fuse Blocks	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	Operator Interface	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	Phase Monitor	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A
Motor Contactors	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	Relays	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	PLC	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A
Overloads	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	Dist. Blocks	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A	Door Switches	<input type="checkbox"/> Yes	<input type="checkbox"/> N/A

### CONTROL ENCLOSURE COOLING

N/A  Air Conditioner  Water to Air Heat Exchanger  Air to Air Heat Exchanger

Solenoid Valve	<input type="checkbox"/> N/A	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Wye Strainer	<input type="checkbox"/> N/A	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Fan	<input type="checkbox"/> N/A	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Screens	<input type="checkbox"/> N/A	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Poly Tubing	<input type="checkbox"/> N/A	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
Flow 2-3 GPM	<input type="checkbox"/> N/A	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____

Comments: \_\_\_\_\_



Service Order No. \_\_\_\_\_  
 Service Date \_\_\_\_\_  
 Page 3 of \_\_\_\_\_

## PREVENTIVE MAINTENANCE CHECKLIST

Job Name \_\_\_\_\_ Job No. \_\_\_\_\_ Model No. \_\_\_\_\_

### PRESSURE REGULATING VALVE

Valve No. 1     N/A  
 Manufacturer \_\_\_\_\_ Size \_\_\_\_\_  
 Regulate Pressure \_\_\_\_\_ psi  
 Pressure Drop \_\_\_\_\_ psi  
 Function     OK     Problem \_\_\_\_\_

Valve No. 2     N/A  
 Manufacturer \_\_\_\_\_ Size \_\_\_\_\_  
 Regulate Pressure \_\_\_\_\_ psi  
 Pressure Drop \_\_\_\_\_ psi  
 Function     OK     Problem \_\_\_\_\_

### FILTER OR STRAINER

N/A     Active     Not Active     Manual  
 Manufacturer/Type \_\_\_\_\_ Size \_\_\_\_\_ Number of Cans \_\_\_\_\_  
 Visual     OK     Problem \_\_\_\_\_  
 Function     OK     Problem \_\_\_\_\_

### SENSORS AND GAGES

<input type="checkbox"/> Incoming Gauge	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
<input type="checkbox"/> Manifold Gauge	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
<input type="checkbox"/> PR Valve Gauge	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
<input type="checkbox"/> Murphy Gauge	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
<input type="checkbox"/> Flow Sensor	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
<input type="checkbox"/> Flow Switch	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____
<input type="checkbox"/> Level Sensor	<input type="checkbox"/> OK	<input type="checkbox"/> Problem	_____

### INLET FLUSH

N/A  
 Pressure setting \_\_\_\_\_ psi  
 Operation     OK     Problem \_\_\_\_\_

### PRESSURE RELIEF VALVE

N/A  
 Manufacturer \_\_\_\_\_ Size \_\_\_\_\_ Relief Pressure \_\_\_\_\_ psi  
 Function     OK     Problem \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Service Order No. \_\_\_\_\_  
 Service Date \_\_\_\_\_  
 Page 4 of \_\_\_\_\_

## PUMP AND MOTOR PREVENTIVE MAINTENANCE CHECKLIST

Job Name \_\_\_\_\_ Job No. \_\_\_\_\_ Model No. \_\_\_\_\_

Pump No. \_\_\_\_\_ Pump Type  VT  SUB  HC  VC  
 Elapsed Run Time \_\_\_\_\_ Hours  N/A

### **PUMP**

Manufacturer \_\_\_\_\_ Model \_\_\_\_\_ S/N \_\_\_\_\_ Trim \_\_\_\_\_  
 Design Flow \_\_\_\_\_ gpm  
 Visual Exterior  OK  Problem  
 Check Val Orient  OK  N/A  Problem  
 Foot Valve  OK  N/A  Problem  
 Temp. Sensor  OK  N/A  Problem

### **MOTOR**

Manufacturer \_\_\_\_\_ Model \_\_\_\_\_ S/N \_\_\_\_\_  
 Horsepower \_\_\_\_\_ F.L.A. \_\_\_\_\_  
 Visual Exterior  OK  SUB  Problem  
 Lead Connections  OK  SUB  Problem  
 Megger Readings #1) \_\_\_\_\_ MΩ #2) \_\_\_\_\_ MΩ #3) \_\_\_\_\_ MΩ  
 Grease Bearings  Yes  No  N/A

### **PUMP/MOTOR RUNNING**

Vibration  OK  Problem  
 Sound  OK  Problem  
 Pressure At Zero GPM \_\_\_\_\_ psi At \_\_\_\_\_ gpm \_\_\_\_\_ psi  
 Stuffing Box  OK  Adjust  Grease  Problem  
 Mechanical Seal  OK  Problem  
 Current Draw At Zero GPM L1 \_\_\_\_\_ Amps At \_\_\_\_\_ gpm L1 \_\_\_\_\_ Amps  
 L2 \_\_\_\_\_ Amps L2 \_\_\_\_\_ Amps  
 L3 \_\_\_\_\_ Amps L3 \_\_\_\_\_ Amps

### **ELECTRONIC BUTTERFLY VALVE**

N/A  
 Manufacturer \_\_\_\_\_ Model \_\_\_\_\_  
 Tighten Term  Yes  No  
 Brake  OK  N/A  Problem  
 RC Snubber  OK  N/A  Problem  
 Pin Backlash  OK  Problem  
 Valve Shaft Seal  OK  Problem  
 Blow By  OK  Problem  
 Valve Operation  OK  Problem

### **POSITIVE PRIME**

N/A  Single Positive Prime  Per Pump Positive Prime System  
 Filter Screen  Cleaned  Problem  
 Reducing Valve  Set 5-10 psi  Problem  
 Tubing  OK  Problem

Comments: \_\_\_\_\_



Appendix H

# Water Maze Cleaning System

# Royce Industries L.C. Cleaning Systems

11 WEST BROOKS AVE \* NORTH LAS VEGAS NEVADA 89030

OFFICE (702) 633-6500 FAX (702) 633-6565

Dean Hicks

702-283-1916 cell

702-896-0863 fax

April 29, 2014

Kathleen Blakely  
2601 E Sunset Road  
Las Vegas, NV 89120-3515

Requested O & M procedures Desert Rose Golf Course. Water Maze and Support equipment used by Water Maze.

#### Air Compressors

1. Insole Rand Air Compressors.
2. Change compressor oil every 4 months.
3. Change air filter every 6 months.
4. Change belts every 12 months.
5. Drain air tank once a month.
6. Keep a log on each machine. Noting service work.

Water Maze Bio System. Water Maze CLB-603. (Keep a log as to service work). Maintenance Shop Wash Pad.

1. Recharge. (Replenish) (Microbes and Nutrients once a month BioStax 1800 Liquid Bacteria Concentrate).  
(Note Dean Hicks on this 702-283-1916).
2. Empty Debris Dumpster Daily. ( Grass cart).
3. Change Bag filter once a month. (Note Dean Hicks on this).
4. Extremely Dirty Environments ( Grass ) Recommended pre-clean with air before Washing.
5. First Tank (CLT-300) open bottom valve once a week. Open Weekly for 5 seconds. Purge solids.
6. First Tank (CLT-300) open bottom valve at six month and wash out tank with power hose.
7. Second Tank ( CLB-603 Bio-Digester) Open bottom valve Dailey for 5 Seconds. Purge solids.
8. Third Tank (CLT-600) open bottom valve weekly for 5 Seconds. Purge solids
9. Recommended that water in the system be changed once a year.
10. Recommended Sump pit be cleaned once a month. Purge solids. Note three in number. Sand traps.
11. Hydro-Screen empty Sand Trap monthly.
12. Hydro-Screen Power washer every 6 months.

Water Maze Bio System. Water Maze CLB-603 Cart Barn location. (Keep a long as to service work).

1. Recharge. (Replenish) (Microbes and Nutrients one a month Bio Stax 1800 Liquid Bacteria Concentrate).
2. Change Bag filter once a month
3. CLB-603 Bio-Digester) Open bottom valve Dailey for 5 Seconds Purge solids.
4. Clean Jazzie filter once a month.
5. Recommended Sump pit be cleaned once a month. Purge solids. Recommend area around sump pit be broom cleaned daily, not wash down. High concretion of sand in this area.
6. Landa Power Washer Model SEA. Change Oil in Pump every 6 months and adjusted with gauges.
7. Change belts as needed.

Dean Hicks  
Royce Industries  
702-283-1916



Appendix I

**Desert Rose Golf Course Product  
Construction Submittals**



4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL  
 NO. 212A-001  
 PACKAGE NO: 212A**

**TITLE:** HDPE Drainage Pipe  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 8  
**DAYS OVERDUE:** 0

**RECEIVED FROM**      **SENT TO**      **RETURNED BY**      **FORWARDED TO**  
 WADS      MS      STAN      JR

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Seals	Prints	Drawing Date	Held	Elapsed
001	HDPE Drainage Pipe For all perforated & solid HDPE drainage pipe.	1/27/14	2/4/14			NEW	0	1		0	8

**SHOP DRAWING SUBMITTAL**      Proj. # ECLAISE  
 Submittal Title: HDPE Drainage Pipe For Perforated  
 SCI Drawing No. \_\_\_\_\_      Rev. \_\_\_\_\_

Reviewed  
 Reviewed As Noted  
 Reviewed As Noted - Resubmit  
 Resubmit  
 Returned Without Review  
 For Information Only  
 VOID

**Stanley Consultants inc.**

By: [Signature]      Date: 2/11/14

Action of any kind on drawings by ENGINEER/ARCHITECT does not relieve CONTRACTOR from responsibility for errors, correctness of details, or conformance to the contract.

Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.

Authorized Representative: \_\_\_\_\_  
 Date: 02/04/14

January 27, 2014

Ms. Angie Gruenenfelder  
Las Vegas Paving Corp.  
4420 South Decatur Blvd.  
Las Vegas, NV 89103  
Phone: 702.251.5800  
Email: [angie.gruenenfelder@lasvegaspaving.com](mailto:angie.gruenenfelder@lasvegaspaving.com)

Re: Drainage Submittal – Desert Rose GC – Las Vegas, NV

Dear Angie,

For your approval, please find the following descriptive, technical, and specification information for the golf course drainage pipe, fittings, inlets and cleanouts that Wadsworth Golf proposes to furnish and install at Desert Rose GC in Las Vegas, NV

For all perforated HDPE drainage pipe [greens (6" mainline; 4" laterals); bunkers (4")]:

- Advanced Drainage Systems (ADS) N-12 high-density polyethylene (HDPE), slit perforations, smooth interior, annular exterior, dual wall, integral bell pipe
- Advanced Drainage Systems (ADS) high-density polyethylene (HDPE) injection-molded, single-wall, soil-tight snap fittings
- Regency #14/1 PE UL solid copper tracer wire (blue in color)

For all solid HDPE drainage pipe:

- Advanced Drainage Systems (ADS) N-12 high-density polyethylene (HDPE), smooth interior, annular exterior, dual wall, soil-tight, integral bell pipe
- Advanced Drainage Systems (ADS) injection-molded, double wall, soil-tight snap fittings
- Regency #14/1 PE UL solid copper tracer wire (blue in color)

For all drain inlets (see details):

- PermaBasin #PB2400B Catch Basin (turf areas)
- 12" Nyloplast Inline Drain w/ Square Grate (non-turf areas)

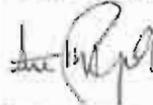
For all wye cleanouts (see detail):

- Advanced Drainage Systems (ADS) "heavy duty" high-density polyethylene (HDPE), corrugated interior, corrugated exterior, single wall, soil-tight, plain end pipe
- Carson #809-9-4 7" Round Pit, Green, T-Cover, No Imprint

These products are industry standard for golf course applications. Wadsworth has used them successfully for many years. Also enclosed, please find construction details for the drain inlets and cleanouts.

We would appreciate a review of this submission at your earliest convenience. If you have any questions or require further clarification, please do not hesitate to contact me.

Sincerely,  
WADSWORTH GOLF CONSTRUCTION COMPANY



Scott McDougall,  
Estimator  
[scottm@wadsworthgolf.com](mailto:scottm@wadsworthgolf.com)

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

Cc: Mark Slugocki – [marks@wadsworthgolf.com](mailto:marks@wadsworthgolf.com)

ADS HDPE N-12 DOUBLE WALL  
DRAINAGE PIPE



## N-12<sup>®</sup> ST IB PIPE (PER AASHTO)

N-12 corrugated dual-wall pipe was introduced in 1987. Today's N-12 pipe offers significant performance advantages, plus the best soil-tight joint in the industry. Available in diameters from 4" to 60" (100 to 1500 mm), N-12 pipe is replacing reinforced concrete pipe as a preferred product for storm water applications.

ADS N-12 pipe contains a superior built-in bell-and-spigot joint. The joints are sealed by high-quality, factory-installed rubber gaskets that meet all the requirements of ASTM F477. A polyethylene bell minimizes joint distortion. The chipping and cracking that is common to concrete bells is eliminated.

### APPLICATIONS:

Storm Sewers	Slopes/Edge Drains
Retention/Detention	Mining/Forestry/Industrial
Golf, Turf & Recreation	Foundation Drains
Culverts/Cross Drains	Downspouts/Roof Drainage
Grain Aeration	Land Reclamation
Waterways	Terracing
Ditch Enclosures	

### FEATURES:

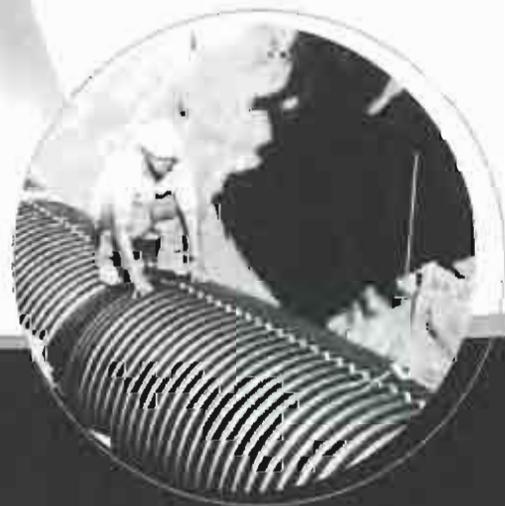
- 4" - 60" (100 to 1500 mm) diameters available
- Nominal 20 ft. (6 m) and 13 ft. (4 m) lengths available
- Bell-and-spigot joint design
- In-line bell design
- Exceptional joint strength
- Excellent abrasion and corrosion resistance
- Light weight
- Fast Installation times
- Structural strength that will support H-25 live loads with 1' (0.3 m) minimum cover; 54" and 60" (1250 and 1500 mm) pipe requires 2' (0.6 m) cover for H-25 loads

**ADS Service:** ADS representatives are committed to providing you with the answers to all your questions, including specifications, and installation and more.



### BENEFITS:

- Variety of diameters and lengths fit any project
- Joint only requires lube for fitting - ends are pushed together for easy field installation
- Unlike pipes from other manufacturers, there are no additional gasket materials, grout or sealing bands to transport and apply
- Installation cost savings from lower shipping costs, fewer people, and less heavy equipment required
- Hydraulic efficiency from smooth interior
- Long-term durability of HDPE





## ADS N-12® ST IB PIPE (PER AASHTO) SPECIFICATION

### SCOPE

This specification describes 4 through 60-inch (100 to 1500 mm) ADS N-12 ST IB pipe (per AASHTO) for use in gravity flow drainage applications.

### PIPE REQUIREMENTS

N-12 ST IB pipe (per AASHTO) shall have a smooth interior and annular exterior corrugations.

- 4- through 10-inch (100 to 250 mm) shall meet AASHTO M252, Type S
- 12- through 60-inch (300 to 1500 mm) shall meet AASHTO M294, Type S or ASTM F2306
- Manning's "n" value for use in design shall be 0.012

### JOINT PERFORMANCE

Pipe shall be joined using a bell-and-spigot joint meeting AASHTO M252, AASHTO M294, or ASTM F2306. The joint shall be soil-tight and gaskets, when applicable, shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

### FITTINGS

Fittings shall conform to AASHTO M252, AASHTO M294 or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the soil-tight joint performance requirements of AASHTO M252, AASHTO M294 or ASTM F2306.

### MATERIAL PROPERTIES

Virgin material for pipe and fitting production shall be high-density polyethylene conforming with the minimum requirements of cell classification 424420C for 4- through 10-inch (100 to 250 mm) diameters, or 435400C for 12- through 60-inch (300 to 1500 mm) diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The 12- through 60-inch (300 to 1500 mm) virgin pipe material shall comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 of AASHTO M294 and ASTM F2306, respectively.

### INSTALLATION

Installation shall be in accordance with ASTM D2321 and ADS published installation guidelines, with the exception that minimum cover in trafficked areas for 4- through 48-inch (100 to 1200 mm) diameters shall be one foot (0.3 m) and for 54- and 60-inch (1350-1500 mm) diameters, the minimum cover shall be 2 foot (0.6 m) in single run applications. Backfill for minimum cover situations shall consist of Class 1, Class 2 (minimum 90% SPD) or Class 3 (minimum 90% SPD) material. Maximum fill heights depend on embedment material and compaction level; please refer to Technical Note 2.01. Contact your local ADS representative or visit our website at [www.ads-pipe.com](http://www.ads-pipe.com) for a copy of the latest installation guidelines.

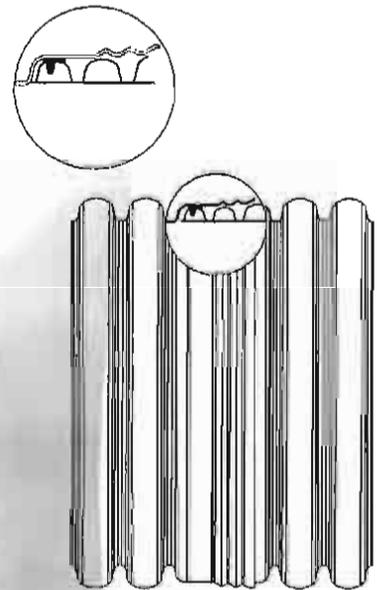
### PIPE DIMENSIONS

Standard Pipe Size (in.)	4	6	8	10	12	15	18	24	30	36	42	48	54	60
Standard Pipe Size (mm)	(100)	(150)	(200)	(250)	(300)	(375)	(450)	(600)	(750)	(900)	(1050)	(1200)	(1350)	(1500)
Maximum Outside Diameter (in.)	4.8	6.3	9.1	11.4	14.5	18	22	28	36	42	48	54	61	67
Maximum Outside Diameter (mm)	(122)	(175)	(231)	(290)	(368)	(457)	(559)	(711)	(914)	(1067)	(1200)	(1380)	(1549)	(1702)
Notes	All diameters available with or without perforations.													

\*Check with sales representative for availability by region.

\*\*Pipe O.D. values are provided for reference purposes only, values stated for 12- through 60-inch are in (in). Contact a sales representative for exact values.

ADS Terms and Conditions of Sale\* are available on the ADS website, [www.ads-pipe.com](http://www.ads-pipe.com). The ADS logo, the Green Stripe, and N-12® are registered trademarks of Advanced Drainage Systems, Inc. © 2010 Advanced Drainage Systems, Inc. BRO 10581 03/12 MH



The Most Advanced Name in Drainage Systems™

Advanced Drainage Systems, Inc.  
4640 Trueman Blvd., Hilliard, OH 43026  
1-800-821-6710 [www.ads-pipe.com](http://www.ads-pipe.com)



# REGENCY TRACER WIRE





## PE Sprinkler Systems Wire

### Description:

Regency's single conductor PE Sprinkler Systems Wire is manufactured for the purpose of direct burial power wire applications in accordance with the National Electric Code.

Conductor construction is soft drawn bare copper meeting the requirements of ASTM Specification B-3. Gauge sizes 14, 12 and 10 awg are solid conductors.

The insulation is a low density, high molecular weight polyethylene for systems applications of up to 600 volts.

The PE Sprinkler Systems Wire is constructed in accordance with Underwriters Laboratories, Inc.

### Application:

Suitable for use as power and control wire for irrigation systems.

### Construction:

**Conductor:** Soft drawn bare copper (ASTM Spec. B-3).  
Solid (14 awg - 10 awg)

**Insulation:** Polyethylene (PE)

**Temperature:** 75 C

**Voltage:** 600 volts

Conductor Size	Insulation Thickness
14 awg thru 10 awg	.045

Material must be able to pass the following tests without showing signs of degradation:

**Cold Bend** – The insulation shall not show any cracks when sample is bent around a 3X mandrel after being subjected to -25 C for four (4) hours.

**Electrical** - AC test voltage, 60 seconds at 5000 volts.

**Mechanical Water Absorption** – Insulation shall not absorb more than 25 mg. mass of water per square inch.

**Sunlight Resistance** – Samples conditioned for 300 hours of carbon-arc or xenon-arc exposure.

**Temperature Range** -55 C - +60 C



4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL**  
**NO. 212A-002**  
**PACKAGE NO: 212A**

**TITLE:** Drain Inlets  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 8  
**DAYS OVERDUE:** 0

**RECEIVED FROM**      **SENT TO**      **RETURNED BY**      **FORWARDED TO**  
 WADS      MS      STAN      JR

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Sepias	Prints	Drawing Date	Held	Elapsed
001	Drain Inlets	1/27/14	2/4/14			NEW	0	1		0	8

**SHOP DRAWING SUBMITTAL**      Proj. # ECLAISE  
 Submittal Title Drain Inlets  
 SCI Drawing No. \_\_\_\_\_      Rev. \_\_\_\_\_

Reviewed  
 Reviewed As Noted  
 Reviewed As Noted - Resubmit  
 Resubmit  
 Returned Without Review  
 For Information Only

**Stanley Consultants INC**

By: [Signature]      Date: 2/11/14

Action of any kind on drawings by ENGINEER/ARCHITECT does not relieve CONTRACTOR from responsibility for errors, correctness of details, or conformance to the contract.

Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.

Authorized Representative: \_\_\_\_\_  
 Date: 02/04/14



January 27, 2014

Ms. Angie Gruenenfelder  
Las Vegas Paving Corp.  
4420 South Decatur Blvd.  
Las Vegas, NV 89103  
Phone: 702.251.5800  
Email: [angie.gruenaenfelder@lasvegapaving.com](mailto:angie.gruenaenfelder@lasvegapaving.com)

Re: Drainage Submittal – Desert Rose GC – Las Vegas, NV

Dear Angie,

For your approval, please find the following descriptive, technical, and specification information for the golf course drainage pipe, fittings, inlets and cleanouts that Wadsworth Golf proposes to furnish and install at Desert Rose GC in Las Vegas, NV.

For all perforated HDPE drainage pipe [greens (6" mainline; 4" laterals); bunkers (4")]:

- Advanced Drainage Systems (ADS) N-12 high-density polyethylene (HDPE), slit perforations, smooth interior, annular exterior, dual wall, integral bell pipe
- Advanced Drainage Systems (ADS) high-density polyethylene (HDPE) injection-molded, single-wall, soil tight snap fittings
- Regency #14/1 PE UL solid copper tracer wire (blue in color)

For all solid HDPE drainage pipe:

- Advanced Drainage Systems (ADS) N-12 high-density polyethylene (HDPE), smooth interior, annular exterior, dual wall, soil-tight, integral bell pipe
- Advanced Drainage Systems (ADS) injection-molded, double wall, soil-tight snap fittings
- Regency #14/1 PE UL solid copper tracer wire (blue in color)

For all drain inlets (see details):

- PermaBasin #PB2400B Catch Basin (turf areas)
- 12" Nyloplast Inline Drain w/ Square Grate (non-turf areas)

For all wye cleanouts (see detail):

- Advanced Drainage Systems (ADS) "heavy duty" high-density polyethylene (HDPE), corrugated interior, corrugated exterior, single wall, soil-tight, plain end pipe
- Carson #809-9-4 7" Round Pit, Green, T-Cover, No Imprint

These products are industry standard for golf course applications. Wadsworth has used them successfully for many years. Also enclosed, please find construction details for the drain inlets and cleanouts.

We would appreciate a review of this submission at your earliest convenience. If you have any questions or require further clarification, please do not hesitate to contact me.

Sincerely,  
WADSWORTH GOLF CONSTRUCTION COMPANY

Scott McDougall,  
Estimator  
[scottm@wadsworthgolf.com](mailto:scottm@wadsworthgolf.com)

Approved: \_\_\_\_\_

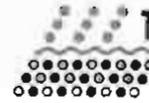
Date: \_\_\_\_\_

Cc: Mark Slugocki – [marks@wadsworthgolf.com](mailto:marks@wadsworthgolf.com)

PERMABASIN CATCH BASINS  
TURF AREAS



Home of the patented Turf Drain System



Turf Drainage Co.

of America, Inc.

expert planning, design, manufacture and installation

Toll free: 1-800-999-2794

# Perma Basin™

## The basin built to leak...

**Perma Basins™**, patented by Turf Drainage Company of America, not only collect surface water but have **permeable sidewalls** to collect seepage water around the basin — firming the soil profile up around the basin. Perma Basins are specified by architects on new projects, as well as used by superintendents wherever a drainage basin needs to be added or replaced.

**Easy installation** makes them perfect for in-house replacement for older plastic basins that tend to “trash over” with grass clippings due to narrow openings.

No other basin provides the **flexibility** of a Perma Basin. Different models are available depending upon the depth needed to collect seepage water, but all models have universal sleeves that enable the installer to connect 4” to 8” pipe without special fittings. Seepage drainage collection lines and solid pipe outfall pipes can be graded through the same sleeve. Standard units range from 18” to 6 feet deep, and can be custom made to any size.

**Constructed of cast aluminum**, Perma Basins have a clean appearance as well as the **largest grate opening** in the industry to help reduce the “trashing over” from grass clippings that is common with other basins.

Perma Basins have become a popular item with architects for new construction projects, including being specified by the PGA Tour on 10 different TPC courses. Because they are designed from the beginning to have permeable sidewalls, they help to firm the areas up around the drainage basin. They not only are easy for contractors to install, but when the project is completed, they are the easiest basin for a superintendent to add drainage to in the future.



Perma Basins not only collect surface water but have permeable sidewalls to collect seepage water — thus firming up the soil profile around the basin...



