

Fountain Square Design/Build Reconstruction

RFP # 25-55

ADDENDUM No. 1

October 15, 2025

Any and all changes to the Contract Document are valid only if they are included by written addendum to all potential respondents, which will be mailed, emailed and/or faxed prior to the proposal due date to all who are known to have received a complete RFP document. Each respondent must acknowledge receipt of any addenda in their response. Each respondent, by acknowledging receipt of any addenda, is responsible for the contents of the addenda and any changes to the proposal therein. Failure to acknowledge receipt of any addenda may cause the proposal to be rejected. If any language or figures contained in this addendum are in conflict with the original document, this addendum shall prevail.

This addendum consists of the following:

1. Addendum Number One (1) is attached and consists of a total of seventy-one (71) pages including this cover sheet. Any changes to the drawings or specifications noted within Addendum Number One (1) will be reflected in subsequent drawing issues.

Please feel free to call (847-448-8107) or email (tnunez@cityofevanston.org) with any questions or comments.

Sincerely,

Tammi Nunez
Purchasing Manager

Fountain Square Design/Build Reconstruction

RFP # 25-55

ADDENDUM No. 1

October 15, 2025

This addendum forms a part of the Specifications and Bid Documents for RFP #25-55 and modifies these documents. This addendum consists of the following:

Pre-Proposal Attendees:

The list of attendees at the non-mandatory pre-proposal meeting is attached.

Questions Received:

Question 1:

Design Intent Drawings:

- Can you confirm if the current fountain design provided in the RFP represents a fixed aesthetic intent or if alternative design concepts are welcomed during the design-build proposal phase?
- Can you provide a narrative for the fountain performance intent – should this be a dancing fountain with rising and falling spray heights, are RGBW lights appropriate, should the fountain control synchronize to music? All of these elements provide a level of complexity and design/engineering cost, so Identifying the intent will provide a better equipment cost.

Question 1 Response:

- Respondents should consider the current aesthetic appearance and performance of the fountain to be fixed in the reconstruction effort. Construction of the substructure that supports the surface aesthetics is however up for discussion with the City. It is important to note that the plaza space is intended to support vehicular traffic for use during festivals and events which was the primary reason the trough design was implemented. If respondents have alternate structural design ideas that simplify fountain construction / operation and still support the design intent the City is open to considering those ideas.
- The entire decorative pool system specification from the original fountain's construction is attached for reference. This specification details the fountain' performance requirements and should provide respondents with a good understanding of the intended programming and effects.

Question 2:

Design Development Deliverables:

What specific deliverables are expected during the design phase (e.g., 3D renderings, hydraulic calculations, schematic layouts, lighting layouts, equipment specifications, control diagrams, etc.)?

Question 2 Response:

The City expects the design team to generate whatever technical plans/specifications are required to repair / reconstruct the fountain. Generally, this will include structural, mechanical, electrical, plumbing, and paving systems. Since the full scope of repairs / reconstruction work will not be known until the evaluation phase is complete, respondents should clarify their assumptions about the required level of effort for design documentation in their responses. In the event actual work required is different than these assumptions, the City will work with the selected DBC to modify the design contract via a change order.

Question 3:

Structural Scope:

If structural is excluded, will the GC or City provide a structural engineer of record for the basin and surrounding plaza elements?

Question 3 Response:

Structural is not excluded from the scope of work of this RFP. The selected DBC will be responsible for all structural engineering design work and construction of structural elements.

Question 4:

Design Review Process:

- How many design review meetings are expected with the City and/or design review committee, and are they virtual or in-person?
- What is the expected timeline between design submission and approval?

Question 4 Response:

- Three meetings are expected during the design and documentation task: kick off, 75% design review, and 100% design review. These meetings can be either virtual or in person.
- City staff that are managing the repair / reconstruction project can likely approve design work within several weeks of submission. This does not however apply to City code officials or other agencies responsible for permitting approvals.

Question 5:

Design Liability & Certification:

This feature appears to fall under the Interactive Water Feature code. Please confirm if this is accurate. Will this water feature be classified as an interactive water feature (splash pad) where people are invited to come in contact with the

water. There is a wide difference in design and material for a non-contact vs. interactive water feature.

Question 5 Response:

This water feature will be classified as an interactive water feature (splash pad). When originally constructed, Fountain Square required the following permits and licenses:

- State of Illinois Department of Public Health (IDPH) Swimming Facility Construction Permit
- IDPH Swimming Facility License
- Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) WMO Permit
- City of Evanston Building Permit

Question 6:

Electrical/Controls Integration:

- Should the fountain system controls integrate into the City's central BMS or be standalone?
- Are there specific communication protocols or monitoring systems required (e.g., remote monitoring, SCADA integration)?

Question 6 Response:

- Please see the attached Decorative Pool Systems specification for BMS controls requirements.
- Please see the attached Decorative Pool Systems specification for communication protocols and monitoring system requirements.

Question 7:

Water Source and Drainage Coordination:

- Is there an existing water service and drain connection available nearby, or should new service lines be included in the bid?
- Who is responsible for connecting fountain utilities to the main building systems?

Question 7 Response:

- The fountain has an existing 2" water service from a 12" main on Orrington Avenue. This service is connected to a mechanical vault immediately south to the fountain and contains the fountain's pumping systems. Drainage is provided through a 4" sanitary connection at the northwest corner of the fountain and a 4" sump discharge in the mechanical vault. Please see the fountain and mechanical drawings attached to the RFP for additional information.
- These utilities already exist and will only require reconnection by the DBC if determined to be needed during the evaluation task.

Question 8:

Site Access & Construction Constraints:

Are there specific work-hour restrictions, noise ordinances, or pedestrian access requirements in the plaza area during construction?

Question 8 Response:

Construction work hours in the City of Evanston are restricted to 7:00 am to 7:00 pm Monday through Friday and 8:00 am to 5:00 pm on Saturday. No work is allowed on Sunday. The City's noise ordinance can be found in City Code Title 9, Chapter 5 (9-5-20) linked [here](#). During construction, it is expected that the plaza space will be closed to pedestrian traffic. However, the DBC's construction site must provide for pedestrian access along the perimeter of the plaza including the east sidewalk on Sherman Avenue, the west sidewalk on Orrington Avenue, the north sidewalk on Davis Street, and the walkway north of the memorial wall.

Question 9:

Start-Up and Training:

- What level of commissioning, owner training, and operation manual documentation is expected?
- Will the City's staff be involved in startup/commissioning?

Question 9 Response:

- The primary intent of the commissioning exercise is to validate and verify all operational sequencing of the fountain system and troubleshoot any identified issues. Owner training should include demonstrating fountain operational, maintenance, startup and shutdown procedures to staff. Training should be performed on site and in a classroom setting and should include detailed agendas, and a training/operations manual.
- Staff will participate in the startup/commissioning process in order to better understand operations, but the DBC will be expected to lead this effort and implement any/all corrections. The attached Decorative Pool Systems specification provides additional guidance on these items.

Question 10:

Maintenance Contract Term:

The RFP mentions a maintenance period — please confirm the required duration and whether it includes both seasonal opening/closing and routine upkeep.

Question 10 Response:

The intended maintenance contract duration is 5 years and is intended to address a wide array of services including the items noted in this question. Please see page 7 (Phase 3 – Maintenance) of the RFP for additional information.

Question 11:

Maintenance Provider Approval:

Can a third-party maintenance provider be proposed, and does that provider need to be pre-approved by the City?

Question 11 Response:

Yes, a third-party maintenance vendor can be proposed. This vendor's qualifications should be submitted with the proposal for the City's consideration.

Question 12:

Spare Parts and Consumables:

Should spare parts (e.g., nozzles, lights, filters) be included in the bid, and if so, at what quantity or value?

Question 12 Response:

This will be determined during the design and documentation task. Respondents do not need to provide pricing for these items at this time.

Question 13:

As-Built Documentation:

What are the requirements for as-built drawings, O&M manuals, and digital deliverables (e.g., CAD, PDF)?

Question 13 Response:

The DBC shall deliver AutoCAD and PDF copies of all drawings produced for the project. The drawings shall be updated as needed to reflect as-built conditions that might differ from the design drawings. The DBC shall deliver PDF copies of all specifications, shop drawings, product data, and other similar records produced for the project. The DBC shall deliver all O&M Manuals in PDF format.

Question 14:

Coordination with Landscape Architect:

Will the City assign a landscape architect or design manager during the design-build process, and what level of coordination is expected with their team?

Question 14 Response:

The City will assign a staff member as Project Manager to coordinate directly with the DBC. Coordination efforts will likely vary over the course of the project and may involve other City departments and staff members. During construction, the DBC should expect to hold weekly construction meetings with the City.

Note: Acknowledgment of this Addendum is required in the Bid.

RFP 25-55, Fountain Square Repairs
Non-mandatory Pre-Proposal October 9, 2025, meeting attendees

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DECORATIVE POOL SYSTEMS

PART 1 – GENERAL REQUIREMENTS

1.1 CONFORMANCE

- A. Conform to Division 1 – General Requirements

1.2 DESCRIPTION

- A. Description of Work:

1. The work described in this section includes the supply, supervision, labor, transportation, temporary construction, equipment, tools, services and incidentals to install the mechanical and electrical systems for the Fountain Square Renovations at Fountain Square, Evanston, Illinois, water feature as detailed on the drawings and this specification prepared by The Waterworx Company. Provide start-up assistance, maintenance manuals, replacement parts and instruction to the City of Evanston for water feature care and operation.
2. It is the responsibility of the Contractor to provide all programming, software services, programming implementation, programming adjustments, and on-call software and programming adjustments as needed to correct malfunctions for a one (1) year period of time commencing with the date of substantial completion of the completed fountain system).
3. The Contractor shall provide the complete storyboarding, software and programming required to provide the “fluid and animated” display of the water feature lighting effects and operations. The programming of the water feature shall be provided consistent to the best practices and industry acceptable procedures for a lighting show.
4. The Contractor shall make themselves available to meet with the Landscape Architect for the purpose of establishing the desired lighting programs for the Fountain.

5. The Contractor shall develop the relevant programs to achieve the required displays for the Fountain, with final refinement and adjustments taking place on site with the Landscape Architect during the commissioning stage.
6. The Contractor shall provide the following programs for the Plaza Fountain:
 - a) One “*Overnight Program*” to run from 11PM to 7AM that would allow the filtration and water treatment systems to remain running, but lights and jets do not operate.
 - b) One “*Daytime Program*” to run from 7AM to 11PM where the filtration and water treatment systems remain running and the jets and lights are programmed to run at a variety of pre-set programs as described in this Section, Subsection B, Item 1.2, i.
 - c) Ten special event programs to run from 7AM to 11PM for scheduled events where the filtration and water treatment systems remain running and the jets and lights are programmed to run at a variety of pre-set programs for Memorial Day, City Festivals, Independence Day, Kits and Cats Event, Northwestern Homecoming, Veteran’s Day, Cancer Awareness, Peace Events, Halloween and ETHS Spirit Days, as described in this Section, Subsection B.1, Items j. to q.
 - d) One “*Windy Conditions Program*” to run from 7AM to 11PM where the filtration and water treatment systems remain running and the jets and lights are programmed to run at a variety of pre-set programs as described in this Section, Subsection B.1. Item r, when windy conditions prevail:
 - e) One “*Override Program*” to allow lighting and jet programs to be manually overridden by the City to create custom programs for special events with the filtration and water treatment systems remaining on.
7. The Contractor shall provide training on all aspects of the system on-site.

B. Description of the Water Features

1. Fountain - General

- a) The Fountain consists of a (4) rows of (5) nozzles concealed in troughs below the fountain pool finishes. The nozzles will be controlled to provide different heights of operation during the day through the use of programmable water effect pumps located in the adjacent subterranean equipment room. The water feature consists of a rectangular grid of water jets and lights. The nozzle arrangement and associated equipment are to be provided such that each of the 4 jet rows can operate independently from the other rows with all jets operating at uniform heights. No stepping will be accepted and no variation in the minimum and maximum jet heights will be accepted. All level changes are to be fully controllable with smooth, even level changes and with all jets capable of leveling out to the same level within a tolerance of 1 inch. The jet programs will typically operate as an immersive, barrier free water interactive feature during the day and a quiet, serene fountain in the evening. The Contractor shall produce and provide a daily program using 4 set water heights (above the finished grade) as follows; Off - 0" ht., Very Low - 8" ht., Low – 24" ht., Medium – 48" ht. and Tall - 72" ht. to create changing water effects and jet configurations. The general intent is to have the fountain "wake up" at 7AM and become more animated over the day with more frequent height changes during visitors' hours at lunch time and in the afternoon and operating at lower heights with less frequent height changes in the evening. The nozzles will be allowed to rise to a maximum height of 6 feet during the course of the day. An overflow pool edge will allow water to drain to an outer trough at the edge of the pool through a slot in the paving. This water will be collected and re-circulated through the water treatment and filtration equipment located in the equipment room.

