REPORT

FOR

CONDENSATE COLLECTION SYSTEM AND FOUNTAIN RESTORATION AT JOHN PEACE LIBRARY

AT

THE UNIVERSITY OF TEXAS

AT SAN ANTONIO

One UTSA Circle
San Antonio, TX 78249-0653

FOR

THE UNIVERSITY OF TEXAS AT SAN ANTONIO
One UTSA Circle
San Antonio, Texas 78249-0653

MEP ENGINEERS:
ALDERSON & ASSOCIATES, INC.
CONSULTING ENGINEERS
7700 Torino, Suite 101
San Antonio, Texas 78229
Firm No. 1008
John Faultersack

PROJECT NUMBER: 12-92
PROJECT DATE: November 20, 2012
John Peace Library/Sombrilla Plaza Fountain Report:

1. Existing Systems Description
   a. Fountains
   b. Air Handlers

2. Condensation Potential at Air Handlers (description and excel spreadsheet)

3. Evaporation Potential at Fountains (description and excel spreadsheet)

4. Description of Options

6. Cost Estimate of Options

7. Maintenance Involvement

Appendices

Schematic

Backup Cost information
**Existing Sombrilla Plaza Fountain:**

The existing pool/fountain feature at the Sombrilla Plaza (south of JPL Bldg) is comprised of a 55’L x 25’W x 24” deep pool, with a 6.5’ x 8’ x 9’ high “tower” fountain feature toward one end. This tower contains four venturi outlets that spray water up and over its edge for a waterfall effect. (See photos attached.)

The fountain’s pool walls are tiled, with the grout degraded by cleaning over the approximately 35 years of existence. The pool bottom’s surface is painted, reportedly requiring resurfacing every year or two. The pool has four skimmer inlets, two at each side, and several water outlets along the walls. The unfinished concrete tower feature has an adjacent recessed (single) inlet in the pool bottom. Pipes for the pool and tower feature are routed west, direct-buried under the tiled plaza approximately 150-200 feet to a pump room under the adjacent John Peace Library. This piping is believed to be severely degraded, based on reports of the amount of sediment entering the pool. Outlets/inlets are noticeably corroded. In the pump room, the two pumps (7.5 hp - tower feature, and 1.5 hp - pool) appear to be serviceable, but have not run for approximately two years. Piping inside the pump room is reported to have asbestos-containing materials.
Sombrilla Plaza and fountain; pump room door is in center of picture, to right of blue barrel.

Eroded grout and inlet piping at tiled pool wall
**Existing JPL Air Handling Units:**

Three large (~100,000 cfm ea) built-up air handling units reside in the sub-level of the John Peace Library. The nearest one is approximately 300 feet from the pool pump room, which is on essentially the same level. The route between the air handler and the pump room is relatively accessible, but contains numerous large ducts and pipes that impact the pathway between the two locations. Ground conditions along this route were observed to be dry.

The air handler’s cooling coils are four-level, with intermediate drain pans. The upper three levels have condensate pipes routed directly down to the next lower coil’s drain pan, with the bottom level pan (approx. 3” above the concrete floor) draining directly across the floor to two adjacent floor drains connected to the sanitary sewer. (A dedicated fan coil for treating the outside air is located inside the large mixing plenum of this built-up unit, but appears not to be used at this time, so all dehumidification occurs at the main cooling coil.)

**Condensation Potential at the Air Handlers:**

A spreadsheet was developed to calculate the condensation potential at the cooling coils, based on a constant (design) volume of outside air and monthly weather bin data for the year. The difference between the outside conditions (dry bulb[db] and mean coincident wet bulb[wb]) and an assumed coil leaving condition of 55 deg F db/53 deg F wb (56.6 gr/lb-dry air) was used to calculate condensation. The building’s internal latent loads (due to people, etc.) were approximated based on an assumed constant return air condition of 75 deg F db/62.6 deg F wb (64.7 gr/lbda) and the same coil leaving conditions. The space latent contribution was a relatively minor portion of the total condensation potential. (See the attached table for results by the month.)