**Turf Drainage Co.**  
of America, Inc.

PO Box 702, Marrero, LA 70073

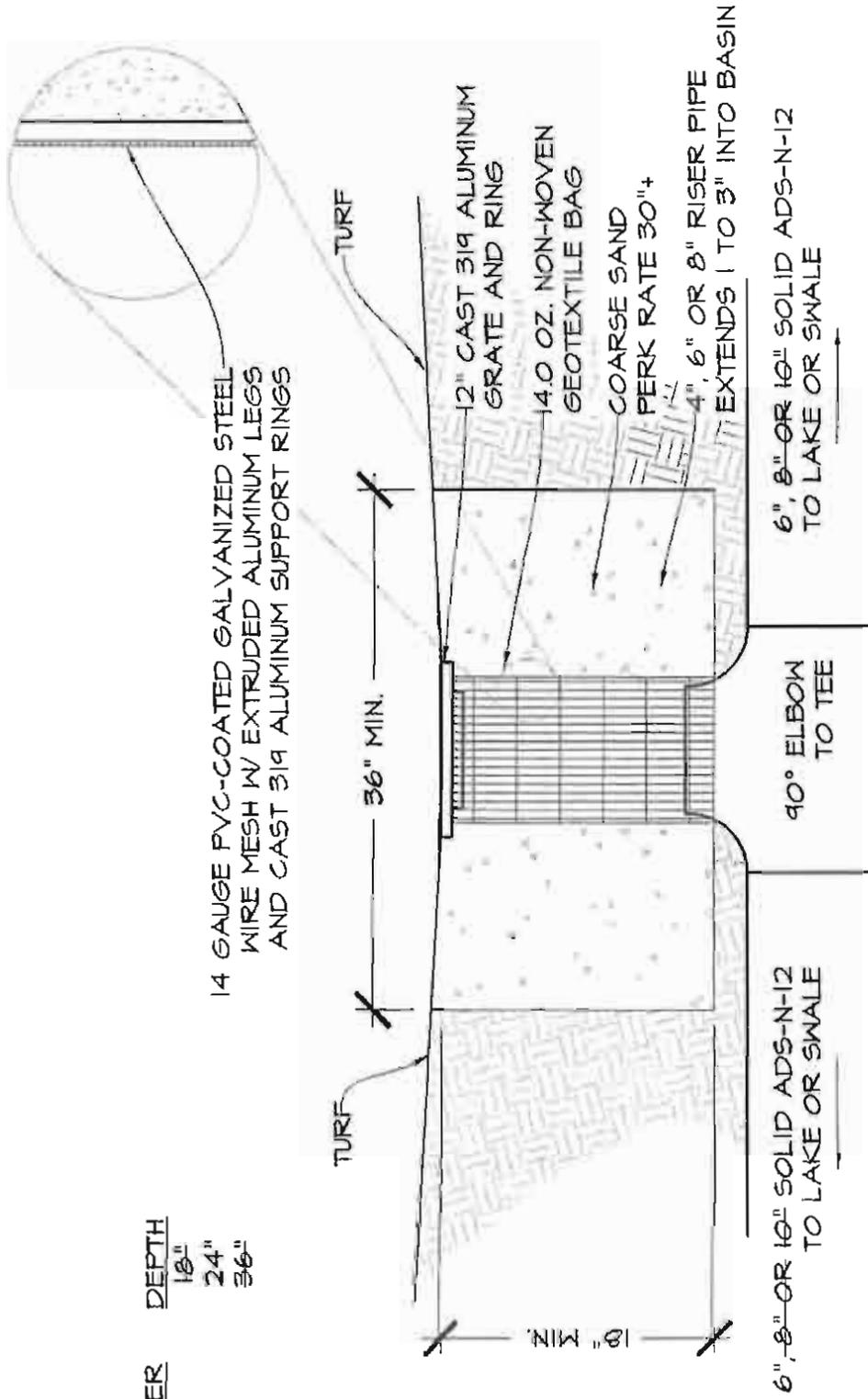
Office: 504-340-3930

Toll Free: 1-800-999-2794

Fax: 504-340-5097

MODEL	DIAMETER	DEPTH
PB1800-B	18"	18"
PB2400 B	12"	24"
PB3600-B	12"	36"

14 GAUGE PVC-COATED GALVANIZED STEEL WIRE MESH W/ EXTRUDED ALUMINUM LEGS AND CAST 319 ALUMINUM SUPPORT RINGS



## 4 TYPICAL PERMA BASIN DRAIN DETAIL - SECTION VIEW

SCALE: 1" = 1'-0" NTS

NYLOPLAST INLINE DRAINS  
NON-TURF AREAS



## Section 2722

### Engineered Surface Drainage Products

#### GENERAL

PVC surface drainage inlets shall be of the inline drain type as indicated on the contract drawing and referenced within the contract specifications. The ductile iron grates (12" and 15" frames are cast iron) for each of these fittings are to be considered an integral part of the surface drainage inlet and shall be furnished by the same manufacturer. The surface drainage inlets shall be as manufactured by Nyloplast a division of Advanced Drainage Systems, Inc., or prior approved equal.

#### MATERIALS

The inline drain required for this contract shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the furnished configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals. The pipe bell spigot shall be joined to the inline drain body by use of a **swage mechanical joint**. The pipe stock used to manufacture the inline drain body and pipe bell spigot of the surface drainage inlets shall meet the mechanical property requirements for fabricated fittings as described by ASTM D3034, Standard for Sewer PVC Pipe and Fittings; ASTM F1336, Standard for PVC Gasketed Sewer Fittings.

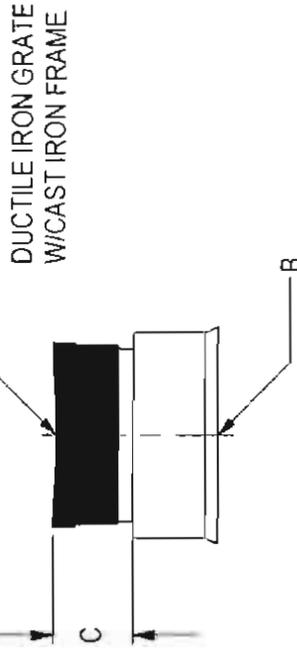
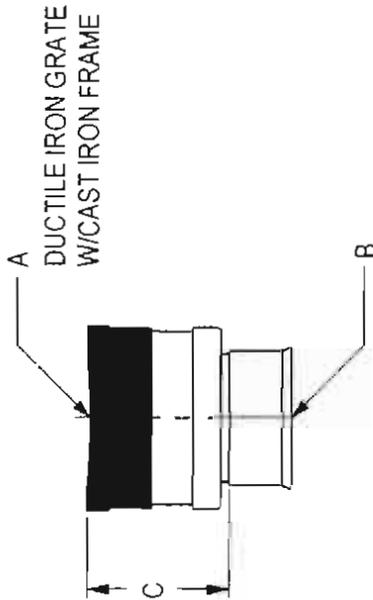
The grates furnished for all surface drainage inlets shall be ductile iron grates for sizes 8", 10", 12", 15", 18", 24" and 30" (12" and 15" frames are cast iron) shall be made specifically for each fitting so as to provide a round bottom flange that closely matches the diameter of the surface drainage inlet. Grates for inline drains shall be capable of supporting H-25 wheel loading for heavy-duty traffic or H-10 loading for pedestrian traffic. 12" and 15" will be hinged to the frame using pins. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron and ASTM A-48-83 Class 30B for 12" and 15" cast iron frames. Grates shall be provided painted black.

#### INSTALLATION

The specified PVC surface drainage inlet shall be installed using conventional flexible pipe backfill materials and procedures. The backfill material shall be crushed stone or other granular material meeting the requirements of class 1 or 2 material as defined in ASTM D2321. The surface drainage inlets shall be bedded and back-filled uniformly in accordance with ASTM D2321. For H-25 Load rated installations, an 8" to 10" thick concrete ring will be poured under the grate and frame as recommended by details provided to the manufacturer.

THIS PRINT DISCLOSES SUBJECT MATTER IN WHICH NYLOPLAST HAS PROPRIETARY RIGHTS. THE RECEIPT OR POSSESSION OF THIS PRINT DOES NOT CONFER, TRANSFER, OR LICENSE THE USE OF THE DESIGN OR TECHNICAL INFORMATION SHOWN HEREIN. REPRODUCTION OF THIS PRINT OR ANY INFORMATION CONTAINED HEREIN, OR MANUFACTURE OF ANY ARTICLE HEREFROM, FOR THE DISCLOSURE TO OTHERS IS FORBIDDEN, EXCEPT BY SPECIFIC WRITTEN PERMISSION FROM NYLOPLAST.

		3138 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 <a href="http://www.nyloplast-us.com">www.nyloplast-us.com</a>	
DRAWN BY CJA DATE 10MAR00		MATERIAL PROJECT NO./NAME INLINE DRAIN SECTION 2722	
APPD BY CJA DATE 10MAR00		TITLE 8" - 30" SPECIFICATIONS	
DWG SIZE A		SCALE 1:1 SHEET 1 OF 1	
		DWG NO. 7003-110-009 REV C	



VARIOUS TYPES OF OUTLETS  
WITH WATERTIGHT ADAPTERS

FOR:  
ADS N-12  
SDR-35 SEWER  
SCHEDULE 40 DWV  
CORRUGATED PVC  
RIBBED PVC

VARIOUS TYPES OF OUTLETS  
WITH WATERTIGHT ADAPTERS

12X12

FOR:  
ADS N-12  
SDR-35 SEWER  
SCHEDULE 40 DWV  
CORRUGATED PVC  
RIBBED PVC

A	B	C
12"	4"	10.50
12"	6"	11.50
12"	8"	11.50
12"	10"	11.25
12"	12"	6.00

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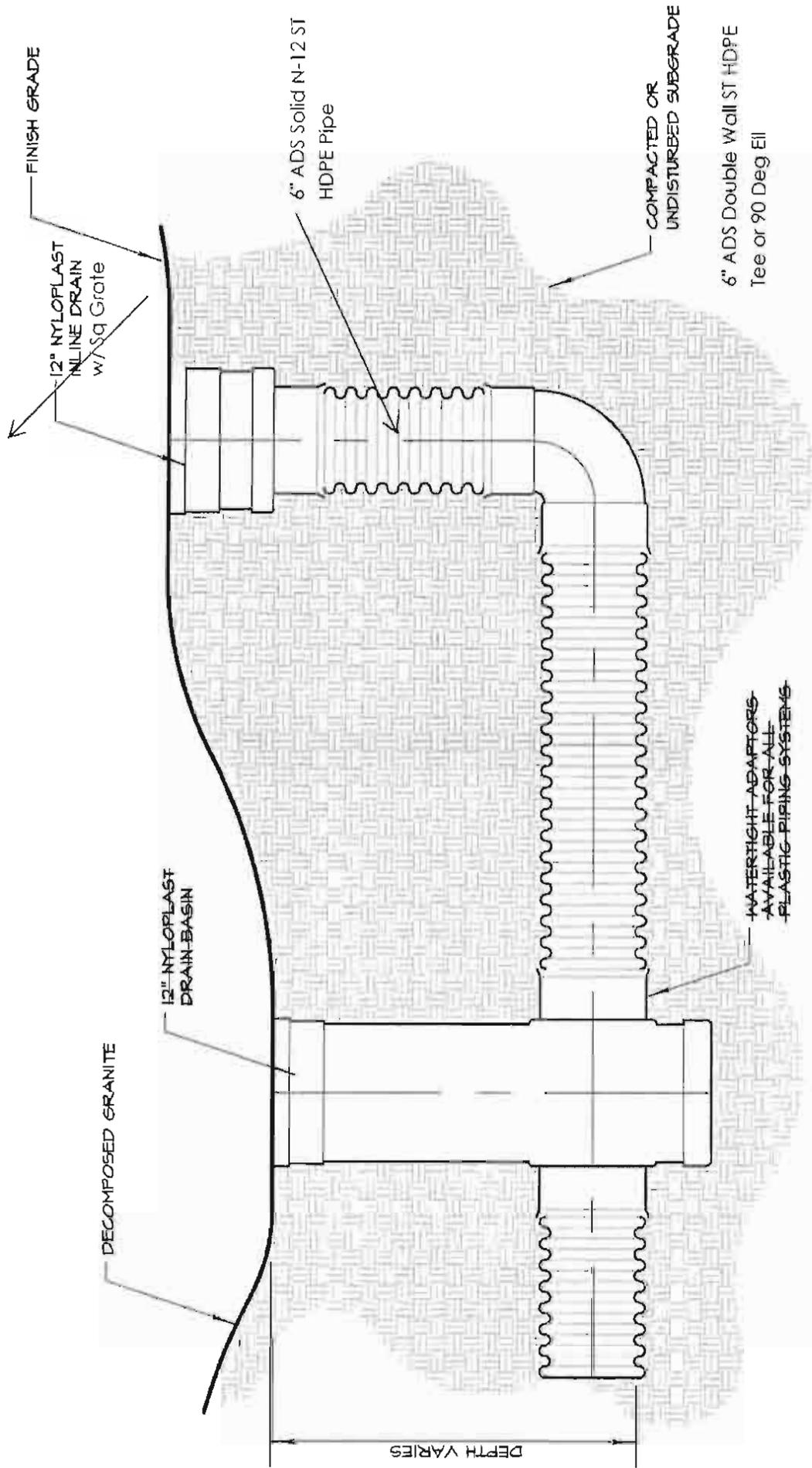
DRAWN BY	CJA	MATERIAL	
DATE	6-25-99	PROJECT NO./NAME	INLINE DRAIN
APP'D BY	CJA	SCALE	NTS
DATE	6-25-99	SHEET	1 OF 1
DWG SIZE	A		

3130 VERONA AVE  
BUFORD, GA 30518  
PH (770) 932-2443  
FAX (770) 932-2490  
www.nyloplast-us.com

**Nyloplast**

TITLE  
12' DESIGN DETAILS

DWG NO. 7803-110-002  
REV B



# NYLOPLAST CATCH BASIN/DRAIN LINE - SECTION

SCALE: 1"=1'-0"





4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL  
 NO. 212A-003  
 PACKAGE NO: 212A**

**TITLE:** Wye Cleanouts  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 8  
**DAYS OVERDUE:** 0

**RECEIVED FROM**      **SENT TO**      **RETURNED BY**      **FORWARDED TO**  
 WADS      MS      STAN      JR

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Series	Priots	Drawing Date	Held	Elapsed
001	Wye Cleanouts	1/27/14	2/4/14			NEW	0	1		0	8

**SHOP DRAWING SUBMITTAL**      Proj. # ECLAISE  
 Submittal Title Wye Cleanouts  
 SCI Drawing No. \_\_\_\_\_      Rev. \_\_\_\_\_

Reviewed  
 Reviewed As Noted  
 Reviewed As Noted - Resubmit  
 Resubmit  
 Returned Without Review  
 For Information Only  
 VOID

**Stanley Consultants INC.**

By: [Signature]      Date: 2/11/14

Action of any kind on drawings by ENGINEER/ARCHITECT does not relieve CONTRACTOR from responsibility for errors, correctness of details, or conformance to the contract.

Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.

Authorized Representative: \_\_\_\_\_  
 Date: 02/04/14  
 Expiration: \_\_\_\_\_

January 27, 2014

Ms. Angie Gruenenfelder  
Las Vegas Paving Corp.  
4420 South Decatur Blvd.  
Las Vegas, NV 89103  
Phone: 702.251.5800  
Email: [angie.gruenenfelder@lasvegaspaving.com](mailto:angie.gruenenfelder@lasvegaspaving.com)

Re: Drainage Submittal – Desert Rose GC – Las Vegas, NV

Dear Angie,

For your approval, please find the following descriptive, technical, and specification information for the golf course drainage pipe, fittings, inlets and cleanouts that Wadsworth Golf proposes to furnish and install at Desert Rose GC in Las Vegas, NV.

For all perforated HDPE drainage pipe (greens (6" mainline; 4" laterals); bunkers (4")):

- Advanced Drainage Systems (ADS) N-12 high-density polyethylene (HDPE), slit perforations, smooth interior, annular exterior, dual wall, integral bell pipe
- Advanced Drainage Systems (ADS) high-density polyethylene (HDPE) injection-molded, single-wall, soil-tight snap fittings
- Regency #14/1 PE UL solid copper tracer wire (blue in color)

For all solid HDPE drainage pipe:

- Advanced Drainage Systems (ADS) N-12 high-density polyethylene (HDPE), smooth interior, annular exterior, dual wall, soil-tight, integral bell pipe
- Advanced Drainage Systems (ADS) injection-molded, double wall, soil-tight snap fittings
- Regency #14/1 PE UL solid copper tracer wire (blue in color)

For all drain inlets (see details):

- PermaBasin #PB2400B Catch Basin (turf areas)
- 12" Nyloplast Inline Drain w/ Square Grate (non-turf areas)

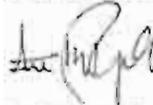
For all wye cleanouts (see detail):

- Advanced Drainage Systems (ADS) "heavy duty" high-density polyethylene (HDPE), corrugated interior, corrugated exterior, single wall, soil-tight, plain end pipe
- Carson #809-9-4 7" Round Pit, Green, T-Cover, No Imprint

These products are industry standard for golf course applications. Wadsworth has used them successfully for many years. Also enclosed, please find construction details for the drain inlets and cleanouts.

We would appreciate a review of this submission at your earliest convenience. If you have any questions or require further clarification, please do not hesitate to contact me.

Sincerely,  
WADSWORTH GOLF CONSTRUCTION COMPANY



Scott McDougall,  
Estimator  
[scottm@wadsworthgolf.com](mailto:scottm@wadsworthgolf.com)

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

Cc: Mark Slugocki – [marks@wadsworthgolf.com](mailto:marks@wadsworthgolf.com)

## HEAVY DUTY PIPE

With over 45 years experience, Advanced Drainage Systems, Inc. (ADS) has provided expert knowledge and innovative product solutions proven in a wide range of drainage applications. Our HDPE pipe delivers superior value while providing physical strength and structural design that just cannot be matched by metal or concrete.

### APPLICATIONS:

Culverts	Parking Lots
Paths & Walkway Drains	Field Drainage
Landscape/Subdrainage	Slope, Edge, Foundations
Golf Courses	Downspouts/Roof Drainage
Sports Playing Fields	Waterway Terracing
Grain Aeration	Land Reclamation
Pond Overflows & Dams	Irrigation Ditch Enclosures

### FEATURES/BENEFITS:

- Available in varying stick and coil lengths depending on the diameter. Longer lengths result in fewer joints
- Easy-to-handle, safe, lightweight pipe requires less labor and equipment for faster installation and reduced costs
- AASHTO HS-25 (Highway traffic loads) rated with a minimum of 12" (300 mm) of cover for 3" - 8" (75 - 200 mm) diameters
- Provides superior resistance to chemicals, road salts, motor oil and gasoline - will not rust, deteriorate or crumble
- Withstands repeated freeze/thaw cycles and continuous sub-zero temperatures

**ADS Service:** ADS representatives are committed to providing you with the answers to all your questions, including specifications, and installation and more.



## ADS SINGLE WALL HEAVY DUTY PIPE

### SCOPE

This specification describes 3- through 24-inch (75 to 600 mm) ADS single wall heavy duty corrugated polyethylene highway pipe for use in gravity-flow drainage applications.

### PIPE REQUIREMENTS

ADS single wall corrugated heavy duty pipe shall have annular interior and exterior corrugations.

- 3- through 6-inch (75 to 150 mm) shall meet ASTM F405.
- 8- through 24-inch (200 to 600 mm) shall meet ASTM F667

### JOINT PERFORMANCE

Joints for 3- to 24- inch (75 – 600 mm) shall be made with split or snap couplings. Standard connections shall meet the requirements of the ASTM F405 or ASTM F667. Gasketed connections shall incorporate a closed-cell synthetic expanded rubber gasket meeting the requirements of ASTM D1056 Grade 2A2. Gaskets, when applicable, shall be installed by the pipe manufacturer.

### FITTINGS

Fittings shall conform to ASTM F405 or ASTM F667.

### MATERIAL PROPERTIES

Pipe and fitting material shall be high density polyethylene conforming with the minimum requirements of cell classification 423410C as defined and described in the latest version of ASTM D3350; or ASTM D1248 Type III, Class C, Category 4, Grade P33.

### INSTALLATION

Installation shall be in accordance with ASTM D2321 and ADS recommended installation guidelines with the exception that minimum cover in trafficked areas for 3- through 24-inch (75 to 600 mm) diameters shall be one foot (0.3 m). Contact your local ADS representative or visit our website at [www.ads-pipe.com](http://www.ads-pipe.com) for a copy of the latest installation guidelines.

### PIPE DIMENSIONS

Standard Pipe Size (in.)	3	4	5	6	8	10	12	15	18	24
Standard Pipe O.D. (in.)	3.6 (91)	4.8 (117)	5.8 (147)	7 (178)	9.5 (241)	12 (305)	14.5 (368)	18 (457)	22 (559)	28 (711)

All diameters available with or without perforations.

\*Check with sales representative for availability by region.

\*\*Pipe O.D. values are provided for reference purposes only, values stated for 3-through 24-inch are ±0.5 inch. Contact a sales representative for exact values.



3" - 24" Split Band Coupler



3" - 10" External Snap Coupler

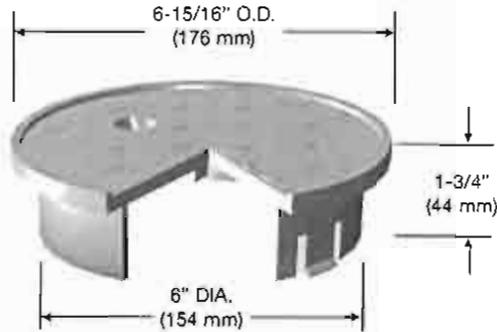


3" - 8" Internal Snap Coupler



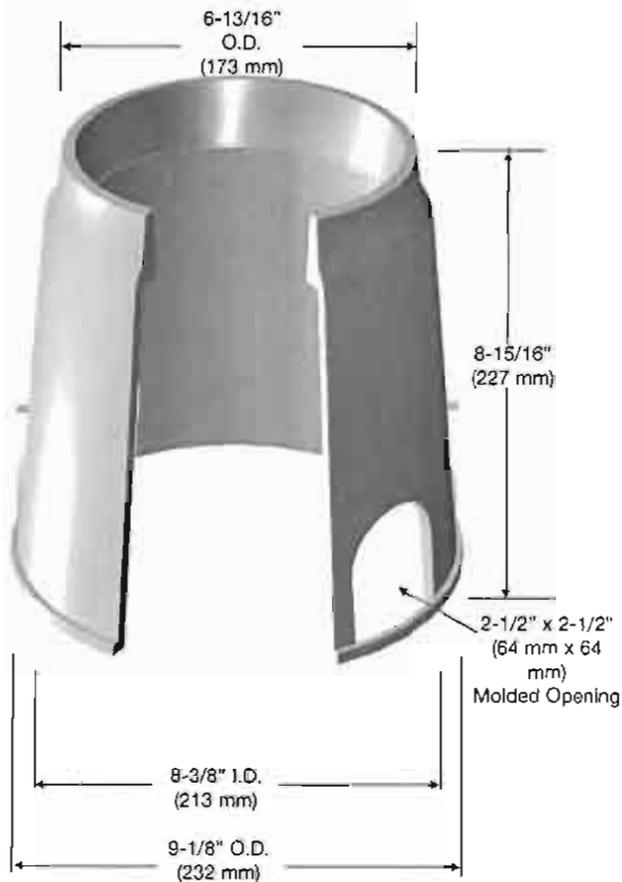
# L Series 809

## Light Duty



### T-Cover

Material: Polyolefin  
 Weight: 0.5 lbs.  
 Model: 809-4



### Body

Material: Polyolefin  
 Weight: 2.0 lbs.  
 Model: 809-9

### Colors Available

Green Body and Cover  
 Black Body and Cover

Note: For use in non-vehicular traffic situations only. We do not recommend installation in concrete or asphalt. Weights and dimensions may vary slightly.

# L Series 809



**Pomona, California**  
 Toll-Free: 800.735.5566  
 Phone: 909.634.3020  
 Fax: 800.827.1111

## Light Duty

### Static Vertical Load Rating (Design Load; Test Load)

- ASTM C857 – A-0.3, 300 lbf/ft<sup>2</sup>; Report Ultimate
- SCTE – Light Duty, Pedestrian; 3,000 lbf

### Shipping Configuration

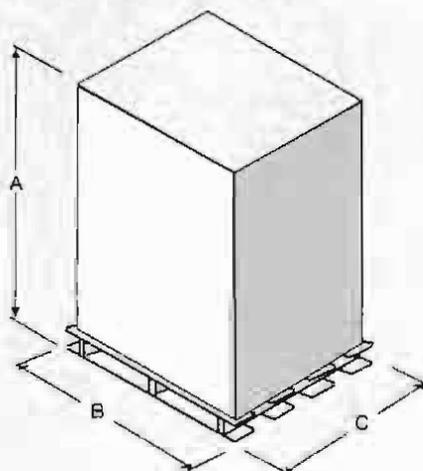
- Unit, 240 assemblies,  
= 49.5 cu. ft., 565.0 lbs.

Material Property	ASTM Test Method	Typical Value <sup>1</sup>
Type, Class, Category	D 1248	III, A, 3
Density, g/cm <sup>3</sup>	D 1505	0.950 min., not to exceed 0.965
Tensile Strength, at break, psi	D 638	3,000 to 4,400
Elongation, at break, %	D 638	400
Tensile Impact, ft-lb/in <sup>2</sup>	D 1822	27
Flexural Modulus, psi	D 790	120,000 min., not to exceed 240,000
Low Temperature Brittleness, F50, at °C	D 748	<-78
Hardness, Shore D	D 2240	66
Deflection Temperature, at 66 psi, °F	D 648	150° min., not to exceed 200°
Electrical Dielectric Strength, V/mil	D 149	400 min., not to exceed 600
<b>Molded Product<sup>2</sup></b>		
Chemical Resistance	D 543	Very Resistant
Water Absorption	D 570	Less than 1% weight change

Note: For use in non-vehicular traffic situations only. We do not recommend installation in concrete or asphalt. Weights and dimensions may vary slightly.