- b) Illumination of the nozzle effects will be provided by LED light fixtures located at each nozzle. These light fixtures will be programmed to come on in the evening time to highlight the water nozzle effects and provide the lighting programs described in Section B1.
- c) The fountain is protected from splashing outside the pool area due to high winds by a wind sensing device which signals the fountain programmer to reduce motor speeds to lower the fountain sprays and initiate programs that suit the windy conditions.
- d) The equipment room is located adjacent to the water feature. The equipment room houses all of the pumping units for the water features as well as the water treatment systems, filtration systems, automatic filling systems and local disconnects for the electrical equipment in the room.
- e) The control panel will be located on the plaza in a ventilated steel enclosure and will be accessible to the maintenance personnel only.
- f) The surface includes a suspended stone and stainless steel system with openings for the nozzles and lifting points. All components are specifically designed to be flush-mounted into the suspended deck to provide a safe environment to persons as they interact with the feature.
- g) Due to the fact the water feature is an interactive feature and accessible to the public, the operating pressure of the jets are not to exceed 14 fps (feet per second) to avoid any potential injury to persons as they interact with the feature.
- h) The Contractor shall provide the 24 hour/ 7 days a week program for the filtration and water treatment systems to be on continuously during all fountain operations.
- i) The Contractor shall provide the following DAY programs for the fountain with the most westerly row being row #1, and moving east, the

next row is row #2, followed by row #3 and row #4, the row along the east side of the fountain:

- On the hour program: Every hour on the hour from 7am to 11pm, is marked by all the jets being off for 5 seconds rising up over 3 seconds to tall height, standing for 5 seconds beginning on the hour before dropping down over 1 second to the very low height for 1 second.
- 7:00AM to 7:00:15 – On the hour program
- 7:00:15AM to 8:00AM - All jets on Very Low.
- 8:00AM to 8:00:15AM – On the hour program
- 8:00:15AM to 8:15AM – All Jets on Low
- 8:15AM to 8:30AM – Outside Jets (rows #1 and #4) on Low, Inside Jets (rows #2 and #3) on Medium
- 8:30AM to 8:45AM –All Jets on Medium
- 8:45AM to 9:00AM – Outside Jets on Medium, Inside Jets on Tall
- 9:00AM to 9:00:15AM– On the hour program
- 9:00:15AM to 9:15AM – Outside Jets on Very Low, Inside Jets on Low
- 9:15AM to 9:30AM – All jets on Low
- 9:30M to 9:45AM – Outside Jets on Low, Inside Jets on Medium
- 9:45AM to 9:50AM – All jets on Medium
- 9:45AM to 9:50AM – Outside Jets on Tall, Inside Jets on Medium
- 9:50AM to 9:55AM – All Jets on Tall
- 9:55AM to 9:57AM – Outside Jets on Medium, Inside Jets on Tall
- 9:55AM to 9:57AM – Outside Jets on Low, Inside Jets on Medium
- 9:57AM to 9:59AM – Outside Jets on Very Low, Inside Jets on Low
- 9:59AM to 10:00AM – All Jets on Very Low
- 10:00AM to 10:00:15AM– On the hour program
- 10:00:15AM to 10:15AM – All Jets on Low
- 10:15AM to 10:30AM – 1st and 4th row - Jets on Low, 2nd and 3rd row – Jets on Medium
- 10:30AM to 10:45AM – 1st and 4th row - Jets on Low, 2nd and 3rd row – Jets on Tall
- 10:45AM to 10:59AM – All Jets on Tall
- 10:59AM to 11:00AM – All Jets on Very Low
- 11:00AM to 11:00:15AM – On the hour program

- 11:00:15AM to 11:15AM - 1st and 3rd row - Jets on Low, 2nd and 4th row – Jets on Medium
- 11:15AM to 11:30AM – 1st and 3rd row - Jets on Low, 2nd and 4th row – Jets on Tall
- 11:30M to 11:45AM – 1st and 3rd row - Jets on Very Low, 2nd and 4th row – Jets on Medium
- 11:45AM to 12:00PM– 1st and 3rd row - Jets on Medium, 2nd and 4th row – Jets on Low
- 12:00PM to 12:00:15PM – On the hour program
- 12:00:15PM to 12:15PM - 1st and 3rd row jets rise from Very Low to Tall over 3 seconds then 2nd and 4th rows rise from Very Low to Tall as 1st and 3rd row fall to Very Low over 3 seconds then 2nd and 4th rows fall from Tall to Very Low as 1st and 3rd row jets rise from Very Low to Tall over 3 seconds. Repeat.
- 12:15PM to 12:20PM – Outside Jets on Medium, Inside Jets on Low
- 12:20PM to 12:25PM – Outside Jets on Tall, Inside Jets on Low
- 12:25PM to 12:30PM– Outside Jets on Low, Inside Jets on Tall
- 12:35PM to 12:40PM– Outside Jets on Tall, Inside Jets on Medium
- 12:40PM to 12:45PM– All Jets on Medium
- 12:45PM to 12:59PM – 1st and 3rd row jets rise from Very Low to Tall over 3 seconds then 2nd and 4th rows rise from Very Low to Tall as 1st and 3rd row fall to Very Low over 3 seconds then 2nd and 4th rows fall from Tall to Very Low as 1st and 3rd row jets rise from Very Low to Tall over 3 seconds. Repeat.
- 12:59PMto 1:00PM– All Jets on Very Low
- 1:00PM to 1:00:15PM – On the hour program
- 1:00:15PM to 2:00PM – Repeat 12:00:15PM to 1:00PM Program
- 2:00PM to 2:00:15PM – On the hour program
- 2:00:15PM to 3:00PM – Repeat 12:00:15 to 1:00PM Program
- 3:00PM to 3:00:15PM – On the hour program
- 3:00:15PM to 4:00PM – Repeat 1:00:15 to 2:00PM Program
- 4:00PM to 4:00:15PM – On the hour program
- 4:00:15PM to 5:00PM – Repeat 12:00:15 to 1:00PM Program
- 5:00PM to 5:00:15PM – On the hour program
- 5:00:15PM to 5:15PM – All Jets on Medium
- 5:15PM to 5:30PM – Outside Jets on Medium and Inside Jets on Tall
- 5:30PM to 5:45AM – All Jets on Tall

- 5:45PM to 6:00PM – Inside Jets on Tall and Outside Jets on Low
- 6:00PM to 6:00:15PM – On the hour program. Lights Turn On White and stay on until 11:00PM.
- 6:00:15PM to 6:15PM - Outside Jets on Low, Inside Jets to Medium
- 6:15PM to 6:30PM – Outside Jets on Medium, Inside Jets on Tall
- 6:30PM to 6:45PM – All Jets on Tall
- 6:45PM to 7:00PM– 1st and 3rd row - Jets on Low, 2nd and 4th row – Jets on Tall
- 7:00:05PM to 7:00:20PM - Jets on Tall
- 7:00:20PM to 7:00:25PM - Jets to Very Low
- 7:00:25PM to 7:00:30PM - Jets on Very Low
- 7:00:30PM to 7:15PM - Jets on Low
- 7:15PM to 7:30PM - Jets on Medium
- 7:30PM to 7:45PM - Jets on Low
- 7:45PM to 8:00 – All Jets on Medium
- 8:00PM to 8:00:15PM – On the hour program
- 8:00PM to 9:00PM – All Jets on Medium
- 9:00PM to 9:00:15PM – On the hour program
- 9:00:15PM to 10:00PM – All Jets on Low
- 10:00PM to 10:00:15PM – On the hour program
- 10:00:15PM to 11:00PM – All Jets on Very Low
- 11:00PM - Jets Off. Lights Off.

j) The Contractor shall provide the following RED, WHITE AND BLUE program for the fountain for civic holidays including Memorial Day (last Monday in May) and Independence Day (July 4th):

- 7:00AM to 9:00AM - All jets on Very Low
- 9:00AM to 11:00AM – Outside Jets (rows #1 and #4) on Low, Inside Jets (rows #2 and #3) on Very Low
- 11:00AM to 1:00PM –All Jets on Low
- 1:00PM to 3:00PM – All jets on Medium
- 3:00PM to 6:00PM – All jets on Tall
- 6:00PM to 11:00PM – Lights Turn On. 2 lighting programs options; the first when all lights at all nozzles are to be green, the second option when the lights at end nozzles (both ends) of each row to be red, lights at nozzles one in from the end (both ends to be white) and lights at center nozzle of each row to be blue.
- 6:00PM to 9:00PM – All Jets on Medium

- 9:00PM to 11:00PM – All jets on Low
 - 11:00PM – All jets and lights off
- k) The Contractor shall provide the following CITY FESTIVALS program for the fountain for Northwestern University events such as Homecoming Week and scheduled school events:
- 7:00AM to 6:00PM – Repeat DAY TIME program for jets
 - 6:00PM to 11:00PM – Lights Turn On. 2 lighting programs options; the first when the lights at all nozzles are to be blue, the second option when the lights at all nozzles are to be green.
 - 6:00PM to 7:00PM – All Jets on Medium
 - 7:00PM to 8:00PM – All jets on Tall
 - 8:00PM to 10:00PM – All jets on Medium
 - 9:00PM to 10:00PM – All jets on Low
 - 10:00PM to 11:00PM – All jets on Very Low
 - 11:00PM – All jets and lights off
- l) The Contractor shall provide the following PURPLE program for the fountain for Northwestern Homecoming and Kits and Cats Events:
- 7:00AM to 6:00PM – Repeat DAY TIME program for jets
 - 6:00PM to 6:15PM – Lights Turn On. Lights at all nozzles of each row to be purple
 - 6:00PM to 7:00PM – All Jets on Medium
 - 6:15PM to 6:30PM - Lights at end nozzles (both ends) of each row to be purple, lights at nozzles one in from each end to be white, lights at center nozzle of each row to be purple.
 - 6:30PM to 6:45PM - Lights at all nozzles of each row to be white for 55 seconds slowly change to purple over 5 seconds, remaining purple for 55 seconds then changing back to white over 5 seconds. Repeat.
 - 6:45PM to 7:00PM - Lights at end nozzles (both ends) of each row and center nozzle of each row to be white for 55 seconds slowly change to purple over 5 seconds, remaining purple for 55 seconds lights then changing back to white over 5 seconds while lights at nozzles one in from the end (both ends) to be purple for 55 seconds slowly change to white over 5 seconds, remaining white for 55 seconds lights then changing back to purple over 5 seconds. Repeat.
 - 7:00PM to 8:00PM – All jets on Tall

- 7:00PM to 7:15PM – Repeat 6:00PM to 6:15PM lighting sequence
 - 7:15PM to 7:30PM - Repeat 6:15PM to 6:30PM lighting sequence
 - 7:30PM to 7:45PM - Repeat 6:30PM to 6:45PM lighting sequence
 - 7:45PM to 8:00PM - Repeat 6:45PM to 7:00PM lighting sequence
 - 8:00PM to 9:00PM – All jets on Medium
 - 8:00PM to 9:00PM – Alternate lights along each row and between each rows to be purple and white
 - 9:00PM to 10:00PM – All jets on Low
 - 9:00PM to 11:00PM – Lights at all nozzles of all rows to be purple
 - 10:00PM to 11:00PM – All jets on Very Low
 - 11:00PM – All jets and lights off
- m) The Contractor shall provide the following VETERAN'S DAY program (dates to be determined) for the fountain:
- 7:00AM to 9:00AM - All jets on Very Low
 - 9:00AM to 11:00AM – Outside Jets (rows #1 and #4) on Low, Inside Jets (rows #2 and #3) on Very Low
 - 11:00AM to 1:00PM –All Jets on Low
 - 1:00PM to 3:00PM – All jets on Medium
 - 3:00PM to 6:00PM – All jets on Tall
 - 6:00PM to 9:00PM – Lights Turn On. Lights at end nozzles (both ends) of each row to be red, lights at nozzles one in from each end to be white, lights at center nozzle of each row to be blue.
 - 6:00PM to 9:00PM – All Jets on Medium
 - 9:00PM to 11:00PM - Lights at all nozzles to be changing yellow/ orange effects to simulate the flickering of flames.
 - 9:00PM to 11:00PM – All jets on Very Low
 - 11:00PM – All jets and lights off
- n) The Contractor shall provide the following CANCER AWARENESS EVENTS program (dates to be determined) for the fountain:
- 7:00AM to 11:00PM – Repeat DAY TIME program for jets
 - 6:00PM to 6:15PM – Lights Turn On. Lights at all nozzles and all rows are to be pink throughout the evening.
 - 11:00PM – All jets and lights off