**Evaporation Potential at the Fountain:**

A spreadsheet was developed to calculate the evaporation potential for the fountain/pool, based on surface area and an activity factor to account for water spray from special features. The water was assumed to be at the average monthly ambient dry bulb temperature. The activity factor ranged from 0.5 for a calm pool to 1.0 for the fountain feature; the fountain was assumed to operate for 12 hours per day. The same weather bin data was used as in the condensation potential calculations.

The results of the spreadsheets show that the available average condensation exceeds the evaporation except for five months from November thru March. SAWS restrictions on fountain operation would prevent operation during these months if no other water source could be obtained. (See the attached table for results by the month.)
### TABLE: CONDENSATION AND EVAPORATION ESTIMATES:

<table>
<thead>
<tr>
<th>John Peace Library</th>
<th>AHU-1A: HIGH (ONLY)</th>
<th>CFM: 9,000 cfm oa on ¾ coil face</th>
<th>Cond. Rate(gal/mo)*</th>
<th>Evap Rate(gal/mo)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>0</td>
<td>1358</td>
<td>70,000 cfm ra on ¾ coil face</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>0</td>
<td>1386</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>202</td>
<td>2284</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>7809</td>
<td>2395</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>19884</td>
<td>2781</td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>26733</td>
<td>3280</td>
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<td></td>
</tr>
<tr>
<td>July</td>
<td>28825</td>
<td>4084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>27955</td>
<td>4261</td>
<td></td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>20968</td>
<td>3295</td>
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<td></td>
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<tr>
<td>October</td>
<td>11091</td>
<td>2598</td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>860</td>
<td>1673</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>0</td>
<td>1434</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>144,327</td>
<td>30,827</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based on an “averaged” day in each month*
Description of Fountain System Options:

1. Condensation Collection Option/Refurbishment of Pool/Fountain (see attached schematic at end):
   a. Collection of the condensate from the upper three-fourths of the cooling coil of the air handler nearest to the pump room. Modify the upper three (of four) levels of the coil drain pans and collection piping and route a 2” copper collection pipe thru the air handler’s concrete wall; gravity drain it to a tank/pump/treatment skid-mounted package adjacent to the air handler, recessed into the ground as required.
   b. Condensate Collection Tank/pump/treatment package: Contains an approximately 400 gallon, gravity collection/recirculation tank, filtration, UV water treatment unit, circulation pump with drive, valves and controls to filter and treat the collected water. Unit is capable of pumping in recirculation/treatment/filtration mode or pumping to remote pump room (or alternatively directly to the fountain pool).
   c. Route 1” copper, un-insulated pipe from the outlet of the pump package to the fountain pump room, approximately 300 feet away (or alternatively overhead to the fountain pool approximately another 200 feet away). Piping routed over/under existing duct/pipes in sub level area (and overhead on the plaza level, then down and trenched across to the pool; insulating/jacketing the pipe overhead at the plaza would be required).
   d. Pipe to inlet side of pool pump (or alternatively to the fountain pool). Provide controller to tell collection pump when to route water to the pool/pump.
   e. Control interface/conduit connection between pool controller and condensate collection system.
   f. Provide electrical power for collection pump package.
   g. Refurbish existing pool/fountain and equipment room:
      1) replace existing pumps/piping in equipment room
      2) pool refinishing/modifications for new skimmers/inlets
      2) tower feature rehab
      3) new pool and fountain lights
      4) replacement of all pool and fountain piping between equipment room and fountain/pool; will entail major disruption to Sombrilla Plaza.
   h. See attached appendix for bill of materials estimate and details.
2. Remote Underground Vault/Tank and Pumping/Treatment System for Pool/Fountain:
   a. Provide the condensate collection option from above, with the fountain/pool pump system located in the landscaped area approximately 30 feet to the east of the pool; provide collected/pumped condensate drain water from the air handler to a storage tank buried along with the vault-mounted fountain/pool pumps and filters in the landscaped area. (Alternatively condensate could be piped directly to the pool.) The buried storage tank allows for possible periodic makeup water from other sources (hauling, domestic...) during dry periods when condensation collection potential is limited. This option would require pumped, insulated/jacketed condensate drain piping to be extended to the landscaped area or pool; routing would be overhead under the second level “balcony” in front of JP Library and down/trenched to the landscaped area or pool.
   b. Refurbish existing pool/fountain:
      1) pool refinishing and modifications for new skimmers/inlets
      2) tower feature rehab
      3) pool and fountain lights
      4) pool and fountain piping from landscaped area to the pool
   c. Electrical power to pool/fountain packaged equipment and lights.
   d. See attached appendix for bill of materials estimate and details.