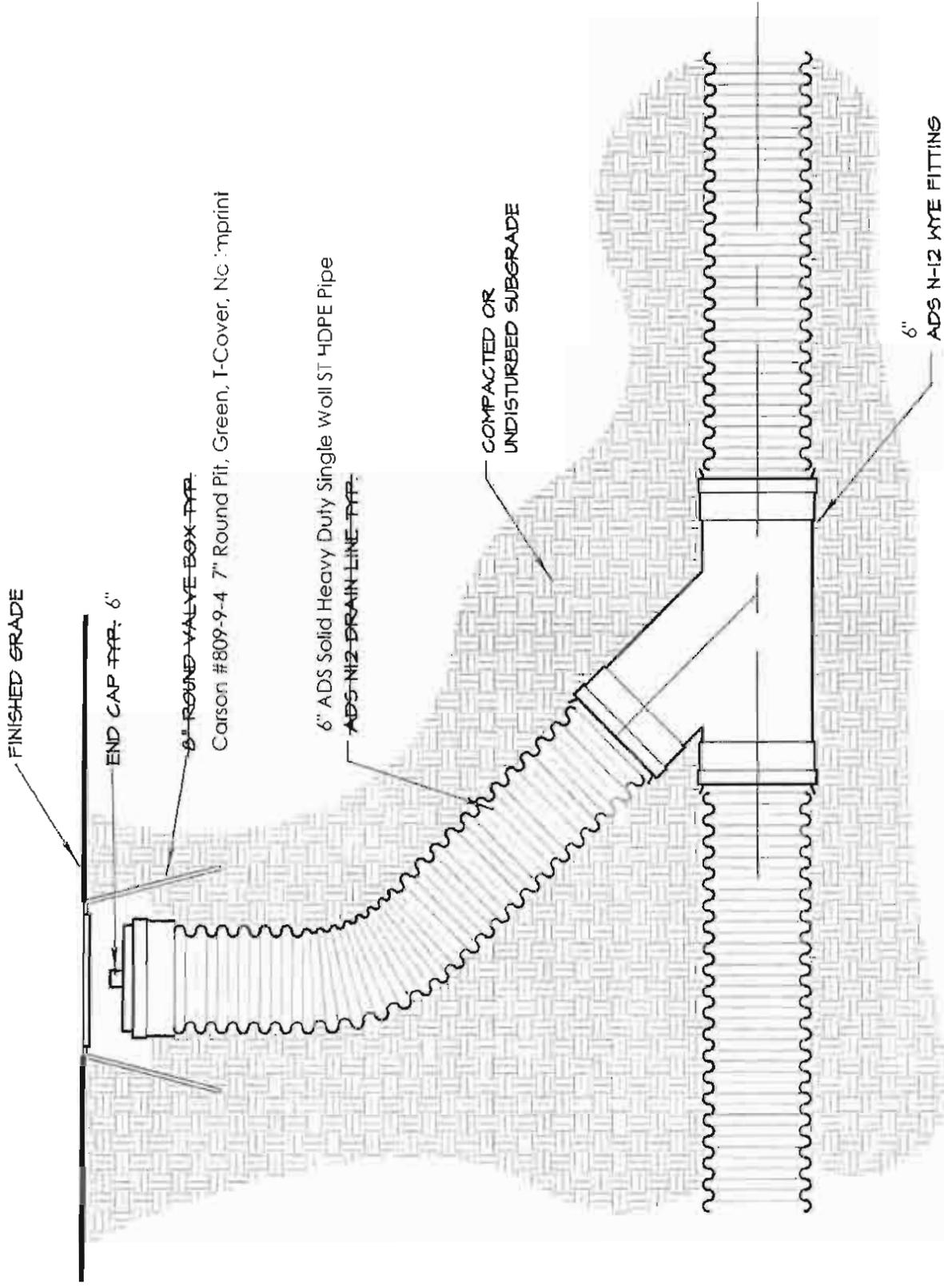
<sup>1</sup>The values listed for physical property measurements are nominal values only. Certain physical property measurements are subject to variations consistent with the test methods and are within a generally accepted range for such values.  
<sup>2</sup>Test reports available on request.

### Shipping Information



Dim.	Description	Value
A	Height	51"
B	Length	40"
C	Width	48"

Units: 240 per pallet  
 Weight: 640 lbs. per pallet



WYE CLEANOUT FOR NDS DRAIN LINE - SECTION

6

NOT TO SCALE



4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL**  
**NO. 212A-004**  
**PACKAGE NO: 212A**

**TITLE:** USGA Sand  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 1  
**DAYS OVERDUE:** 0

**RECEIVED FROM**                      **SENT TO**                                      **RETURNED BY**                                      **FORWARDED TO**  
 WADS                      MS                      STAN                      JR

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Seals		Prints		Drawing	
											Date	Held
001	USGA Sand For use in the greens.	2/3/14	2/4/14			NEW	0	1			0	1

<b>SHOP DRAWING SUBMITTAL</b>		Proj. #	<u>FCLAISE</u>
Submittal Title		<u>USGA Sand for use in greens</u>	
SCI Drawing No.		Rev.	
<input checked="" type="checkbox"/>	Reviewed		
<input type="checkbox"/>	Reviewed As Noted		
<input type="checkbox"/>	Reviewed As Noted - Resubmit		
<input type="checkbox"/>	Resubmit		
<input type="checkbox"/>	Returned Without Review		
<input type="checkbox"/>	For information Only		
<input type="checkbox"/>	VOID		
By:	<u>[Signature]</u>	Date:	<u>2/11/14</u>
Action of any kind on drawings by ENGINEER/ARCHITECT does not relieve CONTRACTOR from responsibility for errors, correctness of details, or conformance to the contract.			

Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.

Authorized Representative: \_\_\_\_\_  
 Date: 02/04/14

February 3, 2014

Ms. Angie Gruenenfelder  
Las Vegas Paving Corp.  
4420 South Decatur Blvd.  
Las Vegas, NV 89103  
Phone: 702.251.5800  
Email: [angie.gruenenfelder@lasvegaspaving.com](mailto:angie.gruenenfelder@lasvegaspaving.com)

Re: USGA Sand Submittal – Desert Rose GC – Las Vegas, NV

Dear Angie,

Under cover of this letter, and for your approval, Wadsworth Golf is submitting USGA sand test results for green construction at Desert Rose GC in Las Vegas, NV. Based on test results from Thomas Turf Services dated January 27, 2014, the USGA sand meets the recommendations of the United States Golf Association (USGA) for use in the greens.

We would appreciate a review of this submission at your earliest convenience. If you have any questions or require further clarification, please do not hesitate to call.

Sincerely,  
WADSWORTH GOLF CONSTRUCTION COMPANY



Scott McDougall,  
Estimator  
[scoltm@wadsworthgolf.com](mailto:scoltm@wadsworthgolf.com)

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

Cc: Mark Slugocki – [marks@wadsworthgolf.com](mailto:marks@wadsworthgolf.com)



January 27, 2014

Bob Motis  
Impact Sand & Gravel  
145 E. Warm Springs  
Las Vegas, NV 89119

Mr. Motis:

The submitted Greens Sand was subjected to the standard soil testing procedures used to determine acceptable materials for golf course construction. The results were compared to the *USGA Recommendations for a Method of Putting Green Construction (2004)*.

## Root Zone Recommendations

The sand component for the root zone should be composed of silica or another inert hard mineral. Sands with carbonates should be avoided due to the physical and chemical limitations that they promote. To avoid the potential for future problems, the USGA and most architects recommend avoiding sands high in carbonates when possible.

The USGA's 2004 recommendations for the particle size distribution of a root zone mixture are as follows:

Name	Particle Diameter (mm)	Recommendation (by weight)
Fine Gravel	2.0-3.4	≤ 3% fine gravel and ≤ 10% total gravel plus very coarse sand
Very Coarse Sand	1.0-2.0	
Coarse Sand	0.5-1.0	≥ 60% total coarse sand plus medium sand
Medium Sand	0.25-0.50	
Fine Sand	0.15-0.25	≤ 20%
Very Fine Sand	0.05-0.15	≤ 5%*
Silt	0.002-0.05	≤ 5%*
Clay	<0.002	≤ 3%*

\*The total of the very fine sand, plus silt and clay fractions may not exceed 10%.

Once the sand has been selected, an organic amendment may be mixed with the sand as needed to achieve the physical properties that will support healthy turf growth.

## Physical Measurements Recommendations

Hydraulic Conductivity*	Water Holding Capacity @30 cm Tension	Bulk Density	Porosity		
			Total	Capillary	Air-filled
inches / hour	%	grams / cc	%	%	%
≥6			35 to 55	15 to 25	15 to 30

All parameters of the Physical Measurements recommendations should be used to evaluate the root zone and not just one parameter. Often only the saturated hydraulic conductivity (infiltration rate) is utilized to make decisions concerning the possible performance of the root zone which could result in a poor decision. All the data should be weighed to select the components for the root zone in order to make a good decision.

Once the materials are evaluated and a recommendation for the individual materials formulated, a quality control testing program should be implemented to make sure that the integrity of the components and their implementation are correct.

## Discussion of Lab Results

The results of the tests performed on the Greens Sand proposed for use in pure sand USGA greens construction are summarized in the enclosed tables. The results of the quality control samples run simultaneously with this sample indicate the data are accurate.

### Greens Sand

The particle size analysis of the Greens Sand showed it to be almost free of gravel and to contain acceptable amounts of silt and clay. The sand also contained an acceptable 8.8-9.2% very coarse sand which is within the recommended maximum of 10%. The sand contained 35.7-36.5% coarse sand and 34.0-34.3% medium sand for an acceptable total of 70.0-70.5%. This total is above the USGA's recommended minimum of 60%. The sand contained an acceptable 12.9-13.5% fine sand which is within the recommended maximum of 20%. The sand contained an acceptable 4.0-4.2% very fine sand which is within the recommended maximum of 5%. The sand also contained an acceptable total of 7.3-7.5% of the particles in the very fine sand, plus silt and clay fractions which is within the recommended maximum of 10%. The sand had a  $D_{85}$  of 0.89 mm and a  $D_{15}$  of 0.20 mm. The sand particles were sub-angular to angular in shape with a low to medium degree of sphericity. The sand had a medium alkaline pH of 8.4, was low in total salts and contained some carbonates. Based on these results, the Greens Sand does meet the USGA's particle size recommendations for a root zone.

The physical measurements of the Greens Sand showed it to have a high, but acceptable saturated hydraulic conductivity (infiltration rate) of 84.1 inches per hour which is above the USGA's recommended minimum of 6 inches per hour. The sand retained 11.1% moisture at 30 cm tension. The sand had an acceptable bulk density of 1.50 g/cc and a typical particle density of 2.64 g/cc. The sand had an acceptable 43.2% total porosity, 16.7% capillary porosity and 26.5% air-filled porosity. Based on these results, the Greens Sand does meet the USGA's physical measurements recommendations for a root zone.

### Summary

The Greens Sand had a medium alkaline pH, was low in total salts and contained some carbonates. The Greens Sand did meet the USGA's particle size recommendations for a root zone.

The Greens Sand did meet the USGA's physical measurements recommendations for a root zone.

As long as your client can accept the high saturated hydraulic conductivity, the Greens Sand may be used for pure sand greens construction.

Please note that the Desert Rose Golf Club has previously had issues with poor irrigation water quality and salt accumulation. Therefore, the high saturated hydraulic conductivity will be beneficial in leaching the salts out of the root zone profile.

If you have any questions concerning these recommendations or are in need of further assistance, please feel free to phone me directly at 979-575-5107. You may also send E-Mail to: <soiltest@thomasturf.com>. Thank you for using Thomas Turf Services, Inc.

Sincerely,

James C. Thomas, C.P.Ag.  
Pres., Thomas Turf Services

JCT:rgy

Enclosures: Tables (2)  
Invoice

File: 98008, G9210 – USGA

**Thomas Turf Services, Inc.**  
**Soil Analysis & Turf Management**  
 11183 State Hwy. 30  
 College Station, TX 77845  
 Phone: 979-774-1600  
 Fax: 979-774-1604



Testing Certificate Number: 0743.01  
 Geotechnical Putting Green Materials

Impact Sand & Gravel	Facility: Desert Rise Golf Club
Bob Motta	Account No.: 99009
145 E. Warm Springs	Lab ID: G9210
Las Vegas, NV 89119	Date Recd: 22-Jan-14
Phone (Fax: 702-851-9511) Cell: 702-355-2401	Test Dates: 22-27-Jan-14
Email: b.motta@impact-companies.com	Report Date: 27-Jan-14

**Particle Size Analysis Report - ASTM F1632 - Method B**

U.S. Sieve No.	Texture			Chemical Analysis			
	Sand 75 to 20	Silt 202 to 25	Clay 4.75	pH	EC (µmhos/cm)	Extraction Method	Acid Reaction (1:1 N.HCl)
U.S. Sieve No.	75 to 20	202 to 25	4.75				
Particle Diameter (mm)	2.0 - 0.85	0.85 - 0.075	0.075				
UNGA Recommendations (%)							
Sample ID							
Green Sand	96.5	1.8	1.8	8.2	111.0	1:1	Medium to Severe
Durican	96.8	1.8	1.8				

**Particle Size Distribution**

U.S. Sieve No.	Gravel	Very Coarse	Coarse	Medium	Fine	Very Fine	Primary Particle Shape (Spherical/Angular)
	>2.0	1.0-2.0	0.50-1.0	0.25-0.50	0.075-0.25	<0.075	
U.S. Sieve No.	>2.0	1.0-2.0	0.50-1.0	0.25-0.50	0.075-0.25	<0.075	
Particle Diameter (mm)	>2.0	1.0-2.0	0.50-1.0	0.25-0.50	0.075-0.25	<0.075	
UNGA Recommendations (%)		5-10 Max*					
Sample ID							
	Percent Retained on Sieve						
Green Sand	0.2	0.0	95.1	34.1	13.3	6.1	Low to Medium / Sub-ang. to Angular
Durican	0.1	0.2	30.3	14.0	12.6	6.1	Low to Medium / Sub-ang. to Angular

Reviewed By: James C. Thomas, C.P. Ag.  
 Pres., Thomas Turf Services, Inc.

\*The total of the very coarse sand and gravel fractions may not exceed 10%  
 \*\*The total of the very fine sand, silt and clay fractions may not exceed 10%

**Thomas Turf Services, Inc.**  
**Soil Analysis & Turf Management**

1183 State Hwy. 30  
 College Station, TX 77845

Phone: 979-774-1600  
 Fax: 979-774-1694

Impact Sand & Gravel  
 Bob Motis  
 145 E. Warm Springs  
 Las Vegas, NV 89119  
 Phone / Fax: 702-853-9511 Cell: 702-355-2401  
 E-mail: bmotis@impaccompany.com



Testing Certificate Number: 0743.01  
 Geotechnical Putting Green Materials

Facility: Desert Rose Golf Club  
 Account No.: 98008  
 Lab ID: G9216  
 Date Rec'd: 23-Jan-14  
 Test Dates: 23-Jan-14  
 Report Date: 23-Jan-14

**Physical Measurements Report**  
**ASTM Test Method F1815**

Units	Sat. Hydraulic Conductivity in/hr ± h	30 cm Water Bedding %	Bulk Density g/cc	Particle Density g/cc	Total %	Porosity Capillary % 1.5 to 2.5	Air-Filled % 1.5 to 30
Green Sand	64.1	11.1	1.50	2.61	35.55	16.7	26.5
2004 USGA Recommended Sample ID							

\*Core Sample & Compacted Using 21 Drops of a 7.22% Humectant  
 Particle Density Calculated Using Method K.2

Reviewed by: \_\_\_\_\_  
 James C. Thomas, C.P.A.E.  
 Pres., Thomas Turf Services, Inc.

**TITLE:** USGA Gravel  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 4  
**DAYS OVERDUE:** 0

RECEIVED FROM	SENT TO	RETURNED BY	FORWARDED TO
WADS MS	STAN JR		

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Senias	Prints	Drawing Date	Held	Elapsed
001	USGA Gravel	4/17/14	4/21/14			NEW	0	1		0	4

<b>SHOP DRAWING SUBMITTAL</b>		PROJ. # _____
SUBMITTAL TITLE _____		
SCI DRAWING NO. _____		REV. _____
<input checked="" type="checkbox"/>	REVIEWED	
<input type="checkbox"/>	REVIEWED AS NOTED	
<input type="checkbox"/>	REVIEWED AS NOTED - RESUBMIT	
<input type="checkbox"/>	RESUBMIT	
<input type="checkbox"/>	RETURNED WITHOUT REVIEW	
<input type="checkbox"/>	FOR INFORMATION ONLY	
<input type="checkbox"/>	VOID	
BY: <u>Raf Heckemper</u>	DATE: <u>5-1-14</u>	
ACTION OF ANY KIND ON DRAWINGS BY ENGINEER/ARCHITECT DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS, CORRECTNESS OF DETAILS, OR CONFORMANCE TO THE CONTRACT		

**Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.**

Authorized Representative: \_\_\_\_\_  
 Date: 04/21/2014  
 Expedition®

April 16, 2014

Ms. Angie Gruenenfelder  
Las Vegas Paving Corp.  
4420 South Decatur Blvd.  
Las Vegas, NV 89103  
Phone: 702.251.5800  
Email: [angie.gruenenfelder@lasvegaspaving.com](mailto:angie.gruenenfelder@lasvegaspaving.com)

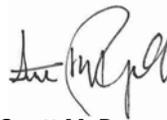
Re: USGA Gravel Submittal – Desert Rose GC – Las Vegas, NV

Dear Angie,

Under cover of this letter, and for your approval, Wadsworth Golf is submitting USGA gravel test results for green construction at Desert Rose GC in Las Vegas, NV. Based on test results from Thomas Turf Services dated March 26, 2014, the USGA gravel meets both the particle size and bridging recommendations of the United States Golf Association (USGA) for use in the greens.

We would appreciate a review of this submission at your earliest convenience. If you have any questions or require further clarification, please do not hesitate to call.

Sincerely,  
WADSWORTH GOLF CONSTRUCTION COMPANY



Scott McDougall,  
Estimator  
[scottm@wadsworthgolf.com](mailto:scottm@wadsworthgolf.com)

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

Cc: Mark Slugoeki – [marks@wadsworthgolf.com](mailto:marks@wadsworthgolf.com)  
Victor Delgado – [victord@wadsworthgolf.com](mailto:victord@wadsworthgolf.com)



## Thomas Turf Services



SOIL ANALYSIS AND TURF MANAGEMENT



March 26, 2014

Bob Motis  
Impact Sand & Gravel  
145 E. Warm Springs  
Las Vegas, NV 89119

Mr. Motis:

The Gravel #89 sample was subjected to the standard soil testing procedures used to determine acceptable materials for golf course and sports field construction. The results were compared to the *USGA Recommendations for a Method of Putting Green Construction* (2004).

### Gravel Recommendations

The USGA recommendations for the gravel drainage layer are as follows:

The entire subgrade then shall be covered with a layer of clean, washed crushed stone or gravel to a minimum thickness of four inches (100 mm), conforming to the proposed final surface grade to a tolerance of  $\pm 1$  inch.

Soft limestones, sandstones, or shales are not acceptable. Questionable materials should be tested for weathering stability using the sulfate soundness test (ASTM C-88). A loss of material greater than a 12% by weight is unacceptable.

The LA Abrasion test (ASTM C-131) should be performed on any materials suspected of having insufficient mechanical stability to withstand ordinary construction traffic. The value obtained using this procedure should not exceed 40.

The need for an intermediate layer is based on the particle size distribution of the root zone mix relative to that of the gravel. When properly sized gravel is available, the intermediate layer is not necessary. If the properly sized gravel cannot be found, an intermediate layer must be used.

#### Selection of Gravel When the Intermediate Layer is NOT Used:

The USGA criteria state that:

If an appropriate gravel can be identified, the intermediate layer need not be included in the construction of the green. In some instances this can save a considerable amount of time and money.

The criteria are based on engineering principles which rely on the largest 15% of the root zone particles "bridging" with the smallest 15% of the gravel particles. Smaller voids are produced, and they prevent migration of root zone particles into the gravel yet maintain adequate permeability. The  $D_{85(\text{root zone})}$  is defined as the particle diameter below which 85% of the soil particles (by weight) are smaller. The  $D_{15(\text{gravel})}$  is defined as the particle diameter below which 15% of the gravel particles (by weight) are smaller.

For bridging to occur, the  $D_{15(\text{gravel})}$  must be less than or equal to eight times the  $D_{85(\text{root zone})}$ .

To maintain adequate permeability across the root zone/gravel interface, the  $D_{15(\text{gravel})}$  shall be greater than or equal to five times the  $D_{15(\text{root zone})}$ .

Furthermore, any gravel selected shall have 100% passing a 1/2" (12 mm) sieve and not more than 10% passing a No. 10 (2 mm) sieve, including not more than 5% passing a No. 18 (1 mm) sieve.

## Discussion of Results

The results of the tests performed on the Gravel #89 sample proposed for use in USGA greens construction are summarized in the enclosed tables. The results of the quality control sample run simultaneously with this sample indicate the data are accurate.

The Gravel #89 sample was checked for compatibility in the 2-layer system of construction with the Greens Sand previously tested and reported as Lab ID: G9210 on 27-Jan-14. For ease in comparison, the particle size analysis results of the Greens Sand are included with this report.

### **Gravel #89**

The Gravel #89 sample was free of particles greater than 9.5 mm in size. The gravel contained 20.5% of the particles in the 6.3-9.5 mm range, 31.4% in the 4.0-6.3 mm range and 38.3% in the 2.0-4.0 mm range. The gravel contained an acceptable total of 9.8% of the particles in the less than 2.0 mm ranges which is within the recommended maximum of 10%. Based on these results, the Gravel #89 sample does meet the USGA's particle size recommendations for use in the 2-layer system of construction.

The Gravel #89 sample had a high coefficient of uniformity of 3.5 which is above the recommended maximum of 3.0. This indicates the gravel has a wider than ideal spread in particle sizes.

### **Gravel #89 / Greens Sand (G9210, 1/27/14) - Compatibility**

To determine if the Gravel #89 and Greens Sand could be used in the 2-layer system of construction, the critical values were entered into the enclosed compatibility table. The gravel and sand combination had an acceptable bridging factor of 2.5 which is within the recommended maximum of 8.0. This indicates the sand will not migrate into the gravel. The gravel and sand combination had an acceptable permeability factor of 11.0 which indicates the gravel can transmit the needed amount of water to the drains.

## Summary

The Gravel #89 sample did meet the USGA's particle size recommendations for use in the 2-layer system of construction. The gravel had a high coefficient of uniformity indicating a wider than ideal spread in particle sizes.

The Gravel #89 and Greens Sand combination had an acceptable bridging factor which indicates the sand will not migrate into the gravel. The gravel and sand combination had an acceptable permeability factor which indicates the gravel can transmit the needed amount of water to the drains.

As long as your clients can accept the high coefficient of uniformity, the Gravel #89 is acceptable for use with the Greens Sand in the 2-layer system of construction.

Since the total fine gravel in the <2 mm ranges is near the recommended maximum, a stringent QA/QC program will need to be implemented to make sure that this total remains ≤10% to keep the gravel in compliance with the USGA's gravel size recommendations.

If you have any questions concerning these recommendations or are in need of further assistance, please feel free to phone me directly at 979-575-5107. You may also send E-Mail to: <soiltest@thomasturf.com>. Thank you for using Thomas Turf Services, Inc.

Sincerely,

James C. Thomas, C.P.Ag.  
Pres., Thomas Turf Services, Inc.

JCT:rgy

Enclosure: Tables (3)  
Invoice

File: 98008, G9283 - #89

**Thomas Turf Services, Inc.**  
**Soil Analysis & Turf Management**

11183 State Hwy. 30  
 College Station, TX 77845  
**Phone: 979-774-1600**  
**Fax: 979-774-1604**



**Testing Certificate Number: 0743.01**  
**Geotechnical Putting Green Materials**

Impact Sand & Gravel  
 Bob Moris  
 145 E. Warm Springs  
 Las Vegas, NV 89119  
 Phone / Fax: 702-853-9511 Cell: 702-355-2401  
 E-mail: bmotis@impactcompanies.com

Facility: Product Development  
 Account No.: 98008  
 Lab ID: G9283  
 Date Rec'd: 24-Mar-14  
 Test Date: 25-Mar-14  
 Report Date: 26-Mar-14

**Gravel Distribution Report - ASTM Test Method C136-01**

Diameter	>12.5 mm	9.5 - 12.5 mm	6.3 - 9.5 mm	4.0 - 6.3 mm	2.0 - 4.0 mm	1.0 - 2.0 mm	<1.0 mm
U.S. Sieve	1/2 inch	3/8 inch	1/4 inch	No. 5	No. 10	No. 18	< No. 18
Units	Percent Retained on Sieve						
2004 USGA Recommendations*	0						< 10**
Sample ID							
Gravel #89	0.0	0.0	20.5	31.4	38.3	6.8	3.0

\* For use in the 2-layer system  
 \*\* <10% passing 2 mm including <5% passing 1 mm

Reviewed by: \_\_\_\_\_  
 James C. Thomas, C.P.Ag.  
 Pres., Thomas Turf Services, Inc.

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Facility: Product Development  
Account No.: 98008  
Lab ID: G9283  
Date Rec'd: 24-Mar-14  
Test Dates: 25-Mar-14  
Report Date: 26-Mar-14

**Gravel / Rootzone - Compatibility Report\***

	<b>D<sub>15</sub></b>		<b>D<sub>85</sub></b>		<b>D<sub>90</sub></b>		Coefficient of Uniformity	Bridging Factor	Permeability Factor
	Gravel	RZ	RZ		Gravel				
2004 USGA Recommendations							≤3	≤8	≥5
Sample ID									
Gravel #89	2.20				7.77		3.5		
Greens Sand (G9210, 1/27/14)		0.20	0.89					2.5	11.0

\* Based on test data from ASTM Methods F1632 and C136-01

Reviewed by: \_\_\_\_\_  
James C. Thomas, C.P.Ag.  
Pres., Thomas Turf Services, Inc.

**Thomas Turf Services, Inc.**  
**Soil Analysis & Turf Management**  
 11183 State Hwy. 30  
 College Station, TX 77845  
 Phone: 979-774-1600  
 Fax: 979-774-1604



**Testing Certificate Number: 0743.01**  
**Geotechnical Putting Green Materials**

Impact Sand & Gravel Bob Motis 145 E. Warm Springs Las Vegas, NV 89119 Phone / Fax: 702-853-9511 Cell: 702-355-2401 E-mail: bmotis@impactcompanies.com				Facility: Product Development Account No.: 98008 Lab ID: G9283 Date Rec'd: 24-Mar-14 Test Dates: As Noted Report Date: 26-Mar-14			
Particle Size Analysis Report - ASTM F1632 - Method B							
U.S. Sieve No.	Texture			Chemical Analysis			
	Sand	Silt	Clay	pH†	EC†† umhos/cm	Extraction Method	Acid Reaction††† 1 N HCl
270 to 10	< 270	< .075	< .002	†USEPA Method 9045C - 1:1 Ratio (20 g Soil:20 ml Distilled Water)			
Particle Diameter (mm)	.05 - 2.0	.002 to .05	<.002	††"Methods of Soil Analysis" American Society of Agronomy (Rhodes, J.D. 1982)			
USGA Recommendations (%)	≤5	≤5	≤3	†††Thomas Turf Services Method (1992)			
Sample ID							
Greens Sand	96.5	1.8	1.5	8.4	311.0	1 To 1	Moderate To Severe
Duplicate (G9210, 1/27/14)	96.6	1.8	1.5				
Particle Size Distribution							
U.S. Sieve No.	Gravel	Very Coarse	Coarse	Medium	Fine	Very Fine	Primary Particle Shape Sphericity/Angularity
>2.0	10	18	35	60	100	< 100	
Particle Diameter (mm)	>2.0	1.0-2.0	0.50-1.0	0.25-0.50	0.15-0.25	< .15	
USGA Recommendations (%)	≤3	7-10 Max*	≤60	≤20	≤20	≤5**	
Sample ID	Percent Retained on Sieve						
Greens Sand	0.2	8.8	35.7	34.3	13.5	4.2	Low To Medium / Sub-ang. To Angular
Duplicate (G9210, 1/27/14)	0.1	9.2	36.5	34.0	12.9	4.0	Low To Medium / Sub-ang. To Angular
Reviewed By: _____ James C. Thomas, C.P. Ag. Pres., Thomas Turf Services, Inc.							