- o) The Contractor shall provide the following PEACE EVENTS program (dates to be determined) for the fountain:
- 7:00AM to 11:00PM – Repeat DAY TIME program for jets
 - 6:00PM to 6:15PM – Lights Turn On. Lights at all nozzles and all rows are to be blue throughout the evening.
 - 11:00PM – All jets and lights off
- p) The Contractor shall provide the following HALLOWEEN program (dates to be determined) for the fountain:
- 7:00AM to 11:00PM – Repeat DAY TIME program for jets
 - 6:00PM to 11:00PM – Lights Turn On. Lights at all nozzles and all rows are to be Orange throughout the evening.
 - 11:00PM – All jets and lights off
- q) The Contractor shall provide the following ETHS SPIRIT DAYS program (dates to be determined) for the fountain:
- 7:00AM to 6:00PM – Repeat DAY TIME program for jets
 - 6:00PM to 7:00PM – All Jets on Medium
 - 6:00PM to 6:15PM – Lights Turn On. Lights at all nozzles of row #1 and #3 to be blue, lights at all nozzles of row #2 and #4 to be orange
 - 6:15PM to 6:30PM - Lights at end nozzles (both ends) of each row to be blue, lights at nozzles one in from each end to be orange, lights at center nozzle of each row to be blue.
 - 6:30PM to 6:45PM - Lights at all nozzles of each row to be orange for 55 seconds then slowly change to blue over 5 seconds, remaining blue for 55 seconds then changing back to orange over 5 seconds. Repeat.
 - 6:45PM to 7:00PM - Lights at end nozzles (both ends) of each row and center nozzle of each row to be orange for 55 seconds slowly change to blue over 5 seconds, remaining blue for 55 seconds lights then changing back to orange over 5 seconds at the same time that the lights at nozzles one in from the end (both ends) to be blue for 55 seconds slowly change to orange over 5 seconds, remaining orange for 55 seconds lights then changing back to blue over 5 seconds. Repeat.
 - 7:00PM to 8:00PM – All jets on Tall
 - 7:00PM to 8:00PM – Repeat 6:00PM to 7:00PM lighting sequence
 - 8:00PM to 10:00PM – All jets on Medium
 - 8:00PM to 9:00PM – Repeat 6:00PM to 7:00PM lighting sequence
 - 9:00PM to 10:00PM - Repeat 6:00PM to 7:00PM lighting sequence

- 10:00PM to 11:00PM – All jets on Very Low
 - 10:00PM to 11:00PM - Repeat 6:00PM to 7:00PM lighting sequence
 - 11:00PM – All jets and lights off
- r) The Contractor shall provide the following WINDY CONDITIONS program for the fountain when windy conditions prevail:
- 7:00AM to 12:00PM - Jets on Very Low
 - 12:00PM to 6:00PM - Jets on Low
 - 6:00PM to 11:00PM – Lights Turn On White and stay on until 11:00PM.
 - 6:00PM to 11:00PM – Jets on Very Low
 - 11:00PM – All jets and lights off
- s) It is the responsibility of the Contractor to provide all programming, software services, programming implementation, programming adjustments, and on-call software and programming adjustments (as needed to correct malfunctions for a one (1) year period of time commencing with the date of substantial completion of the completed fountain system). All references to the “Programming” in these specifications obligate the contractor for all specified services.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Specification Sections including the following:

1. Concrete
2. Masonry
3. Metals
4. Thermal and Moisture Protection
5. Finishes
6. Plumbing
7. Electrical
8. Site work

B. Related Work Specified Elsewhere:

1. Power Supply – Refer to drawings for characteristics of power requirements to water feature equipment, including fused main disconnect switches or circuit breakers for power supply line disconnect. Power supply is to be brought to the line side of fountain control panel by others.
2. Water Supply – Refer to drawings for characteristics of water supply requirements to water feature equipment. Positive pressure backflow preventer and shut-off valve in equipment space to be provided by others.
3. Drainage – Refer to drawings for pool and equipment space drainage requirements. All drains to be of adequate size to handle volumes specified, installed to code and complete with backwater devices. Drains in equipment room and drain line(s) to pool fitting(s) to be provided by others.
4. Bonding – Water features require loop bonding as per National Electric Code requirements. Comply with requirements of NEC article 680 for fountain bonding requirements.
5. Ventilation – Equipment room to have forced air ventilation by others.
6. Lighting and Receptacle – Equipment room to have adequate lighting and power receptacle by others.

1.4 QUALITY ASSURANCE

A. General: Quality Control shall be assisted on this project by the following required procedures:

1. Performance of all work according to applicable codes and standards
2. Performance of all work according to applicable municipal, county, and state codes along with applicable and proper permits.
3. Use of qualified personnel
4. Proper submittals as required by these Specifications and General Conditions.
5. Use of proper materials and equipment
6. Site observations by the Contractor
7. In-progress inspection as required by the governing regulatory agencies.
8. In-progress observations by the Water Feature Consultant as specified herein.

9. Final project review.

B. Regulatory Requirements

1. Plumbing Code – For plumbing work included in the water feature work, comply with Local Building Codes.
2. Electrical Code – For electrical work included in the water feature work, comply with Local Codes and the National Electrical Code.
3. All work must meet or exceed the latest standards for local building code, electrical safety code, health and safety codes and all other applicable codes and regulations set by jurisdictional authorities.

C. Qualifications

1. The Contractor shall use only experienced workers that are skilled in the trade involved. Use certified plumbers and electricians for the installation of the mechanical and electrical systems.
2. *Specialty Fountain Equipment Supplier.* The equipment supplier for the specialty fountain components, as identified on the Equipment List on drawings, shall have a minimum five (5) years' experience in the supply of specialized fountain equipment and shall work closely with the installer throughout the construction and commissioning of the water features to ensure proper installation, testing and adjustment of equipment.

D. Coordination

1. Pre-Installation Conference – Conduct pre-installation conference at project site to be attended by the Water Feature Consultant, general contractor, equipment/supplier, mechanical and electrical contractors and any other trades associated with the installation of the water feature.
2. Progress Meetings/Critical Phase Inspections – Conduct a minimum of three (3) 1-day site meetings during construction with the Water Feature Consultant and specialty fountain equipment supplier.
3. Coordinate water feature work with the work of other trades, for proper time and sequence to avoid construction delays.

4. Pre-programming Meeting: The Contractor shall make themselves available for one (1) pre-programming meeting for the purpose of discussing and exchanging ideas and artistic impressions in order to establish the design intent of the Landscape Architect for the water and lighting effects.
5. Coordinate waterproofing test with waterproofing trades along with the fixing of all specialty water feature equipment that penetrate the waterproof envelope. It is the responsibility of the waterproofing contractor to remove and re-install all clamps and fasteners of specialty water feature equipment that penetrates the waterproof envelope.
6. Before starting any fountain filtration or water treatment system, a Manufacturer's Representative of the equipment shall be present at the job site to inspect the equipment and authorized the initial startup of the equipment. All expenses incurred to provide these certifications are the responsibility of the Contractor.
7. Start-Up – The fountain equipment supplier shall supply qualified personnel with a minimum of five (5) years experience to supervise start-up and programming of water features. A minimum of five (5) days on site is required. Contractor to provide personnel for adjustments required to all mechanical and electrical equipment as required by equipment supplier and Water Feature Consultant.
8. Design Team interaction with Contractor: The Landscape Architect shall have five days from the initial commissioning of the fountain feature to view and comment on the displays as produced by the Contractor. The Contractor shall be responsible for fully demonstrating the programming of the fountain to the Landscape Architect. The Contractor shall implement changes based on the comments received in writing for up to one (1) revision of the light programs.
9. Coordinate training of personnel on the maintenance and operations of the water features including start up and operations procedures, daily, weekly and monthly maintenance activities, programming and winterizing. The Contractor shall supply qualified personnel with a minimum of five (5) years experience to provide the training and shall conduct the training sessions in the presence of the Water Feature Consultant.

10. The contractor is to provide first year shut down, second year spring start up, and assist owner on site with second year spring shut down. Additionally, the contractor shall maintain the fountain for the duration of the second year and to be available to assist the owner with operations through the same period. This maintenance will not include “Daily” maintenance as described in Appendix 2; this will be performed by the City.

E. Submittals

1. Samples – Submit samples in accordance with Section 01340, in color and finish selected. Samples shall be prepared with materials and to thicknesses specified.
2. Product Data – Submit manufacturer’s product specifications and installation instructions for complete water feature system, including all pipe work, valves and fittings, pipework & plumbing isolators & hangers and for each component or product used in system. Include complete listing and description of performance and control product data. Submit manufacturer’s product specifications and installation characteristics, clearly indicating wherein actual components will be in any way modified from requirements, and how these differences exceed minimum requirements (Consultants will be sole judge of whether proposed difference is acceptable in each case).
3. Construction and Shop Drawings – Submit shop drawings of entire water feature mechanical and electrical systems. Include piping and wiring control diagrams, grounding layout drawings, light fixtures, drains, filters and various parts of the system. Show plan locations, required rough-in, anchoring and building-in requirements, and all details of penetrations of waterproofing.
4. Programming Storyboards – Submit storyboards of all for jet and lighting sequences for review and approval by the Landscape Architect to establish the necessary data to develop a fully operational, automated fountain with the water and lighting programs approved by the Landscape Architect.
5. Inspection Certification and Test Reports – Provide 2 certified copies of all Inspection Certifications and Reports as required by regulatory agencies and these Specifications. Provide test records and summaries containing “as-

installed” performance and operational data including water flow rates, pressures, motor currents, lighting circuit currents, etc. All tests must be witnessed by the City’s Representative. Provide certified test reports clearly indicating compliance with performance requirements specified.

6. Provide completed Pre-Startup Checklist included in these Specifications three (3) business days prior to beginning of scheduled fountain startup. See attached document in Appendix 1. Failure to do so or false information could result in back charges to cover additional startup costs.
7. Maintenance Manuals including spring start up and fall shut down sequences – Submit three (3) copies of bound maintenance manuals for water feature(s). Include full maintenance and operating instructions, parts, lists, recommended spare parts and emergency parts inventory, sources of purchase for major and critical components and similar information. Include mechanical and electrical certification from authorities having jurisdiction.
8. Contract Close-Out Submittals – Provide copies of all approved product data used, including any approved substitutions. Provide 2 copies of as-built drawings to include control and breaker panel systems, exact conduit and pipe work routing, pump systems, wiring sizes and materials. These drawings shall accurately record actual and final locations of the fountains, water feature components, actual piping and conduit, freeze-protection components and all related equipment.

F. Use of Proper Materials and Equipment

1. The contractor shall use only approved materials and equipment.

1.5 PRODUCT HANDLING AND PROTECTION

- A. Handle and store materials in accordance with manufacturer’s directions. Arrange for suitable storage areas.
- B. Be responsible for damage to work until project is complete and accepted by the City. Make good damaged materials.

- C. Cover and protect work of other sections in the area of work from damage. Make good all damage to the satisfaction of Consultant.
- D. Provide special protective devices, caps, plugs and covers for exposed fountain hardware during construction period.

1.6 WATER TIGHTNESS TEST

Test pool and piping for water tightness prior to installing finishes. Test must be performed to waterproofing manufacturer's recommendations. Test must be witnessed by the City of Evanston's Representative. Minimum five (5) days notice in writing must be given to all parties prior to test.

1.7 WARRANTY

- A. Contractor hereby warrants that work specified under this section shall remain free from defects in materials and workmanship in accordance with General Conditions, for a period of 1 year. Any defects occurring within warranty period shall be repaired/ replaced by Contractor at no cost to the City, including required removal and re-installation of other work. The warranty period shall commence on the date of substantial completion. Lamps and fuses are not included in this one (1) year warranty.
- B. If any equipment fails, does not operate satisfactorily, or shows undue wear, the Contractor will be notified and shall be responsible for remedying the defect within seven (7) calendar days at his expense without exception.
- C. The Contractor shall warrant that all equipment shall produce the performance specified herein or shown and must meet all requirements and design guidelines as set forth in these documents.

- D. Defects shall include failure of system to produce water patterns and heights stipulated on drawings.

1.8. PRODUCTS

- A. Where practical, the product of a single manufacturer for each type category of material or equipment shall be utilized throughout as rectified under this Section.
- B. All equipment and materials shall be capable of both continuous and intermittent duty rating and operation.
- C. All materials and equipment shall be new, undamaged, and fully protected throughout the construction period in order that all equipment and materials shall be in perfect condition at the time of acceptance of the facility by the City.
- D. It shall be responsibility of the contractor to replace any damaged equipment or materials furnished within the scope of his work.

PART 2 – PRODUCTS

2.1 GENERAL

- A. The drawings indicate control and flow diagrams explaining the intended water feature operations. Diagrams are for information only; verify all equipment and connections are suitable for intended purpose.
- B. Establish final sizes of equipment and connections based on manufacturer's equipment complying with intended purpose.
- C. Schedules on drawings indicate principle required equipment of the water feature system and product numbers of one manufacturer indicate minimum acceptable

quality. Final equipment configuration, including required quantities is the responsibility of the water feature equipment supplier.