3. Local Submerged System for Fountain, with Pool Circulation/Treatment in Equipment Room:
   a. Provide local submerged pump for the tower fountain feature, with the pump in the existing basin; rework the fountain’s spray feature.
   b. Provide new pool circulation pump with filtration/treatment system in the existing equipment room. Provide new piping from the equipment room pump to the pool; will require excavation of Sombrilla Plaza from equipment room to the pool.
   c. Provide collected condensate piping to pool pump inlet.
   d. Refurbish existing pool/fountain:
      1) pool refinishing/ modifications for new skimmers/inlets
      2) tower feature rehab, with new submerged pump, piping.
      3) pool and fountain lights.
4) electrical power to new fountain pump and lights.

e. See attached appendix for bill of materials estimate and details.

**Cost Estimate of Options** [Notes: 1) No asbestos remediation is included; 2) Estimates are necessarily approximate at this stage of development; *’d $’s furnished by “Fountain People” — see appendix]

1. **Condensation Collection Option/Refurbishment of Pool/Fountain Option:**
   a. Condensate collection System (includes electrical to collection pump skid): $29,500
   b. Pool/fountain equipment/materials: $65,000*
   c. Equipment Installation and pool/fountain rehab and new piping to pool: $375,000*
   **TOTAL: $ 469,500**

2. **Remote Underground Vault/Tank and Pumping/Treatment System for Pool/Fountain:**
   a. Condensate collection System: $47,500 (includes piping overhead/trenched to landscaped area or pool and electrical to pump skid)
   b. Pool/fountain equipment/materials (including storage tank): $106,000*
   c. Equipment Installation, pool/fountain rehab and piping to pool: $ 550,000*
   d. Electrical (to landscaped area): $16,000
   **TOTAL: $ 719,500** (approx. $180,000 deduct if no storage tank in landscaped area)

3. **Local Submerged System for Fountain, with Pool Circulation/Treatment in Equipment Room:**
   a. Condensate collection System (includes electrical to collection pump skid): $29,500
   b. Pool and fountain equipment/materials: $53,000*
   c. Installation, pool/fountain rehab (incl. fountain sump revision for pump) and piping: $350,000*
   d. Electrical to fountain pump, lights: $12,000
   **TOTAL: $ 444,500**
Maintenance Implications:

1. **Condensation Collection Option/Refurbishment of Pool/Fountain Option**:
   a. Strainer/filter cleaning at collection pump system (near the air handler).
   b. Periodic replacement of UV lamp at condensate water treatment system.
   c. Cleaning of condensate collection piping at air handler coils.
   d. Cleaning of strainers and filters at fountain/pool pumps.
   e. Pool/fountain chemical treatment.
   f. Periodic replacement of light bulbs, etc.