\*The total of the very coarse sand and gravel fractions may not exceed 10%.  
 \*\*The total of the very fine sand, silt and clay fractions may not exceed 10%.

**TITLE:** Irrigation Materials List  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 97  
**DAYS OVERDUE:** 0

RECEIVED FROM	SENT TO	RETURNED BY	FORWARDED TO
WADS MS	STAN JR		

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Senias	Prints	Drawing Date	Held	Elapsed
001	Irrigation Materials List Wadsworth's proposed irrigation materials list for Desert Rose GC	1/29/14	2/4/14			CLO	1	0		91	97
002	Irrigation Materials List - Revised	2/7/14	2/12/14	2/19/14	2/19/14	AAN	0	1		0	12
003	Irrigation Materials List Revised PVC mainline & lateral pipe materials	5/2/14	5/6/14			NEW	0	1		0	4

<b>SHOP DRAWING SUBMITTAL</b>		PROJ. # _____
SUBMITTAL TITLE _____		
SCI DRAWING NO. _____		REV. _____
<input type="checkbox"/>	REVIEWED	 <p><i>Heckenkemper Golf Course Design</i> a div. of Planning Design Group</p>
<input checked="" type="checkbox"/>	REVIEWED AS NOTED	
<input type="checkbox"/>	REVIEWED AS NOTED - RESUBMIT	
<input type="checkbox"/>	RESUBMIT	
<input type="checkbox"/>	RETURNED WITHOUT REVIEW	
<input type="checkbox"/>	FOR INFORMATION ONLY	
<input type="checkbox"/>	VOID	
BY: <u>Rolf Heckenkemper</u>	DATE: <u>5/8/2014</u>	
ACTION OF ANY KIND ON DRAWINGS BY ENGINEER/ARCHITECT DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS, CORRECTNESS OF DETAILS, OR CONFORMANCE TO THE CONTRACT		

Yellow highlighted Materials Approved.

**Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.**

Authorized Representative: \_\_\_\_\_  
 Date: 05/06/14  
 Expedition®

May 2, 2014

Ms. Angie Gruenenfelder  
Las Vegas Paving Corp.  
4420 South Decatur Blvd.  
Las Vegas, NV 89103  
Phone: 702.251.5800  
Email: [angie.gruenenfelder@lasvegaspaving.com](mailto:angie.gruenenfelder@lasvegaspaving.com)

Re: Revised Irrigation Materials Submittal – Desert Rose GC – Las Vegas, NV

Dear Angie,

Under cover of this letter, and for your review and approval, Wadsworth Golf is submitting our revised proposed irrigation materials list for Desert Rose GC in Las Vegas, NV. JM Eagle is no longer willing to honor their commitment concerning the PVC pipe for this project; our revised submittal includes material cut sheet information from Cresline Plastic Pipe Co., Inc.

We would appreciate a review of this submission at your earliest convenience. If you have any questions or require further clarification, please do not hesitate to call.

Sincerely,  
WADSWORTH GOLF CONSTRUCTION COMPANY



Scott McDougall,  
Estimator  
[scottm@wadsworthgolf.com](mailto:scottm@wadsworthgolf.com)

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

Cc: Mark Slugoeki – [marks@wadsworthgolf.com](mailto:marks@wadsworthgolf.com)

# Job: Desert Rose



## Materials List - Irrigation

### Sprinkler Heads

#### VIH Rotors

- ◆ Toro #DT35-46-338EI full circle electric valve-in-head rotor, #33 nozzle, 80 PSI, effluent top, integrated decoder, 1" FACME inlet
- ◆ Toro #DT35-46-318EI part circle electric valve-in-head rotor, #31 nozzle, 80 PSI, effluent top, integrated decoder, 1" FACME inlet
- ◆ Toro #DT35-46-308EI part circle electric valve-in-head rotor, #30 nozzle, 80 PSI, effluent top, integrated decoder, 1" FACME inlet

### Control System

#### Central Control System

- ◆ Toro Lynx #LX-04-5-08 Central Control System w/ Premium Computer Hardware, 5-Year NSN Support Service, CE Level w/ Network GDC Field Hardware, including gateway, handheld radio interface, two (2) handheld radios w/ chargers, antenna, cable, FCC license, site survey, system optimization, and all other components recommended by Toro to make a complete and operational Central Control System

#### Weather Station

- ◆ Toro #T107 Weather Station, Solar-Powered, Hard-Wired Communication, and all other components recommended by Toro to make a complete and operational Weather Station

#### Surge Protector

- ◆ Toro #DEC-SG-LINE decoder line surge protector

### Valves

#### Quick Coupling Valves

- ◆ Toro #474-24 quick coupling valve, two-piece body, lavender vinyl locking cover, 1" FIPT inlet

#### Mainline Gate Valves

- ◆ For HDPE Mainline
  - Clow AWWA C509 resilient wedge gate valve, epoxy coated iron body (inside and outside), 2" square operating nut, flanged ends
- ◆ For PVC Mainline
  - Clow AWWA C509 resilient wedge gate valve, epoxy coated iron body (inside and outside), 2" square operating nut, push-on for IPS PVC pipe

#### Lateral Isolation Valves

- ◆ Harco #841112PL angle valve w/ cross handle, epoxy coated iron body (inside and outside), 12" height, 2" male swivel inlet, 2" deep bell gasket outlet for IPS pipe (including Harco #65-90481102 DR11 stiffener for HDPE pipe)

#### Air Relief Valves

- ◆ Bermad #02-ARC-I combination air and vacuum release valve, cast iron body, 2" FIPT inlet, 2" FIPT outlet

#### Drip Valves

- ◆ Rain Bird #XCZ-100-PRBR drip zone valve kit, plastic, medium flow w/ pressure regulating basket filter, 1" FIPT inlet, 1" MIPT outlet

#### Ball Valves for Air Relief Valves

- ◆ Nibco #T-580 ball valve, bronze body, 2" FIPT inlet, 2" FIPT outlet

## Pipe

### Mainline Pipe

- ◆ Performance Pipe IPS DR13.5 160 PSI HDPE pipe w/ 4710 resin, purple stripe, plain end
- ◆ **Cresline** IPS DR21 CL200 PVC pipe, blue or white in color, integral bell, ring tight

### Lateral Pipe

- ◆ Performance Pipe IPS DR11 200 PSI HDPE pipe w/ 4710 resin, purple stripe, plain end
- ◆ **Cresline** IPS DR21 CL200 PVC pipe, standard white in color, integral bell, solvent weld

### Drip Valve Pipe

- ◆ Centennial Plastics CenFlo IPS HDPE 100 lb poly pipe, plain end
- ◆ Netafim Techline RW #TLRW6-1810 17 mm dripline, brown w/ purple stripe, .6 GPH flow rate, 18" OC emitter spacing

## Pipe Fittings

### Service Saddles

- ◆ For Lateral Isolation Valves
  - Harco IPS electrofusion swivel saddle, nupi based, 200 PSI rating, 2" female swivel outlet (for HDPE mainline)
  - Harco IPS swivel saddle, epoxy coated ductile iron body, stainless steel single strap, 2" female swivel outlet (for PVC mainline)
- ◆ For Air Relief Valves
  - Harco IPS electrofusion branch saddle, nupi based, 200 PSI rating, 2" butt fusion outlet

### HDPE Fittings

- ◆ Harco IPS butt fusion fittings from 4710 resin only, DR11 body, DR13.5 machine ends (for mainline fittings only), molded when available (fabricated otherwise)
- ◆ Harco IPS brass transition fitting, brass MIPT x DR11 butt fusion HDPE

### Ductile Iron Fittings – Push-On

- ◆ Harco deep bell, gasketed style, encased in polywrap

### Ductile Iron Fittings – Mechanical Joint

- ◆ Sigma AWWA C153 CL350 compact

### Ductile Iron Fittings – Flanged

- ◆ Sigma AWWA C110 CL250

### PVC Fittings – Solvent Weld

- ◆ Lasco Schedule 80
- ◆ Lasco Schedule 40
- ◆ Lasco Insert (for 100 lb poly pipe)
- ◆ Netafim 17mm Barbed (for dripline pipe)

### Nipples

- ◆ Edmund A. Gray Brass

## Swing Joints

### VIH Rotors

- ◆ Toro #TSJ-15A12-12-5-10A 1.5" unitized swing joint, 1.5" MACME inlet, 1" MACME outlet, triple top, 12" lay

### Quick Coupling Valves

- ◆ Lasco #G1MS-218 1" unitized swing joint, 1.5" MACME inlet, 1" brass MIPT outlet, snaplok stabilizer, single top, 18" lay

### Services

#### ◆ For VIH Rotors

- Harco #75-35386 2 x 2 x 1.5 230 PSI polypropylene compression x compression x FACME service tee
- Harco #75-32386 2 x 1.5 230 PSI polypropylene compression x FACME service 90 deg ell

#### ◆ For Quick Coupling Valves

- Lasco #302-251 2 x 2 x 1.5 soc x soc x FACME service tee
- Lasco #307-251 2 x 1.5 soc x FACME service 90 deg ell

## Wire

### Communication Wire

#### ◆ For VIH Rotors

- Express
  - Regency #14/2 Toro GDC jacketed decoder wire, solid copper conductor, direct burial, eight (8) colors
- Individual Hole
  - Regency #14/2 Toro twisted decoder wire, solid copper conductor, direct burial, two (2) colors

#### ◆ For Pump Station / Weather Station

- Regency two pair, #18 tinned copper conductor, tinned copper drain wire, aluminum mylar shield, direct burial, unarmored

### Bonding/Shielding Wire

- ◆ Regency #10 solid bare copper wire

### Equipment Ground

- ◆ Regency #6 solid bare copper wire

## Electrical

### Decoder Cable Fuse Device (DCFD)

- ◆ Paige #270DCFD 2-way decoder cable fuse device

### Splices

- ◆ Communication (VIH Rotors)
  - Paige #7364D 3M DBR/Y-6 direct burial splice, red/yellow wire nut, UL listed
- ◆ Communication (Pump Station / Weather Station)
  - 3M SLiC two pair communication cable waterproofing kit
  - 3M 316 IR low voltage connector
- ◆ Bare Copper
  - Cadweld #PG11LPLUS 4-way connector for #6/#8 solid

### Grounding

- ◆ For Central Controller & Weather Station
  - L.H. Dottie 5/8" x 8' copper clad steel ground rod, UL listed
  - Cadweld #NT1161GPLUS 3-way connector for 5/8" rod and #6 solid
  - Regency 4" x 96" x .0625" copper alloy ground plate w/ 25 lf of #6 bare solid copper wire
  - Erico ground enhancement material (GEM)
- ◆ For Surge Protectors
  - L.H. Dottie 5/8" x 8' copper clad steel ground rod, UL listed
  - L.H. Dottie ground rod clamp for 5/8" rod and #10 solid, UL listed

## Miscellaneous

### Valve Boxes

- ◆ Carson #910-10-4 10" round pit, purple, t-cover, imprint 'ICV'
  - for quick coupling valves, mainline gate valves (HDPE mainline) and lateral isolation valves (HDPE mainline)
- ◆ Carson #910-10-4 10" round pit, green, t-cover, imprint 'ICV'
  - for mainline gate valves (PVC mainline) and lateral isolation valves (PVC mainline)
- ◆ Carson #910-10-4 10" round pit, gray, t-cover, imprint 'Electric'
  - for ground rods, decoder cable fuse devices (DCFD) and electrical splices
- ◆ Carson #1220-12-4 jumbo valve box, purple, t-cover, imprint 'Irrigation Control Valve'
  - for air relief valves and drip valves
- ◆ Carson #1220-6X jumbo valve box extension, purple, 6" height
  - for air relief valves
- ◆ Carson #1419-12-4 standard valve box, gray, t-cover, imprint 'Electric'
  - for central controller and weather station

### Valve Tags

- ◆ For Reclaimed System
  - Christy #ID-MAX-P2-RC006 recycled/reclaimed irrigation ID tag, purple, double side stamped

### Solvents

- ◆ IPS Weld-On #721 PVC cement, blue in color
- ◆ IPS Weld-On #P-70 primer, purple in color

End of Materials List

CWPVC-4

JULY, 2013

PLEASE ORDER BY PART NUMBER.

SDR-41 100 PSI PVC1120 ASTM D-2241 *NOTE	SIZE	O.D.	I.D.	MIN. WALL	WEIGHT PER 100'	FEET PER PALLET	PALLETS PER T.L.	GJ PART NO.
	4"	4.500	4.280	.110	101.61	760	20	49031
	6	6.625	6.301	.162	220.89	360	20	49033
	8	8.625	8.205	.210	375.76	280	16	49035
	10	10.750	10.226	.262	585.26	160	16	49038
	12	12.750	12.128	.311	825.02	120	12	49040

SDR-32.5 125 PSI PVC1120 ASTM D-2241 *NOTE	SIZE	O.D.	I.D.	MIN. WALL	WEIGHT PER 100'	FEET PER PALLET	PALLETS PER T.L.	GJ PART NO.
	3"	3.500	3.284	.108	77.05	1160	20	49042
	4	4.500	4.224	.138	126.91	760	20	49044
	6	6.625	6.217	.204	276.28	360	20	49046
	8	8.625	8.095	.265	471.24	280	16	49048
	10	10.750	10.088	.331	735.08	160	16	49050
12	12.750	11.966	.392	1033.15	120	12	49052	

SDR-26 160 PSI PVC1120 ASTM D-2241 	SIZE	O.D.	I.D.	MIN. WALL	WEIGHT PER 100'	FEET PER PALLET	PALLETS PER T.L.	GJ PART NO.
	3 <sup>***</sup>	3.500	3.230	.135	95.24	1160	20	48110
	4 <sup>**</sup>	4.500	4.154	.173	157.63	760	20	48130
	6	6.625	6.115	.255	343.09	360	20	48170
	8 <sup>**</sup>	8.625	7.961	.332	585.35	280	16	48190
	10 <sup>**</sup>	10.750	9.924	.413	909.60	160	16	48200
12 <sup>**</sup>	12.750	11.770	.490	1280.86	120	12	48210	

SDR-21 200 PSI PVC1120 ASTM D-2241 	SIZE	O.D.	I.D.	MIN. WALL	WEIGHT PER 100'	FEET PER PALLET	PALLETS PER T.L.	GJ PART NO.
	2"	2.375	2.149	.113	53.50	2960	20	48471
	3	3.500	3.166	.167	116.68	1160	20	48511
	4	4.500	4.072	.214	193.02	760	20	48531
	6	6.625	5.993	.316	420.57	360	20	48571
	8	8.625	7.805	.410	715.32	280	16	48591
	10	10.750	9.728	.511	1113.20	160	16	48600
12	12.750	11.538	.606	1568.19	120	12	48610	

GJ PIPE IS PRODUCED FROM PVC MATERIAL AS PER ASTM D-1784. GASKET CONFORMS TO F-477.

GJ PIPE IS 20 FT. LAYING LENGTH ± 1" WITH 15° BEVEL AT THE SPIGOT END AND BELL DEPTH REFERENCE LINE.

GJ PIPE IS PRODUCED WITH A REINFORCED (STEEL BAND) GASKET WHICH IS PERMANENTLY INSTALLED AND SEALED INTO THE BELL SOCKET AS THE PIPE IS BEING MANUFACTURED.

ALL GJ SDR-26 AND 3"-8" SDR-21 PIPE IS CERTIFIED TO THE UNIFORM PLUMBING CODE BY NSF INTERNATIONAL.

ALL GJ SDR-26 AND SDR- 21 PIPE IS CERTIFIED TO NSF/ANSI 61, ANNEX G (CA AND VT LEAD FREE LAWS) BY NSF INTERNATIONAL.

\* NOTE: GJ SDR-41 AND SDR-32.5 PIPE IS NOT CERTIFIED BY NSF INTERNATIONAL.

\*\* NON-STOCK ITEM

**CONVERSION CHART FOR PRESSURE RATINGS  
AT VARIOUS TEMPERATURES FOR CRESLINE - PVC PIPE**

<b>TEMPERATURE °F</b>	73.4°	80°	90°	100°	110°	120°	130°	140°
<b>CONVERSION FACTOR</b>	1.00	.88	.75	.62	.50	.40	.30	.22

PRESSURE RATING IS THE ESTIMATED MAXIMUM PRESSURE THAT WATER AS THE MEDIUM IN THE PIPE CAN EXERT CONTINUOUSLY FOR A LONG TIME WITH A HIGH DEGREE OF CERTAINTY THAT FAILURE OF THE PIPE WILL NOT OCCUR.

**DO NOT USE PLASTIC PIPE AND FITTINGS FOR COMPRESSED AIR.**

**ASSEMBLY:**

1. CLEAN AND DRY THE INTERIOR OF GJ BELL AND THE EXTERIOR OF THE PIPE SPIGOT.
2. APPLY LUBRICANT TO THE SPIGOT END OF THE PIPE. LUBRICATE UP TO THE INSERTION DEPTH RING. DO NOT LUBRICATE THE GASKET.
3. INSERT THE SPIGOT END INTO THE GJ BELL, MAKING SURE THE TWO LENGTHS ARE ALIGNED. PUSH THE PIPES TOGETHER UNTIL THE SPIGOT DEPTH RING IS FLUSH WITH THE ENTRANCE OF THE BELL.

**PRECAUTIONS:**

1. BE SURE TO KEEP DIRT OFF LUBRICATED SPIGOT AND OUT OF THE GJ BELL.
2. THE PIPE SHOULD BE BURIED AT LEAST 24 INCHES BELOW GROUND AND PREFERABLY BELOW THE FROST LINE.
3. INSTALLATION, TRENCHING AND BACKFILLING SHOULD BE PERFORMED IN ACCORDANCE WITH ASTM F 690.
4. BE SURE LINE IS PRESSURE TESTED BEFORE BACKFILLING. ALL JOINTS AND CONNECTIONS MUST BE LEFT EXPOSED UNTIL TESTING IS COMPLETED.

**PALLET QUANTITIES GJ PVC PRESSURE PIPE**

PIPE SIZE	FEET PER PALLET	WT. PER PALLET			
		SDR-41	SDR-32.5	SDR-26	SDR-21
2	2960	--	--	--	1584
3	1160	--	894	1105	1353
4	760	773	965	1198	1467
6	360	796	995	1235	1514
8	280	1053	1320	1639	2003
10	160	937	1176	1456	1781
12	120	991	1240	1538	1882

JOINTS INSTALLED PER QUART OF LUBRICANT	
PIPE SIZE	JOINTS
2	125
3	105
4	100
6	70
8	50
10	8
12	6



NSF® pw-G U.P.Code

**CRESLINE - WEST, INC.**

**CORPORATE HEADQUARTERS: 600 CROSS POINTE BOULEVARD · EVANSVILLE, IN 47715 · TELEPHONE (812) 428-9300**

**PLANT: 3747 W. BUCKEYE ROAD · PHOENIX, AZ 85009 · TELEPHONE (602) 269-5161**

**WAREHOUSE: 1930 W. WHITESBRIDGE ROAD · FRESNO, CA 93706 · TELEPHONE (559) 486-1840**

**www.cresline.com**



**PVC PRESSURE PIPE  
SDR-26, SDR-21 & SDR-13.5**

CWPVC-2

APRIL, 2010

PLEASE ORDER BY PART NUMBER.

<b>SDR-26 PRESSURE PIPE 160 PSI PVC1120 ASTM D-2241</b>  	SIZE	O.D.	I.D.	MIN. WALL	WEIGHT PER 100'	FEET PER PALLET	PALLETS PER T.L.	BELLED PART NO.
	1¼"	1.660	1.532	.064	20.93	4000	32	45243
	1½	1.900	1.754	.073	27.31	3600	28	45280
	2	2.375	2.193	.091	42.51	2800	24	45345
	2½	2.875	2.655	.110	62.13	2240	20	45410
	3	3.500	3.230	.135	92.81	1500	20	45470
	4*	4.500	4.154	.173	158.24	580	28	47075
	6*	6.625	6.115	.255	343.40	400	20	47120
8	8.625	7.961	.332	554.30	280	16	45695	

NOTE: 8" SDR-26 IS DUAL MARKED FOR SCH-40 PIPE.

<b>SDR-21 PRESSURE PIPE 200 PSI PVC1120 ASTM D-2241</b>  	¾"	1.050	.930	.060	12.11	6600	40	46157
	1	1.315	1.189	.063	16.17	5400	32	46207
	1¼	1.660	1.502	.079	25.59	4000	32	46243
	1½	1.900	1.720	.090	33.32	3600	28	46285
	2	2.375	2.149	.113	52.32	2800	24	46345
	2½	2.875	2.601	.137	76.53	2240	20	46410
	3	3.500	3.166	.167	113.71	1500	20	46470
	4*	4.500	4.072	.214	192.22	580	28	47275
	6*	6.625	5.993	.316	420.11	400	20	47320
8*	8.625	7.805	.410	710.96	280	16	47335	

\*PIPE DUAL MARKED FOR POTABLE WATER AND WELL CASING (20' LAYING LENGTHS).

<b>SDR-13.5 PRESSURE PIPE 315 PSI PVC1120 ASTM D-2241</b>  	½"	.840	.716	.062	9.81	8400	44	46105
	2	2.375	2.023	.176	78.80	2800	24	46025
	2½	2.875	2.449	.213	113.50	2240	20	46035
	3	3.500	2.982	.259	170.70	1500	20	46045
	4	4.500	3.834	.333	281.80	580	28	46055

NOT RECOMMENDED FOR THREADING.

ALL SDR-26, SDR-21, AND SDR-13.5 PIPE IS CERTIFIED TO THE UNIFORM PLUMBING CODE BY NSF INTERNATIONAL.

ALL SDR-26, SDR-21, AND SDR-13.5 PIPE IS CERTIFIED TO NSF/ANSI 61, ANNEX G (CA AND VT LEAD FREE LAWS) BY NSF INTERNATIONAL.

**PRESSURE RATINGS  
FOR CRESLINE - PVC PIPE  
AT 73.4°**

SIZE	½	¾	1	1¼	1½	2	2½	3	4	6	8
SDR-26	--	--	--	160	160	160	160	160	160	160	160
SDR-21	--	200	200	200	200	200	200	200	200	200	200
SDR-13.5	315	--	--	--	--	315	315	315	315	--	--

**CONVERSION CHART FOR PRESSURE RATINGS  
AT VARIOUS TEMPERATURES FOR CRESLINE - PVC PIPE**

TEMPERATURE °F	73.4°	80°	90°	100°	110°	120°	130°	140°
CONVERSION FACTOR	1.00	.88	.75	.62	.50	.40	.30	.22

PRESSURE RATING IS THE ESTIMATED MAXIMUM PRESSURE THAT WATER AS THE MEDIUM IN THE PIPE CAN EXERT CONTINUOUSLY FOR A LONG TIME WITH A HIGH DEGREE OF CERTAINTY THAT FAILURE OF THE PIPE WILL NOT OCCUR.

**DO NOT USE PLASTIC PIPE AND FITTINGS FOR COMPRESSED AIR.**

**PALLET QUANTITIES PVC PRESSURE PIPE**

PIPE SIZE	FEET PER PALLET	WT. PER PALLET		
		SDR-26	SDR-21	SDR-13.5
½	8400	--	--	824
¾	6600	--	800	--
1	5400	--	874	--
1¼	4000	837	1024	--
1½	3600	983	1200	--
2	2800	1190	1465	2206
2½	2240	1392	1715	2542
3	1500	1393	1706	2561
4	580	918	1115	1635
6	400	1374	1680	--
8	280	1552	1991	--

PVC SDR-26, SDR-21, AND SDR-13.5 CAN BE USED ON JET OR SUBMERSIBLE PUMPS OF 1 HP OR LESS

MAXIMUM DEPTH SETTINGS TO WATER LEVEL IN FT @ 73.4° F			
CRESLINE PVC PRESSURE PIPE	MAX. TANK SHUT-OFF PRESSURE		
	40 PSI	50 PSI	60 PSI
ANY SIZE PVC SDR-26	275'	255'	230'
ANY SIZE PVC SDR-21	365'	345'	320'
ANY SIZE PVC SDR-13.5	635'	610'	585'



NSF® pw-G U.P.Code

CRESLINE - WEST, INC.

CORPORATE HEADQUARTERS: 600 CROSS POINTE BOULEVARD · EVANSVILLE, IN 47715 · TELEPHONE (812) 428-9300

PLANT: 3747 W. BUCKEYE ROAD · PHOENIX, AZ 85009 · TELEPHONE (602) 269-5161

WAREHOUSE: 1930 W. WHITESBRIDGE ROAD · FRESNO, CA 93706 · TELEPHONE (559) 486-1840

www.cresline.com



4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL  
 NO. 213A-003  
 PACKAGE NO: 213A**

**TITLE:** HDPE Irrigation Fittings  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 6  
**DAYS OVERDUE:** 0

RECEIVED FROM		SENT TO		RETURNED BY	FORWARDED TO	
WADS	MS	STAN	JR			

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Senias	Prints	Drawing Date	Held	Elapsed
001	HDPE Irrigation Fittings	1/29/14	2/4/14			NEW	0	1		0	6

**Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.**

Authorized Representative: \_\_\_\_\_  
 Date: 05/06/14

# HDPE Fittings from HARCO



HARCO offers fittings for HDPE pipe starting at 1/2" through 36"+. Both IPS and DIPS available as well as FM fittings. HARCO has developed a set of sources with long and proven experience in the manufacture of pipe fittings for HDPE pipe. We offer special fittings for irrigation applications utilizing our Swivel and Lateral Isolation Valve Products.