2.2 SPECIALIZED EQUIPMENT

A. General

1. All specialty equipment, as indicated on the equipment list on the drawings, shall be single-source supplied from a supplier with a minimum of 10 years experience in supplying specialty fountain components and systems. Due to the specialized nature of the water feature's operational system, only specific components will be eligible for substitution. Note that only substitutions authorized and approved in writing by the City of Evanston may be used.
2. All specialized water feature materials used in mechanical and electrical systems shall be first quality lines, non-corrosive, separated from dissimilar metals, long lasting types having full U.L. Certification where necessary. All submersible and cast-in items in the pools will be constructed of bronze, copper, 316 stainless steel or where otherwise noted in this specification.
3. The layout and dimensions of specialty components have been used by the Water Feature Consultant. Any changes will require the contractor to provide the additional design and engineering necessary to allow review and approval by the Water Feature Consultant. The following will apply for all changes:
 - a) The Contractor shall assume full responsibility for additional expenses as required in any way to design and meet changes from the original materials or equipment specified.
 - b) No substitution will be considered unless there is a substantial benefit to the City.
 - c) If notice of substitution is not furnished to the Water Feature Consultant within fifteen days after the Contract (or notice of intent of contract) is awarded, then equipment and materials as named in the Specifications are to be used without exception.

B. Mention of Brand

1. The naming of a certain brand or manufacturer on the drawings or in the specifications is to establish a quality and performance standard for the article desired. Due to the specialized nature of the majority of equipment required to provide a fully-programmed operational system, only specific components will be eligible for substitution. Note that only substitutions authorized and approved in writing by the Water Feature Consultant may be used.

2. Approved Manufacturers:

Pumps:	Peerless, Goulds or approved equal.
Water Treatment:	Vissers , BEC or approved equal.
Filtration Tanks:	PAC Fab, Sta Rite or approved equal
Inlets and Drains:	PEM, Defo or approved equal
Water level sensors:	PEM, Defo or approved equal
Submersible Junction boxes:	PEM, Defo or approved equal
Control Panel:	E A Electric or approved equal

C. Equipment List

1. Drawings and installation specifications are based on manufacturer's literature. Manufacturers shall comply with the minimum quality standard of material and detailing indicated on the drawings or specified herein. Refer to drawings for mechanical and electrical equipment lists.

2.3 AUTOMATED CONTROL SYSTEMS – GENERAL

- A. The fountain control system for each water feature and associated machine room is a custom control and operator interface specifically design for operating and controlling water features.
- B. All fountain control panels shall be manufactured by the same source for ease of operation and maintenance.
- C. Each system comprises of the following elements:

Motor control Center (MCC) includes:

1. Main disconnect and fusing
2. Control integration and communication systems
3. All load points for system panels
4. All starters and contactors

Fountain Control Panel:

1. Computer systems
2. Logic controllers
3. I/O points for field termination of sensors and controls
4. Control of all automated nozzles
5. connection points for BAS and BMS
6. Sequencers

Sequencing controller

1. Storage and playback of sequences
2. connection to other fountain rooms
3. Programming systems
4. Internet and telephone systems

Lighting control panels

1. Control systems for lighting control sub panels
2. Integration control for building lighting
3. Opto isolation or connection to sub panels
4. DMX control arbitrator

Lighting Transformer panels

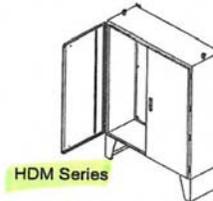
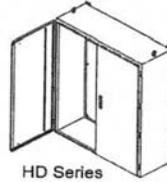
1. Local transformer panels and communication centers to control lighting systems
2. load terminals for all in fountain lighting control modules
3. fusing for lighting control boxes
4. Communication and feedback for lighting system

- D. All panels are linked and use identical protocols.
- E. All panels are to be assembled and connected to each other at the factory. The entire system is to be tested prior to shipping to site.
- F. All water feature control panels described herein shall be provided by a single source manufacturer to ensure full compliance with the design intent and contract specifications.

2.4 MOTOR CONTROL CENTER (MCC)

- A. Enclosure
 - 1. All Drives shall be enclosed in one main MCC and shall conform to governing codes for use in the mechanical room environment.
 - 2. Drives and enclosure shall be UL/CE approved.
 - 3. Drive and enclosures including sizing and load draws shall be submitted to the Engineer for review and approval prior to purchase.
 - 4. The MCC shall have enough free space/bays to allow for inclusion of PLC output modules, and interface.
 - 5. Enclosure to be Nema 3R, Double Door Enclosure, HDM606012 series, aluminum cabinet with black painted finish.

BEL **HD/HDM Series** **EEMAC / NEMA 12**
 Double Door Enclosures



TECHNICAL READOUT

Catalog No.		Dimensions			Panel		Weight	
Without Feet	With Feet	A	B	C	D	E	Without Feet	With Feet
HD544208	HDM544208	54	42	8	50	x 38	260	275
HD604808	HDM604808	60	48	8	56	x 44	425	440
HD604810	HDM604810	60	48	10	56	x 44	430	447
HD606010	HDM606010	60	60	10	56	x 56	520	537
HD726010	HDM726010	72	60	10	68	x 56	595	612
HD727210	HDM727210	72	72	10	68	x 68	710	736
HD484812	HDM484812	48	48	12	44	x 44	396	416
HD604812	HDM604812	60	48	12	56	x 44	456	476
HD606012	HDM606012	60	60	12	56	x 56	532	552
HD726012	HDM726012	72	60	12	68	x 56	615	635
HD727212	HDM727212	72	72	12	68	x 68	710	730
HD604816	HDM604816	60	48	16	56	x 44	480	504
HD606016	HDM606016	60	60	16	56	x 56	500	524
HD726016	HDM726016	72	60	16	68	x 56	700	724
HD727216	HDM727216	72	72	16	68	x 68	745	769
HD604820	HDM604820	60	48	20	56	x 44	456	486
HD726020	HDM726020	72	60	20	68	x 56	700	730
HD727220	HDM727220	72	72	20	68	x 68	855	885
HD604824	HDM604824	60	48	24	56	x 44	500	538
HD606024	HDM606024	60	60	24	56	x 56	600	638
HD726024	HDM726024	72	60	24	68	x 56	760	790
HD727224	HDM727224	72	72	24	68	x 68	890	928

Wide Models

HD244210	HDM244210	24	42	10	20	x 38	125	142
HD304210	HDM304210	30	42	10	26	x 38	150	167
HD364812	HDM364812	36	48	12	32	x 44	227	244

Application:

Type 12 enclosure designed to house and protect pneumatic, hydraulic or electrical equipment.

Construction:

- 14 or 12 steel gauge
- Slip hinges enabling door removal for easier access and mounting
- Continuously welded and ground smooth seams
- Three point lock flush handle
- Grounding stud on inner door surface and hole on back panel
- 2 or 4 lifting eye bolts
- 12 gauge galvanized back panel (HD7272 will be steel painted smooth white)
- Galvanized mounting rail
- Self-adhesive polymer BEL data pocket
- 12" high mounting feet on HDM model
- ANSI/ASA61 grey polyester textured powder coating inside out

Also Available:

- TYPE 3R and 4 construction (drip shield, stainless hinges)
- Cutouts, louvers, hubs and windows
- Set of rail for door mounting
- Aluminium, SS, galvanized steel
- Special finishes & sizes

Standards:

- CSA certified 150359
- UL listed E109310



BEL Products Inc.

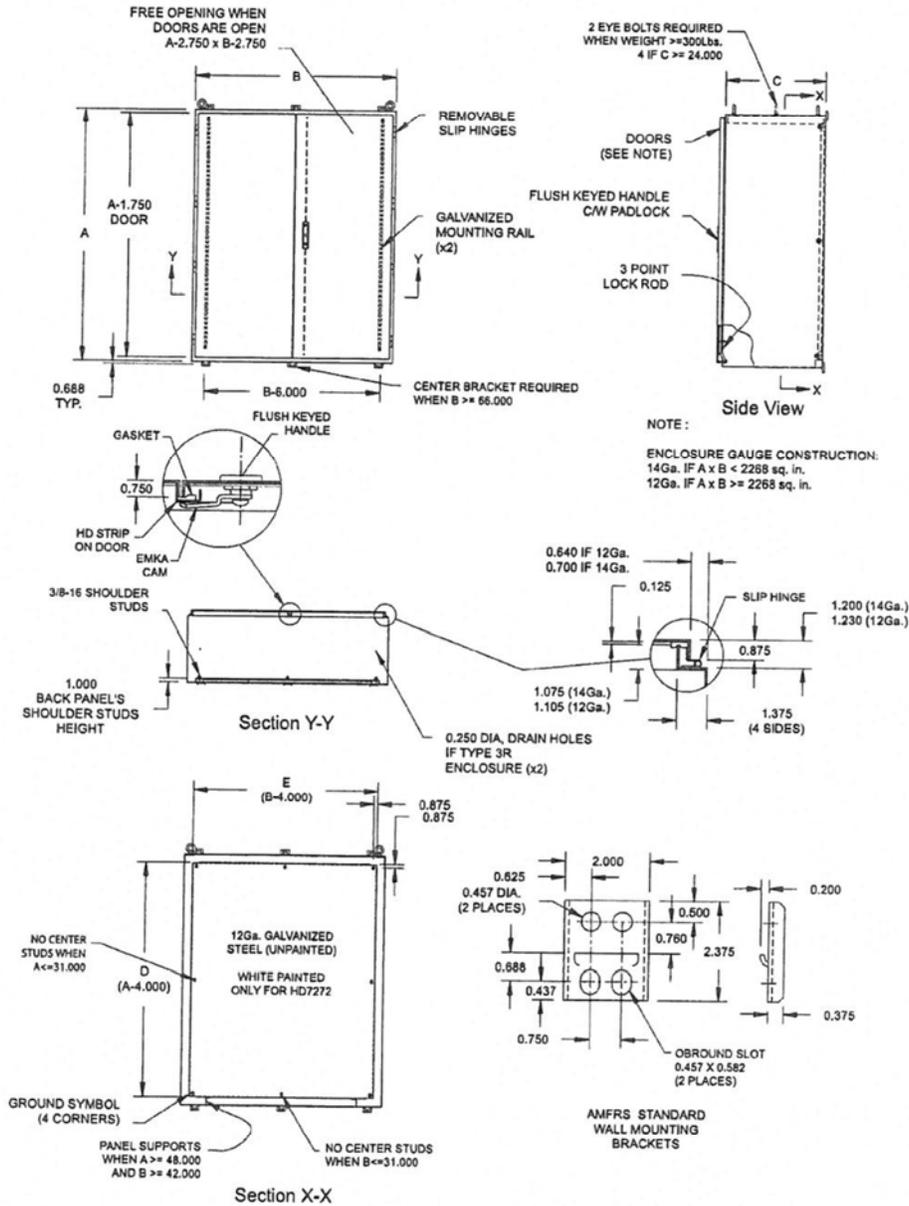
Technical specifications subject to change without notice. 10/2013

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HD/HDM Series

**EEMAC / NEMA 12
 Double Door Enclosures**



BEL Products Inc.

Technical specifications subject to change without notice. 10/2013

- B. The MCC at a minimum shall be equipped with the following minimum items:
 - 1. Main Disconnect.
 - 2. Individual Drive Disconnects
 - 3. Individual RUN lights
 - 4. Individual Hand Off Auto Selector Switches.
 - 5. Fan and ventilation as required.
 - 6. All Starters and overloads shall be included in this MCC.

- C. The MCC shall be installed to allow operators working on pumps and motors a free and clear view of the front side (controls side) of the MCC during his performance of work and maintenance or serviceman disconnects shall be provided.

2.5 AUTOMATED PROGRAMABLE LOGIC SEQUENCER AND CONTROL SYSTEM

- A. This specification describes the functional requirements, design features, hardware, software, performance, services, and documentation required for programmable logic control system that is located within the main control panel located on the plaza housed in a ventilated steel enclosure. For the purposes of this specification, a programmable logic control system is defined as one that provides a robust, secure, cost-effective, and flexible solution with easy-to-use hardware and software. The specific programmable logic controller specifications shall be submitted to the Engineer for a complete review and approval.

- B. The programmable logic control system shall provide as a minimum the following functions as defined in the specific sections of this specification:
 - 1. Integrated Alarms and Events
 - 2. User friendly operator interface
 - 3. Data ports for a modem connection
 - 4. Producer Requirements: The Technical Producer shall be a recognized leader in Fountain Control capable of supplying all necessary support services including hardware and software support, system installation and commissioning, and on-going support.