2. **Remote Underground Vault/Tank and Pumping/Treatment System for Pool/Fountain**:
   a. Strainer/filter cleaning at collection pump system (near the air handler).
   b. Periodic replacement of UV lamp at condensate water treatment system.
   c. Cleaning of condensate collection piping at air handler coils.
   d. Cleaning of strainers and filters at fountain/pool pumps.
   e. Possible periodic hauling reclaimed water from remote sites.
   g. Periodic replacement of light bulbs, etc.

3. **Possible Local System for Fountain, with Pool Circulation/Treatment in Equipment Room**:
   a. Strainer/filter cleaning at collection pump system (near the air handler).
   b. Periodic replacement of UV lamp at condensate water treatment system.
   c. Cleaning of condensate collection piping at air handler coils.
   d. Cleaning of strainers and filters at fountain/pool pumps.
   e. Possible periodic hauling reclaimed water from remote sites.
   g. Periodic replacement of light bulbs, etc.
Appendix:

Pool Equipment Cost Estimates from Fountain People, Inc. (P.O. Box 807, San Marcos, TX 78667, www.fountainpeople.com)

### P13230-New Location Bill of Material

**Price Including Freight & Crate; Excluding Installation = $105,637.00**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FRG-13230</td>
<td>Fiberglass Grating</td>
</tr>
<tr>
<td>1</td>
<td>PFV-EC-13230</td>
<td>Custom In-ground Vault System with effect pump and strainer; filter pump and strainer; cartridge filter with spare element; valves; pressure gauges; vacuum gauges; water fill station with hose bib, pressure regulating valve, solenoid valve and isolation valves; electronic water quality monitoring system w/ auto safety shutdown; sump pump with float switch and check valve for vault drainage; landscape lid with hasp and lock; ventilation fan; enamel coated cast iron vent caps; entry ladder; vault interior light and convenience electrical outlet; UL Listed electronic controls including NEMA-12 enclosure, power distribution, GFCI light circuits, motor starters, time clocks, HOA switches, low water cutoff protection system, labeled terminal strips for field connections; System pre-plumbed and pre-wired with sealed vault penetrations. Engineer sealed for in-ground placement.</td>
</tr>
<tr>
<td>2</td>
<td>FWR-E-13230</td>
<td>Custom In-Ground (1000) Gallon Reservoir with draining sump pump, junction box, check valve; ladder, mechanical water fill system w/quick fill valve; overflow, landscape lid with hasp and lock; sealed schedule 40 PVC glue type penetrations; hold-down straps, stainless steel cables with hardware, stainless steel anchor hooks. System pre-plumbed, pre-wired and engineered for in-ground placement.</td>
</tr>
<tr>
<td>4</td>
<td>FEC-200A</td>
<td>2&quot; Sweep Eyeball Inlet w/Waterstop, Cast Bronze</td>
</tr>
<tr>
<td>4</td>
<td>FSK-150J</td>
<td>Skimmer, ABS Construction, w/Brass Face and 1-Port</td>
</tr>
<tr>
<td>2</td>
<td>FFD-300</td>
<td>3&quot; Floor Drain w/Plug and Waterstop, Cast Bronze</td>
</tr>
<tr>
<td>2</td>
<td>FWS-300</td>
<td>3&quot; Cast Bronze Waterstop Coupling</td>
</tr>
<tr>
<td>2</td>
<td>FWS-400</td>
<td>4&quot; Cast Bronze Waterstop Coupling</td>
</tr>
<tr>
<td>1</td>
<td>CWL-002WDWS</td>
<td>Wall Water Level Sensor, Overflow Housing w/ Waterstop, Cast Bronze</td>
</tr>
<tr>
<td>1</td>
<td>CWL-302P</td>
<td>Operating Water Level Sensor w/30' Cord</td>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>Flush Cast Bronze Junction Box w/(1) 3/4&quot; Bottom Connection, (2) 1/2&quot; Side Connections and Potting Compound</td>
</tr>
<tr>
<td>1</td>
<td>CLED-5</td>
<td>UL Listed electronic control panel including NEMA-12 enclosure, power distribution, DMX Interface LED control card for operating up to (5) individual light fixtures, labeled terminal strips for field connections</td>
</tr>
<tr>
<td>5</td>
<td>LED-300</td>
<td>Lumen-SPOT™ 6&quot; Diameter LED Light w/30' Underwater Cable and mounting stand</td>
</tr>
<tr>
<td>1</td>
<td>P13</td>
<td>Conduit Cast Bronze Junction Box w/(1) 3/4&quot; Red Brass Waterstop Riser, (3) 1/2&quot; Machined Brass Seals and Potting Compound</td>
</tr>
<tr>
<td>1</td>
<td>P22</td>
<td>Conduit Cast Bronze Junction Box w/(2) 3/4&quot; Red Brass Waterstop Risers, (2) 1/2&quot; Machined Brass Seals and Potting Compound</td>
</tr>
<tr>
<td>1</td>
<td>PWA-30</td>
<td>In-ground Liquid Acid Storage Tank with valve assembly and metering pump. Housing is heavy duty FRP with a lockable top lid and separate sealed pump compartment. Unit is supplied pre-wired and assembled with all tubing and connectors with a 30 gallon poly acid drum (meets “double wall” requirements). Tank is designed for full load and is supplied with a chemical funnel (chemicals by Contractor).</td>
</tr>
<tr>
<td>1</td>
<td>PWC-30</td>
<td>In-ground Liquid Chlorine Storage Tank with valve assembly and metering pump. Housing is heavy duty FRP with a lockable top lid and separate sealed pump compartment. Unit is supplied pre-wired and assembled with all tubing and connectors with 30 gallon liquid chlorine drum (meets “double wall” requirements). Tank is designed for full load and is supplied with a chemical funnel (chemicals by Contractor).</td>
</tr>
<tr>
<td>1</td>
<td>DESIGN SERVICES</td>
<td>Schematic drawing to illustrate piping, wiring and utility connections; Installation details for equipment list items; Specifications</td>
</tr>
<tr>
<td>3</td>
<td>JOBSITE VISIT</td>
<td>Consecutive Days of Jobsite Design Service by Factory Representative</td>
</tr>
<tr>
<td>3</td>
<td>OPERATION MANUALS</td>
<td>CD-ROM Operation and Maintenance Manuals</td>
</tr>
<tr>
<td>1</td>
<td>PERFORMANCE GUARANTEE</td>
<td>Water Effects Performance Guarantee</td>
</tr>
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**Price Including Freight & Crate; Excluding Installation = $105,637.00**