THE HARRINGTON CORPORATION  
P.O. Box 10335 • Lynchburg, VA 24506-0335  
Phone: (434) 845-7094 Fax: (434) 845-8562

sales@harcofittings.com  
www.harcofittings.com

PF148-121709

CALL FOR OTHER CONFIGURATIONS



Philmac Universal  
Transition Couplings  
3/4" - 2"



Fabricated Butt Fusion Fittings  
3" - 36"+



Philmac Polypropylene  
Compression Fittings  
3/4" - 2"



Transition Fittings  
1/2" - 6"+



Molded Butt Fusion Fittings  
1/2" - 12"



Flange Adapters,  
Back Up Rings, and Accesories  
2" - 36"+



Electrofusion Saddles  
and Couplings  
3/4" - 32"



Stainless Steel Stiffeners  
1 1/2" - 20"+



Molded Socket  
Fusion Fittings  
1/2" - 4"



Polyethylene  
Ball Valves  
1/2" - 12"



MJ Adapters,  
MJ Bell Adapters,  
Accessories, and Restraints  
3" - 24"+



THE HARRINGTON CORPORATION  
P.O. Box 10335 • Lynchburg, VA 24506-0335  
Phone: (434) 845-7094 Fax: (434) 845-8562

sales@harcofittings.com  
www.harcofittings.com



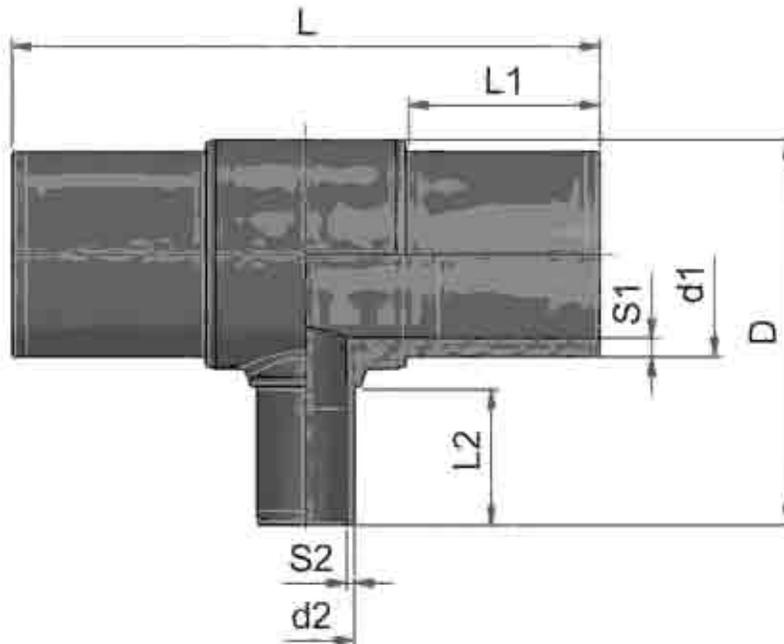
# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



## Butt Reducing Tees

Black PE 4710 HDPE  
Produced to ASTM D3261



d1	S1	L1	d2	S2	L2	D	L
2	0.22	2.76	3/4	0.10	1.97	5.08	9.45
2	0.22	2.76	1	0.12	1.97	5.08	9.45
2	0.22	2.76	1 1/4	0.12	2.17	5.08	9.45
3	0.32	3.31	1	0.12	2.36	6.56	10.00
3	0.32	3.31	1 1/4	0.13	2.36	6.56	10.00
3	0.32	3.31	2	0.22	2.76	6.95	10.00
4	0.41	3.43	1 1/4	0.15	2.17	7.32	12.60
4	0.41	3.43	2	0.22	2.76	7.84	12.60
4	0.41	3.43	3	0.31	3.31	8.32	12.20
6	0.60	3.74	2	0.22	2.76	9.80	15.91
6	0.60	3.74	4	0.41	3.43	10.87	15.91



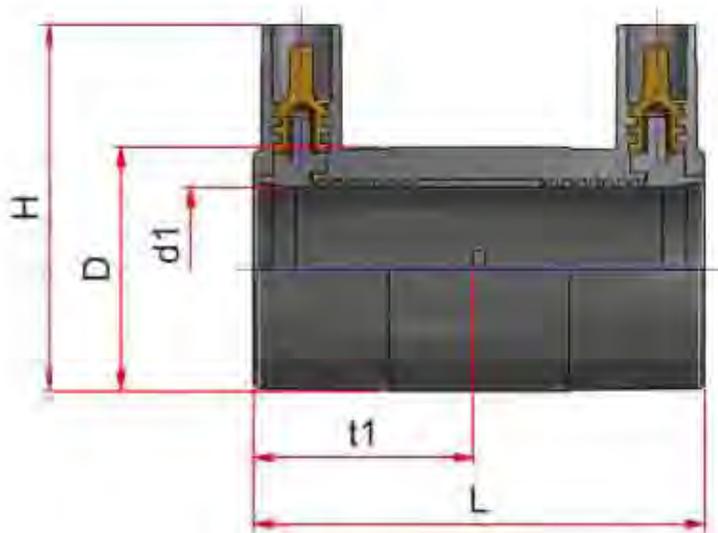
# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



## Electrofusion Couplings

Black PE 4710 HDPE  
Produced to ASTM F1055

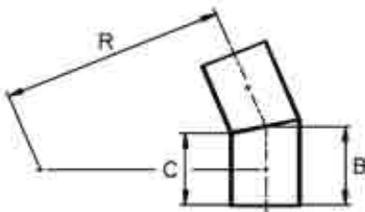


d1 (IPS)	D	H	L	t1
3/4	1.59	2.40	2.91	1.41
1	1.79	2.40	2.91	1.41
1 1/4	2.16	2.91	3.26	1.57
1 1/2	2.64	3.40	3.47	1.69
2	3.11	3.88	5.12	2.52
3	4.45	5.04	5.90	2.91
4	5.59	6.14	6.30	3.11
6	8.03	8.42	7.28	3.60
8	11.02	11.02	7.08	3.54



# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



## Fabricated IPS 2-Segment 22.5 Ell Black PE 4710 HDPE 2" - 24" Produced to AWWA C906-99

Nominal Size Actual OD	Pressure Class (psi)	Feed Stock	Dimensions R x C x B (in)
2" 2.375"	100	DR 11	13 1/8 x 4 x 4 1/4
	128	DR 11	
	160	DR 9	
	200	DR 7	
3" 3.500"	100	DR 11	13 5/8 x 4 x 4 3/8
	128	DR 11	
	160	DR 9	
	200	DR 7	
4" 4.500"	100	DR 11	14 1/4 x 5 x 5 1/2
	128	DR 11	
	160	DR 9	
	200	DR 7	
6" 6.625"	80	DR 17	15 1/4 x 6 x 6 5/8
	128	DR 11	
	160	DR 9	
	200	DR 7	
8" 8.625"	80	DR 17	16 1/4 x 6 1/2 x 7 3/8
	128	DR 11	
	160	DR 9	
	200	DR 7	
10" 10.750"	80	DR 17	17 1/4 x 6 1/2 x 7 5/8
	100	DR 11	
	128	DR 11	
	160	DR 9	
12" 12.750"	80	DR 17	19 1/2 x 8 x 9 1/4
	100	DR 11	
	128	DR 11	
	160	DR 9	
14" 14.000"	80	DR 17	21 x 8 x 9 3/8
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	



# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



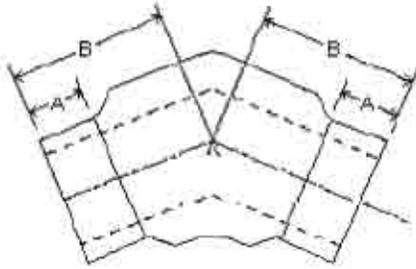
## Fabricated IPS 3-Segment 45 Wyes Black PE 4710 HDPE

Nominal Size Actual OD	Pressure Class (psi)	Feed Stock	Dimensions L x C x J (in)
2" 2.375"	80	DR 17	21 3/8 x 4 x 16 7/8
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	
3" 3.50"	80	DR 17	23 x 4 x 18 1/4
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	
4" 4.50"	80	DR 17	24 3/8 x 4 x 19 3/8
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	
6" 6.625"	80	DR 17	31 3/8 x 6 x 24
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	
8" 8.625"	80	DR 17	36 1/4 x 8 x 26 3/8
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	
10" 10.750"	80	DR 17	41 1/4 x 8 x 31
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	
12" 12.750"	80	DR 17	44 x 8 x 33 3/8
	100	DR 11	
	128	DR 11	
	160	DR 9	
	200	DR 7	



# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



## Molded IPS Butt 45 Ell

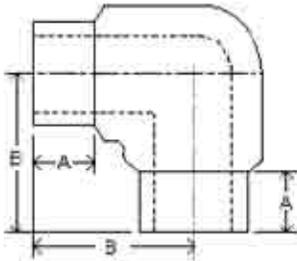
Black PE 4710 HDPE  
Produced to ASTM D2513 and ASTM D3261  
2" and Up are AWWA C906-07

Nominal Size Actual OD	Pressure Class (psi)	SDR	Dimensions A x B (in)
3/4" 1.05"	160	DR 11	2.05 X 2.28
1" 1.315"	160	DR 11	2.17 X 2.48
1 1/4" 1.66"	160	DR 11	2.44 X 2.83
1 1/2" 1.90"	160	DR 11	2.64 X 3.07
2" 2.375"	100	DR 17	2.50 X 4.50
	160	DR 11	
	200	DR 9	
	267	DR 7	
3" 3.50"	100	DR 17	3.20 X 5.50
	160	DR 11	
	200	DR 9	
4" 4.50"	100	DR 17	3.00 X 5.00
	160	DR 11	
	200	DR 9	
6" 6.63"	100	DR 17	4.0 X 10.00
	160	DR 11	
	200	DR 9	
8" 8.63"	100	DR 17	6.0 X 10.00
	160	DR 11	
	200	DR 9	
10" 10.75"	100	DR 17	7.64 X 10.04
	160	DR 11	
12" 12.75"	100	DR 17	7.80 X 10.63
	160	DR 11	



# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



## Molded IPS Butt 90 Ell

Black PE 4710 HDPE

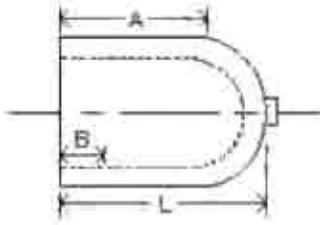
Produced to ASTM D2513 and ASTM D3261  
2" and Up are AWWA C906-07

Nominal Size Actual OD	Pressure Class (psi)	SDR	Dimensions A x B (in)
3/4" 1.05"	160	DR 11	1.72 X 2.94
1" 1.32"	160	DR 11	1.72 X 3.06
	200	DR 9	
1 1/4" 1.66"	160	DR 11	3.13 X 4.50
	200	DR 9	
1 1/2" 1.90"	100	DR 17	3.0 X 4.50
	160	DR 11	
	200	DR 9	
2" 2.38"	100	DR 17	2.88 X 5.06
	160	DR 11	
	200	DR 9	
	267	DR 7	
3" 3.50"	100	DR 17	3.0 X 6.00
	160	DR 11	
	200	DR 9	
	267	DR 7	
4" 4.50"	100	DR 17	3.0 X 6.0
	160	DR 11	
	200	DR 9	
	267	DR 7	
5" 5.56"	100	DR 17	3.0 X 6.0
	160	DR 11	
	200	DR 9	
6" 6.63"	100	DR 17	4.0 X 8.63
	160	DR 11	
	200	DR 9	
8" 8.63"	100	DR 17	6.0 X 11.81
	160	DR 11	
	200	DR 9	
	267	DR 7	



# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



## Molded IPS Butt Caps

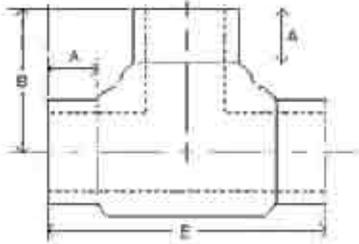
Black PE 4710 HDPE  
Produced to ASTM D2513 and D3261  
2" and Larger Meet AWWA C906-07

Nominal Size Actual OD	Pressure Class (psi)	SDR	Dimensions A x B x L (in)
1/2" 2.375"	160	DR 11	2.25 X 1.50 X 2.875
3/4" 2.375"	160	DR 11	2.25 X 1.50 X 2.875
1" 2.375"	160	DR 11	2.25 X 1.50 X 2.875
	200	DR 9	
1 1/4" 2.375"	100	DR 17	2.25 X 1.50 X 2.875
	160	DR 11	
	200	DR 9	
1 1/2" 2.375"	100	DR 17	2.25 X 1.50 X 2.875
	160	DR 11	
	200	DR 9	
2" 2.375"	100	DR 17	2.25 X 1.50 X 2.875
	160	DR 11	
	200	DR 9	
	267	DR 7	
3" 4.350"	100	DR 17	3.00 X 1.50 X 3.25
	160	DR 11	
	200	DR 9	
	267	DR 7	
4" 4.50"	100	DR 17	3.00 X 1.50 X 4.00
	160	DR 11	
	200	DR 9	
	267	DR 7	
6" 6.63"	100	DR 17	2.875 X 1.50 X 4.50
	160	DR 11	
	200	DR 9	
	267	DR 7	
8" 8.63"	100	DR 17	2.125 X 1.50 X 4.75
	160	DR 11	
	200	DR 9	
	267	DR 7	



# THE HARRINGTON CORPORATION

Warehouses in VA, FL, TX, AZ



## Molded IPS Butt Tee

Black PE 4710 HDPE

Produced to ASTM D2513 and ASTM D3261  
2" and Up are AWWA C906-07

Nominal Size Actual OD	Pressure Class (psi)	SDR	Dimensions A x B x L (in)
1/2" 0.84"	200	DR 9.3	1.72 X 2.94 x 5.88
3/4" 1.05"	160	DR 11	1.72 X 2.94 x 5.88
1" 1.32"	160	DR 11	1.72 X 3.06 x 6.12
	200	DR 9	
1 1/4" 1.66"	160	DR 11	2.75 X 4.53 x 9.25
	200	DR 9	
1 1/2" 1.90"	100	DR 17	3.02 X 4.62 x 9.24
	160	DR 11	
	200	DR 9	
2" 2.38"	100	DR 17	2.50 X 4.25 x 8.50
	160	DR 11	
	200	DR 9	
	267	DR 7	
3" 3.50"	100	DR 17	3.0 X 5.75 x 11.38
	160	DR 11	
	200	DR 9	
	267	DR 7	
4" 4.50"	100	DR 17	3.0 X 6.25 x 12.25
	160	DR 11	
	200	DR 9	
5" 5.56"	267	DR 7	3.0 X 6.25 x 12.25
	100	DR 17	
	160	DR 11	
6" 6.63"	200	DR 9	4.0 X 8.25 x 16.25
	160	DR 11	
	100	DR 17	
	267	DR 7	
8" 8.63"	200	DR 9	6.0 X 12.09 x 24.18
	160	DR 11	
	100	DR 17	
	267	DR 7	

# ACME SERVICE FITTINGS FOR HDPE LATERALS

## Compression x Acme



**FEATURES**

- 1½" Female Acme Outlets
- Full size fittings
- All plastic
- Internal restraint & seal
- Rated 230psi

**BENEFITS**

- Strength and reliability
- No fusion required
- Horizontal orientation of branch
- No holes cut in pipe
- No metal screws

**CONFIGURATIONS**

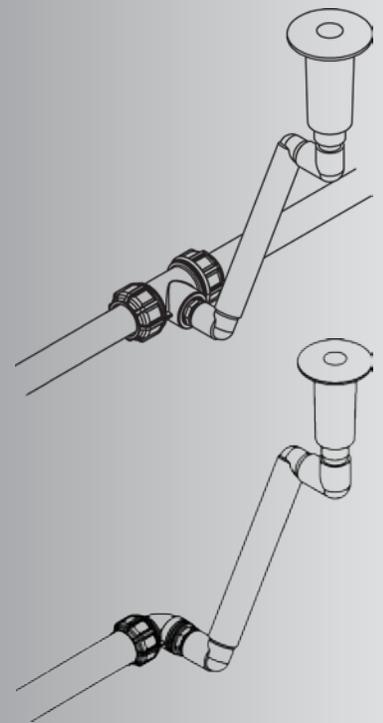
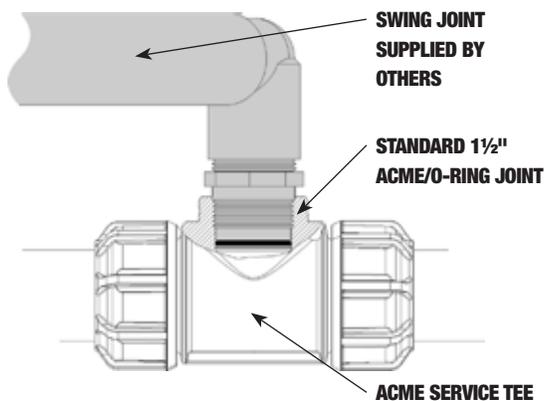
- Service Tee
- Service Elbow
- Service Adapter

**SIZES**

2" x 1½"

**Looking for something more robust than PVC mechanical clamp saddles?**

Available now are ACME Service Tees, Service Ells, and Service Adapters for 2" HDPE laterals in golf irrigation systems. Make the critical connection of the lateral to the swing joint serving the irrigation head with a full size fitting, branches directed horizontally, no holes drilled in pipe, and no metal screws to tighten. Having the industry standard 1½" Female Acme outlet for connection to swing joints, this polypropylene compression fitting provides for easy installation without fusion. Being full sized fittings, they will have better long-term strength and reliability than the saddles previously used.

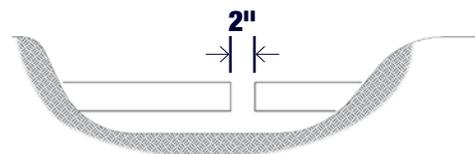


# ACME SERVICE FITTINGS FOR HDPE LATERALS

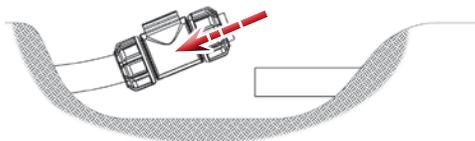
## Compression x Acme

### Tee Installation

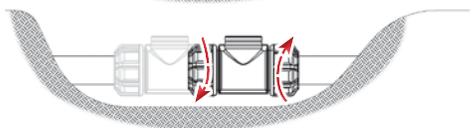
After "pulling lateral," excavate to expose pipe at required location.



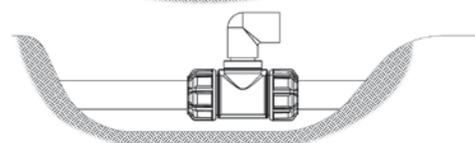
Cut 2" gap in pipe at desired position to serve branch of tee. Cuts should be square. Remove dirt, debris, shavings, and burrs from ends of pipes. Knock rawed edges off pipe at cut.



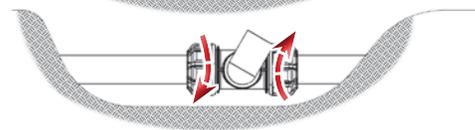
Lift one end of lateral and "load" service tee as shown.



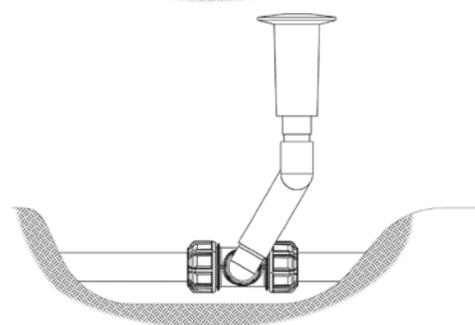
Align pipe ends. Pull service tee over joint. Center branch over gap. **HAND TIGHTEN NUTS.**



Confirming branch is centered over pipe gap, install swing joint inlet assembly into branch of service tee, threaded full "in."



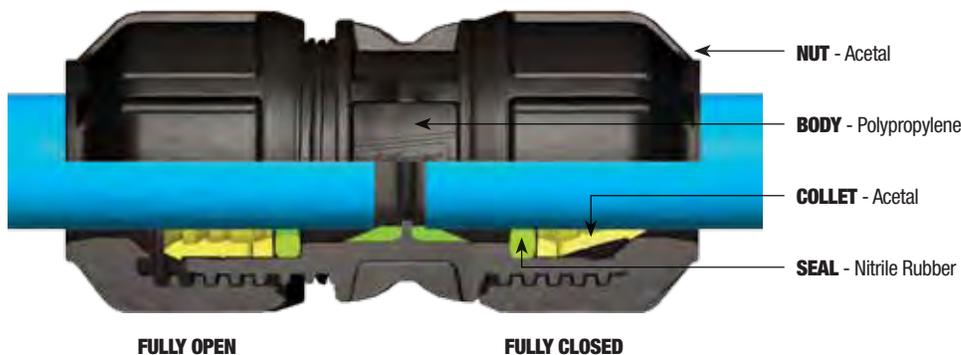
Rotate service tee to position branch horizontally and **FULLY TIGHTEN NUTS WITH WRENCH.** "Back off" swing joint inlet so that ell is pointing up and can be rotated to final position when the swing joint is installed.



Install the rest of the swing joint and irrigation head.

#### COMPRESSION x ACME SERVICE FITTINGS

SIZE	DESCRIPTION	PART #	WT
2 x 1½	<b>ACME SERVICE TEE</b>	<b>75-353886</b>	<b>2.0</b>
2 x 1½	<b>ACME SERVICE ELL</b>	<b>75-32386</b>	<b>1.2</b>
2 x 1½	<b>ACME SERVICE ADAPTER</b>	<b>75-33386</b>	<b>1.0</b>



### MATERIALS OF CONSTRUCTION

**Body:** Polypropylene

**Nut:** Acetal

**Collet:** Acetal

**Seal:** Nitrile Rubber

### SUGGESTED SPECIFICATION

Service Fittings for 2" laterals serving irrigation heads shall be polypropylene compression fittings in the form of tees, ells, or adapters with 1½" Female Acme outlets. Pressure Rating shall be 230psi. Installation shall not require disassembly of the fitting, the handling of any loose parts, or the beveling and lubrication of pipe. All service outlets shall be oriented horizontally. Fittings shall be as manufactured by Philmac Pty Ltd. and The Harrington Corporation (Harco) of Lynchburg, VA.



THE HARRINGTON CORPORATION  
P.O. Box 10335 ♦ Lynchburg, VA 24506-0335  
Phone: (434) 845-7094 Fax: (434) 845-8562

sales@harcofittings.com  
www.harcofittings.com

PF150-022410



4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL  
 NO. 213A-004  
 PACKAGE NO: 213A**

**TITLE:** Irrigation Wire  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 6  
**DAYS OVERDUE:** 0

RECEIVED FROM		SENT TO		RETURNED BY	FORWARDED TO
WADS	MS	STAN	JR		

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Senias	Prints	Drawing Date	Held	Elapsed
001	Irrigation Wire	1/29/14	2/4/14			NEW	0	1		0	6

**Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.**

Authorized Representative: \_\_\_\_\_  
 Date: 05/06/14  
 Expedition ®



830 South West Street, Sikeston MO 63801

800-876-3020 / 573-472-2990 / FAX 573-471-3134



## Toro™ GDC Decoder Cable

### Description:

Regency's Toro™ GDC Cable is manufactured for the control of Toro's™ decoder systems. It is direct burial rated.

Conductor construction is soft drawn bare copper meeting the requirements of ASTM Specification B-3. Toro™ GDC Decoder Cable features solid copper conductors.

The two conductors shall be insulated with a low density, high molecular weight polyethylene (PE). One conductor will be insulated black and the other conductor insulated white. The two conductors are twisted with a 4" lay and rated for systems applications up to 600 volts.

The two twisted conductors shall be extruded with a high density, sunlight resistant polyethylene (HDPE) jacket. The jacket comes in a variety of colors to accommodate easy identification. Comes with pull cord for easy stripping.

Toro™ GDC Decoder Cable is constructed in accordance with Underwriters Laboratories, Inc.

### Application:

Suitable for use as Toro's™ communication wire for control of Toro decoder systems.

### Construction:

**Conductor:** Soft drawn bare copper (ASTM Spec. B-3).  
Two (2) conductors  
Solid (14 awg)

**Insulation:** Polyethylene (PE)

**Outer Jacket:** High Density Polyethylene (HDPE)

**Temperature:** 75 C

**Voltage:** 600 volts

**Jacket Colors:** Red, blue, green, and yellow.

Gauge Size	Conductor Insulation	Outer Jacket
14	.045	.035



830 South West Street, Sikeston MO 63801

800-876-3020 / 573-472-2990 / FAX 573-471-3134



## Toro® Twisted Decoder Cable

### Description:

Regency's Toro® Twisted Decoder Cable is manufactured for the purpose of direct burial power wire applications in accordance with the National Electric Code.

Conductor construction is soft drawn bare copper meeting the requirements of ASTM Specification B-3. Gauge sizes 14 - 12 are solid 2 conductor.

The insulation is a high density polyethylene, twisted for systems applications of up to 600 volts. UV inhibitors added for color stability. One conductor shall be colored black and the other conductor may be colored red, white, orange, blue, yellow, purple, tan, green, or grey. These two conductors shall be twisted with a 4" lay length.

Regency's Toro® Decoder Cable is constructed in accordance with Underwriters Laboratories, Inc.

### Application:

Suitable for use as power and control wire for irrigation systems.

### Construction:

**Conductor:** Soft drawn bare copper (ASTM Spec. B-3).  
Solid (14 awg - 12 awg)

**Insulation:** Polyethylene (PE)

**Temperature:** 60 C

**Voltage:** 600 volts

Conductor Size	Insulation Thickness
14 awg - 12 awg	.075

Material must be able to pass the following tests without showing signs of degradation:

Cold Bend – The insulation shall not show any cracks when sample is bent around a 3X mandrel after being subjected to -25 C for four (4) hours.

Electrical - AC test voltage, 60 seconds at 5000 volts.

Mechanical Water Absorption – Insulation shall not absorb more than 25 mg. mass of water per square inch.

Sunlight Resistance – Samples conditioned for 300 hours of carbon-arc or xenon-arc exposure.

Temperature Range -55 C - +60 C

## 1804S

## Irrigation Control Cable



### Description:

Regency's Irrigation Control Cable is manufactured for the purpose of power and control cable applications in accordance with the National Electric Code.

Conductor construction is soft drawn bare copper meeting the requirements of ASTM Specification B-3 and B-8.

The insulation is color-coded Polyvinylchloride (PVC) Each insulated conductor is sheathed with a clear nylon jacket and are twisted and color-coded to facilitate pair identification.

The cable is then wrapped with an aluminum polyester tape.

Irrigation Control Cable is constructed in accordance with Underwriters Laboratories, Inc.

### Application:

Suitable for control circuits for operation and interconnection of protective and signaling devices. U.L. listed and labeled for installation in duct, conduit and wireways. May be used in wet or dry locations, sunlight resistant, and suitable for direct burial.