- C. Applicable Codes: The integrated controller described in this specification shall be intended for use in a below-grade equipment room environment.
- D. System Architecture: The programmable logic control system shall be based around a utilizing industry standard operating systems, and protocols. The protocols required shall include CsCAN, Device Net, CAN TCPIP, DMX 512a. Refer to the Project Drawings for system layout. Refer to feature design narrative and Control method statement document for description of operation parameters.
- E. Integrated Controllers

The integrated controller shall be capable of handling the following control requirements:

1. Continuous processes control
2. Discrete operations
3. Machine control
4. Animation and choreographic control
5. Lighting systems control

- F. Building Control Integration

The open control system must provide a terminal strip (or equivalent) to enable a future connection with a building/facilities control system (BAS/BMS). A. Fountain controller/PLC shall have the ability to communicate by either BACnetIP or BACnetMSTP as per the City's Bacnet control requirements. The building control system must be compatible with Andover (Schneider Electric) and control the following:

1. Ability to control lighting on and off times
2. Monitor wind velocity devices
3. Monitor mechanical rooms fault status
4. Monitor each water features current operating status.
5. Ability to start and stop the features automated program (schedule)

G. HMI locations

Each system shall have three points of control integrated in the programming. HMI' shall be located in the main control panel, the MCC, and the remote programming location. Each HMI and automation control system will be connected to each other via a closed Device net loop. Each system can communicate using custom control methodology over standard TCP/IP networks. The layout and cable requirements are indicated on in the drawing set.

H. Physical Requirements

The programmable logic controller shall be mounted in a chassis (rack) within the main control panel located on the plaza housed within a ventilated steel enclosure with power supply, appropriate network interface modules, and I/O modules. The chassis shall be a wall-mountable design for use on sub-panels in enclosures. The chassis' shall also be available in a number of sizes. The power supply shall be separate from the chassis so that it does not consume any I/O slots. Power supplies shall be available in 220/240 VAC and 24 VDC models. The integrated controller shall be able to survive a power loss of up to four days without loss of memory or programming. Options must be provided for a replaceable battery as well as a rechargeable battery.

2.6 CONTROL RELAYS (KR, K)

- A. Control relays shall be "industrial duty" and rated for continuous operation. Each unit shall be 2-pole and equipped with both normally closed and normally open contacts for each pole.
- B. A control relay shall be provided to activate the operation of the underwater fountain lights in groups as indicated on the drawings.
- C. A control relay shall be provided to de-activate all underwater lights as controlled by a photocell. This will prevent the underwater lights from inadvertently operating during daylight conditions.

2.7 VARIABLE FREQUENCY DRIVES (INVERTERS)

Not required on this project

2.8 CONTROL SYSTEM INTERFACE

- A. Motor Overloads shall be connected to the Automation Control Center. Connection shall be via a direct line with no splices or joins between points.
- B. Cabling within the MCC shall conform to the same standards as the Automation Control Center.

2.9 FOUNTAIN CONTROL PANEL

- A. Enclosure/Panel
 - 1. Main enclosure shall be constructed of Painted Steel.
 - 2. Junction boxes shall be NEMA type 12, or IP54 non-ventilated. Sub-panels and raceways shall be white or beige.
 - 3. Enclosures shall be sized to provide 20 percent space for future expansion.
 - 4. The control panel shall have a Fused Disconnect Switch.
 - 5. Disconnect switch shall meet the requirements of IEC 947-3. Incoming power conductors shall terminate at the line side of the disconnect switch.
 - 6. Blades will be de-energized when disconnect switch is open.
 - 7. Handle shall be defeatable.
 - 8. Components in enclosures shall be well organized and the wiring routed in raceways.
 - 9. Spacing between components and raceways shall be as per manufacturer's specification for proper ventilation and cooling.
 - 10. Raceway and Ducting shall be no more than sixty (60) percent filled.
 - 11. There shall be ducting on the field side of the terminal strip.
 - 12. All electrical equipment that is mounted in non-ventilated NEMA type 12 or IP54 enclosures designed to operate continually and reliably within an enclosure ambient temperature of 0°C to 60°C.

13. When ventilation or positive pressure within a panel is required, fans with a fine filter shall be used (boxer fans with foam filters are acceptable).

B. Nameplates

Nameplates inside control panels shall be a lamacoid type attached with double sided tape or epoxy glue.

1. The typical nameplate shall be white on a black background.
2. The control panel shall have a nameplate secured to the outside of the panel.
3. It shall contain as a minimum the:
 - a) Input power
 - b) Manufacturer
 - c) Serial number
 - d) Manufacturer's contract number and panel number
 - e) Manufacturer's phone number
4. Enclosures that are floor mounted shall have a minimum clearance of 300 mm between the floor and any component.

C. Terminal Blocks

1. Provide an adequate number of terminal blocks to provide necessary for a complete and functional system such that:
 - a) No more than two wires shall be terminated under one terminal screw,
 - b) The greatest of TEN percent or two extra terminal blocks are provided in all enclosures.
 - c) All devices to be terminated to a terminal block. Acceptable items are Weidmuller WDU4 catalogues number 102010 and Allen Bradley 1492-IFM20F or 1492-IFM40F.

D. Fuses / Protection

1. Provide all necessary fuses for a fully functional system as per NEC or CEC International Electrical Standards or local governing codes.
2. Such that:
 - a) High Voltage A/C shall use type J fuses.

- b) 2080VAC loads shall be fused using type ABC fuses. Fuse holders for all 208VAC loads shall be Weidmuller terminal blocks.
 - c) VDC fuses shall be of AGC type, using Weidmuller terminal block fuse holders.
3. Provide one U-Ground convenience receptacle fused at 2.5 amps for local programming power. Receptacle is to be on the interior of the panel and labeled "FOR PROGRAMMING ONLY" This supply is to be GFCI protected.
 4. Provide external Power ON/Emergency Stop Buttons as indicated in the Bill of materials
 5. Additional emergency stops requirements:
 - a) Emergency Stops shall be a non-illuminated red Push-Pull mushroom head 22-mm buttons.
 - b) The equipment shall contain enough emergency stops to disable the machine with minimal effort from all sides.
 - c) An emergency stop will be located on the main control panel.
 6. Emergency stops will contain two sets of normally closed contacts.
 - a) One set will be used in a hard-wired circuit that disables the master control relay.
 - b) The other will be wired to a PLC input.
 7. Provide "System On" Pilot Light (Green)
 - a) This light shall be energized only when the state of the MCR is true, (see below.)
 - b) Lights shall be 24 VDC. Lights will be LED's where available for longer life expectancy.
 - c) Stack lights shall be placed to be visible to the nearest operators and indicate which portion of the equipment may be malfunctioning.
- E. Master Control Relay (MCR)
1. The Master Control Relay (MCR) will be a hard-wired 24 VDC circuit.
 2. The 24 VDC relay will be an Omron relay.
 3. A "Power On" green illuminated pushbutton will energize the MCR if no emergency stops are pushed.

4. The MCR will enable power to all PLC outputs when energized.
5. The MCR will not control power to the PLC, PLC inputs, DC Power Supply or devices in the emergency circuit.
6. An auxiliary contact on the MCR will be wired to a PLC input to monitor the state of the system.

F. Control Relays

1. Provide additional control relays as required.
2. Control relays are Omron or approved equal.
3. All AC and DC loads shall use suitably rated surge suppressors and diodes to limit reverse voltage spikes.

G. Transformers and Power Supplies

1. Control circuit transformers are to be a minimum of 500 volt-amperes.
2. Transformers will conform to NEMA standard ST-1 or equivalent
3. Transformers shall be copper-wound with an isolated secondary
4. The secondary neutral of 220 VAC transformers shall be grounded
5. The transformer shall be fused on the primary and secondary sides
6. Transformers shall be sized appropriately for the anticipated load plus ten percent.
7. 24 VDC power supplies shall be a regulated power supply with built in over voltage and short circuit protection that is sized for the applications.
8. Electrical drawings shall contain a power consumption work sheet for transformers and power supplies.

2.10 OPERATOR INTERFACE

- A. The Operator interface shall be the principal control surface for all fountain functions.
- B. The principle operators' interface and HMI for the fountain system shall be a custom programmed Horner Graphical Touch display.
- C. The system shall be programmed at the direction of the Engineer in compliance with the general performance of the fountain system.

- D. The Contractor shall provide a remote E-Stop in the plant room and in other locations designated on the drawings for Emergency use.
- E. The Contractor shall supply remote E-Stops at an on-grade location within 20 feet of the fountain for remote stopping of the fountain operations.
- F. The operator interface shall include but not limited to:
 - 1. Machine Control and monitoring
 - 2. Feature water level control
 - 3. Variable frequency speed control
 - 4. Lighting control
 - 5. Emergency monitoring and shut-off – including:
 - 6. Programming and coding for:
 - a) System reporting
 - b) HMI interface
 - c) Time of day and operation programming.
 - d) Error and fault logging.
 - e) Serial communicator to chorographic devices
 - f) Communication for audio systems.
 - g) Wind sensor and control
 - h) Optional upgrade to send SMS and Cellular information over the local cellular system.

2.11 LOGIC INTERFACE

- A. Logic programming will be written in CSCAPE ladder logic version 8.1 or better.
- B. The installing contractor shall be responsible for keeping the fountains operating system up to date for a period of one year.
- C. The Programmer shall have a minimum of:
 - 1. 5 years experience in programming similar PLC's, controllers, and sequencers
 - 2. 3 years programming water features

3. 5 years experience writing serial code
4. The programmer shall be knowledgeable of DMX->Serial communications to ensure accurate communication.

D. The PLC shall communicate:

1. Via Devicenet to the VFD's as supplied. All programming of this logic shall be the PLC programmers' responsibility.
2. To the Audio System via Serial RS232C
3. To the Sequencing System via Serial RS232C

2.12 CHOREOGRAPHY INTERFACE

A. DMX Nozzle Relays:

1. The sequence valves of the fountain shall be controlled via fast acting Solid State relays.
2. Relay cards shall be Horner electric Smart stick relays
3. The OCS platform will be able to translate DMX encoded signals to trigger the PLC hardware.

B. Playback and Sequences:

1. Programming and playback of show sequences shall be accomplished via a DMX storage and playback unit. The unit shall be capable of synchronization with a SMPTE LTC Time code player.
2. The memory of the playback unit shall be expandable
3. The number of sequences that can be stored shall be a product of memory only.
4. The playback device shall be an Alcorn McBride light cue(s) controller as manufactured by High end systems.
5. The device shall be capable of simultaneous transmission of 1 universe of 512 control channels in a single packet.
6. The unit shall conform to USITT DMX-512A standards.

2.13 LIGHTING INTERFACE

- A. Sub-panel to contain water features lighting system
- B. Provide electrical panels in accordance with the above general specifications to provide power to the water features lighting system.
 - 1. The design shall incorporate all necessary transformers and supplies to power all the lights on with multiple 24V contact from the system PLC panel and sequence the LED lighting systems.
 - 2. The lighting will be triggered using custom LED control technology.
 - 3. Each load circuit of the lighting system shall be protected with adequate fusing.
 - 4. Each load circuit of the lighting system shall be fully GFI protected.
 - 5. The panel shall have its own exterior mounted disconnect switch
 - 6. The Engineer and Producer / Choreographer shall approve the Ground faulting method prior to panel fabrication.
- C. The panel builder shall ensure space requirements and airflow requirements are met, so as not to overheat the interior of the panel during operation.

2.14 ULTRAVIOLET DISINFECTION EQUIPMENT

- A. The primary disinfection system shall be comprised of an Ultraviolet (UV) disinfection system, which is to be installed in the water treatment system after filtration and before chlorination. The UV water treatment unit shall be a pressurized reactor UV treatment system engineered using amalgam UV lamps and electronic ballasting technologies to provide a reliable, high performance and energy efficient system. This system shall be specifically designed, and its' performance targeted, at DNA inactivation of cysts such as cryptosporidium.
- B. The tender shall include the following information on the UV system:
 - 1. Submittal shall include details of Reactor and Control Panel, lamp and ballast descriptions, and engineering report stating headloss and UV System

efficiency prescribed as the ratio of the total electrical input power in Watts per US gallon treated, at the design flow rate, UV transmission, and UV Fluence (or dosage).

2. To be acceptable, the manufacturer shall submit supportive documentation to demonstrate that the proposed UV system design will deliver the specified dose at the design UV Transmittance and flow rate.

C. The UV equipment shall include the following, but not be limited to:

1. Electro polished 316L stainless steel UV Reactor and associated fittings.
2. Nema electrical enclosure, rated for site requirements, to house a standard industrial PLC Controller and electronic ballasting.
3. 254nm UV intensity monitor with reactor over-temperature detector.