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<th>Qty</th>
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<tr>
<td>1</td>
<td>PRODUCT WARRANTY</td>
<td>One Year Equipment Warranty</td>
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<tr>
<td>2</td>
<td>START-UP SERVICE</td>
<td>Consecutive days of on-site inspection, assistance and operations training by factory representative at feature start-up</td>
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</table>

### P13230-1-Existing Location Bill of Material

**Price Including Freight & Crate; Excluding Installation = $64,464.00**

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<td>PFC-13230</td>
<td>Custom UL Listed Skid Mounted System with: pumps and strainers; 90 sq. ft. cartridge filter with spare element; isolation and throttling valves; pressure gauges; vacuum gauges; low pressure/flow protection system, electronic water quality monitoring system w/ auto safety shutdown, water fill station with hose bib, pressure regulating valve, solenoid valve and isolation valves; epoxy coated steel housekeeping pad/base.</td>
</tr>
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<td>PWA-30</td>
<td>Dual application in-ground or free-standing Liquid Acid Storage Tank with valve assembly and metering pump. Housing is heavy duty FRP with a lockable top lid and separate sealed pump compartment. Unit is supplied pre-wired and assembled with all tubing and connectors with a 30 gallon poly acid drum (meets &quot;double wall&quot; requirements). Tank is designed for full load and is supplied with a chemical funnel (chemicals by Contractor).</td>
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<td>PWC-30</td>
<td>Dual application in-ground or free-standing Liquid Chlorine Storage Tank with valve assembly and metering pump. Housing is heavy duty FRP with a lockable top lid and separate sealed pump compartment. Unit is supplied pre-wired and assembled with all tubing and connectors with 30 gallon liquid chlorine drum (meets &quot;double wall&quot; requirements). Tank is designed for full load and is supplied with a chemical funnel (chemicals by Contractor).</td>
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<td>One Year Equipment Warranty</td>
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## Training checklist for Site Maintenance.