### Construction:

**Conductor:** Soft drawn bare copper (ASTM Spec. B-3 and B-8).  
Four (4) conductors, Stranded

AWG	Number of Conductors	Conductor Stranding
18	4	7

**Drain Wire:** 20 AWG tinned copper laid between aluminum shield and PVC insulation  
**Insulation:** Polyvinylchloride (PVC) with a nylon sheath. . Nom. Insulation Thickness .015". Nylon Thickness .004"  
**Outer Jacket:** Polyvinylchloride (PVC). Nom. Jacket Thickness .045"  
**Nominal O.D.:** .335"  
**Shield:** Aluminum/Polyester  
**Temperature:** 90 C dry; 75 C wet  
**Voltage:** 600 volts  
**Resistance** 6.92 OHMS per M at 68 Deg. F  
**Capacitance** 44.8 Pico Farads Nom  
**Lbs./M':** 65  
**Color Coding:** Per ICEA method 1; Pairs – black and white. One conductor in each pair is printed alphanumerically for easy identification

# Regency Wire & Cable

830 South West Street, Sikeston MO 63801

800-876-3020 / 573-472-2990 / FAX 573-471-3134



## Bare Copper Wire

### Description:

Regency's Bare Copper Wire is manufactured for grounding purposes in accordance with the National Electric Code.

Conductor construction is soft drawn bare copper meeting the requirements of ASTM Specification B-3 and B-8. Gauge sizes 14 thru 10 are solid copper. Sizes 8 thru 2 are available in either solid or 7 stranded. Gauge size 1/0 thru 4/0 is available in either 7 or 19 stranded.

### Application:

Suitable for use as ground or tracer wire.

### Construction:

**Conductor:** Soft drawn bare copper (ASTM Spec. B-3 and B-8).  
Solid (14 awg to 10 awg)  
Solid or 7 stranded (8 awg to 2 awg)  
7 or 19 stranded (1/0 awg to 4/0 awg)

AWG SIZE	STRANDING	WEIGHT PER MFT	NOMINAL O.D.
14	SOLID	12.4	.064
12	SOLID	19.8	.081
10	SOLID	31.5	.102
8	SOLID	50	.128
6	SOLID	79.5	.162
4	SOLID	126.3	.204
2	SOLID	200.9	.258
8	7 STR	51	.146
6	7 STR	81	.184
4	7 STR	128.9	.232
2	7 STR	204.9	.292

# Lateral Isolation Valve



**2" & 2½"  
Valves**



**3" & 4" Valves**



ENGINEERED FOR DURABILITY

# Lateral Isolation Valve



## High Strength, Long Life.

Harco Lateral Isolation Valves are manufactured with ductile iron, stainless steel and bronze components for high strength and superior corrosion resistance. Ductile iron components are coated with fusion bonded epoxy providing additional corrosion protection and low friction for high flow. These materials are ideal for golf course and commercial irrigation projects and for reuse water applications.

## Construction

Harco Lateral Isolation Valves are made of materials selected for the extremes found in irrigation systems. Harco Lateral Isolation Valves have fusion bond epoxy coated ductile iron bodies, 316 stainless steel bonnets and trim, low zinc bronze stems and peroxide cured EPDM seals assuring long life. Bronze on stainless stem threads eliminate the risk of stem seizure caused by galling of stainless on stainless threads. The twin stem seals are permanently lubricated. And, each valve is factory hydro tested. The 3" & 4" Harco Lateral Isolation Valves also utilize fusion bond epoxy coated ductile iron bonnet.



## High Flow, Reliable proven joints

Valves are resilient seated angle valves equipped with large flow ways and long stem travel to provide very low head loss and high CV values (CV=96 for 2", CV= 138 for 2½" and CV=226 for 3" & 4") Inlet is configured with the reliable Harco swivel joint and outlets with gasketed push on joint with knuckle restraint making for quick and problem free connections.

1" Threaded port provides connection for quick coupler on live side of valve when closed.

## Configurations Sizes 2", 2½", 3", & 4"

Harco Lateral Isolation Valves are available in 2", 2 ½", 3", and 4" sizes. All sizes are available in male swivel inlet with nominal 6" rise from top of main to top of lateral. 2" valves are also available in male swivel inlet with 12" rise and 2" push on gasketed inlet. 2" valves are available with 1" tapped and plugged side outlet and plain without side outlet. 2 ½", 3", and 4" valves have 1" tapped and plugged side outlet. 2" and 2 ½" Harco Lateral Isolation Valves are equipped with cross handles or 2" square operating nuts. 3" and 4" Harco Lateral Isolation Valves have 2" square operating nuts.



## Easy to install, Internally Restrained Joint

The valve easily assembles into the Harco swivel socket of tees or saddles and provides a reliable gasketed joint and capable of rotating to provide field alignment. Gasket inlet version of 2" valve incorporating an integral knuckle restraint on both inlet and outlet bells affords the riser height adjustability of PVC without the risks of plastic threads and glue joints.

The swivel system is easy to seal and orient unlike NPT pipe joints, eliminating risk of losing seal or over tightening of an NPT joint when attempting to orient.

The Harco Lateral Isolation Valve is covered by US Patents # 7,055,865 & 7,552,949

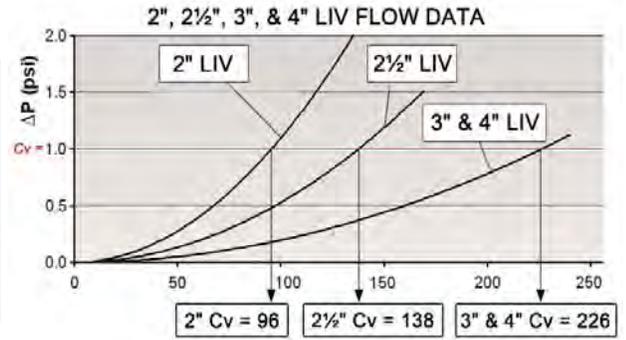
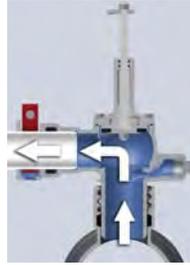
## Replacement Valve opportunity

2" gasketed inlet x gasketed outlet configuration is ideal to replace existing installed valves that have failed or need replacement. The gasketed inlet allows an existing lateral piping connection to be easily cut into, existing valve removed and replaced in little time while minimizing the area to be excavated and disturbed. The integral knuckle restraints on inlet and outlet allow the system to be re-pressurized immediately after repair.

(see [www.harcofittings.com](http://www.harcofittings.com) for installation instructions.)

## Flow Characteristics

The Lateral Isolation Valve features full port flow with a fully retractable seal assembly. Flow loop testing of yields a minimum Cv of 96 for 2", 138 for 2½", and 226 for the 3" and 4" LIV's. For a 2" with a 50 gpm flow there is a pressure drop across the valve of ¼ psi. This flow performance can benefit the user in reduced pumping costs, greater operating flexibility, and the selection of other system components. The unique configuration of the side outlet tap provides full 1" flow without sacrificing lay length needs.



## Installation

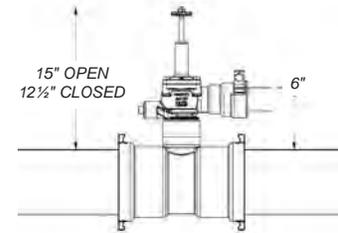
1. Valve into swivel tee or saddle, lubricate the gasket and the spigot with the lubricant supplied by the pipe manufacturer.
2. Rotate male thread "in" until joint "bottoms out".
3. Rotate male thread "out" to proper horizontal orientation for valve up to and no more than 360°.
4. Install beveled pipe having lubricated outlet gasket, remove wood wedge, tighten restraint bolt to 35 ft-lbs.

## Suggested Specification

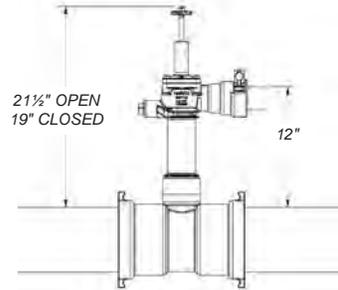
Lateral Isolation Valves shall be 200 psi rated angle globe valves with integrally restrained ends. Ends shall be male swivel or integrally restrained push on gasketed joint as required. Components shall be Ductile Iron, 316 Stainless Steel, and Low Zinc Bronze complying with ASTM A536, ASTM A276, ASTM B62-C83600 respectively or equivalent. Ductile Iron shall be fusion bond epoxy coated. Gasketed joints shall be SBR Rubber and comply with ASTM F477. Internal seals shall be EPDM rubber. Lateral Isolation Valves shall be as manufactured by The Harrington Corporation of Lynchburg, VA.

LATERAL ISOLATION VALVE				
(OUTLET SIZE x HEIGHT FROM TOP OF MAIN TO TOP OF LATERAL)				
STYLE	DESCRIPTION	PART NUMBER (w/ sideoutlet)	PART NUMBER (w/o sideoutlet)	WEIGHT
	2 x 6, GASKET x MALE SWIVEL CROSS HANDLE	8411062PL	841106L	15 lbs
	2 x 6, GASKET x MALE SWIVEL SQUARE NUT	8411062PN	841106N	
	2 x 12, GASKET x MALE SWIVEL CROSS HANDLE	8411122PL	841112L	18 lbs
	2 x 12, GASKET x MALE SWIVEL SQUARE NUT	8411122PN	841112N	
	2 x variable GASKET x GASKET CROSS HANDLE	8411GG2PL	8411GGL	17 lbs
	2 x variable GASKET x GASKET SQUARE NUT	8411GG2PN	8411GGN	
	2½ x 6, GASKET x MALE SWIVEL CROSS HANDLE	8412062PL	n/a	15 lbs
	2½ x 6, GASKET x MALE SWIVEL SQUARE NUT	8412062PN	n/a	
	3 x 6, GASKET x MALE SWIVEL SQUARE NUT	8413062PN	n/a	22 lbs
	4 x 6, GASKET x MALE SWIVEL SQUARE NUT	8414062PN	n/a	29 lbs

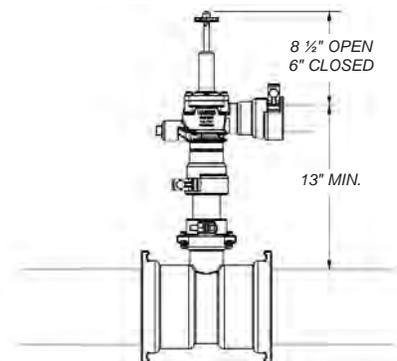
Flow Rates



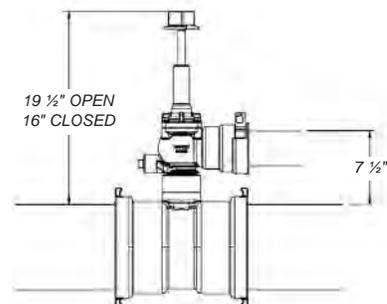
2 x 6 & 2½ x 6 GASKET x MSWL



2 x 12, GASKET x MSWL



2", GASKET x GASKET



3 x 6 & 4 x 6, GASKET x MSWL



# Lateral Isolation Valve

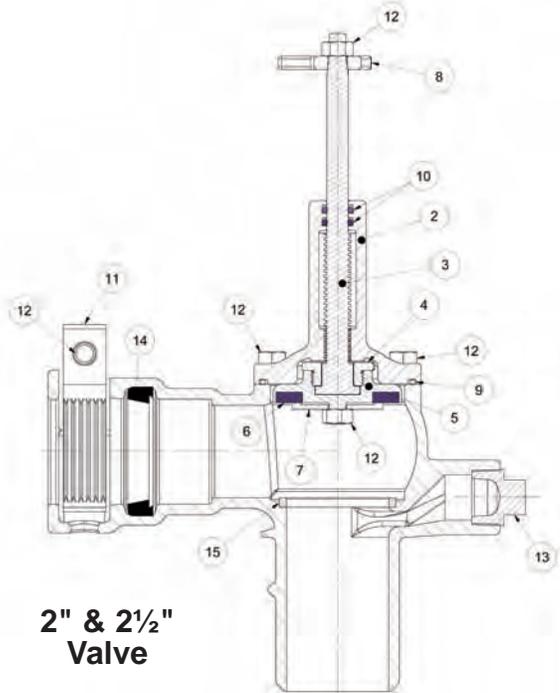
## MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIAL	STANDARD
1	BODY	DUCTILE IRON *	ASTM A536, Grade 65-45-12
2	BONNET	316 SS	ASTM A351, Grade CF8M
3	STEM	NON-GALLING SS	316 SS Equivalent
4	RETAINER BUSHING	316 SS	ASTM A276, Grade 316
5	SEAL CUP	316 SS	ASTM A351, Grade CF8M
6	SEAL	EPDM †	ASTM D2000
7	RETAINING WASHER	316 SS	ASTM A276, Grade 316
8	HANDLE	316 SS	ASTM A351, Grade CF8M
9	BONNET O-RING	EPDM †	ASTM D2000
10	STEM O-RING	EPDM † ‡	ASTM D2000
11	GRIP RING	DUCTILE IRON	ASTM A536, Grade 65-45-12
12	NUTS & BOLTS	316 SS	ASTM A193, Grade B8M
13	PLUG	316 SS	ASTM A351, Grade CF8M
14	GASKET	SBR	ASTM F477
15	SEAT	316 SS	ASTM A276, Grade 316

\* FUSION BONDED EPOXY COATED

† PEROXIDE CURED

‡ PERMANENTLY LUBRICATED



**2" & 2½"  
Valve**

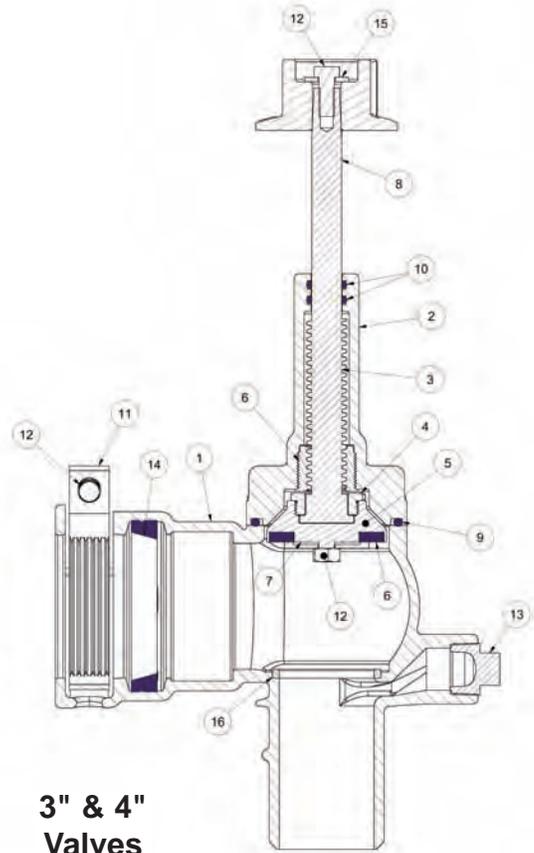
## MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIAL	STANDARD
1	BODY	DUCTILE IRON *	ASTM A536, Grade 65-45-12
2	BONNET	DUCTILE IRON *	ASTM A536, Grade 65-45-12
3	STEM	316 SS	ASTM A351, Grade CF8M
4	RETAINER BUSHING	316 SS	ASTM A276, Grade 316
5	SEAL CUP	316 SS	ASTM A351, Grade CF8M
6	SEAL	EPDM †	ASTM D2000
7	RETAINING WASHER	316 SS	ASTM A276, Grade 316
8	HANDLE	DUCTILE IRON *	ASTM A351, Grade CF8M
9	BONNET O-RING	EPDM †	ASTM D2000
10	STEM O-RING	EPDM † ‡	ASTM D2000
11	GRIP RING	DUCTILE IRON	ASTM A536, Grade 65-45-12
12	NUTS & BOLTS	316 SS	ASTM A193, Grade B8M
13	PLUG	316 SS	ASTM A351, Grade CF8M
14	GASKET	SBR	ASTM F477
15	STEM BUSHING	BRONZE	ASTM B62-C83600
16	SEAT	316 SS	ASTM A276, Grade 316

\* FUSION BONDED EPOXY COATED

† PEROXIDE CURED

‡ PERMANENTLY LUBRICATED



**3" & 4"  
Valves**



HARRINGTON CORPORATION • P.O. BOX 10335 • LYNCHBURG, VIRGINIA 24506

PHONE: 434-845-7094 • FAX: 434-845-8562 • E-MAIL: sales@harcofittings.com • WEB: www.harcofittings.com

JAN. 1, 2014

PF137-010114



4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL  
 NO. 213A-005  
 PACKAGE NO: 213A**

**TITLE:** Lateral Isolation Valves  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 6  
**DAYS OVERDUE:** 0

RECEIVED FROM		SENT TO		RETURNED BY	FORWARDED TO
WADS	MS	STAN	JR		

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Sepias	Prints	Drawing Date	Held	Elapsed
001	Lateral Isolation Valves	1/29/14	2/4/14			NEW	0	1		0	6

**Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.**

Authorized Representative: \_\_\_\_\_  
 Date: 05/06/14

# Lateral Isolation Valve



**2" & 2½"  
Valves**

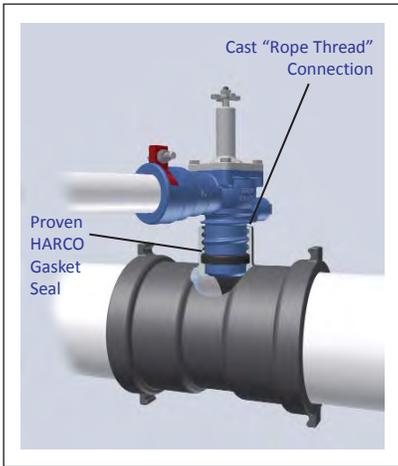


**3" & 4" Valves**



ENGINEERED FOR DURABILITY

# Lateral Isolation Valve



## High Strength, Long Life.

Harco Lateral Isolation Valves are manufactured with ductile iron, stainless steel and bronze components for high strength and superior corrosion resistance. Ductile iron components are coated with fusion bonded epoxy providing additional corrosion protection and low friction for high flow. These materials are ideal for golf course and commercial irrigation projects and for reuse water applications.

## Construction

Harco Lateral Isolation Valves are made of materials selected for the extremes found in irrigation systems. Harco Lateral Isolation Valves have fusion bond epoxy coated ductile iron bodies, 316 stainless steel bonnets and trim, low zinc bronze stems and peroxide cured EPDM seals assuring long life. Bronze on stainless stem threads eliminate the risk of stem seizure caused by galling of stainless on stainless threads. The twin stem seals are permanently lubricated. And, each valve is factory hydro tested. The 3" & 4" Harco Lateral Isolation Valves also utilize fusion bond epoxy coated ductile iron bonnet.



## High Flow, Reliable proven joints

Valves are resilient seated angle valves equipped with large flow ways and long stem travel to provide very low head loss and high CV values (CV=96 for 2", CV= 138 for 2½" and CV=226 for 3" & 4") Inlet is configured with the reliable Harco swivel joint and outlets with gasketed push on joint with knuckle restraint making for quick and problem free connections.

1" Threaded port provides connection for quick coupler on live side of valve when closed.

## Configurations Sizes 2", 2½", 3", & 4"

Harco Lateral Isolation Valves are available in 2", 2 ½", 3", and 4" sizes. All sizes are available in male swivel inlet with nominal 6" rise from top of main to top of lateral. 2" valves are also available in male swivel inlet with 12" rise and 2" push on gasketed inlet. 2" valves are available with 1" tapped and plugged side outlet and plain without side outlet. 2 ½", 3", and 4" valves have 1" tapped and plugged side outlet. 2" and 2 ½" Harco Lateral Isolation Valves are equipped with cross handles or 2" square operating nuts. 3" and 4" Harco Lateral Isolation Valves have 2" square operating nuts.



## Easy to install, Internally Restrained Joint

The valve easily assembles into the Harco swivel socket of tees or saddles and provides a reliable gasketed joint and capable of rotating to provide field alignment. Gasket inlet version of 2" valve incorporating an integral knuckle restraint on both inlet and outlet bells affords the riser height adjustability of PVC without the risks of plastic threads and glue joints.

The swivel system is easy to seal and orient unlike NPT pipe joints, eliminating risk of losing seal or over tightening of an NPT joint when attempting to orient.

The Harco Lateral Isolation Valve is covered by US Patents # 7,055,865 & 7,552,949

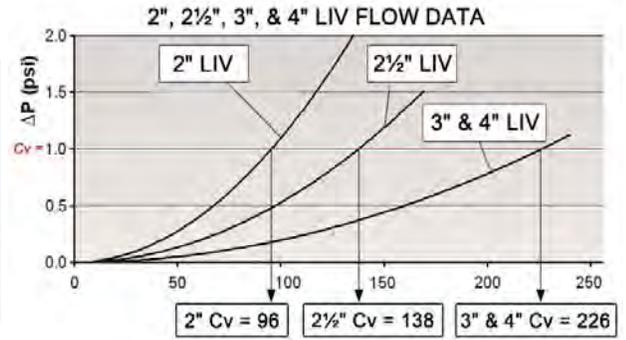
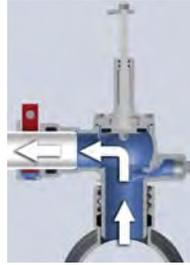
## Replacement Valve opportunity

2" gasketed inlet x gasketed outlet configuration is ideal to replace existing installed valves that have failed or need replacement. The gasketed inlet allows an existing lateral piping connection to be easily cut into, existing valve removed and replaced in little time while minimizing the area to be excavated and disturbed. The integral knuckle restraints on inlet and outlet allow the system to be re-pressurized immediately after repair.

(see [www.harcofittings.com](http://www.harcofittings.com) for installation instructions.)

## Flow Characteristics

The Lateral Isolation Valve features full port flow with a fully retractable seal assembly. Flow loop testing of yields a minimum Cv of 96 for 2", 138 for 2½", and 226 for the 3" and 4" LIV's. For a 2" with a 50 gpm flow there is a pressure drop across the valve of ¼ psi. This flow performance can benefit the user in reduced pumping costs, greater operating flexibility, and the selection of other system components. The unique configuration of the side outlet tap provides full 1" flow without sacrificing lay length needs.



## Installation

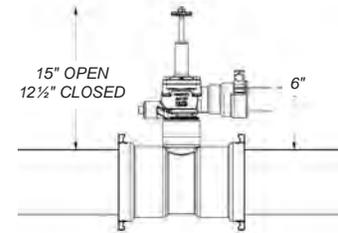
1. Valve into swivel tee or saddle, lubricate the gasket and the spigot with the lubricant supplied by the pipe manufacturer.
2. Rotate male thread "in" until joint "bottoms out".
3. Rotate male thread "out" to proper horizontal orientation for valve up to and no more than 360°.
4. Install beveled pipe having lubricated outlet gasket, remove wood wedge, tighten restraint bolt to 35 ft-lbs.

## Suggested Specification

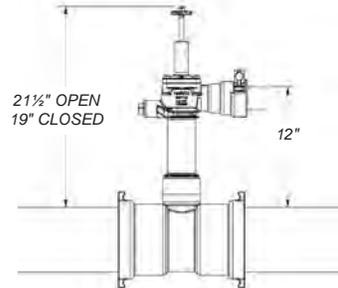
Lateral Isolation Valves shall be 200 psi rated angle globe valves with integrally restrained ends. Ends shall be male swivel or integrally restrained push on gasketed joint as required. Components shall be Ductile Iron, 316 Stainless Steel, and Low Zinc Bronze complying with ASTM A536, ASTM A276, ASTM B62-C83600 respectively or equivalent. Ductile Iron shall be fusion bond epoxy coated. Gasketed joints shall be SBR Rubber and comply with ASTM F477. Internal seals shall be EPDM rubber. Lateral Isolation Valves shall be as manufactured by The Harrington Corporation of Lynchburg, VA.