D. Provide UV equipment, which shall disinfect filtered, re-circulating, municipal water with the following characteristics:

- | | |
|--|-----------------------|
| 1. Flow Range: | 60 USGPM Feature |
| 2. Water Temperature Range: | 1° to 40°C |
| 3. Air Temperature Range | 1° to 40°C |
| 4. Relative Humidity | 95% non-condensing |
| 5. Maximum operating pressure: | 150 psi |
| 6. Ultraviolet Transmittance @ 253.7 nm: | 85% |
| 7. UV Design Dosage at end of lamp life | 60 mJ/cm ² |
| 8. Maximum number of units: | 1 each feature |
| 9. Equipment Redundancy: | 1 each feature |
| 10. Iron | ≤ 0.3 mg/l |
| 11. Hardness | ≤ 120 mg/l |
| 12. Manganese | ≤ 0.05mg/l |

E. General Requirements

1. To be acceptable, the UV equipment must operate in an enclosed pressure vessel and use Amalgam UV lamps.

2. The UV system is to be furnished with the latest components and equipment available at the time of shipment.
3. Supply a UV system complete with UV reactor, control panel, and UV intensity monitoring system, as herein specified.
4. System shall be designed to allow for either UV Unit to be shutdown without reducing the UV dosage below the design level.
5. The supplier shall take into consideration the pressure drop through the UV unit and its impact on the system pump capacity. A copy of the existing pump's specifications, including pump curve, is attached.

F. Design, Materials and Construction

1. All metal components in contact with the feed water shall be Type 316L stainless steel.
2. All materials exposed to UV light shall be Type 316L stainless steel, General Electric Type 214 quartz glass, or equivalent, or a suitably UV resistant material such as Teflon® or Viton®.
3. The system shall be designed for complete immersion of the quartz sleeve housed UV lamps, including electrodes, such that the lap of the water is exposed to the UV rays emitting perpendicularly from the entire length of the lamp's arc.
4. The major axis of the UV lamps shall be parallel to flow.
5. The system shall be capable of operation for minimum periods of 10 minutes of zero flow before a high reactor temperature critical alarm is generated.
6. If any stoppage of the water flow is expected during operation of the UV System, overheating of the UV Reactor must be prevented. In such a case, a water bleeding system must be incorporated into the outlet piping of the UV Reactor. This water bleeding system shall consist of a solenoid valve, being controlled by a thermal switch or timer, to periodically bleed water through the UV reactor, to keep it cool, and prevent an over-temperature alarm condition.

G. UV Reactor

1. Each UV reactor shall be configured such that the inlet assembly introduces turbulence into the water flow and directs the flow parallel to the longitudinal axis of the UV Reactor. The outlet shall be orientated perpendicular to the same axis and positioned beyond the end of the lamp's arc. Two substantial mounting legs shall be located on the bottom of the UV reactor to evenly support its wet weight.
2. Each UV reactor shall have an NPT drain fitting affixed to the bottom of the inlet end of the reactor and another NPT fitting at the top of the outlet end of the UV reactor to serve as a chemical cleaning outlet port.
3. Each UV reactor shall accept its respective UV lamps and quartz sleeves through only one end of the vessel. This end of the UV reactor shall allow for complete reactor entry so internal inspection and/or service can be accomplished.
4. UV reactors shall be able to operate indefinitely at a maximum inlet pressure of 150 psi and be furnished with a factory certified pressure test report detailing the minimum hydrostatic pressure test.
5. Access to UV lamps shall be via quick release bayonet style fittings to permit rapid lamp replacement.

H. UV Lamps

1. UV lamps shall be low pressure, high intensity, amalgam type with ruggedized filaments to withstand shock and vibration.
2. Lamp bases are to be made from ceramic to resist UV light and high temperatures.
3. All electrical connections to the UV lamps shall be terminated at one end and interface to a ceramic lamp connector, being resistant to UV light and high temperature.
4. Lamp cabling shall be oil and water resistant, submersible, outdoor type, which is temperature rated for -60° to +105°C, voltage rated at 600Vrms and have a UV resistant jacket.

5. UV lamps shall have a monochromatic spectral output with the emissions peaking at 254 nanometers. 254nm UV lamp output shall be to be guaranteed to be at least 80% of initial output, after 12,000 hours of operation, with no more than three controlled on/off power cycles per day.

I. UV Ballasts

1. UV ballasts shall be electronic and compatible with the low pressure, high intensity amalgam lamps supplied.
2. UV ballasts shall be powered by 230VAC +/-10%, 50/60 Hz, single phase power.
3. UV ballasts shall be have an electrical efficiency of 94% or greater.

J. Lamp End Seals and Lamp Holder

1. The open end of the UV lamp sleeves will be sealed to the sleeve guide by a suitable compression O-ring made from Viton®.
2. The O-ring compression is made by a 316L stainless steel sleeve retainer that will require no special tools for installation or removal.

K. UV Lamp Sleeves

1. Sleeves will be clear fused quartz, GE Type 214 or equivalent, with a minimum UV transmissivity of 89 percent per millimeter of wall thickness.
2. Sleeves will be domed at one end and be accessible through the reactor service entrance.

L. UV System Controller

1. The Controller shall be a standard industrial, globally available, Programmable Logic Controller (PLC) and interface to an LCD screen to display UV System operating status.
2. The LCD screen shall continuously display the relative UV intensity at the reactor wall, as a percentage, and the UV System operating hours.
3. Any Alarm condition, including but not limited to, lamp failure or over-temperature condition, shall take precedence over normal screen data.

Screen shall display alarm condition to inform the operator of the specific fault. e.g. "Lamp 5 Off"

4. The AC power supplied to the UV System controller power supply shall be 230 +/- 10%, 50/60 Hz, single phase and shall be conditioned if damaging power line disturbances such as surges, spikes or brown out conditions are possible.
5. Upon powering up the UV System, a lamp start delay shall be provided to ensure the amalgam lamps have had the opportunity to cool from previous operation. Following the lamp start delay, ballasts shall be powered sequentially to minimize AC line surges and nuisance circuit breaker tripping.
6. Dry relay "Alarm" contacts shall be provided for use as a remote Alarm indicator.

M. Spare Parts

1. Spare parts for one year of operation shall be supplied including (1) spare lamp and (1) set of seals for each unit.
2. Required safety equipment shall be supplied.

N. Testing/Commissioning

1. Testing shall be carried out in the presence of the Engineer or Engineer's Representative.
2. The Supplier shall be responsible for carrying out all tests and for expenses incurred in this connection.
3. The Supplier or their authorized representative shall demonstrate the operation of the UV System and maintenance procedures.

O. UV Equipment Warranty

1. The UV equipment shall be Warranted to be free from defects in material and workmanship, from the date of installation, for the following respective time periods: a minimum of ten (10) years for the UV reactor and associated fittings; a minimum of one (1) year for the UV Sensor; a minimum of two (2) years for the electronic ballasts, lamp cabling, electronic control system and any visual display.

2.15 CHEMICAL CONTROLLERS

- A. A programmable chemical automaton system shall be supplied for continuous monitoring and control of pH and sanitizer ORP (oxidation-reduction potential). The controller shall also display the Langelier saturation index. The controller shall include a programmable microprocessor with a four (4)-line display screen and a sixteen (16)-key keyboard for operator access.
- B. The controller shall automatically activate the appropriate chemical feeders in order to maintain the sanitizer activity level within +/- 10mV (millivolts) of ORP and the pH within +/- 0.2 pH unit of the set points selected by the operator. ORP function shall include a seven-day, level-based chemical saver program. All set point and calibration levels shall be adjustable with a numeric keypad mounted on the front panel of the unit. Controllers with internal switches or calibration adjustments and/or requiring special signal generating equipment to service will not be considered equal.
- C. The controller shall be capable of operating all outputs in the following operator-selectable modes of operation: automatic, manual, timer or off. In the automatic mode, the operator shall be able to choose between on/off control with adjustable deadband or proportional feed control with adjustable deadband and progressive control zones.
- D. The controller shall include a programmable seven-day shock program with operator selectable ON and OFF times for each day of the week.
- E. The controller shall continuously calculate and display the langelier Saturation Index using either sensor data and/or manual input for pH, temperature, total alkalinity and calcium hardness. The resulting calculated water condition shall be displayed on the main screen as either "Scaling", "Corrosive" or "OK".
- F. The controller shall be contained in a NEMA Type 4X (rain and splash proof) lockable fiberglass cabinet with an LCD graphic display screen of four (4) lines

of twenty (20) alphanumeric characters each. The main display screen shall show the current values, control mode and operational status for ORP, and pH.

- G. The controller shall be factory set to water treatment industry standards. The operator shall be able at any time to adjust all programmable functions to preferred settings. The controller shall have a reset mode to reset all or selected functions to the original factory standards.
- H. The controller shall have the capability to calibrate all sensor inputs, depending on the accuracy needed, using either 1, 2, or 3-point calibration to determine respectively the origin, slope and curvature of the calibration curve.
- I. The controller shall include programmable high and low alarm levels for all control functions with operator-selectable feed lockout and alarm buzzer options. A Remote Alarm relay shall be included in parallel with alarm buzzer for operator-selectable voltage or dry contact output.
- J. The controller shall continuously monitor and alert for failure of ORP and pH probes using dynamic probe testing before the water chemistry gets out of range. Failure alarms based on safety timers or out-of-range alarms will not be considered equal.
- K. The controller shall record and display the elapsed run time for each activation event and a cumulative run time resettable at any time by the operator. The controller shall provide for operator-adjustable event run time limits and total run time alarms for all control functions.
- L. The controller shall include a battery for memory storage with minimum reserve power for six (6) months.
- M. The controller shall have an on-board memory for storing of test data on operator-selectable schedules. RS-232 serial communications port shall be included for on-site downloading of test data. Test data storage must consist of the following sensor inputs: ORP, pH (PPM, Temperature, Conductivity or

TDS available with optional sensors). Controllers failing to data log all listed parameters will not be considered equal.

- N. The manufacturer of the chemical controller shall provide qualified personnel to inspect the installation of all equipment, start up all equipment, and track the operation of the equipment. Complete operator training on all equipment shall be supplied.
- O. An immersion chlorine feeder system shall be provided.

2.16 STRAINER BASKETS AND FILTRATION UNITS

A. Strainers

1. Strainers to be constructed of food grade Fiberglass Reinforced Isophthalic or Vinylester Resin (F.R.P.), PVC and stainless steel material. The strainers are totally non-corrosive and have a high gloss gel-coat finish with UV protection. Strainers to be designed for working pressures of 30 P.S.I.G. or 65 P.S.I.G. and a vacuum service of 20" of mercury.
2. Strainer designs to come with integrally molded influent/ effluent 2" to 10" vanstone flange connections, frp. / clear acrylic cover, hinged lid fastening hardware and drain/ vent plugs.
3. Strainers to be certified to ANSI/ NSF Standards for this project application.

B. Strainer Baskets

1. Shall be vertically pleated corrosion resistant non-welded strainer basket, producing 0-P.S.I.G. head loss when operating at designed flow rates.
2. The strainer basket to consist of food grade FRP end caps, 16- gauge stainless steel straining element with 1/8" perforated holes and stainless steel connecting rods.
3. All strainer baskets to have a minimum of a 4 to 1 open area ratio of the strainer basket to influent flange connection.
4. Strainer baskets to be self aligning and come with a molded flow indication arrow to insure proper flow direction.

C. Filter Systems

1. Filter tanks to be constructed of Fiberglass Reinforced Isophthalic or Vinylester Resin (F.R.P.) and manufactured to ASTM and ASME tank standards.
2. Tanks to be non-corrosive and have a high gloss gel-coat finish with UV protection.
3. Filter systems to be designed for working pressures of 50 P.S.I.G. or 100 P.S.I.G. with a 4 to 1 safety factor.
4. Filter systems to be shipped with all internal components and media dump port in a fully assembled state.
5. Filters to have integrally molded influent/ effluent connections (both top piped & end piped), integrally molded manhole seat with internally mounted F.R.P./ Clear Acrylic cover, integrally molded F.R.P. saddle supports and molded pressure gauge panel with two (2) panel mount gauges.

2.17 PUMPS

A. General

1. Pumps are required for installation in the equipment room and as indicated on the equipment list on the drawings.
2. Pumps shall be of the "Centrifugal" type and provide the performance and construction characteristics specified herein.
3. Each pump shall be rated for "self-priming" duty and be rated for continuous and intermittent duty.
4. Pumps shall be constructed of stainless steel or have a cast iron volute as indicated below and on the Equipment List on the Drawings and are to be suitable for continuous fountain duty in treated water conditions. The pump case shall be designed to withstand 75 psi hydrostatic pressure and hydraulically tested before shipping.
5. The discharge orientation shall be vertically upward. The pump shall be provided with a mating bracket or structure to maintain positive shaft alignment between the motor and pump head.