- Importance in starting / running, clean, free of debris.
- Filter pump: strainer cleaning Gauge readings.
- Filter: Backwash, or cart change. “Y” Strainer service Gauge readings.
- Main Effects: pump strainer cleaning, gauge readings, service schedule, general care.
- Probes: WLC, Chemical, how to service, when to clean.
- Controls: Clocks, VFD, HMI, PLC, DSC, DMX, LED, Pilot light indicators
- Controls: Wireless remote adjustments, service, troubleshooting.
- Controls: HOA settings, running system.
- Treatment systems: Chemtrol. Injection, erosion type. UV
- Thermal overloads; resetting, troubleshooting.
- Solenoids, Motor driven valves: Care and adjustments.
- Reservoir systems: how and when to service. Procedures.
- Annual service: check valves, motors, battery replacements.
- Winterization: how, and when.
- O&M manual review, and Q&A

## Project Training Notes: Your warranty is extended to cover properly maintained equipment.

- Importance in keeping system clean, free of debris
- Filter pump: strainer cleaning
- Filter: Backwash, or cart change. “Y” strainer service, Gauge readings
- Main Effects: pump strainer cleaning, gauge readings, service schedule, general care. If bearing are serviceable type, you must check manufacturers recommended times of service. Grease bearings every 90 days maximum as required. Check Mfg. recommendations in O&M
- Probes: how to service, when to clean.
- Controls: DSC, PLC, VFD, HMI, Clocks, Controller indications, LED’s, Pilot lights.
- Controls: Wireless remote adjustment, service troubleshooting.
- Controls: HOA’s, Switches, settings, service, running system. (system should always be run in “AUTO”)
- Chemical systems; Chemtrol, Aqua-Sol, erosion type.
- Thermal overloads; Resetting, Troubleshooting.
- Solenoids, Motor driven valves: Care and adjustments.
- Reservoir systems: How and when to service. Procedures.
- Annual service: Check valves, Motors, Battery replacements
- Winterization: How, and When (condensed version is; drain everything, and seal all openings to prevent any water from getting into the system anywhere)
- O&M Manual review, and Q&A

Installation Estimate: (from email from Fountain People)

Option #1:
Effects and Filter Skid Located in Existing Pump Room (Equipment Only) = $64,464.00
Installation and reconditioning: $375,000

Option #2:
Effects and Filter Vault & Reservoirs Located in Planter Next to Fountain Basin (Equipment Only) = $105,243.00
Installation and reconditioning: $550,000

Option #2-A:
Effects and Filter Vault Located in Planter Next to Fountain Basin (Equipment Only; no storage tank) = $69,917.00
Installation and reconditioning: $405,000

Option #3:
Effects Submersible Pump in Existing Pit w/Filter Skid in Existing Pump Room (Equipment Only) = $52,143.00
Installation and reconditioning: $350,500

Option #4: (For info only; not included in report above)
Effects Submersible Pump in Existing Pit w/Filter Vault and Reservoirs Located in Planter Next to Fountain Basin (Equipment Only) = $101,373.00
Installation and reconditioning: $430,000
Option #4-A: (For info only; not included in report above)

Effects Submersible Pump in Existing Pit w/Filter Vault Located in Planter Next to Fountain Basin (Equipment Only) = $66,047.00

Installation and reconditioning: $390,000