LATERAL ISOLATION VALVE				
(OUTLET SIZE x HEIGHT FROM TOP OF MAIN TO TOP OF LATERAL)				
STYLE	DESCRIPTION	PART NUMBER (w/ sideoutlet)	PART NUMBER (w/o sideoutlet)	WEIGHT
	2 x 6, GASKET x MALE SWIVEL CROSS HANDLE	8411062PL	841106L	15 lbs
	2 x 6, GASKET x MALE SWIVEL SQUARE NUT	8411062PN	841106N	
	2 x 12, GASKET x MALE SWIVEL CROSS HANDLE	8411122PL	841112L	18 lbs
	2 x 12, GASKET x MALE SWIVEL SQUARE NUT	8411122PN	841112N	
	2 x variable GASKET x GASKET CROSS HANDLE	8411GG2PL	8411GGL	17 lbs
	2 x variable GASKET x GASKET SQUARE NUT	8411GG2PN	8411GGN	
	2½ x 6, GASKET x MALE SWIVEL CROSS HANDLE	8412062PL	n/a	15 lbs
	2½ x 6, GASKET x MALE SWIVEL SQUARE NUT	8412062PN	n/a	
	3 x 6, GASKET x MALE SWIVEL SQUARE NUT	8413062PN	n/a	22 lbs
	4 x 6, GASKET x MALE SWIVEL SQUARE NUT	8414062PN	n/a	29 lbs

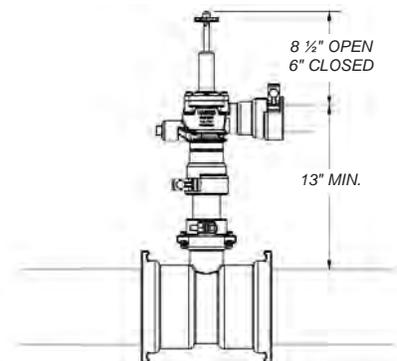
Flow Rates



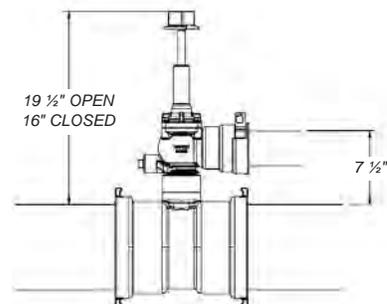
2 x 6 & 2½ x 6 GASKET x MSWL



2 x 12, GASKET x MSWL



2", GASKET x GASKET



3 x 6 & 4 x 6, GASKET x MSWL



# Lateral Isolation Valve

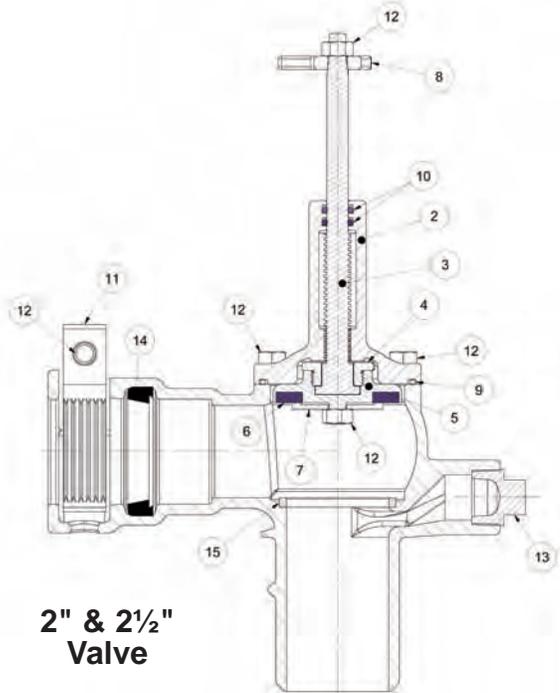
## MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIAL	STANDARD
1	BODY	DUCTILE IRON *	ASTM A536, Grade 65-45-12
2	BONNET	316 SS	ASTM A351, Grade CF8M
3	STEM	NON-GALLING SS	316 SS Equivalent
4	RETAINER BUSHING	316 SS	ASTM A276, Grade 316
5	SEAL CUP	316 SS	ASTM A351, Grade CF8M
6	SEAL	EPDM †	ASTM D2000
7	RETAINING WASHER	316 SS	ASTM A276, Grade 316
8	HANDLE	316 SS	ASTM A351, Grade CF8M
9	BONNET O-RING	EPDM †	ASTM D2000
10	STEM O-RING	EPDM † ‡	ASTM D2000
11	GRIP RING	DUCTILE IRON	ASTM A536, Grade 65-45-12
12	NUTS & BOLTS	316 SS	ASTM A193, Grade B8M
13	PLUG	316 SS	ASTM A351, Grade CF8M
14	GASKET	SBR	ASTM F477
15	SEAT	316 SS	ASTM A276, Grade 316

\* FUSION BONDED EPOXY COATED

† PEROXIDE CURED

‡ PERMANENTLY LUBRICATED



**2" & 2½"  
Valve**

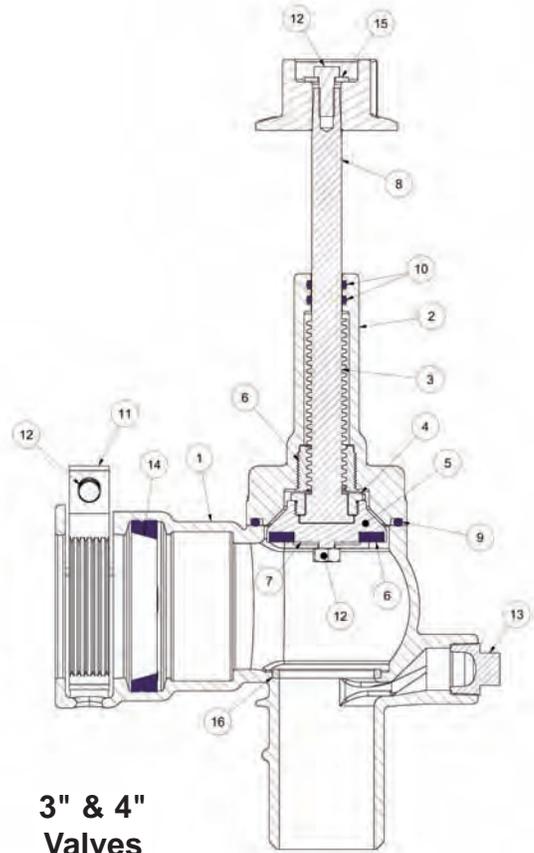
## MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIAL	STANDARD
1	BODY	DUCTILE IRON *	ASTM A536, Grade 65-45-12
2	BONNET	DUCTILE IRON *	ASTM A536, Grade 65-45-12
3	STEM	316 SS	ASTM A351, Grade CF8M
4	RETAINER BUSHING	316 SS	ASTM A276, Grade 316
5	SEAL CUP	316 SS	ASTM A351, Grade CF8M
6	SEAL	EPDM †	ASTM D2000
7	RETAINING WASHER	316 SS	ASTM A276, Grade 316
8	HANDLE	DUCTILE IRON *	ASTM A351, Grade CF8M
9	BONNET O-RING	EPDM †	ASTM D2000
10	STEM O-RING	EPDM † ‡	ASTM D2000
11	GRIP RING	DUCTILE IRON	ASTM A536, Grade 65-45-12
12	NUTS & BOLTS	316 SS	ASTM A193, Grade B8M
13	PLUG	316 SS	ASTM A351, Grade CF8M
14	GASKET	SBR	ASTM F477
15	STEM BUSHING	BRONZE	ASTM B62-C83600
16	SEAT	316 SS	ASTM A276, Grade 316

\* FUSION BONDED EPOXY COATED

† PEROXIDE CURED

‡ PERMANENTLY LUBRICATED



**3" & 4"  
Valves**



HARRINGTON CORPORATION • P.O. BOX 10335 • LYNCHBURG, VIRGINIA 24506

PHONE: 434-845-7094 • FAX: 434-845-8562 • E-MAIL: sales@harcofittings.com • WEB: www.harcofittings.com

JAN. 1, 2014

PF137-010114



4420 S. Decatur Blvd.  
 Las Vegas, NV 89103-5803  
 Phone: 251-5800 Fax: 251-4891

**SUBMITTAL  
 NO. 213A-006  
 PACKAGE NO: 213A**

**TITLE:** Irrigation Pump Station  
**PROJECT:** 603152-13 LV Wash (12281)  
**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 1  
**DAYS OVERDUE:** 0

RECEIVED FROM		SENT TO		RETURNED BY	FORWARDED TO
WADS	MS	STAN	JR		

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Senias	Prints	Drawing Date	Held	Elapsed
001	Irrigation Pump Station	2/3/14	2/4/14			NEW	0	1		0	1

**Las Vegas Paving Corp. has checked the attached submittal for accuracy completeness and has found it in strict conformance with the Contract Documents.**

Authorized Representative: \_\_\_\_\_  
 Date: 05/06/14

February 3, 2014

Ms. Angie Gruenfelder  
Las Vegas Paving Corp.  
4420 South Decatur Blvd.  
Las Vegas, NV 89103  
Phone: 702.251.5800  
Email: [angie.gruenfelder@lasvegaspaving.com](mailto:angie.gruenfelder@lasvegaspaving.com)

Re: Irrigation Pump Station Submittal – Desert Rose GC – Las Vegas, NV

Dear Angie,

Under cover of this letter, and for your review and approval, enclosed is Wadsworth Golf's irrigation pump station submittal, including configuration/schematic drawings, for Desert Rose GC in Las Vegas, NV.

We would appreciate a review of this submission at your earliest convenience. If you have any questions or require further clarification, please do not hesitate to call.

Sincerely,  
WADSWORTH GOLF CONSTRUCTION COMPANY



Scott McDougall,  
Estimator  
[scottm@wadsworthgolf.com](mailto:scottm@wadsworthgolf.com)

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

Cc: Mark Slugocki – [marks@wadsworthgolf.com](mailto:marks@wadsworthgolf.com)

**VERTICAL TURBINE PROPOSAL**  
**Variable Speed Virtual Vision III Pumping System**  
**U. L. Approved Package Pumping System Suitable For Three Phase Power**

<b>Customer:</b>	All Bidders	<b>Date:</b>	September 30, 2013
<b>Attn:</b>		<b>Quotation #:</b>	082213JNVTV-1-75x3
<b>Phone #:</b>		<b>Project Name:</b>	Desert Rose Golf Course
<b>Fax #:</b>		<b>Location:</b>	Las Vegas, NV
<b>Email:</b>		<b>Quoted By:</b>	Bob Sylvester/jwn
<b>cc:</b>		<b>Sales Email:</b>	Bob.sylvester@watertronics.com
<b>Specifier Name:</b>	Terry Little		

**STATION PERFORMANCE:** 2600 GPM @ 110 PSI

**POWER REQUIREMENT:** Power shall be 460 volt, 3 phase, 60 hertz.

**Note: See Power Supply in the Terms and Conditions Section below for more information.**

**MODEL DESCRIPTION:** VTV-1-75x3/10STV-460-3-2600-110

**Project Scope:** Variable speed, (VFD) vertical turbine pump station, piping, valves, and base. All control panels painted white for superior corrosion resistance. Designed for 19' x 5.5' x 10' deep wet well. Station is proposed to be installed **inside a** weather resistant building, as furnished by the owner. Controls will be an Industrial grade PLC with a color touch screen operator interface device and software programming written specifically for this project—with information given at time of design or order. A formed and reinforced steel base platform will support all manifolding, pumps, motors, and control panels to provide an integral unit ready to quickly install at the job site.

**Note!!** This Proposal was formulated to meet the customer supplied design specification identified by: Any differences in the specifications from the equipment outline within this proposal should be brought to the immediate attention of Watertronics for clarification.

**STANDARD CONTROLS & EQUIPMENT INCLUDE:**

- U.L. listed NEMA 4 master control panel assembly with 400 amp main disconnect and interior lighting package
- **Air conditioner cooling** for control panel
- Microprocessor controls with AccuWare station software to maintain constant pressure at variable flow
- VirtualVision III Color Touchscreen operator interface device with active matrix LCD display featuring:
  - Digital flow (GPM) and pressure (PSI) display
  - Both cumulative and resettable gallons pumped indicators
  - Pump ready/running status with elapsed run time display per pump
  - Flow-based pressure regulation to match discharge pressure with irrigation demand
  - Individual motor overload reporting
  - Minute by minute data logging saved to a removable flash RAM card
  - 32MB card to store approximately 12 months of data
  - Historic & real time X-Y plotting of pump station operation
  - Filter controls as required
  - Alarm log file
  - Ability to change system parameters such as setpoint pressure, time delays
  - Fertigation graphic and control interface when sold with a Watertronics EZ Feed Injection Package
- Alarm conditions w/safety shut down, condition time stamp & automatic diagnostic system:

Automatic repressurization after fault condition  
Low discharge pressure shutdown  
High discharge pressure shutdown  
Individual motor overload/phase loss  
VFD fault shutdown  
Low water level shutdown

- **75 HP** Variable frequency drive sequenced between all main pumps, rated for the motor horsepower
- Dual mechanical interlocking output contactors for auto-alternation of main pumps & manual override. X-line contactor is MSP breaker type motor protection w/electronic overload and rotary handle power disconnect.
- Transient/surge protection package for 480 volt and analog circuits
- 3 ea. 75 HP, 1800 RPM, Inverter duty **PREMIUM efficient** vertical hollow shaft (VHS) motors with winding space heaters and self-release couplings
- 3 ea. 75 HP, 1800 RPM, vertical turbine pumps with ductile iron discharge heads
- Vertical turbine irrigation pumps shall have stainless steel shafting; water lubricated bearing, stainless steel basket strainer, cast iron bowls, stainless steel collets, and stainless steel impellers
- 10 HP, 3600 RPM, submersible sustain pump and stainless steel motor
- **10 HP VFD dedicated to the jockey pump**
- Individual pump isolation & check valve assemblies
- 4" pressure relief valve with lug style butterfly isolation valve
- Hose bib connection for washdown
- Flow meter spool with Data Industrial flow sensor
- Stainless steel pressure transducer
- Station discharge isolation valve
- 3-3/4" TOL's on discharge manifolding
- Structurally superior, *formed* 3/8" reinforced steel skid for mounting pumps, controls & piping
- Integral wet well access hatch if wet well diameter allows
- Steel grit blasting of pump station skid and all piping
- Station skid, valves and all piping painted (**Sandstone**)
- Two part epoxy primer coat of all painted surfaces
- Polyurethane paint final coat of all painted surfaces, including the skid, piping and valves, for superior protection
- Baked & curing process of all primer coated and painted surfaces
- Complete assembly, calibration and dynamic run and vibration test prior to shipment
- 2 operation and maintenance manual(s)
- Access to Watertronics customer service technical phone support, technicians on call 24/7
- Access to Watertronics factory authorized service technician

#### **ADDITIONAL EQUIPMENT & SERVICES INCLUDED WITH PUMP STATION:**

- **Watervision 5:** Remote monitoring & control software package with Maintenance Manager and PumpLink OCX for interface with irrigation central control system communicating by way of direct cable connection less than 4000'. Pump station monitoring software and hardware, will be fully compatible with Windows 7 and XP for workstations. Software will include full graphical representation of the pump station and its features.
- Air Conditioning, mounted on Control Panel—indoor use only (pump station building)
- 8" FL x 18" FL fabricated steel discharge drop pipe with swivel connection and 2" blow-out connection
- 2 ea, 8" VAF Model V1500 all stainless steel suction scanner filter with 500 micron screen. Includes inlet and outlet isolation valve and full flow by pass line with isolation valve plus Watertronics designed controls that enable filter flush via 1) pressure drop, 2) time, or 3) total flow—improving filter performance and life by eliminating unnecessary flushes.
- Patented Electronic Butterfly Valve (EBV) system that provides the following features:
  - 1) VFD back-up mode to automatically function on the fly during an event of a VFD failure, without loss of irrigation, 2) purge air from VT column, 3) reduces PSI overshoot, 4) eliminates water hammer and check valve slam, 5) provides superior slow fill or surge, 6) provides variable flow without causing line surge, 7) eliminates abrupt PSI drop, and 8) improves pump sequencing PSI regulation.

[REDACTED]

Shipment: Estimated 10 weeks after receipt of signed contract and drawing approval.

### Terms and Conditions

#### DELIVERY AND SET-UP:

1. All reasonable efforts will be made to meet the requested delivery date after the receipt of a signed contract however; Watertronics will not be liable for delays in delivery.
2. Pump station components shipped separately from the station, at the Customer's request, may incur additional freight charges, payable by the Customer.
3. Customer will be responsible for having job site readily accessible for station delivery via flat bed truck.
4. Customer will provide the equipment and personnel required to unload and/or set the pump station.
5. DOMESTIC (USA): Station Set-up charges include one day on site. If more than one day is required, additional charges of \$950.00 per day will be assessed if the customer caused the delay. Travel time not included if separate service call is required.  
INTERNATIONAL DESTINATIONS: It is the responsibility of the owner's representative (contractor) to offload the station, identify any freight damage, inventory equipment and place the skid in position on the concrete slab. Vertical Turbines may be set in place on the skid for final assembly by an authorized service agent at time of technical startup. Any delays when on site due to events out of our control may incur additional charges. Charges include technician's time (\$950/day), travel fees, airline penalties, hotel, and meals.  
FREIGHT DAMAGE must be written on shipping documents with copies going to the carrier and Watertronics. Watertronics will require pictures of damage caused by the carrier.  
MISSING EQUIPMENT from the Bill of Materials (BOM) must be identified within 2 weeks of delivery.
6. Customer will be responsible for electrical permit if required.
7. Customer will be responsible for primary electrical hookup to pump station.
8. Customer will be responsible for making all piping connections.
9. Customer will be responsible for building modifications (roof removal & installation) if required.
10. Customer will be responsible for wet well, slab, and concrete work.
11. Customer will be responsible for piping wye strainer / filter flush line back to supply lake

#### START-UP:

1. Customer is responsible to guarantee the following before station calibration can be performed: a.) Permanent utility power is available and installed on pump station disconnect, b.) adequate water supply to operate station to full capacity, c.) installed irrigation system to be operate station to full capacity.  
DOMESTIC (USA): Start-up charges include one day on site. If more than one day is required, additional charges of \$950.00 per day will be assessed if the customer caused the delay.  
INTERNATIONAL DESTINATIONS: Final assembly and startup will be completed under the terms listed above. If the site is ready for startup i.e. power in place, site and infrastructure ready to run water the time allotted is adequate. Any delays due to events out of our control may incur additional charges. Charges include technician's time (\$950/day), travel fees, airline penalties, hotel, and meals.
2. Purchaser will notify Watertronics two weeks in advance of the desired start-up date.

#### WARRANTY:

1. Watertronics warrants its pump station products to be free of defects in materials and workmanship for a period of one (1) year from the date of startup, but not later than fifteen (15) months from the date of invoice, unless modified by customer with the selection of the extended warranty option. Stations deemed delivery complete and invoiced accordingly, at Watertronics' factory and stored there, shall have the warranty period commence as of the invoice date.
2. This warranty is limited to replacing or repairing any defective component at the sole option of Watertronics and does not apply to equipment that has been damaged, misapplied or has been modified in any way.
3. Regular scheduled maintenance is required to keep the pump station running in top condition. A minimum of two (2) scheduled preventative maintenance service calls must be performed during the warranty period for the warranty to remain in force. Scheduling and payment for maintenance shall be the responsibility of the owner. Any work performed on the pump station must be provided by a Watertronics recognized PSN (Pump Service Network) service provider and documentation of all work performed within the warranty period must be on file at the factory. Any maintenance or repairs done without the pre-authorization of Watertronics or its recognized service providers shall void this warranty.

4. This warranty does not cover damages under the following conditions, unless otherwise specified in writing: (1) Lightning strikes, misapplied or inappropriate in-coming power, improper grounding, vandalism, or any incidental, consequential, or acts of God, (2) repairs or replacements made without the pre-authorization of Watertronics or its recognized service providers, (3) exposure to destructive gaseous or chemical solutions, (4) exposure to water pH levels of less than 6.0 which is typically the result of SO2 burner or sulfuric acid injection, (5) water salinity levels greater than 2000 parts per million, (6) water from a reverse osmosis process plant, (7) unusually high dirt load or abrasives in the water, or (8) pumping water not suitable for turf irrigation.
5. Watertronics will not accept liability for any costs associated with the removal or replacement of equipment in difficult to access locations. This includes, but is not limited to, the use of cranes larger than 15 tons, scuba divers, barges, helicopters, or other unusual means. These extraordinary costs shall be borne by the owner, regardless of the reason necessitating removal of the product from service.
6. THIS WARRANTY IS ABSOLUTELY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES. THIS INCLUDES ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATION ON THE PART OF WATERTRONICS.

NO AGENT, EMPLOYEE OR REPRESENTATIVE OF WATERTRONICS HAS ANY AUTHORITY TO BIND WATERTRONICS TO AN AFFIRMATION, REPRESENTATION OR WARRANTY CONCERNING THE PRODUCT SOLD UNDER THIS WARRANTY. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

POWER SUPPLY:

1. **The pump station proposed herein is designed for 480 volt, WYE configured or closed delta balanced 3 phase power. The acceptable range of voltage is 455 volts (min) – 495 volts (max). Unless specifically stated under Optional Equipment, open delta, phase converter, or other forms of unbalanced three phase power are not acceptable.**
2. If the supply voltage is not within this acceptable range, the purchaser is responsible for making the necessary corrections. This may include re-tapping or replacing the primary transformer. If the supply voltage is outside the stated range, electrical components such as VFD's, fuses, breakers, overloads, motors, power supplies may intermittently trip or prematurely fail and will not be considered for warranty coverage.
3. The use of generator power is not recommended. If a generator is required as a temporary power supply, the pump station will be covered under Watertronics' limited warranty provided that their "Engine Driven Generator Power Warranty Policy and Operation Guidelines" document is strictly adhered to.
4. Proper electrical grounding of the pump station is a requirement. Station will not operate properly and could pose a health hazard if not properly grounded. Failures of any magnitude due to improper grounding will not be covered under warranty.

Payment Terms:

**U.S. DOLLARS ONLY**

1. All purchase orders are subject to acceptance at factory in Hartland, Wisconsin. Receipt of Production deposit, verification of acceptable credit and confirmation of order are required before production. On domestic orders of \$100,000 or less, a 25% production deposit is required to initiate the order with the balance due net 30 days from date of final invoice. Orders over \$100,000 require a 50% production deposit. For international orders, either an Irrevocable Letter of Credit (ILC) drawn on a U.S. Bank, with all costs of the ILC borne by the purchaser, is required for the full amount of purchase at time of order, or a 50% cash deposit with order and the remainder paid in cash when product is stated ready for shipment.
2. Late fee of 1.5% per month will be added to any balance due after thirty (30) days from the date of invoice. All payments and/or credits are applied to the outstanding balance before computing a finance charge.
3. In the event the customer cannot take delivery on the requested date, delivery shall be deemed completed, and the warranty period shall commence, at Watertronics' factory with storage for future shipment. For the purpose of payment, eighty (80) percent of the contract price will be due, payable net 30 days from invoice. The customer will be responsible for storage and handling charges at the factory. A minimum charge of \$200 per week will apply, with total storage charges added to the final invoice.

OTHER INFORMATION:

1. Prices valid for sixty (60) days from the date of this proposal.
2. State and local sales taxes are not included in these prices.
3. Seller retains a security interest in the above mentioned equipment as provided by the UNIFORM COMMERCIAL CODE, until payment is received in full.
4. All claims for incorrect deliveries must be submitted in writing to Watertronics Customer Service within 15 days after receipt of goods.
5. All claims for price discrepancy must be submitted in writing to Watertronics Customer Service within 60 days after receipt of goods.
6. A completed pump station may not be returned to Watertronics for credit.

CHANGE ORDERS:

1. Change Orders initiated by parties outside of Watertronics, after an order has been entered, may require additional charges to the purchaser regardless of the reason or initiating party. A minimum administrative fee of \$ 150.00 will be charged.

- a. Lost engineering and order administration time will be charged to the purchaser at \$150.00 per hour.
- b. Purchase orders to vendors perfected by Watertronics made invalid by the Change Order will incur charges against the purchaser equal to any penalties levied against Watertronics. To include, re-stocking charges, lost freight charges or return goods freight charges and any vendor administrative costs.
- c. Watertronics lost manufacturing time will be charged to the purchaser at \$100.00 per hour. Additional labor to satisfy the Change Order will be estimated at \$100.00 per hour and added to the total Change Order amount.
- d. Materials made unusable or scrapped because of the Change Order will be charged to the purchaser at actual sale value as originally assigned to the job. Replacement materials or goods will be valued as required by the Change Order and be shown in its total.

Acceptance Terms:

1. Purchaser hereby agrees that in the event of default in the payment of any amount due, that if this account is placed in the hands of an attorney, or agency for collection or legal action, to pay any and all related attorneys fees, costs of collection including agency, private process servers fees, court costs, etc., incurred and any other costs of collection permitted by the laws governing these transactions.
2. Equipment cancelled before completion will incur restocking charges that will be calculated at time of cancellation. Restocking fees may be the full cost of the pump station depending on the nature of the pump station that is cancelled.
3. Equipment shipped separately from the station, at Purchaser's request, may incur additional freight charges, payable by Purchaser.
4. Delayed deliveries by the customer once equipment is ready to ship, will incur minimum storage charges of \$200 per week, added to the final invoice.

ACCEPTED BY:

Company Name: \_\_\_\_\_ By: \_\_\_\_\_

Print Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature Date: \_\_\_\_\_ Requested Delivery Date: \_\_\_\_\_

Is this sale taxable? (circle one) Yes No (If the order is non-taxable, a tax exempt certificate for the "ship to" state must be submitted with this order).

Please Return One Signed Copy of This Quotation On Acceptance. Merchandise delivered or shipped is due and payable to: Watertronics LLC, 525 Industrial Drive, P.O. Box 530, Hartland, WI 53029-0530.  
 Fax number: 262-367-5551 Phone 262-367-5000.

BILL TO INFORMATION:

Company Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ Email Address \_\_\_\_\_

Billing Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Contact Name (Print): \_\_\_\_\_ Title: \_\_\_\_\_

SHIP TO INFORMATION:

Company Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Shipping Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Contact Name (Print): \_\_\_\_\_ Title: \_\_\_\_\_ Phone : \_\_\_\_\_

Thank you for the opportunity to quote on your pump station needs. If you have any questions or require further information, please call us at 262-367-5000.