6. The pump impeller shall be balanced to provide smooth operation. The impeller shall be keyed to the shaft and locked with a suitable cap or setscrew.
7. The pump assembly shall include a motor in the size specified constructed to NEMA standards. The motor-pump construction shall be suitable for variable speed operation. The assembly shall be provided with a solid structural base plate for mounting.
8. The construction and design shall allow the rotating element and motor to be easily removed without disturbing connecting piping. Each pump shall be supplied with a suction port strainer basket made of fiberglass or stainless steel and a stainless steel strainer basket, which is easily removable for cleaning.
9. Pumps shall be supplied with a hair and lint suction strainer.
10. The contractor shall furnish and install as shown in the plans and described in these specifications.
11. Pump(s) shall meet or exceed the efficiency shown in the pump schedule.
12. To insure cavitation-free operation, each pump's NPSH Requirement must be low enough to permit stable, continuous operation at 130% or greater of best efficiency point. Note that these pumps are to be installed in the below-grade feature equipment room.
13. Each pump shall be capable of continuous operation without producing noise in excess of the Hydraulic Institute and OSHA guidelines.
14. Pump shaft shall be fitted with a leakless mechanical seal suitable for the temperatures and pressures indicated.
15. The pumps shaft shall be of stainless steel #316.
16. Pump base plates shall be grouted and leveled.
17. Each pump rotating assembly shall be equipped with bearing isolators or sealed bearings.
18. It is mandatory that each pump arrive at the project site with the following connected related equipment and features:
 - a) Connected / mounted to a pre-manufactured pump skid
 - b) Connected to the pump base plate with rubber-padding-type connectors to reduce pump noise and vibration effects

- c) Mounted lifting hooks and connectors to allow the installation of the pumps into the below-grade equipment room
- d) Each pump skid shall be sized to allow entrance into the below-grade feature room access opening.

B. Pumps

- 1) Pumps shall be of the close coupled end suction centrifugal type.
- 2) Pump shall be capable of delivering flow and total head as outlined in the equipment list with an efficiency of not less than 72% at the specified condition.
- 3) Pumped liquid will be at a temperature of 68 °F with a specific gravity of 1.
- 4) Casing: Pump casing shall be cast iron with smooth water passages and fitted with a bronze replaceable wearing ring. Maximum casing working pressure shall be 175 Psi. Suction and discharge connections shall be 125 lb class ANSI NPT
- 5) Impeller: The impeller supplied for the specified conditions shall be one piece bronze casting of a diameter not greater than 90% of the casing cutwater diameter.
- 6) Sealing: Sealing of the pump liquid cavity shall be accomplished with: Mechanical Seal Pumps - Bronze Fitted: A face type mechanical seal with ceramic stationary seat, carbon washer, Buna N rubber flexible members, 18-8 stainless steel metal parts and 18-8 stainless steel spring. Seal shall be mounted over a bronze shaft sleeve. Seal to be rated for 225o F. maximum.
- 7) Driver: Pump shall be close coupled to a HI/NEMA 184JM frame JM -Mech Seal TEFC enclosure electric motor rated for horse power as outlined on the equipment list and complete with 480 Volt 3 Ph 60 Hz. Motor shaft shall be carbon steel and of a size and design to limit shaft deflection at the stuffing box to no more than .002 inches. Motor bearings shall be grease lubricated and sized for a minimum of 20,000 hours L10 life which is equivalent to 100,000 hours average bearing life.

2.18 FOUNTAIN COMPONENTS

A. Devices - General

1. All Specialty fountain components shall be new and of top quality. The mixture of components from various manufacturers is not acceptable.
2. The electrical contractor shall install all electrical devices and the mechanical contractor shall install all other fountain equipment that has no electrical interface or connection.
3. Bidders shall be familiar with general specification of these devices from body of fountain specification.

B. Main Drains

1. All drain fittings shall be of stainless steel and / or bronze construction fitted with a large area basket strainer and anti-vortex plate. Each fitting shall be complete with a bronze membrane clamp for clamping of waterproofing as required by water proofing manufacturer. Drain fittings shall be as identified on the equipment listing.

C. Inlet Fittings

1. All inlet fittings shall be of stainless steel and /or bronze construction fitted with a large area basket strainer and anti-vortex plate. Each fitting shall be complete with a bronze membrane clamp for clamping of waterproofing as required by water proofing manufacturer. Floor-mounted water inlet fittings shall be as identified on the equipment listing.

D. Water Level Sensors

1. Water level sensors shall be constructed of cast bronze, brass, copper and stainless steel. Level switches shall be reed type relay enclosed in plastic, magnetically actuated float with minimum of 1" level adjustment. Voltage shall be 12VAC 0.5 amp. Non-inductive.
2. Provide water-level sensors into each fountain as identified on the equipment listing.

3. Each device shall provide sensing signals to activate a relay and solenoid valve located in the filtration equipment room. Sensors shall turn all pumps and lights associated with the water feature "OFF" in the event of a low water
4. The units shall be electrically terminated to the main fountain control panel.
5. All water levels sensors shall be terminated to the main Fountain Control Panel as required

E. Drain and Overflow Fittings

1. All drain and overflow fittings shall be of stainless steel and /or bronze and copper construction fitted with a bronze membrane clamp for clamping of waterproofing as required by water proofing manufacturer.
2. Provide multiple overflows and drain devices into each fountain per the equipment listing.
3. Drain and overflow fittings shall be as identified on the equipment listing.
4. These devices shall connect to the master drain piping from each fountain.

F. Underwater Lights

1. All fountain lighting shown on the drawings indicate the intended location of the lighting within the pool and landscape including the schematic locations of the lighting components and controls. Locations are shown for schematic information only; verify all equipment and connections for intended purpose with the specified manufacturer. Establish final sizes of equipment and connections based on manufacturer's equipment complying with intended purpose.
2. Final equipment configuration, including required quantities is the responsibility of the equipment supplier.
3. Lighting equipment indicated on the equipment list and in the drawings, shall be single-source supplied from a manufacturer with experience in supplying specialty underwater lighting components and systems.
4. All submerged lighting components shall be first quality lines, non-corrosive, separated from dissimilar metals, long lasting types with full U.L. Certification for underwater use. All submersible items will be constructed of bronze, copper, 316 stainless steel or non-ferrous materials.

5. Any changes to the layout and dimensions of lighting components used in the drawings will require the contractor to provide the additional design and engineering necessary to allow review and approval by the Water Feature Consultant and landscape architect.
6. It is the responsibility of the contractor to provide a complete lighting system for the feature.

G. Miscellaneous Fountain Accessories

1. Refer to the drawings for the required fountain accessories that are required to be supplied and installed by the Contractor.

H. Special Tools or Equipment

1. The Contractor shall provide all special tools for proper and continued operation and maintenance of the equipment and materials provided under this Section.
2. The contractor shall deliver one complete set of these tools to the City's Operating Personnel during the startup and testing of the equipment.

I Maintenance Accessories

Contractor to provide maintenance staff with the following materials:

1. One fresh water connection complete with isolation valve, hose bib and 10 meters (30ft.) of flexible rubber hose in ½" diameter on a wall mount support in each equipment space.
2. One set of hip waders in size twelve (North American size), 10 litre (2 ½ gallon) plastic bucket, a lightweight 15 ½ ft telescopic pole with dual locking clamps, a heavy duty 18" wall brush with nylon bristles with telescopic pole adapter, a polypro mesh leaf skimmer bag with contoured reinforced sides (2 sets of each).
3. Professional swimming pool water quality test kit including bromine, PH, Total alkalinity and calcium hardness for water treatment systems. (4 sets of each)

4. One set of plastic laminated 11" x 17" "Process Flow" diagram, "System Electrical Schematic" diagram and "Control Panel Wiring" diagram to be mounted on equipment space wall.
5. 5 gallon wet/dry vacuum

J. Spare Parts

Contractor to provide maintenance staff with the following emergency spare parts:

1. 1 set of control panel fuses and control panel indicator lights.

2.19 PLUMBING COMPONENTS AND FIXTURES

- A. Use only 95/5 solder.
- B. Use red brass, bronze or copper (Type L) only for stub-ups through pool floor and walls. Provide a membrane clamp or flange if a waterproofing membrane is used, or a suitable puddle flange if there is no membrane. Flange type must be approved by Water Feature Consultant prior to installation.
- C. Interconnecting piping between pool(s) and water feature equipment room – use copper (buried-type L, exposed-type M) or fabricated stainless steel (14 gauge, type 302/316) or C.P.V.C. schedule 80 (if permissible). Drainage piping to waste may be cast iron.
- D. Use brass gate valves 2 inches diameter or smaller.
- E. Use gear operated, butterfly, gate, ball (for isolation only), plug or equivalent low loss infinitely variable valve or as specified for valves larger than 2 inches diameter used on discharge lines. Valves to be bronze or stainless steel fitted with EPDM seals.
- F. Use butterfly type or gate valves with low loss characteristics. Do not use Ball type check valves unless specified. Valves to be bronze or stainless steel fitted with EPDM seals.

- G. Use only silent type check valves with low loss characteristics. Do not use ball type check valves unless specified. Valves to be bronze or stainless steel fitted with EPDM seals.
- H. Use stainless steel flexible type couplings to isolate all pumps from interconnecting piping. Metroflex metrosphere or equal.
- I. Use liquid filled pressure gauges on discharge end of all pumps to monitor operating pressures.

2.20 ELECTRICAL COMPONENTS AND FIXTURES

- A. Use red brass pipe for conduit located within the pool and for stub-ups through the pool floor.
- B. Use rigid PVC conduit for interconnecting conduit outside the pool where conduit is to be encased in concrete only. Use rigid galvanized steel or EMT conduit in other locations as permitted by code.
- C. Make connections between dissimilar metals with dielectric fittings.

PART 3 – EXECUTION

3.1 INSPECTION

Examine conditions under which fountain work is to be installed. Notify Contractor, in writing, of conditions detrimental to proper performance of fountain work. Do not proceed with fountain installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

A. General – Comply with codes, governing regulations, the requirements and recommendations of the fountain manufacturer, and with the requirements of Division 15 and 16.

B. Plumbing:

1. Pipe Assembly

- a) Install piping straight and true in accordance with the best practice.
- b) Make pipe runs as direct as possible, using a minimum number of fittings.
- c) Cut pipe ends accurately to fit. Bending or springing of pipe will not be permitted, unless so specified.
- d) Cut pipe ends square and thoroughly ream or file ends, and wipe clean to remove all burrs prior to joining.
- e) Run pump and/or filter suction lines straight into the pump eye for at least eight pipe diameters, unless otherwise specified or shown on the drawings.
- f) Use long radius elbows in pump and/or filter suction lines whenever change in direction is required, unless otherwise specified or shown on the drawings.
- g) Make pipe size reductions with reducing fittings. Bushings will not be permitted.
- h) Make screwed joints tight with tongs and wrenches.
- i) Make soldered joints for copper tubing without corrosive paste flux. Use solder approved for application.
- j) Install unions or flanged connections on at least one side of all check valves, solenoid valves and control valves. Install unions or flanged connections at all equipment locations (pumps, filters, etc.) so that such equipment may be readily disconnected.

2. Thermal Expansion
 - a) Provide swing joints, turns, expansion loops or long offsets wherever shown on plans, or whenever necessary to allow for proper expansion and contraction of piping.

3. Noise and Vibration
 - a) Install piping, equipment and systems with utmost precautions to prevent noise and vibration transmission. Use hangers and isolators as recommended by pipework manufacturer to minimize noise.
 - b) Isolate equipment that would tend to cause noise or vibration with suitable vibration dampeners to reduce noise or vibration transmission to buildings and/or other equipment. Also isolate piping connected to this equipment.
 - c) Ensure all pipework is adequately supported to prevent movement and vibration.

4. Pipe Coding
 - a) Identify all equipment room components with engraved plastic white on black surface identification labels complete with stainless steel or brass chain, in an approved manner as to service and characteristics.
 - b) Identify flow direction on all pipework systems with colored directional adhesive labels in an approved manner.

5. Valves, Union and Flanges
 - a) Locate valves required for control or isolation of any part of the fountain mechanical system in accessible positions. Where several valves are related as to function, group together, wherever possible, or as indicated on the plans.
 - b) Use brass "U" valves with non-rising stem and positive shut-off or equivalent for valves 2 inches or smaller.
 - c) Use gear operated butterfly valves on discharge lines larger than 2 inches diameter.

- d) Use butterfly type or gate valves on suction lines larger than 2 inches diameter.
- e) In submerged locations, use valves designed for such use and/or approved for such use by the Water Feature Consultant/Engineer.
- f) Use unions suitable for not less than 125 psi and of the same size and material as the adjacent piping.
- g) Use flanges of the companion type faced and drilled, complete with necessary adapter and suitable for not less than 125 psi. Use flanges of the same size and material as the adjacent piping.

6. Insulation

- a) Insulate all pipework associated with fountain using 1" thick fiberglass pipe insulation for pipework up to and including 4" diameter. Use 1 ½" thick fiberglass pipe insulation for pipework over 4" diameter. All pipe insulation to meet code requirements. Submit proposed pipe insulation for approval by Water Feature Consultant prior to installing.