**PUMP STATION SPECIFICATIONS**

**NAME:** DESERT ROSE GOLF COURSE

**STATION MODEL:**

VTV-1-75x3/10ST-460-3-2600-110

**STATION TOTAL PERFORMANCE:**

2600 GPM @ 110 PSI

**PUMP HORSEPOWER:**

SUSTAIN PUMP: 10HP (3600RPM, 270TDH)

PUMP NO.1 75HP (1800RPM, 275TDH)

PUMP NO.2 75HP (1800RPM, 275TDH)

PUMP NO.3 75HP (1800RPM, 275TDH)

**CHECK VALVE SIZE**

SUSTAIN: BUILT IN PUMP

PUMP NO.1 6"

PUMP NO.2 6"

PUMP NO.3 6"

**ISOLATION VALVE SIZES:**

SUSTAIN PUMP: 2"

PUMP NO.1 5"

PUMP NO.2 5"

PUMP NO.3 5"

DISCHARGE ISOLATION VALVE: 8"

RELIEF VALVE SIZE: 4"

PUMP STATION DISCONNECT: 400 AMP

POWER REQUIREMENTS: 460V, 60HZ, 3PH, 385 FLA

EXHAUST FAN REQUIREMENTS FOR BUILDING: 3400 CFM

**WET WELL DIMS:** .....228" X 66"

**WET WELL DEPTH:** .....11'-7"

**MAIN LINE CONNECTION:** FLG

**NOMINAL PIPE SIZE:** ..18" ANSI150#

**DROP PIPE COVER:**.....36" [0.91m]

**INTAKE FLUME SIZE:** TBD

**FLUME TYPE/MATERIAL:**...TBD

**PLEASE VERIFY ALL INFO WITH  
YOUR INITIALS AND DATE**

**INITIAL DATE**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
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_____	_____
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_____	_____

**STATION COMPONENTS:**

- A 75HP PUMP & MOTOR
- B 10HP SUBMERSIBLE PUMP AND MOTOR
- C SILENT CHECK VALVE
- D PRESSURE RELIEF VALVE
- E FLOW SENSOR
- F PRESSURE TRANSDUCER & GAUGE
- G VAF V-1500 S.S. FILTER W/500 MICRON (X2)
- H HOSE BIB CONNECTION
- I STATION ISOLATION VALVE
- J AIR CONDITIONER
- K CONTROL CABINET
- L FILTER ISOLATION VALVE
- M LEVEL SENSOR
- N ACCESS HATCH
- O INJECTION PORTS (3) 3/4"
- P N/A
- Q 8" x 18" FLG DROP PIPE WITH SWIVEL CONNECTION
- R PRESSURE TRANSDUCER & GAUGE
- S 2" BLOW OUT FITTING
- T ELECTRONIC BUTTERFLY VALVE
- U ELECTRONIC BUTTERFLY VALVE FOR FILTER AUTO FLUSH
- V PAINTED STEEL STATION BASE (SANDSTONE)
- W FILTER BY-PASS VALVE

**CUSTOMER APPROVAL SIGNATURE:**

- APPROVED AS SUBMITTED
- MAKE INDICATED CHANGES AND RESUBMIT



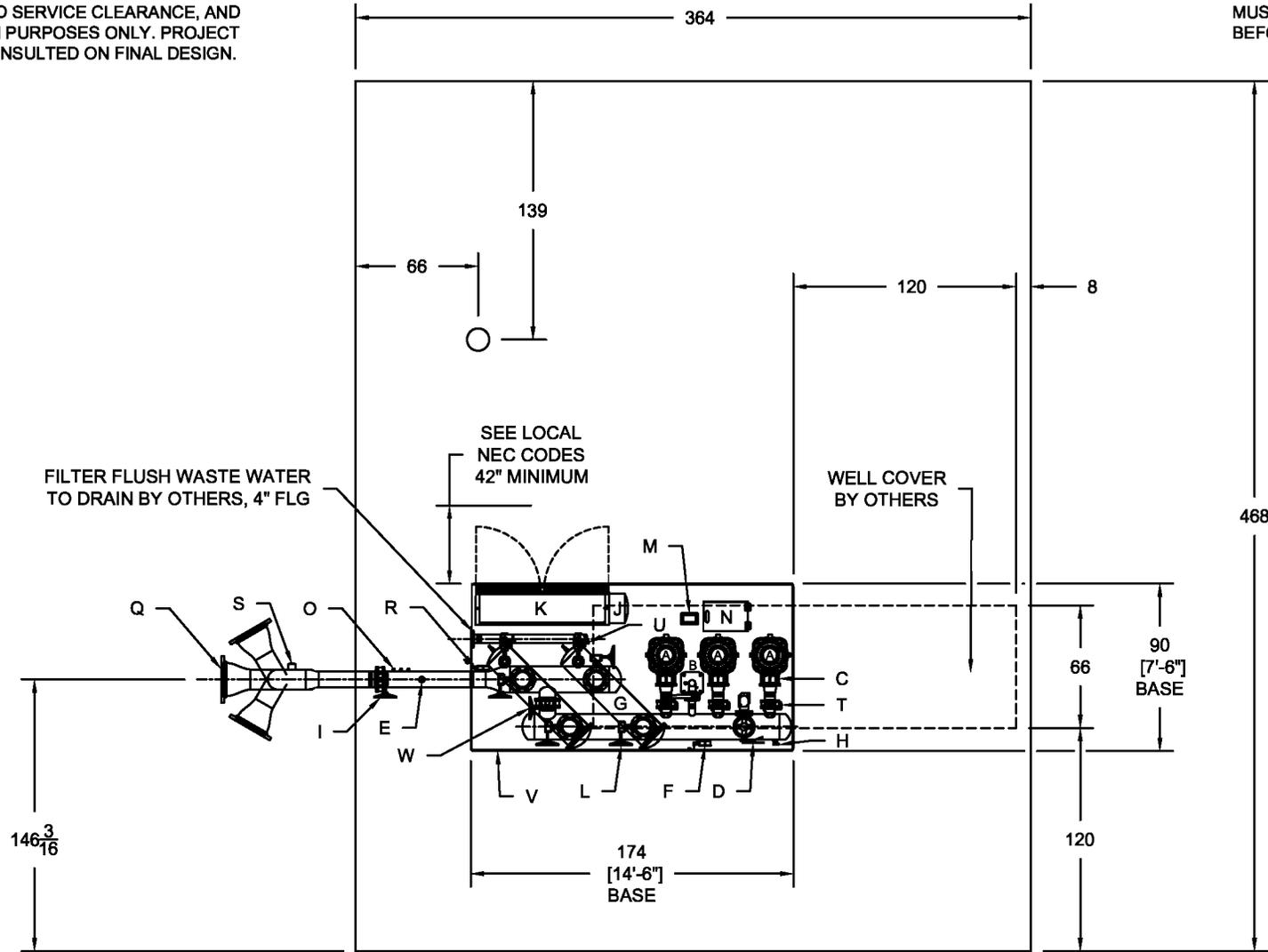
PHONE: 1-262-367-5000  
FAX: 1-262-367-5551

SHEET 1 OF 4 SHEETS

DRAWING NO. PRVT11625 08/12/13  
REV 1 01/22/14

PUMP HOUSE/CONCRETE SLAB  
 DIMENSIONS ARE RECOMMENDED  
 MINIMUMS FOR NEC AND SERVICE CLEARANCE, AND  
 ARE FOR ILLUSTRATION PURPOSES ONLY. PROJECT  
 MANAGER SHALL BE CONSULTED ON FINAL DESIGN.

DIMENSIONS AND SIZES OF EXISTING  
 STRUCTURES, AND/OR COMPONENTS  
 MUST BE VERIFIED TO WATERTRONICS  
 BEFORE STATION CONSTRUCTION BEGINS



PLAN VIEW

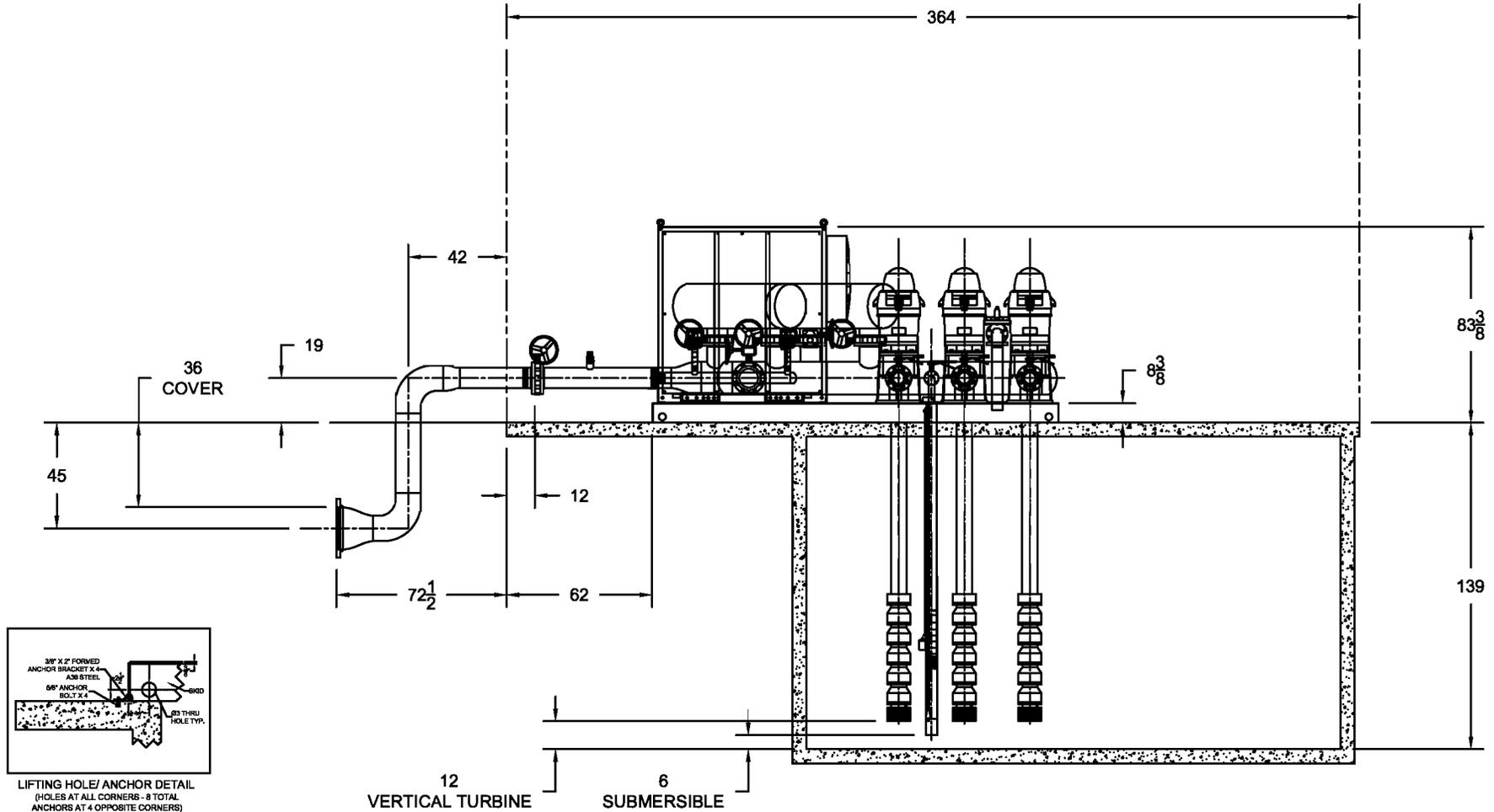
CONCEPT DRAWING ONLY  
 DRAWING NOT TO SCALE

THE PUMP STATION PROPOSED HEREIN IS DESIGNED TO BE  
 PLACED IN A PUMP HOUSE FOR PROTECTION FROM THE ENVIRONMENT.  
 IF A PUMP HOUSE IS NOT USED, WATERTRONICS MUST BE  
 NOTIFIED AT TIME OF QUOTATION SO SPECIAL PROVISIONS CAN  
 BE MADE.

CUSTOMER APPROVAL SIGNATURE  <input type="checkbox"/> APPROVED AS SUBMITTED <input type="checkbox"/> MAKE INDICATED CHANGES AND RESUBMIT	7				SCALE: NONE   DRWN BY: DJR  THIS DRAWING AND DESIGN, IS THE PROPERTY OF WATERTRONICS AND IS NOT TO BE REPRODUCED IN WHOLE OR PART, NOR EMPLOYED FOR ANY PURPOSE OTHER THAN SPECIFICALLY PERMITTED IN WRITING BY WATERTRONICS. THIS DRAWING LOANED AND SUBJECT TO RETURN ON DEMAND	TITLE: DESERT ROSE GOLF COURSE IRRIGATION PUMP STATION   A LINDSAY COMPANY
	6					
	5					
	4					
	3					
	2					
	1	01/22/14	RWE	MODIFIED GEOMETRY		
NO.	DATE	BY	DESCRIPTION	DATE: 08/12/13   SHEET 2 OF 4 SHEETS	JOB NO.:	DRAWING NO. PRVT11625

DIMENSIONS AND SIZES OF EXISTING STRUCTURES, AND/OR COMPONENTS MUST BE VERIFIED TO WATERTRONICS BEFORE STATION CONSTRUCTION BEGINS

PUMP HOUSE/CONCRETE SLAB DIMENSIONS ARE RECOMMENDED MINIMUMS FOR NEC AND SERVICE CLEARANCE, AND ARE FOR ILLUSTRATION PURPOSES ONLY. PROJECT MANAGER SHALL BE CONSULTED ON FINAL DESIGN.



ELEVATION VIEW

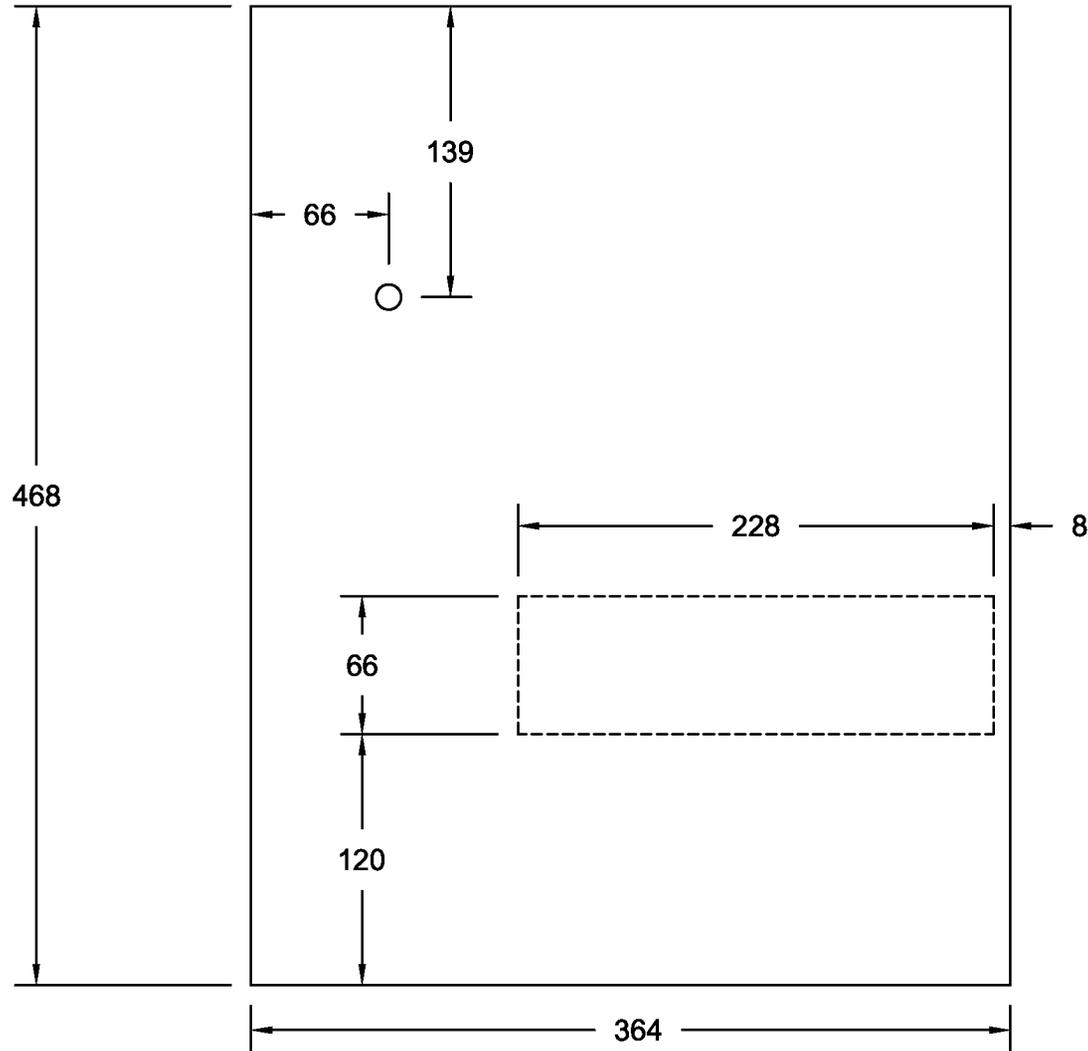
CONCEPT DRAWING ONLY  
DRAWING NOT TO SCALE

THE PUMP STATION PROPOSED HEREIN IS DESIGNED TO BE PLACED IN A PUMP HOUSE FOR PROTECTION FROM THE ENVIRONMENT. IF A PUMP HOUSE IS NOT USED, WATERTRONICS MUST BE NOTIFIED AT TIME OF QUOTATION SO SPECIAL PROVISIONS CAN BE MADE.

CUSTOMER APPROVAL SIGNATURE  <input type="checkbox"/> APPROVED AS SUBMITTED <input type="checkbox"/> MAKE INDICATED CHANGES AND RESUBMIT	7				SCALE: NONE   DRWN BY: DJR  THIS DRAWING AND DESIGN, IS THE PROPERTY OF WATERTRONICS AND IS NOT TO BE REPRODUCED IN WHOLE OR PART, NOR EMPLOYED FOR ANY PURPOSE OTHER THAN SPECIFICALLY PERMITTED IN WRITING BY WATERTRONICS. THIS DRAWING LOANED AND SUBJECT TO RETURN ON DEMAND	TITLE: DESERT ROSE GOLF COURSE IRRIGATION PUMP STATION   <b>WATERTRONICS</b> A LINDSAY COMPANY
	6					
	5					
	4					
	3					
	2					
	1	01/22/14	RWE	MODIFIED GEOMETRY		
NO.	DATE	BY	DESCRIPTION	DATE: 08/12/13   SHEET 3 OF 4 SHEETS	JOB NO.:	DRAWING NO. PRVT11625

DIMENSIONS AND SIZES OF EXISTING STRUCTURES, AND/OR COMPONENTS MUST BE VERIFIED TO WATERTRONICS BEFORE STATION CONSTRUCTION BEGINS

PUMP HOUSE/CONCRETE SLAB DIMENSIONS ARE RECOMMENDED MINIMUMS FOR NEC AND SERVICE CLEARANCE, AND ARE FOR ILLUSTRATION PURPOSES ONLY. PROJECT MANAGER SHALL BE CONSULTED ON FINAL DESIGN.

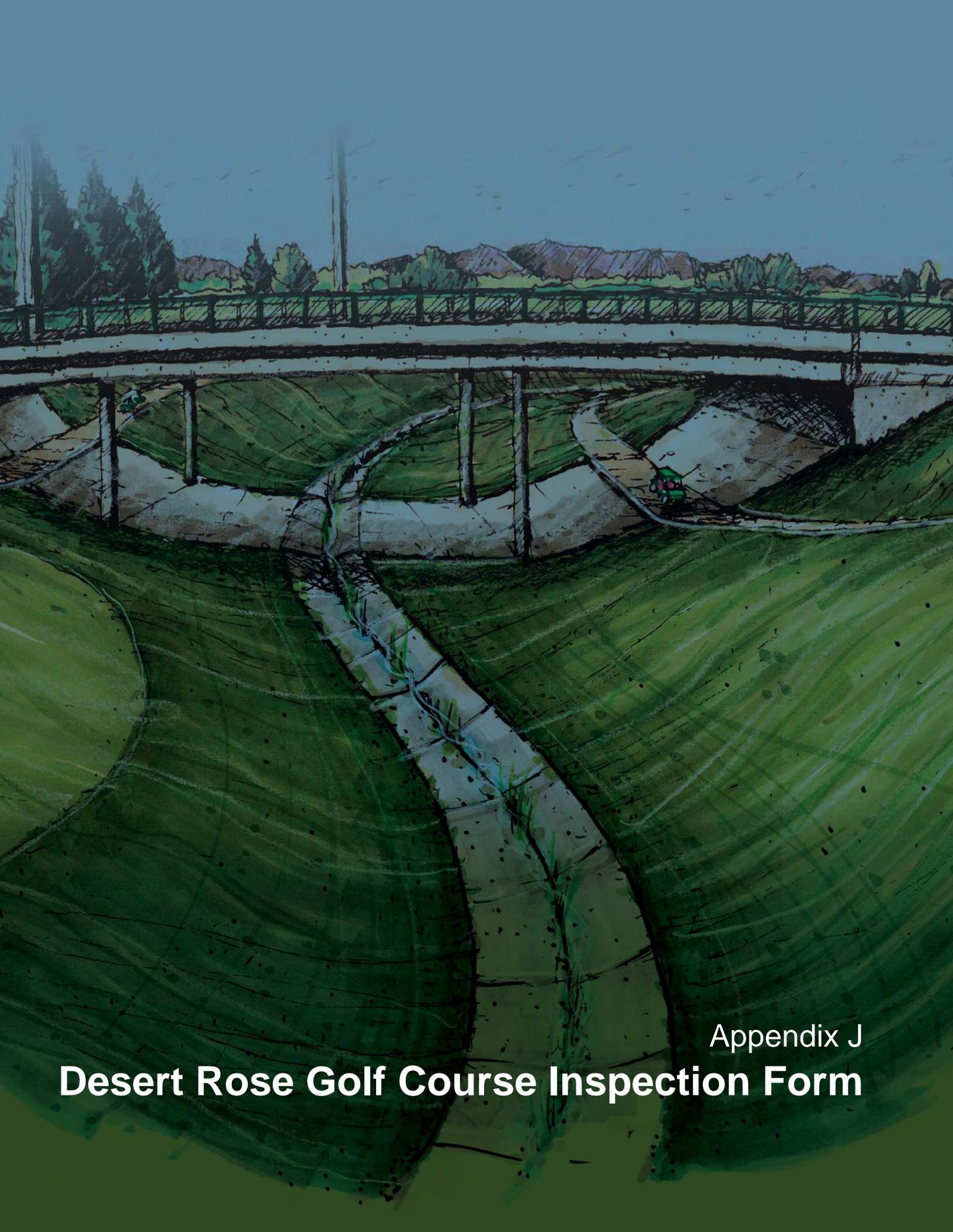


**SLAB VIEW**

CONCEPT DRAWING ONLY  
DRAWING NOT TO SCALE

THE PUMP STATION PROPOSED HEREIN IS DESIGNED TO BE PLACED IN A PUMP HOUSE FOR PROTECTION FROM THE ENVIRONMENT. IF A PUMP HOUSE IS NOT USED, WATERTRONICS MUST BE NOTIFIED AT TIME OF QUOTATION SO SPECIAL PROVISIONS CAN BE MADE.

CUSTOMER APPROVAL SIGNATURE  <input type="checkbox"/> APPROVED AS SUBMITTED <input type="checkbox"/> MAKE INDICATED CHANGES AND RESUBMIT	7				SCALE: NONE   DRWN BY: DJR  THIS DRAWING AND DESIGN, IS THE PROPERTY OF WATERTRONICS AND IS NOT TO BE REPRODUCED IN WHOLE OR PART, NOR EMPLOYED FOR ANY PURPOSE OTHER THAN SPECIFICALLY PERMITTED IN WRITING BY WATERTRONICS. THIS DRAWING LOANED AND SUBJECT TO RETURN ON DEMAND	TITLE: DESERT ROSE GOLF COURSE IRRIGATION PUMP STATION  
	6					
	5					
	4					
	3					
	2					
	1	01/22/14	RWE	MODIFIED GEOMETRY		
NO.	DATE	BY	DESCRIPTION	DATE: 08/12/13	SHEET 4 OF 4 SHEETS	
				JOB NO.:	DRAWING NO. PRVT11625	



Appendix J

# Desert Rose Golf Course Inspection Form

DESERT ROSE GOLF COURSE INSPECTION FORM			PAGE: 1 OF 3
WASH NAME: LAS VEGAS WASH		DATE:	TIME:
LOCATION:		OBSERVER:	
EMERGENCY CONDITION:		DEPT.:	TEL.:
DATE OF EMERGENCY CONDITION:		WEATHER CONDITIONS:	
HOLE/LOCATION	OBSERVATION/NOTES	ACTION NEEDED	
1	Golf Cart Bridge		
1	Golf Cart Bridge Abutment (West)		
1	Golf Cart Bridge Abutment (East)		
1	Golfer Footbridge and Concrete Footings		
1	Concrete Low Flow Channel		
1	66-Inch Pipe/Headwall		
1	Riprap Apron		
1	Upstream Trash Rack and Headwall		
1	Low Flow Pipe		
1	Downstream Trash Rack and Headwall		
1	Pyramat Slopes		
1	Alternative Planting Areas		
1	Low Flow Confluence		
2	Concrete Trapezoidal Channel		
10/18	Pyramat Slopes		
10/18	Concrete Low Flow Channel		
10/18	Sahara Avenue Bridge Crossing		
10/18	Sahara Avenue Bridge Concrete Lining		
10/18	Bridge Pier Walls		

DESERT ROSE GOLF COURSE INSPECTION FORM		PAGE: 2 OF 3	
WASH NAME: LAS VEGAS WASH		DATE:	TIME:
LOCATION:		OBSERVER:	
EMERGENCY CONDITION:		DEPT.:	TEL.:
DATE OF EMERGENCY CONDITION:		WEATHER CONDITIONS:	
HOLE/LOCATION	OBSERVATION/NOTES	ACTION NEEDED	
10/18	Golfer Foot Bridge		
11/17	Pyramat Slopes		
11/17	Concrete Low Flow Channel		
11/17	Golfer Foot Bridges		
17	84" RCP Outlet and Headwall		
11/16	Golfer Foot Bridge		
11/16	Upstream Trash Rack and Headwall		
11/16	Downstream Trash Rack and Headwall		
11/16	Low Flow Pipe		
12/16	Golfer Foot Bridge		
12/16	Pyramat Slopes		
12/16	Concrete Low Flow Channel		
16	84" RCP and Manholes		
16	96" RCP Inlet at Christy		
12	Concrete Access Road		
13/15	Pyramat Slopes		
15	48" RCP and Headwall		
13/14	Golfer Foot Bridges		
13/14	Low Flow Channel		
13/14	Pyramat Slopes		
13/14	Concrete Channel Transition		
13/14	Concrete Channel		

<b>WASH NAME: LAS VEGAS WASH</b>	<b>DATE:</b>	<b>TIME:</b>
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<b>LOCATION:</b>	<b>OBSERVER:</b>
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<b>EMERGENCY CONDITION:</b>	<b>DEPT.:</b>	<b>TEL.:</b>
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<b>DATE OF EMERGENCY CONDITION:</b>	<b>WEATHER CONDITIONS:</b>
-------------------------------------	----------------------------

<b>HOLE/LOCATION</b>	<b>OBSERVATION/NOTES</b>	<b>ACTION NEEDED</b>
13/14 Golf Cart Bridge		
13/14 Golf Cart Bridge – South abutment		
13/14 Golf Cart Bridge – North Abutment		

**Additional Notes:**

<b>Request For Assistance and Action Follow-up:</b>	
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DESERT ROSE GOLF COURSE INSPECTION FORM			PAGE: 1 OF 3
WASH NAME: FLAMINGO WASH		DATE:	TIME:
LOCATION:		OBSERVER:	
EMERGENCY CONDITION:		DEPT.:	TEL.:
DATE OF EMERGENCY CONDITION:		WEATHER CONDITIONS:	
HOLE/LOCATION	OBSERVATION/NOTES	ACTION NEEDED	
4	Pyramat Slopes		
4	Upstream Trash Rack and Headwall		
4	Low Flow Pipe		
4	Downstream Trash Rack and Headwall		
4	Low Flow Channel		
4	54" RCP and Headwall		
4	Storm Drain Manholes		
4	54" RCP Inlet Headwall		
4	Concrete Access Ramp		
4/9	Golfer Foot Bridge		
9	Pyramat Slopes		
5/8	Pyramat Slopes		
5/8	Concrete Low Flow Channel		
8	48" RCP Headwall		
5/8	Golfer Foot Bridge		
6/7	Pyramat Slopes		
6/7	Concrete Low Flow Channel		
6/7	Concrete Channel Transition		
6/7	Concrete Channel		
6/7	Energy Dissipater		



**WASH NAME: FLAMINGO WASH**

**DATE:**

**TIME:**

**LOCATION:**

**OBSERVER:**

**EMERGENCY CONDITION:**

**DEPT.:**

**TEL.:**

**DATE OF EMERGENCY CONDITION:**

**WEATHER CONDITIONS:**

**LOCATION**

**OBSERVATION/NOTES**

**ACTION NEEDED**

LOCATION	OBSERVATION/NOTES	ACTION NEEDED

**Additional Notes:**

**Request For Assistance and Action Follow-up:**

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