C. Electrical:

1. Wiring Materials

- a) Install electrical conductors connected to equipment having a tendency to cause noise or vibration in sealtight flexible conduit not to exceed four feet in length.
- b) Install other electrical conductors in rigid PVC conduit, unless otherwise specified or indicated on drawings. Make connections with approved fittings.
- c) Use ¾ "minimum conduit size unless otherwise specified or indicated on the drawings.
- d) Select wire, flexible cord, cable and/or conductors as to size, type, current carrying capacity, voltage and insulation based on intended service
- e) Use connecting and terminating devices used for making connections, taps and/or splices as approved for specific application.

- f) Use junction and/or pull boxes, located outside the pool, that conform to applicable codes, are of sufficient size, suitable design, and approved.
 - g) Construction to meet site requirements.
2. Installation of Electrical Work
- a) Furnish and install new conduits from the fountain junction boxes to fountain equipment room. Install all fittings, junction boxes, wiring and other electrical equipment located within the fountain pool and as indicated on the drawings.
 - b) Make connections to junction boxes in the pool tight with thread sealant.
3. Installation of Conduit
- a) Install and seal wiring in conduit in accordance with the best practice. Use flexible cord approved for submersible application between underwater pool light fixtures and underwater junction boxes.
 - b) Conceal conduit in finished areas, unless otherwise specified or indicated on the drawings.
 - c) Cut square and carefully ream the ends of all conduit cut. Remove rough edges.
 - d) Seal open ends of conduit with approved conduit seals during construction.
 - e) Provide a bushing where a conduit enters a box or fitting to protect conductors from abrasion.
 - f) Use approved fittings for exposed runs of conduit. Make fittings covers accessible. Bends will not be permitted around corners of beams, walls or equipment. Set screw type fitting is prohibited.
 - g) Make threadless couplings and connectors suitable for preventing water from entering the conduit where conduit is installed in wet locations or is buried in concrete or ground. Running threads will not be permitted.
 - h) Provide sliding expansion joints with bonding straps where conduits cross building expansion joints.

- i) Make bends in conduit so that the conduit is not damaged and the inside diameter of the conduit is not effectively reduced. Use no more than four 90 degree bends on any single run of conduit between outlets and/or other fittings.
 - j) Provide adequate support for concealed and/or exposed conduit.
4. Installation of Conductors
- a) Install conductors in conduit after conduit, except exposed conduit with removable conduit seals, has been completed.
 - b) Remove debris and moisture from all conduit, boxes and other fittings before installing conductors. Do not use cleaning agents or lubricants that might have a detrimental effect on conductor coverings.
 - c) Connect conductors to terminals using approved connectors. Neatly group wires to panel cabinets, pull boxes and wiring gutters. Fan wires out to the terminals.
 - d) Protect conductors from damage resulting from further mechanical work. Replace damaged conductors.
 - e) Refer to main Division 16 electrical contract for minimum wire size and type to be used.
5. Conductor Color Coding
- a) Use conductors (600 volts and under) color-coded and identified by one color. Maintain color continuity throughout the project.
 - b) Use the following color-coding: Phase "A" – Black, Phase "B" – Red, Phase "C" – Blue, Neutral – White, and Grounding Conductors – Green.
6. Grounding
- a) Ground electrical systems to maintain a continuous positive electrical ground throughout the entire system.
 - b) Ground all metal objects in and around pool as required by the National Electric Code.
 - c) Provide grounding lug on metal items requiring grounding.

- d) Identify circuit wiring in the motor control center and feeders in an approved manner.

D. Tests and Adjustment

1. Arrange for all testing as required of all connections to meet municipal codes and regulations, and as further on drawings. Do not backfill or enclose any fitting until tests have been carried out and work has been accepted.
2. Thoroughly flush pipe and equipment prior to operating system. Protect sensitive equipment from clogging, including sensors and valves.
3. Do pressure test to 517 kPa (75psi) on plumbing lines, and test electrical services. Electrical system shall be ground fault tested. All pressure tests to be documented and witnessed by the City's representative.
4. Pressure test filter and drainage system at 206 kPa (30psi) for 24 hours prior to backfilling or concealing piping system.
5. Correct and/or repair any leaks and run tests again. Test remaining fountain systems as indicated on drawings.
6. Adjust water systems for volume and water flow characteristics to reflect design intent and as directed by Consultant.

E. Clean-up and Instructions

1. Upon completion of work, clean up all areas affected by this work, remove excess materials, debris and tools.
2. Give the City's personnel instructions on use and maintenance of system.

PART 4 – MEASUREMENT AND PAYMENT

- 4.1 All work described above under "Decorative Pool Systems" will be measured and paid for at the lump sum cost for Decorative Pool Systems which shall include all work necessary to instruct, operate and maintain the fountain at fountain regardless as to whether the work is explicitly described above.

END OF SECTION

APPENDIX 1

PART 1 - PRE START-UP CHECKLIST - ITEMS TO BE INSPECTED IN THE POOL			YES	NO
1.	Nozzles	Location within pool to dwgs	<input type="radio"/>	<input type="radio"/>
2.	Stub-Ups	Location within pool to dwgs	<input type="radio"/>	<input type="radio"/>
3.	Overflow Drains	Location within pool to dwgs	<input type="radio"/>	<input type="radio"/>
4.	Suction Drains	Location within pool to dwgs	<input type="radio"/>	<input type="radio"/>
5.	Electrical Stub-ups	Location within pool to dwgs	<input type="radio"/>	<input type="radio"/>
6.	Junction Boxes	Location within pool to dwgs	<input type="radio"/>	<input type="radio"/>
		Can junction box be spun onto stub up	<input type="radio"/>	<input type="radio"/>
7.	Gratings	Installed to manufacturer's specs	<input type="radio"/>	<input type="radio"/>
		Penetrations located correctly	<input type="radio"/>	<input type="radio"/>
		Easy to reassemble	<input type="radio"/>	<input type="radio"/>
8.	Water Feature Construction	Pool level	<input type="radio"/>	<input type="radio"/>
		Wall details – coping, tile complete	<input type="radio"/>	<input type="radio"/>
9.	Waterproofing	Tested and water tightness verified	<input type="radio"/>	<input type="radio"/>
10.	Plumbing/piping installed		<input type="radio"/>	<input type="radio"/>
11.	Water level sensor in pool (to be adjusted by Specialty Equipment Supplier)		<input type="radio"/>	<input type="radio"/>
12.	Drainage connection for overflow and pool drains		<input type="radio"/>	<input type="radio"/>
13.	Inventory of items on site completed		<input type="radio"/>	<input type="radio"/>
14.	Grounding of in pool components completed		<input type="radio"/>	<input type="radio"/>

- | | | | |
|-----|--|---|---|
| 15. | Copies of inspection/test certificates (if required) | o | o |
| 16. | Wiring within pool completed | o | o |

PART 2 - PRE START-UP CHECKLIST - ITEMS TO BE INSPECTED IN
EQUIPMENT ROOM

		YES	NO
1.	Pumps suction inlets connected	o	o
2.	Pump suction strainer location correct	o	o
3.	Pump location correct	o	o
4.	Pump discharge pipe work route correct	o	o
5.	Pump discharge pipe work wall penetrations	o	o
6.	Control panel location as per code	o	o
7.	Conduit and wiring routed between panel and:		
	Pumps	o	o
	Specialty control valves	o	o
	Water fill valves	o	o
	Wind sensor unit and anemometer	o	o
	Flow sensors	o	o
	Pressure sensors	o	o
	Pool (# conductor and type)	o	o
	Ground connection	o	o
8.	Main power supply wiring into line side of panel	o	o
9.	Water fill line system piped? Backflow preventor?	o	o
10.	Floor drain location and size checked	o	o

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11.	Ventilation duct location and associated equipment	o	o
12.	Housekeeping pad size and dimensions	o	o
13.	Access hatch/door for equipment removal installed	o	o
14.	Vapor proof lighting in room and switch location	o	o
15.	Receptacles – GFI protected	o	o
16.	All plumbing/pipe installed as per local codes	o	o
17.	Heating location and size as per local codes	o	o

END OF APPENDIX 1

APPENDIX 2

MAINTENANCE

It should be the duty and desire of the maintenance personnel to keep the fountain in an immaculate condition.

The maintenance program consists of a series of scheduled visits to ensure that the operation of the water feature systems and the individual components that it comprises are periodically checked to ensure that this goal is achieved.

DESCRIPTION OF SCHEDULED VISITS:

DAILY VISIT

Each day a short visit is planned to each water feature to collect and extract floating debris from pools, and collected debris on easily accessible screens.

WEEKLY VISIT

Each week a visit is planned to each water feature to conduct the following tasks:

- Sand filters should be checked for debris build up, backwashed and rinsed.
- The basket strainers located on the suction to the main pumps should be removed, emptied of their debris content and cleaned.
- Using approved test kits the water quality of the features should be checked. Tests include pH level, oxidizing agents residual, copper level, calcium hardness and total alkalinity. Appropriate preventative or corrective measures using approved chemicals or settings to the ionizer should be made.
- All blown lamps located in light fixtures subject to status should be replaced accordingly

- Any identified nozzles and sequence valves clogged by debris are to be dismantled and cleaned and/or adjusted.
- Cleaning of grates and suction drains.

MONTHLY VISIT

- Pool should be completely drained, and all debris extracted and cleaned using a portable high pressure car wash/jet system, and/or brushes.
- During this shutdown a careful inspection of all equipment should be made and all concrete and tile work inspected. Careful attention should be given to detect and identify possible leaks to pipework connections, cracks in concrete, deterioration in electrical connections, cracked light lenses, etc.
- Particular attention is required to ensure that in pool suction fittings, the debris grate screens are thoroughly cleaned at this time.
- Circulation and filtration pumps should be checked for vibration, ventilation, leaks on seals, shaft alignment (motor to pump), oil level, etc.
- Control of all pool lighting.
- Water treatment preventative control to be added to the fresh water.

YEARLY VISIT

Once per year a complete technical check-up/audit of the entire water feature system is required. During this period a complete verification of all mechanical and electrical components are made including:

- Control panel – cleaned, connections and isolation verified

- Electrical checks (using appropriate test gauges) – all electrical components are checked for intensity, isolation and thermal overload settings.
- Valves – all valves are operated, cleaned and coated with anti-rust protection, replacement of defective seals, membranes etc.
- Pumps – verify shaft alignment (pump/motor), bearings, vibration or noise, overloading, seals, temperature.

SPECIAL CASES

Introduction of foaming agents:

In the case where a detergent has been introduced into the water feature creating excessive foaming, the pool in question and the systems should be completely drained and cleaned before they are put back into service.

MAINTENANCE RECORD

After each visit the maintenance personnel shall register a brief account into an official maintenance record book which shall be left inside the interior features plant room at the disposition of the client. In this maintenance record book the following remarks shall be made:

- Nature of the visit (see schedule)
- Date and end of visit
- Name of the contractors agent
- Brief account of elements verified
- Remarks relating to problems encountered performance, etc.

WATER TREATMENT

It is essential to the proper functioning of the water features that preventative and corrective measures be taken to avoid damage to the pool structures and equipment.

Although the health and safety rules for decorative water features are not the same as for swimming pools due to a typically high circulation rate in a small volume of recirculated water, particular attention is needed to maintain proper water balance.

However, to ensure that the water features operate properly there is a requirement to ensure that proper water balance is achieved for these systems to operate effectively.

1. Water Balance

To ensure proper water quality the following water balance parameters need to be monitored on a regular basis:

- A. pH: pH is a logarithmic function permitting the relative acidity or basicity to be expressed in simple mathematical terms. The pH scale extends from 0 to 14. From 0 to 7 is considered Acidic, between 7 and 14 is considered basic (or alkaline). A seemingly small pH change can drastically affect overall water balance. For water features the pH must be maintained between 7.2 and 8.0.
- B. Total Alkalinity: Total alkalinity is a quantitative measurement of alkaline components present in water. Proper total alkalinity levels are important to ensure optimal chemical balance in pools. To protect pool systems from deteriorative effects of low alkalinity the range must be maintained within 100 and 150ppm.
- C. Calcium hardness: Calcium hardness indicates the calcium content in water usually expressed in m/litre or ppm. Too high calcium hardness will create scale formation to surfaces of pool and reduce efficiency or eventually damage components. Too low calcium hardness will create aggressive corrosive water, which shall attack pool surfaces and induce surface pitting to components. It is therefore essential that calcium hardness be maintained between ranges of 175-300 ppm.

2. Sterilization

To ensure proper sterilization of water borne algae and bacteria use a Bromine residual/oxidizing agent. The water disinfection equipment controls the growth of bacteria and algae. In addition, a low residual level of Bromine is required to oxidize organic material normally captured by the filtration system. A level of 1.0 to 3.0 ppm of bromine is required for this task.

END OF APPENDIX 2